National Water Resource Strategy III

2023

water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

" Water is Life,
Sanitation is Dignity "

2030 NDP

NATIONAL WATER RESOURCE STRATEGY THIRD EDITION (NWRS-3)

MARCH 2023

VISION OF THE NATIONAL WATER RESOURCE STRATEGY III

"The protection and management of water resources to enable equitable and sustainable access to water and sanitation services in support of socio-economic growth, development and sustained ecosystem functioning for the well-being of current and future generations."

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Water Sector Priority Focus Areas 2020 - 2030

1. Reducing water demand & increasing supply
2. Redistributing water for transformation
3. Managing water & sanitation services under a changing climate
4. Regulating the water & sanitation sector
5. Improving water quality
6. Protecting & restoring ecological infrastructure for the green economy
7. Creating effective water sector institutions
8. Promoting international cooperation
9. Building capacity for action
10. Ensuring financial sustainability
11. Managing data & information in line with 4IR and global knowledge
12. Enhancing & deploying research, development & innovation
13. Addressing legislative & policy gaps

Preface

Water resources in South Africa are under pressure. If we are to meet the demands of the economy, of society and ensure sufficient water for the environment, we need to make strategic decisions and plan comprehensively and carefully.

The NWRS-3 sets out the strategy to ensure that water resources must be protected, used, developed, managed and controlled sustainably and equitably; that the Water and Sanitation Department must support development and the elimination of poverty and inequality, and contribute to the economy and job creation.

It is important to note that the NWRS-3 focuses on achieving equity and redistribution and the goals of our Developmental State, we need to streamline our policies, legislation and strategies for both water resource management and water and sanitation services.

We are currently tightening our policy, legislative and overall sector environment, and this Strategy forms part of that process, so that we can remove obstacles to ensure greater equity in water resource allocation and meet our national objectives.

The dynamics of water, equity, development and growth are complex, where water resource management lies at the heart of our aspiration to achieve growth, sustainable development and poverty reduction. There can be no growth and development without water; so, water must be at the heart of all our planning, financing and governance frameworks.

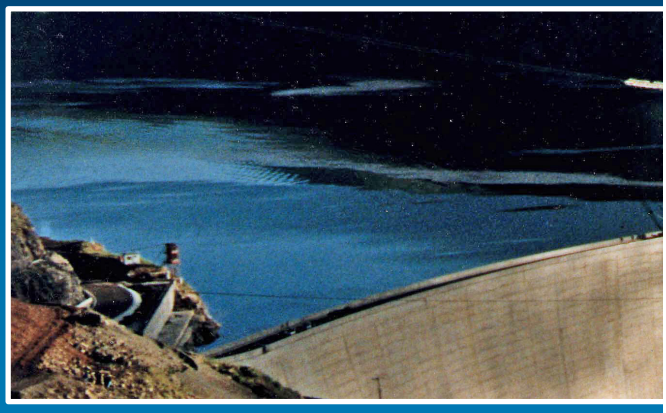
Good governance, improved management of our resources and ensuring that every drop counts are addressed in the Strategy, through an improved institutional framework, strengthening our sector capacity, and through various mechanisms and concepts, such as water re-use and water off-setting.

To effectively and efficiently address our infrastructure challenges and maintain balance between supply and demand for the entire water and sanitation value chain, we require considerable investment which will be funded from on-budget and off-budget sources through the private sector.

I would like to acknowledge and thank all those who contributed to this Strategy which, I believe, provides a robust way forward towards achieving water security, sustainability and our national priorities. Making this Strategy work requires a collaborative effort. I call on the entire water sector and other sectors, both public and private, to embrace this Strategy towards realising a better life for all.

HONOURABLE SENZO MCHUNU
MINISTER OF WATER AND SANITATION

Foreword



This National Water Resource Strategy 3 (NWRS-3) sets out how South Africa will achieve the following overarching goals:

- That water must be protected, used, developed, conserved, managed and controlled sustainably and equitably.
- That water and sanitation must support development and the elimination of poverty and inequality.
- That water and sanitation must contribute to the economy and job creation.

The major focus of the NWRS-3 is protection and equitable and sustainable access and use of water by all South Africans while sustaining our water resource. Equity and redistribution will be achieved through the authorisation process and other mechanisms and programmes, such as water allocation reform, financial support to emerging farmers and support to urban and rural local economic development initiatives.

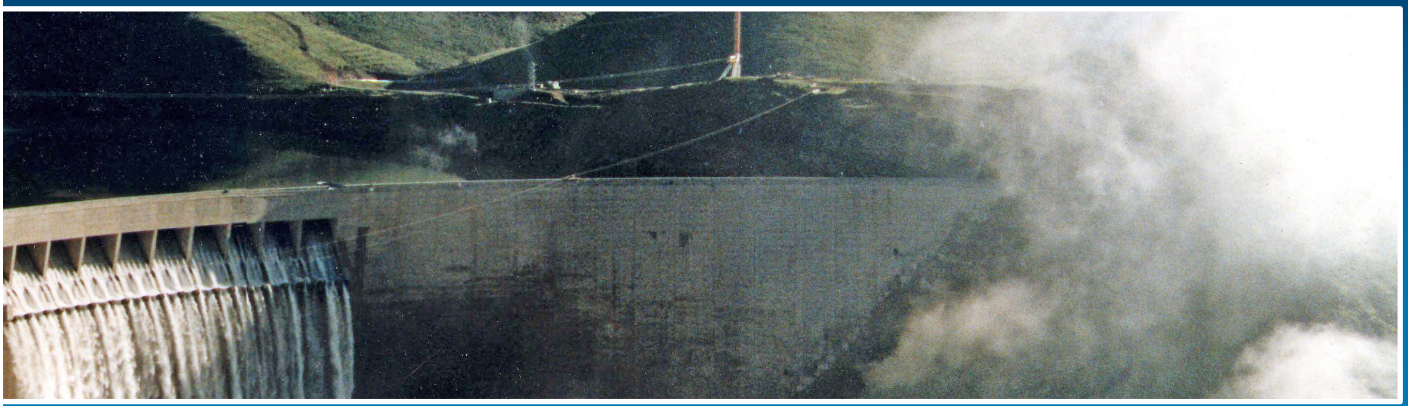
With South Africa's growing population, and focus on economic growth and development, we need to ensure water security and healthy water ecosystems that support our national imperatives. Apart from the water demands of the economic sectors (energy, mining and agriculture), increasing urbanisation and industrialisation place enormous pressure on our scarce water resource in terms of management and allocation.

While South Africa has well-developed water resources infrastructure, it is fast approaching full utilisation of available surface water yields and running out of suitable sites for new dams. In addition, climate change outcomes in terms of rainfall and temperature will have a negative impact on water storage. Water demand is likely to grow over the next ten years. Therefore, we need to find new ways of reducing water demand and increasing availability that move beyond "traditional engineering solutions" of infrastructure development. Ensuring a sustainable water balance requires a multitude of strategies, including water conservation and water demand management (WCWDM), further utilisation of groundwater, desalination, water re-use, rainwater harvesting and treated acid mine drainage.

While South Africa benefited from a surplus of available water in 2000, the time has now come where a mix of water resources is required to reconcile supply and demand. Towards this end, Reconciliation Strategies have been developed to assess water balance against future needs. These strategies will inform our future water resource planning, management and investment.

Given the constraints and demands on the resource, South Africa cannot afford practices that reduce supply, such as pollution, inefficient water management practices, lack of infrastructure maintenance, unaccounted for water and poor governance.

Our national economic and development priorities, together with the complex environment within which we operate, require a new era of advanced and smarter water management.



The NWRS-3 provides for robust and sustainable water sector institutions (including six catchment management agencies and six water management areas) that have the necessary capacity to manage our water resource sustainably and equitably, as well as to ensure sustainable and effective water and sanitation service delivery. The goals, strategic objectives and strategic actions contained in the NWRS-3 are in line with international principles and approaches where social and economic goals are aligned, sector investment is increased and water is recognised as fulfilling a central role in socio-economic planning and development.

A key challenge of this Strategy is to increase our skills and capacity within the sector for both water resource management and water and sanitation service delivery. Institutions must be appropriately staffed and resourced and, towards this end, we will continue to prioritise skills development, staff motivation and capacity building at all levels. Increasing our regulatory capacity to improve compliance and ensure that standards and licence conditions are met is an integral part of strengthening our institutional framework and capacity.

Our sector makes a critical contribution to South Africa's transformation, development and growth objectives. Access to safe water supply and sustainable sanitation and making water available for productive purposes profoundly affects the daily lives of poor people and supports rural livelihoods.

Successful implementation of this Strategy will bring about great benefits: access to water and sanitation for all South Africans, availability of water to support economic growth and job creation, protection of existing assets, stimulation of the construction sector, including small and medium scale enterprises, and protection of our precious water resource for current and future generations.

As the Department of Water and Sanitation, we will provide the necessary leadership to operationalise the NWRS-3 and raise the investment required; however, this requires the collaborative effort of all sectors and stakeholders to make it successful and to ensure that water and sanitation play a central role in ensuring development, growth and sustainability for all.

DR SEAN PHILLIPS
DIRECTOR-GENERAL

Executive Summary & NWRS-3 Vision

The National Water Resource Strategy (NWRS) is the blueprint for water resources management in South Africa and aims to ensure 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 and sustained ecosystem functioning for the well-being of current and future generations.

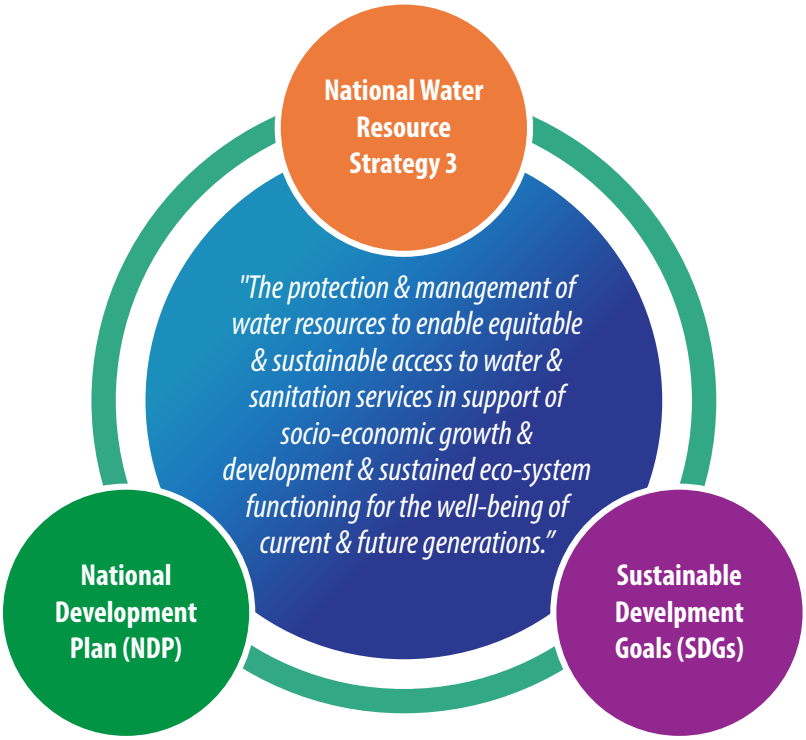
The NWRS-3 is the third version of the strategy, which builds on the first NWRS edition, published in 2004, and the second edition, published in 2013. The NWRS-3 was informed by a three-year review of the NWRS-2, which identified areas of success and areas that remain a challenge.

The NWRS-3 comprises three overarching goals, namely that water must be protected, used, developed, managed and controlled sustainably and equitably, that water and sanitation must support development and the elimination of poverty and inequality, and contribute to the economy and job creation.

Within these goals are focus areas related to increasing water supply, reducing water demand, managing effective water and sanitation, regulating the water and sanitation sector, redistributing water for transformation, promoting international co-operation, managing water and sanitation under a changing climate, improving raw water quality, and protecting aquatic ecosystems and maintaining and restoring ecological infrastructure.

These focus areas are supported by enabling aspects that include the creation of effective water sector institutions, data collection, analysis and information management for effective monitoring, evaluation and reporting, building capacity for action, ensuring financial sustainability, enhancing and deploying research, development and innovation, and addressing legislative and policy gaps.

The third edition of the NWRS also considers the risks of climate change that need to be integrated into short, medium, and long-term water and sanitation sector strategies and planning, as the new reality of climate change is posing a threat to water security in the country. This has a knock-on effect in water-reliant sectors such as agriculture, health and energy. The mainstreaming of climate change considerations in town planning and water planning and management is critical with respect to the strategic direction of future legislative reviews and key strategic priorities.



The Strategic Actions captured under each Strategic Objective of the NWRS-3 are to be operationalized and implemented via the National Water and Sanitation Master Plan where key programmes will be prioritised, budgeted for and executed in conjunction with sector partners.

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Acronyms & Abbreviations

ACIP	Accelerated Community Infrastructure Programme
AIP	Alien Invasive Plants
AMCOW	African Ministers' Council on Water
AMD	Acid Mine Drainage
ARC	Agricultural Research Council
b/a	billion per annum
B-BBEE	Broad-Based Black Economic Empowerment
Bn	Billion
BRICS	Brazil, Russia, India, China and South Africa
CARA	Conservation of Agricultural Resources Act
CHE	Council on Higher Education
CIP	Consolidated Implementation Plan
CMA	Catchment Management Agency
CME	Compliance, Monitoring and Enforcement
CMF	Catchment Management Forum
CMS	Catchment Management Strategy
COP	Conference of the Parties
CRDP	Comprehensive Rural Development Programme
CRU	Central RIA Unit
CSI	Corporate Social Investment
CSIR	Council for Scientific and Industrial Research
CSO	Civil Society Organisation
DALRRD	Department of Agriculture, Land Reform and Rural Development
DBE	Department of Basic Education
DBSA	Development Bank of Southern Africa
DCoG	Department of Cooperative Governance
DDT	Dichlorodiphenyltrichloroethane
DFFE	Department of Forestry, Fisheries and Environment
DHET	Department of Higher Education and Training
DM	District Municipality
DMRE	Department of Mineral Resources and Energy
DHS	Department of Human Settlements
DPE	Department of Public Enterprises
DPSA	Department of Public Service and Administration
DSI	Department of Science and Innovation
DTA	Department of Traditional Affairs
DTIC	Department of Trade, Industry and Competition
DWA	Department of Water Affairs
DWS	Department of Water and Sanitation
DWM	Developmental Water Management
e.g.	for example
EU	European Union
ELU	Existing Lawful Use
etc.	etcetera; and so on
EWSETA	Energy and Water Sector Education and Training Authority
EXCO	Executive Committee
FAO	Food and Agriculture Organisation
FET	Further Education and Training
FETWater	Framework Programme for Research, Education and Training in Water, South Africa (UNESCO initiative)
G8	The Group of Eight (world's eight wealthiest western countries)
GA	General Authorisations
GCM	Global Circulation Models
GCIS	Government Communication Information System
GDP	Gross Domestic Product
GEMS	Global Environment Monitoring System
GET	General Education and Training
GFETQSF	General and Further Education and Training Qualifications Sub-Framework
GG	Government Gazette
GGP	Gross Geographic Product
GIS	Geographical Information System
GLeWAP	Groot Letaba River Water Development Project
GN	Government Notice
GRIP	Groundwater Resource Information Project
HDI	Historically disadvantaged individuals
Ha	Hectares
HE	Higher Education
HEI	Higher Education Institutes
HEQSF	Higher Education Qualifications Sub-framework
HRDS	Human Resources Development Strategy
HYDSTRA	Integrated water resources management software
IB	Irrigation board
IDP	Integrated Development Plan
IDZ	Industrial Development Zone

i.e.	*id est*; that is
IHP	International Hydrological Programme
IPAP3	Industrial Policy Action Plan 3
IPP	Independent Power Producers
IRP	Integrated Resource Plan
IRR	Institutional Reform and Realignment
IT	Information technology
i.t.o.	in terms of
IUA	Integrated Units of Analysis
IWA	International Water Association
IWRM	Integrated Water Resource Management
IWWMP	Integrated Water and Waste Management Plan
IWTTSA	Industry Water Task Team of South Africa
JPTC	Joint Permanent Technical Committee
JSE	Johannesburg Stock Exchange
JWC	Joint Water Commission
KNP	Kruger National Park
KPI	Key performance indicator
LEDP	Local Economic Development Plan
LGSETA	Local Government Sector Education & Training Authority
LHDA	Lesotho Highlands Development Authority
LHWP	Lesotho Highlands Water Project
LRAD	Land Reform for Agricultural Development
LTAS	Long Term Adaptation Scenarios
LWC	Limpopo Watercourse Commission
m^3/a	cubic meter per annum
mm/year	millimetres per year
mg/l	milligrams per litre
Ml/day	megalitres per day
MAR	mean annual runoff
MDG	Millennium Development Goals
MFMA	Municipal Finance Management Act
MIG	Municipal Infrastructure Grant
MISA	Municipal Infrastructure Support Agency
MMTS2	Mooi-Mgeni Transfer Scheme Phase 2
MoU	Memorandum of Understanding
MTEF	Medium Term Expenditure Framework
MWIG	Municipal Water Infrastructure Grant
MW	Megawatt
NATED	National Technical Education
NCBF	National Capacity Building Framework for Local Government
NDP	National Development Plan
NEMA	National Environmental Management Act
NEPAD	New Partnership for Africa's Development
NFEPA	National Freshwater Ecosystem Priority Areas
NGA	National Groundwater Archive
NGP	New Growth Path
NGO	Non-government organization
NGS	National Groundwater Strategy
NMBMM	Nelson Mandela Bay Metropolitan Municipality
NPC	National Planning Commission
NPS	Non-point source
NPSS	Non-Point Source Strategy
NQF	National Qualifications Framework
NRF	National Research Foundation
NRW	Non-Revenue Water
NSA	National Skills Accord
NSDP	National Spatial Development Perspective
NSDS	National Skills Development Strategy
NSI	National System of Innovation
NT	National Treasury
NWA	National Water Act (Act 36 of 1998)
NWAC	National Water Advisory Council
NW&SMP	National Water and Sanitation Master Plan
NWRS	National Water Resource Strategy
NWRS-1	National Water Resource Strategy (first edition, 2004)
NWRS-2	National Water Resource Strategy (second edition, 2013)
NWRS-3	National Water Resource Strategy (third edition, 2023)
NWRIA	National Water Resource Infrastructure Agency
NWRSR	National Water Resources and Services Regulator
NWSF	National Water Security Framework
ODA	Official Development Assistance
OECD	Organisation for Economic Cooperation and Development
ORASEC-OM	Orange-Senqu Watercourse Commission
ORWRDP	Olifants River Water Resource Development Project
OQSF	Occupational Qualifications Sub-Framework
OSD	Occupation Specific Dispensation
PALAMA	Public Administration Leadership and Management Academy
PES	Present Ecological State
PFMA	Public Finance Management Act
PGDP	Provincial Growth and Development Plan
PGDS	Provincial Growth and Development Strategy
Ph	Phase
PICC	Presidential Infrastructure Coordinating Commission
PMU	Project Management Unit
PPP	Public Private Partnerships
PS	pump station
PWC	Permanent Water Commission
QCTO	Quality Council for Trades and Occupations
R&D	Research and Development
R&I	Research and Innovation
RBIG	Regional Bulk Infrastructure Grant
RBO	River Basin Organisations
RDM	Resource Directed Measures

RDP	Reconstruction and Development Programme
REGIS	Software system developed in the Netherlands, currently under investigation for its application in South Africa
RIA	Regulatory Impact Assessment
RIDMP	Regional Infrastructure Development Master Plan
RISDP	Regional Indicative Strategic Development Plan
Rio+20	United Nations Conference on Sustainable Development, 2012
RPF	Resource Poor Farmers
RPL	Recognition of Prior Learning
RQO	Resource Quality Objectives
RSA	Republic of South Africa
RSAPIII	Regional Strategic Action Plan III
RWH	Rainwater harvesting
RWU	Regional Water Utility
RWQO	Receiving Water Quality Objective
SA	South Africa
SAAWU	South African Association of Water Utilities
SADC	Southern African Development Community
SAICE	South African Institution of Civil Engineering
SALGA	South African Local Government Association
SAWS	South African Weather Service
SDC	Source Directed Controls
SGDs	Sustainable Development Goals
SETA	Sector Education & Training Authority
SIP	Strategic Integrated Project
SIV	System Input Volume
SIWI	Stockholm International Water Institute
SULP	Sustainable Utilisation Plans
SWPN	Strategic Water Partnership Network
TAC	Technical Advisory Committee
TCTA	Trans-Caledon Tunnel Authority
TPTC	Tripartite Permanent Technical Committee
UDF	Urban Development Framework
UN	United Nations
UNCSD	United Nations Conference on Sustainable Development
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNESCO	United Nations Educational, Scientific and Cultural Organisation
V&V	Validation and Verification
VGG	Vaal Gamagara
WAR	Water Allocation Reform
WAS	Water Accounting System
WARMS	Water Registration Management System
WARS	Water Allocation Reform Strategy
WCOs	Water Control Officers
WCWSS	Western Cape Water Supply System
WC/WDM	Water Conservation and Water Demand Management
WDCS	Waste Discharge Charge System
WEF	Water Energy Food
WISA	Water Institute of Southern Africa
WMA	Water Management Area
WMP	Water Management Plan
WMS	Water Management System
WRA	Water Research Act (Act 34 of 1971)
WRC	Water Research Commission
WRM	Water Resource Management
WRTC	Water Resources Technical Committee
WS	Water Services
WSA	Water Services Authority
WSAct	Water Services Act (Act 108 of 1997)
WSDP	Water Services Development Plans
WSLG	Water Sector Leadership Group
WSP	Water Services Provider
WTW	Water Treatment Works
WUL	Water Use Licence
WWC	World Water Council
WWF SA	Worldwide Fund for Nature South Africa
WWTW	Waste Water Treatment Works

Chapter: 1

Introduction

1.1. Purpose & Scope

The National Water Resources Strategy (NWRS) is the legal instrument for implementing and operationalising the National Water Act (NWA)(Act 36 of 1998). NWRS considers the entire water and sanitation value chain, starting from source to tap and back to source. It is binding on all authorities and institutions implementing the NWA. The NWRS sets out the strategies, objectives, plans, guidelines and procedures of the Minister, and the institutional arrangements relating to the protection, use, development, conservation, management and control of water resources within the framework of existing relevant government policy to achieve the purpose of the NWA and any compulsory national standards prescribed under section 9(1) of the Water Services Act, 1997 (Act No. 108 of 1997). The compulsory standards that the Minister may from time to time prescribe relate to:

- The Provision of water services;
- The quality of water taken from or discharged into any water services works or water resource system;
- The effective and sustainable use of water resources for water services;
- The nature, Operation, Sustainability, Operational efficiency and economic viability of water services;
- Requirements for persons who install and operate water services works, and
- The construction and functioning of water services works and consumer installations.

The NWRS provides the foundation for the water circular economy and for the water use sectors like municipal, agriculture, industry, and mining. In the municipal space the Water Services Act (WSA) stipulates that everyone has a right of access to basic water supply and basic sanitation. The NWRS lays the foundation for the obligation to ensure that all people in South Africa have access to effective, reliable, affordable and sustainable water and sanitation services.

The provision of water and sanitation services must be in line with the national priorities in the National Government Priority Outcomes.

Provision of water and sanitation services is dependent on national water resources being managed, developed and used in support of various national policies,principles, objectives and imperatives; therefore, the water and sanitation services need to be provided in a manner that is consistent with the broader goals of integrated water resources management (e.g., interventions to improve the management of urban runoff/ storm water to mitigate against pollution of precious water resources).

The National Water Resource Strategy is the primary mechanism to manage water across all sectors towards achieving national government's development objectives. The NWRS-1 was published in 2004 and the second edition (NWRS-2) was published in 2013 and was the blueprint for water resources management in South Africa.

The National Water Resource Strategy Third Edition (NWRS-3) builds on the National Water Resources Strategy editions 1 and 2, and the revision of the strategy, as prescribed in the NWA, has been undertaken with the purpose being to:

- Facilitate the proper management of the nation's water resources.
- Provide a framework for the protection, use, development, conservation, management and control of water resources for the country as a whole.
- Provide a framework within which water will be managed at local, regional, national or catchment level, in defined water management areas.
- Provide a framework for strengthening the regulation of the water and sanitation sector.
- Provide information about all aspects of water resource management.
- Identify water-related development opportunities and constraints.
- Provide opportunities for the implementation of innovative technologies and solutions.

The purpose of the third edition of the National Water Resource Strategy (NWRS-3) is to ensure 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 South Africa. The NWRS-3 is a strategy for all sectors and stakeholders who use and impact upon South Africa's water resources and it responds to the NWA by outlining strategic objectives and actions which are then carried forward for resourcing and implementation in the National Water and Sanitation Master Plan (NW&SMP). The relationship between the National Water Act (NWA), Water Services Act (WSA), National Water Resources Strategy Third Edition (NWRS-3) and the National Water and Sanitation Master Plan (NW&SMP) is illustrated below:

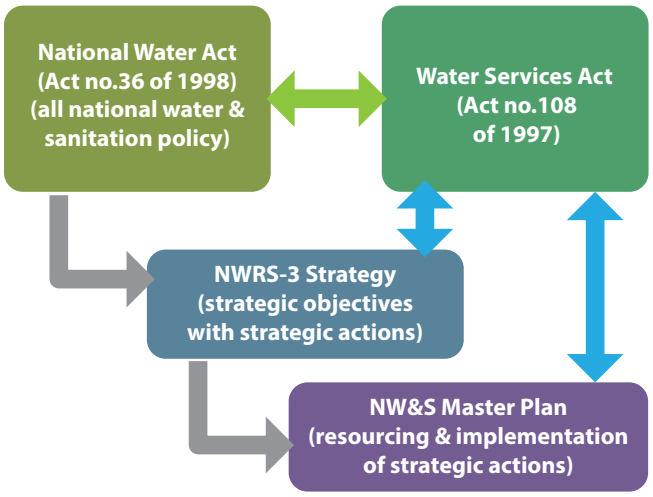


Figure 1:
Relationship between NWA, WSA, NWRS-3 & NW&S Master Plan

1.2. Reasons for the Revision of the NWRS

In 2014, the 69th United Nations General Assembly concluded an intergovernmental negotiation process which resulted in the final outcomes of major global meetings such as the Sendai Framework for Disaster Risk Reduction 2015–2030 and the Addis Ababa Action Agenda, as well as inputs such as the synthesis report of the Secretary-General on the post-2015 agenda, "The road to dignity: ending poverty, transforming all lives and protecting the planet", published in Dec 2014.

On the 25th of September 2015, the UN General Assembly adopted a new developmental agenda called the sustainable development agenda to transform the world by 2030. This agenda builds upon the outcome documents of the UN Conference on Sustainable Development (Rio + 20 Conferences) which took place in June 2012 where there was agreement by member states to launch a process to develop a set of Sustainable Development Goals (SDGs).

In adopting the 2030 Agenda for Sustainable Development (2030 Agenda) world leaders, including South Africa, resolved to free humanity from poverty, secure a healthy planet for future generations, and build peaceful, inclusive societies while also focusing on human rights for all, and the empowerment of women and girls as part of the push to achieve gender equality (UNEP, 2017). The 2030 Agenda was adopted in 2015 and it set out 17 Sustainable Development Goals (SDGs) and 169 targets. The SDGs are integrated and indivisible and they balance the three dimensions of sustainable development – economic, social and environmental.

Within the continent of Africa, South Africa also committed to driving the Africa Agenda 2063 which is a strategic framework for the socio-economic transformation of the continent within a 50-year period, from 2013 to 2063. It is Africa's blueprint for transforming the continent into a global powerhouse of the future. The 7 Aspirations of the Africa Agenda 2063 are closely aligned with South Africa's NDP and the SDGs and relate to inclusive growth and sustainable development; integration and political unity; good governance, democracy, respect for human rights, justice and the rule of law; peace and security; cultural identity, common heritage, shared values and ethics; people-driven development; and being a united and influential global player and partner.

Over and above these international developments, South Africa's National Water Act, 1998 (Act No 36 of 1998) requires that the National Water Resources Strategy (NWRS) be revised at five yearly intervals. The NWRS-2 focused on five key sector priorities and was approved and implemented between 2013 and 2018 in collaboration with the water sector. In 2018, the Department undertook a three-year review of the implementation of the NWRS-2 to determine the impact of the implementation of the NWRS-2 by the sector. The review of the NWRS-2 sought to identify the successes of the NWRS-2 implementation and most importantly the challenges that remain.

Furthermore, groundwater resources plays a vital role in sustaining water ecosystems and contributes to water security through water supply mix, and they are key resources for the achievement of SDGs. The National Groundwater Strategy (NGS) developed in 2016 aims to achieve an integrated and sustainable utilization of groundwater resources through a groundwater governance framework, broken down into a number of strategy themes and strategic actions. The cooperative approach will enhance the roll-out of groundwater strategies, while also providing a higher profile to unique groundwater-specific governance requirements

The 3rd revision of the NWRS is aligned to the country's growth path National Development Plan (NDP), which seeks to eliminate poverty and reduce inequality by 2030, and it also incorporates water supply and sanitation aspects to give effect to the National Water and Sanitation Master Plan (NW&SMP), which is subsidiary to, and operationalises the NWRS-3.

1.3. Process to Develop the NWRS-3

The NWRS-3 builds on the NWRS-2 that was published in 2013. Between 2016 and 2018 the Department undertook a three-year review of the NWRS-2 to determine the impact of the implementation of the NWRS-2 by the sector. The purpose of the NWRS-2 three-year review was to assess the planned activities undertaken and the progress achieved in implementing each of the strategic objectives of the NWRS-2, and to capture the level of sector internalisation and the impacts, lessons learnt and recommendations emanating from the implementation of the NWRS-2, so that these be taken forward and inform the development of the NWRS-3.

The approach undertaken during the NWRS-2 three-year review entailed the following key steps:

- Assessment of the NWRS-2 Strategy;
- Assessment of the NWRS-2 Consolidated Implementation Plan (CIP);
- Assessment of the NWRS-2 Progress Reports;
- Assessment of the NWRS-2 internalisation by Sector Partners in their Strategic Plans and Reports;
- Assessment of the NWRS-2 implementation impacts in terms of economic, legal, social, environmental, financial and political dimensions;
- Assessment of the NWRS-2 Planned Activities and Successes per Strategic Action; and
- Assessment of the NWRS-2 Lessons Learnt and Recommendations from implementation which have informed the development of the NWRS-3.

During the development of the NWRS-3 a broad range of stakeholders were consulted through a highly inclusive process. Therefore, the NWRS-3 represents the aspirations of many South African individuals and institutions, building upon existing policy, legislative mandates and the strategic vision of our government, including development and economic growth ambitions.

1.4. Reflecting on the NWRS-2

The NWRS-2 is a comprehensive strategy that defined the fundamentals of integrated water resource management and presented a clear perspective on the water situation in South Africa with associated critical actions required. The NWRS-2 built on the progress that was made with the implementation of the NWRS-1.

Based on the NWRS-2 three year review it was noted that the level of internalization of the NWRS-2 in the Sector Departments and Sector Partners strategies and plans was as follows:

In roughly 35% of the Sector Partner documents there was alignment with the NWRS-2 Principles.

In roughly 12% of the Sector Partner documents there was alignment with the NWRS-2 Strategic Objectives.

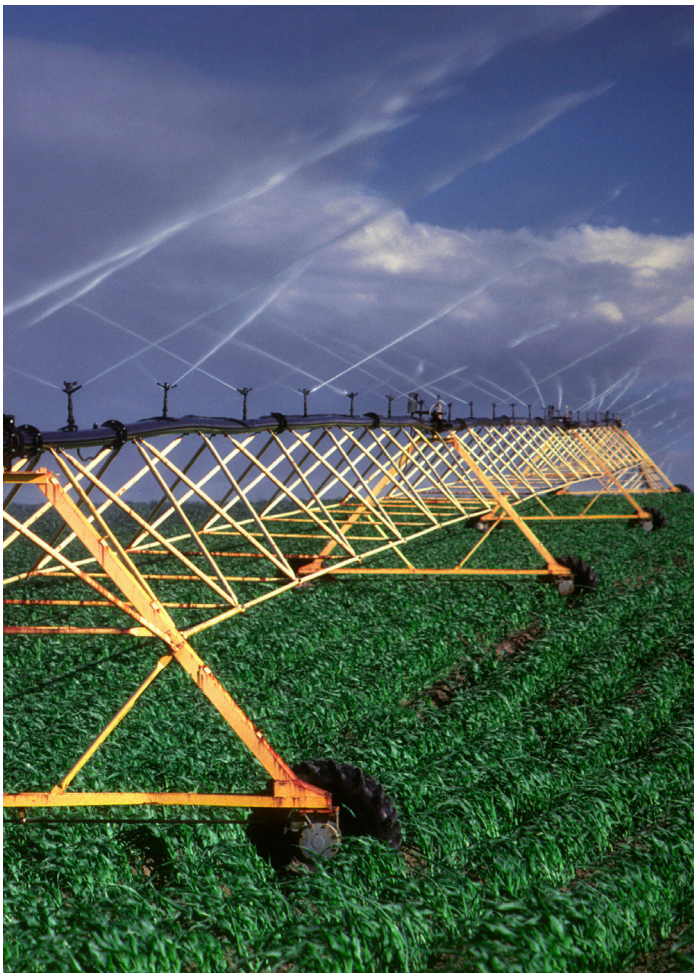
In roughly 82% of the Sector Partner documents there was alignment with the NWRS-2 Strategic Actions at implementation level.

The NWRS-2 three-year review sought to identify the implementation successes of the NWRS-2 in line with the NDP Vision 2030 targets and actions and National Government Outcomes, as well as the outstanding challenges that remain, and these are included below.

NWRS-2 Successes & ongoing challenges

- The National Water Monitoring Strategy was finalised.
- A maintenance program and costing model for gauging stations was finalised and implemented.
- Mine Water Management Policy has been approved.
- 11 water monitoring programmes linked to the review of the Water Monitoring Strategy were maintained and managed.
- 6 water resource data and information management systems were operationalized and continuously managed (Hydstra, NGIS (NGA), WMS & WARMS) and digitisation of all related documents dating back to 2005/6 was implemented.
- The Mineral Council SA developed a spreadsheet-based WUE Self-Assessment Reporting Tool (W-SART) to enable the mines to enter their water-balance data in a uniform format and, to also do computations for 5-year Site-Specific Targets which will inform the mine's WC/WDM Plans.
- Completion of the feasibility studies for uMkhomazi, Ncwabeni, Umzimvubu and Western Cape Water Supply System Augmentation to enhance water availability.
- 1 462 Resource Poor Farmers were provided with access to water for economic development.
- A WWF-funded project which explored appropriate legal mechanisms for protecting the water resources in Strategic Water Sources Areas (SWSAs).
- Delineation of Strategic Water Source Areas (SWSAs) was undertaken.
- The Framework for Monitoring Compliance to RQOs was developed.
- The Olifants-Doorn WMA's Resource Quality Objectives (RQOs) have been gazetted and RQOs have also been determined for the Berg, Breede and Gouritz WMAs. The other three catchments (Mvoti-Umzimkulu, Vaal (Upper, Middle, and Lower) and Olifants) RQOs have been gazetted for public comment.
- DAFF/WRC co-funded a research project titled "Assessment of the social and economic acceptability of rainwater harvesting and conservation practices in selected peri-urban and rural communities".
- During the COVID 19 (2020-2021), DWS installed roughly 3 316 water tanks in different provinces as a short term measure.

- Major developments in the Mzimvubu River catchment to support socio-economic development will facilitate future multi-purpose development of; inter alia, irrigation, hydropower stations and possible inter-basin transfers for domestic and industrial use.
- DWS allocated 220 comprehensive bursaries in the fields of engineering, surveying and science to deserving students.
- The DWS participated in various Global and Africa bilateral and multilateral cooperation respectively to advance water security agenda.
- The Acid Mine Drainage Project was implemented as a short-term intervention for the Western, Central and Eastern Basins of the Witwatersrand Goldfields, and to protect the Environmental Critical Level (ECL) in the Central and Eastern Basins.
- DEA designated 2 Wetlands of international importance (Ramsar sites) between 2013 and 2015 – namely the uMgeni Vlei Nature Reserve and the False Bay Nature Reserve.
- The revision process of the Forestry South Africa Environmental Guidelines for Commercial Afforestation in South Africa was undertaken by the FSA EMC Editorial Sub-committee on an annual basis and the latest version is 2022 Version 4.
- The implementation of regulations that ensured that the 300-day time frame for all environmental authorisations is achieved, including water use licences was achieved to an extent where this timeframe was from the submission of an application (and excluded preparatory work needed to inform reports that are subjected to specialist input and consultation). It is currently the maximum timeframe for NEMA regulated processes – and shorter timeframes are prescribed for processes that follow the basic assessment requirements as set out in EIA Regulations. Further detail regarding progress on water use authorisation and progress is set out in Chapter 6 and 8.
- Between April 2021 and March 2022, the DWS was able to finalise 613 out of 971 water-use licence applications, from April to June 2022, the DWS has finalised 150 applications, more than the targeted 113 and for the second quarter period, which runs from July to September 2022, 37 applications out of a targeted 252 were finalised.
- The WRC funded the development of a wetlands monitoring programme which was finalised in 2015.
- DWS partnered with the Wildlife Environmental Society of Southern Africa (WESSA) to implement an Eco-School project.
- The water release module was implemented in specific Government Water Schemes and Irrigation Boards to minimise water losses, improve scheme and financial management as well as increase productivity and simplify water release calculations to improve scheme water use efficiency.
- Private sector investment in the WASH project was estimated at R447 000.
- The DWS policy on sustainable Hydro Power generation was approved.
- The Strategy for Compliance Monitoring was approved in 2015 and was updated and approved with the Enforcement Component when the units were combined in 2018 with the first seven Environmental Management Inspectors (Blue Scorpions) designated in June 2016.
- The Councillor Development Programme which was primarily aimed at giving councilors a vision and understanding of their political roles with respect to the water services business within their municipalities was implemented.
- The Amanzi Ethu Nobuntu Enviro Champs Programme was implemented as part of the Presidential Employment Stimulus Program to create over 600 jobs for youth in the Greater uMngeni catchment and capacity development biomonitoring in rivers and wetland monitoring using citizen science tools.
- Strategic investment was made in the maintenance and restoration of water-related ecological infrastructure through the Ecological Infrastructure for Water Security Project (funded by the Global Environment Facility, implemented by Development Bank of Southern Africa with support from DFFE and executed by SANBI in partnership with DWS and other stakeholders).



NWRS-2 Ongoing Challenges

- To reduce water demand and increase efficiency of water supply and effectively implement WCWDM measures.
- To increasingly redistribute water for transformation.
- To manage water and sanitation services more effectively.
- To expand and improve water and sanitation sector regulation.
- To improve the management of water and sanitation under a changing climate.
- To improve water quality and increasingly protect and restore ecological infrastructure.
- To ensure and improve water quality monitoring.
- To enhance the effectiveness of water sector institutions and improve financial sustainability.
- To better manage data and information and enhance research, development and innovation.
- To have a dedicated budget, programme and timeline to address failing WWTWs across SA.
- To innovate and implement new technologies in the sector.
- To implement cost reflective water and sanitation tariffs.
- To ensure proper faecal sludge management by WSAs.
- To cope with severe financial constraints within a poor economic climate.
- To address the long-term declining water quality situation.
- To effectively maintain pumping infrastructure.
- To ensure effective infrastructure maintenance and development.
- To ensure implementation and reporting on the Green Drop programme.
- To prevent deterioration of river health.
- To ensure water resource protection implementation on both flow and quality.
- To finalise a Water Offset Policy or water stewardship policy.
- To implement the No Drop certification tool.
- To effect significant challenges in the roll-out of safe {water-borne} sanitation.
- To quantify and eradicate unlawful water use including irrigation.
- To finalise the establish of the CMA's.
- To implement the Waste Discharge Charge System
- To augmentation key schemes such as the LHWP2 and implement a long-term solution for legacy AMD.
- To implement the appropriate water conservation and demand management measures.
- To implement the processing of the water use license applications within the regulated timeframe.

1.5. What is New in the NWRS-3

The NWRS-3 builds on the NWRS-2 and the following key areas are new:

- Focus on priorities of the 6th Administration of the Government of the Republic of South Africa.
- Alignment with the Global Sustainable Development Goals (SDGs), Africa's Agenda 2063, the National Water Security Framework Version 5.0 and the DWS Strategic Plan (2020 to 2025).
- Focus on the Integrated Water Quality Management ensuring infrastructure compliance and reduction in pollution.
- Support for technological advances in new knowledge and real time data acquisition for Water Resources Management (WRM).
- National Groundwater Strategy (NGS) which aims to achieve an integrated and sustainable utilization of groundwater resources through a groundwater governance framework.
- Development of standard operating practices to strategically audit the status of compliance of water sector institutions with regards to their WUA conditions and self-regulation requirements.
- Alignment with the National Water and Sanitation Master Plan (NW&SMP) as the "execution arm" of the NWRS-3 (i.e. timelines, responsibilities, budgets per Strategic Action).
- Incorporation of refinements and improvements informed by NWRS-2 three-year review outcomes to improve the strategy layout.

1.6. Communication & Advocacy Strategy for the NWRS-3

It is proposed that a communications and advocacy strategy for the NWRS-3 be compiled and undertaken once the NWRS-3 strategy is finalized and approved. This should include, but not be limited, to:

- Stating the background, purpose and objectives of the NWRS-3 strategy.
- Establishing a communications plan with key identified messages.
- Establishing clear rollout and co-ordination mechanisms nationally and provincially.
- Identifying key sector partners, role-players and stakeholders that will participate – with particular focus on the private sector (locally and internationally).
- Identifying various target audiences and different platforms to reach these target audiences.
- Identifying rollout campaign requirements, resources, materials and a clear rollout plan.
- Resourcing and implementing the rollout of the NWRS-3 communications and advocacy strategy.

Chapter: 2

Strategic Imperatives

The NWRS-3 responds to South Africa's National Development Plan (NDP) 2030 and to the Global Development Goals (SDGs) inclusive of related regional and continental plans.

These strategic imperatives are key drivers in shaping the NWRS-3 and require alignment as illustrated below.

Figure 2 / Table: Relationship between NWRS-3, SDG6, and NDP 2030

NWRS-3	SDG 6	NDP 2030
GOAL 1: Water must be protected, used, developed, conserved, managed & controlled sustainably & equitably • **CH 9:** Managing water and sanitation under a changing climate • **CH 11:** Improving water quality • **CH 12:** Protecting aquatic ecosystems & maintaining and restoring ecological infrastructure	**Goal 6 Sub Goal 3:** Improved WQ through reduced pollution **Goal 6 Sub Goal 6:** Protect & restore ecosystems	**Chapter 5:** Transition to low carbon economy
GOAL 2: Water and sanitation must support development & the elimination of poverty & inequality • **CH 4:** Reducing water demand • **CH 5:** Increasing water supply • **CH 8:** Regulating the water & sanitation sector	**Goal 6 Sub Goal 4:** Improved water security / WUE **Goal 6 Sub Goal 5:** Integrated water management	**Chapter 6:** Inclusive & integrated rural economy **Chapter 13:** Building a capable state
GOAL 3: Water & sanitation must contribute to the economy & job creation • **CH 7:** Managing effective water and sanitation services • **CH 6:** Redistributing water for transformation • **CH 10:** Promoting international co-operation	**Goal 6 Sub Goal 1:** Safe drinking water access by 2030 **Goal 6 Sub Goal 2:** Safe sanitation access by 2030	**Chapter 3:** Economy that will create jobs **Chapter 4:** Improving infrastructure

NWRS-3 ENABLING CHAPTERS:					
13. Creating effective water sector institutions	**14.** Collecting data & analyzing & managing information for effective M, E & R	**15.** Building capacity for action	**16.** Ensuring financial sustainability	**17.** Enhancing & enabling deployment of research,development	**18.** Addressing legislative and policy gaps

2.1 Global Sustainable Development Goals (SDGs) 2030

There are 17 Global Sustainable Development Goals (SDGs) to be achieved by 2030. The new goals reflect a flexible global vision, recognising that each country faces specific challenges to achieve sustainable development.

This includes a dedicated water goal - Goal 6: To ensure availability and sustainable management of water and sanitation for all.

Goal 6 has 6 sub-goals/targets:

- By 2030 achieve universal access to safe and affordable drinking water.
- By 2030 achieve access to safe and adequate sanitation (specific focus on needs of woman and girls).
- Improved water quality through reduced pollution.
- Improved water-use efficiency/water security.
- Implement integrated water management.
- Protect and restore Ecosystems.

Figure 3: SDG 6 & it's 6 Sub-Goals

Water is also duplicated, reflected and / or implied in various other SDG goals.

South Africa had an opportunity to respond early in support of the 2030 Agenda for Sustainable Development and the significant convergence between South Africa's National Development Plan (NDP) and the SDGs is often emphasised.

According to an unpublished analysis by the Department of Planning, Monitoring and Evaluation (DPME) and the UN Development Programme (UNDP), the NDP directly facilitates 74% of the SDG targets, and sectoral programmes address 19% of the remaining targets (DPME, 2019).

In this way, the NDPs' vision has the potential to accelerate the realisation of the SDGs in South Africa, notably by fostering greater policy coherence and reducing duplication and inefficiencies.

The drafting of South Africa's annual Country Report is the culmination of an iterative process that consists of three phases and all three phases are coordinated by Stats SA. During the first phase, various experts are commissioned to draft 17 preliminary SDG Goal Reports. These reports form the basis for numerous engagements with key stakeholders from all sectors. Goal Reports are then updated after each engagement with stakeholders.

In the second phase, Goal Reports are used as the basis for compiling four Thematic Reports, which cover the following SDGs:

- Social Thematic Report: SDG 1, SDG 2, SDG 3, SDG 4 and SDG 5.
- Economic Thematic Report: SDG 8, SDG 9, SDG 10, SDG 12 and SDG 17.
- Environmental Thematic Report: SDG 6, SDG 7, SDG 11, SDG 13, SDG 14 and SDG 15.
- Governance, Peace, Justice and Security Thematic Report: SDG 16.

Draft Thematic Reports are used as the basis for engagement with stakeholders in a process like the drafting of the Goal Reports. During the third phase, Thematic Reports are then used to compile the Country Report on an annual basis.

2.2 South Africa's National Development Plan (NDP) 2030

The NWRS-3 responds to South Africa's vision for 2030, as articulated in the National Development Plan (NDP) and to the National Government Outcomes outlined in National Government's Programme of Action for 2019-2024 that monitors the implementation of the Medium-Term Strategic Framework 2019-2024 (MTSF). The MTSF is structured around seven priority outcomes that are key drivers for change and service delivery.

In its Vision 2030, the NDP articulates the national development goal of eradicating poverty and sharply reducing inequality by 2030. The Vision 2030 sets the social floor that by 2030 all South Africans should have access to basic services such as water and sanitation.

To achieve this, government has defined a New Growth Path (NGP), which is one of inclusive growth and development, with a focus on diversification and wide participation by South African citizens within a vibrant and growing economy. The main aim of the NGP is to enhance growth, employment creation and equity.

As water plays a central role in all sectors, including agriculture, energy, mining, industry, tourism, urban growth and rural development, its allocation, development, management and protection is an essential prerequisite for inclusive economic growth, poverty reduction and the significant reduction of inequality in South Africa.

The NWRS-3 analyses the role of water and sanitation in the South African community and economy and identifies the specific challenges, development opportunities and actions that inform an agreed framework for priority areas of focus for the country. It thus seeks to address concerns about socio-economic growth and South Africa's potential, which may be restricted if water security, adequate sanitation, resource quality and associated water and sanitation management issues are not resolved in time. The NWRS-3 aims to ensure that water and sanitation serve as an enabler for inclusive economic and social well-being and development and not a hindrance.

The relevant priority areas for DWS in the National Development Plan Vision for 2030 are:

- Create jobs and livelihoods.
- Expand infrastructure.
- Transition to a low carbon economy.
- Transform urban and rural spaces.
- Build a capable state.

The National Water Resource Strategy 3 is developed within a national context that promotes equity, job creation, growth, livelihoods, quality health, development and other important objectives. It is critical that the NWRS-3 addresses these national strategic goals to remain relevant to the social and development aspirations of the country. The development objectives are clearly outlined in the NDP.

Water supply and sanitation services, which depend on adequate management, are a priority for most South African communities. Their effective and sustainable management is essential for community health, development and cohesion, and continued economic activity and investment.

The NWRS-3 provides a framework that ensures that water resources, are protected, conserved, managed, developed and delivered for the long term, but also contribute to the attainment of the social and economic goals of the country relating to the water sector and water and sanitation service provision.

The NWRS-3 Water and Sanitation Sector programmes to be implemented via the National Water and Sanitation Master Plan (NW&SMP), and their alignment with the targets and actions of the NDP Vision 2030, are outlined on the following pages.

Targets and Actions for Vision 2030	Table 1: Water and Sanitation Sector Programme and Alignment
Vision 2030 Theme: Economy & Employment	
11 million jobs created by 2030	• Infrastructure development programmes • Water conservation and water demand management - fixing leaks, retrofitting, plumbing • Wastewater treatment turnaround programmes • Infrastructure asset management • Integrated catchment management and resource protection • Water availability for economic sectors to create jobs • Recruitment programmes for scientists, technicians, engineers, managers and development practitioners
Vision 2030 Theme: Economic Infrastructure	
Ensure people have access to clean, potable water and that there is sufficient water for agriculture and industry, recognising trade-offs in the use of water	• Development, operation, maintenance and refurbishment of water resources infrastructure (including WTW and WWTW infrastructure) • Support the development, operation, maintenance and refurbishment of water and sanitation services infrastructure • Accelerated Community Infrastructure Programme (ACIP) • Regional Bulk Infrastructure Grant (RBIG) programme • Support to historically disadvantaged individual (HDI) farmers • Identify water resources that can be developed further • Exclude watercourses from all mining activities in strategic water source areas. • Exclude mining from all protected areas and tourism areas • Invest in sea water desalination on large scale • Include heavier fines for polluters
Reduce water demand in urban areas to 15% below business-as-usual scenario by 2030	• Promote water conservation and water demand management programs in all sectors and put in place measures for water loss reduction in urban areas and protection of strategic water resources. WCWDM is a priority program and actions have been developed to address targets
Complete Lesotho Highlands Water Project Phase 2 by 2026	• Project prioritised by DWS and the Trans-Caledon Tunnel Authority (TCTA)
Comprehensive management strategy including an investment programme for water resource development, bulk supply and wastewater management for major centres with reviews every five years	• Water infrastructure investment framework • Regional Bulk Infrastructure Programme • Green Drop assessment • Blue Drop assessment • No Drop assessment • Long term solution for legacy AMD
Create regional water and wastewater utilities and expand mandates of existing water boards	• Institutional establishment process already considering options for configuration of regional water utilities
Vision 2030 Theme: Transition to a low carbon economy	
Stimulate renewable energy, retro-fit buildings and focus on environmental sustainability	• Department of Mineral Resources and Energy (DMRE), DWS and Eskom partnership established and task team already considering sites for hydropower stations

Targets and Actions for Vision 2030	Water and Sanitation Sector Programme and Alignment
Vision 2030 Theme: Inclusive rural economy	
Substantial increase investment in irrigation infrastructure in Makatini Flats and Mzimvubu River Basin	• Planning and assessment of Mzimvubu Dam options well advanced
Active rural economies through improved infrastructure and service delivery	• Water supply programme • Accelerated Community Infrastructure Programme • Water Allocation Reform • Regional Bulk Infrastructure Grant
Vision 2030 Theme: SA in the region and the world	
Develop regional market for food, energy and water and put in place water management agreement with neighbouring countries	• International relations and cooperation • Trans-boundary treaties, agreements and institutional arrangements
Vision 2030 Theme: Education & Innovation	
Improve the system of skills planning and shaping production of skills Develop a set of strong qualification and support for non-formal programmes	• DWS Learning Academy • Water Sector Skills Development strategy developed to improve skills planning and production of relevant skills for the sector
Vision 2030 Theme: Social Protection	
Number of public works jobs should rise from the present level to 2 million by 2030	• Align all infrastructure development programmes with public works jobs and labour-intensive methods • Water conservation and water demand management fixing of leaks programme • Operation and maintenance and wastewater treatment rehabilitation programmes • Water supply projects
Vision 2030 Theme: Building a capable state	
A formalised graduate recruiting scheme for the public service, skills strategies for managers, technical, professional and local government staff	• Occupational specific dispensation (OSD) posts • Collaboration with Public Works education programme
Develop regional utilities to deliver some local government services on an agency basis where local or district municipalities lack capacity	• Establishment of regional water utilities

2.3 National Government Priority Outcomes

Delivering his State of the Nation Address (SONA) in Parliament in February 2023, President Cyril Ramaphosa said that the time for idle talk was over and that implementation is needed if the country is to realise the vision of the National Development Plan (NDP). The President has announced the following national government priorities to fast-track South Africa's path to prosperity:

- Growing the economy and jobs.
- Building better lives.
- Fighting corruption.
- Making communities safer.
- Making government work.

All of the country's programmes and policies across all departments and agencies will be directed in pursuit of these overarching tasks, and that at the same time, the National Development Plan is to be restored to its place at the centre of the national effort, to make it alive, and to make it part of the lived experience of the people of South Africa.

As the country enters the next 30 years of democracy there is a need to proclaim a bold and ambitious goal – a unifying purpose – to which everyone dedicates their resources and energies.

To meet desirable growth targets, national government will aim to rebuild the foundations of the economy by revitalising and expanding the productive sectors, and this will require the country to reimagine its industrial strategy to unleash private investment and energise the State to boost economic inclusion.

In this regard, the NWRS-3 sets the strategic direction for water and sanitation resource management and services provision in the country over the next few years, subject to continuous review as required, with a focus on water and sanitation sector priorities and objectives.

The NWRS-3 seeks to develop an appropriate balance between supply and demand-driven approaches, considering the specific constraints pertaining to the resources and recognises that all people in South Africa need access to affordable and reliable water and sanitation before 2030.

Many national strategies across various sectors in South Africa acknowledge the importance that sustainable water resources and effective water and sanitation service delivery play in ensuring the achievement of social justice and economic development in the country.

Chapter: 3

Context

3.1 Constitutional, Legislative & Policy Mandates

The vision and the mission of the Department of Water and Sanitation (DWS) is guided, amongst others, by the various constitutional, legislative, policy and strategic mandates. The Constitution of the Republic of South Africa (1996) sets out management of the entire water and sanitation value chain as a national competency. It also states that everyone has a right to live in an environment that is not harmful to their health or well-being and supports socially justifiable economic development.

Chapter 2 of the Constitution indicates the rights of individuals to have access to basic water and sanitation services and sets out the institutional framework for the provision of these services. It gives municipalities the executive authority and the right to administer the provision of water and sanitation services within their areas of jurisdiction.

The Constitution also gives national and provincial government authority to regulate local government in terms of water and sanitation services. It further gives them the obligation to support and strengthen the capacity of local government to provide services.

While the enormous backlogs associated with water supply and sanitation are indeed a pressing concern, so is the sustainable management of the country's scarce national water resources. The relationship between the National Water Act (Act 36 of 1998) and the Water Services Act (Act 108 of 1997) is of importance to address a situation where more water is currently allocated for supply purposes by municipalities than is feasible from an ecological perspective, and to address the disconnect between water resource management and water supply, human settlements and sanitation.

The basic obligation is to ensure that all people in South Africa have access to effective, reliable, affordable and sustainable water and sanitation services.

Provision of water and sanitation services is dependent on national water resources being managed, developed and used in support of various national policies, principles, objectives and imperatives; therefore the water and sanitation services need to be provided in a manner that is consistent with the broader goals of integrated water resources management.

The DWS draws its water and sanitation sector primary mandate from the following legislative framework:

- The National Water Act, 1998 (Act No 36 of 1998) (Chapters 1, 7, 8 and 9) where the mandate of DWS is:

  1. To ensure that the country's water resources are protected, used, developed, conserved, managed and controlled in a sustainable and equitable manner for the benefit of all people.
  2. As the public trustee of the water resources with the power to regulate the allocation, use, flow and control of all water in the Republic.
  3. To establish suitable institutions to achieve its purpose.

- The Water Services Act, 1997 (Act 108 of 1997) (Chapters 2, 8 and 10) where the mandate of DWS is:

  1. To monitor and intervene, where necessary, in matters of water and sanitation services.
  2. To maintain a National Water Services Information System.
  3. To monitor and regulate the performance of all water and sanitation services institutions.
  4. To prescribe compulsory national water and sanitation sector standards and tariffs.

- The Water Research Act, 1971 (Act 34 of 1971) (Chapter 2) the mandate of DWS is:

  1. To promote water related research.
  2. To exercise an oversight over the Water Research Commission.

Over and above the Constitutional and legislative mandates, the DWS needs to comply with all national and provincial legislation, regulations, and policy directives, as well as local by-laws applicable to their functions and, in particular, with the National Environmental Management Act (NEMA) (Act No. 107 of 1998) under which the National Water Act (NWA) is defined as a Specific Environmental Management Act (SEMA) and where sections of NEMA apply and enhance the DWS compliance monitoring and enforcement function with its inclusion in the Environmental Management Inspectorate.

3.2 Principles

The principles and values underpinning the achievement of the DWS vision and the implementation of its mission are premised on the Batho Pele principles and are aligned to section 195 of the Constitution as follows:

Principle 1: Promoting and maintaining high standards of professional ethics:

DWS understands that its stakeholders value and seek openness, honesty, consistency and fairness from the department and achieves this by doing what is right and acting in good faith at all times, and especially when nobody is watching. The DWS is committed to ethical behaviour and have a zero tolerance stance towards corruption of any form in the sector and exercises care not to disclose confidential information.

Principle 2: Utilising resources efficiently and effectively: DWS seeks:

- To ensure value for money in everything it does,
- To provide high quality services, cost effectively and with the least possible wastage,
- To pursue all programmes to the full,
- To proactively focus on turning ideas into cutting edge, best in class and "outside the box" approaches and solutions.

Principle 3: Promoting socio-economic wellbeing and ecologically sustainable use of water resources DWS is committed:

- To ensure reduction and prevention of pollution and degradation of water resources,
- To promote efficient, sustainable and beneficial use of water in the public interest,
- To facilitate social and economic development,
- To meeting basic human water needs of present and future generations.

Principle 4: Providing services impartially, fairly, equitably and without bias, DWS strives:

- To provide services impartially, fairly, equitably and without bias,
- To actively pursue opportunities to uplift the communities of South Africa,
- To implement its mandate with passion and dedication,
- To remain true to the values of loyal service to the people,
- To identify quickly and accurately when services are falling below the promised standard and to have procedures in place to remedy the situation,
- To deliver public services to the many South Africans who do not have access to them,
- To rectify inequalities in the distribution of existing services,
- To strive to deliver a service higher than the basic level of service to poor and vulnerable communities,
- To constantly measure the extent to which citizens are satisfied with the service or products they receive from the department.

Principle 5: Responding to people's needs where citizens are encouraged to participate in policy-making as DWS seeks:

- To listen to and comprehend the needs of its stakeholders in the sector,
- To proactively innovate and create new approaches to what it does,
- To encourage the public to participate in policy making and in service delivery.

Principle 6: Rendering an accountable, transparent, and development-oriented public administration DWS is committed:

- To keep its promises,
- To reporting accurately,
- To be accountable for tasks at hand,
- To doing tasks correctly the first time,
- To providing the public with timely accessible and accurate information,
- To work with care, empathy, respect and consideration,
- To good human resources practices,
- To good career development,
- To maximise human potential,
- To employment and personnel management practices based on ability, objectivity, and fairness and need to redress imbalances and inequalities of the past.

3.3 Water for Sustainable Growth & Development

Water is the most abundant resource on Earth, yet only less than 1% of freshwater is accessible for direct human use. The physically accessible freshwater potential of the world is 90 000 km3, with an estimated 35 million km3 inaccessible as it is either locked in the ice cover of the Arctic or Antarctica or in deep aquifers.

South Africa shares four (4) major rivers with six (6) neighbouring states, namely, Zimbabwe, Botswana, Mozambique, Swaziland, Lesotho and Namibia ((the Orange-Senqu River is shared with Botswana, Lesotho and Namibia, the Limpopo River with Botswana, Mozambique and Zimbabwe, and the Incomati River and the Maputo River are shared with Mozambique and Eswatini. South Africa's approach to transboundary water resource management has substantially changed after the country's international isolation was overcome with its transformation to democracy)) which entail international agreements on water sharing for these river basins. The surface water potential of the major drainage systems in South Africa are dominated by the Orange and the Limpopo river basins. Over 60% of the country's river flow comes from 20% of the land area.

To overcome the uneven spread of water resources and to manage floods and drought, the country has developed many dams with a total capacity to store about two thirds of the country's mean annual rainfall. South Africa has an arid to semi-arid climate, with an average annual rainfall of 465mm (half the world average), producing a total annual runoff of approximately 49 000 million m³/a.

The current reliable yield of surface water at an acceptable assurance of supply is approximately 10 200 million m³/a nationally. The combined storage capacity of large dams is in the order of 31 000 million m³. The total nationally accessible groundwater potential is about 4 500 million m³/a of which between 2 000 and 3 000 million m³/a is currently being utilised.

Of the approximately 5 000 registered dams the vast number (3 832) are small dams (less than 12m) serving farms and municipalities. These smaller dams play a critical role in local water security and climate resilience.

South Africa is still heavily reliant on surface water and where additional water is still available, such as in the uThukela, Mzimvubu and Pongola basins, it is located in areas far from the existing centres of demand. It is thus important for South Africa to focus its water resource planning to improve integrated water resource management to ensure continued water security.

This includes optimising dam storage and transfer systems, effectively managing and protecting the water resource mix and exploring various options for the balancing of water availability with requirements.

The Department has reviewed the reconfiguration of the Water Management Areas (WMAs) from nine (9) to six (6). The intention is to establish six (6) Catchment Management Agencies (CMAs) nationally. The revised reconfiguration is as follows:

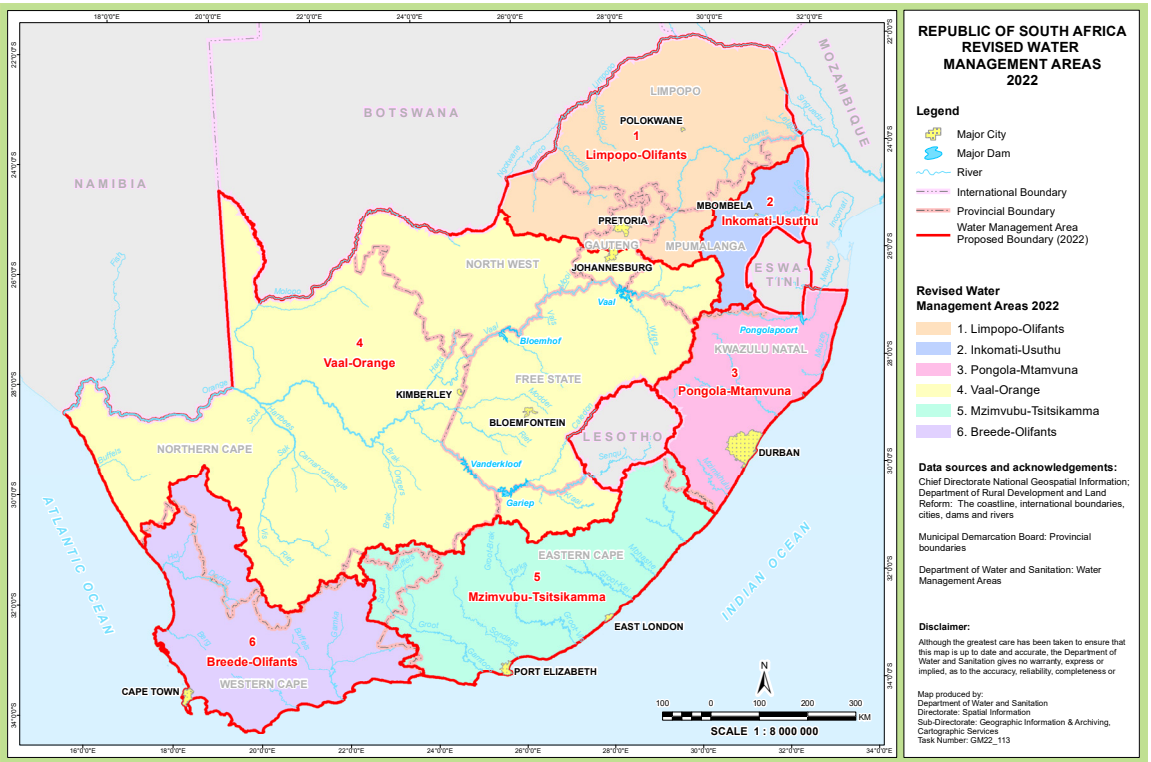


Figure 4: Water Management Areas within South Africa

1. Limpopo-Olifants
2. Inkomati-Usuthu
3. Pongola-Mtamvuna
4. Vaal-Orange
5. Mzimvubu-Tsitsikamma
6. Breede-Olifants

The Constitution of the Republic of South Africa provides that everyone has the right of access to basic water supply and sanitation. Water and sanitation services infrastructure is relatively well developed, however much of this existing infrastructure requires maintenance at a time when the country is already experiencing a lack of focus on sustainable asset management. Population growth and increased urbanisation also add an additional impact on water resource management as well as on water and sanitation services provision.

The schemes also require efficient and effective operations, for which specialised skills and capabilities at all levels are needed. Major challenges are experienced with the capabilities of Water Services Authorities to effectively manage the schemes on a sustainable basis. This issue needs to be dealt with decisively through a review of the mandates and policies in relation to the management and regulation of water and sanitation infrastructure, and available capacity.

The distribution of water use by sector in South Africa, as per the National Water and Sanitation Master Plan, is shown in the diagram below:

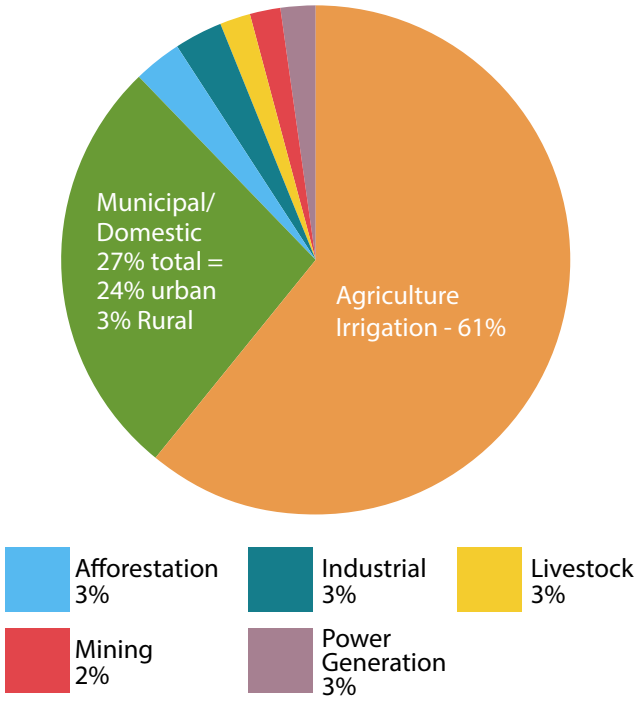


Figure 5: Water use by sector in SA

Agriculture, including afforestation and livestock watering, is the largest user at 66% of the total water use, followed by municipal and domestic use at 27% (including industrial and commercial users provided from municipal systems), with power generation, mining and bulk industrial use, livestock and conservation and afforestation jointly making up the remaining 12%.

The level of assurance at which agricultural water is supplied is lower than that of the other sectors (85%). Water for power generation is seen as strategically important and is provided with the highest assurance of supply (99.5 %) - which translates to 1: 200-year risk of failure.

To support more effective management of the above challenges, work is currently underway to:

- Explore appropriate institutional models for a water and sanitation infrastructure agency.
- Transform water boards into regional water utilities.
- Establish the remaining Catchment Management Agencies (CMA) that will manage Water Management Areas (WMAs).
- Ensure transformation of Water User Associations to assist the CMA's and DWS in local water resource management.

The National Water and Sanitation Master Plan (October 2018), highlights the following key water and sanitation status quo aspects in South Africa:

- Over 3 million people still do not have access to a basic water supply service and 14.1 million people do not have access to safe sanitation.
- Only 64% of households have access to a reliable water supply service.
- 56% of wastewater treatment works are in a poor or critical condition.
- 44% of water treatment works are in a poor or critical condition.
- More than 50% of South Africa's wetlands have been lost, and of those that remain, 33% are in poor ecological condition.
- Only 5% of agricultural water used is by HDI farmers.
- 41% of municipal water does not generate revenue and 35% is lost through leakage.
- Municipalities are losing about 1660 million m^3 per year through nonrevenue water - at a unit cost of R6/m^3 this amounts to R9.9 billion each year.
- R89,8 billion more is needed each year for the next 10 years to achieve water security.

The security of water, energy and food resources is a key priority for South Africa. The water, energy and food (WEF) are stressed due to extreme weather events of drought, flood and water pollution. South Africa is currently grappling with the poverty-inequality-unemployment challenges. Most government initiatives are driven by the urgent need to address this problem and deliver on the promise of a better life for all. In these efforts, water, energy and food are critical resources for delivering on socio-economic reforms, sustainable economic development, and achieving national and international goals. Therefore, it is critical to increase the application of the WEF Nexus approach in planning, policymaking and implementation.

3.4 Approach to the NWRS-3

The approach of the NWRS-3 reflects and builds upon the principles of equity, sustainability and environmental protection that underpin all national water and sanitation legislation and policies in South Africa. The NWRS-3 is founded on the principles of integrated water resources management (IWRM) within the context of a developmental state.

The concept of developmental water management (DWM) and all related linkages across the entire water value chain and sanitation value chain are therefore recognized and upheld by the NWRS-3 to be operationalized via the National Water and Sanitation Master Plan (NW&SMP).

3.5 Overview of the NWRS-3

The vision for the National Water Resources Strategy 3, as aligned with the vision of South Africa's National Development Plan (NDP) Vision 2030, is:

"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 and sustained ecosystem functioning for the well-being of current and future generations."

The NWRS-3 aims to achieve this vision by focussing on three overarching goals:

GOAL 1:
Water must be protected, used, developed, conserved, managed and controlled sustainably and equitably.
GOAL 2:
Water and sanitation must support development and the elimination of poverty and inequality.
GOAL 3:
Water and sanitation must contribute to the economy and job creation.

The various chapters contained in the strategy are aligned to the achievement of the goals, as well as to the creation of an enabling environment to aid in the achievement of the goals.

Each chapter of the strategy contains various key strategic objectives and strategic actions for the implementation of the NWRS-3 and these are carried forward for resourcing and execution within the National Water and Sanitation Master Plan (NW&SMP). The various chapters of the NWRS-3 are outlined below in brief:

Reducing water demand
To ensure efficient use of water by all sectors through the implementation of appropriate water conservation and water demand management measures to meet the social and economic needs of South Africa both now and in the future.

Increasing water supply
To ensure well-maintained and properly operated water resource infrastructure is available to meet the social, environmental and economic water use requirements of South Africa.

Redistributing water for transformation
To allocate water so that historically disadvantaged and indigent South Africans enjoy equitable access to basic water supply and sanitation services, water for productive economic purposes, and reap the benefits from water use to prosper socially and economically.

Managing effective water & sanitation services
To ensure the delivery of potable water and sustainable sanitation for economic and human development and elimination of the backlog in basic water supply and sanitation while progressively improving levels of service and achieving optimal development and use of infrastructure.

Regulating the water & sanitation sector
To improve the ability of the DWS to regulate the water and sanitation sector to achieve the objectives of government, protect the resource and the consumer and ensure the sustainability of water and sanitation institutions.

Managing water & sanitation under a changing climate
To plan and respond to a changing climate and its impact on the environment, water resources, water and sanitation services and the quality of life.

Promoting international cooperation
To advance the African agenda and to shape the global water agenda while ensuring that, in South Africa, Integrated Water Resources Management (IWRM) is implemented in a manner that conforms to international water protocols and treaties as well as the legislative framework governing water while addressing new national and international water and sanitation development imperatives as well as ensuring that regional and international sanitation obligations are met and complied with.

Improving water quality
To ensure that South Africa takes an inclusive approach to integrated water quality management through applying integrated, adaptive water quality regulation and management to secure water that is "fit for use for all forever".

Protecting aquatic ecosystems, maintaining & restoring ecological infrastructure
To ensure that South Africa's aquatic ecosystems are protected effectively at different and appropriate levels taking account of environmental, social and economic well-being, and ensuring that ecological infrastructure is maintained and restored to support water security.

Creating effective water sector institutions
To provide for the establishment and transformation of institutions to assist the DWS in giving effect to its core mandate – the development, protection, conservation and allocation of water resources, and regulation of water and sanitation services and water use. Institutional arrangements entail the establishment, development, strategic alignment and performance monitoring and evaluation of all water and sanitation institutions and role-players.

Collecting data & analysing & managing information for effective monitoring, evaluating & reporting
To establish national monitoring systems on water resources (NWA chapter 14; clause 137(1)) and to ensure that there is a national information system on water and sanitation services (WSA chapter 10; clause 67(1)).

Building capacity for action
To ensure that sufficient capacity is created in the water and sanitation sector to implement and sustain the execution of water and sanitation policy and legislation and give effect to the provisions of the proposed Water and Sanitation Act.

Ensuring financial sustainability
To ensure that the necessary financial resources are in place, together with the necessary systems, structures and processes to enable the implementation and progress monitoring of the NWRS-3.

Enhancing & enabling deployment of research, development & innovation
To ensure that research, development and innovation are undertaken in order to provide effective and efficient water and sanitation management solutions that respond to the needs for water security and sustainable sanitation for communities, productive use, and strategic water use and ecosystem services.

Addressing legislative & policy gaps
To address emerging legislative and policy issues through regular revision and new development of all water and sanitation sector legislation, polices and strategies to best address the changing needs of South Africa's entire water and sanitation value chain.

The diagram below provides an overview of the NWRS-3 and sets out the enablers for execution, the chapters aligned to each of the three main goals, and the overall vision of the strategy:

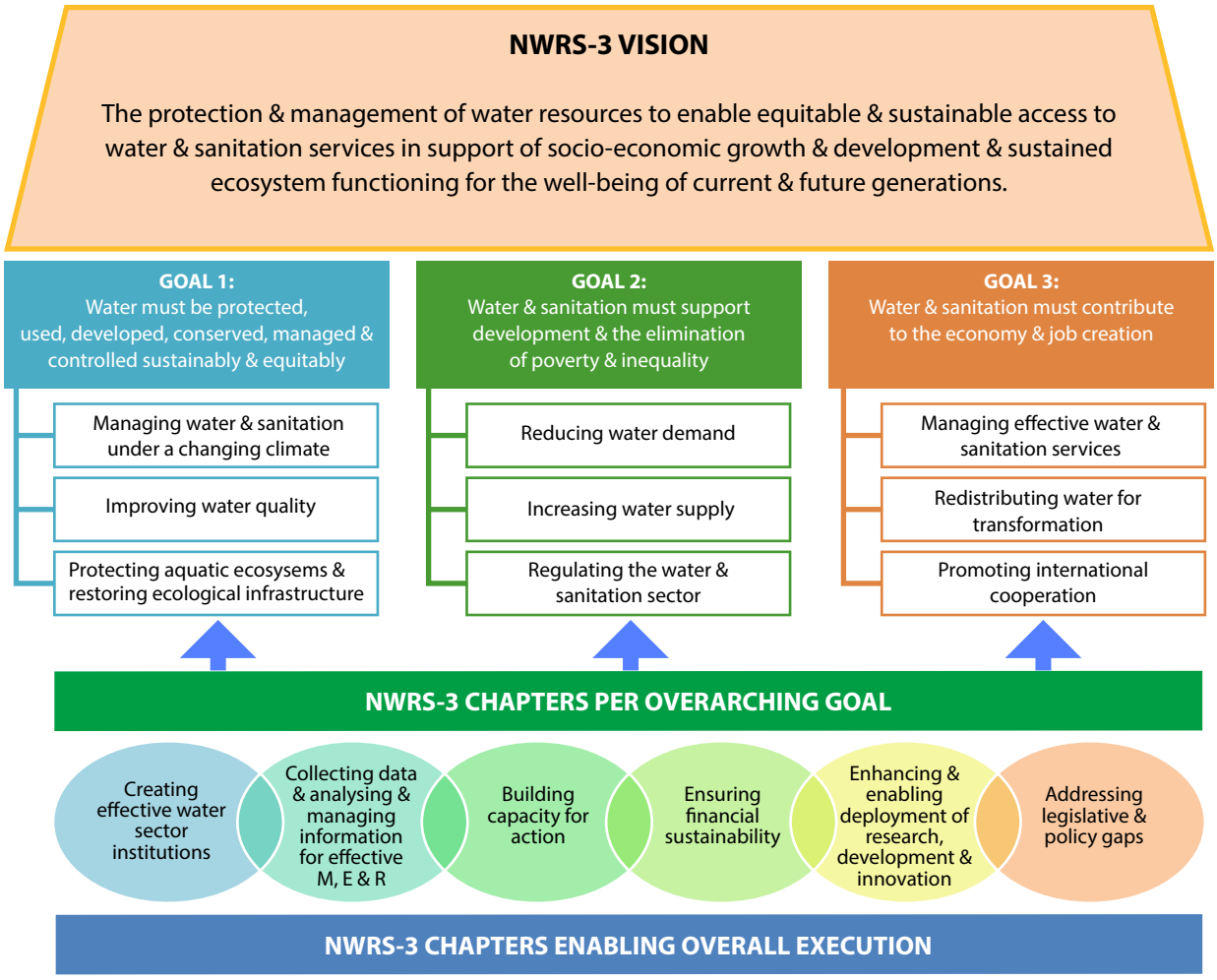


Figure 6: Overview of the NWRS-3 Vision, Goals & Chapters

Chapter: 4

Reducing Water Demand

4.1 Context & Current Challenges

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 precipitation for the country of about 495 mm per annum (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 (NWRS-1, 2004). The potential sources of water for use by the various sectors have historically been surface water and groundwater. Other alternatives like reuse of wastewater and treatment of impaired water like seawater and mine-affected water are coming into focus as the scarcity increases due to increased demands.

South Africa's water resource are highly developed especially surface water systems through a numerous small and large dams built in mostly the water rich areas of the country. This current high level of development of the surface water resources limits further opportunities to augment future water supply through the building of additional dams. Most of the best sites for building dams have already been developed. The remaining undeveloped sites come at relatively high social, economic, and environmental costs.

Groundwater resources have some remaining potential, as they are not fully utilised. This resource faces some critical challenges like limited information availability, susceptibility to vandalization of equipment and potentially unsustainable utilisation. Other potential sources of water include the treatment and reuse of wastewater, desalination of seawater and use of mine affected.

To make headway in reducing water scarcity, the country must consider both the resource side and the utility of existing developed water resources, bringing water conservation and water demand (WC/WDM) into focus. Water conservation is the minimisation of loss or waste, the care and protection of water resources and the efficient and effective use of water.

Water demand management is the adaptation and implementation of a strategy or a programme by a water institution or consumer to influence the water demand and usage of water to meet various objectives like achieving economic efficiency, social development, social equity, and environmental protection, sustainability of water supply and services and political acceptability.

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. WC/WDM is also a fundamental step in promoting water use efficiency and is consistent with the National Water Act (Act 36 of 1998) which emphasises effective management of our water resources (DWAF, 2004).

The linkage to the legislative mandate derives from the policy. The National Water Policy elaborates by adding that: "...a formal policy will be developed for water conservation and use in each of the main user sectors, such as agriculture, industry and mining. These will include regulations for water conservation in each use sector to ensure their arrangements will be made to promote more efficient water use. The conservation and water demand management function of the national Department will be strengthened, and greater priority will be given to this area."

Subsequently, the global policy initiatives and actions like the sustainable development goals add impetus to the context of reducing water demand. Target 6.4 of the Sustainable Development Goals (SDGs) highlights the need to substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity by 2030.

The National Development Plan (NDP) 2030 sets out the priorities for water demand management 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 Plan acknowledges and refers to the detailed targets that have already been set for different catchments through the Reconciliation Strategies and All-Town Strategies.

Achieving water demand reductions on this scale will require active and targeted programmes to reduce water leaks in conveyance and distribution networks, and to increase the efficiency of water use by domestic and commercial water users. Various policies and instruments have previously been used as incentives or disincentives to achieve reduce water use. The Plan, furthermore, requires targets to be in place for the 2022 horizon.

In South Africa, the agricultural sector, in particular irrigated agriculture, uses the largest volume of water as shown in section 3.3 (albeit at lower levels of assurance of supply than urban and industrial uses). As a result, the farming sector will have to increase the efficiency of its water use to accommodate any future expansion of production, or to allow transfers to other users within the water sector. The NDP commission also proposed a dedicated national programme to provide support to local and sectoral efforts to manage water demand and improve water use efficiency. Water saving and demand management projects should be considered as part of the overall range of water supply investment programmes.

This builds on the principles of the national water policy (DWAF, 1997). The principle states - Water resources shall be developed, apportioned and managed in such a manner as to enable all 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.

In South Africa, the management of water resources and the provision of water to different sectors, including Agriculture, call for a new approach in which WC/WDM is expected to play a crucial role to ensure social equity, economic development and environmental sustainability.

WC/WDM considers and focuses on the following water use sectors: agriculture, industries, mining, power generation and local government sector including general water use by citizenry. WC/WDM is still not treated as a priority hence there is still lack of proper planning, implementation, reporting and regulation.

The following challenges are experienced per sector:

Agriculture

- No sufficient critical measurement at critical control points in the irrigation schemes, local surface water and groundwater use by agriculture,
- Insufficient capacity to effectively monitor and enforce compliance of the largest user in water sector further compounded by the delays in finalising the validation and verification processes.
- No real time monitoring and management of water conveyance systems, resulting in lack of information on water losses
- Limited self-monitoring by water users and institutions prior to the development of the metering of irrigation regulations.
- The canal infrastructure is old and deteriorating leading to high water losses and wastages.
- Inadequate focus on proper operation and maintenance with now more focus needed on maintenance aspects due to the aged infrastructure.

Forestry

- While forestry in South Africa is critical for timber and fibre production, income generation and job provision, it comes at some water cost, as the commercial forestry genius potentially impact on water resources through stream flow reduction.

Water & Sanitation Services Institutions & Local Government

- Poor performance of Water Services Authorities in provision of water and sanitation services due to lack of adequate funding and planning.
- Poor governance and lack of skilled personnel and capacity.
- Non-institutional prioritisation of WC/WDM.
- Lack of operation and maintenance of water distribution systems.
- Lack of sound water accounting, meter management programmes and effective billing measures for all consumers.
- Lack of capacity to monitor, enforcement compliance with WC/WDM Regulation 509.
- Non implementation of WC/WDM Plans.

Industry, Mining, & Power Generation

- Even though the sector demonstrates meaningful WC/WDM initiatives, the achievements are negated by the potentially high negative impacts on water quality due to the high levels of more harmful effluents.
- No agreed key performance standard or published regulations for the industries.
- No reporting and monitoring system in place.
- Weak WC/WDM enforcement tools and lack of regulations being in place.
- Need to strengthen existing partnership with various sector partners.

Social Awareness & Advocacy Programmes

- Awareness campaigns are more reactive rather than pro-active.
- The sector does not prioritise social advocacy initiatives in their WC/WDM planning in terms of funding and human capacity.
- The sector is not consistent in its Public Participation Programmes.
- Currently, the focus is on Local Government sector/water users.
- Customer Service Centres at Local Government level are inadequate to deal with customer queries and complaints.
- Lack of integration of social advocacy initiatives within the sector.
- South Africa has the World highest per capita consumption while we are a water scarce country.

4.2 Guiding Principles

In the quest to achieve a balance between social equity, economic efficiency and environmental sustainability, the National Water Conservation and Water Demand Management (NWC/WDM) strategy was developed using the following three fundamental principles:

- Water Institutions should endeavour to supply water in an efficient and effective manner by minimising water losses and promoting Water Conservation / Water Demand Management 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 an integral part of the water resource planning processes and for water supply and sanitation. 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.

There is a need for providing regulations to enable compliance monitoring and enforcement to set targets that would make compliance compulsory. In addition, the principles guiding the development and implementation of WC/WDM must consider the integration of the Water Energy Food (WEF) nexus, as included in the National Water Security Framework, and its implications for future water security.

South Africa is a developing country in terms of population as well as economically. With a growing population so does the need for more food as well as energy to power industries and water is intrinsically linked to this. South Africa has moved from being a net food exporter to an importer of food due to population growth and reduction of agricultural yields. The country's energy production is currently heavily reliant on non-renewable sources, that being coal. In the Mpumalanga Province, some of the coal mines are located in areas where there is potential for arable land, thus limiting the agricultural potential of the country. Both the mining and agricultural activities have a negative impact on the country's water resources in terms of quality and quantity, yet they are critical for socio-economic development potential of the country. It is therefore important that water conservation remains high on the agenda as we look into the future of this country to ensure that the basic human rights of the citizens are protected as per Sections 24 and 27 of the Constitution and adhering to the Reconstruction and Development Programme (RDP) Policy of South Africa in terms of providing electricity

4.3 Baseline & Status Quo

The Department has embarked on a project to update the National and Sectoral WC/WDM strategies that were developed in 2004. The aim of the project is to ensure that WC/WDM strategies reflect the latest concepts in WC/WDM and also to develop an implementation/action plan to operationalize the updated strategies. These strategies will be aligned to the priority Strategic Objectives and Strategic Actions provided in the NWRS-3.

Agriculture Sector

The irrigation sector is by far the largest water user in South Africa. The sector has 1.6 million hectares of land under irrigation, using up to 13.6 billion m3/ annum. Any percentage reduction in water use in this sector will therefore have a significant effect on the total water consumption of the country. A balanced approach to improve efficiencies must be targeted at conveyance and distribution networks (leaking pipelines and canals) and at field level when applying water. Although South Africa's irrigation farmers have made great strides in improving field application efficiencies through use of latest technologies like trickle systems and centre pivots, there is still some scope for improvement.

The Water Administration System (WAS) is being used at several irrigation schemes, with a combined area of over 142, 000 hectare irrigated, Example of some of the schemes include Hartbeespoort, Sand-Vet, Orange-Riet, Vaalharts, Impala, Lower Orange and Loskop. These have seen benefits like minimising of water distribution losses, availability of information on individual farm and scheme level water use. Scaling the WAS to all parts of the country will realise further benefits.

Integrated accounting system that improves debit management, sing the WAS makes it possible to release the correct amount of water from a dam (source) according to applications (demand). The Department through WRC is also in the process of developing an Irri-Drop Framework which seeks to drive high water use efficiency in the entire irrigation water chain from water supply to field level application.

Irrigation schemes are submitting Water Use Efficiency Accounting Reports on a monthly basis reporting on their water use efficiency. Currently reports are received from 75% (59 of 78) of the big irrigation schemes. The average water loss of the applicable schemes is about 30%.

Water & sanitation services Institutions & Local Government Sector

The current status of municipal performance regarding WC/WDM is a concern taking considerations of the water security risk in the country, more especially within the large water supply system supplying Metropolitan areas and large cities in the country. The municipalities in the 8 large Water Supply System are situated in areas of high economic significance and should increase their efforts to achieve the targets set under the various water reconciliation strategies to ensure water security.

The DWS monitors and analyse the progress made with the implementation of WC/WDM and targets for the large water supply systems (WSS). The 8 large water supply systems are the Integrated Vaal River (IVRS), Crocodile West River, KwaZulu-Natal Coastal Metropolitan, Western Cape, Algoa, Amatole, Greater Mangaung and Olifants River.

The results for the target versus actual savings achieved for the 8 large water supply systems are summarised in the table below, which indicates a total of 12.7% achieved savings by June 2021 compared with a target of 12.0%. The Western Cape, Amatole, Algoa, Olifants River and Greater Mangaung have reached their targets while the remaining three WSS are generally following the high population without WC/WDM demand projections.

Table 2: Situational Analysis in the 8 Large Water Systems in SA (2022)

Projected SIV without WDM kl/annum	Projected SIV with WDM kl/annum	Projected % savings	Actual demand kl/annum	Actual % savings	Situational Analysis
System: IVRS (Integrated Vaal River System)					
1 768 358,517	1 570 358,591	11.2%	1 681 865,875	4.9%	The 4.9 % reduction in demand is positive considering that municipalities within the IVRS are following the high population with no WDWDM demand projections
System: CWRWSS (Crocodile West Water Supply System)					
97 033 292	90 145 676	7.1%	97 571 329	-0.6%	Results indicate no progress has been made, and municipalities are following the high population without WC/WDM demand projections
System: KZNCMWSS (Kwa Zulu Natal Coastal Municipality Water Supply Systems)					
504 668 475	460 975 319	8.7%	499 735 020	1.0%	Municipalities in the KZNCMWSS exceeded their 2021 targets by 38 million m3/a, which indicates digress on savings achieved from the past 2 years as a result of restrictions imposed in the system
System: WCWSS (Western Cape Water Supply System)					
543 531 209	455 513 491	16.2%	306 100 956	43.7%	Municipalities achieved savings of 43.7% against their 16.2% target.

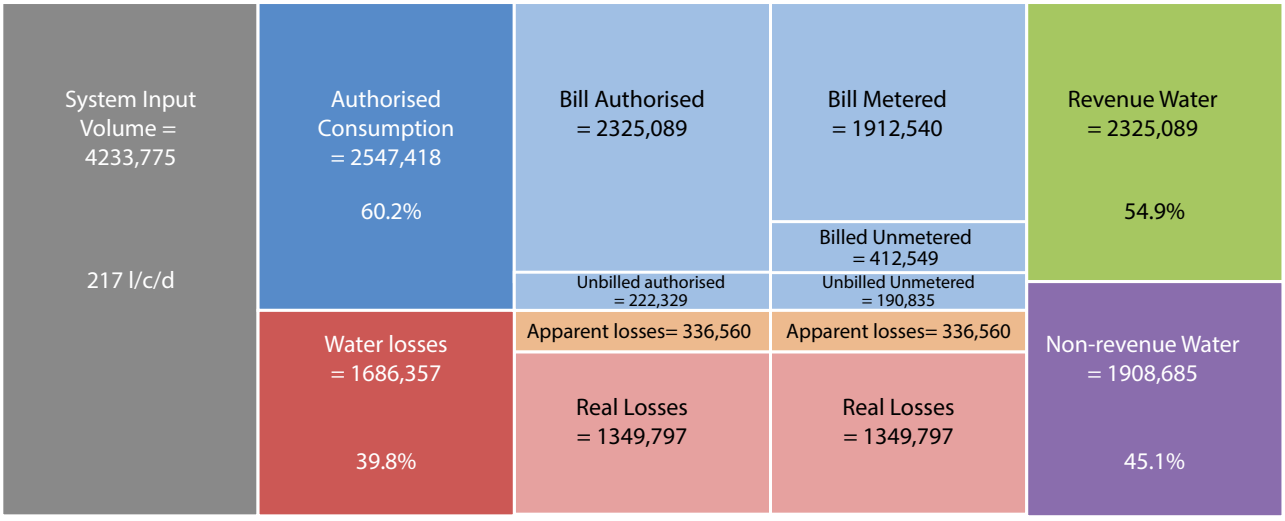
Table 2 continued: Situational Analysis in the 8 Large Water Systems in SA (2022)					
Projected SIV without WDM kl/ annum	Projected SIV with WDM kl/ annum	Projected % savings	Actual demand kl/annum	Actual % savings	Situational Analysis
System: AWSS (Algoa Water Supply System)					
166 764 084	124 328 270	25.4%	118 513 077	28.9%	The results indicate that municipalities have achieved their 2021 targets. Results further indicates demand reduction by 28.9% compared to a targeted 25.4% by June 2021
System: AmWSS (Amatole Water Supply System)					
81 195 173	71 029 386	12.5%	68 977 648	15.0%	The results indicate that municipalities in the AmWSS slightly achieved the projected target. Municipalities in the AmWSS achieved savings of 15.0% against a target of 12.5%
System: GBWSS (Greater Mangaung Water Supply System)					
119 223 303	105 603 735	11.4%	86 789 576	27.2%	The results indicate that municipalities within the GBWSS achieved a 27.2% saving compared to the targeted 11.4% by June 2021
System: ORWSS (Olifants River Water Supply System)					
319 068 090	295 275 500	7.5%	290 389 827	9.0%	Results show that progress has been made with reduction in demand although with very low confidence level
TOTAL					
3 433 268,278	**3 020 274,909**	**12.0%**	**2 996 238,511**	**12.7%**	

The 2020/21 national water balance indicates a System Inputs Volume (SIV) of 4233.8 million m³/annum, Non-Revenue Water (NRW) of 1908.7 million m3/annum (45.1%) and water losses of 1686.4 million m3/annum (39.9%). The national water balance indicates that both parameters (NRW) and water losses increasing despite the efforts on WC/WDM interventions. In 2016, NRW was 41 % (DWS, 2017) but it has since grown to 45% in 2021 (DWS, 2022).

This means that stakeholders must intensify implementation of WC/WDM measures to reduce per capita water consumption.

Table 3 below is the, the National IWA water balance reflects the current state of water losses and non-revenue water as of June 2021 in Mm3/a (DWS, 2022):

Table 3: The National International Water Association (IWA) Water Balance in SA (2022)



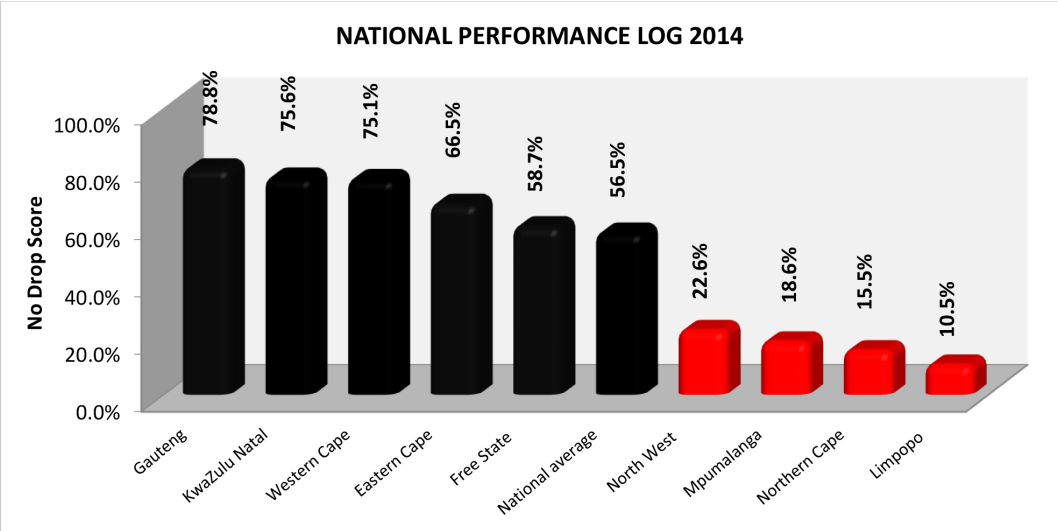
The water sector is driving several initiatives to achieve the targets to reduce water consumption and also achieve efficiency in the utilisation of water.

The Department and the Water Resource Group also launched a partnership with private partners at the World Economic Forum in 2011 called Strategic Water Partners Network-SA (SWPN-SA). One of the first projects conceptualised under this partnership, was the No Drop Programme. The No Drop Programme is an incentive based regulatory programme aimed at assessing and improving the municipal water use efficiency, water losses and non-revenue water. The No Drop Programme is based on assessments against specific criteria to evaluate a municipality's performance against legal and international best practice requirements.

The latest NO drop assessment of 2014, covering 152 Water Services Authorities (WSAs) (949 water supply systems) showed the following results:

- 30 % of the water supply systems assessed obtained more than 50% No Drop Score, with a balance of 70 % attaining less than 50 % No Drop score.
- Of the 152 WSAs assessed, good data sets were received from 71 municipalities representing a total population of 32 580 710 and 9 043 534 households, which is approximately 62 % of the country's total population.
- The national average No Drop score of 56.5% was achieved, which is considered average performance. The score is influenced by the good scores achieved (> 50 %) by Gauteng, KwaZulu-Natal, Western Cape, Eastern Cape, and Free State Provinces.
- The National Barometer for the country with a weighted average No Drop score of 56.9% is shown in figure 7:

The results shows that 51% of 152 WSAs have proper WC/WDM plans and strategies in place and are busy with some form of implementation in the field A total of 38-40% of 152 WSAs have proper or partial water balances in place, which is a baseline requirement for planning and project scoping. The current status makes a strong case to focus on improving the quality of planning and the intensity and acceleration of implementing the No Drop Programme going forward. Figure 8 shows the submissions made for No Drop assessment as pertaining to WCWDM planning:



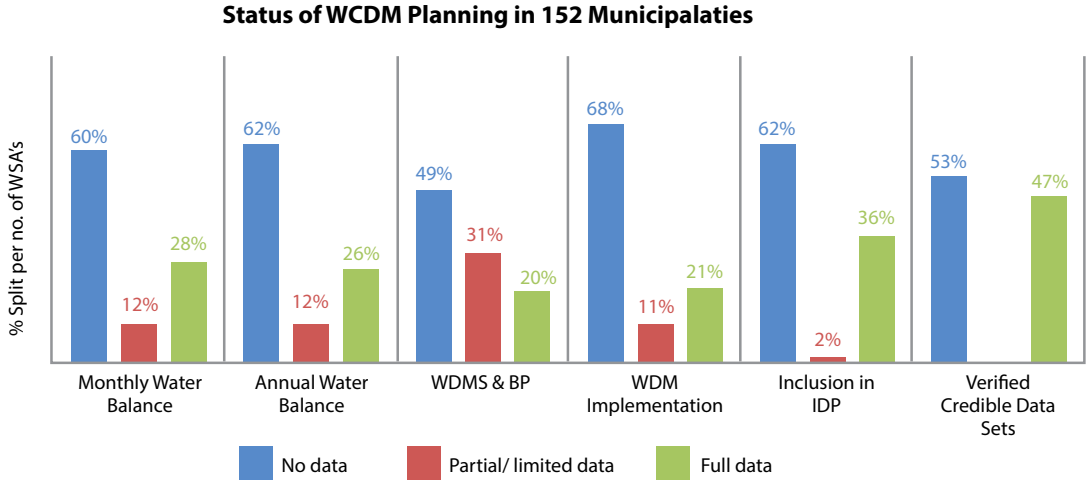


Figure 8: The Status of WC/WDM Planning in 152 Municipalities in SA (2014)

Industries, Mining & Power Generation Sector (IMP)

Manufacturing Industries

According to the DTI (2019) the manufacturing industry accounts for about 11% of the total South African workforce, down from 14% in 2008. The manufacturing employment share has been stable at about 11% for the past eight years, though the total employment in the economy has been increasing since 2011. The NDP has set a target of 350 000 new jobs for this sector by 2020.

Water is critical in manufacturing as it can be an input, be part of the product, be the product and is also in the manufacturing processes for cleaning and cooling. The Manufacturing Sector is a pillar sector required to drive economic growth and social development of the country. Thus, the sector is identified for future growth in water demand.

Mining Sector

The mining sector in 2021, employed 452,866 people, contributed R27.2 billion in taxes to South Africa and contributed R371.9 billion to GDP. The economic disruption of the COVID-19 pandemic is a recurring feature in recent employment statistics. Mining gross domestic product (GDP) declined in nominal terms by 1.2% in 2020, to a value of R371.9 billion. After allowing for the more than 24% rise in commodity prices, the inflation adjusted decline was 13%. In nominal terms, the mining sector contributed 8.4% and 7.5% in real terms to GDP. In the same year, the South African economy contracted by 6.8%, attributable to the COVID-19 pandemic.

The efficiency of water usage by different mining sub-sectors has not yet been systematically determined. However, data from a study commissioned by DWS in partnership with the Minerals Council of South Africa in 2012 does provide some indicative water use efficiency benchmarks for common minerals mined in South Africa.

This highlights potential opportunities for WC/WDM initiatives in the mining sector. This along with a range of technical interventions developed in association sector partners like WRC and CSIR aimed at improving water usage in mining, as well as water treatment and re-use options such as the Emalahleni Water Reclamation project and others, further illustrate room for improvement.

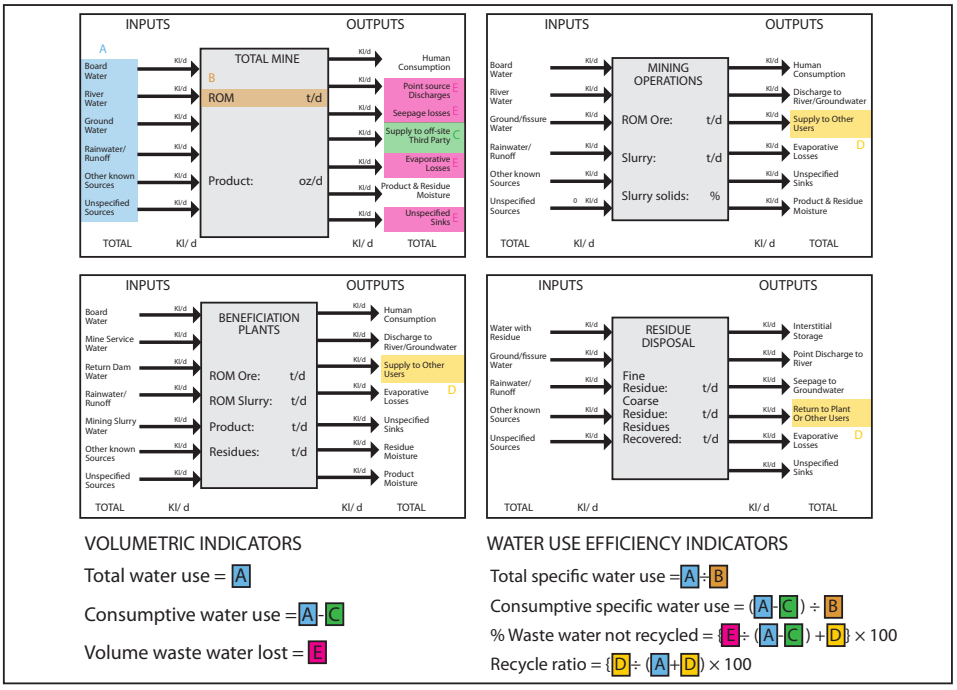
The DWS has developed a suite of supporting tools to guide the implementation of WC/WDM by the mines. And these include the commodity-based national water use efficiency benchmarks that have been developed for coal, gold, platinum and "other" subsectors.

In addition to these, seven key performance indicators as shown in the figure below have been adopted as part of a standard for measuring the mines WUE performance status. A Standardised Water Accounting Framework (SWAF) has also been developed to ensure uniform and streamlined reporting on water use data and/or water balances by the mines. The SWAF will soon be converted into an on-line electronic system which will be used by the mines to submit their WC/WDM Plans as well as annual reports on the progress of the implementation of the plans.

The Mineral Council SA has further developed a spreadsheet-based WUE Self-Assessment Reporting Tool (W-SART) to enable the mines to enter their water-balance data in a uniform format and, to also do computations for 5-year Site-Specific Targets which will inform the mine's WC/WDM Plans. This tool which is based on SWAF principles is only meant for self-regulation, not for reporting to the DWS. The tools are available to use by all mines in the country and is available (and downloadable) on Mineral Council website. To this end water use licences and regulations remain the key instruments for enforcing the implementation of WC/WDM, and in line with this, specific WC/WM conditions requiring the development of WC/WDM Plans are being incorporated into the licences with effect from 2015, and the process is also underway to include WC/WDM as part of the mining regulations, i.e. Regulation on use of Water for Mining and Related Activities aimed at the Protection of Water Resources (GN 19182, Notice 1091). See figure 9 on following page.

The DWS has developed a methodology to guide the implementation of WC/WDM within the mining sector. This methodology which is based on the generic implementation methodology developed as part of the study to set water use efficiency benchmarks provides for a clear distinction between the responsibilities and roles for the mining industry and for the regulator as shown in the figure on the following page.

Figure 9:
Water Use Indicators for the Mining Sector



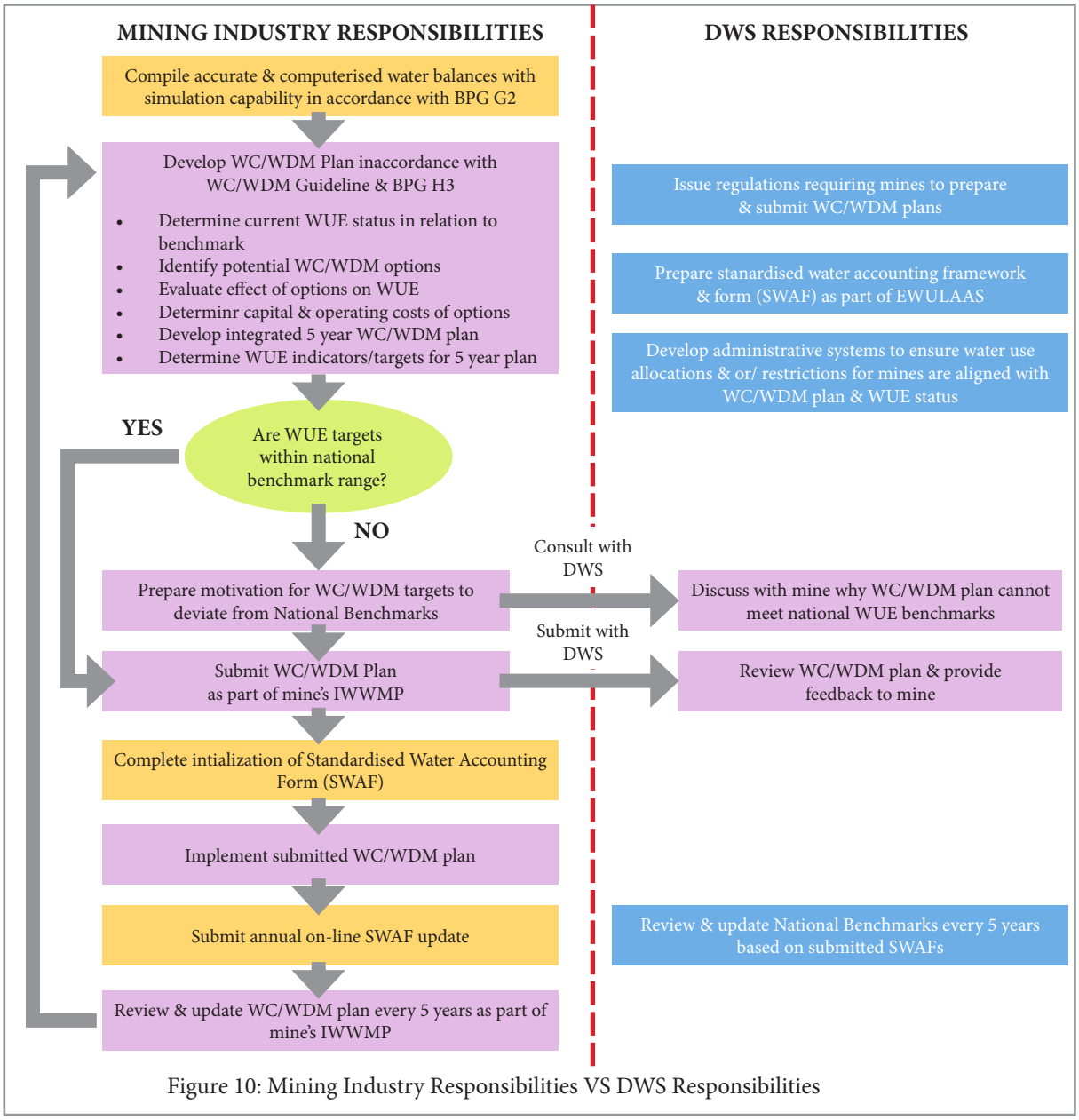


Figure 10: Mining Industry Responsibilities VS DWS Responsibilities

Power Generation Sector

The energy sector including Eskom, the national power generator, is highly dependent on reliable supplies of water for the generation of electricity (steam generation and cooling processes), and an elaborate and sophisticated network of water transfer and storage schemes have been developed specifically to support this sector and ensure high levels of reliability. The water sector is on the other hand highly dependent on a constant and reliable supply of electricity to "move water". The Energy sector has introduced a new technology in coal power generating stations which is called Flue Gas Desulfurization (FGD). This technology removes sulphur dioxide from the exhaust flue gases of fossil fuel power plants and the emissions of other sulphur oxide emitting processes. The main disadvantage of this technology is that it requires volumes of water to clear emissions and due to water scarcity in the country, further research on technologies is thus required to meet the future water demand.

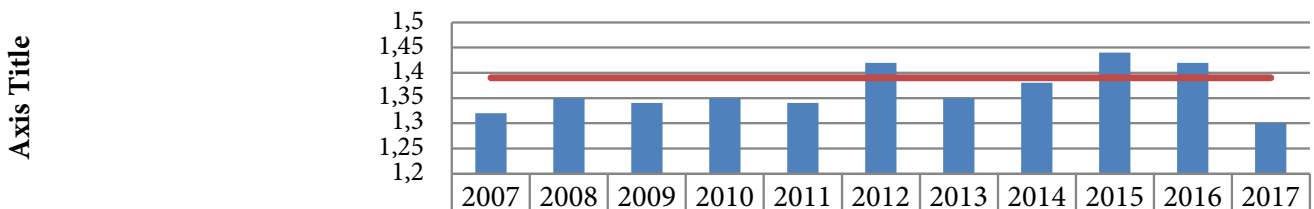
The South African Energy Sector Report 2021, indicated that South African energy supply is dominated by coal which made up 65% of the primary energy supply in 2018, followed by crude oil with 18% and renewables with 11%. Natural gas contributed 3% while nuclear contributed 2% to the total primary supply during the same period. At present Eskom's coal-based power plant fleet consists of 10 base load power plants (used during normal demand) and 3 return to service (RTS) power plants (used during peak demand). These power plants have diverse technical parameters and use a combination of cooling technologies which is bound to provide different water usage profiles. Eskom employs three types of cooling systems at its power plants. The most common and older type is wet cooling, but there are also direct and indirect dry cooling systems.

Within the context of the current Integrated Resources Plan, South Africa's energy mix is bound to change to provide sufficient energy security. However, the abundance of local reserves of coal is likely to keep coal a dominant fuel source (Pouris and Thopil, 2015) although it is proposed that the installation of hydro electrical units be investigated in future at most dam outlets to augment the grid with green energy. Eskom has set itself a target of 1.39 l/kWhSO and has generally performed well over the years with just a few years over the target of 1.39l/kWhSO
See figure 11 below.

WC/WDM Social Awareness & Advocacy Programmes

One of the biggest challenges in ensuring the effectiveness of water conservation and water demand management programmes is the paradigm shift required amongst all South Africans to understand the importance of conserving the nation's water resources. Traditionally there are often stereotypes and social beliefs that water exists naturally and is free thus resulting in high water wastage.

Furthermore, evidence has shown that most technical interventions without adequate social engagement and education of communities often lead to failures of good technical interventions. The social pillar is thus driven mainly to ensure community buy-in and support of technical programmes aimed at reducing water losses and wastages within communities. Increased use of social media campaigns should be considered and used in future. The WC/WDM education and awareness campaigns that the department has implemented are as follows:



	2007/8	2008/9	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
Specific Water Consumption l/kWhSO	1,32	1,35	1,34	1,35	1,34	1,42	1,35	1,38	1,44	1,42	1,3
Target	1,39	1,39	1,39	1,39	1,39	1,39	1,39	1,39	1,39	1,39	1,39

Figure 11: Eskom Specific Consumption against Target (2007/08 to 2017/18)

"Be water wise" truck / puppet show campaign
This campaign is a road show campaign. The truck Campaign is aimed to create awareness and educate South Africans about water use efficiency. It became successful with the help of all relevant stakeholders involved such as municipalities and other relevant stakeholders. The Truck Campaign consists of the Truck which is used to carry water use efficiency messages. The truck gets to be branded with the DWS logo and water saving tips. The department also distribute water use efficiency promotional material to community members, at all different stops during this campaign. Most of the promotional material consists of brochures, water bottles, cups, 25l buckets, school bags etc. All these carry very powerful messages of water use efficiency.

The Department appointed the Water Ambassadors, who are celebrities and professional actors. These water use efficiency ambassadors do industrial theatre performance which is an integral part of the campaign. The performance that is conducted by water use efficiency ambassadors is aimed at creating awareness and educating people on how water is being wasted on daily basis and how people can save water by giving them water saving tips to avoid unnecessary water wastages. The community interacted very well with the water use efficiency ambassadors.

Door to door Campaign
The Department and municipalities officials conduct door to door campaigns educating and creating awareness for water use efficiency. The program of this campaign is mostly dependent on the municipality that has invited the department. The promotional materials are also distributed, such as water saving tips and how to fix leaking taps. The municipal officials in this campaign provide the plumbers and do live demonstration on how to fix leaking taps and toilets in communities visited.

School Campaigns
The Department runs schools competitions to involve learners in solving water issues, especially within the water use efficiency spectrum. The schools project is called South African Youth Water Prize, which is a science & technology-based project. The competition begins at provincial level and proceeds to the national level. The national winner represents South Africa in the Stockholm Junior Water Prize (SJWP) in Stockholm, Sweden to compete with learners from 30 countries annually.

Education & Awareness Workshops in the Agricultural Sector
It is estimated that the water losses through canals of the irrigation schemes are between 30 to 45%. Efficient use of water by the sector has the potential to play a significant role towards making more water available for use not only within the agricultural sector but also for the other water use sectors.

It is therefore important to link with other stakeholders like NGOs and conduct education and awareness in this sector to ensure that the agricultural sector implements WC/WDM measures.

The Department of Water and Sanitation, hosts workshops with the irrigation schemes on water use efficiency and WC/WDM. Education and awareness is not the function of national government only, all sector institutions, private sector organizations and civil society should be institutionalising the promotion of WC/WDM.

4.4 Strategic Objectives & Strategic Actions

The strategic objectives of this chapter and the various strategic actions to be undertaken within each strategic objective are as follows:

4.4.1 Strategic Objective 1

To ensure that all sectors use water efficiently and effectively to enhance existing WC/WDM programmes across all sectors.

To achieve the above strategic objective, the following strategic actions must be undertaken:

- Develop, implement and monitor WC/WDM plans from all water management, water and sanitation services institutions and water users and develop a database for the management of this information.
- Promote appropriate measures to influence the reduction in water wastage and ensure compulsory metering and billing.
- Ensure that the WUA and end users understand the need to modernise their water conveyance systems and irrigation equipment, and that the Department must modernise its water conveyance systems.
- Drive the reduction of physical leakage as part of the WC/WDM programmes through improved regulation and compliance and information management.
- Encourage water management and services institutions to use the latest technologies in water release and distribution systems.
- Enforce the submission of monthly (or quarterly) water balances by WSAs through the department's regulatory instruments.
- Encourage all WSAs to appoint properly trained staff to implement and drive WC/WDM objectives.

4.4.2 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.

To achieve the above strategic objective, the following strategic actions must be undertaken:

- Promote the efficient use of water amongst consumers and customers.
- Promote the use of water saving technologies by consumers and customers.
- Co-ordinate the implementation of a generic water education and awareness campaign.
- Preventative maintenance programmes are put in place for users and consumers to reduce wasting of water.
- Promote environmental awareness and protection concept to all stakeholders.
- Co-opt all water users and WSAs to participate in the platform for planning and management within their regions.

4.4.3 Strategic Objective 3

To ensure all water use sectors set water use efficiency improvement targets and implement programmatic WC/WDM projects to achieve these set targets.

To achieve the above strategic objective, the following strategic actions must be undertaken:

- Implement measures to reduce Non-Revenue Water (NRW) and water losses in all municipalities.
- Implement a programme to reduce the water requirements and water losses at irrigation schemes by 2030, without affecting production.
- Reduce water demand and increase water efficiencies of industrial users.
- Develop and implement adequate information system to support implementation of WC/WDM measures and decision-making.
- Ensure the implementation of WC/WDM best practices in new developments.
- Ensure that water waste-preventative maintenance programmes are put in place for water management and water and sanitation services institutions.
- Carry out ongoing water audit and water balance and report performance.
- Obtain sector reports on the achievement of set targets and monitor progress against meeting these targets.
- Adopt integrated planning principles.
- Ensure that WC/WDM measures have been implemented before new infrastructure development is considered.
- Encourage self-monitoring by water users and institutions on the set WC/WDM targets and measures as per water use sector's WC/WDM plans.

4.4.4 Strategic Objective 4

To align the water use authorisation process with WC/WDM priorities and encourage interventions to improve water use efficiency.

To achieve the above strategic objective, the following strategic actions must be undertaken:

- Ensure that WCWDM conditions are included in the Water Use Authorizations.
- Ensure that water allocations promote equitable and optimal utilisation of water.
- Monitor and enforce compliance of WC/WDM conditions specified in water use (authorizations)

4.4.5 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.

To achieve the above strategic objective, the following strategic actions must be undertaken:

- Develop guidelines, standards and tools to support the implementation of WC/WDM by all water sector institutions and water use sectors.
- Conduct training and capacity building on the guidelines, standards and tools developed to support the implementation of WC/WDM by all water sector institutions and water use sectors.
- Provide oversight and ensure that effective WC/WDM measures are implemented across all sectors.
- Ensure adequate institutional and financial capacity for WC/WDM.
- Monitor, regulate and establish adequate governance to ensure the implementation of WC/WDM.
- Co-ordinate and co-operate with other government departments, municipalities and WSAs to facilitate the implementation of WC/WDM.
- Promote the reuse, reducing, recycling and recovery of wastewater.

Chapter: 5

Increasing Water Supply

5.1 Context & Current Challenges

South Africa has four internationally shared river basins that contribute 45% of the country's total river flow. The Orange-Senqu River is shared with Botswana; Lesotho and Namibia; the Limpopo River with Botswana; Mozambique and Zimbabwe; and the Inkomati River and the Maputo River are shared with Mozambique and Eswatini. These resources must be shared equitably with these neighbouring states who also have increasing water needs due to growing populations and economies. This may impact on the volume of water from the shared rivers that is available for South Africa.

In addition, climate change is projected to increase the variability of rainfall throughout the country, and reduced average rainfall is expected, particularly in the western part of the country. Climate change may also increase the agricultural demand for water due to higher temperatures and therefore reduce the country's ability to rely on rain-fed agriculture.

Delays in the implementation of Phase 2 of the Lesotho Highlands Water Project (to augment the Vaal River System for greater Gauteng), the uMkhomazi Water Project Phase 1 (to augment the Umgeni System for the KwaZulu-Natal coastal metropolitan region) and the augmentation of the Western Cape Water Supply System have significantly impacted on the water security of these areas.

The increasing gap between water supply and demand in South Africa is driven by over-consumption, over-allocation of water, inefficient use, wastage, leakage, inappropriate infrastructure choices (e.g. water borne sanitation in arid areas), as well as population and economic growth. Water availability will further decline if the degradation of aquatic ecosystems (including wetlands), poor land use practices, high levels of water pollution and increase in invasive alien plants infestations continues.

To balance supply and demand, South Africa must move from the current water mix which is strongly dominated by surface water, with some groundwater and return flows to a water mix that includes increased groundwater use and storm water harvesting as well as reuse, desalination and treated acid mine drainage (AMD).

Greater emphasis must be placed on the use of groundwater. It is not merely an additional supply of water it is the only supply in most of the Northern Cape Province. Since groundwater levels are also running low, better management of aquifers must be done including weekly monitoring of water levels to ensure water availability for future use.

The monitoring of groundwater use should inform actions toward sustainable management of the water resource. Without demand management, currently planned infrastructure development and the broadening of the water mix will not be sufficient to balance supply and demand.

If the targets of reducing physical losses in municipalities are reached, as well as a reduction in the per capita consumption to the global average, in addition to the surface and groundwater supplies, and desalination, re-use and treated AMD, there may be a slight surplus available over the next 20year planning horizon. In the short term, however, urgent mitigation should be put in place for municipalities who have water losses of 25% or higher.

5.2 Guiding Principles

Principles that guide water resource planning, infrastructure development and management are:

- New water resources infrastructure should not be developed or authorised unless effective water conservation and water demand management interventions have been put in place in the affected area.
- Water resource infrastructure development must be based on sound strategies for reconciling realistic water requirements with appropriate supplies.
- Groundwater, wastewater reuse, desalination, treated acid mine drainage, rainwater harvesting and water conservation and water demand management interventions must be, together with surface water resources, recognised and utilised as integral components of water resource Reconciliation Strategies.
- Artificial Recharge (AR) and Management of Aquifer Recharge (MAR) and well fields must be implemented to ensure water demand is met and to properly monitor that groundwater is not being over abstracted and to avoid ecological infrastructure and integrity compromise.
- Water infrastructure planning must be aligned with the vision expressed in the Urban Development Framework in support of South Africa's cities and towns meeting the needs of our growing population for shelter, economic, social and environmental development.
- The principle of "the polluter pays" must be upheld - any reduction of receiving water quality needs to have a value assigned to it.
- The central principle of "the user pays" must be upheld - beneficiaries of the water management system shall contribute to the costs of its establishment and maintenance on an equitable basis.
- The poor communities in the vicinity of state-owned infrastructure must benefit from that infrastructure.
- Universal access to basic water and sanitation must be recognised as a Constitutional responsibility of the national sphere of government.
- Water infrastructure planning and development must consider the multiple use needs of communities and be developed for multi-purpose use.
- Investment in water infrastructure must be cost effective and produce value for money on a sustainable basis.
- Water infrastructure development, operation and maintenance must be used as a vehicle for job creation and for supporting equitable socio-¬economic development.
- Water resource, supply and ecological infrastructure must be properly operated and maintained.
- Planning for water resource development and water supply infrastructure, including design, construction, operation, maintenance, and management of water resource infrastructure, must take full account of ecological infrastructure and the possible consequences of climate change.
- Opportunities for developing the hydro-electric potential of the country must be promoted wherever viable.
- Resilience to flooding must be improved by greater use of sustainable urban drainage systems.

5.3 Baseline & Status Quo

Agricultural users pay a much lower tariff than other users and the relatively cheap water has not incentivised the adoption of water efficient irrigation practices. Studies done for RQOs also indicate that there is not enough water released for ecological flows and that this needs to be increased.

Average domestic water use in South Africa is around 237 litres per person per day compared to the world average of 173 litres per person per day. The high domestic water use is partly due to municipal non-revenue water which is currently at an unacceptably high 41% as outlined in paragraph 4.3. While figures vary greatly between municipalities and services providers, average physical losses in municipal systems sit at around 35%, against a global best practice in the order of 15%. Groundwater potential does exist and is currently underutilised in most parts of South Africa except in the Northern Cape where there is evidence of overuse in some cases. Groundwater needs to be managed better and deeper groundwater potential can be explored in areas that have depleted their current resources.

On the positive side, sea water is unlimited and with the cost of desalination decreasing due to advances in technology, desalinated water (brackish groundwater, mine affected water, sea and wastewater) could become comparable to surface water developments cost wise. Utilisation of desalinated sea water is not only feasible for coastal areas but it may free up surface and ground water for upstream and/or inland use. Re-use of effluent is also becoming more cost effective with advances in technology, and treated effluent from wastewater and mine drainage can be used to supplement supply for domestic use or agriculture use.

5.4 Strategic Objectives & Strategic Actions

The strategic objectives of this chapter and the various strategic actions to be undertaken within each strategic objective are as follows:

5.4.1 Strategic Objective 1

To ensure reliable current and future water supply inclusive of the effects of climate change.

To achieve the above strategic objective, the following strategic actions must be undertaken:

- Update the National Water Balance on regular basis.
- Increase the interconnections of water resource and water services infrastructure to improve water security.
- Strengthen agreements for sharing of water and related benefits with co-basin states, including shared aquifers
- Develop water resource, feasibility, reconciliation, balance and climate change adaptation studies and plans which also include wetlands and estuaries as these systems also play a vital role in the quality and maintenance of groundwater and surface water.
- Achieve integrated water resource planning at national, regional and local levels that will fully and sustainably establish the unique potential of groundwater for socio-economic development.
- Explore impaired water sources and treat to ensure a good water quality is achieved.
- Promote other water source uses such as wastewater reuse, desalination, storm water harvesting and use of mine affected water and other options for secondary use.
- Identify, develop and operate water infrastructure for multiple uses and increase benefits and reduce costs to make the developments more attractive.
- Improve the effectiveness of water resource planning by continuously improving the planning tools to emerging factors like climate change.
- Expand the water mix (surface water, groundwater, re-use and desalination, and incorporate climate change into studies) through developing, updating and maintaining reconciliation water resource planning.
- Incorporate climate change considerations in water resource planning.
- Update the All-Towns studies and reconciliation studies with respect to drought preparedness and integrate the results into with the WSDP process and related sectoral plans (domestic, agriculture, energy, mining, industrial development, land reform and rural development)
- Achieve integrated water resource planning at national, regional and local levels that will fully and sustainably establish the unique potential of groundwater for socio-economic development.
- Implement artificial recharge for water security through more intensive use of the buffer capacity of aquifers by augmenting the groundwater resources.
- Develop saline and brackish inland water sources and update treatment processes to ensure a good water quality is achieved.
- Properly manage the disposal of waste like brine
- Implement desalination of sea water to augment the supply of potable water.
- Explore the feasibility of different direct wastewater and water return-flow reuse options, such as industrial and municipal wastewater reuse, acid mine drainage reuse and other options.
- Support the evaluation of sites identified by the DMRE as possible hydroelectricity generation sites where economically viable.
- Facilitate development of water resource infrastructure by fast tracking requisite detailed feasibility study (including EIA) of high priority interventions and develop bankable projects,
- Increase availability of surface water by eradicating alien invasive species.
- Work collaboratively with the DFFE and other organisations to maintain and restore ecological infrastructure, including Strategic Water Source Areas, for water security and to help buffer against the effects of climate change.
- Develop strategic water resource infrastructure.

5.4.2 Strategic Objective 2

To maintain a long-term capital investment plan for the development of water resources infrastructure.
To achieve the above strategic objective the following strategic actions must be undertaken:

- Determine and continuously update funding requirements for the water sector over a 10-to-30-year horizon.
- Develop an appropriate funding model for the development of water resources infrastructure.
- Develop a funding model for multi-purpose social and economic-related investments that go to the maintenance and rehabilitation of ecological infrastructure, including Strategic Water Source Areas, and that the National Water Pricing Strategy of the DWS makes provision for these types of costs.
- Redirect incentive policies and public expenditures impacting groundwater by and within different sectors to achieve a combined, much stronger focus on sustainable and efficient groundwater management.
- Ensure implementation of asset replacement and upgrading strategy (e.g. the pump transfer system along the Usutu-Vaal scheme is old and inefficient).
- Build capacity across the water sector in financing of water projects

5.4.3 Strategic Objective 3

To ensure that water supply systems and infrastructure are operated, maintained and refurbished according to formal rules and guidelines in addition to operating Decision Support Systems (DSS) that are based on historical data, establish real-time operating systems to facilitate flood water harvesting, minimise system spillage losses, mitigate against risk of flooding damages, and also in preparation to regulate other emerging hydrological processes due to anticipated climate change.

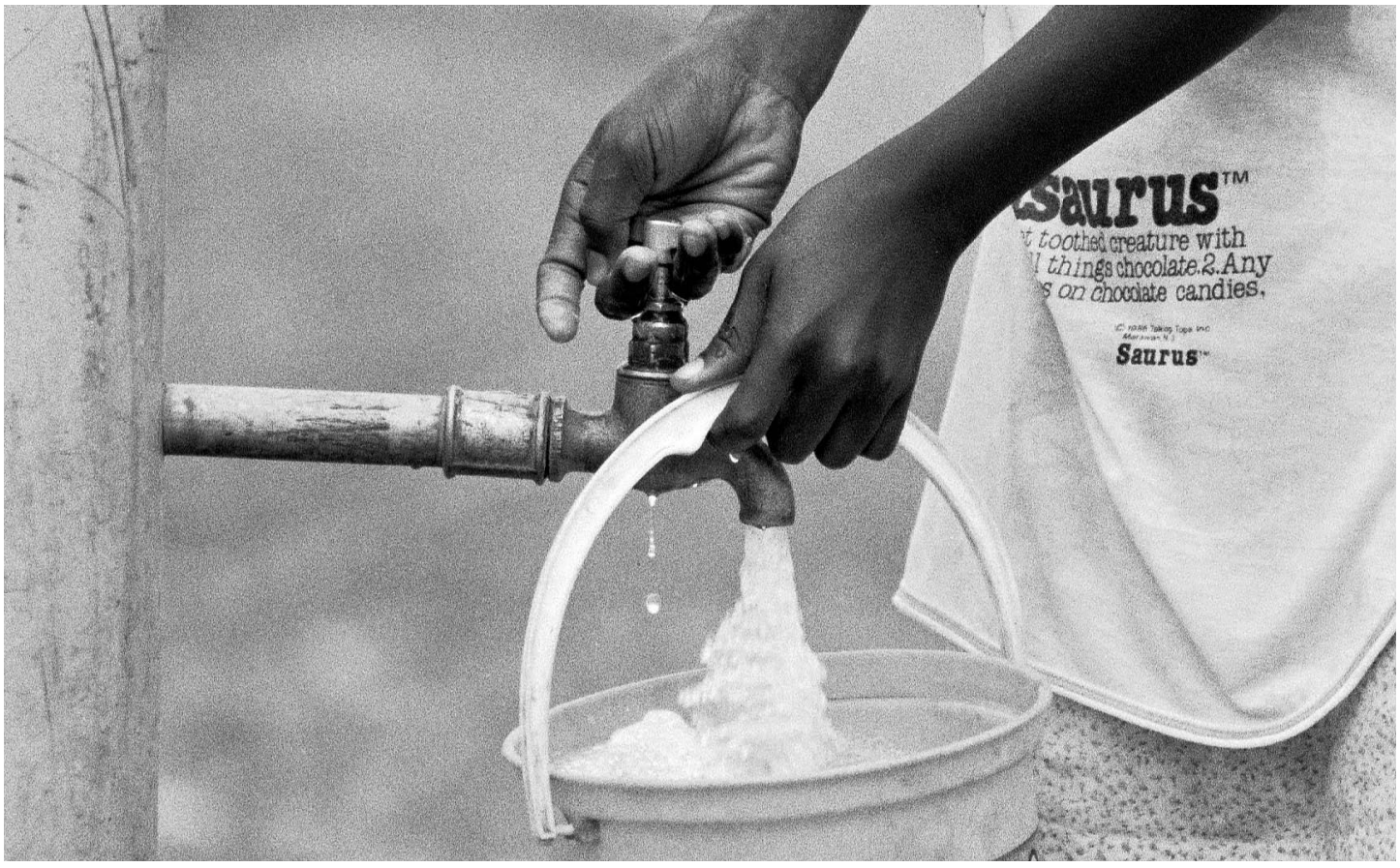
To achieve the above strategic objective the following strategic actions must be undertaken:

- Continue to develop and implement all operating rules and/or management plans for water supply systems and infrastructure.
- Monitor the success and effectiveness of the operating rules. Monitoring of systems performance based on the adopted operating rules is ongoing monthly by tracking observed Dam levels, actual water use and transfers against the projected values. Monthly monitoring meetings with stakeholders are held in cases where water restrictions have been imposed to closely monitor compliance to the restricted volumes. Operating rules for aquifers are important for sustainable groundwater supply and management.
- Produce a National Treasury approved Water and Sanitation Master Plan for maintenance, rehabilitation and refurbishment of infrastructure, including maintenance and restoration of ecological infrastructure.
- Refurbish water conveyance and transfer infrastructure like canals and pipes, as well as the dams and water and sanitation infrastructure, and that incorporates maintenance an including restoration of ecological infrastructure.
- Invest in the care, rehabilitation and restoration of ecological infrastructure including Strategic Water Source Areas to sustain water supply systems, and water resource infrastructures.

5.4.4 Strategic Objective 4

To use water resources infrastructure, particularly major storage dams, to promote multi-purpose stakeholder use.
To achieve the above strategic objective, the following strategic actions must be undertaken:

- Assist water and sanitation institutions to develop systems, for at least, basic domestic and social use, higher levels of services, economic use and recreational use.
- Undertake a feasibility study on hydroelectric power development, aquaculture and recreation where feasible at dams and canals.
- Ensure that a funded management and maintenance plan is in place for the infrastructure.
- Ensure all infrastructure investment projects meet specific return on investment criteria to adequately demonstrate equitable social and economic development.
- Ensure communities situated near large water infrastructure like dams are prioritised and receive access to basic water supply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Chapter: 6

Redistributing Water for Transformation

6.1 Context & Current Challenges

The perpetuation of inequitable water allocation is still an issue that needs to be addressed. At the present moment the National Water Act is under review and the current context is as follows:

- The National Water Act (NWA) stipulates that equity, sustainability and efficiency are the key guiding principles for water resources management.
- Equity in access to the benefits from water resource use means that water must be allocated so that it brings maximum benefit to all, whether directly or indirectly.
- Equity in access to water resources deals with the concept of direct access to water for productive purposes, such as water for irrigating crops or water for a business or an industry.

Equitable access to water, or to the benefits derived from using water, is critical to transformation in the water sector, contributing to eradicating poverty, and promoting equitable sustainable economic growth. Basic principles such as, polluter pays and user pay are intended to facilitate and promote sustainable and equitable access to water resources and water and sanitation services as well as sustainable and equitable provision of water and sanitation services.

The NWRS-3 is centred on the recognition of water as a basic human need, sanitation as human dignity and recognition of its critical role to ensure equitable and sustainable socio-economic development. The yield of a water resource (m3/annum) is not available all the time. During drought, only a fraction is available. Restriction is one of water management practice in such times, to reduce supply to less priority uses (less risky users) to reduce the rate of depletion of the resource so that it may sustain supply for longer to high priority (higher risk users) – hopefully until rains return.

The principle of equity means that special attention must be given to the needs of those that were historically denied access to water or to the economic benefits of water.

Equity implies a concept of fairness, which allows for different practices in the management of water and sanitation in response to different social, economic and environmental needs.

To bring equity to a practical level, it is important to distinguish between equity in access to water and sanitation services, equity in access to water resources and equity in access to the benefits from water resource use through economic, social and environmental development and management.
The majority of South Africans still suffer from water insecurity and lack access to reliable water supplies for domestic and productive purposes and lack of hygienic sanitation services.

There is a water allocation reform (WAR) programme in the DWS dedicated to redressing inequity (race and gender) and poverty eradication. Historically some WULAs were motivated based on partial support of HDIs but this was not captured in the WUL conditions so CME could not monitor compliance. WUL conditions must be auditable and management and implementation of the WAR programme needs to be improved.

The WAR programme entails:

- Water may be set aside in a catchment, specifically for allocation to HDI users.
- General Authorisations (GA), in terms of the NWA, may be gazetted for specific catchments for the allocation of water resources to HDI users.
- Meaningful partnership initiatives, such as Joint Venture initiatives and Public Private Partnerships, when encouraged and implemented may be used to facilitate the WAR and these should also be regularly audited to ensure that they are of real benefit to HDIs.
- Initiatives used to attract targeted beneficiaries of the WAR to consider, develop and enter into water-based business enterprises.

- Compulsory licensing which is the process where all the water uses in an area are reviewed and water is re¬allocated according to specific imperatives, needs and requirements is one of the mechanisms of the WAR. The reasons for introducing compulsory licensing may be any or all of the following:
  1. Achieve a fair allocation of water from a water resource.
  2. Promote beneficial use of water in the public interest.
  3. Facilitate efficient management of the water resource.
  4. Protect water resource quality.

6.2 Guiding Principles

The principles that guide the equitable allocation and provisioning of water resources are summarised below:

- Equity, sustainability and efficiency are core principles of the National Water Policy that underpin the protection, use, development, conservation, management and control of water resources.
- Water allocation will be done in terms of the priorities to ensure that water requirements for national growth and development, including water for strategically important uses, such as power generation, are prioritised.
- Water to meet reserve requirements always receives priority.

Collectively these guiding principles will inform the strategic objectives to be achieved towards the implementation reforms in water allocations.

Unlike other resources that are only measured in quantity, water availability is also measured in assurance of supply. Therefore, where it is taking long to develop additional yield or finalise the WAR processes, a reduced assurance of supply can be considered and in so doing increase water availability of the resource, and hence enable other emerging priority uses to be accommodated.

6.3 Baseline & Status Quo

Equitable access to water resources is far from being achieved:
- Allocations are still largely in the hands of the previously advantaged.
- Most of the current water use licence applications are still from previously advantaged groups.

The implementation of the WAR programme has not yet covered the entire scope of the programme, for example:

- From 2013 to 2022. the total volume of water authorised during the period was 2,1 billion m3/a (including 1,4 billionm3/a allocated to SOEs & Local Government) with 281 million m3/a being allocated to HDIs.
- Compulsory licensing, as one of the mechanisms of the WAR, has only been completed in only three catchments and as such is not very much helping the WAR programme as the process has proved to be slow and is resource intensive and complex.
- General authorisation as the tool in achieving redress and making water available to reallocate, has not been applied with desired intentions and results.

The following are the five clear priorities for allocating water in South Africa and ensuring equity:

Priority 1: In line with the Constitution and the National Water Act, the highest allocation priority is afforded to water for the purposes of the Reserve. In terms of current policy, a quantity of 25 litres per person per day has been incorporated into the Reserve determination. The ecological component of the Reserve is also in dire need of more water allocation.

Priority 2: The second-highest priority, therefore, is meeting international water requirements in terms of the agreements with neighbouring countries.

Priority 3: The third highest priority is accorded to the allocation of water for poverty eradication, the improvement of livelihoods of the poor and the marginalised and uses that will contribute to greater racial and gender equity.

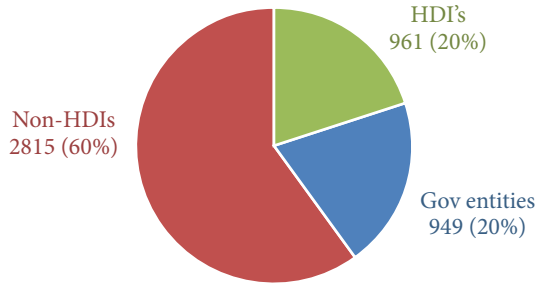
Priority 4: The fourth highest priority is accorded to the allocation of water for uses that are strategically important to the national economy, as described in Section 6(1) (b) (IV) of the National Water Act.

Priority 5: The fifth priority will be water used for general economic purposes, which includes commercial irrigation and forestry.

All five priorities must give effect to allocations that promote equity.

The status quo provides current positions that are not in terms of the accepted principles and that are intended to be impacted through the achievement of the strategic objectives identified below.

Figure 12:
The number of Water Use Authorisation Applications received since 2013.



6.4 Strategic Objectives & Strategic Actions

The strategic objectives of this chapter and the various strategic actions to be undertaken within each strategic objective are as follows:

6.4.1 Strategic Objective 1

To redress race and gender imbalances.

A primary focus of water allocation processes is to redress past race and gender imbalances in water use and to support the reduction of poverty and inequity in the country.

To achieve the above strategic objective, the following strategic actions must be undertaken:

- Align water, land and agrarian reform programmes and link to the Irrigation Strategy.
- Provide financial support to enable access to water resources through implementation of Section 61 of the NWA to deserving Historically Disadvantaged Individuals (HDIs).

6.4.2 Strategic Objective 2

To promote broad-based black economic empowerment.

The water allocation process must contribute to broad-based black economic empowerment (B-BBEE) and gender equity by facilitating access by HDI-owned enterprises to water.

To achieve the above strategic objective, the following strategic actions must be undertaken:

- Investigate, revitalise, refurbish and mentor existing under-performing HDI-owned schemes.
- Define the criteria to allocate water (new/saved) to HDI applicants.

6.4.3 Strategic Objective 3

To be fair, reasonable and consistent in providing access to water use

The water allocation process must be undertaken in a fair, reasonable and consistent manner within the framework of the legislation and Constitutional imperatives.

To achieve the above strategic objective, the following strategic actions must be undertaken:

- Complete the validation and verification process country wide.
- Develop a validation and verification database.
- Accelerate the implementation of the National Water Policy Review (2013) to dismantle water trading as it impedes the implementation of Water Allocation Reform negatively.
- Implement the process of compulsory licensing as envisaged in the NWA.

6.4.4 Strategic Objective 4

To reduce the administrative burden of water use authorisation.

Mechanisms that reduce the administrative burden of authorizing water use must be implemented.
To achieve the above strategic objective, the following strategic actions must be undertaken:

- Implement the water use authorisation process to achieve a streamlined and effective process that can support the allocation and reallocation of water.
- Update the water authorisation and registration management system (WARMS).
- Keep the WARMS information up to date.
- Gazetted general authorisations to be reviewed and updated to enable water use by small scale HDI farmers.

6.4.5 Strategic Objective 5

To respond effectively to local, provincial and national planning initiatives.

The water allocation process and in particular, the WAR programme must be aligned with the land reform and local economic development programmes.

To achieve the above strategic objective, the following strategic actions must be undertaken:

- Work with DALRRD to integrate land, water, and agrarian reform programmes.
- Develop collaboration, implementation, and reporting protocols for the task teams.

Chapter: 7

Managing Effective Water & Sanitation Services

7.1 Context & Current Challenges

The fundamental function of water and sanitation services is to ensure the delivery of potable water and basic sanitation facilities for human and economic needs, protect the environment, improve public health and ensure human dignity through the elimination of all basic water and sanitation service backlogs, while progressively improving levels of service and achieving optimal development and use of infrastructure. The Water Services Act (WSA) stipulates that everyone has a right of access to basic water supply and basic sanitation.
Provision of hygienic, sustainable, equitable and efficient sanitation services is the vision of the National Sanitation Policy, reviewed and approved in 2016.

The basic obligation is to ensure that all people in South Africa have access to effective, reliable, affordable and sustainable water and sanitation services.

The provision of water and sanitation services need to be provided in line with the national priorities contained in the National Government Priority Outcomes. Provision of water and sanitation services is dependent on national water resources being managed, developed and used in support of various national policies, principles, objectives and imperatives; therefore the water and sanitation services need to be provided in a manner that is consistent with the broader goals of integrated water resources management (e.g. interventions to improve the management of urban runoff / storm water to mitigate against pollution of precious water resources).

Water and sanitation services delivery in South Africa acknowledges the Batho Pele principles of consultation, service standards, access, courtesy, information, openness and transparency, redress and value for money. Projects need to be more focussed on outcomes achieved versus funds spent.

Institutional reform, effective regulation, decentralisation and transformation are the key success factors for the water and sanitation services that are sustainable during the term of the NWRS-3 and beyond. These create a complex environment in which many institutions and role-players are involved. The key challenge is to create an enabling and supporting environment which fosters collaboration, mutual support and learning.

The National Development Plan – Vision 2030 (NDP) and the 2nd edition of the National Water Resource Strategy (NWRS-2) state that reducing growth in water demand is as important as increasing water supply.

The overarching guiding principle is the constitutional position, that it is the rights of individuals to have access to basic water and sanitation services, and an environment that is not harmful to their health and wellbeing, whilst setting out the institutional framework for the provision of these services. The Constitution of the RSA gives municipalities the executive authority and the right to administer the provision of water and sanitation services to residents within their areas of jurisdiction. The most important policy priority is the provision of access to, at least, a basic water and sanitation service to all people living in South Africa that is sustainable and affordable.

The NWRS-3 is developed in the context of these constitutional rights, mandates, authorities and policy priorities. The Water Services Act, 1997 (Act 108 of 1997) provides the broad mandate of the DWS as:

- To monitor and intervene, where necessary, in matters of water and sanitation services.
- To maintain a National Water Services Information System.
- To monitor and regulate the performance of all water and sanitation services institutions.

The DWS constitutional and legislated mandate is discharged within the context of all other national and provincial legislation, regulations, and policy directives, as well as within local by-laws.

Water services authorities are responsible for ensuring that adequate investments are made in water and sanitation services infrastructure and that these investments are sustainable over time. The primary instrument of planning in the water and sanitation services sector is the Water Services Development Plan (WSDP), as part of the IDP process, and requires the consideration of the physical, social, economic, financial, environmental and institutional aspects of water and sanitation services provision in a particular Water Services Authority area.

The WSDP seeks to show how the Water Services Authority plans to meet this universal service obligation. The primary objectives of the Water Services Development Plan are to assist Water Services Authorities to carry out their mandate effectively and it serves as a regulatory framework and instrument for the DWS to regulate the sector.

It is the responsibility of the Water Services Authorities to protect assets by ensuring that an appropriate asset management plan is developed and implemented. The Water Services Authority must ensure that the maintenance and rehabilitation plan is part of the Water Services Development Plan. Water Services Authorities are required to maintain a register of water and sanitation services assets and put in place a system to manage these assets in terms of the maintenance and rehabilitation plan. Municipal asset management systems need to be improved to ensure greater sustainability of water and sanitation services. Management of critical water and sanitation services assets is becoming more complex and difficult largely due to ineffective revenue collection, reducing funding options, aging infrastructure, management of available funding programmes, lack of water demand management etc.

7.2 Guiding Principles

The guiding principles for water and sanitation services in South Africa are founded around the concepts of sustainability, equity and affordability. The guiding principles of water and sanitation services have their origin in the Water Services Act (1997) adjusted and repositioned over time. The Strategic Framework for Water Services (2003) further clarified the principles guiding water and sanitation services. The primary principles in relation to water and sanitation services that guide and inform the strategic objectives may be summarised as follows:

Principle 1: Separation of regulatory and operational responsibilities. There is a clear separation of the activities of regulation and operation. This reduces the potential for conflicts of interest inherent in self-regulation and will help to improve the clarity of objectives and responsibilities. Regulation will seek to protect the interests of consumers and balance these with the need for sustainable institutions.

Principle 2: Local government is responsible for ensuring water and sanitation services provision. Provision of water and sanitation services is the constitutional responsibility of local government. Developmental and democratic local government is in the best position to make accountable decisions related to how services should be provided, considering the social and environmental aspects of water and sanitation services.

Principle 3: Management at the appropriate level. The institutional vision provides for management, decision making and control of water and sanitation services projects to be devolved to the lowest appropriate level whilst considering efficiency benefits related to economies of scale.

Principle 4: Access to basic services is a human right. Everyone has the right to have access to a basic level of water and sanitation service, to an environment that is not harmful to his or her health or well-being and to have the environment protected, for the benefit of present and future generations.

Principle 5: Higher levels of service (moving up the ladder). As economic affordability increases and the backlog in the provision of basic services reduces, then depending on water resource availability, it should become possible for more and more households to be provided with higher levels of services.

Principle 6: Consumer responsibility. The right to basic water supply and sanitation services comes with a corresponding responsibility, namely, to use water and sanitation services responsibly and with due care, and to pay for services provided over and above services provided in terms of the free basic water and free basic sanitation policies.

Principle 7: A public good. While water supply and sanitation services are an intensely private social sphere of the water value chain, they are also a public good with environmental and public health protection benefits accruing well beyond the household boundary. Addressing backlogs in access to water supply and sanitation services must be through holistic public interventions especially regarding impacts on water resources.

Principle 8: The user pays principle. Charging for water and sanitation services is essential to generate funds for operating, maintaining and investing in water and sanitation systems. However, tariffs must take into account the affordability of water and sanitation services for the poor. Water and sanitation services should be planned and implemented in response to effective demand which is linked to consumers' willingness and ability to pay the appropriate charges in the context of the prevailing subsidy and pricing framework. Institutions that abstract raw water from water sources must pay for raw water intake.

Principle 9: Integrated planning. This should result in alignment between water and sanitation services and water resources and between the water sector and other spheres of economic and social activity as captured in the integrated development plan and other planning activities.

Principle 10: Sustainable livelihoods and local economic development. Water and sanitation programmes should be designed to support sustainable livelihoods and local economic development. The provision of water supply and sanitation services has significant potential to alleviate poverty through the creation of jobs, use of local resources, improvement of nutrition and health, development of skills, and provision of a long-term livelihood for many households.

Principle 11: The choice of technology. A trade-off must be made between effectiveness, affordability, capacity to operate and maintain, life-cycle costs, consumer acceptability and environmental impact in choosing the appropriate technology. Users should be fully informed of the available technical choices and related financial and operational implications.

Principle 12: Water demand management is necessary to ensure efficient and effective water and sanitation services delivery. Water demand management should be given as much attention as supply expansion in water and sanitation services and water resources planning.

Principle 13: The polluter pays. Producers or generators of pollution will be required to pay for the costs of avoiding pollution or of cleaning up or remedying its effects. The environment must be protected from the potentially negative impacts of developing and operating water and sanitation services.

Principle 14: End-User education. Water and sanitation services must be accompanied by environmental, health and hygiene promotional activities and end user education.

Principle 15: Operations and maintenance. Asset management strategies and maintenance and rehabilitation plans must be developed by WSAs and a register of water and sanitation service assets (bulk and on-site components) put in place as well as a system to manage these assets. These plans must be based on the principle of preventative maintenance so as to ensure long term sustainability.

7.3 Baseline & Status Quo

South Africa is a water-stressed country and facing several water challenges and concerns that include water demand management, security of supply, resource pollution and inefficiency and inappropriate use of water.

Water is the most abundant resource on Earth, 70% of the earth surface is covered by water, yet only 2.5% is available as freshwater and less than 1% of freshwater is accessible for direct human use. Water and Sanitation services infrastructure currently covers more than 35,000km of bulk pipelines and 290,000km of reticulation systems that are managed by 144 Water Service Authorities and their appointed Water Service Providers.

Water and Sanitation service delivery is a complex environment and the following are some of the immediate to medium term challenges facing South Africa:

- Households with access to water supply have increased from 84.4% in 2002 to 88.7% in 2021 (STATS-SA 2021). There are still challenges of providing access to water supply services to the remaining the 11% of households to an RDP level. The main problem however is the reliability of the supply which only reflects a 6% of households receiving a reliable water supply.
- Households with access to improved sanitation, increased from 61.7% in 2002 to 84, 1% in 2021 (STATS-SA 2021). There are still challenges of providing universal access to the remaining 15.9% of households with improved sanitation services including eradicating open defecation.
- 61% of households are serviced with waterborne sanitation systems, which may become unsustainable considering the impact of climate change and the availability of water resources.
- Approximately 30% of water and sanitation infrastructure is dysfunctional due to poor operation and maintenance and lack of infrastructure asset management.
- Drinking water quality in rural areas is problematic.
- The Green Drop Report (2022) notes that 39% (334) of municipal wastewater systems, 89% (102) of Department of Public Works and 3.33% (1) of private systems are categorised as critical (i.e. Green Drop score <31%).
- A budget of R130 billion/annum is needed by 2030 to address capital infrastructure requirements, which is a 32% shortfall of available funds.
- Non-Revenue Water is currently at approximately 45% which equates to approximately R10 billion/annum, and per capita consumption is approximately 217 l/c/d compared with the world average consumption of approximately 173 l/c/d.
- The replacement of old infrastructure and identification of inappropriate infrastructure.
- Drinking water quality in some part of the country does not meet compliance standards.

7.4 Strategic Objectives & Strategic Actions

The strategic objectives of this chapter and the various strategic actions to be undertaken within each strategic objective are as follows:

7.4.1 Strategic Objective 1

To enable integrated planning of water supply and sanitation services.

To achieve the above strategic objective, the following strategic actions must be undertaken:

- Develop and implement a long-term plan for the turn-around of water supply and sanitation services in the country based on a sector-wide approach, that recognises DWS as regulator of W&S provision that includes the development of centralised programmes to obtain economies of scale and to ensure impact (e.g. driving municipal non-revenue-water improvements and assessing the cost-effectiveness and appropriate systems for desalination).
- Plan for disaster management by implementing adequate flood protection and drought management on regional level.
- Provide direct Water Services Development Planning support to WSAs as part of a legal requirement and integration into Municipal IDPS.
- Develop and implement Provincial Water and Sanitation Services Delivery Master Plans to provide reliable and sustainable water supply and sanitation services to all households within South Africa:
- Provincial Bulk Services Master Plans
- Reliable Services Delivery Action Plans that include a backlog analysis and infrastructure asset management plans.
- Set lifecycle planning (asset management) conditions.
- Develop and implement a national water services improvement programme to turn around the functionality of currently dysfunctional, large water and wastewater treatment works with an accompanying publicity campaign, followed by a programme addressing the rest.
- Roll-out Feasibility and Implementation Readiness studies to align with national grant funding programmes.
- Ensure the alignment between municipalities IDPs, WSDPs, Business Plans and infrastructure master plans.
- Ensure the development of proper Water Services Development Plans by WSAs that will effectively inform IDPs (including setting of specific Green, Blue and No Drop targets for WSAs to attain).
- Ensure the development of Excreta/Shit Flow Diagrams and Sanitation Safety Plans by WSAs (including the treatment and reuse of sludge and effluent).
- Facilitate integration of water supply capital budgets and funding programmes.
- Expand and formalise an integrated spatial information and knowledge systems.
- Promote an integrated approach between Regional Bulk Systems and the development of Groundwater as a valid source for conjunctive use.
- Promote and monitor the implementation of water conservation and water demand management (WC/WDM).
- Promote integrated sustainable development for the country and SADC region.

7.4.2 Strategic Objective 2

To ensure efficient, sustainable and safe water supply and sanitation service delivery.

To achieve the above strategic objective, the following strategic actions must be undertaken:

- Deliver services to achieve (100%) universal and safe sanitation coverage throughout the entire sanitation service chain (Municipal Sanitation Projects).
- Deliver services to achieve (100%) universal and sustainable water supply provision (Municipal Water Supply Projects).
- Align interventions with CoGTA on struggling municipalities with existing support programmes e.g. MISA.
- Revisit levels of service for water supply and sanitation services against issues of affordability.
- Investigate and promote alternative service delivery models such as BOTT (build, operate, train and transfer), management contracts and concessions.
- Encourage WSAs to investigate and implement innovative water and sanitation technologies and investigate decentralised water and sanitation solutions.
- Ensure appropriate effective technologies and water use efficiency.
- Ensure safely managed on-site sanitation services throughout the sanitation service chain (collection, transportation, treatment, disposal and/or end use).
- Support municipalities to develop and maintain effective asset management – including operations and maintenance.
- Ensure all Water and Sanitation Policy norms and standards are adhered to.
- Conduct and implement extensive asset assessment and rehabilitation and renewal plans.

7.4.3 Strategic Objective 3

To ensure financially sustainable water supply and sanitation services.

To achieve the above strategic objective, the following strategic actions must be undertaken:

- Develop a credible national water and sanitation investment framework and funding model (considering all existing grant funding and programmes).
- Implement financial systems for effective water and sanitation revenue management.
- Monitor the provision of free basic water and sanitation services.
- Create an environment for financially sustainable water and sanitation service institutions.
- Ensure the existence of a credible pricing strategy for water and sanitation services.
- Ensure the value of sanitation by-products is realised to generate a sanitation economy.
- Ensure allocation of funds for operation and maintenance of water and sanitation infrastructure.
- Facilitate identification of bankable projects.

7.4.4 Strategic Objective 4

To enable acceleration of water supply and sanitation service delivery.

To achieve the above strategic objective, the following strategic actions must be undertaken:

- Provide institutional, planning, development and management support to municipal water and sanitation sector institutions.
- Develop a comprehensive, credible performance assessment mechanism of water and sanitation service delivery in the country.
- Reconcile water and sanitation service delivery figures by sector departments and other role-players.
- Promote the implementation and maintenance of reconciliation strategies by municipalities.
- Establish public/public and public/private partnerships with signed MOUs.
- Facilitate vibrant, equitable and sustainable communities contributing towards food security for all.

7.4.5 Strategic Objective 5

To effectively regulate water supply and sanitation services.

To achieve the above strategic objective, the following strategic actions must be undertaken:

- Review existing norms and standards for all levels of water supply and sanitation services.
- Ensure continuous improvements of regulatory framework for water supply services as part of the WSDP development programme and Water and Sanitation services Audit reports.
- Monitor the use of skilled process controllers and maintenance personnel in sector institutions.
- Revitalise and maintain implementation of the Blue Drop certification programme.
- Revitalise and maintain implementation of the Green Drop certification programme.
- Revitalise and maintain implementation of the No Drop certification programme.
- Develop a non-sewered sanitation regulation programme in light of the SDG requirement to safely manage faecal sludge from onsite sanitation technologies like VIPs, septic tanks and conservancy tanks etc.

7.4.6 Strategic Objective 6

To ensure the principles of health, dignity and protection of the environment are upheld

To achieve the above strategic objective, the following strategic actions must be undertaken:

- Promote use of water supply and sanitation technologies that are appropriate for settlement types and the compactible to the environment
- Promote use of water supply and sanitation technologies that use less or no water.
- Ensure that provision of health, hygiene and end user education is implemented a core component of all water supply and sanitation service delivery.

Chapter: 8

Regulating the Water & Sanitation Sector

8.1 Context & Current Challenges

Regulation of the water, water services and sanitation sector is a critical element of effective, equitable and sustainable management of water resources and the delivery of sustainable and appropriate water and sanitation services.

Regulation aims to change the behaviour of water users and water and sanitation institutions to ensure the sustainable and equitable use, protection, conservation, and development of the nation's water resources and sustainable, equitable and appropriate delivery of water and sanitation services.

The Minister, as a shareholder in several water and sanitation sector institutions, plays a role in providing strategic guidance and oversight to these organisations, which is different from the regulatory role of various organs of state.

These water and sanitation sector institutions may be responsible for the regulatory functions within their delegated areas functions, yet the Minister remains ultimately accountable for every regulatory aspect of water and sanitation.

The DWS's mandate is derived from the Constitution of the Republic of RSA, the National Water Act and the Water Services Act.

The scope of regulation encompasses:

- Water use authorisation: to ensure the equitable and sustainable use of water in the public interest. At present water use of the resource is authorised (or permissible) in one of four ways, namely, in terms of Schedule 1 of the NWA, a general authorisation, an existing lawful use, or in terms of a water use license.
- Water resource protection: publication of resource qualifies objectives aim to provide acceptable water quality parameters for water users to perform in. This will be further strengthened by the future inclusion and regulation of activities within strategic water source areas to ensure that the ecological reserve is protected.
- Drinking water quality regulation: promotes that minimum standards for drinking water provision are incentivised through programmes such as the Blue Drop certification programme and through national minimum norms and standards. Blue Drop programme requirements need to be supported by a sound legislative mandate to strengthen Blue Drop assessments, and non-compliance with the Blue Drop programme should be followed by regulatory action. Authoritative requirements include minimum requirements to prescribe mechanisms for the provision of potable water and a need for authoritative statues to encourage potable water compliance within set standards. Water Resource Regulation to address emerging risks and significant impacts posed to water resources including Mine Water, Unconventional Gas exploration and developments, and groundwater management (addressing quality and aspects of drilling and borehole management) thereby provide an adequate level of protection to water resources and secure a supply of water acceptable quality.
- Water resource regulation: to address emerging risks and significant impacts posed to water resources including mine water, unconventional gas exploration and developments, and groundwater management (addressing quality and aspects of drilling and borehole management) thereby provide an adequate level of protection to water resources and secure a supply of water of acceptable quality.
- Wastewater discharge and faecal sludge management regulation: promotes that minimum standard for industrial effluent and wastewater discharge are incentivised through programmes such as the Green Drop certification programme and through national minimum norms and standards. Green Drop programme requirements need to be supported by a sound legislative mandate to strengthen Green Drop assessments, and non-compliance with the Green Drop programme should be followed by regulatory action. The development of a non-sewered sanitation regulation programme is also required in light of the SDG requirement to safely manage faecal sludge from onsite sanitation technologies like VIPs, septic tanks and conservancy tanks etc. Authoritative requirements must include minimum requirements to prescribe mechanisms for the provision of sanitation

services and a need for authoritative statues to encourage sanitation service compliance within set standards.

- Infrastructure regulation: to ensure that water infrastructure is functional, properly operated and maintained, appropriate for present and future needs, meets public health and safety standards and is sufficiently durable for a realistic economic life expectancy. This includes dam safety regulation to ensure the on-going protection of public health and safety in relation to dams with a safety risk.
- Regulation of corporate governance: in water and sanitation sector institutions to ensure compliance with legislation and rules that govern the behaviour of organizations and functionaries in the public sector, such as the PFMA, MFMA, National Treasury directives, and the King Codes of Conduct.
- Regulation of qualification: to ensure that process controllers and other functionaries responsible for operating water and wastewater works have the requisite skills and that courses offered by training institutions are accredited to the appropriate standards.
- Regulation of competition: to ensure fair competition where appropriate.
- Economic and social regulation: to ensure that pricing is appropriate and pro-poor while still ensuring sufficient funding from revenue and the fiscus to maintain appropriate service standards and sustainable infrastructure.
- Compliance monitoring and enforcement:
  - to ensure that authorized water users and water management institutions comply with their water use authorisation conditions and obligations.
  - to monitor performance of water services institutions against norms and standards.
  - to bring users into compliance through enforcement actions (administrative directives and in future penalties, criminal and civil).
  - to curb unlawful water uses/practices which undermine the availability and integrity of the water resource.

8.2 Guiding Principles

The key guiding principles for achieving the objectives of regulation are listed below.

- Equity: Regulation across the water chain must promote equity in access to water use and water and sanitation services, especially for historically disadvantaged and vulnerable groups.
- Administratively fair and just procedures: Adherence to transparent decision making and due process requirements that allow for public participation and accountability towards all stakeholders.
- Predictability: Provide reasonable certainty as to the principles and rules that will be followed in the regulatory framework.
- Minimal regulation: Regulatory intervention should be the minimum necessary to deal with the matter being addressed and should avoid unnecessary administrative burdens on regulatory and regulated bodies as well as on the water user.
- Transparency: Regulatory outcomes should be easily accessible (published).
- Information based: Water resource, water and sanitation services and institutional information must be publicly available and up to date.
- Appropriate institutional operating framework: A separation of operational and regulatory functions to achieve the optimal degree of independence.
- Absolute independence is seldom possible: The regulatory body must have the capacity to consistently perform professionally, competently and conscientiously.
- Capacity of water and sanitation regulatory bodies: All water and sanitation regulatory bodies must have adequate capacity and capability to formulate an effective water and sanitation regulatory framework, and to implement effective water and sanitation regulation.
- Capacity of water and sanitation regulated bodies: The water and sanitation regulated bodies need sufficient capacity to respond effectively to the water and sanitation regulatory requirements.
- Comprehensive regulation: Regulation should be comprehensive, extending throughout the whole value chain.

8.3 Baseline & Status Quo

The Department of Water and Sanitation (DWS) is responsible for the regulation of the use of water across the country. This includes issuing water use authorizations for water abstraction and storage, instream water uses, waste discharge, dam safety licences for dams with a safety risk and setting the charges for the use of raw water according to the pricing strategy, and bulk water and retail water tariffs in line with the Water Services Act (norms and standards).

DWS also sets standards for water and sanitation provision and for water and sanitation services tariffs. Water Services Authorities are responsible for developing by-laws that, amongst other things, contribute to the regulation of water use in municipal areas. The South African Bureau of Standards sets several standards for the water sector, including drinking water standards. Despite strong regulatory tools in the legislation, the quality of raw water continues to deteriorate across the country, and there are high levels of water theft and water wastage.

The continued use of water under the Existing Lawful Use (ELU) clause of the National Water Act is hampering the redistribution of water and effective regulation of this water use.

Dam safety is managed by too small a team to deliver effectively. In addition, many municipalities have challenges with service quality and assurance of supply so fail to deliver the requisite level of water and sanitation services, including failing to meet drinking water quality standards.

The baseline or the current positions or departure points for the regulatory function at the inception of the NWRS-3 can be summarised as follows:

Water use authorisation

- The backlog of licence applications has largely been removed through finalisation of water-use licence applications within 90 days.
- There is a significant under registration of waste related water uses.
- Validation and verification of existing lawful uses is incomplete.
- The full scope of the Water Allocation Reform (WAR) programme still needs to be implemented.
- There are challenges in streamlining the process of licence approval to ensure and maintain an efficient, equitable and effective authorisation process and to prevent a new backlog from developing.
- There are still major challenges in ensuring the accurate and up-to-date capturing of water use information on the WARM system.
- A complete and accessible electronic database and hard copy of actual issued authorizations with supporting technical documentation to allow for effective compliance monitoring and enforcement is needed.
- The process of compulsory licensing has only been tested in two catchments and is very resource intensive and highly complex.
- Collaboration will be required between the respective departments in so far as climate change matters are concerned. The continued streamlining of authorisations under various pieces of legislation, including the NEMA and the NWA, is important.
- Unconventional gas development is a threat to groundwater and surface water resources; therefore the interconnectivity and interdependence of these systems must be accounted for in regulations.
- Unconventional gas exploration and development activities were declared as a Section 21(e) controlled activity under Section 38(1) (d) in Government Notice 999 (Gazette no: 39299), of 16 October 2015. Draft regulations have been gazetted on unconventional gas exploration and development has been published for comments. These support regulations aim at the regulation of unconventional gas development activities in relation to water resource protection:
  1. Unconventional gas development should include not only exploration and production but also the decommissioning of the wells and waste created by the different types of unconventional gas development.
  2. Events such as earthquakes should be incorporated into this interconnectivity system as they do occur all over the Karoo basin and can have huge implications on groundwater quality and quantity of supply to water in towns as the geological system is vast and complex. In such cases, the entire water network including pipeline should be monitored and not just the well or waste site, to ensure no gas leakage is occurring or endangering the environment or shallow groundwater or surface water resources.
  3. Draft water policy and draft unconventional gas development regulations call for the reuse and treatment of wastewater and disposal to purpose-built waste landfills and treatment works, and for discharge limits to be set as required.
  4. Water from unconventional gas development (if it meets an acceptable standard) should be re-used either as irrigation water or for further oil and gas development, as this water is not yet deemed suitable for human consumption in SA due to possible high concentrations of hydrocarbons and other trace metals and cacogenic materials being present in the water.

Water resource regulation

- Sustainable management of water resources through resource directed measures and source directed controls is needed.
- The protection and maintenance of priority freshwater ecosystems in good condition.
- Rehabilitation and protection of ecological infrastructure, including Strategic Water Source areas is important.
- An Anti-Pollution Task Team has been established to ensure the prevention of pollution of water resources from point and non-point source pollution by managing at source.
- Recharge areas for groundwater and managed aquifer recharge is important.
- Awareness creation among communities, business and decision makers about the value of water and to ensure commitment to sustainable water use practices is needed.
- Monitoring the ecological health of our water resources through an integrated information management system must be done.

Water & sanitation services regulation

- Draft norms and standards for levels of Water and Sanitation Services were gazetted in 2017 but could not be finalised due to policy challenges that needed to be clarified. The Department is revising these Norms and Standards for public consultation in 2023.
- The Green Drop, Blue Drop and No Drop programmes are in place, however these are in need of consistent implementation every second year. This is a good system but in the Northern Cape the water quality cannot be achieved as set out by Blue Drop standards as the water quality is bad due to continuous droughts and climate change. Either the system should be changed to include groundwater quality for each region, and when it was a good rainy season quality can be set against that standard or otherwise water quality standards should be developed for fractured Karoo systems, fractured granite systems, Kalahari sand systems, primary aquifer systems, dolomite systems, WITS systems, TMG, Bushveld Igneous complex etc.
- The Institutional Performance and Assessment Programme (IPAP) formerly known as the Regulatory Performance Monitoring System is being revised and will monitor the performance of Water Services Authorities against the key performance indicators provided in the Strategic Framework for Water Services.
- There are high levels of ongoing pollution of water resources by effluent discharged from malfunctioning wastewater treatment works and a need for storm water runoff to be regulated.
- There are still problems with drinking water quality in several towns.

Classification of works

- Construction of large water infrastructure is regulated under NEMA and the EIA Regulation requirements.
- Regulation of water treatment works must be strengthened.
- Wastewater treatment works regulation needs to be further enforced.

Dam safety regulation

- Dam safety regulation is an on-going programme of regulating dams with a safety risk (i.e. during all design, construction, rehabilitation, alteration and decommissioning phases).
- Increased regulation of new dam specifications is needed.

Regulation of corporate governance

- The process to amend the legislation governing water and sanitation services and water resources to facilitate the achievement of the objectives of government including regulatory framework is ongoing.
- The revised legislation needs to, inter alia, clarify the role of the Water Tribunal, the appeal process, and strengthen the regulatory role of the DWS in relation to water and sanitation services and water resources.
- Adequate enforcement measures around water and sanitation services need to be put in place.

Regulation of qualifications

- Work has been done on updating the qualifications required for water treatment process controllers via a MoU partnership with WISA.
- The regulation of qualifications for process controllers and officials in the water sector must still be expanded to other critical positions.

Regulation of competition

- Economic efficiency, adaptability and development in the water and sanitation sector must be promoted.
- Technology and innovation must be promoted and consumers provided with competitive prices and product choices in the water and sanitation sector.
- Employment and general socio-economic welfare in the water and sanitation sector must be promoted.
- A greater spread of ownership within the economy, in particular by increasing the ownership of historically disadvantaged individuals in the water and sanitation sector must be promoted.
- Small business must be ensured of an equitable opportunity to participate in the economy through participation in the water and sanitation sector.

Economic and social regulation

- A Pricing Strategy for raw water use has been Gazetted and is under review and in the interim the strategy currently under implementation is the Pricing Strategy for raw water of 2007.
- The aggregate of revenues collected from the sale of raw water still does not cover the cost of supplying the water because the tariffs are kept at minimum levels.
- Under-recovery of costs to supply water and sanitation services lead to inability to maintain infrastructure and the inability to build new infrastructure for augmenting supplies to meet growing water needs has suffered, which impacts on the regulatory function.
- Norms and standards for water and sanitation service tariffs currently being implemented are those that were Gazetted in 2002 and are currently undergoing review.
- A project to determine suitable institutional arrangements for economic regulation from source to tap and back to source has been initiated.
- Almost all municipalities provide free basic water and use stepped tariffs that are pro-poor and promote water conservation, but issues with losses and metering still hamper this service.

- Free basic sanitation implementation is not monitored or regulated.
- Economic regulation in the water and sanitation services sector is still a neglected area in the South African context and current institutional arrangements of the economic regulator do not lend themselves to a clear separation of the policy and regulatory roles.
- A business case was approved and consulted on the economic regulator and this is currently being revived with an updated business case.

Compliance monitoring and enforcement

- High levels of illegal water use and pollution from various sources still exist due to capacity constraints and making use of remote sensing tools such as satellites and drones could help to improve compliance monitoring and enforcement efforts especially in water users with large land use footprints i.e. irrigation, mining and afforestation.
- Varying regulatory conditions of licensed water uses create complexity as there are varying conditions for licences under the National Water Act (1998) and those under the Water Act (1956). Historically some WULAs were motivated based on partial support of HDIs but this was not captured in the WUL conditions so CME could not monitor compliance. WUL conditions must be auditable, and management and implementation of the WAR programme needs to be improved.
- The Compliance and Enforcement strategy of 2018 was approved and is being implemented with the development of the National Compliance Information Management System and the Enforcement Case Management System. DWS has partnered with DFFE and instituted an in-house basic Environmental Management Inspectorate Training to strengthen the skills of the inspectors and investigators and to clear the training backlog of compliance and enforcement officials within the Department. Currently, new officials appointed are accommodated in the Inspectorate's 3 weeks basic training programme.
- The Department has grown from eight formally trained and designated inspectors and investigators to eighty-seven
- Current enforcement provisions place a high dependence on the judiciary and long delays are experienced in civil and criminal matters. To address this, the Department is developing in collaboration with DFFE an administrative penalty provision empowered by NEMA.
- Further skill development is ongoing to empower inspectors and investigators have the necessary skills and background knowledge of the various industries, docket management, investigative sampling in order to exercise their functions with authority
- Illegal water abstractions, especially by mines and irrigation farmers present serious problems.
- Mine closures often do not proceed according to the MPRD Regulations which prescribe the requirements to obtain a mine closure certificate and require that at closure groundwater must be fit for current and future domestic and other uses consistent with agreed current and future land use, and surface water must be fit for current and future basic human needs and aquatic ecosystem requirements. Several NEMA regulations must also be adhered to, specifically the Financial Provisioning Regulations, EIA Regulations, etc. Mine closure certificates should be issued once all regulatory requirements relating to mine closure (also those in terms of the NEMA etc.) have been complied with. Abandoned and ownerless mines are also a major challenge.
- Many wastewater treatment works are not authorised and discharge substandard effluent into water sources and such illegal discharges need to be monitored by WSAs and enforced by DWS.
- Acid mine drainage (AMD) is a major source of pollution.
- Waste Discharge Standards are outdated and General & Special Effluent Standards that were gazetted in 1984 are currently being used.
- Unconventional gas development is not yet a compliance monitoring and evaluation problem but is said to pose a threat to groundwater and to the environment which has sparked calls for strict regulation, and due to the highly technical nature of unconventional gas development such regulatory skills will need to be developed internally or sourced for government including DWS.
- Limited capacity in terms of water resource inspectors needs to be urgently addressed as it results in many users not being monitored for compliance with their water use authorizations.
- Limited law enforcement and judicial system capacity to deal with water related crimes results in many unresolved cases.
- There is a growing concern related to municipalities that accept effluent from industries without resources to treat that effluent which is later discharged into water courses without meeting the required standards.

8.4 Strategic Objectives & Strategic Actions

The strategic objectives of this chapter and the various strategic actions to be undertaken within each strategic objective are as follows:

8.4.1 Strategic Objective 1

To contribute to the achievement of government objectives of equity in water allocation and access to water for socio-economic development, redressing the race and gender imbalances of the past and reducing poverty and inequality.

The following strategic actions must be undertaken to achieve this strategic objective:

- Conclude the validation and verification process.
- Develop and implement an action plan to strengthen water use authorisation processes.
- Establish a single aligned authorisation process between the DFFE, and the DMRE, led by DWS.
- Streamline and accelerate the water use authorisation process with necessary resources.
- Prioritise the addressing of capacity constraints and call for compulsory licensing in stressed catchments to ensure equitable allocation of water and to impose appropriate conditions across these catchments where they are currently authorised through ELU's.
- Update authorization regulations.
- Define and implement measures to address the challenges in streamlining the process of water use licence approvals and prevent new licence backlogs from developing.
- Revise the policy and regulations to expand the current subsidies for resource poor farmers to include support to rural development more broadly and include activities and initiatives related to the multiple use of water (e.g. greywater, rainwater harvesting, and storm water), for alternative uses that do not require very high-quality treated water, so as to reduce pressure on conventional water supply systems.

8.4.2 Strategic Objective 2

To effectively regulate the water sector to protect water resources and water users.

The following strategic actions must be undertaken to achieve this strategic objective:

- Incorporate the existing water and sanitation services regulatory framework to develop a comprehensive water and sanitation regulatory framework that will guide the equitable and sustainable regulation of the entire water and sanitation value chain.
- Anchor a shared understanding of groundwater governance in appropriate policy and regulations that will enhance sustainable and efficient use of groundwater resources.
- Revitalise the Green, Blue and No Drop programmes and publish results.
- Develop regulations for non-sewered faecal sludge management.
- Follow up and ensure the implementation of action plans and corrective measures captured in Green, Blue and No Drop programme reports to address the impact on water resources.
- Revise and publish updated s9 and s10 norms and standards in terms of the Water Services Act.
- Include water use efficiency and conservation targets in the KPIs of all water sector institutions including municipalities (i.e. CEOs, Municipal Managers, municipal Water Supply and Sanitation Managers and in municipal implementation plans).
- Establish a Water Efficiency Labelling and Standards (WELS) Scheme.
- Prohibit the use of potable water for unconventional gas development activities to protect water supply and promote efficient use of water.
- Undertake social regulation.
- Develop and maintain Information Management Systems and Integration of NCIMS, ECMS.
- Ensure outcome 10, NECER reporting and Annual CME Reporting.
- Develop an inventory of all water users and uses per sector (mining, industries, agriculture etc.) per province or catchment areas and water resources they impact and map them on GIS to quantify the use of water resources throughout South Africa.
- Promote increased use of risk-based guidelines to assist and support resource poor water users to ensure optimal utilization of existing water resources and end-user goals.

8.4.3 Strategic Objective 3

To protect resource quality and the integrity of water ecosystems.

The following strategic actions must be undertaken to achieve this strategic objective:

- Develop and implement a targeted discharge regulatory strategy inclusive of non-point sources of pollution especially in agricultural and urban areas as well as for the implementation of RQOs in areas where RQOs have been determined. Ensure regulation of storm water quality management especially from urban areas.
- Publish supporting regulations aimed at regulation of unconventional gas development activities in relation to water resource protection.
- Implement the polluter pays principle (Waste Discharge Charge System).
- Promote environmental planning through Environmental Management Frameworks (EMFs) and other tools especially on catchments to ensure protection of water source areas.

- Recognize sector-specific best management practices for the beneficial reuse of biodegradable wastewater via irrigation to agricultural land to allow for the benefits and risks to be managed accordingly.

8.4.4 Strategic Objective 4

To promote and progressively achieve compliance through incentives and effective compliance monitoring and enforcement.

The following strategic actions must be undertaken to achieve this strategic objective:

- Identify and prosecute major non-compliant water users across the country, with a national compliance promotion campaign to accompany the action.
- Develop and promote partnerships with the regulated community to promote self-regulation and best practice.
- Audit compliance of self-regulation requirements of Institutional Water Sectors as per their water use authorisation conditions.
- Ensure the designation of Environmental Management Inspectors (EMIs) and further provision of advanced training.
- Promoted awareness and provided training to Institutional Water Sectors on CME requirements.
- Develop a calculator for applying administrative penalties to be included and empowered by policy and legislative amendments under NEMA to enable application.
- Develop improved regulatory approaches to manage pollution from land-based and in-stream activities.
- Continue to build and strengthen compliance monitoring and enforcement capacity to take strong action against illegal water use in accordance with standard operating procedures.
- Establish a joint compliance monitoring and enforcement programme with DFFE and DMRE.
- Establish a dedicated compliance monitoring and enforcement fund for receipt of proceeds from legal action, agreements and penalties for furtherance of CME activities.
- Ensure trans-boundary compliance monitoring and enforcement engagements with countries of common or shared water resources.
- Include the number of compliance notices and other sanctions imposed, including the proportion of successful interventions and/or criminal prosecutions undertaken against non-compliance include in DWS CME annual reports.
- Compile regular reports on the current state of compliance of water users that includes: (1) compliance to RQOs; (2) Steps taken to monitor compliance with WULs and its impacts, particularly in mining areas; industrial sectors, municipalities and other relevant sectors.
- Take definite steps to ensure legal protection of water source areas through, inter alia, the use of section 24(2A) of NEMA, the inclusion of a specific provision that provides that the DWS Minister has the powers to restrict or prohibit the grant of water use licences alongside the use of a host of legal tools, including section 26(g) of the Regulations of the National Water Act, s49 of the MPRDA, Minister having access to the financial provision set aside by mines to deal with mine water management challenges, management tools in terms of the Conservation of Agricultural Resources Act, 43 of 1983 and SPLUMA, declarations in terms of the National Environmental Management: Biodiversity Act, 10 of 2004, of water source areas as threatened ecosystems, environmental management frameworks and any further tools available.

8.4.5 Strategic Objective 5

To facilitate financially sustainable and well governed water and sanitation institutions.

The following strategic actions must be undertaken to achieve this strategic objective:

- Develop compliance monitoring and enforcement systems that will enable the recording of the measured water abstracted from the resource for irrigation use and regular reporting on the quantity of water used.
- Delegation of regulatory functions that are subject to that delegation to the CMA.
- Get norms and standards for bulk and reticulated potable water supply and sanitation approved.
- Implement and monitor norms and standards for bulk and reticulated potable water supply and sanitation tariffs.

8.4.6 Strategic Objective 6

To ensure water and sanitation infrastructure that is operated efficiently, is properly maintained and operated, poses negligible risk to public health and safety and remains fit for purpose for the full design economic lifespan.

The following strategic actions must be undertaken to achieve this strategic objective:

- Ensure unconventional gas development regulations implement an allowance for dam safety and for the protection of water supply infrastructure to prevent negative impacts on the integrity of dams and water supply infrastructure.
- Ensure that there are adequate resources to ensure safety of dams as well as to assess the holding capacity of dams and adherence to operating rules and regular desilting.
- Implement an integrated and targeted regulatory strategy that focuses resources on critical and priority areas requiring regulation and that co-ordinates the regulatory capacity and authority in the sector.
- Liaise with the SETAs to set standards for qualifications for all functionaries in the water sector.

Chapter: 9

Managing Water & Sanitation Under a Changing Climate

9.1 Context & Current Challenges

Climate change is expected to have a major impact in South Africa with consequences for people, the economy and ecosystems. Water is the primary medium through which the impact of climate change will be felt in South Africa. The effects of climate change are likely to result in changing rainfall patterns, increasing temperatures, as well as in intensity and frequency of extreme events. Increasing evaporation, changes in soil moisture, changes in recharge and runoff are also likely to occur and impact upon water availability and water quality.

While there is a degree of uncertainty on rainfall patterns, temperatures are likely to increase by up to two degrees along the coast and six degrees moving in-land by 2050 and beyond. Spatial and temporal variation is expected in the immediate future. Downscaled climate change scenario projections indicate that the western and interior parts of the country are likely to become drier and hotter, and the eastern parts of the country wetter and warmer. Increased rainfall intensity will exacerbate scouring in rivers and sedimentation in dams, potentially impacting on water infrastructure.

Higher temperatures will contribute to increased evaporation rates that will impact negatively on water quantity, quality and therefore availability of water. Climate change poses significant additional risks to water security, which in turn has a knock-on effect on those sectors highly reliant on water such as agriculture, health and energy as well as mining and industries. Thus, this set of risks must be considered and integrated into short, medium and long term water and sanitation sector strategies and planning approaches.

The National Climate Change Response White Paper (2011), that provides the framework for South Africa's response to climate change and requires the development of sector strategies, advocates a two-pronged approach to be followed in which:

- Firstly, in the short-term, climate change is used as the catalyst for addressing urgent short comings in the water sector and implementing effective, efficient and sustainable water resources and services management measures.
- Secondly, a long-term strategic focus on planning, adaptation and the smart implementation of new concepts and proactive approaches to managing water resources.

The National Climate Change Response Strategy for the Water Sector (DWS, 2014) emphasises good water management which is a critical foundation for adaptation to water-related climate change impacts to this end, the key elements of the strategy include:

- Integrating climate change considerations in the short, medium and long-term water planning processes across water and sanitation and other relevant sectors.
- Sustaining state-of-the-art, water-related research and capacity development in all aspects of climate change.
- Ensuring the availability of relevant high quality, complete and current data, and tools with which to analyse the data on climate change.
- Ensuring that water adaptation measures are managed from a regional perspective given the trans-boundary nature of our major rivers.
- Implementing best catchment and water management practices to ensure the greatest degree of water security and resource protection under changing climatic conditions.
- Investing in water conservation and water demand management.
- Exploring new and unused resources, for example groundwater, re-use of effluent, and desalination and implementing rainwater harvesting, storm water management and grey water use.
- Reducing the vulnerability and enhancement of the resilience to water-related impacts of climate change in communities and sectors at greatest risk.
- Providing human, legal, regulatory, institutional, governance and financial resources and capacity to deal with the long-term effects of climate change.

It is against this background that the DWS has developed a Water and Sanitation Sector Policy on Climate Change (2017) and National Climate Change Adaptation Strategy (2014) for the Water Sector in South Africa. This strategy provides guidance on adaptation to water-related impacts of climate change and to maximise on any beneficial impacts. The strategy details an approach to be taken to climate change adaptation in the water sector, as well as measures and actions that support adaptation.

9.2 Guiding Principles

The achievement of South Africa's climate change response objectives in the water and sanitation sector are guided by the following principles:

- Integration of potential climate change impacts into water resources and water and sanitation services planning and supply at all levels.
- Drive appropriate strategic responses to minimize the impacts of climate change.
- Existing initiatives and institutions must be aligned to improve the effectiveness of the national response (i.e. SDG: 13 - SAWS: climate and forecasting / early warning systems, DFFE: emissions and green programmes).
- Climate and water is elevated onto appropriate agendas to ensure that it is incorporated into the national agenda adequately.
- Critical ecological infrastructure and water and sanitation infrastructure must be protected, maintained and enhanced.
- Riparian vegetation and buffer zones must be rehabilitated and restored (SDGs 6, 13 and 15).
- Water and sanitation infrastructure is planned for a changing future using a no-¬regrets and low regrets approaches.

9.3 Baseline & Status Quo

Southern Africa is recognised as one of the world's most vulnerable regions to the impacts of climate change. Adaptation measures are therefore needed to improve the resilience of societies and economies in the region, including mechanisms to reduce the risks associated with extreme events such as floods and droughts as well as salt water intrusion, in particular in Island States. To assist Member States with this process, the Southern African Development Community (SADC) Secretariat developed a Climate Change Adaptation (CCA) Strategy (2011) for the pivotal shared water sector.

The main goal of the CCA Strategy is to improve climate resilience through the strengthening and adaptation of water resources development and management in Southern Africa. The objective is to further develop the SADC shared water sector as a tool to decrease climate vulnerability, and to ensure that water management practices are well adapted to cope with increased climate variability. The CCA Strategy recognises that the adverse impacts on water escalate to other water-dependent sectors such as energy, health and agriculture. Integrated Water Resources Management (IWRM) is therefore being pursued.

The CCA Strategy promotes the adoption of a multi-dimensional approach to climate change adaptation, in alignment with IWRM. The strategy calls for the implementation of adaptation measures at different geographical intervention levels (local, transboundary river basins, SADC region), in different focal areas of interventions (water governance, water management, infrastructure development), and at different stages of the adaptation process (preparation, response, recovery).

On the 22nd of April 2016, South Africa became a signatory to the Paris Agreement which is a legally binding international framework to guide the global response to the global challenge of climate change - the Paris Agreement requires South Africa to:

- Submit a Nationally Determined Contribution (NDC) every five years.
- Develop policies and measures (PAMs) to implement our NDCs, and to report on progress.
- Account for the NDC (the extent to which goals of the NDC have been met).
- Submit biennial reports to the UNFCCC on national circumstances, emissions, adaptation and other facets of climate change.
- South Africa should submit regular communications on adaptation, and also develop a long-term low-carbon development strategy.

In addition, Chapter 5 of the NDP (2030) entails ensuring environmental sustainability and an equitable transition to a low-carbon economy through focussing on the following key points:

- South Africa has a rich endowment of natural resources which, if used responsibly, can fund the transition to a low-carbon future and a more diverse and inclusive economy.
- Developmental challenges must be addressed in a manner that ensures environmental sustainability and builds resilience to the effects of climate change, particularly in poorer communities.
- Investment in skills, technology and institutional capacity is critical to support the development of a more sustainable society and the transition to a low-carbon economy.
- Focused, institutionalised capacity building and management structures are needed.
- Carbon-pricing mechanisms that target specific mitigation opportunities need to be implemented.

- Consumer awareness initiatives and sufficient recycling infrastructure should result in South Africa becoming a zero-waste society (a circular or blue-green economy e.g. Operation Phakisa).
- Some mining houses have invested in wastewater treatment facilities to recycle mining impacted water, thereby reducing water demand form the water resource. There are also mining initiatives where this water is treated to meet potable water standards (e.g Anglo American initiative in Emalahleni). These water recycling projects by the mines are potential adaptation projects for climate change.
- The development of environmentally sustainable green products and services, including renewable energy technologies, will contribute to the creation of jobs in niche markets where South Africa has or can develop a competitive advantage.

The Department of Environmental Affairs' Long-Term Adaptation Scenarios (2013) technical report on Climate Trends and Scenarios for South Africa highlights the following climate trends that have been observed in South Africa over the past five decades:

- Mean annual temperatures have increased by at least 1.5 times the observed global average of 0.65°C reported by the Fourth Assessment Report (AR4) of the International Panel on Climate Change (IPCC) for the past five decades.
- Maximum and minimum daily temperatures have been increasing annually, and in almost all seasons. A notable exception is the central interior (zone 3, Vaal), where minimum temperatures have been increasing less strongly, and some decreases have been observed.
- High and low temperatures (i.e. hot and cold extremes) have respectively increased and decreased in frequency in most seasons across the country, particularly in the western and northern interior.
- The rate of temperature change has fluctuated, with the highest rates of increase occurring from the middle 1970s to the early 1980s, and again in the late 1990s to middle 2000s.
- Rainfall has shown high inter-annual variability, with smoothed rainfall showing amplitude of about 300 mm, about the same as the national average.
- Annual rainfall trends are weak overall and nonsignificant, but there is a tendency towards a significant decrease in the number of rain days in almost all hydrological zones. This implies a tendency towards an increase in the intensity of rainfall events and increased dry spell duration.
- There has also been a marginal reduction in rainfall for the autumn months in almost all hydrological zones.
- Extreme rainfall events show a tendency towards increasing in frequency annually, and especially in spring and summer, with a reduction in extremes in autumn.
- Overall, rainfall trends are similar in all the hydrological zones, with rainfall being above average in the 1970s, the late 1980s, and mid to late 1990s, and below average in the 1960s and in the early 2000s, reverting to the long-term mean towards 2010.

Four broad climate scenarios could usefully represent plausible climate outcomes over the coming century given the two main groups of emissions scenarios namely unmitigated (unconstrained) and mitigated (constrained) future energy pathways.

South Africa's climate future from 2025 and beyond can be described using four broad climate scenarios at national scale, with different degrees of change and likelihood that capture the results of global mitigation action and the passing of time:

1. Warmer (<3°C above 1961–2000) and wetter, with greater frequency of extreme rainfall events.
2. Warmer (<3°C above 1961–2000) and drier, with an increase in the frequency of drought events and somewhat greater frequency of extreme rainfall events.
3. Hotter (>3°C above 1961–2000) and wetter, with substantially greater frequency of extreme rainfall events.
4. Hotter (>3°C above 1961–2000) and drier, with a substantial increase in the frequency of drought events and greater frequency of extreme rainfall events.

The Department of Environmental Affairs' Long-Term Adaptation Scenarios (2013) technical report on Climate Change Implications for the Water Sector in South Africa emphasises that:

- Climate change impacts on South Africa are likely to be felt primarily via effects on water resources. Projected impacts are due to changes in rainfall and evaporation rate, and hydrological projections are essential for translating these into potential water resource impacts.
- Preliminary projections for national runoff range from a 20% reduction to a 60% increase by as early as mid-century based on an unmitigated emissions pathway. Across the country, this ranges from increases along the eastern seaboard and central interior to decreases in much of the Western and Northern Cape. If global emissions are constrained to stabilise at 450 ppm CO2, these changes are projected to lie between a 5% decrease and a 20% increase in annual runoff.
- Under all four future climate scenarios, a higher frequency of flooding and drought extremes is projected, with the range of extremes exacerbated significantly under the unconstrained global emissions scenario. Under a wetter future climate scenario, significant increases in runoff would result in increased flooding, human health risks, ecosystem disturbance and aesthetic impacts. Drier future climate scenarios would result in reduced surface water availability but would not exclude the risk of extreme flooding events.

- Areas showing highest risks in extreme of increased runoff related events (and flooding conditions) include KwaZulu-Natal, parts of southern Mpumalanga and the Eastern Cape. Specific areas at risk to increased evaporation, decreased rainfall and decreased runoff include the south-west and western regions, and to some extent the central region and the extreme north-east.

9.4 Strategic Objectives & Strategic Actions

The strategic objectives of this chapter and the various strategic actions to be undertaken within each strategic objective are as follows:

9.4.1 Strategic Objective 1

To improve and enhance water management and sanitation for enhanced adaptive capacity.

The following strategic actions must be undertaken to achieve this objective:

- Develop and review climate change mitigation, adaptation and response strategies for the water and sanitation sector.
- Implement climate change response strategies for the water and sanitation sector.
- Ensure representation and coordination with other departments to fulfil national, regional and international climate change policy obligations.

9.4.2 Strategic Objective 2

To integrate climate change considerations into short, medium and long-term water and sanitation planning processes.

The following strategic actions must be undertaken to achieve this objective:

- Give strategic direction to the Department on water and sanitation related climate change aspects.
- Mainstream climate change considerations and issues into planning and management of water and sanitation.
- Invest in ecological infrastructure, especially Strategic Water Source Areas, as an important mechanism for long-term adaptation to the effects of climate change on water provision growth and development.

9.4.3 Strategic Objective 3

To develop appropriate adaptation measures to maximise water security and resource protection under changing climate conditions.

The following strategic actions must be undertaken to achieve this objective:

- Conduct studies on risk and vulnerability assessments of the systems.
- Use appropriate tools to protect climate sensitive water sources.
- Maintain and restore ecological infrastructure in priority areas.

9.4.4 Strategic Objective 4

To enhance internal capacity and provide resources for improved resilience to climate change impacts.

The following strategic actions must be undertaken to achieve this objective:

- Ensure best science and latest knowledge on nature-based adaptations and solutions.

9.4.5 Strategic Objective 5

To increase awareness of and build capacity on climate change issues.

The following strategic actions must be undertaken to achieve this objective:

- Present at different fora on issues relating to climate change and the water and sanitation sector.
- Develop and implement requisite tools in increased awareness and build capacity on climate change issues i.e. using climate change early warning tools for citizens developed with them in a bottom-up approach recognising local indigenous knowledge and facilitating ownership, risk mitigation and resilience.

9.4.6 Strategic Objective 6

To ensure inter-linked climate and hydrological scenario projections representative of the complex inter-related natural systems.
The following strategic actions must be undertaken to achieve this objective:

- Establish and strengthen the Department relationships with academic and research institutions.
- Identify and use coupled climate hydrological scenario projections for water planning and management.

Chapter: 10

Promoting International Cooperation

10.1 Context & Current Challenges

Globalisation has presented an opportunity of strategic engagements in pursuit of national interest. In this regard, the nature of conducting bilateral relations between states has changed dramatically within the last decade. Many states have now developed bilateral cooperation partnerships with each other, which take different forms e.g. Bi-National Commissions (BNCs), bilateral technical cooperation agreements, bilateral consultative mechanisms, Memorandum of Understanding, Statement of intent, etc.

South Africa and therefore the Department of Water and Sanitation (DWS) is advancing national interest on water and sanitation in support of the realization of National Government Priority Outcome 11: Create a better South Africa and contribute to a better Africa and a better world. This is achieved as per guidance of the Department of International Relations and Cooperation (DIRCO).

The DWS recognizes the need to collaborate with all geographic regions, countries and multilateral organisations to ensure that all people have access to safe and reliable supply of drinking water, including sanitation services and thereby ensure water security and sanitation for dignity. Therefore, the Department's international engagements will be driven by the desire to contribute to the development of South Africa via the NDP, the African Continent via the Africa Agenda 2063 and to making the world a better place via commitment to the SDGs.

States now meet and forge closer ties on a bilateral level more than ever before. Regional ties are also on the increase as a strategy to positively deal with the challenges of socio-economic transformation, opportunities for employment creation, skills development, and regional economic integration using water as a catalyst for development. In this regard, the country's engagement in Southern African Development Community (SADC) falls under this category of engagement.

South Africa is a signatory to the following conventions:

- The Convention on the Law of Non-Navigational Uses of International Watercourses, an international treaty of May 1997, pertaining to the uses and conservation of all waters that cross international boundaries, including both surface and groundwater.
- The Revised Protocol on Share Water Courses in the Southern African Development Community (SADC) and has obligations to fulfil in ensuring that it meets its obligations on its trans boundary relations in the interest of regional economic integration, peace and security.

This is against the background that South Africa shares four major international river systems with neighbouring countries:

- The Orange/Senqu system is shared with Lesotho (trans boundary), Botswana and Namibia (contiguous);
- The Limpopo system is shared with Botswana, and Zimbabwe (contiguous) and Mozambique (trans boundary);
- The Nkomati system is shared with Eswatini and Mozambique (transboundary); and
- The Usutu/Pongola-Maputo system is shared with Mozambique and Eswatini (transboundary).

Recently, South Africa served as a member of the High-Level Panel on Water (HLPW) where South Africa's President served among the 11 sitting Presidents to advance the goal 6 on Water and Sanitation for all. The Outcome of the High-Level Panel on Water has highlighted key imperatives for the countries to achieve Goal 6 through key Programmes such as Valuing Water, Africa Infrastructure Programme (AIP). Furthermore, the work of the Panel culminated into the adoption of the Decade on Water 2018 to 2028 where South Africa is serving in the Decade on Water Steering Committee.

Based on the above and as indicated by foreign policy documents, the SADC is the main priority of the South African foreign policy. RSA has economy and infrastructure interaction with the countries in the region, which inform the common conditions under which the Department must operate.

In this regard, South Africa is currently cooperating with Namibia with a view to jointly study the options for water infrastructure in the Lower Orange River and jointly conducting a study with Botswana and Lesotho on Botswana Water transfer.

South Africa has strategic partnerships in the following areas:

- SADC countries and the rest of Africa;
- South-South Cooperation;
- North–South Cooperation;
- Multilateral cooperation in Africa;
- Multilateral cooperation outside Africa; and
- UN-Family and global water platforms.

From time to time, DIRCO invites DWS to participate in International Presidential Projects aimed at advancing national water sector interest, and for DWS to deliver Presidential International Projects aimed at strengthening bilateral cooperation and supporting reconstruction and development of countries recovering from crisis.

DWS experts get invitations from international organisations to present papers on their areas of expertise. This is a knowledge generating agenda which goes a long way in enhancing knowledge generation and validating DWS and water entity experts through reputable peer review mechanisms and conferences.

This chapter on international water cooperation and trans-boundary management seeks to achieve the following:

- to ensure that transboundary water cooperation contribute to water security in the country;
- to guide the water and sanitation sector on the development and promotion of develop strategic international partnerships with a view to respond to challenges facing the water and sanitation sector and to harness capacity building and to exchange expertise and information;
- to guide the water and sanitation sector in international engagements, including the servicing of existing agreements and obligations and to enhance future engagements for the benefit of the sector in strategic partnerships at both bilateral and multilateral level;
- to tap into the expertise of international partners (in this regard, international relations will be used to benchmark, share lessons and experiences, exchange expertise and to further advance national interest by providing capacity building and expertise to those partners who fall into the category of being assisted by South Africa);
- to play a consistent role in advancing common regional and continental interest, based on national interest in the global governance system through influence; this will be demonstrated through DWS fulfilling its obligation in all the shared river basins and contributing to the Africa and global governance or multilateral platforms such as the AMCOW, World Water Weeks, UN Family, SADC;
- to consistently identify international opportunities for job creation, research partners, provision of services in strategic partner countries and institutions and business opportunities for the benefit of the RSA private sector, the water entities and the South African citizens; to facilitate access to sources of funding, expertise and in-kind resources for national and regional development initiatives related to water;
- to consistently identify trends and practices that contribute to the refinement of departmental policies, strategies and practices;
- to position and validate South African water and sanitation experts and scientists through their participation in the related international platforms;
- to enhance interaction with international civil society, non-governmental organisations (NGOs) and other key local strategic stakeholders on international water and sanitation issues and the implementation of key strategic water and sanitation engagements with the aim of creating dynamic partnerships for development and cooperation for the benefit of the sector;
- to leverage, through strategic partnerships, joint programmes, agreements, cooperation and other international initiatives, international and regional skills, capacity, resources and expertise in water and sanitation management;
- to expand international cooperation and capacity-building support to South Africa and neighbouring countries in water- and sanitation-related activities and programmes; and
- to ensure that research and innovation in the sanitation sector is crucial to achieving both national and international imperatives of water conservation and demand management, water security and the public health benefits of sanitation.

10.2 Guiding Principles

The principles that guide South Africa's water and sanitation sector are cooperation, the development and implementation of global or international water and sanitation governance and management. These aspects are primarily set out in the following documents:

- The Constitution of the Republic of South Africa.
- The National Development Plan, 2030.
- National interest on water and sanitation in line with foreign policy imperatives including Foreign policy discussion documents from the Department of International Relations and Cooperation.
- The United Nations Convention on the Law of Non-Navigational Uses of International Watercourses, an international treaty of May 1997, pertaining to the uses and conservation of all waters that cross international boundaries, including both surface and groundwater of which RSA is a signatory.

- The "Revised Protocol on Shared Water Courses in the Southern African Development Community" to which South Africa is a signatory.
- Presidential Outcome 11 on "creating a better South Africa and contributing to a better and safer world".
- African Union 2063 Agenda.
- SADC Regional Strategic Implementation Plan of 2021-2025.
- AMCOW Work plan.
- Ramsar Convention (DWS/DFFE/DALRRD management of wetlands of international importance).
- Sharm el Sheik Declaration of AMCOW.
- eThekwini Declaration on sanitation of AMCOW.
- The International Sustainable Development Goals (SDGs), Agenda 2030.
- The 2030 Agenda for Sustainable Development, in in particular, (SDG6 on ensuring availability and sustainable management of water and sanitation for all.
- Relevant South African legislation and policies governing international water cooperation.
- Bilateral cooperation Indicators for Active Water cooperation.
- Report on the outcome of the High-level Panel on Water of 2018.

10.3 Baseline & Status Quo

The Southern African Development Community (SADC) has adopted the Revised Protocol on Shared Water Courses in the Southern African Development Community (SADC Protocol), which establishes the preconditions for joint management of transboundary water resources. In addition, the SADC focuses on developing trans-boundary water infrastructure for improving the lives of the people living in the region.

The primary purpose of the SADC Protocol is to develop closer cooperation between SADC member states for the sustainable and coordinated management, protection and utilisation of shared watercourses in the most beneficial way to advance the SADC Agenda of regional integration and poverty reduction.

This primary purpose is achieved through the establishment of shared watercourse institutions or River Basin Organisations (RBO). Shared watercourse institutions are established as a River Basin Commission, Joint Water Commission, Technical Committee or Joint Water Authority. The establishment of shared watercourse institutions is guided by a series of general principles of customary law as detailed above.

South Africa is a signatory to the Revised Protocol on Shared Water Courses in the SADC; it thus has an obligation to fulfil its commitments through cooperation with its neighbours in the management of international waters in the interest of regional economic integration, peace and security. South Africa shares four major rivers systems with six neighbouring countries:

- Orange/Senqu system shared with Lesotho, Botswana and Namibia through the Orange-Senqu River Commission.
- Limpopo system shared with Botswana, Zimbabwe and Mozambique through the Limpopo Watercourse Commission.
- Inco-Maputo and Usuthu/Pongola systems shared with Eswatini and Mozambique through the administration of the Inco-Maputo agreement by Incomati and Maputo Watercourse Commission.

Furthermore, South Africa cooperates with some SADC countries that South Africa shares rivers and borders with through the following Commissions:

- RSA/Botswana Joint Permanent Technical Commission (JPTC);
- RSA/Kingdom of Lesotho Highlands Water Commission (LHWC) on the Lesotho Highlands Water Project;
- RSA/Namibia Permanent Water Commission (PWC);
- RSA/Mozambique Joint Water Commission (JWC);
- RSA/Zimbabwe Joint Water Commission (JWC);
- RSA/the Kingdom of Eswatini Joint Water Committee (JWC);
- RSA/DRC; Joint Water Commission (JWC).

Outside Africa, South Africa has implemented strategic bilateral cooperation programmes globally with countries such as the Netherlands, Denmark; Iran (training), Sweden, Netherlands, Cuba, China Japan, USA, Russia and Hungary.

These Africa and Global Bilateral Cooperation engagements have resulted in active water cooperation within states and enabled the resolution of water and sanitation issues through structured relations and has further contributed to the Programme of Bi-National Commissions.

Furthermore, these engagements have resulted in high impact in terms of benefiting the water and sanitation sector through scholarships, secondment of technical experts and engineers to support South Africa, tailored training programmes, development of training facilities and support for the municipalities through water and sanitation grants and training opportunities. Furthermore, all these bilateral cooperation partnerships have met the Indicators for Active Water Cooperation. South Africa's current water and sanitation engagement with other countries is shown top opposite page.

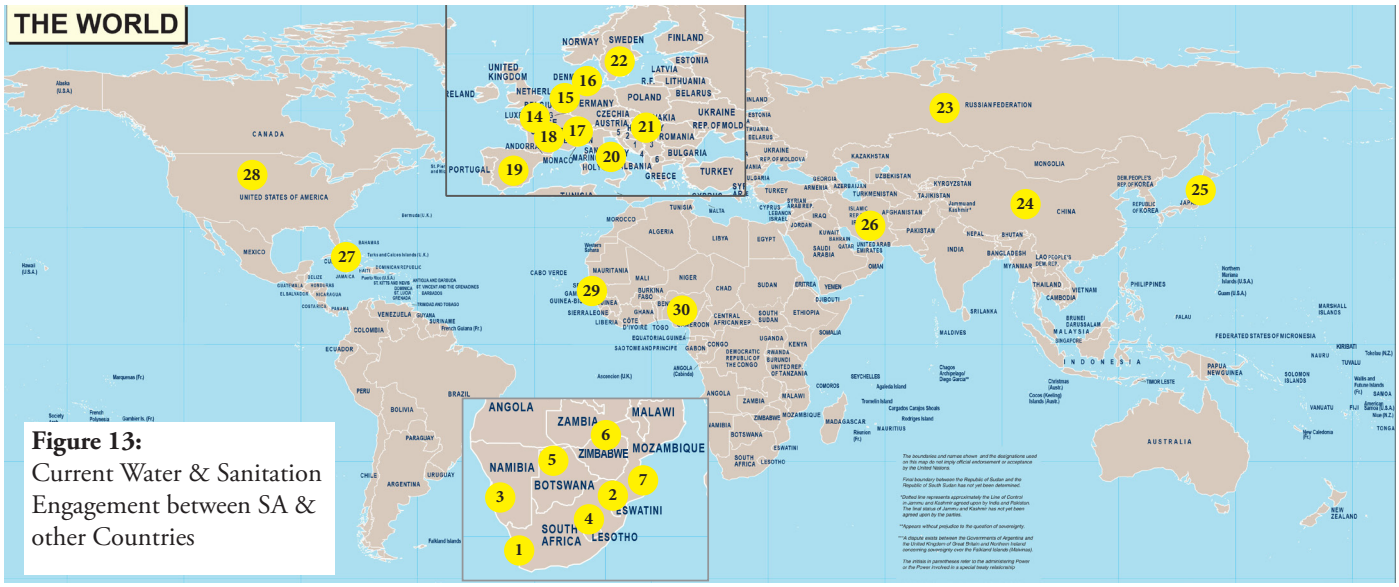


Figure 13: Current Water & Sanitation Engagement between SA & other Countries

1	Republic of South Africa	9	LIMCOM	17	Switzerland	25	Japan
2	Eswatini	10	TPTC	18	France	26	Islamic Republic of Iran
3	Namibia	11	SADC	19	Spain	27	Cuba
4	Lesotho	12	NEPAD	20	Italy	28	United States of America
5	Botswana	13	AUC	21	Hungary	29	Senegal
6	Zimbabwe	14	EUROPEAN UNION	22	Sweden	30	Nigeria
7	Mozambique	15	Netherlands	23	Russia		
8	ORASECOM	16	Denmark	24	China		

South Africa's role in Africa multilateral forums has a significant influence on global decisions and there is a strong linkage between these forums. This was demonstrated through South Africa's participation on the African Ministers Council on Water (AMCOW), Southern African Development Community (SADC) Ministers responsible for water and the nexus Ministers responsible for energy and food (agriculture) and the related Senior Officials including the Water Resources Technical Committees. In Southern Africa, the critical development was the adoption of the SADC Infrastructure Masterplan where RSA contributed on the water and sanitation chapter.

Furthermore, SADC also adopted a 2016 SADC Industrialization Strategy and Roadmap which resonates with South Africa's vision in the Water and Sanitation Masterplan on Infrastructure Development and investment in water infrastructure as there is a recognition that no industrialization can take place without water security in the region.

South Africa is a founding member of AMCOW and serves on the AMCOW Executive Committee (EXCO) and on its Technical Advisory Committee (TAC) on a rotational basis. Furthermore, the AMCOW provides policy development leadership on water issues and challenges at a continental level. South Africa has participated at this forum with a view to position water and sanitation as key drivers of development in the continent. Furthermore, this platform serves as a reporting line for African Ministers to Heads of State on the status of implementing the SDG6 on water and sanitation for all through its Monitoring and Evaluation Programme.

Furthermore, South Africa participates in the Pan African Sanitation Programme of AMCOW called the AfriSAN which is held biannually in line with the eThekwini Declaration.

AfriSAN has taken a key decision among others that the AMCOW Secretariat and its AfricaSAN partners will develop a programme aimed at promoting the use of available technologies in the form of pilots and demonstrators with a view to developing the concept of a Pan-African Test Bed network for innovative water and sanitation solutions. This is aimed to improve the quality of water and sanitation data, strengthen the Water and Sanitation Sector Monitoring system, establish a Knowledge Management and Information Sharing hub at the AMCOW Secretariat, and link up with relevant water and sanitation institutions, including the Water Research Commission, in the Republic of South Africa. These decisions ensure that South African institutions such as the WRC are best positioned in the international space to demonstrate their capabilities in technology development and technology transfer in Africa.

South Africa's cooperation with global multilateral forums has grown to include the European Union (EU), Brazil, India, China South Africa (BRICS), the World Water Council (WWC), and Strategic International Water Weeks such as the Stockholm World Water Week (SWWW), Amsterdam International Water Week, Singapore Water Week, and the International Water Association (IWA), among others.

The DWS participates actively in several programmes that are run by the UN and its agencies. To date, South Africa contributed through the work of UN-Water by serving in the UN High Level Panel on Water Steering Committee through its Sherpas and the President played a critical role in advancing Goal 6 with other 11 sitting Presidents. This work has influenced the global agenda on water and further position water as a key catalyst for development. The HLPW has produced an Outcomes document which has further resulted in the United Nations General Assembly (UNGA) to adopt a resolution on the Water Decade 2018 to 2028 which will guide the work on UN Water going forward.

Other United Nations platforms which were critical in positioning water as a driver for economic development are United Nations Framework Convention on Climate Change (UNFCCC), and several United Nations Educational, Scientific and Cultural Organisation (UNESCO) programmes, which include FETWater, International Hydrological Programme (IHP) and International Hydrological Education IHE) programmes. These programmes have resulted in South African experts influencing the Programmes in these platforms and enabled RSA experts to present their papers for international validation and positioning them as key global contributors to knowledge generation.

The South African Water and Sanitation Sector (Entities) has also participated in these multilateral for a such as the World Water Forum arranged by the World Water Council (WWC) and the Stockholm World Water Week arranged by the Stockholm International Water Institute (SIWI), Amsterdam International Water Week arranged by the Dutch Government, International Water Association (IWA), and International multi-stakeholder institutions where our Department and its entities have shared their expertise and learning on best practices. These platforms have positioned RSA experts as global payers and generators of knowledge.

Strategic Water Resources Group SWPN is the brainchild of the Water Resources Group, an initiative of the World Economic Forum established in 2011. This is a Public Private Partnership Programme with Industry in support of achieving water security in 2030. The shared goal between DWS and the private sector is to contribute to closing the projected 17% water gap by 2030, through partnership between the public and private sector, as a contribution to efficient, equitable and sustainable water supply and access to water for all South Africans. Since inception, there has been a process of evolution through an establishment phase, an analysis phase, and now a phase of piloting and scaling up the execution of programmes. SWPN can report significant successes, specifically. A viable partnership model has been established Projects with high potential for impact of the reduction of water loss have been delivered.

The Partnership has evolved to the point where there can be, and is, a greater focus on pilot and innovative project delivery going forward. The SWPN was awarded the 2018 State-of-the-Art Partnership of the Year Award in the clean water category at the Partnership for Growth (P4G) Summit in Copenhagen in October 2018.

10.4 Strategic Objectives & Strategic Actions

The strategic objectives of this chapter and the various strategic actions to be undertaken within each strategic objective are as follows:

10.4.1 Strategic Objective 1

To advance the African agenda through sustainable development by multilateral and bilateral cooperation in Africa.

The following strategic actions must be undertaken to achieve this objective:

- Service and implement existing Africa bilateral agreements and obligations.
- Develop new strategic bilateral agreements which yield results in technology transfer opportunities and water and sanitation business opportunities for RSA Entities.
- Advance South Africa's interest in SADC, AMCOW and AfriSAN and related platforms by influencing the water and sanitation agenda.
- Ensure that RSA fulfils its reporting obligations in the SADC, AMCOW and other key related Africa multilateral platforms.

10.4.2 Strategic Objective 2

To advance the water and sanitation agendas in the global system of governance and water and sanitation diplomacy in support of political and economic relations through multilateral cooperation.

The following strategic actions must be undertaken to achieve this objective:

- Facilitate access to sources of funding, expertise and in-kind resources for national and regional development initiatives related to water and sanitation through key multilateral organisation and platforms.
- Continued participation in the UN Water related engagements and in particular, as a Steering Committee Member at the UN-Decade on Water 2018 to 2028.
- Identify trends and practices that can contribute to the refinement of South African policies, strategies and practices in platforms such as the World Water Week, World Water Council and Forum, and World Water Summits.

- Facilitate the participation of RSA water experts in International multilateral platforms with a view to contribute to knowledge generation and validation of their expertise by their peers.

10.4.3 Strategic Objective 3

To advance strategic global bilateral relations, particularly South-South and North-South relations.

The following strategic actions must be undertaken to achieve this objective:

- Service and implement existing global agreements and obligations
- Develop new strategic bilateral agreements which yield results in technology transfer opportunities and water and sanitation business opportunities for RSA Entities.
- Position the South African water and sanitation sector as a preferred destination for investment in water and sanitation infrastructure.
- Share knowledge, expertise and technical cooperation exchange training programmes aimed at benefiting the water sector.

10.4.4 Strategic Objective 4

To enhance technical and development cooperation regarding international resources.

The following strategic actions must be undertaken to achieve this objective:

- Exchange technical, engineering and scientific expertise to advance the national interest by providing capacity building and expertise to partners who can be assisted by South Africa.
- Leverage international resources for the benefit of the water sector.
- Advance the interest of water entities in technical cooperation with strategic partners in Africa, and globally.
- Tap into the expertise available through international partnerships with a view to support RSA institutions to implement the Water and Sanitation Masterplan.

10.4.5 Strategic Objective 5

To promote and facilitate the establishment of shared resources agreements and shared watercourse institutions for the management of share watercourses (including for aquifers that are transboundary but with no River Basin Organisations established).

The following strategic actions must be undertaken to achieve this objective:

- Provide guidance to the water and sanitation sector in the shared watercourse institutions.
- Influence and support the full development of river basin organisations such as the Limpopo Watercourse Commission and the Tripartite Permanent Technical Committee and support the capacity building of their related secretariats through secondments where necessary.
- Advance the implementation of the respective transboundary Strategic Action Plans in line with RSA national interest.
- Enhance the sustainable, equitable and reasonable utilisation of the watercourses through participation in the Commissions where RSA is a member.
- Use international relations as a benchmark for sharing lessons and experiences with other global River Basin Organisations.
- Promote a co-ordinated and integrated environmentally sound development and management of share watercourses and sanitation programmes for the benefit of RSA water resources regime.
- Promote the harmonisation and monitoring of legislation and policies for planning, development, conservation of watercourses and allocation of the water and sanitation resources.
- Actively participate in and grow appropriate regional and international partnerships towards groundwater resource understanding and optimal utilization, including transboundary resource management.

10.4.6 Strategic Objective 6

To promote research and technology development, information exchange, capacity building and the application of appropriate technologies with partner countries in Africa and Globally.

The following strategic actions must be undertaken to achieve this objective:

- Utilise strategic partnerships to harness opportunities for capacity building and exchange of expertise and information in addressing challenges faced by the water sector.
- Identify international opportunities for job creation, research partnerships, and provision of services in strategic partner countries.

Chapter: 11

Improving Water Quality

11.1 Context & Current Challenges

The water quality management context and current challenges below are informed by the content in the DWS IWQM Strategy Edition 2 (2017). Due to the importance of improving water quality within South Africa it is expected that the content, strategic objectives and strategic actions contained in this chapter may overlap in some parts with other chapters in the NWRS-3.

Water quality and water quantity issues are inextricably linked. One of the elements of WQM is recognising that water resources have a certain assimilative capacity which can dilute pollution to acceptable levels. Increased abstraction of water from our water resources has two impacts on water quality:

- Firstly, it decreases the amount of water available in the water resources, resulting in reduced assimilative capacity and increased concentrations of pollutants; and
- Secondly, a portion of the abstracted water is usually returned to the water resources at the tail end of the use processes, usually in a worse quality than when abstracted.

Thus, the management of water quality in South Africa cannot be done in isolation from the management of abstraction, storage and use. The prevalence and / or severity of impact of particular water quality issues vary markedly from river system to river system and between water management areas as can be seen in the map below showing the different types of water quality problems across South Africa.

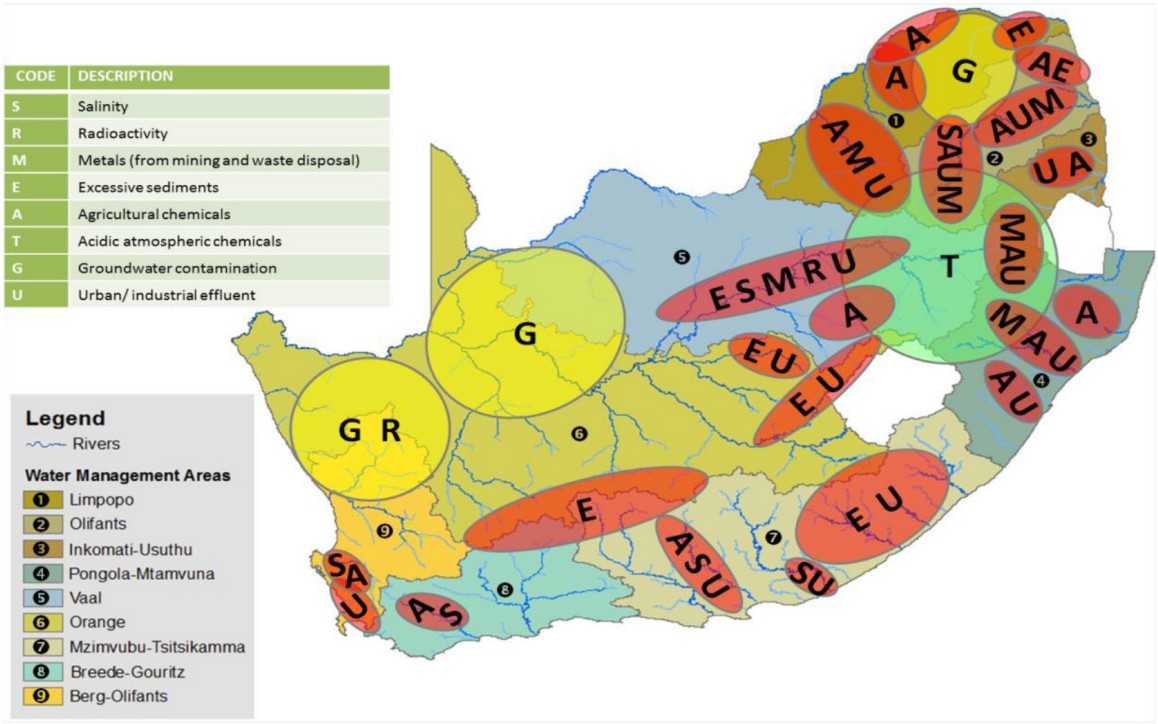


Figure 14: Water Quality Problems occurring across SA

There are thirteen water quality management challenges noted in South Africa, namely – eutrophication, acidification, salinization, sedimentation, urban runoff, radioactivity, thermal pollution, pathogens, organics (including endocrine disruptors), hydrocarbons, agrochemicals, metals and nanoparticles (including micro plastics). Individually, these thirteen issues differ in terms of the following characteristics:

- The geographical extent of their impact;
- The cumulative severity of their impacts on the fitness-for-use of the resource, on water users health, on the local and regional economy, and on local and downstream ecosystems;
- The extent to which they have been/are being monitored; and
- Levels of technical/scientific knowledge and understanding of the above impacts, their temporal patterns and geographic prevalence.

Based on the above analysis five priority water quality issues stand out, around which there is considerable knowledge for action, and the impacts are recognised as being highly significant. These five prioritised water quality issues are shown in the table below and each emanates from various sources and has a range of factors that exacerbate their impact. *(See table 4 below)*

Many of the other sources of pollution display localised effects (e.g. radio-activity and thermal pollution) or the level of knowledge, understanding or impact (e.g. nanoparticles, hydrocarbons) were too low to make informed decisions around their management (i.e. the impact on water resourced from atmospheric deposition).

Some of the remaining water quality issues, such as microbial (pathogen), agrochemical and metals pollution, are known to be potentially harmful, but due to inadequate monitoring and their geographical prevalence not being known, challenges exist in effectively managing these types of pollution. Monitoring to improve our understanding of these pollutants and their impacts will be strategically critical. As the economy develops, more pressure will be placed upon our water resources. In order to improve the management of these resources, it is crucial to have a full understanding of the root causes of these water quality challenges and the way they are currently managed.

The five priority water quality challenges outlined above all have multi-sectoral characteristics and speak to the overlapping or adjacent mandates of a range of government institutions. For that reason, the requisite future management responses to these challenges will need to go well beyond the statutory and regulatory mandate, measures, controls, instruments and processes of DWS alone.

The future management of these water quality challenges will need strategic regulatory collaboration and partnerships between DWS and various other state institutions across all three tiers of government, the CMAs, water boards, universities, research institutions, the private sector and organised civil society.

Table 4: Water Quality Issues & Sources of Pollution

Water Quality Issue	Source of Pollution
Eutrophication	Agricultural sources, domestic wastewater, urban storm-water runoff and diffuse sources.
Salinisation	Natural sources, agricultural sources, industrial sources, domestic wastewater and diffuse sources.
Acidification/Alkalinisation	Mining sources, industrial sources and emissions.
Urban Pollution	Microbial pollution, solid waste, heavy metal contamination, hydrocarbon sources, sedimentation, nutrient enrichment and storm-water runoff.
Sedimentation	Destruction of riparian habitats and wetlands, natural runoff, agricultural sources and urban runoff.

The current state of the country's water resources indicates that the management of water quality has not been as effective as required to ensure that water resources are sustainably used. The key issue is due to a number of complex and inter-connected challenges such as balancing of socio-economic development needs, on-going uncertainties in governance, challenges with appropriate technical capacity and impacts of global shocks like climate change and disasters as illustrated in the diagram below; as well as challenges of poor maintenance, aging infrastructure and inefficient monitoring and data management leading to poor decision-making.*(figure 15 below)*

Broadly, the challenges can be split into 4 categories: (i) Non-aligned policy, legislative and governance frameworks, (ii) Inappropriate practices, (iii) Insufficient finances and (iv) Ineffective knowledge and information management - these are elaborated on below:

Challenges due to non-aligned policy, legislative and governance frameworks:

- Fragmented policies and implementation;
- Insufficient cooperative governance;
- Unclear regulatory responsibility and associated cooperative governance;
- Fragmented responsibility for WQM functions;
- Delay in the development of Catchment Management Strategies; and
- Lack of a Non-Point Source Strategy (NPSS).

Challenges due to inappropriate practices:

- Inadequate measures to counter adverse land use practices;
- Challenges with treating wastewater;
- Lack of funding for implementation of mining rehabilitation plans;
- Non-performing municipalities;
- Mushrooming of informal dense human settlements in urban areas and in an appropriate location, such as, wetland and industrial high risk areas; and
- Lack of an integrated, catchment approach.

Challenges due to insufficient financing:

- Budget allocations for WQM is insufficient; and
- Lack of broadened finance mechanisms.

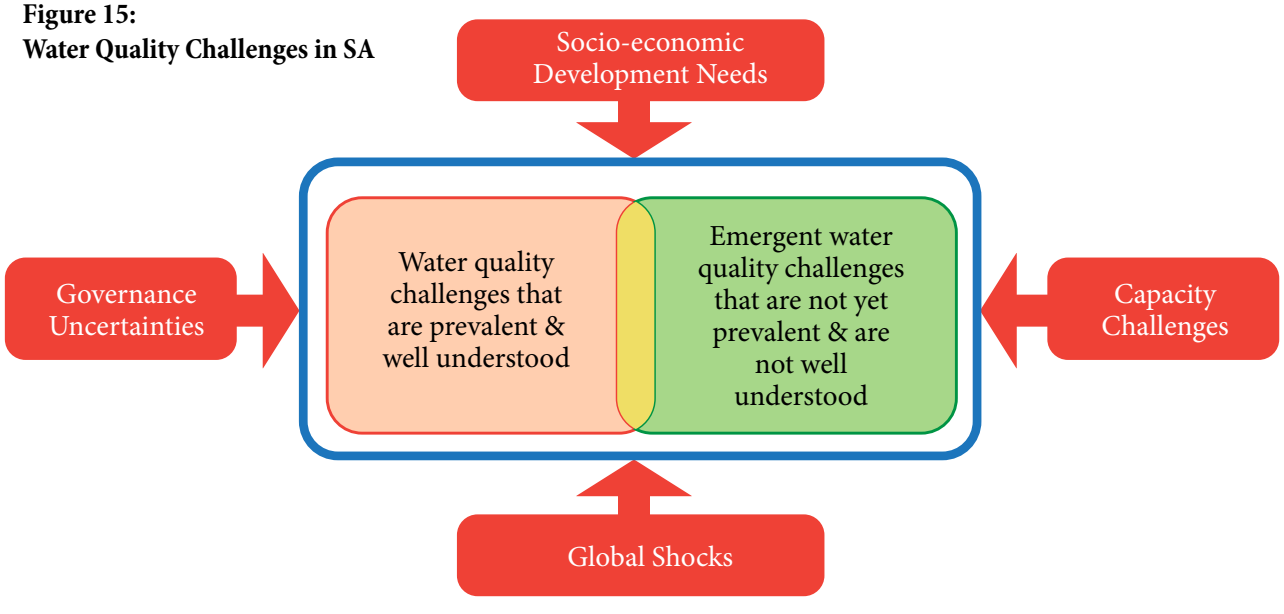
Challenges due to Ineffective Knowledge and Information Management:

- Limited technical capacity in government;
- Major gaps in the monitoring system;
- Insufficient translation of data into appropriate information and ensuring effective enforcement of regulations; and
- Inadequate monitoring and assessment.

In addition, there are several trends which already are, or can be expected to unfold in South Africa over the next few decades, which may lead to new or accelerated water quality impacts in many locations across the country, such as:

- Changes in rainfall patterns due to climate change;
- Destruction of ecological infrastructure such as wetlands, estuaries and riparian areas of rivers;
- Increases in water demand and changes in the rate of biogeochemical and ecological processes that determine water quality due to higher temperatures;
- Increases in unconventional gas extraction in the form of hydraulic fracturing;
- Increases in population growth and urbanisation resulting in increases in growth of inadequately serviced densely populated settlements;
- Increases in industrialisation;
- Increases in water demand due to the water-food-energy nexus; and
- Premature closure of mines.

Figure 15:
Water Quality Challenges in SA



11.2 Guiding Principles

The key principles to enable integrated water quality management are as follows:

Principle 1: Government- wide integrated water quality management: It is the constitutional duty of all spheres of government and the state as a whole to protect the quality of South Africa's water resources.

Principle 2: People-centric: Public participation is a crucial element of IWQM that must be promoted to ensure active and engaged citizenry. Participation of stakeholders at all levels must be carefully balanced and integrated so as to ensure impoverished rural subsistence farmers, local NGOs, civil society groups and marginalised and disempowered communities are also included.

Principle 3: Subsidiary and accountability: Water quality must be managed at the lowest appropriate level and the institutions responsible for managing water quality must be held accountable (i.e. via blue drop and green drop monitoring).

Principle 4: Transboundary IWQM: Water pollution has spatial dimensions that traverse an array of administrative and natural boundaries. International, national, provincial and local boundaries do not typically align with natural boundaries creating an array of planning, management and operational challenges that need consideration.

Principle 5: Partnerships: In order to manage water quality effectively, partnerships must be developed between the government, private sector and civil societies.

Principle 6: Administrative fairness & implementability: Regulation must be administratively fair and must also be effectively implementable within technical and financial resource constraints.

Principle 7: Administrative penalties: A system of effective administrative penalties for water pollution offences must be adopted and the waste discharge charge system must be implemented promptly.

Principle 8: An integrated & adaptive approach: An integrated and adaptive, systems-based resource, remediation and source directed approach which manages the water resource system as a whole at catchment or sub-catchment scale will be adopted, e.g. to include integration between "quality" and "volume", integrated planning and integrated regulation.

Principle 9: Hierarchies of pollution management: Pollution management will follow a hierarchy of decision-making permeated by:

- Prevent, where possible.
- Minimise, where possible or be subjected to specific licence conditions or minimum standards.
- If the above options have been exhausted, then apply a precautionary approach using agreed minimum standards.
- Reuse and recycle, where possible, to support the green economy.
- For catchment specific responses, a differentiated approach is applied. This allows for continuous improvement and adaptive management approaches. Rehabilitation and reclassification will be applied catchment specific contexts as needed.

Principle 10: Promotion of green/ecological infrastructure restoration & rehabilitation: Rehabilitation and restoration of catchments will be pursued, including the use of green/ecological infrastructure, and provision measures put in place via the pricing strategy to ensure funding for green infrastructure.

Principle 11: Risk-based approach: A risk-based approach to regulation will be adopted, based on the likely magnitude of potential impacts.

Principle 12: Water quality is a developmental issue: In addressing the management of water quality, the developmental, economic, social and environmental impacts of deteriorating water quality must be taken into account.

Principle 13: Broadened funding mechanisms: The mechanisms for funding integrated water quality management must be broadened, given that water quality has impacts on, and is impacted by, many different sectors, and recognising the negative developmental impact of declining water quality.

Principle 14: Polluter pays: The cost of treating water discharge and pollution must be recovered from users who discharge and impact or threaten Resource Quality Objectives.

Principle 15: Informed public: Efforts to ensure that broader societal awareness of the importance of resource water quality will prove increasingly important in catalysing more responsible behaviours.

Principle 16: Data is a strategic asset: Use of technology and real time data on water quality must be improved, standardised, reliable and scientifically defensible and must be collected, managed and protected as a strategic asset for monitoring, management, legal actions and research purposes, while also being used to support co-learning and adaptive management (e.g. estuarine monitoring with DFFE coastal).

Principle 17: Publicly available information: Information and data on water quality, waste discharges and audit and compliance reports must be made available in the public domain and should be used to enhance public awareness and education, and to support adaptive management approaches.

Principle 18: Protect strategic water sources areas: Through the use of various mechanisms & tools.

11.3 Baseline & Status Quo

The integrated water quality management baseline and status quo below are informed by the content in the DWS IWQM Strategy Edition 2 (2017).

South Africa faces a wide range of water quality challenges impacting on both surface water and groundwater, originating from both point source discharges such as mining, industrial processes and municipal Wastewater Treatment Works (WWTW), and from diffuse sources due to run-off from land. The pollution challenges manifest at various scales, differ between catchments, and have different severity of impact. Add to that the increasing demands for limited water supplies, deteriorating raw water quality and changes in temperature and rainfall due to climate change all find themselves the makings of a perfect storm, if not addressed urgently, will significantly limit our socio-economic growth.

This deterioration in water quality is a key factor in this challenge and is an economic and developmental issue:

- It reduces the amount of water available for use as more water must be retained in our river systems to sustain acceptable standards;
- It increases the costs of doing business as many enterprises are forced to treat water before being able to use it in their industrial processes and the cost of municipal water treatment increases;
- It reduces economic productivity as an increased number of workdays are lost due to water-related illnesses and as poor water quality reduces productivity in certain sectors (e.g. poor water quality impacts on crop yields and makes crops vulnerable to import restrictions from countries with strict quality standards; and on recreation and tourism);
- It threatens human health and livelihoods where people are exposed to poor water quality for consumptive or domestic usage; and
- It has environmental implications where biological and chemical contamination of water can impact on important aquatic species and sustainable functioning of eco-systems.

Some of these impacts are clearly visible, such as major fish kills, whilst others are more insidious and long-term in nature. Combined, however, they are already having a significant negative impact on socio-economic development in South Africa.

The above (but not limited to) impacts and subsequent deterioration of water quality in our rivers, streams, dams, wetlands, estuaries and aquifers, is due to effluent discharges and run-off from urban and industrial areas, seepage and discharges from mining areas, and pollution from intensive agriculture:

- Sewage from urban areas is often not treated properly prior to discharge, due to inadequate or broken sewerage systems, overloaded or poorly managed sewage treatment plants, aging infrastructure and poor management capacity at municipal level resulting in poor operation and maintenance of infrastructure.
- Many industrial processes produce waste that contains hazardous or even toxic chemicals that are discharged into sewers, rivers or wetlands.
- Waste products disposed of in landfills or slag heaps may release pollutants that seep into nearby watercourses or groundwater.
- The mining sector is a significant source of water pollution, both immediate and long-term.
- Agricultural practices add to the pollution burden, with pesticides and fertilisers entering water resources, and greater monitoring of this is needed by DALRRD.

These impacts are illustrated in the figure below, which summarises the national percentage of compliance of in-stream state of water quality at 276 selected monitoring points (DWA, 2011).See figure 16.

Without a change in how land and water resources are managed, worsening water quality will continue to decrease the socio-economic benefits from, and increase the costs associated with, the use of the country's water resources.

Currently, the Department's approach to the protection of the resources is two-pronged: Resource Directed Measures (RDM) and Source Directed Measures (SDM). Resource directed measures set the goals for resource protection and are informed by the Water Resource Classification system, which allows for different levels of protection for different water resources. Source directed measures set measures to protect water resources (for example rivers and wetlands) by preventing and/or minimizing potential polluting activities, and limiting impacts to acceptable levels as defined through RDM, through imposing regulatory controls (e.g. water use authorizations, regulations, best practice guidelines, etc.) and by providing incentives.

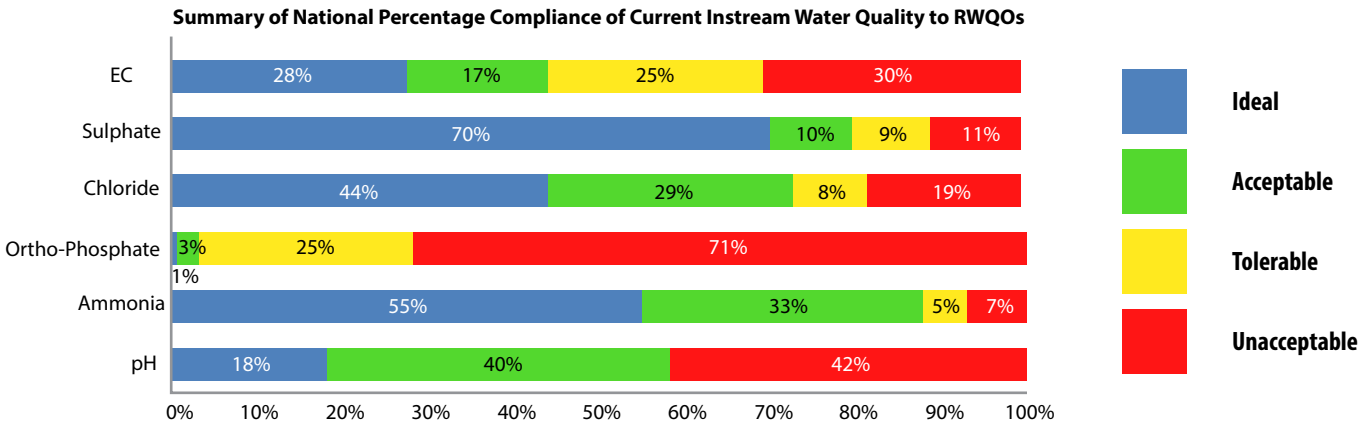


Figure 16: Percentage Compliance of Instream Water Quality to RWQOs in SA (2011)

The RDMs also make provision for the "Reserve", defined as the quantity and quality of water required to maintain a healthy aquatic ecosystem, whilst meeting the basic human requirements. Sensitive receiving environments, like dolomitic groundwater resources, and rivers with a high conservation value will receive greater management attention, and pollution sources in these areas may be required to implement more stringent management.

In addition, the National Water Act specifies that Resource Quality Objectives (RQOs) will be established for different water resources; this process is currently underway countrywide. These are aimed at specifying appropriate numeric and narrative objectives for different water resources, and can include indicators of water quality, as well as the biological and physical characteristics of the resource (DWAF, 2002) and specific attention needs to be given to the implementation of all RQOs.

The National Water Act dictates that water resources management practices and strategies must give effect to the Reserve, the RQOs, and to the Water Resource Classification system. In the absence of the RQOs, certain catchments have implemented the agreed Resource Water Quality Objectives (RWQOs).

Trace metals are also becoming more important as water quality is deteriorating due to climate change, especially in groundwater. After long periods of droughts like is currently being experienced by the Northern Cape, RDM calculations should be recalculated to include the loss of rain in the system to ensure that water is not being over abstracted but used more sustainably by the end users. RQOs should include a decline in water quality that is a direct effect of climate change or mining process like unconventional gas development.

The key components to effective water quality management include the effective co-ordination between the various planning, information management, monitoring and source directed control activities (such as developing guidelines and protocols for pollution control and rehabilitation, water use licensing and compliance monitoring and enforcement) and well as engagement with stakeholders (DWS, 2015).

Given that water quality management considers the collective impact of land use and water use processes, coordinated planning and action is required not only within the Department but at all levels, from national government through provincial and local authorities to individual landowners and affected stakeholders, such as civil society.

The provision and implementation of clear policies, strategies and plans, which provide the necessary direction to the Department as well as the larger water sector, for the effective, equitable, sustainable and integrated management of South Africa's surface and ground water quality is paramount for the management of the resources.

Currently, water quality is managed and controlled by the Department through the application of a number of management instruments. These are inter alia the Water Quality Management Policy and Strategy for the RSA (DWAF, 1991), the Resource Directed Management of Water Quality Policy and Strategy (DWAF, 2006), the Policy and Strategy for Ground Water Quality Management (DWAF, 2000), the National Water Resource Monitoring Strategy (DWAF, 2004), Regulation 810, which developed a system for the classification of water resources (DWA, 2010), Best Practice Guidelines for Water Resource Protection in the South African Mining Industry (DWAF, 2006) and the Blue and Green Drop Initiative and Reports (DWA 2009 and DWA 2010).

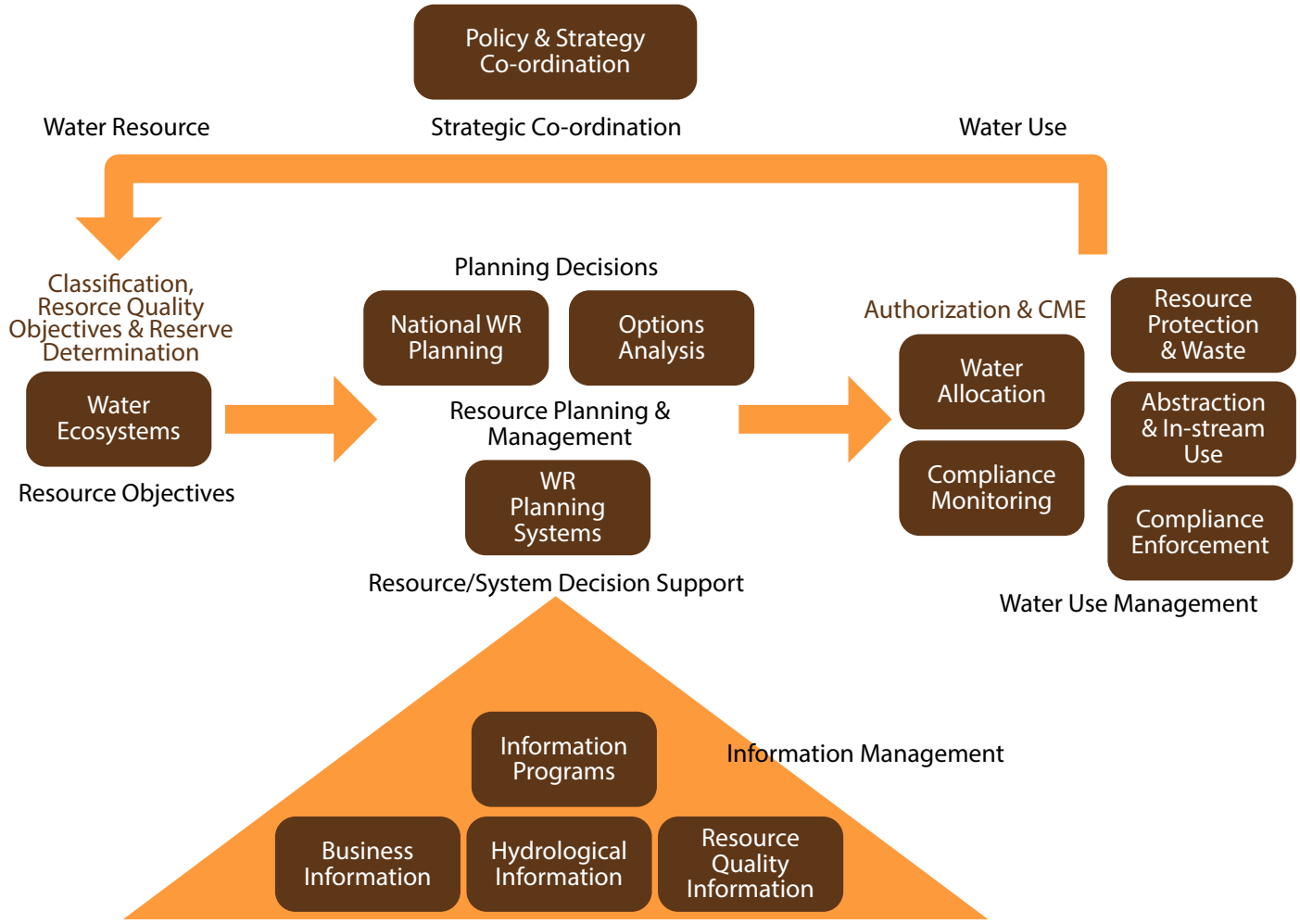


Figure 17: DWS Integrated Water Resource Planning Component

As illustrated in the diagram above, the Department's Integrated Water Resource Planning component provides the required Resource Planning and Management cohesion that links Resource Objectives with Water Use Management. Within the Department's Integrated Water Resource Planning function water quality planning is focused on "connecting" Resource Water Quality Objectives with water quality Water Use Management, and hence, it functionally fulfils the coordination role from a water quality perspective.

11.4 Strategic Objectives & Strategic Actions

The strategic objectives of this chapter and the various strategic actions to be undertaken within each strategic objective are as follows:

11.4.1 Strategic Objective 1

To harmonise policies and strategies to enable improved IWQM.

To achieve the above strategic objective, the following strategic actions must be undertaken:

- Ensure that policy development and refinement within DWS addresses IWQM.
- Harmonise policies and strategies to support IWQM.
- Finalise and implement the non-point source pollution strategy.
- Develop, finalise and implement the National Eutrophication Strategy.
- Align the Policy and Strategy for Groundwater Quality Management with the Resource Directed Measures Framework.
- Align the Policy and Strategy for Groundwater Quality Management with the Waste Act of 2008 in terms of groundwater protection and ensure emphasis on groundwater remediation.
- Ensure that Acid Mine Drainage, Unconventional Gas Developments and others are covered during this alignment and ensure that waste and water regulations including the Mine Water Management Policy address the issue of brine produced through desalination being a hazardous waste and potential ground and surface water pollution caused by unconventional gas development.

11.4.2 Strategic Objective 2

To undertake legislative reviews and amendments to effectively enable IWQM.

To achieve the above strategic objective, the following strategic actions must be undertaken:

- Amend the NWA and WSA to provide effective support to IWQM.
- Develop guidelines and protocols on the effective use of IWQM instruments.
- Identify and amend relevant legislation to strengthen IWQM.

11.4.3 Strategic Objective 3

To improve IWQM related governance.

To achieve the above strategic objective, the following strategic actions must be undertaken:

- Assess the current DWS Head Office and Regional Office IWQM functions and structures and implement restructuring changes to ensure alignment with the DWS IWQM strategy.
- Establish inter-governmental IWQM structures at trans-boundary basin, national and provincial levels to ensure coordination and joint action supported by regular reporting (linked to MoAs).
- Facilitate the development of sector IWQM plans by other government departments and ensure that these are incorporated into all CMA Strategies and that progress is reported annually.

11.4.4 Strategic Objective 4

To formalise IWQM governance frameworks to support non-governmental IWQM engagements.

To achieve the above strategic objective, the following strategic actions must be undertaken:

- Develop an IWQM partnership framework that is fair and equitable and defines the relationships with the private sector and NGOs.
- Develop and foster strategic IWQM sector partnerships.
- Develop an IWQM engagement framework that enables more active participation of civil society at transboundary, national and catchment levels.
- Support and drive functional IWQM platforms for the engagement of civil society nationally and within catchments.

11.4.5 Strategic Objective 5

To improve co-ordination of WQM planning, the following strategic actions must be undertaken:

- Develop an IWQM plan for national priority catchments, ensuring consideration of trans boundary WQ concerns.
- Develop a strategic action plan for the financing, rehabilitation and upgrade of prioritized WWTWs.
- Develop a strategic action plan for the implementation of the mine-water management policy.
- Develop strategic action plans to reduce non-point source pollution.
- Develop a protocol for the management of industrial discharge within the municipal environment.
- Develop an IWQM plan at catchment and regional level for each water management area as part of the CMS.
- Integrate IWQM and water resource planning with Regional Mining Plans in priority areas.
- Ensure that WSDPs, IDPs and SDFs reflect WQM priorities and management responses.

11.4.6 Strategic Objective 6

To strengthen IWQM regulation, compliance and enforcement.

To achieve the above strategic objective, the following strategic actions must be undertaken:

- Address the backlog of WUL applications urgently and meet stipulated timeframes for new licence applications by setting up appropriate organisational structures in the CMAs and DWS Regional Offices.
- Categorise risk-based protocols for determining water use authorization.
- Develop protocols for CMA engagement in IWUL applications and approval processes.
- Ensure that the conditions in WUL are scientifically defendable and can realistically be achieved in a developing country.
- Publish licencing regulations and ensure adherence to the regulations through co-operative management.
- Develop IWQM information management systems to support the integrated licensing approach and ensure that the roles and responsibilities of all role-players doing monitoring are defined.
- Develop improved regulatory approaches to manage WQ pollution from land-based and in-stream activities.
- Develop a targeted approach for the enforcement of IWQM regulation.
- Assess gaps in IWQM regulatory frameworks and instruments and develop revised approaches and instruments, as necessary.
- Develop approaches to strengthen operational CME and the EMI network.

11.4.7 Strategic Objective 7

To apply IWQM systems-based adaptive management processes.

To achieve the above strategic objective, the following strategic actions must be undertaken:

- Develop localised programmatic monitoring and reporting of IWQM actions and outcomes.
- Review, identify and address priority WQ challenges at regular intervals.
- Develop protocols for systems-based adaptive management for IWQM.

11.4.8 Strategic Objective 8

To achieve fiscal support for IWQM.

To achieve the above strategic objective, the following strategic actions must be undertaken:

- Support research into the socio-economic-environmental and management costs of poor WQ.
- Develop a framework to access the Financial Provision set aside by mines from DMR to deal with Mine Water Challenges such as AMD.
- Review municipal conditional grants and identify financial support required for Local Government.
- Develop and implement a protocol for extending the financial provisioning clause to all industries that are deemed "high-risk" polluters.

11.4.9 Strategic Objective 9

To develop pricing and incentives that support IWQM.
To achieve the above strategic objective, the following strategic actions must be undertaken:

- Develop an action plan to support the phased implementation of the WDCS across the country.
- Explore innovative financing mechanisms for incentivising good IWQM practice.
- Determine financial incentives for water-reuse (AMD, other).
- Promote Public Private Partnerships to unlock the AMD economy.
- Develop the legal and institutional mechanisms for introducing administrative penalties for environmental non¬compliance including water pollution.

11.4.10 Strategic Objective 10

To strengthen IWQM monitoring and information management.

To achieve the above strategic objective, the following strategic actions must be undertaken:

- Strengthen national and catchment WQ monitoring networks through spatial expansion and identification of priority constituents for catchment-specific monitoring.
- Support the network expansion with an initiative to ensure that accessible accredited laboratories are available to ensure efficient and effective WQ analyses.
- Lead the development of a programme to create and support citizen-based WQ monitoring programmes.
- Ensure the harmonisation of data and information systems pertaining to resource WQ.
- Develop systems to enable WQ data and information access by stakeholders / public.
- Develop protocols and systems to ensure M&E and that new information informs adaptive management decisions for IWQM.

11.4.11 Strategic Objective 11

To build equitable water quality and IWQM capacity through education, training and communication.

To achieve the above strategic objective, the following strategic actions must be undertaken:

- Develop and implement a capacity building programme for officials in DWS, CMA and other sector departments in systems-based, adaptive IWQM.
- Expand IWQM capacity-building initiatives to civil society and the private sector.
- Develop regulations to ensure the professionalization of key water and sanitation services IWQM functions.
- Provide bursaries / learnerships pertaining to WQM at tertiary institutions.
- Investigate options provided by innovative developments to improve water quality.
- Lead the sector in innovation, research and development for IWQM.
- Report annually on the state of WQ in the country.
- Develop online tools for easy access to WQ and WQM related information.
- Develop and maintain multi-sector stakeholder platforms for sharing IWQM information.
- Lead and roll-out IWQM awareness creation campaigns.

Chapter: 12

Protecting Aquatic Ecosystems & Maintaining & Restoring Ecological Infrastructure

12.1 Context & Current Challenges

Ecological infrastructure refers to naturally functioning ecosystems that generate or deliver valuable services to people. It includes, for example, healthy mountain catchments, rivers, wetlands, coastal dunes, and nodes and corridors of natural habitat, which together form a network of interconnected structural elements in the landscape.
Well-functioning ecosystems deliver a range of valuable services to people, such as water quality improvement, streamflow regulation and flood attenuation. This indivisibility of water is a cornerstone of the National Water Policy, to the extent that water ecosystems are not seen as users of water in competition with other users, but as the base from which the resource is derived.

The National Water Act, Chapter 3, prescribes the protection of the water resources through Resource Directed Measures (RDM) and the classification of water resources. These are measures which, together, are intended to ensure the protection of the water resource as well as measures for pollution prevention, remedying the effects of pollution while balancing with the need to use water as a factor of production to enable socio-economic growth and development.

Our water resources are facing ever increasing pressures from climate change, population growth, over utilization of the water resource, poor land-use practices and subsequent pollution. Pollution from wastewater treatment works has become a major concern in South Africa as most wastewater treatment works are overloaded and ill-operated.

It is for these reasons then that additional regulatory measures were introduced, such as the Green Drop compliance. The DWS launched the Green Drop certification programme as part of its incentive-based regulation approach but it should be noted that it forms part of a broader regulation approach which could include prosecution as a very last resort, when recurring failures are detected. The Green Drop certification program for wastewater treatment works is an effort to ensure that these works progressively improve their operations and maintenance so as to not impact negatively on the water ecosystems into which they discharge their product.

While sanitation is an intensely private social sphere of the water value chain, it is also a public good with environmental and public health protection benefits accruing well beyond the household boundary. Addressing backlogs in access to sanitation must be through holistic public interventions especially with regard to impacts on water resources.

Poorly constructed or inadequately operated and maintained sanitation facilities results in ecosystem degradation, which in-turn impacts on exposure to and transmission of faecal-related pathogens. This happens when the ecosystem had exceeded its carrying capacity to assimilate waste and process it (Nadkarni, 2004). The environmental effects of provision of incorrect or poorly maintained sanitation services are realized through the effects on human health.

Well-functioning ecosystems, such as water quality improvement, streamflow regulation and flood attenuation, deliver a valuable service to people. Well-managed water ecosystems can also buffer human settlements and built infrastructure against extreme events that are likely with climate change, playing a crucial and cost-effective role in disaster-risk reduction.

There is a need to improve on the current technologies by:
- Developing a common framework for the economic analysis of ecological benefits, and
- Discussing the elements of ecological risk assessment and economic benefit analysis.

Climate change will also alter the environment and present new challenges in the future. The manifestations of climate change include higher temperatures, altered rainfall patterns, and more frequent or intense extreme events such as changes in flow patterns, drought and floods (Marsden Jacob & Associates, 2006). This, in turn, will affect where and what types of plants and animals can survive the quality of their habitats and their abundance.

The rate and scale of change will affect different species in different ways as they try to adapt to changing habitats.

Some sites that are of conservation interest and that are currently being protected may become increasingly vulnerable to irreversible species and habitat changes. We can assist in this adaptation by ensuring healthy ecosystems that can easily adapt to changing conditions, by reducing the stresses imposed on the water resource through abstraction and discharges, by clearing alien vegetation, and by restoring and improving habitats where damage is caused by use. By protecting water resources, a system that is more resilient to the impact of climate change, such as floods and droughts will be ensured.

Many South Africans are not aware of the scarcity of water in the country and that if water is not well managed, there will not be enough to meet all the demands. South Africans need to recognize water as a valuable resource and invest in technologies and communications that will improve the way that it is used and managed.

Regional consultation with stakeholders has indicated that the microbiological quality of the water resources is also deteriorating. Sufficient data is still required to understand the extent of the problem. Major problem areas and pollution sources include untreated or poorly treated discharges from wastewater treatment works and run-off as well as leaching from un-serviced areas. The challenge is providing better information to the private sector, organisations, communities and individuals to ensure that they value water and the water environment so that they can make more informed choices and use water more efficiently.

Communities are at risk of being affected by waterborne diseases when drinking untreated water directly from rivers and using the water for recreation, washing and irrigation purposes. Maintenance and restoration of ecological infrastructure can help to mitigate this risk to a degree because naturally functioning ecosystems can improve water quality through filtering of pollutants and toxins as ecosystems can serve to purify water.
Sound scientific monitoring and effective and transparent communication of monitoring results is needed to provide information about the ecological state of water ecosystems. The trajectories and rates of change taking place in that state are necessary for evaluating the effectiveness of past management decisions, demonstrating the outcome of service delivery and refining management approaches and policy options.

The key role-players in the management and protection of water ecosystems are DWS, DFFE, DMRE, DTIC, DALRRD and DCoG as well as the business sector and communities with DWS taking the lead.

12.2 Guiding Principles

The key principles to enable water resource protection are founded on ensuring that sufficient water is available to sustain ecosystem functioning, that the quality of the resource is protected at the source, and that the environment has intrinsic value for economic and social growth:

Principle 1: Protection of the water resource through Resource Directed Measures (RDM) and Source Directed Measures (SDM): The most critical resource protection imperative over the next five years is the implementation of the water resource classes and to set Resource Quality Objectives (RQOs). These should be clarified within the Department first, and then involve stakeholder engagement to create ownership of water resources. The amount of water available to allocate will be determined after accounting for the Reserve, international obligations and the water requirements for power generation, which is considered a strategic sector. (The Reserve, which has a prior right of allocation, includes the water quantity and quality needed to maintain aquatic ecosystems in a particular state, as well as the water required to meet basic human needs).

Principle 2: Water resource protection should be based on a participatory approach, involving users, planners and policymakers at all levels: The participatory approach to water resource protection should involve raising awareness of the importance and value of water among policymakers and the general public. It means that decisions are taken at the lowest appropriate level, with full public consultation and involvement of users in the management of our water resources.

Principle 3: The value of water resources must be recognized from an economic point of view and the social and environmental benefits of the resource: It is important that society recognizes determining the economic value of water, accounting for the use of water (for example, household water supply and irrigation for agriculture) and the ecosystem services provided or supported by water resources (for example, nutrient cycling, habitat provision, and recreation).

Principle 4: Measures set for protecting resources: Water resource protection is effected through Resource Directed Measures (RDM), which set the goals to balance the need to protect, sustain and use water resources in relation to the quantity, quality, habitat and biota of water resources, and Source Directed Controls (SDC), which set controls to prevent water quality pollution and degradation. The potential impacts on the quality of the resource (this includes the quantity of all aspects of the water resource, including water quality, the integrity of riparian and instream habitats and aquatic organisms (biota)), will be considered when granting a licence in order to ensure that water resources are protected.

Principle 5: Incentive based protection of the water resources: To manage the quality of the water resource and protect the ecosystems, the waste discharge charge system must be used as an instrument to improve the quality of the degraded rivers, estuaries, wetlands and aquifers.

Principle 6: Integrated protection of aquatic ecosystems: The complex and interconnected nature of catchments must be recognised so that they are managed as integrated social-ecological systems that support the aquatic ecosystems (water quantity and quality, habitat and biota) into which they feed and to ensure pollution prevention.

Principle 7: Increasing the economic value of sanitation: The values underpinning future sanitation services in the country will be to place greater emphasis on applying the principles of polluter pays', user pays' and on increasing the recognition of the economic value of sanitation, as these are crucial to sustainable sanitation services provision in this changing environment.

Principle 8: Recognising the scarcity of good quality water: The way in which sanitation services are provided must reflect the growing scarcity of good water quality in South Africa in a manner which reflects their value and does not undermine long term sustainability of water resource and economic growth and prevents pollution. The ecosystem, public and economic benefits of improved sanitation must be recognised and valued. The economic value of sanitation by-products should be recognised and the reuse of these products should be encouraged, particularly as a resource in energy generation. The economic value of sanitation is recognised concurrently with recognition of the social value of sanitation.

12.3 Baseline & Status Quo

South Africa has made significant progress towards implementing sustainable water resource protection programmes, such as the development of the water resource classification system, the development and progressive implementation of Resource Directed Measures; development of a Pricing Strategy that will provide incentive based resource protection; implementation of wastewater risk abatement plans, such as the Green Drop certification for municipal wastewater treatment works to minimise pollution of the environment, as well as identifying key ecosystems as priority areas for conservation and the development of programmes to monitor and manage ecosystem health.

The difficulty facing the water sector is how to implement the policies and programmes for water resource protection in a cost effective and sustainable manner within a reasonable time frame. There is still much that needs to be done in the areas of implementation of water resource protection policies and programmes and monitoring of ecosystem health to proactively minimise degradation of the resource, focus rehabilitation efforts and ensure compliance to sustainability.

South Africa has implemented steps to mitigate the developmental pressures on the water resource, such as the development of National Freshwater Ecosystem Priority Areas, the protection of riparian and wetland buffers and critical groundwater recharge areas, as well as the rehabilitation of strategic water ecosystems.

South Africa has identified strategic spatial priorities for conserving water ecosystems and supporting the sustainable use of water resources in the form of maps of National Freshwater Ecosystem Priority Areas (NFEPAs). NFEPA maps provide a single, nationally consistent information source for incorporating water ecosystem goals into planning and decision-making processes.

Buffers of natural vegetation around water ecosystems play an important role in mitigating the negative impacts of adjacent land-use practices. The setback lines are used to indicate how wide a buffer should be. However, limiting land use rights in buffer zones has direct financial consequences for landowners and developers. Currently, a statutory minimum setback line to mitigate impacts is implemented. Other legislation (i.e. NEMA and CARA) refers to explicit setback lines around water resources, and significant work has gone into developing a technical tool for buffer delineation in the water sector.

Research has shown that degradation of these ecosystems is not necessarily permanent and that it is possible to reinstate at least some ecosystem services through rehabilitation. Several government programmes, including the Working for Water programme in DWS, the Natural Resource Management programmes of DFFE and Land Care in DALRRD, focus on the rehabilitation of water ecosystems to varying degrees. DWS has also embarked on a project to development Rehabilitation Management Guidelines for Water Resources. The aim of the project is to map out the legislative framework and develop integrated guidelines for water resource rehabilitation practices in South Africa.

These programmes generate additional value by maximizing employment creation, supporting small emerging businesses and transferring skills to beneficiaries drawn primarily from those groups most excluded from the mainstream economy. Many rehabilitated wetlands are successfully and sustainably delivering a higher level of service than before rehabilitation, thereby allowing them to better perform their role as ecological infrastructure.

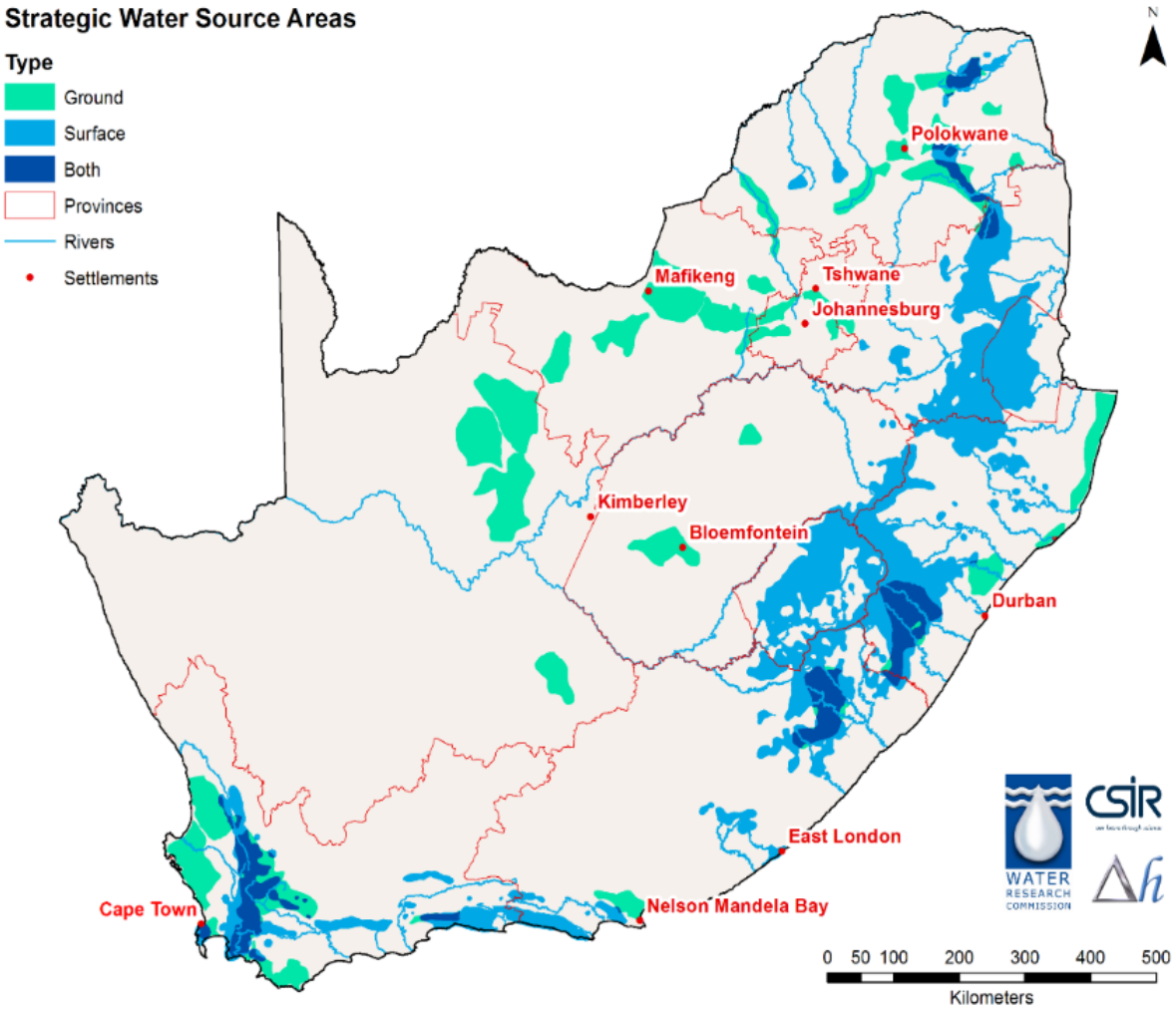
Most of South Africa's rivers are shared watercourses with other SADC countries. Although South Africa is a signatory to the Southern African Development Community, the implementation of the Revised Protocol on Shared Watercourses in the SADC, in particular, on the protection of the resource is complicated because of the governance issues of shared watercourses. This complicates water management in the region as well as linking the developmental futures of neighbouring states.

The Green Drop certification, a part of the Wastewater Risk Abatement Plan, has been implemented across all municipalities and reflects the state of compliance and assistance that is required by municipalities to decrease their wastewater risk to the environment.

The areas with greater than average rainfall per year represent strategic water source areas in South Africa, Lesotho and Swaziland. These Strategic Water Source Areas supply a disproportionately high amount of the country's mean annual runoff in relation to their surface areas. These areas occupy approximately 8% of the land surface and contribute 50% of the water supply. They are thus strategic national assets that are vital for water security and need to be acknowledged as such at the highest level across all sectors.

Securing Strategic Water Source Areas through appropriate mechanisms that aim to maintain their capacity to regulate the quality and quantity of water over time can produce significant returns in terms of water security. Investing in securing Strategic Water Source Areas is also important for long-term adaptation to the effects of climate change on water provision, growth, and development. The figure below shows identified Strategic Water Source Areas of South Africa.

Addressing these challenges is a considerable feat that cannot be undertaken by the DWS alone - it requires cooperative governance with the key stakeholders in the management and protection of water ecosystems being DWS, DFFE, DMRE, DTIC, DALRRD and DCoG as well as the business sector and communities, with DWS is taking the leadership role.



12.4 Strategic Objectives & Strategic Actions

The strategic objectives of this chapter and the various strategic actions to be undertaken within each strategic objective are as follows:

12.4.1 Strategic Objective 1

To ensure sustainable management of water resources through Resource Directed Measures (RDM) and Source Directed Controls (SDC).

To achieve the above strategic objective, the following strategic actions must be undertaken:

- Determine Resource Quality Objectives, Classes and Reserve for all significant water resources.
- Prioritise the review and update of Resource Quality Objectives (RQOs).
- Monitor all water resources, wetlands and buffer zones for compliance with RQOs and align these with EFR, other networks, DFFE Coastal Management and SDGs 13, 14 and 15 to minimise costs.
- Implement the RDM (the Water Resource Classification, Reserve and RQOs) in the four main stem rivers of the Berg, Breede and Gouritz, Middle and upper Vaal WMA's).
- Develop SDC strategies and guidelines for protection, remediation and rehabilitation (DWS has already initiated the development of the National Eutrophication Management Strategy and the Rehabilitation Management Guidelines of water resources in SA, as a way of giving effect to this Strategic Objective.
- Review the Resource Directed Measures methodology as it relates to groundwater in terms of the National Groundwater Strategy due to the unique hydrogeological characteristics and vulnerability of groundwater systems.
- Include climate change scenario projections in ecological reserve determination monitoring and studies.
- Develop Effluent Quality Discharge Standards based on the RQOs per catchment or sub catchment to bring into effect the set RQOs.

12.4.2. Strategic Objective 2

To identify, protect and maintain freshwater ecosystems priority areas in good condition.

To achieve the above strategic objective, the following strategic actions must be undertaken:

- Implement the National Wetland Monitoring Programme (NWMP).
- Monitor compliance to the RQOs.
- Map and monitor the extent of wetlands, estuaries, lakes, dams, and rivers (SDG 6.6.1.a).
- Monitor quantity of water in rivers, lakes, dams, estuaries and groundwater (SDG 6.6.1.b).
- Monitor quality of water in rivers, lakes, dams, estuaries and groundwater (SDG 6.6.1.c.).
- Monitor ecosystem health of wetlands, lakes, dams, estuaries and rivers (SDG 6.6.1.d).
- Identify, protect and maintain freshwater ecosystems priority areas in good condition.
- Review and promulgate aggressive restrictions within the legislation to restore and protect ecological infrastructure.

12.4.3. Strategic Objective 3

To rehabilitate and protect ecological infrastructure, including Strategic Water Source areas.

To achieve the above strategic objective, the following strategic actions must be undertaken:

- Declare water source areas, critical groundwater recharge areas and aquatic ecosystems that are recognised as threatened or sensitive, as protected areas.
- Develop and maintain approaches for proactive protection of groundwater resources and aquifer-dependent ecosystems to secure a sustainable supply of water for human survival and socio-economic development, while maintaining essential groundwater environmental services.
- Establish innovative ways for collective action through taking a stewardship approach to securing Strategic Water Source Areas.
- Monitor the impact of alien invasive plants in water security and ensure their removal from Strategic Water Resource Areas and riparian / buffer zones.
- Identify and use legal mechanisms to protect strategic water source areas.
- Invest in strategic water source areas and ecological restoration to maintain healthy ecosystems that deliver benefits (i.e. entrepreneurial opportunities in the blue-green zero waste economy).
- Identify and rehabilitate priority degraded water ecosystems, the rehabilitation of which is necessary to achieve strategic objectives including Resource Quality Objectives.
- Protect sensitive areas, protected areas, nature reserves and national parks.
- Establish dedicated rehabilitation plans for rivers and DWS infrastructure like dams and weirs where there is no hydrological and ecological connectivity.
- Compile a database of all decanting mines in the country.
- Create large scale constructed wetlands and other national infrastructure such as berms and swales to assist with water purification.
- Include AMD treatment for all gold and coal mines.
- Set up dedicated river management plans.

12.4.4. Strategic Objective 4

To prevent pollution of water resources from point and non-point source pollution by managing at source.

To achieve the above strategic objective, the following strategic actions must be undertaken:

- Secure funds for restoration and ongoing maintenance of ecological infrastructure through operationalising the water pricing strategy.
- Develop and implement technologically based monitoring embracing 4IR.
- Implement the "polluter pays" principle and develop capacity in the water services authorities to implement this principle.
- Undertake Green Drop Auditing.
- Ensure reduction and removal of pollutants at source.
- Ensure law enforcement and compliance of discharge standards by water sector institutions.
- Exclude mining activities from watercourses and water resources via the establishment of riparian buffers.
- Develop a non-point source strategy.

12.4.5. Strategic Objective 5

To create awareness among communities, business and decision makers about the value of water and ensure commitment to sustainable water use practices.

To achieve the above strategic objective, the following strategic actions must be undertaken:

- Fund, develop and implement a database to capture and manage data generated from the River Ecosystem Monitoring Programme (REMP) and the National Wetland Monitoring Programme (NWMP).
- Monitoring rates of change in ecological state through implementation of the NWMP and the Freshwater Biodiversity Information System (FBIS).
- Support the implementation of National Wetland Management Framework.

Chapter: 13

Creating Effective Water Sector Institutions

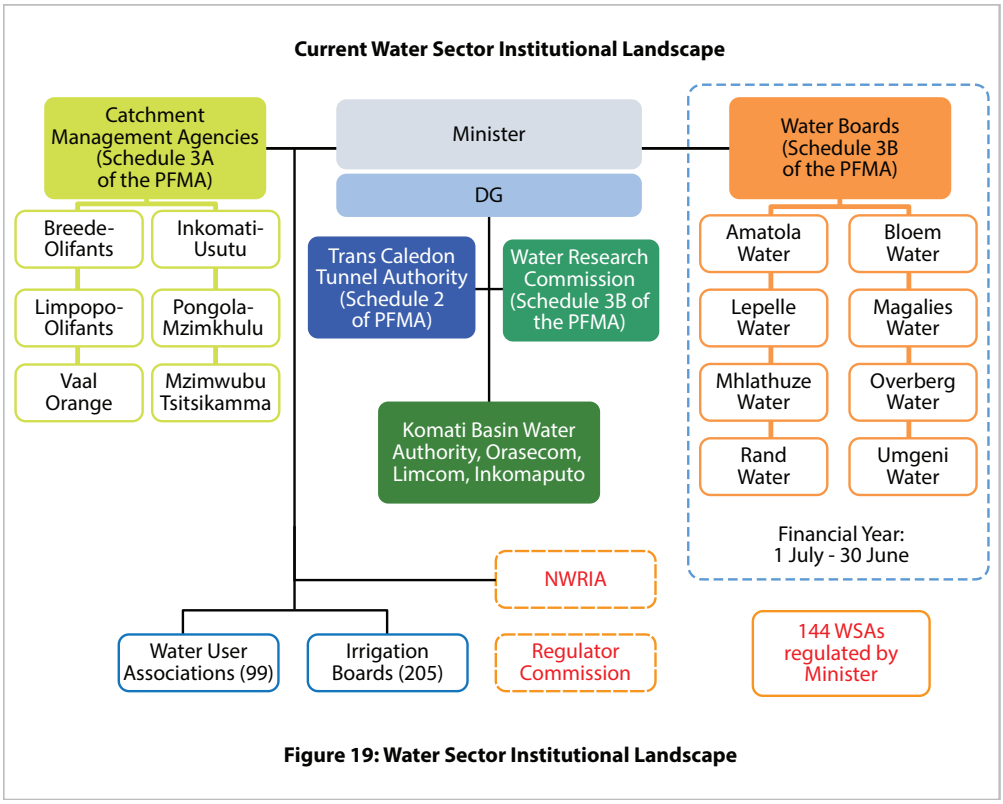


Figure 19: Water Sector Institutional Landscape

13.1 Context & Current Challenges

The National Water Act (Act 36 of 1998) provides for the establishment and transformation of institutions to assist the DWS in giving effect to its core mandate – the development, protection, conservation and allocation of water resources, and regulation of water and sanitation services and water use.

The diagram above outlines the current institutional arrangements of the water sector.

Since the enactment of the National Water Act and the Water Services Act (Act 108 of 1997), an institutional framework for water resource management and water and sanitation services has been established. Policy, capacity, resources and legal issues within the water sector have hampered implementation of the institutional arrangements to full functionality and highlighted the need for institutional realignment and rationalisation within the sector.

In 2010, the DWS initiated an Institutional Reform and Realignment process to revise the institutional framework for the water sector to ensure that:

- Roles, responsibilities and accountability within the water value chain are better defined, which in cooperate the water users and the local communities, to separate the policy making, implementation and regulatory functions.
- The number of institutions reporting to the Minister are rationalized and aligned to improve delivery, good governance, and economies of scale, financial viability, transparency and accountability.
- The sector has sufficient institutional capacity to achieve its mandate and government outcomes and to improve water resource management and water and sanitation services delivery.
- The institutional framework for the water and sanitation sector is simple, clear, cost-effective and pragmatic with clear roadmap and timelines for implementation

Clarity and certainty regarding future institutional arrangements in the following five strategic areas is needed:

- Developing, financing and managing national water infrastructure.
- Managing water resources at the local and catchment level.
- Managing regional water infrastructure.
- Supporting local government in the delivery of water and sanitation services.
- Managing local water resources infrastructure.
- Supporting resource-poor farmers.
- Transformation of the irrigated agriculture component of the water sector.
- DWS oversight role over entities
- Regulation of the sector.
- The role of the Water Tribunal.

These areas will form the backbone for the NWRS-3 as they require policy, regulatory and operational attention.

Furthermore, the pronouncement by the President of the Republic of South Africa in his 2021/22 State of the Nation addresses, the President emphasized the importance of economic recovery through the acceleration of various economic reforms, one of which was the establishment of the National Water Resource Infrastructure Agency, the Department of Water and Sanitation (DWS) has developed the National Water Resource Infrastructure Agency (NWRIA) draft Bill, which once promulgated will serve as the founding legislation to the establishment of the agency.

13.2 Guiding Principles

The key guiding principles for achieving the objectives of institutional arrangements have been identified as follows:

- Water resource management at the appropriate level: The institutional vision provides for protection, use, development, management and control of water resources to be carried out at the appropriate level, considering efficiency benefits related to economies of scale.
- Clear definition of roles and responsibilities: The roles and responsibilities of the three spheres of government and of the envisaged water resource and water and sanitation services institutions are clearly defined, with overlapping mandates being eliminated wherever possible. The imperative of co-operative government is recognized.
- Coherence between national, regional and local water related strategies and plans: All water resource management and water and sanitation services strategies, plans and instruments at local, regional and national level, must be aligned to achieve coherence.
- Separation of regulatory and operational responsibilities: There is a clear separation of the responsibilities and authorities for regulation of and operations in the water sector. WSAs and all other users of water such as RWIs, WUAs and WSPs are not party to decision-making in relation to water use authorisations. There is also a clear separation of regulatory (water use authorisation) functions from the operational (water user) functions. Regulation will seek to protect the integrity of the water resource and aquatic ecosystem for future sustainable use, while ensuring that water resources are made available for supplying the justifiable needs for growing and sustaining the socio-economy of the country.
- Collaboration and partnerships: The importance of collaboration and partnerships between all stakeholders and beneficiaries is recognized, including between all spheres of government, the private sector and civil society.
- Alignment: Institutions will be aligned throughout the water value chain to ensure the efficient, equitable and sustainable protection, use, development, conservation and control of water resources and the provision of improved and sustainable water and sanitation services, taking cognizance of the need to reflect the cultural, gender and racial diversity of South Africa. Realignment of institutions promotes economies of scope and scale in support of sustainability in the water sector.
- Financial sustainability: Realignment must enable institutions to leverage finance for water infrastructure and sustainable management.

13.3 Baseline & Status Quo

a) Trans Caledon Tunnel Authority

The current situation, about the development, financing and managing of national water infrastructure is:

- The Trans-Caledon Tunnel Authority (TCTA) operates as a schedule 2 entity to finance and project management all economically viable water projects.
- The National Water Resources Infrastructure Branch and the Water Trading Entity are programs within the DWS to manage and operate national water infrastructure. The intention is to establish an alternative and appropriate National Water Resources Infrastructure institutional model (Agency) for developing, financing and managing national water infrastructure incorporating the three above facilities. The establishment of the proposed Agency should make a difference in developing and improving the management of water in the country and it should have a clear purpose without just adding another layer of unnecessary administration and costs

b) Water Management Institutions

Catchment Management Institutions
The current situation, about the establishment, funding and delegation of functions and authority to the Catchment Management Agencies (CMAs) is:

- To date two CMAs are operational – namely, the Inkomati-Usuthu and Breede-Gouritz CMAs out of the envisaged establishment of nine (9) CMAs in the NWRS-2.
- The Limpopo North-West, Vaal, Olifants and Pongola-Umzimkulu CMAs have been gazetted for establishment.
- The Orange, Berg-Olifants and Mzimvubu-Tsitsikamma have been gazetted for public consultation.

To address some of the challenges of slow establishment of CMAs the department conducted a case study to reduce the Water Management Area/CMAs. The main principles in realigning the water management areas and respectively the CMAs from 9 to 6 are:

- Operational Integration: Connected and integrated water systems, easy coordination and monitoring of agreements and improved capacity-pooled technical skills
- Integrated water resource planning: The river basins fall within the same water system, Improved resource planning and transboundary systems managed by same conventions
- Economies of scale: enhance revenue and hence sustainability, Cost – effectiveness and consolidate management structures

The Department has reviewed the reconfiguration of the Water Management Areas (WMAs) from nine (9) to six (6) therefore also reducing the number of CMAs from nine (9) to six (6). The reduction of WMAs supports the principles of rationalisation of the number of entities, integrated water resource planning and economies of scale. The six CMAS are the:

- Limpopo-Olifants
- Inkomati-Usuthu
- Pongola-Mtamvuna
- Vaal-Orange
- Mzimvubu-Tsitsikamma
- Breede-Olifants

The advantages of reducing the number water management areas from nine 9 to six (6) are that:

- Management of integrated water systems which were previously split across the WMAs, will be much easier;
- Scarce technical skills can be better distributed between institutions;
- Stronger revenue streams will give rise to more sustainable institutions;
- Establishment of the CMAs can be achieved in a shorter time; and
- Larger CMAs can more easily cooperate and coordinate on regional, provincial and international levels as a result of being more substantial.

The Department will ensure that large water management areas have local structures to support the CMA to ensure that better coordination, efficiency, and effective coordination of the water resources with stakeholders. This will also give effect to the principle of subsidiarity.
Details of the reconfigured WMAs are provided in Annexure 1 and the gazette notice is provided in Annexure 2, and the figure on the following page the proposed six WMAs.

(i) Water User Associations

The current situation, with regard to the managing of local water resources infrastructure, transformation of Irrigation Boards (IBs) and establishment of Water User Associations (WUAS) is:

- The development and transformation of WUAs, either through the transformation of existing IBs (to ensure broader representativity) or through the establishment of new WUAs comprising of resource poor farmers has not been successful and requires those involved to make financial contributions (without direct interest) to ensure the financial viability of the WUAs.
- The slow transformation of IBs has been due to several factors including difficulties in achieving the representativity targets at Management Committee level, unresolved concerns regarding the transfer of private assets and liabilities to a wider grouping and lack of financial and technical resources to support new 'developmental' WUAs.
- Strategic interventions are envisaged to:

Establish an "improved" WUA to manage an area of operation required and defined by CMA/DWS and should therefore:
a. Focus on all uses and users, not mainly agricultural (as is often currently the case).
b. Not have boundaries defined mainly around existing irrigation infrastructure / schemes (as is often currently the case).
c. Remain an operational institution, not regulatory.

- Conduct case by case due diligence of existing local institutions with the aim of defining and establishing new institutions based on the most efficient hydrological and integrated water resource management criteria and promoting reform.
- Enable the Department to effectively regulate and support the local water resource institutions to perform their functions and effectively address the transformation agenda of government.
- Strengthen the existing CMFs in the local communities by reconstituting and restructuring them as Catchment Stewardship Forums (incorporating users and beneficiaries) in line to the guiding principles.
- Strengthen the partnership with the local authorities and municipalities to ensure a more responsiveness to community participation and engagement in addressing the systemic failure of local water and sanitation systems.

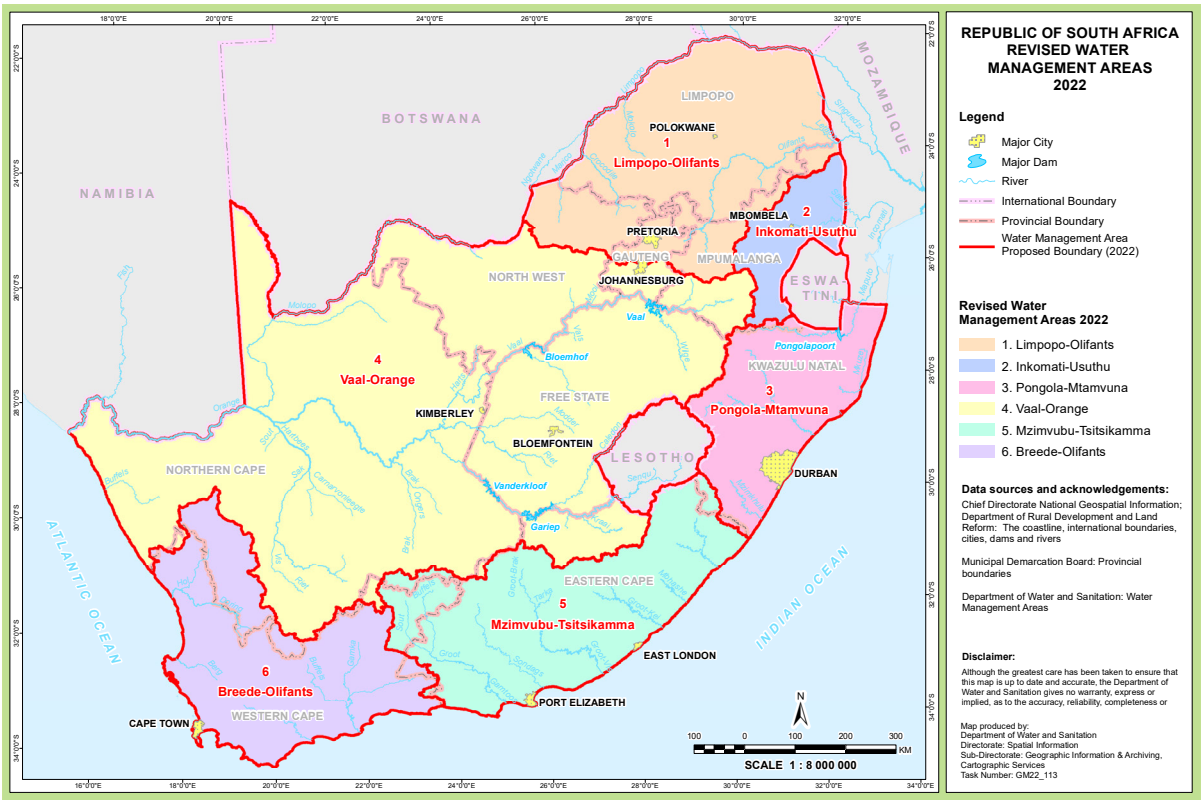


Figure 1: Water Management Areas Map

- The strategic interventions are also aimed at achieving long term outcomes which will result in:
- Developmental & Integrated Water Resources Management - Resource to be shared and managed by all users with specific focus on redress. The focus should be on the use and management of resource not only the infrastructure ownership and management.
- Transformation agenda- Equitable access to water specifically to emerging farmers. Adequate support and training for poor resource farmers and provision of adequate Infrastructure. Assistance to Previously disadvantaged farmers through information and assistance with access to water rights by making water available set aside for allocation.
- Stewardship- We shall promote good stewardship on water use ensuring that we are good citizen. These includes payment of services by users, equity and redistribution of water, WCDM by users, Reporting on water use, Good governance and Contribution to maintenance of infrastructure.
- Collaboration- Collaboration between DWS and Department of Agriculture, Rural Development Land Reform and Irrigation Boards and Water User Associations to align the land and water resources earmarked for reform.
- There are 99 WUAs established, including new associations and transformed boards. Approximately 205 Irrigation Boards still needed to be transformed to become WUAs.

(ii) Water Services Institutions

Water Boards play a critical role within the water value chain, they are bulk water supply entities established in terms of the Water Services Act, 1997 (Act No. 108 of 1997) and they are listed as Schedule 3b entities in the Public Finance Management Act, 1999 Act No. 1 of 1999. Their core business is the provision of bulk water services (primary function) and they also provide support to municipalities (secondary function).

This includes both bulk potable and untreated water, wastewater treatment and other related services such as drought interventions, for the public benefit. The Minister of Water and Sanitation is the Executive Authority and shareholder of Water Boards and has the mandate to provide oversight management.

The Department has reviewed the Water Boards in terms of financial sustainability, extending services to areas that are not currently serviced and to clarify institutional confusion caused by having multiple Water Boards serving the same area. The following change drivers informs the review of the Water Boards.

- Municipal performance is generally weak and compromises effective and sustainable water services delivery. This means that services are not being effectively expanded to all households without, services being provided to existing households may not be sustainable, and that the quality of services is deteriorating.
- All geographical areas which need the services of Water Boards, but which are not yet serviced by Water Boards, should be serviced by Water Boards.
- Some areas are serviced by multiple water boards, resulting in a degree of institutional confusion (for example, Hammanskraal, where two Water Boards and the Tshwane Metro are all supplying water, resulting in confusion when there are disruptions in service delivery)
- In some instances, the relationships between water boards and municipalities are poor and not conducive to optimal outcomes for service delivery. Relationships with provincial governments need to be developed further, as part of improving relationships with municipalities
- The financial viability of some water boards is marginal. In some instances, this is related to underlying structural issues (geography and client base), in addition to challenges with billing and revenue collection at municipal level and non-payment by municipalities to water boards.
- As far as possible, Water Boards should be financially sustainable and able to raise capital from the market for infrastructure projects.

The current situation, about the reconfiguration of water boards is as follows:

- Sedibeng Water has been disestablished and the areas previously services by Sedibeng Water were incorporated into Bloem Water and Magalies Water.
- Bloem Water will cover the whole of Free State and the whole of Northern Cape.
- Magalies Water will cover the whole of North West province – this involves transferring some areas and assets from LNW and Rand Water to Magalies Water.
- Rand Water will service the whole of Gauteng, and the whole of Mpumalanga – this involves transferring some areas and assets from Magalies Water to Rand Water.
- The Lepelle Northern Water (LNW) area of operation will be expanded to include the whole of Limpopo.
- Umgeni and Mhlathuze Water will be reconfigured into a single Water Board for KZN. Mhlathuze Water will be disestablished.
- The Amatola Water Board will service the whole of Eastern Cape.
- Overberg Water's area of operation will be extended to cover the entire Western Cape Province.

13.4 Strategic Objectives & Strategic Actions

The strategic objectives of this chapter and the various strategic actions to be undertaken within each strategic objective are as follows:

13.4.1 Strategic Objective 1

To establish catchment management agencies.

To achieve the above strategic objective, the following strategic actions must be undertaken:

- Develop business cases for the establishment of the catchment management agencies.
- Consult with relevant stakeholders.
- Extend the area of operation for the reconfigured CMAs through gazette notice.
- Appoint Board members to operationalise the CMAs.
- Establish financially sustainable Water Management Institutions across the country, and transfer staff and budget and delegated functions, including licensing of water use and monitoring and evaluation of water resources.
- Continuously improve stakeholder understanding and collectively agree on and work within an expanding framework of local level participative management.

13.4.2 Strategic Objective 2

To determine the optimal configuration of water boards to manage bulk water supply and assist municipalities to perform their primary water and sanitation services mandate.

To achieve the above strategic objective, the following strategic actions must be undertaken:

- Consult with relevant stakeholders.
- Conduct due diligence study.
- Extend the area of operation for the reconfigured Water Board through gazette notice.
- Transfer staff, assets and liability to the receiving entity.

13.4.3 Strategic Objective 3

To conclude effective establishment of the National Water Resources Infrastructure Agency.

To achieve the above strategic objective, the following strategic actions must be undertaken:

- Establish the National Water Resources Infrastructure Agency (NWRIA).
- Develop the business case and the Bill to give effect to the establishment of the NWRIA.
- The primary role of the institutional model for the NWRIA will be to own, finance, develop, operate and maintain national water resources infrastructure in an efficient and effective manner to meet the social and economic needs of the country. In doing so, the objectives of integrated water resources management must be realized.
- Provide technical and financial resources and support to ensure that the institutional model becomes sustainable as soon as possible.
- Manage the phased approach of transferring the functions and resources from TCTA, Infrastructure Branch and Water Trading Entity within DWS.
- Empower the institutional model to contract out the operation and maintenance of national infrastructure.

13.4.4 Strategic Objective 4

To conclude the process to restructure, transfer and/or disestablish a water user association or irrigation board.

To achieve the above strategic objective, the following strategic actions must be undertaken:

- Conduct case by case due diligence, in line with the policy position of existing local institutions with the aim of defining and establishing new institutions based on the most efficient hydrological and integrated water resource management criteria and promoting reform.
- Support the programmes to build the capacity of emerging farmers in this sector to enable them to access subsidies in terms of the pricing strategy.
- Develop and implement a Strategic Governance Framework for effective groundwater governance.
- Develop a programme for the acceleration of the transformation agenda of government.

13.4.5 Strategic Objective 5

To conclude the establishment bodies established in terms of international agreements.

To achieve the above strategic objective, the following strategic actions must be undertaken:

- Evaluate and review existing bodies in terms of international agreements.
- Identify and establish any bodies still outstanding in terms of international agreements.

13.4.6 Strategic Objective 6

To finalise the governance arrangements of the Water Tribunal.

To achieve the above strategic objective, the following strategic action must be undertaken:

- Identify and conclude any activities required to ensure effective governance arrangements for the Water Tribunal.

13.4.7 Strategic Objective 7

To establish the national appeal process.

To achieve the above strategic objective, the following strategic actions must be undertaken:

- Assess and conclude any activities in terms of the proposed Water and Sanitation Act that must be undertaken with respect to the national appeal process.

Chapter: 14

Collecting Data, Analysing & Managing Information for Effective Monitoring, Evaluating & Reporting

14.1 Context & Current Challenges

Both the NWA, 36 of 1998 and the WSA, 108 of 1997 place the duty on the Minister to:

- Establish national monitoring systems on water resources as soon as reasonably practicable (NWA chapter 14; clause 137(1)).
- Establish information systems linked to the national monitoring systems (NWA chapter 14; clause 137(2)).
- Ensure that there is a national information system on water and sanitation services. (WSA chapter 10; clause 67(1)).

The purpose of national information systems, (NWA chapter 14; clause 140), is:

(a) To store and provide data and information for the protection, sustainable use and management of water resources;
(b) To provide information for the development and implementation of the national water resource strategy; and
(c) To provide information to water and sanitation management institutions, water and sanitation users and the public –
(i) For research and development;
(ii) For planning and environment impact assessments;
(iii) For public safety and disaster management; and
(iv) On the status of water resources.

The purpose of the national information system, (WSA chapter 10; clause 68), is:

(a) To record and provide data for the development, implementation and monitoring of national policy on water and sanitation services; and
(b) To provide information to water and sanitation services institutions, consumers and the public –
(i) To enable them to monitor the performance of water and sanitation services institutions;
(ii) For research purposes; and
(iii) For any other lawful reason.

Therefore, the ultimate goal is to provide information needed for planning, decision making and operational water and sanitation management and related infrastructure at local, regional and national levels.

Water and sanitation refers to water and sanitation in any stage of the water and sanitation life cycle, and water and sanitation information refers to data or value-added information products that relate to the occurrence, spatial and temporal distribution, quality, quantity, movement, use (actual, authorised or registered), compliance to management and transformation objectives and the cost of surface and groundwater and sanitation etc. as well as any metadata related to these.

The responsibility for monitoring lies with the Department of Water and Sanitation, however, the DWS Minister has a limited legislative mandate to regulate data uploaded into national information system/s. Some of the data submitted could be questionable so standards regulating the verification of data should be put in place, as well as mechanisms to ensure credibility of data submitted into national Information systems.

14.2 Guiding Principles

The principles that guide the collection, compilation, accumulating and dissemination of national or international water and sanitation information issues are primarily set out in the:

- Water Services Act, 108 0f 1997, of the Republic of South Africa, and
- National Water Act, 36 of 1998, of the Republic of South Africa.

The primary principles in relation to monitoring and information management that guide and inform the strategic objectives may be summarised as follows:

- The Minister has the duty to provide complete, accurate and up to date information to the National and International public.
- An integrated, easily accessible monitoring and information management system that supports sustainable water and sanitation management is critical.
- Data on water and sanitation must be collected, managed and protected as a strategic asset.
- The recording of observations on all elements of the water and sanitation value chain is essential for effective water and sanitation management and interinstitutional collaboration.
- The effective use and exchange of data on water and sanitation requires compliance with universal standards and world best practice to align South Africa with international reporting and to ensure conformity to treaties/conventions bilateral/multilaterals to which RSA accedes.
- Monitoring and information management in a decentralised, participatory and multi-sectoral environment requires an effective level of governance and coordination.
- Water and sanitation data and information needs to be accessible at all levels of the public, empowering it to exercise its constitutional rights.
- Adequate skilled resources are required not only to ensure consistent collection of water and sanitation data, but also to analyse the data.
- Adequate and reliable funding is a prerequisite for the sustained and continued monitoring of water and sanitation.
- The Minister may require any Province, water and sanitation services institution and consumer to furnish information to be included in the national information system.

14.3 Baseline & Status Quo

Currently, a number of data collection and archiving as well as information system initiatives in major national water and sanitation monitoring programmes are in progress, 11 of which are operated by the DWS. As a result of the established systems, a new data landscape has emerged in the Department reflecting numerous 'islands' or 'silos' of data by functional area. With an overload of dispersed and disintegrated data, of different quality and consistency, it is difficult to establish one trusted source of decision-making information.

Information stored in the following different sources and formats not only hinders decision support but also deters improvement in service delivery:

- Surface water data (including stream flows, rain, evaporation and reservoirs) in the HYDSTRA database.
- Groundwater data in various databases, including NGA, WARMS, GRIP, HYDSTRA and Hydrogeological maps.
- Fitness for use data in the National Chemical Monitoring Programme, National Microbial Water Quality Monitoring Programme, National Eutrophication Monitoring Programme, National Toxicity Monitoring Programme and National Radioactivity Monitoring Programme.
- Databases and tools for water quality and quantity archiving such as the water quality management system (WMS), NGA/REGIS, HYDSTRA and geographical information systems (GIS).
- Water-use data captured by the DWS in the electronic Water Use Licence Application and Authorisation System (e-WULAAS).
- Compliance and performance data in the Regulatory Performance Management System.
- Gauged rainfall data, primarily in the South African Weather Service (SAWS) database and DWS stations in HYDSTRA, but also available from others such as the Agricultural Research Council (ARC), water boards, local and district municipalities, WUAs etc.
- The National Integrated Water Information System (NIWIS).
- The National Water Services Knowledge System (WSKS).
- The Integrated Regulation Information System (IRIS).
- The Integrated Water Resource Management System at catchment level (HYDRONET).
- The NCIMS (compliance monitoring) and ECMS (Enforcement) information systems currently manged for CME.
- The Resource Directed Measures (RDM) Decision Support System.
- The River Health Programme (RHP).
- The Adopt-a-River Programme and Citizen Science Programme.
- The springs and groundwater rainfall recharge monitoring programme and the mountain rainfall programme.
- Hydrological information regarding flood situations, drought flow conditions and the consequences of climate change in shared water courses.

There are several challenges associated with the current status of Departmental water and sanitation information systems including the following:

- Limited means of analysing information for decision making because information is rigid in its standard or customized formats which are not user-defined or user-controlled.
- Fragmentation causes lack of a single consistent view of business information on a subject area. To get a departmental view of information for decision making requires multiple inquiries and development of new reports – a time consuming and costly exercise.
- Information is not easily accessible whenever needed by decision makers.
- With disintegrated information, decision makers find it difficult to study patterns and make reliable and meaningful analysis and projections.

- Data sharing between stakeholders in the water and sanitation sector is insufficient, resulting in information needs not being met as well as they could be, even under present circumstances.
- The 2004 NWRS-1 envisaged a single extensive, integrated, accessible water information system. Although progress has been made in this regard, there are still many separate water and sanitation information systems, both within and outside the DWS, which function as standalone systems with limited accessibility.
- The water and sanitation information systems are data-driven and not information-driven.

The optimisation project reviewed existing major national water and sanitation monitoring programmes. This resulted in the need to expand the current coverage of water and sanitation monitoring networks where it is inadequate.

While there is some reporting about the availability and use of water, gaps exist with regards to water accounting on how water supply is balancing growing demand including transformational imperatives.

Data acquisition and management also plays a crucial role in the DWS water resources and sanitation management because it determines the quality of data that is used to generate information for water and sanitation related decision making. To ensure that credible and accurate data is available, accessible, secure and timely, a Data Management Strategy for Water and Sanitation has been developed and was approved in 2019 for implementation.

The aim of the Data Management Strategy is to develop a model to coordinate and facilitate the sector wide management of data and information required to populate the national data and information systems. The developed model should consist of guidelines and a strategic framework for data acquisition and management in Water and Sanitation.

The main pillars for data acquisition and management are:
- Data Governance.
- Data Life Cycle Management.
- Data Management Systems.
- Collaboration with institutions in the Water and Sanitation sectors.

It is important that the following main issues related to data acquisition and management are addressed:
- Lack of data governance (accountability, roles and responsibility) for executing data acquisition and management processes.
- Lack of Standard Operating Procedures (SOP's) for data acquisition and management in Water and Sanitation.
- Lack of structured data management systems for some type of data in Water and Sanitation.
- Lack of integration between the currently existing data management systems in Water and Sanitation.
- Insufficient data sharing between stakeholders in the Water and Sanitation sectors.
- Declining number of skilled personnel for data acquisition and management in Water and Sanitation.
- Shifting data acquisition from traditional methods to real-time mass data acquisition making use of technology and 4IR (i.e. remote sensing, communication apps, biotelemetry etc.).

The Data Management Strategy should act as a data acquisition and management guideline and reference for other strategies such as the National Groundwater Strategy (NGS), the integrated Water Quality Management (IWQM) Strategy, the Wetlands Policy and Strategy, and the Knowledge Management Strategy, etc. Data through research is addressed in chapter 17 of the NWRS-3.

14.4 Strategic Objectives & Strategic Actions

The strategic objectives of this chapter and the various strategic actions to be undertaken within each strategic objective are as follows:

14.4.1 Strategic Objective 1

To develop and maintain water and sanitation information systems and hydrological monitoring networks.

The following strategic actions must be undertaken to achieve this objective:

- Review and update Management, Monitoring, Evaluation and Reporting Structures.
- Review and develop a comprehensive DWS information management strategy to include:
- Amended authorisation conditions to provide for self-reporting.
- Harmonisation of monitoring actions by all responsible institutions.
- Performance information of Validation and Verification audits.
- Amended authorisation conditions to provide for self-regulation and self- reporting.
- Align monitoring institutions to support National, Continental and International reporting programmes, e.g. SDGs, Africa Agenda 2063, Citizen Science and Adopt-a-River Programmes.
- Establish monitoring networks and programmes relating to all emerging requirements.
- Grow and maintain the groundwater resource knowledge base, focusing on the resource itself, its socio-economic role and its appropriate management.

- Ensure the digitisation of all monitoring networks and information systems across the entire water and sanitation value chain.
- Ensure data is spatially overlaid when presented to ensure ease of use in terms of location, so that historical monitoring of sites can be tracked in relation to the impact of climate change on monitoring sites where sample collection areas are dry and new areas are now selected.

14.4.2 Strategic Objective 2

To implement data management so as to collect, analyse, compile, maintain, disseminate and provide easy access to accurate, complete, up to date and relevant data.

The following strategic actions must be undertaken in order to achieve this objective:

- Implement the Data Management Strategy as per the roll out plan of the Department.
- Capture, maintain, analyse and disseminate accurate, up to date and relevant information.
- Provide up to date and relevant data and intelligence to the water and sanitation sector and the public.
- Ensure the customer information walk-in centres are maintained, fully functional and well resourced.

14.4.3 Strategic Objective 3

To support decision-making, reduce and manage risks and deal with emerging climate change impacts.

The following strategic actions must be undertaken to achieve this objective:

- Establish a hydrological extremes and risks management operational programme.
- Monitor for compliance.
- Monitor for outcomes.
- Monitor for impact and collaborate and share data with DFFE, SAWS and ARC.

14.4.4 Strategic Objective 4

To raise awareness of the importance of investing in the collection and management of high-quality water and sanitation related information.

The following strategic actions must be undertaken to achieve this objective:

- Share data and information on water availability, water quality and water quantity within the water and sanitation sector.
- Share information on sector successes and achievements.
- Implement a co-ordination and liaison programme.

14.4.5 Strategic Objective 5

To improve governance of monitoring and information management in the water and sanitation sector.

The following strategic actions must be undertaken to achieve this objective:

- Form partnerships and inter-governmental cooperation agreements for data and information sharing.
- Establish Integrated Water Monitoring Committees and sub-committees.
- Ensure coordination and collaboration at local, provincial and national levels.
- Develop and implement standardized guidelines / SOPs, best practices for integrated monitoring.

14.4.6 Strategic Objective 6

To develop and implement a water and sanitation monitoring plan at national, regional and local levels and ensure uninterrupted continuation of existing monitoring and assessment programmes.

The following strategic actions must be undertaken to achieve this objective:

- Monitor and assess for compliance.
- Monitor for outcomes.
- Monitor and assess for impact.
- Establish and promote partnerships and inter-governmental cooperation agreements on data collection and information sharing.
- Ensure integrated monitoring governance and monitoring committees are optimally operational.

14.4.7 Strategic Objective 7

To enhance quality assurance and auditing of data and information on all aspects of water and sanitation.

The following strategic actions must be undertaken to achieve this objective:

- Assess and implement international standards such as those used by the World Meteorological Organisation (WMO) for collection and monitoring of information nationally in the water and sanitation sector.
- Review and establishment of a formal Quality Control and Assurance function, starting with the water quality monitoring programmes with the aim of expanding it to serve all the monitoring programmes.

Chapter: 15

Building Capacity for Action

15.1 Context & Current Challenges

The National Water Resource Strategy, First Edition (NWRS-1; 2004) argues that "Any strategies put in place to give effect to the provisions of the National Water Act (the Act) will not be effective if there aren't enough competent people available to implement them. It is imperative to ensure that sufficient capacity is created in the water and sanitation sector to implement and sustain the implementation of water and sanitation policy and legislation".

While skills and capacity are vital to the implementation of the NWRS-3, reforms within Government have placed the primary responsibility for the coordination and facilitation of education, training, and skills development across the various sectors in the Department of Higher Education and Training, through the various Sector Education and Training Authorities (SETAs).

The Skills Development Act (Act No. 97 of 1998, as amended) conferred the primary legislative responsibilities of: facilitation of learning programme linked to occupations, disbursement of workplace training funds (mandatory and discretionary grants) and skills planning functions to SETAs. This arrangement has exposed the water sector to two SETAs namely the: Local Government Sector Education and Training Authority (LGSETA), which represent most of the Water Services Authorities (WSAs) and Energy and Water Sector Education and Training Authority (EWSETA). The challenges with this are that water and sanitation services are local government functions, which is LGSETA space and whilst EWSETA Sector Skills Plan (SSP) is meant to represent the entire sector, including WSAs.

For the water and sanitation sector, the Energy and Water Sector Education and Training Authority (EWSETA) is charged with the responsibility of coordinating and facilitating skills development and capacity building in the post school education and training landscape proposed by the National Skills Development Plan 2030, Human Resource Development Strategy (HRDS) II (2010-2030), New Growth Path, National Development Plan (NDP) 2030 and the National Skills Accord (NSA) between government, business and labour. Through Sector Skills Plans, the EWSETA and LGSETA focuses on:

- Determining skills development priorities after an analysis of the skills demand and trends, level of skills required and supply issues within the sector.
- Identifying a set of water and sanitation -sector-specific objectives and goals that will meet water and sanitation sector needs, economic or industrial sector growth strategies, and address scarce and critical skills in the sector.
- Identifying strategies, activities and resources to address sector skills development objectives and goals.
- Reporting on the implementation of the sector skills plan.

The water and sanitation sector has a multiplicity of stakeholders and role players who represent various interests and mandates in relation to capacity building, training and skills development. Such stakeholders represent government, education and training institutions and agencies, water sector institutions, water users, support agencies and institutions as well as civil society organisations.

In playing the leadership role DWS will strive for robust partnerships of sector stakeholders, strong corporative governance from role-players and comprehensive coordination process to achieve the objectives of putting in place a well-coordinated, coherent capacity-building system within the water and sanitation sector.

As the water and sanitation sector leader, the DWS must explore the possibility of updating the Water Sector Competency Framework for it to cater for the entire water and sanitation value chain in terms of sector occupations (including their specialisation) and the skills requirements to deliver on the mandate of the department. In doing so, the department as well as all the water and sanitation institutions must review their skills development plans based on their area of operation to ensure that the entire water and sanitation value chain is catered for.

15.2 Guiding Principles

The water and sanitation sector's efforts in relation to capacity building and training for the implementation of the NWRS-3 are guided by the following principles:

- Water sector capacity building is located within the context of integrated water and sanitation resources and services (including sanitation) management, in line with the vision outlined in the White Paper for Post School Education and Training (WP-PSET)
- The skills and resources will be established and capable water institutions will also be developed, supported and retained.
- Skills and expertise within the sector will be optimized to create institutions that are capable of developing, attracting and retaining skilled people.
- There will be targeted programmes for professionalization of science and engineering occupations.
- Capacity will be developed to address all the institutional, individual and environmental elements of water resources and water and sanitation services functions (development, regulation, management, financing and service delivery) looking at the entire water and sanitation value chains.
- Resources will be directed to ensure that the capacity and efficiency of the state are improved to meet the challenges of growth and development, particularly within the local sphere of government.

15.3 Baseline & Status Quo

Despite the reform structures, various strategic frameworks and some good progress made in respect of key skills and capacity building issues within the water and sanitation sector, challenges remain to be solved, such challenges will include:

- Lack of a coordinated mechanism for the planning, delivery and quality assurance of water-related capacity building, training and skills development programmes within the sector.
- Existence of multiple education, training and skills development providers within the sector (within formal education, post-school and the workplace).
- Lack of capacity to deliver qualifications that meet the needs of the water and sanitation sector among education and training institutions.
- There is a gap between higher education and training qualifications and related professional registration.
- There is inadequate human resource planning within the sector, for example, lack of succession planning, weak retention strategies and the inadequate induction of professional entrants.
- The level of water and sanitation literacy and awareness among members of the public is very low, resulting in inefficient water usage and wastage and unhealthy sanitation practices.
- Education, training and skills development are provided within a complex National Qualifications Framework and regulatory system and the practical articulations and access between the three sub-frameworks is lacking. Education, training and skills development within the sector is funded through a multiplicity of mechanisms, which result in overlaps or under-investment in critical areas.
- There is a shortage of specific critical skills within various institutions across the water value chain (engineering skills, artisans, socio-economic, environmental health, and management skills).
- Water and sanitation services institutions have cited various challenges, such as, that politics influences in the selection and appointment of individuals to positions, delays in attraction of skills and finding suitably qualified candidates, meeting Employment Equity (EE) targets, lack of support from management, disputes with the labour union, the approval process; and consultation processes for Section 57 posts make the process very lengthy.
- The primary reasons cited for difficulties in sourcing suitable technically qualified and/or skilled staff was as follows: remuneration, location, lack of experienced and skilled candidates.
- Other cited reasons were working conditions, travelling distances, competing with counter offers from Water Services Authorities and the private sector, lack of career growth and competition with the private sector.

Notwithstanding the issues and challenges, the sector has made considerable progress towards addressing the skills and capacity gaps throughout the water value chain. Several initiatives have been initiated and implemented by various stakeholders within the sector, including those listed below:

- On the basis of the outcomes of the impact assessment report of FET Water Programme Phases I and II, completed in 2010, recommendations were made to continue into Phase III of the Programme. In this regard, FET Water Phase III (2014 – 2019) currently focuses on six new thematic areas listed below, aligned to priority areas of NWRS II (2013): Water Infrastructure, Water Monitoring and Assessment, Water Planning and Implementation, Water Regulation Requirements, Water Use, Services and Sanitation and Institutional Management and Governance
- The DWS is continuing to implement national water literacy and public awareness programmes (the 2020 Vision Curriculum Support Programme as well as Baswa Le Meetse, Aqua Enduro and Public Speaking, DWS ECO School Programme and the South African Youth Water Prize Competition). The 2020 Vision for Water and Sanitation Education Programme in schools has reached over 20 000 learners and is one of the several competitions culminating in the National Awards.

- Through sector collaboration under the auspices of the Water and Sanitation Sector Leadership Group (WSSLG) Skills Task Team (STT), the sector has developed an Occupations Framework for much coherent and standardised planning, implementation and reporting of education, training and skills development within the sector through Workplace Skills Plan (WSP) and Annual Training Report (ATR) system. The framework has informed several initiatives by various stakeholders within the sector and serves as the basis for the approach employed within this chapter.
- The DWS Learning Academy continues to offer bursaries and to develop graduates (engineers, engineering technicians and technologists, scientists, surveyors, project managers, environmental officers and water economists) with the ultimate goal of registering them as professionals with relevant professional bodies.
- Several water-sector stakeholders (for example, DCoG, EWSETA and WISA) have initiated programmes aimed at the professionalization of the various aspects of the water value chain. The EWSETA is currently re-designing their Water and Wastewater Process Controller training course in alignment with the Quality Council for Trades and Occupations (QCTO) sub-framework, the DCoG initiative focuses on local government in its entirety, and the WISA programme is aimed at the professionalization of process controllers, particularly focusing on:
- Mapping career pathing for the entire suite of qualifications under FET Water to give them more integrity.
- Developing occupationally-based awards for the entire suite of qualifications under FET Water III and registered by the National Qualifications Framework (NQF).
- The EWSETA has developed a Sector Skills Plan in line with its mandate and has commenced with the implementation of short to medium-term initiatives in partnership with various stakeholders within the sector. Such initiatives include supporting TVET colleges to access training materials from accredited training providers, the provision of bursaries for learners and engaging such agencies as the Municipal Infrastructure Support Agency (MISA), water boards and learning academies to open opportunities for workplace learning for students within TVET colleges.
- The EWSETA is undertaking a baseline study to establish and understand the TVET College landscape (locational advantages, curricula, capacity and skills gaps, existing funding models, current qualifications, infrastructure and systems as well as demand and supply issues) through the University of Stellenbosch. This is envisaged to enhance the EWSETA's understanding of the TVET college environment and to inform the design of targeted institutional capacity building programmes in the future.

15.4 Strategic Objectives & Strategic Actions

The strategic objectives of this chapter and the various strategic actions to be undertaken within each strategic objective are as follows:

15.4.1 Strategic Objective 1

To strengthen the strategic orientation and coordination capacity of the EWSETA and LGSETA to ensure a demand-driven skills planning mechanism that caters for short, medium and long-term sector needs.

To achieve the above strategic objective, the following strategic actions must be undertaken:

- Update the Water and Sanitation Sector Occupations Framework for the entire water and sanitation water value chain. Ensure that planning for SETA skills development is based on primary resources such an Organising Framework for Occupations that is reflective of the sector to ensure relevant and appropriate response.
- Ensure that the LGSETA Skills Sector Plans fully account for water and sanitation services sub-sector.

15.4.2 Strategic Objective 2

To develop a responsive skills development funding mechanism to avoid funding duplications and overlaps.

To achieve the above strategic objective, the following strategic actions must be undertaken:

- Partner with institutions to fund training of water sector practitioners in the curation, management and use of data as well as associated technologies.
- Facilitate aligned and collaborative skills and capacity development funding applications protocol that respond to sectoral priorities.
- Ensure water sector's list of priority occupations becomes part of LGSETA and EWSETA Skills Sector Plans.

15.4.3 Strategic Objective 3

To facilitate quality assurance across all water sector occupational learning modes to ensure response and relevant skills.

To achieve the above strategic objective, the following strategic actions must be undertaken:

- Establish regulations on required qualifications and experience for senior and technical positions in DWS, CMAs, water boards and municipal services institutions.
- Ensure skills development requirements are standardised by the sector and implementation systems are quality assured for responsive and skilled water sector.
- Ensure active constitution of community of expert practitioners (CEP) for all learning programmes within technical and vocational space in the water sector.

15.4.4 Strategic Objective 4

To develop an inclusive strategy for the professionalization of water sector institutions and practitioners throughout the water value chain, including regulations, standards, professional registration and on-going development programmes such as mentoring, coaching, seminars and CPD based short courses against critical occupations.

To achieve the above strategic objective, the following strategic actions must be undertaken:

- Develop and implement a programme for recruiting experienced technical and managerial staff, firstly, in South Africa and then internationally.
- Develop and implement a mandatory, modular hands-on qualification for municipal water managers (technical managers) to be run over 18 months and accredited by EWSETA to include aspects such as asset management, tariffs and revenue management, drought management, stakeholder engagement and customer relations.
- Partner with sector stakeholders to offer structured workplace learning opportunities for candidates towards registration in a professional category by a statutory council.
- Develop a monitoring and evaluation system for sector capacity building and training.

15.4.5 Strategic Objective 5

To strengthen partnerships for innovation between role players along the skills pipeline (schools, TVET colleges and HEIs), public and private providers, providers and workplaces, and between local and international providers (in areas where South Africa does not have the relevant expertise).

To achieve the above strategic objective, the following strategic actions must be undertaken:

- Define (and reinstate in some cases) career paths with defined training and on the job experience to build a knowledgeable sector of professionals.
- Initiate a focused research capability initiative in water sector economics to address this existing skills gap.
- Identify new / future skills that are required in the water and sanitation sector such as skills related to the digitisation of the sector.
- Continue to develop high end skills (postgraduate) to ensure future science, technology and innovation capability in South Africa.
- Continue to support programmes that enable development of critical skills and exposure to emerging innovations (e.g. 2020 Vision for Water and Sanitation Education).
- Support investment in knowledge production and innovation capacity within education and training institutions, science councils, state-owned enterprises and private sector organisations.
- Implement and monitor the 5-year Councillor Development Programme in collaboration with the South African Local Government and Association (SALGA). The Programme is meant for Water and Sanitation Portfolio based Councillors to empower and capacitate Councillors in their political roles with respect to the Water and Sanitation business within their municipalities as well as to promote their involvement in Water Resource Management business.
- Implement and monitor the 2021-2026 Water and Sanitation Councillor Development Strategy to enhance the skills and knowledge of Local Government Councillors in the Water and Sanitation Sector. The Strategy has been developed by SALGA in collaboration with the Department of Water and Sanitation (DWS) and is based on the strategic themes in the NWRS-3.

15.4.6 Strategic Objective 6

To ensure Compliance Monitoring and Enforcement (CME) in-house training.

To achieve the above strategic objective, the following strategic actions must be undertaken:

- Ensure Environmental Management Inspectorate (EMI) basic training and develop advanced training material for EMIs to enhance compliance and promotional initiatives.
- Undertake capacity building and training for the Institutional Water Sectors.

Chapter: 16

Ensuring Financial Sustainability

16.1 Context & Current Challenges

The necessary financial resources, together with the necessary systems, structures and processes, will enable the successful implementation and progress monitoring of the NWRS-3. Financial resources must be allocated to address the needs identified across all the chapters of the NWRS-3. All strategic objectives and strategic actions, per NWRS-3 chapter, are to be carried through to the National Water and Sanitation Master Plan (NW&SMP) for phased resourcing and execution.

This chapter covers the full scope of financial management, within the framework of the total water and sanitation value chain that are the subject of the NWRS-3 and all the sectors involved in, and impacting on, water resources and water and sanitation services management. The NWRS-3 seeks to identify and financially resource the total sector perspective and value chain showing the interface between water resource and water and sanitation services management and the respective user sectors with regard to the following:

- The estimated financial requirement for investment on water resources development and water and sanitation services infrastructure with the time frames over time.
- Funds to protect, maintain and restore freshwater ecosystems and strategic water source areas.
- The updated content and progress on the development of a comprehensive national water and sanitation investment framework.
- Progress on the development of a funding model that optimizes on and off budget funding to source sufficient funds to meet the required investment targets.
- The revised Pricing Strategy to give effect to matters such as the pro-poor water tariffs, the waste mitigation charge, the agricultural water use development, funding green infrastructure and the rehabilitation of ecosystems, water based rural livelihood and food for security initiatives.

Financial management for the purpose of NWRS-3, therefore, considers and includes aspects of supporting line functions and providing a structure for budgeting, sourcing of funds, financing, sustainable functional management (including charging for use or services and recoverability), investment, viability and affordability.

NWRS-3 should strive to facilitate the achievement of sustainable reform targets through viable sector economic activities, financial support in the form of subsidies, grants, funding of infrastructure and technical inputs (including extension services) can be made available to beneficiaries of WAR.

Without sufficient, properly managed financial resources and effective financial oversight of the water and sanitation sector:

- The NWRS-3 will not be successfully implemented.
- Works will not be constructed, refurbished or properly operated.
- Water institutions will not be financially sustainable and bad debt will rise.
- No sustainable water resource and water and sanitation services management, meaning that the environment will not be protected, the constitutional and social obligations will not be met and there will not be economic growth.
- Water and sanitation services will not be available where required at the required level of assurance.
- Every sector dependant on water and sanitation, including domestic, agricultural, business, and industrial and energy will be unable to grow.

The National Water Investment Framework informs the budgeting and integrated planning based on a life-cycle approach, which includes planning, development and construction costs, operation and maintenance costs, financing and incidental costs and costs of sustainable water and sanitation management.

The National Water Investment Framework, therefore, will determine how the investment and resourcing required in the NWRS-3 will be planned, funded, resourced and implemented.

The investment framework will include the whole water and sanitation sector value chain, from source to tap to waste and back to source. The investment requirements of the DWS, CMAs, Water Boards, and WSAs and WSPs will be included as well as the investments that benefit the municipalities, agricultural, mining, business, energy, industrial and other water-use sectors.

It is the responsibility of the DWS to mobilise the water and sanitation sector to address revenue management and debt collection challenges, and to lead the water and sanitation sector in dealing decisively with inadequate governance, fraud and corruption. It is the responsibility of the DWS to:

- Develop a debt management strategy.

Establish a debt management desk for the entire water value chain.
To achieve the desirable social benefits related to the provision of adequate basic water supply and sanitation services to all people living in South Africa, government must continue to fund the following:

- Funds for capital investment in infrastructure to extend basic services to those without an adequate service,
- Funds to ensure that the ongoing provision of basic water and sanitation services is affordable to the poor,
- Funds to develop skills and capacity needed in the water and sanitation sector, and
- Funds to implement the provisions of the NWA Section 19 (4) and (5) for the remediation of pollution by a CMA, or in the absence of a CMA, by the DWS.

16.2 Guiding Principles

The primary principles in relation to financial management in the water and sanitation sector that guide and inform the strategic objectives may be summarised as follows:

- Enabling equitable economic development: Support new economic development in identified nodes, within the national aims of enabling equitable economic development, job creation and sustainable economic growth.
- Social equity: Contribute to social equity and redress of the imbalances of the past, both with respect to equitable access to water supply services and direct access to raw water.
- Social and economic uses: Water resource development and water and sanitation services infrastructure will often be targeted at a mix of both social and economic uses;
- Affordability: No one is excluded from access to basic water and sanitation services because of their cost.
- Ecological sustainability: The water needs for the effective functioning of aquatic ecosystems must be protected.
- Economically viable projects: The users who can afford to pay for water use will be mobilised to finance the economically viable portion of water resource development and water and sanitation services infrastructure.
- Cost of ecological reserve: The management activities required to ensure the provision of sufficient water for the ecological reserve must be paid for by all registered and billable users and incorporated into the Pricing Strategy.
- Preserving the resource quality: The preservation of resource quality will be promoted and the polluter / user pays principle will be adopted.
- Financial sustainability: Adequate revenue must be generated to fund the cost related to:
- Management of the country's water resources.
- Operations, maintenance, refurbishment and betterment of existing Government water schemes and waterworks owned by water management institutions.
- Development of new user-funded schemes.
- Investments are planned: All investment requirements, including infrastructure and sustainability requirements, are properly planned from source to tap and back to source.
- Appropriate technology solutions and value engineering: Investments in infrastructure must be cost effective and designed to be fit for purpose.
- Public and private funding: Both the public and private sectors must contribute towards the funding and financing requirements through appropriate mechanisms with ownership of water resource infrastructure residing with an organ of state.
- Transfers and grants: Transfers and grants must be targeted to benefit the poor and support inclusive economic growth.
- Social investment obligation: The private sector is encouraged to contribute towards the social component of infrastructure investment where they use water from the same infrastructure as their corporate social investment obligation (CSI) in water and sanitation infrastructure.
- Lifecycle funding: Adequate funding for operations and regular refurbishment must be available.
- Value for money and stretching of financial resources: The sector must work smarter with the available financial resources through proper financial governance, leaner institutions, and appropriate technology and through techniques such as value engineering.
- Polluter pay principle: The users who pollute the water resource are liable to pay for cleanup.

16.3 Baseline & Status Quo

Ineffective financial management and poor cost recovery is currently impacting negatively on the financial viability of water infrastructure, water management and water and sanitation services institutions. Poor maintenance of water resource infrastructure and water and sanitation infrastructure impacts negatively on ecological infrastructure and aquatic ecosystems leading to non-revenue water due to water and wastewater leaks.

The National Water and Sanitation Investment Framework informs the budgeting and integrated planning (based on a life-cycle approach) which includes planning, development and construction costs, operation and maintenance costs, maintenance and restoration of ecological infrastructure, financing and incidental costs and costs of sustainable water and sanitation management.

The DWS has initiated a revision of the Pricing Strategy. The revised Pricing Strategy will be driven by the principle that the full costs of water resources infrastructure and management are covered in the charges. The following issues still require attention and refinement of the Pricing Strategy:

- The water resource management charge does reflect the full management cost without the capping of the charges for certain sectors.
- The price of water to be able to send the correct economic signal that water is a scarce resource.
- The price of water still varies considerably from place to place, sometimes to the detriment of low-income areas.

The DWS Minister gazetted norms and standards that provide for pro-poor municipal water tariffs in the form of block tariffs. The norms and standards for tariffs are currently under review with a view to strengthen them for regulating water tariffs set by the WSAs and Water Boards.

The DWS Minister also gazetted regulations that provide for the granting of financial assistance to resource-poor farmers in support of agricultural water use development. The DWS is currently reviewing the said regulations with the view of expanding the scope to include other water-based rural livelihoods and food security initiatives.

There is currently no regulatory framework for financially assisting historically disadvantaged farmers.

The DWS has also initiated a programme to address the following financial management issues within the Water Trading Entity:

- Incomplete and inaccurate database of registered and licensed water users.
- Inaccurate water meters and absence of meters.
- Inaccurate and out-of-date billing information.

Some of the immediate and medium-term challenges for the DWS are summarised as follows:

- The inability to produce a credible National Water Investment Framework;
- Delays in the gazetting of the Pricing Strategy;
- The inability to resource and adequately fund the government policies;
- Ineffective and inefficient revenue management;
- The implementation of the Mitigation Charge;
- Financially unsustainable water institutions;
- The inability of municipalities to collect water and sanitation revenue; and
- Inadequate debt management leading to non-enforcement of obligations to pay.

16.4 Strategic Objectives & Strategic Actions

The strategic objectives of this chapter and the various strategic actions to be undertaken within each strategic objective are as follows:

16.4.1 Strategic Objective 1

To fund every aspect of the NWRS-3 in terms of approved funding plans that are cost effective and fit for purpose (value engineering).

The following strategic actions must be undertaken to achieve this objective:

- Develop and implement institutional arrangements that recognise the diversity of circumstances across South Africa and allow for regional cross subsidisation.
- Develop a comprehensive National Water and Sanitation Investment Framework.
- Develop a Water and Sanitation funding model (including the AMD).
- Gazette the Pricing Strategy and Norms and Standard for tariff setting.
- Mobilise the private sector to contribute towards the funding of economically viable projects and multi-purpose projects.
- Work closely with National Treasury regarding the Medium-Term Sector Expenditure Framework (MTSEF).

16.4.2 Strategic Objective 2

To reduce the amount of outstanding debt and financial losses to acceptable levels.

The following strategic actions must be undertaken to achieve this objective:

- Put in place mechanisms in all entities to deal with accumulated debt.
- Develop and implement a programme for collecting outstanding water charges from water users and to improve financial management.

16.4.3 Strategic Objective 3

To monitor and report on financial regulation and governance.

The following strategic actions must be undertaken to achieve this objective:

- Develop regulations in terms of Section 139(8) of the Constitution of RSA, which allows for a national entity to take over water and sanitation service functions, including revenue and billing within a municipality if the service delivery criteria is not met after interventions by the Minister have failed.
- Implement, monitor, evaluate and report on an approved financial regulation and governance system.
- Develop programmes for research on improving financial regulation and governance systems.

16.4.4 Strategic Objective 4

To revise norms and standards for tariff setting applicable to bulk and reticulated potable water and sanitation.

The following strategic actions must be undertaken to achieve this objective:

- Ensure that sufficient revenue is received through tariffs and grants to operate, maintain and improve the water supply and sanitation system.
- Ensure that tariff structures allow for cross subsidisation for the indigent and building of a reserve for periods of drought.
- Get norms and standards for tariff setting of bulk and reticulated potable water supply and sanitation approved.
- Implement norms and standards for tariff setting of bulk and reticulated potable water supply and sanitation.

16.4.5 Strategic Objective 5

To provide financial assistance to historically disadvantaged households, other water-based rural livelihoods and food security initiatives.

The following strategic actions must be undertaken to achieve this objective:

- Agree the framework and implementation plan for effecting financial assistance to historically disadvantaged farmers, including other water-based rural livelihoods and food security initiatives approved.
- Establish and manage a database of historically disadvantaged farmers and other water-based rural livelihoods to monitor and ensure financial assistance to them.
- Ensure funding allocations to historically disadvantaged farmers, water-based rural livelihoods and food security initiatives are accounted for.

16.4.6 Strategic Objective 6

To produce a complete and accurate (approved) database of registered and licensed water users and billing information.
The following strategic actions must be undertaken to achieve this objective:

- Implement accurate billing and effective revenue management systems in all entities in the water value chain with strict credit control measures.
- Ensure the validation and verification process of water users is concluded and finalised.
- Develop the validation and verification database.
- Facilitate the conclusion the verification of completeness and accuracy of WARMS information.

16.4.7 Strategic Objective 7

To promote investor confidence through the establishment of incentives for new investment in the water and sanitation sector.

The following strategic actions must be undertaken to achieve this strategic objective:

- Formulate and establish an appropriate institutional design for economic regulation of the water and sanitation sector.
- Ensure the involvement of institutional oversight and co-operative governance to establish an enabling environment for economic investment in the water and sanitation sector.
- Establish mechanisms to deal decisively with all forms of fraud and corruption in the water and sanitation sector.

Chapter: 17

Enhancing & Enabling Deployment of Research, Development & Innovation

17.1 Context & Current Challenges

The complexity surrounding the environmental drivers of urbanization and population growth, ageing infrastructure and cost of infrastructure, water scarcity and stress, pollution and water quality deterioration, and climate impacts in relation to water resource protection and water service delivery make research and innovation a key contributor to the water and sanitation sector and its sustainability.

Such challenges call for high quality research that informs policy and decision-making and the development and deployment of technologies and solutions that are sustainable and are able to provide for economic goods and services to the sector. The development of skills in the water and sanitation sector and high-level knowledge about water and sanitation is still a priority for rapid progress to be made in ensuring that equity in water use and sanitation services is achieved and water resources are managed in a sustainable way.

The RDI chapter details the key strategic focus areas and water and sanitation system of innovation that needs to be supported to unlock effective research, development and innovation within the NWRS-3 and is a cross cutter across all the technical domains of the water and sanitation sector. In all aspects of the water and sanitation sector, RDI should support:

- New science that offers solutions to challenges.
- Knowledge generation that transitions the sector into improved practices for sustainability for water security, water resource protection and water and sanitation service delivery.
- Science and knowledge that leads to innovation that benefits the sector.
- The provision of evidence that guides policy and implementation thereof.
- Faster and more effective deployment of context-appropriate technologies and innovations.
- Enabling industry improvements and development through the adoption of innovation (the state being a critical first adopter in the public sector market of water and sanitation).
- Opportunities for the export of know-how and technology into the African continent and beyond.
- The development of content that guides education and awareness campaigns.
- Facilitating a learning culture in water and sanitation sector institutions and driving appropriate new knowledge, new content and training approaches in partnership with cross-sectoral partners inclusive of Higher Education Institutions for skills development and future skills enhancement.

The RDI chapter details the key strategic focus areas and water and sanitation system of innovation that needs to be supported to unlock effective research, development and innovation support into the water and sanitation sector. The specific research and innovation questions, issues or strategic programmes and projects that must be designed or implemented are linked into the specific technical chapters of the strategy. The pipeline of solutions coming from the water and sanitation innovation ecosystem, needs to come from a well balance demand-supply relationship that is embedded in effective relationships and understanding between water and sanitation sector implementation and research, development and innovation institutions.

Emphasis is thus placed on the desirability of close ties between the DWS, key water and sanitation sector institutions and the building of partnerships within the water and sanitation system of innovation. A more effective and responsive system of innovation for water and sanitation is an important focus because whilst South Africa has a made good strides related to research and innovation, there are still several challenges to be overcome - namely:

- Overall RDI investment across all sectors in South Africa is low and many water and sanitation innovation and implementation partners are operating in silos and coordination is weak. There is a need therefore for coordination of the different RDI and implementation partners to pool resources and shift solutions and technologies more effectively into practise.
- There is not yet effective transitioning of solutions and technologies between partners in the system of innovation, making the journey to commercialisation too long for innovators, technology developers and businesses.
- There is still opportunity to better connect a wider array of stakeholders to research and innovation processes and planning and water and sanitation sector partner adoption strategies.
- Connecting research and innovation more effectively into the policy advice and implementation system is important and needs greater attention.
- Uptake needs to be strengthened in relation to the alignment of water and sanitation research objectives, thrusts and programmes within broader national policies and strategies relating to water resources management, water use and sustainable sanitation.
- Currently, water and sanitation sector RDI strategy sits with various key stakeholders. At a national level the DWS strategy is linked to its mandate and operations. It has engaged with Department of Science and Innovation (DSI) to understand the Water RDI roadmap, its alignment to the DWS Masterplan and NWRS-3 and continues to strengthen its partnership with DSI. The WRC, as per the Water Research Act, is responsible for setting strategic priorities in consultation and also engages in a sector wide process. The WRC drafts its strategy in consultation with DWS as a major sector partner and other major stakeholders annually and it consults broadly with the water and sanitation sector as well. The process is approved by the WRC Board and then approved by the Minister of Water and Sanitation via DWS.
- DSI is a key strategic partner who is engaged for inputs into RDI strategy and policy and the WRC as a strategic research entity works with the DSI to understand its policy on the national system of innovation and also inputs into its foresight studies and strategic plans such as the DSI Decadal Plan to ensure water and sanitation is represented. Other SOEs also draft their strategic RDI plans based on their needs and the needs expressed by science partners like the WRC and other science councils as well as stakeholders and partners within the sector.

The key strategic partners that need to align closely to ensure RDI is enhanced across the water and sanitation sector are as follows:

- The WRC and the DWS to align to national water and sanitation sector needs and work towards the development of appropriate policy, knowledge, solutions and skills on water security, water resource protection, water and sanitation service delivery and the governance thereof. The DWS remains a critical partner in the sector for deployment of new practices and solutions through effective policy development and implementation.
- The WRC and water and sanitation sector institutions (inclusive of water service authorities and water service providers) to understand the current and future needs and develop, test and adopt new practices and innovations for effective policy implementation and service delivery.
- The WRC and the Department of Science and Innovation (DSI) and the National Research Foundation (NRF), to ensure that approaches to water and sanitation research are consistent with South Africa's broad policy on science and innovation.
- The Council for Scientific and Industrial Research (CSIR), Human Sciences Research Council (HSRC), Universities and other research bodies which play a significant role in researching, developing, and disseminating information on various technologies.

A number of large water users make significant and independent input into water and sanitation research activities, such as Eskom, Sasol, mining and agricultural companies. Hence, the consolidation of collective intelligence, enabling the development of a comprehensive inventory of all water-related research nationally, is of strategic priority.

17.2 Guiding Principles

The following principles guide the identification, development and implementation of research and innovation for the water and sanitation sector:

- Research and innovation is focussed and aligned to achieve an overall water and sanitation vision and needs are identified as per legislation, policy, strategies, masterplans and challenges at institution and community level through various mechanisms such as consultation, surveys and workshops.
- Transformation, equity and empowerment of marginalised groups inform the design of research and development projects.
- Research and innovation cuts across traditional research boundaries and through multidisciplinary approaches in line with agreed high-level objectives of various stakeholders.
- Knowledge derived from water and sanitation research informs policy development and strategic decision-making at all levels of government and across the water and sanitation value chain.
- Research and innovation need to contribute to practical solutions to issues in the water and sanitation sector at various levels.
- Research and innovation need to promote sustainable development within the sector.
- Research and innovation is well coordinated and established within the sector.
- Research and innovation is geared towards aligning products, services and knowledge within the sector.
- Research and innovation builds aligned partnerships for transformative projects to enhance funding, testing and uptake of appropriate solutions.

17.3 Baseline & Status Quo

Despite the challenges highlighted above, South Africa has a well-entrenched research and innovation ecosystem for water and sanitation. The South African contribution to the global share of water and sanitation related research papers ranks very high and is higher than the average for all other disciplines in the country. The South African Research, Development and Innovation (RDI) community is diverse and made up of many role players, institutions and activities. These stakeholders can be broadly categorized as:

- Institutions developing and implementing water and sanitation sector policy, strategy, services, and programmes (e.g. DWS, water boards, municipalities);
- Institutions coordinating and resourcing the water and sanitation system of innovation (e.g. science councils and innovation hubs); and
- Institutions generating knowledge and a range of actors that enable and enhance the water and sanitation RDI value chain e.g. funders, advisors, investors, early adopters of innovation, capacity building organisations and community-based organisations.

The complexity of tracking progress of the water and sanitation national system of innovation (NSI) is high given the complex landscape of role players. There are however 3 primary starting points for analysis:

- The Water Research Commission Corporate Plan and associated Annual Report: The WRC investment constituted 62% of all public funding in the water and sanitation RDI system. This makes the WRC investments and associated outputs the anchor to tracking RDI outputs in South Africa. The corporate plan targets are approved by the Minister of Water and Sanitation on an annual basis.
- The National Water RDI Roadmap: The National Water RDI Roadmap was initiated by DSI and WRC in partnership with the DWS and wider water and sanitation sector. The plan is currently under implementation and is entering a review cycle (2022/23 – 2023/24) to explore progress to date and more strongly align to the new DSI decadal plan.
- Specific catalytic projects can be commission to analyse key processes and progress in the system (e.g. skills system impact mapping, bibliometric studies, market demand analysis, etc).

More than half of water and sanitation research activities, funded and coordinated through the Water Research Commission are conducted by universities, science councils, and organs of state, the private sector, water utilities and other agencies such as the CSIR.

17.4 Strategic Objectives & Strategic Actions

The strategic objectives of this chapter and the various strategic actions to be undertaken within each strategic objective are as follows:

17.4.1 Strategic Objective 1

To increase the ability to make use of more sources of water, including alternatives.

The following strategic actions must be undertaken to achieve this objective:

- Provide guidance and tools to drive the one water concept for water boards, water service authorities and water service providers (develop and test a portfolio of water sources for productive and consumptive use).
- Continue to invest in understanding emerging contaminants (detection and treatment) in order to improve the transition towards reuse, reclamation and recycling of water.

- Identify health and environmental risks and the mitigation measures to manage them.
- Improve raw water quality through investing in communities of practise that bring together built and ecological infrastructure experts and solutions.
- Strengthen partnerships with Higher Education Institutions (HEIs) to undertake research on land use impacts on water linked ecosystems.
- Collaborate with HEIs and undertake ongoing research and planning around climate change and its impacts on water security, water infrastructure and community resilience and adaptation.
- Initiate a hydrological monitoring centre for South Africa to re-establish a robust data, monitoring and information capability for more effective water resources planning and climate change forecasting in future.
- Expand knowledge of the social, economic and environmental barriers in the uptake of treated water for various uses.
- Strengthen public communication of science on alternate sources of water to build public trust and confidence.
- Develop, pilot and demonstrate a suite of alternate sources in relevant locations.
- Link test bed partners (key water sector institutions) with technology developers and innovators to accelerate innovations to the market/public sector.
- Assess market uptake by deploying in multiple environments to de-risk, test replicability and sustainability in different household, municipal and water sector socio-technical systems by building partnerships.

17.4.2 Strategic Objective 2

To improve governance, planning and management of supply and delivery, and management of demand and use.

The following strategic actions must be undertaken to achieve this objective:

- Assess governance, planning and management processes around consistent challenges of non-delivery in the water and sanitation sector.
- Review and develop recommendations for water and sanitation service reforms to improve service delivery.
- Review all relevant guidelines and R&D products to understand where training modules need to be developed around new knowledge and policy development.
- Understand the political economy of water and sanitation.
- Explore with sector partners a professional service centre for water resources and for water and sanitation services.
- Increase research into governance and accountability (technical and political).
- Develop guideline and tools to transition into water and sanitation smart cities (i.e. water and sanitation sensitive design or towns and cities).
- Develop tools and practices to enhance planning in the water and sanitation sector.
- Review and advice on policy and sector reforms for improved water and sanitation delivery and protection of water resources.
- Develop guidelines for improved management practices and skills development.
- Develop knowledge products for improved operations and maintenance of emerging innovations.
- Develop, modernise (i.e. through digital) or enhance appropriate monitoring and compliance tools and processes for enhanced regulation, governance and enforcement by the DWS.
- Fund research into new models to better understand implementation approaches for water allocation reform and equity issues.
- Strengthen research into governance and innovative technological solutions for rural, informal and peri-urban settlements water and sanitation service delivery effectiveness.

17.4.3 Strategic Objective 3

To improve adequacy and performance of supply and demand infrastructure.

The following strategic actions must be undertaken to achieve this objective:

- Embrace the UN Decade of Ecosystem Restoration (2021–2030) and embed the concept of ecological infrastructure in key resource areas as well as the restoration of degraded infrastructure including green infrastructure (i.e. the blue-green / circular economy).
- Develop, demonstrate and validate appropriate alternative, water-less and off grid sanitation systems and distributed networks design.
- Develop and demonstrate appropriate domestic and industrial wastewater technologies for cost effectiveness, energy efficiency and beneficiation.
- Develop and demonstrate solutions that allow for the use of alternative sources of treating water for safe human consumption and water security.
- Develop technology and governance models for small-scale water and sanitation infrastructure and management.
- Enhance storage adequacy (dam infrastructure) through provision of appropriate and sustainable approaches to management, and safety.
- Increase the uptake of effective infrastructure asset management.
- Research climate resilient infrastructure planning and risk mitigation and adaptation mechanisms suitable for intense floods, drought and rising temperatures.

- Recognize the role of ecological infrastructure in effective water and sanitation management and supply protection.
- Develop technologies, tools and approaches to enhance sanitation (faecal sludge and wastewater) and water treatment optimisation and intensification.
- Develop and demonstrate solutions that allow for the use of alternative sources of treating water for safe human consumption and water security.
- Develop technology options for small-scale water infrastructure and management.
- Increase the uptake of effective infrastructure asset management.
- Implement climate resilient infrastructure planning.
- Recognise the role of ecological infrastructure in effective water management.
- Ensure sanitation and water treatment optimisation.

17.4.4 Strategic Objective 4

To improve operational performance and run water and sanitation as a sustainable "business".

The following strategic actions must be undertaken to achieve this objective:

- Research financial models, financing mechanisms and benchmarks across the water and sanitation value chain and within institutions to enhance financial sustainability of the sector and enable policy implementation.
- Evaluate innovative revenue collection tools and approaches to evaluate rates and tariffs as part of sustainable service delivery and infrastructure asset management.
- Review and guide on effectiveness of grants and subsidies to support policy directives.
- Review and research water pricing strategy for improved implementation.
- Research social mechanisms for improved revenue generation (willingness to pay).
- Research how the "4th Industrial Revolution" innovation could transition and modernise transactions in the water and sanitation sector.
- Apply the concepts of water and sanitation sensitive urban design to demonstrate and learn how a city can transition to a smart sustainable city, to a sponge city and to a green city.
- Develop, and test at scale, early warning systems and tools for agriculture, institutions and communities to build resilience and adaptation and more effective disaster management and responsiveness to service delivery.
- Partner with institutions to fund training of water and sanitation sector practitioners in the data science and curation, management and use (sharing and transfer) of data as well as the associated technologies that enable improved customer service, monitoring and evaluation, reporting, benchmarking and prediction.
- Conduct a water resources assessment to gauge planning and investment.
- Assess models and mechanisms for private sector inclusion in the water and sanitation sector.
- Establish the value of water and sanitation in the economy.

17.4.5 Strategic Objective 5

To reduce unintended losses and increase efficiency of productive use.

The following strategic actions must be undertaken to achieve this objective:

- Develop and support innovation through the demonstration of technologies and solutions for improved non-revenue water at all scale of infrastructure and use.
- Strengthen water use efficiency and smart agricultural practice for agriculture water uses at both industry and emerging farmer levels.
- Research and drive demonstration for implementation of water energy and food nexus knowledge, products and services aligned to economic growth and food security.
- Develop technologies, guidelines and implementation support tools that enable SA to use alternative and appropriate sources as part of water supply and sustainable sanitation delivery.
- Strengthen research and innovation and demonstration of solution to enhance water conservation and demand management.
- Develop technologies and approaches to enhance water efficiency in industry.
- Develop and demonstrate, with testbed partners, water efficient and full recycle disruptive sanitation systems for adoption.
- Develop and test with disaster management stakeholders and planners full recycle toilets as strategic technology adoption for provinces facing continuous drought cycles and flood events.

17.4.6 Strategic Objective 6

To improve performance of water pricing, monitoring, billing, metering and collection.

The following strategic actions must be undertaken to achieve this objective:

- Evaluate and benchmark innovative pricing, tariffing models for current needs and assess tariff models.
- Strengthen research, development, demonstration and scale up of innovative technologies for improved monitoring for water use and loss and payment.
- Develop, scan and demonstrate, with testbed partners, smart meters for improved measurements and decision-making.
- Strengthen data generation, curation and sharing for improved decision-making at municipal level and within other water and sanitation sector institutions.
- Assess data policy and data sharing approaches with water and sanitation sector partners to enhance digital innovation development and strategic adaptive practices.
- Strengthen, test and scale for sustainability citizen science approaches and technologies for enhanced water quality monitoring.
- Develop a partnership model for scale up of disruptive technology and monitoring.
- Research and review and guide on socio economic rights.
- Develop and enhance methods, sensors and tools for detection, analysis and managing risks associated with water and sanitation provision.
- Implement and regularly review and / or revise Research, Development and Innovation Policies, Performance Plans and Roadmaps across the sector.
- Maintain effective synergy between the NWRS-3, the National Water and Sanitation Master Plan and the DSI Decadal Plan.
- Align to strategic water and sanitation industry Masterplan developed in consultation with sector partners by Department of Trade and Industry which creates further policy support for RDI, standards, procurement and skills to strengthen the water and sanitation sector and unlock barriers.
- Key institutions needed to unlock this strategic objective to include: DWS, DSI, WRC, National Treasury, SALGA, Municipalities, and Water Boards.
- Continue to build on the work of the SALGA/WRC technology and innovation platform to support stronger interconnections between the municipal environment and water innovation system players, outputs and uptake of innovations and other science partners.
- Support government to be a stronger early adopter of innovative water and wastewater solutions. This requires strategic engagement with the public procurement rules, and the sectors' interpretation thereof, to understand how to manage innovation development and deployment effectively.
- Build smart consortiums and partnerships and effectively coordinate to optimize the value of existing and new funding and resources in the system.
- Explore smart ways to co-fund new opportunities that transform the sector and improve lives, health and the environment through the design of niche programmes that uses a developmental and transformative policy approaches for change.
- Continue to demonstrate emerging innovative technologies in partnership with public and private testbed partners in multiple environments, growing the network of testbeds and streamlining partnerships with emerging industries and standards authorities.
- Support programmes/platforms for entrepreneurs, start-ups and small enterprises with innovative solutions in line with seeking appropriate technologies and transformation and redress and equity objectives.
- Enable better future skills planning and development through investment into the skills research base, and methodologies for skills needs tracking and demand.
- Develop high end/specialist skills through system of innovation mechanisms and platforms.

Chapter: 18

Addressing Legislative & Policy Gaps

18.1 Emerging Legislative & Policy Issues

The water sector in South Africa is governed in terms of the National Water Act (Act No 36 of 1998) and the Water Services Act (Act No 108 of 1997). The National Water Policy Review (2013) and the National Sanitation Policy Review (2016) have provided key policy positions to address oversight and gaps in current water and sanitation policy and their unintended consequences, and the following aspects are noted as requiring attention before any new policy position, or amendment to a policy position be recommended:

- Addressing legislative and policy gaps.
- Developing and updating policies.
- Effecting institutional reform.
- Achieving redress and equity.
- Ensuring planning and implementation.
- Implementing sustainable delivery mechanisms.
- Exploring unconventional gas development (e.g. hydraulic fracturing).

18.2 Policy Principles

The policy principles currently guiding the water and sanitation sector were built from numerous national policy positions found in South African legislation and have been basically stable throughout their existence – namely:

- The White Paper on Water Supply and Sanitation (1994).
- The White Paper on a National Water Policy (1997).
- The White Paper on Basic Household Sanitation (2001).
- The Strategic Framework for Water Services (2003).
- The National Water Policy Review (2013).
- The National Sanitation Policy Review (2016).

The above-mentioned policies all remain valid despite that implementation of these policies has not been without challenges, specifically in reforming the profile of the water and sanitation sector.

18.3 Policy Objectives

The policy objectives of this chapter are as follows:

18.3.1 Addressing Legislative and Policy Gaps

There is a need to work with sector partners to align legislation, reduce the regulatory burden wherever practical, and unblock regulatory obstacles to water re-use. These issues are to be addressed and coordinated in more detail in the National Water and Sanitation Master Plan (NW&SMP) and relate to:

- Align interventions with CoGTA on municipalities with existing support programmes e.g. MISA.
- Roll-out of Feasibility and Implementation Readiness studies to align with national grant funding programmes.
- Align water, land and agrarian reform programmers and link to the Irrigation Strategy.
- Focus on Strategic Water Sources Areas.
- Ensure One Environmental System.
- Implementation of Operation Vulindlela.
- Programmes relating to innovation sector for solutions that are ready for application and invest in their implementation.

18.3.2 Amending Legislation

The National Water Act (Act No 36 of 1998) and the Water Services Act (Act No 108 of 1997) are both used to governing the entire water and sanitation value chain.

The Department of Water and Sanitation has decided to amend each of these Acts separately, where necessary, and has embarked on the amendment process and has developed a National Water Act Bill and a National Water Services Bill.

The amendment approach seeks to prioritize the most critical challenges highlighted in the National Sanitation Policy (2016) and National Policy Review (2013) and it will also result in the most effective way of addressing the most pertinent gaps and legislative challenges to enable sustainable socio-economic development within the water and sanitation sector.

18.3.3 Water Resource Management Policy Developments

The Department will continue to work towards finalization of the Policies that are in different stages of development. The approach to all policy development seeks to prioritize and address the most critical challenges throughout the value chain.

- Integrated Water Quality Management Policy: This policy intervention is aimed at consolidating all past policies on water quality that were segmented in nature. The deterioration of water quality in rivers, streams, dams, wetlands, estuaries, and aquifers impacts on the economy, on human health, and on aquatic ecosystems. It reduces the amount of water available for use because more water must be retained in the river systems to dilute the pollution to acceptable standards.

- Joined National Wetland Management Policy The policy will provide a case for wetland conservation in South Africa (i.e. implications of wetland loss), explains the nature of the problem, identifies solutions and describes the opportunities and appropriate management instrument(s) that should be utilised to address the challenges in terms of wetland protection, management and conservation in South Africa. The National Wetland Policy is being jointly developed and will address the mandates for wetland management, conservation and protection of the three key Departments i.e. DFFE, DWS and DALRRD.

18.3.4 Effecting Institutional Reform

An institutional reform model needs to be legislated that will adequately respond to the challenges related to regional and bulk services which include the following:

- Weak performance in the management of water supply and sanitation services by many municipalities, which compromises service delivery.
- Lack of clarity regarding responsibilities for water resources development at the local and regional level, and for regional bulk services outside of the existing water board serviced areas.
- Governance and performance-related problems within some of the existing water institutions.
- Determining and conforming the institutional framework or arrangement of the Regional Water Utilities, Catchment Management Agencies and Water User Associations.
- Delegation and assignment of Powers and Functions of the CMAs.

18.3.5 Achieving Redress and Equity

Equity is critical in ensuring that water reform in South Africa is realised. In the water sector, equity implies justice in the management of water, responding to social and economic needs of all South Africans. The existing legal framework and policy does not adequately respond to the objective of redress in terms of making water available and advancing equity considerations. It is imperative that provisions within the proposed water and sanitation legislation will not only protect the interest of existing water rights but will also provide water availability for redress. Legislation should provide for equitable water allocation and enjoyment of water benefits by all.

It is expected that the proposed legislation will deal directly and decisively with the following real issues that impact or are on the way of the process of redress and achieving equity:

- The determination of the legal time frame and duration for a licence.
- Revising the authorisation when the right has not been exercised upon with any cause or good reason. There must be a process to revise authorisations when there is redundancy or no use of available water to provide access to water for re-allocation to other equity considerations.
- Ensuring that any transfer of water serves the purpose of the policy in terms of redress and equity in particular.
- Exploring and revisiting the issue of existing lawful use and how it should be modified to enable faster redress and equity achievements without unfairly penalising current water users.

18.3.6 Implementing Sustainable Delivery Mechanisms

Due to the centrality of water to life and local government service delivery imperatives, it is likely that most government policies and legislation would directly or indirectly have an impact on water resources management and, consequently, water and sanitation services provision. There is need for integration between water and sanitation in terms of the whole water value chain management and this includes water-borne sanitation, wastewater treatment, operation and maintenance of infrastructure, on site sanitation and potential pollution of groundwater. The proposed water and sanitation legislation is expected to provide policy direction on some of the following issues:

- A structured mechanism, through which the Minister of Water and Sanitation can give input into the planning and development of water supply and sanitation infrastructure.
- An effective formal reporting mechanism on the water and sanitation services function from Local Government to the Minister and means within the legal framework for the Minister of Water and sanitation to take corrective steps in case of serious malpractice or negligence affecting effective water supply and sanitation management in the country.

18.3.7 Exploring Unconventional Gas Development

To ensure that the limited available water resources are protected from exploitation and pollution the policy and legislative framework needs to expand on the mining of:

- Shale gas.
- Associated hydraulic fracturing.
- A coal-bed methane extraction regulatory framework.

Chapter: 19

Definitions

Acid rain	Rainfall of abnormally high acidity which results from atmospheric pollution by emissions of sulphur dioxide, nitrogen oxide, and chloride.
Anti-pollution measures	The reduction or elimination of pollution by restricting or prohibiting activities which cause pollution.
Biodiversity	The variability among living organisms from all sources including, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part and also includes diversity within species, between species, and of ecosystem.
Biosphere	The global sum of all ecosystems in the zone of life on Earth; integrating all living beings and their relationships. All life forms in the atmosphere, all oceans, freshwater, soils, land surfaces and the underlying geological horizons.
Capable and developmental state	A state that has sufficient human, financial, economic and natural resources to achieve the national objectives for the benefit of all citizens, through effective institutions and infrastructure that enable the economy and society to operate to its full potential.
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.
Climate change	Changes in climatic conditions due to natural causes or to anthropogenic (man-made) effects such as emissions of greenhouse gases, e.g. carbon dioxide, nitrous oxide, and methane, from industry, transport, farming and deforestation, that are expected to have significant consequences for rainfall and water availability on earth.
Constituents	Individual components, elements, or biological entities, such as suspended solids or dissolved salts.
Consumption	Use of water abstracted from any source, such as a river, groundwater or water supply system, for domestic, commercial, industrial, power generation, irrigation or any other purpose.
Contaminants	Constituents which are added to a water supply through the use thereof.
Deforestation	Removing natural forests from the landscape for the purpose of harvesting the timber or for making the land available for other purposes.
Democracy	Rule by the people.
Desalination	The removal of unwanted salts (constituents) from water to make it fit for use.
Development	The systematic use of scientific and technical knowledge, together with traditional knowledge systems and cultural values, to realise the potential of natural resources to support social and economic transformation.
Ecosystem	A community of all the organisms, such as plants, animals, fish and microbes, living in complex but balanced relationships with the physical features of their environment such as light, heat, moisture, wind, water, nutrients and minerals.

Ecological infrastructure	Naturally functioning ecosystems that generate or deliver valuable services to people. It includes, for example, healthy mountain catchments, rivers, wetlands, coastal dunes, and nodes and corridors of natural habitat, which together form a network of interconnected structural elements in the landscape.
Efficiency-equity trade off	Seeking the socially, economically and politically most acceptable outcome of decision making concerning the competing merits of efficiency and of equity and fairness.
Effluent	The liquid discharged from a processing step, usually from an industry, from a water purification works or from a wastewater treatment works.
Effluent discharge Standards	Minimum standards set for the quality of effluent streams as a means of controlling externalities, i.e. the economic and other effects on others.
Efficient water allocation	A situation in which the available water resources are allocated in a way that achieves maximum benefit.
Emissions	Solid, liquid or gaseous substances, or energy in the form of heat, usually discharged into the environment, by people and other living organisms or by chemical or physical processes; usually refers to products of combustion emitted into the atmosphere.
Environmental engineering	The application of science and technology to minimise the negative and to maximise the positive impacts on the environment of physical development and of the utilisation of natural resources for the benefit of society.
Environmental protection	Avoiding negative impacts on the environment caused by physical activities, by the discharge of harmful solid, liquid or gaseous wastes or by the release of radiation.
Equity	Fairness, justice and impartiality which supplements or overrides common and statute law.
Existing lawful use	Water use that was lawfully undertaken any time during a period of two years before the NWA came into force (i.e. from 1 October 1996).
Externalities	Consequences of an action, usually negative but could be positive, which affect other parties but are not reflected in the costs.
Hydraulic fracturing	Also known as fracking. It is the process of injecting pressurised fluids into various rock layers to create cracks to allow natural gas to move freely.
Fog harvesting	The interception and precipitation of moisture in fog to form water.
Governance	Action / manner of governing by implementing sound rules & procedures.
Global warming	The increase in the average surface temperatures across the globe, usually measured over long periods of time; reported to have increased by 1^{0}C over the past hundred years.
Government	This refers to the total of all levels of government, including national, provincial, and local government as in South Africa. It is always necessary to check what level of government is being referred to in any particular context.
Greenhouse gas	Gases such as water vapour, carbon dioxide and methane in the atmosphere that do not affect incoming sunlight but trap heat emitted from the Earth, thus contributing to global warming; hence the greenhouse effect.
Green water footprint	The volume of water evaporated from rainfall stored in the soil as soil moisture.
Green infrastructure	Any infrastructure that is good for the environment and promotes sustainable development.
Grey water footprint	The volume of freshwater required to assimilate a pollution load to at least comply with acceptable water quality standards.
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.
Growth	An increase in an economic factor or variable, normally persisting over successive periods. Rapid or persistent growth is likely to involve changes in the nature of economic activity, with new products or processes, and new types of labour skills, capital goods, and economic conditions.

Impurities	Constituents which are added to the water supply through use.
Management	The people who make decisions in an organisation; the effect, impact and outcome of these decisions.
Mandate	Authority to carry out a policy, course of action or legal command from a superior.
Mining	The extraction of valuable minerals or other geological materials from the Earth, usually from an ore body, lode, vein, seam, reef or placer deposit.
Pollutants	Constituents which are added to water through use.
Pollution control	Methods for controlling pollution, usually by monitoring against minimum standards and acting against contraventions.
Potable	Water intended to be used for drinking or domestic purposes.
Private sector	Those parts of the economy not run by the government, including households, voluntary associations, community organisations, sole traders, partnerships, and privately owned company.
Property rights	The rights of an owner over property.
Public sector	Those parts of the economy which are not controlled by individuals, voluntary organisations, or privately owned companies.
Rainwater harvesting	Interception, collection and storage of water during rain seasons for use in other times.
Reclamation	Treatment of wastewater for re-use, including indirectly or directly as potable water.
Recycling	The re-use of wastewater, with or without various degrees of treatment.
Regulation	A rule or directive made and implemented by an authority, which individuals or organisations are obliged to respect and comply with.
Regulatory agency	A body created to decide on and enforce regulations or rules.
Research and development	The use of resources to create new knowledge, and to develop new and improved products or processes, to enhance economic activities and the quality of life.
Resource poor farmers	A farmer whose resources (land, water, labour and capital) do not currently permit a decent and secure family livelihood.
Repurification	Treatment of wastewater to a quality standard suitable for various uses, including for indirect or direct re-use as potable water.
Re-use	Utilisation of treated or untreated wastewater for a process other than the one that generated it, i.e. it involves a change of user. For instance, the re-use of municipal wastewater for agricultural irrigation. Water re-use can be direct or indirect, intentional or unintentional, planned or unplanned, local, regional or national in terms of location, scale and significance. Water re-use may involve various kinds of treatment (or not) and the reclaimed water may be used for a variety of purposes.
Rights based approach	Priority given to the allocation of water to people who do not have access to water, even to satisfy their basic human needs which is a constitutionally entrenched right; individuals and communities are given access to full information, justice, and to participation in decision-making processes concerning water-related issues. Such water allocations enjoy priority over other uses such as for irrigated agriculture and for industrial use.
Right to access to water	Every person in South Africa is entitled to sufficient, acceptable, safe, physically accessible and affordable water for personal and domestic uses.
River pollution	The effects on rivers of the discharge or dumping into the environment of industrial, agricultural and any other waste products.
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.

Sanitation services	The collection, removal, disposal or treatment of human excreta and domestic wastewater, and the collection, treatment and disposal of industrial wastewater. This includes all the organisational arrangements necessary to ensure the provision of sanitation services including, amongst others, appropriate health, hygiene and sanitation-related awareness, the measurement of the quantity and quality of discharges where appropriate, and the associated billing, collection of revenue and consumer care. Water services authorities have a right but not an obligation to accept industrial wastewater from industries within their area of jurisdiction.
Sand mining	The removal of sand (mainly from riverbeds and banks) for commercial purposes; including the screening and washing of fine material out of the product.
Self-regulation	The self-monitoring and reporting by the water use authorisation holder as required in terms of a water use authorisation. Internal annual audits and external annual audits or environmental audits as per condition of an authorisation to be conducted and submitted to the Department in a specific timeframe. Self-regulation enables the authorisation holder to identify non-compliances and rectify it through corrective actions.
Sewage	Liquid waste, with some suspended material, mainly human excrement.
Sewage disposal	The discharge of liquid waste from human occupation to the environment, usually after some or full treatment.
Sewerage	Infrastructure for the collection, treatment, and disposal of liquid waste (sewage).
Sludge	Solids removed from wastewater during treatment.
Storm water	Runoff from a built-up area after heavy rain.
Strategic water source	Natural source area for water resources that provides disproportionately large volumes of water per unit area and that is considered of strategic significance for water security from a national planning perspective. This includes a surface or groundwater area of national significance.
Surface water	Runoff that occurs in streams and rivers, also in natural lakes and reservoirs; a major resource for water supplies.
Virtual water	The volume of water required to produce products which a country imports and exports; the volume of water embedded in products that are traded between countries or regions. Most relevant to arid or semi-arid countries with scarce water resources.
Value Engineering	A systematic method to improve the value of infrastructure or services by either improving the function or reducing the cost. It is a primary tenet of value engineering that basic functions must be preserved and may not be reduced as a consequence of pursuing value improvements. (Value is defined as the ratio of function to cost.)
Wastewater	Used water from any combination of domestic, industrial, commercial or agricultural activities and any sewer inflow or sewer infiltration.
Wastewater treatment	This includes any process which may be used to favourably modify the characteristics of the wastewater.
Water balance	The regulation or rationalisation of human activity to match the sustainable local water supply, rather than base, or a process of balancing water supply and demand to ensure that water use does not exceed supply.
Water conservation	The minimization 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 or a programme by a water institution or consumer to influence the water demand and usage of water to meet any of the following objectives: economic efficiency, social development, social equity, and environmental protection, sustainability of water supply and services and political acceptability.
Water efficiency	Getting any given results such as equity, gravity, and development with the smallest possible inputs, or getting the maximum possible output from given resources.

Water footprint	An indicator of water use that considers both direct and indirect water use. The water footprint of a product (good or services) is the volume of fresh water used to produce the product, summed over the various steps of the production chain. Water footprint includes 3 components: Volume of water as consumptive use or evaporation of rainwater/stored in soil moisture (green water) Volume of water as consumptive use or evaporation of water withdrawn from groundwater or surface water (blue water) and Volume of polluted water, calculated as water that is required to dilute pollutants to such an extent that the quality of the water remains above agreed water quality standards (grey water).
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 neutral	The reducing of the impact of the water consuming activity in making the impact "water neutral" by simultaneous investment in water conservation measures of other alternatives. Water neutral thereby means that one reduces the water footprint of an activity as much as reasonably possible, and offsets the negative externalities of the remaining water.
Water offsetting	The residual water footprint is offset by making a reasonable investment in establishing or supporting projects that aim at the sustainable and equitable use of water.
Water resource strategy	A plan for dealing with uncertain future circumstances with respect to the availability of clean and sufficient water for domestic and commercial use. This is the set of rules by which the action to be taken depends on the circumstances, including natural events such as climate change and the actions of other people.
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 resources protection	Protection in relation to a water resource, means: a) maintenance of the quality of the water resource to the extent that the water resource may be used in an ecologically sustainable way; b) prevention of the degradation of the water resource; and c) rehabilitation of the water resource.
Water risk	Essentially the pressure of decreasing water availability and the reliability of supplies. The fact that the results of any use of water resources are not certain, but may take more than one value.
Water scarcity	Water is scarce relative to human demands, not in and of itself.
Water and sanitation services	Water supply services and/or sanitation services, or any part thereof.
Water supply services	The abstraction from a water resource, conveyance, treatment, storage and distribution of potable water, water intended to be converted to potable water and water for industrial or other use, to consumers or other Water Services Providers. This includes all the organisational arrangements necessary to ensure the provision of water supply services including, amongst others, appropriate health, hygiene and water-related awareness, the measurement of consumption and the associated billing, collection of revenue and consumer care. Water services authorities have a right but not an obligation to provide industrial water to industries within their area of jurisdiction.
Water trading	The process of buying and selling of water access or use entitlements, also called water rights. The terms of the trade can be either permanent or temporary, depending on the legal status of the water rights.
Wetland	Land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.

Chapter: 20

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Chapter: 21

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Forestry South Africa (FSA)

Gauteng Agriculture, Rural Development and Environment (GARDE)

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Minerals Council South Africa (MCSA)

National Department of Forestry, Fisheries and the Environment (DFFE)

Organisation Undoing Tax Abuse (OUTA) WaterCAN

Paper Manufacturers Association of South Africa (PMASA)

Rhodes University (RU)

Sasol South Africa (SSA)

South African Association for Water User Associations (SAAWUA)

South African Green Industries Council (SAGIC)

South African Institution of Civil Engineering (SAICE)

South African National Biodiversity Institute (SANBI)

South African National Parks (SANParks)

South African Pork Producers Organisation (SAPPO)

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Chapter: 22

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Chapter: 23

Annexures

ANNEXURE A1:

REVISED RECONFIGURATION OF WATER MANAGEMENT AREAS

The Department has reviewed the reconfiguration of the Water Management Areas (WMAs) from nine (9) to six (6). The intention is to establish six (6) Catchment Management Agencies (CMAs) nationally.

The revised WMAs are as follows:

- The Limpopo WMA will be amalgamated with the Olifants WMA. The Olifants River is a tributary of the Limpopo River. These are also Transboundary Rivers which are managed by international agreements. This configuration supports having one point of contact from South Africa to engage with the international counterparts. The geographic areas for the Limpopo and Olifants WMAs are relatively small and all form part of the Limpopo River Catchment.
- The Inkomati-Usuthu WMA will remain unchanged from the previous configuration.
- The Pongola-Mtamvuna WMA will remain unchanged from the previous configuration.
- The Vaal WMA will be amalgamated with Orange WMA as the Vaal River drains into the Orange River. This is a logical management unit, although large in area. This amalgamation will enhance revenue generation and sustainability of the CMA, in the form of economies of scale.
- The Mzimvubu-Tsitsikamma WMA will remain unchanged from the previous configuration.
- The Breede-Gouritz and Berg-Olifants WMA will be amalgamated to be one water management area. The Western Cape Water Supply System (WCWSS) which supplies greater Cape Town spans both these WMAs. This is a logical management unit although large in area. This amalgamation will enhance revenue generation and sustainability of the CMA, in the form of economies of scale.

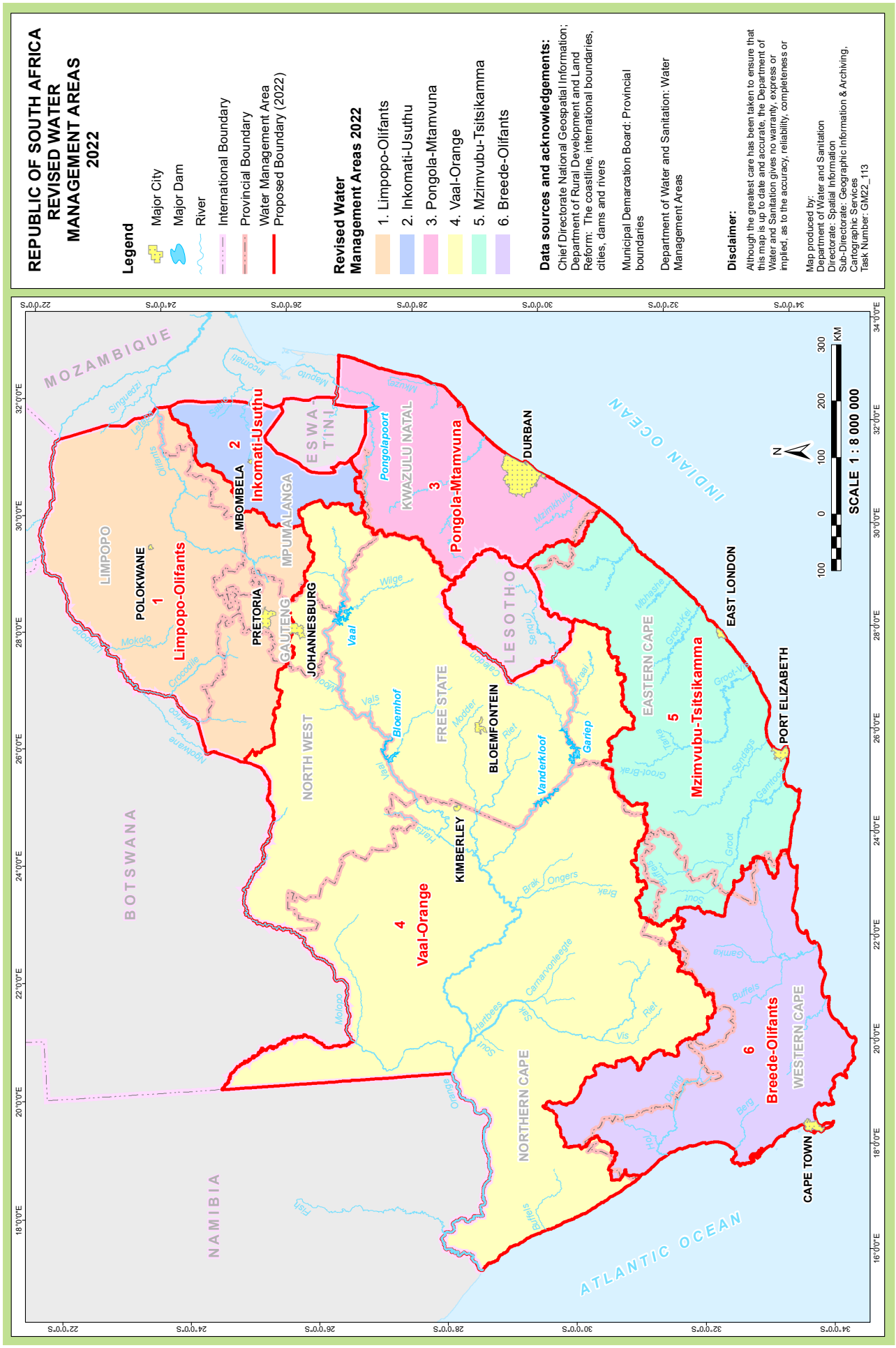


Figure 1: Water Management Areas Map

ANNEXURE A2: SCHEDULE OF THE REVISED 6 WMAs IN SOUTH AFRICA

SCHEDULE Water Management Areas

Nine (9) Water Management Areas were established as part of NWRS2 and boundaries defined in Government Notice 40279 of 16 September 2016.

Table A. 1: Boundary descriptions of nine Water Management Areas as proclaimed in NWRS2

Water management area (number & current names)	Boundary Description
1. Limpopo: Major rivers include the Limpopo, Crocodile West, Marico, Matlabas, Mokolo, Lephalale, Mogalakwena, Sand, Nzhelele, Mutale and Luvuvhu.	Primary drainage region A
2. Olifants: Major rivers include the Elands, Wilge, Steelpoort, Olifants and Letaba.	Primary drainage region B
3. Inkomati-Usuthu: Major rivers include Nwanedzi, Sabie, Crocodile (East), Komati and Usuthu	Primary drainage regions X and the portions of tertiary drainage regions W51 to W56 falling within the boundary of the RSA
4. Pongola-Mtamvuna: Major rivers include the Pongola, Mhlathuze, Mfolozi, Mkuze, Thukela, Mvoti, Umgeni, Umkomazi, Umzimkulu and Mtamvuna	Tertiary drainage regions W11 to W13, W31 to W32, W41, W45 and the portions of W42, W43, W44 and W57 falling within the boundary of the RSA; Primary drainage regions V and U; Tertiary drainage regions T40, T51 and T52
5. Vaal: Major rivers include the Wilge, Liebenbergsvlei, Mooi, Renoster, Vals, Sand, Vet, Harts, Molopo and Vaal	Tertiary drainage regions C11 to C13, C21 to C25, C31 to C33, C41, C60, C70 and C81 to C83. Tertiary drainage regions, C91, C92 (excluding the lower portions of quaternary catchments C92B and C92C) D41 and portions of quaternary catchments D42C, D42D, D73A, D73B, D73C, D73D and D73E. The western boundary runs from the border between South Africa and Botswana along the boundary of the Kalahari East Water User Association (WUA). It follows the boundary of the mentioned WUA in a westerly direction to a point, west of the Langberge, 19 kilometres west of Beeshoek, near Postmasburg. The Water Management Area boundary then runs South East to meet the watershed between quaternary catchments D73A and D73B. The boundary then follows this watershed and that between D73A and D71B, until it meets the boundary of the Hay district. It follows this boundary until it meets the watershed between D71B and C92C. The Water Management Area boundary continues along this watershed until it meets the boundary of the Orange Vaal Water User Association. It continues south-easterly on this boundary until it meets the watershed between C92B and C51M where it follows this watershed and that between C92B and C51L. Thereafter it follows the watershed between C51L and C91E. It continues on this watershed until it reaches the farm boundary of Wolwe Dam 87. The Water Management Area boundary then follows the mentioned farm boundary up to the farm boundary of Vaalboschhoek 85. It then follows successive farm boundaries as they meet, progressively moving in westerly direction, namely: Weltevrede 117, Vaalpan 118, Koppies Dam 119, Spijt Fontein 122, Kareebosch 130, Osfontein 121, Benaauwheidsfontein 442, Olifantskop 196, Sussana 197 and Olifants Dam 170. The Water Management Area boundary the follows the eastern boundary of Olifats Dam 170 in a northerly direction to include the farm Olifantsrug 293 until it meets the watershed between C91E and C52L. Hereafter, the Water Management Area boundary follows the boundaries of the drainage regions as mentioned initially in this description.
6. Orange: Major rivers include the Modder, Riet, Caledon, Kraai, Ongers, Hartbees and Orange.	Tertiary drainage regions C51 (excluding a portion of quaternary catchment C51L), C52 (excluding a small portion of quaternary catchment C52L), D12 to D14, the portions of D15 and D18 that falls within the boundary of the RSA, D21, the portion of D23 that falls within the boundary of the RSA, D24 (excluding the portion of the quaternary catchment D24A that falls in Lesotho), D31 to D35. Tertiary drainage region D42 (excluding portions of quaternary catchments D42C and D42D), D51 to D58, D61, D62, D71 to D73 (excluding portions of quaternary catchments D73A, D73B, D73C, D73D and D 73E), D81 D82. In the area of the confluence of the Vaal and Orange rivers the Water Management Area boundary follows the boundary of the Orange Vaal Water User Association until it meets the boundary of the Water Management Area 5. Hence, the lower portions of quaternary catchments C92B and C92C are included in this Water Management Area. Primary drainage region F (excluding quaternary catchments F50D, F60B, F60C, F60D and F60E.

Table A. 1: Boundary descriptions of nine Water Management Areas as proclaimed in NWRS2 (continued)

7. Mzimvubu-Tsitsikamma: Major rivers include the Mzimvubu, Mtata, Mbashe, Buffalo, Nahoon, Groot Kei, and Keiskamma, Fish, Kowie, Boesmans, Sundays, Gamtoos, Kromme, Groot and Tsitsikamma.	Primary drainage regions P, Q, R, S, L, M and N, tertiary drainage regions T11 to T13, T20, T31 to T36, T60, T70, T80, T90, K80 and K90.
8. Breede-Gouritz: Major rivers include the Breede, Sonderend, Sout, Bot, Palmiet, Gouritz, Olifants, Kamanassie, Gamka, Buffels, Touws, Goukou, and Duiwenhoks.	Primary drainage regions H and J; Tertiary drainage regions G40 (excluding quaternary catchment G40A) and G50; Tertiary drainage regions K10 to K70.
9. Berg-Olifants: Major rivers include the Berg, Diep and Steenbras, Olifants, Doorn, Krom Sand and Sout.	Tertiary drainage regions G10 to G30 and quaternary catchment G40A; Primary drainage regions E and tertiary drainage regions F60 (excluding quaternary catchment F60A) and including quartenary catchment F50D.

Table A.2: Revised (2022) water management Area boundary descriptions

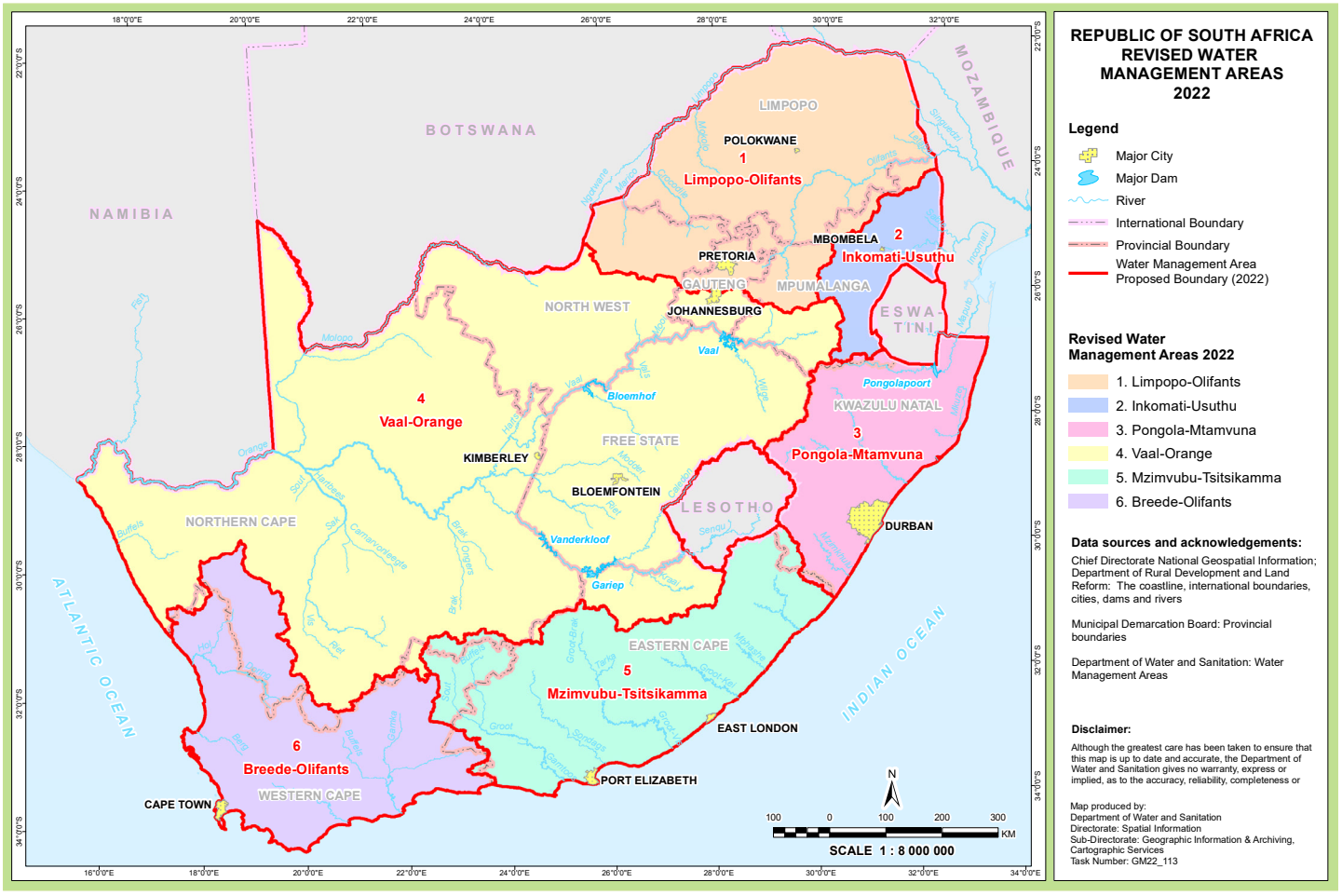
Water management area (number & current names)	Boundary Description
1. Limpopo-Olifants: Major rivers include the Limpopo, Crocodile, Marico, Matlabas, Mokolo, Lephalale, Mogalakwena, Sand, Nzhelele, Mutale, Luvuvhu, Elands, Wilge, Steelpoort, Olifants and Letaba	Primary drainage regions A and B
2. Inkomati-Usuthu: Major rivers include Nwanedzi, Sabie, Crocodile (East), Komati and Usuthu.	Primary drainage regions X and the portions of tertiary drainage regions W51 to W56 falling within the boundary of the RSA.
3. Pongola-Mtamvuna: Major rivers include the Pongola, Mhlathuze, Mfolozi, Mkuze, Thukela, Mvoti, Umgeni, Umkomazi, Umzimkulu and Mtamvuna.	Tertiary drainage regions W11 to W13, W31 to W32, W41, W45 and the portions of W42, W43, W44 and W57 falling within the boundary of the RSA; Primary drainage regions V and U; Tertiary drainage regions T40, T51 and T52

Table A.2: Revised (2021) water management Area boundary descriptions

Water management area (number & current names)	Boundary Description
4.Vaal-Orange: Major rivers include the Wilge, Liebenbergsvlei, Mooi, Renoster, Vals, Sand, Vet, Harts, Molopo, Vaal, Modder, Riet, Caledon, Kraai, Ongers, Hartbees and Orange.	Tertiary drainage regions C11 to C13, C21 to C25, C31 to C33, C41, C60, C70 and C81 to C83. Tertiary drainage regions, C91, C92 (excluding the lower portions of quaternary catchments C92B and C92C) D41 and portions of quaternary catchments D42C, D42D, D73A, D73B, D73C, D73D and D73E. The western boundary runs from the border between South Africa and Botswana along the boundary of the Kalahari East Water User Association (WUA). It follows the boundary of the mentioned WUA in a westerly direction to a point, west of the Langberge, 19 kilometres west of Beeshoek, near postmasburg. The Water Management Area boundary then runs South East to meet the watershed between quaternary catchments D73A and D73B. The boundary then follows this watershed and that between D73A and D71B, until it meets the boundary of the Hay district. It follows this boundary until it meets the watershed between D71B and C92C. The Water Management Area boundary continues along this watershed until it meets the boundary of the Orange Vaal Water User Association. It continues south-easterly on this boundary until it meets the watershed between C92B and C51M where it follows this watershed and that between C92B and C51L. Thereafter it follows the watershed between C51L and C91E. It continues on this watershed until it reaches the farm boundary of Wolwe Dam 87. The Water Management Area boundary then follows the mentioned farm boundary up to the farm boundary of Vaalboschhoek 85. It then follows successive farm boundaries as they meet, progressively moving in westerly direction, namely: Weltevrede 117, Vaalpan 118, Koppies Dam 119, Spijt Fontein 122, Kareebosch 130, Osfontein 121, Benaauwheidsfontein 442, Olifantskop 196, Sussana 197 and Olifantsdam 170. The Water Management Area boundary the follows the eastern boundary of Olifatsdam 170 in a northerly direction to include the farm Olifantsrug 293 until it meets the watershed between C91E and C52L. Hereafter, the Water Management Area boundary follows the boundaries of the drainage regions as mentioned initially in this description. Tertiary drainage regions C51 (excluding a portion of quaternary catchment C51L), C52 (excluding a small portion of quaternary catchment C52L), D12 to D14, the portions of D15 and D18 that falls within the boundary of the RSA, D21, the portion of D23 that falls within the boundary of the RSA, D24 (excluding the portion of the quaternary catchment D24A that falls in Lesotho), D31 to D35; Tertiary drainage region D42 (excluding portions of quaternary catchments D42C and D42D), D51 to D58, D61, D62, D71 to D73 (excluding portions of quaternary catchments D73A, D73B, D73C, D73D and D 73E), D81 D82. In the area of the confluence of the Vaal and Orange rivers the Water Management Area boundary follows the boundary of the Orange Vaal Water User Association until it meets the boundary of the Water Management Area 5. Hence, the lower portions of quaternary catchments C92B and C92C are included in this Water Management Area. Primary drainage region F (excluding quaternary catchments F50D, F60B, F60C, F60D and F60E.
5. Mzimvubu-Tsitsikamma: Major rivers include the Mzimvubu, Mtata, Mbashe, Buffalo, Nahoon, Groot Kei, and Keiskamma, Fish, Kowie, Boesmans, Sundays, Gamtoos, Kromme, Groot and Tsitsikamma.	Primary drainage regions P, Q, R, S, L, M and N, tertiary drainage regions T11 to T13, T20, T31 to T36, T60, T70, T80, T90, K80 and K90.
6. Breede-Olifants: Major rivers include the Breede, Sonderend, Sout, Bot, Palmiet, Gouritz, Olifants, Kamanassie, Gamka, Buffels, Touws, Goukou, Duiwenhoks, Berg, Diep and Steenbras, Olifants, Doorn, Krom Sand and Sout.	Primary drainage regions H and J; Tertiary drainage regions G40 (excluding quaternary catchment G40A) and G50; Tertiary drainage regions K10 to K70. Tertiary drainage regions G10 to G30 and quaternary catchment G40A. Primary drainage regions E and tertiary drainage regions F60 (excluding quaternary catchment F60A) and including quartenary catchment F50D

Table A. 3: Details of amendments to Water Management Areas boundaries

Water Management Area Boundary	Revised Boundary Amendment
1. Limpopo- Olifants	The Limpopo and Olifants WMAs are amalgamated into a single WMA.
2. Inkomati-Usuthu	The Inkomati-Usuthu remains a single WMA. No configuration was done.
3. Pongola-Mtamvuna	The Pongola-Mtamvuna remains a single WMA. No configuration was done.
4.Vaal-Orange	The Vaal and Orange WMAs are amalgamated into a single WMA.
5. Mzimvubu-Tsitsikamma	The Mzimvubu-Tsitsikamma remains a single WMA. No configuration was done.
6. Breede-Olifants	The Breede-Gouritz and Berg-Olifants WMAsare amalgamated into a single WMA.



PERSPECTIVES PER WATER MANAGEMENT AREA

1. Limpopo-Olifants

(The Limpopo and Olifants WMAs are amalgamated into a single WMA).

The Limpopo-Olifants Water Management Area occupies the north-western part of the Northern Province. Significant towns include Bela-Bela, Mahikeng, Makhado, Modimolle, Mokopane, Mookgopong, Musina, Polokwane, Rustenburg, and Zeerust. The Limpopo River watercourse forms the northern boundary of the WMA, and indeed of the country and with its tributaries. The former Limpopo WMA is a large and complex Water Management Area. Much of the area has a low rainfall and there are significant inter-dependencies for water resources between catchments and with neighbouring WMAs. With the former Olifants WMA being one of the highly stressed WMA with fast growing in terms of population and need for improved services. There is very little opportunity for further water resource development and no realistic opportunity to import significant volumes of additional water from elsewhere.

With the amalgamation of the former Limpopo and Olifants into one WMA, the Limpopo-Olifants WMA include the total catchment area of the Limpopo River, where the upper tributaries comprise of the Marico and Crocodile Rivers, and the downstream tributaries comprised of the Luvuvhu and Mutale Rivers. The Olifants River on the other hand covers the main stem originating in the far southern Mpumalanga Highveld region of the WMA. The Olifants river initially flows northwards through the Mpumalanga and Limpopo Provinces draining an area of 54 388 km2 until at the confluence with the Letaba River in the Kruger National Park. In total the drainage area of the Limpopo - Olifants WMA is 183,125 km2.

Water requirements vs. availability

The 2004 yield balance within the Limpopo catchment of the WMA was estimated at 75 million m3/annum deficit (DWS, 2004). The deficits in the Limpopo rivers catchment relate to opportunistic irrigation situated in the Sand and Lephalale Key Areas, which have the highest and third-highest deficit, and over-allocated irrigation in the Nzhelele and Nwanedi Key Areas (DWA, 2004a: iv). The balances in the Apies/Pienaars and Upper Crocodile sub-areas are due to urban return flows in excess of what is currently used in these sub-catchments; where only the Rietvlei Dam catchment (A21A) and the Sterkstroom River (A21K) in the Upper Crocodile Sub-area experience significant negative water balances (DWA, 2004a). The water requirements and groundwater resources of the WMA, as documented in 2004, are much higher than those given in the NWRS (DWA, 2004a). The reason for this is that new information became available on the groundwater use through the registration process as well as the GRIP project (DWA, 2004a). In the Marico River catchment, the Upper Ngotwane sub-area shows that the A10A catchment is in deficit of approximately 4 million m3/a. This is mainly because the level of assurance of supply for the users supplied from the Ngotwane Dam is much lower than the norm. These are the irrigators who may be irrigating annual crops and do not require higher levels of assurance of supply. The Upper Molopo catchment has the second highest deficit in the Limpopo WMA, although the current surface yield is not utilised to its full capacity. The deficit is in the groundwater abstraction, which is more than the available groundwater as currently understood. The yield from groundwater may be much higher than currently understood.

For the Olifants catchment portion of the WMA availability will pose a challenge. This is based on the growth in demand as a result of population and general economic development, including challenges related to poor water quality within the catchment. The table below depicts the water resource yield versus total requirements for 2010.

2. Inkomati-Usuthu

The Inkomati-Usuthu remains a single WMA and no configuration was done. The WMA has an established and functioning Catchment Management Agency. It comprises of the original Inkomati-Usutu Water Management Area (excluding the Pongola catchment).

The Inkomati-Usuthu Water Management Area (WMA) is situated in the north-eastern part of South Africa and borders on Mozambique and Swaziland. It also occupies the south-eastern corner of the Mpumalanga province, west of Swaziland. Its main rivers include the Sabie-Sand, the Crocodile (East), Komati and Usuthu Rivers. The Komati River first flows into Swaziland and re-enters South Africa before flowing into Mozambique. Three of the four rivers draining the WMA confluence to form the Incomati River in Mozambique, which flows to the Indian Ocean, while the Usuthu joins the Pongola River just before the Mozambican border.

The Inkomati-Usuthu WMA, as defined in the NWA of 1998, has an established Catchment Management Agency (CMA), with a draft Catchment Management Strategy (CMS). Transfers of water into this WMA from elsewhere in South Africa are not feasible given distance from all other sources. Opportunities for new dams are very limited, beyond some possible storage to meet growing domestic needs. Water resource deficits will have to be met from within the WMA through more efficient use of the limited resources.

Water requirements vs. availability

The water availability estimate for the Inkomati-Usuthu WMA, at a 98% assurance (1:50 Year Yield) of supply is shown in table 2.2. Surface water makes up the bulk of the water available in the CMA, with ground water only minimally available in part of the WMA. A substantial

amount of the available water is set aside for the ecological reserve (363 million m3/annum), while a significant amount is also taken out of the system by invasive alien plants (92 million m3/annum), mainly in the Inkomati catchment of the new WMA.

Irrigation takes up the greatest amount of the local water requirements, making up 48.5% of the requirement total. Transfers out represent 19.1% of the water requirements, and afforestation 13.2%. Another element of water requirement that is a prominent feature in the Inkomati-Usuthu WMA is the international requirements, which represent the amount of water that must be allowed to flow across the borders into the neighbouring states of Mozambique and Swaziland.The current yield balance within the Inkomati-Usuthu WMA, given the water availability and water requirements estimates, is an estimated 163 million m3/annum deficit.

The Inkomati-Usuthu WMA has International Considerations with Southern Mozambique largely dependent on water from the upstream catchments of the Inkomati-Usuthu WMA. The Interim IncoMaputo Water Use Agreement sets out the water protection and sustainable utilisation (sharing arrangements) of the water resources of the three basin states, that is, South Africa, Swaziland and Mozambique.

3. Pongola-Mtamvuna

(The Pongola-Mtamvuna remains a single WMA and no configuration was done).

The Pongola-Umzimkulu WMA is located in Kwa-Zulu Natal and is one of the larger WMAs, as it is the result of the amalgamation of the Thukela, Mvoti-Mzimkulu and Mhlatuze catchments. The amalgamated WMA – Pongola-Mtamvuna is bounded by the Indian Ocean to the east, Mozambique, Swaziland and the Inkomati-Usuthu WMA to the north, Lesotho and the former Vaal WMA to the west and the Mzimvubu-Tsitsikamma WMA to the south.

This WMA is complex, as it covers an area of high season rainfall, with heavy demands on water resources from the agricultural sector, industrial, mining and urban domestic sectors. The rivers, dams and freshwater resources of the WMA accounts for 40% of South Africa's total water resources (KZN Provincial Planning Commission, 2011). In addition, certain rivers within the WMA are classified as international as their catchments are shared by Mozambique, Lesotho or Swaziland.

In addition, the Pongola-Mtamvuna Water Management Area comprises a number of medium to very large catchments with all the rivers flowing directly into the sea, apart from the Pongola River that joins the Maputo River in Mozambique. There are some water transfers across catchments. The most important sharing of water is the use of the Thukela System to supplement the Vaal System, with more water reserved for expected long-term requirements. The most critical water supply issue in the WMA is in meeting the growing requirements of the Kwazulu Natal Coastal Metropolitan Area, which includes the eThekwini Municipality (Durban) and its environs. The KZN Coastal Reconciliation Strategy published in 2010, is a key source document.

Water requirements vs. availability

The water availability estimate for the Pongola-Mtamvuna WMA, is estimated at a 1917 m3 per annum. The largest water requirement is for irrigation in the agricultural sector as indicated in Error! Reference source not found. which accounts for 32% of the total water requirements. The greatest water requirement is in the Pongola area. The urban water requirement makes up 20%, the largest being the Mgeni, which supplies Durban. 28% of the water is transferred out and mining and bulk industrial account for 8% of the water requirement, especially in the Mhlatuze which supports the Richards Bay industrial complex.

While the WMA has high overall water yield, and over the whole WMA has a positive water balance, nine of the fourteen areas have the requirements outstrip the yield. This indicates that areas are water stressed. The greatest deficit is in the Mgeni area, which is largely due to the expansion of Durban as an urban area and industrial hub.

Twenty per cent of all the groundwater in South Africa is to be found within the Pongola-Mtamvuna WMA, yet this resource is underutilised in the region. There must now be significant investment in the exploration and development of its potential, especially in augmenting supplies to villages and smaller towns.

4. Vaal-Orange

(The Vaal and Orange WMAs are amalgamated into a single WMA).

The boundary of the Vaal WMA is extended to include the Orange WMA to form a single WMA. The intention is to establish the Vaal-Orange CMA for the whole of the Vaal and the Orange WMA areas. An integrated Vaal-Orange CMA will manage the water resources that previously fell in separate catchment areas. Although the proposed Vaal-Orange CMA will be established as a single juristic entity (due to common features such as in and out water transfer requirements), there are also nuanced differences coupled with the sheer size of the WMA that dictate for a regionalised operational model.

The Vaal River system supplies the water resource needs of 60% of the national economy and serves 20 million people. This is the economic heartland of South Africa; water resources are limited and must be secure. The Vaal River System is linked to all of its adjacent WMAs, and planning ensures that water will be made available into the long term. While the Orange River is the country's major artery and a resource that must be managed with great care. The available yield for this system has been fully allocated, and there is no prospect of additional water for allocation without storage volumes being increased.

This will come at significant cost.
The Vaal-Orange WMA Area occupies the Central North-eastern part of South Africa. It extends from Ermelo in Mpumalanga, just west of Swaziland in the east across to Kuruman in the Northern Cape to the west. To the northwest, the extended WMA borders Botswana and the Crocodile (West) and Olifants Catchments. Johannesburg sits on the boundary of the WMA. To the southeast it is bounded by Lesotho, and it includes the Orange WMA. The area of the Orange river system is mainly in the Free State and spreads over to the Eastern and Northern Cape. It includes parts of the Orange river basin upstream of the South Africa/ Lesotho border and therefore it includes the Lesotho Highlands Water Project (LHWP).

The orange is an international river. South Africa is the major user of the Orange River and has invested heavily in developing the water resources of the basin. The Katse and Mohale dams have been built as part of the Lesotho Highlands Water Project and the Polihali Dam is to be built over the period 2012 to 2020. The Gariep and Vanderkloof dams dominate the upper Orange River in South Africa. The Orange-Senqu Commission (ORASECOM), established in year 2000, provides the four sharing countries (Lesotho, South Africa, Botswana, Namibia) with the opportunity for cooperation on basin-wide issues. There is, for example, a monitoring programme and early warning system aimed at detecting change to aspects such as water quality.

Lesotho is developing the Lesotho Lowlands Water Supply Scheme. Namibia has irrigation schemes in the Fish River, some irrigation along the north bank of the Orange, and has indicated its intention to increase this. South Africa and Namibia are investigating the feasibility of a dam at Vioolsdrif, which would deliver water to Namibia and help in the management of South Africa's water use by storing the river's water for the second time (ie after release from Gariep/ Vanderkloof dams), closer to downstream users.

Water requirements vs. availability

The current system yield in the Vaal River System is around 3 000 million m3/annum. The available system yield is impacted by several factors. The Vaal River Bulk Water Supply Reconciliation Strategy of 2009 states that irrigation water requirement makes up about 37% of the total water use supplied from the Vaal River System. Moreover, detailed validation studies carried out for DWS indicated that as much as 174 million m3/annum could be unlawful. The bulk of this unlawful water abstraction is located in the river reach upstream of Vaal Dam and downstream of the outflow where the water from the Lesotho Highlands Water Project is discharge into the Ash River from the tunnels. This volume of unlawful abstraction effectively implies that a large proportion of the additional water available from Mohale Dam (part of the Lesotho Highlands Water Project) does not reach the intended users that are supplied from Vaal Dam.

Water resources in the lower part of the Orange river system are fully developed. Large operational and transmission losses are experienced in the process of ensuring that the requirements of the various water users are met during the long travel distance of 1 400 km, from the point of release at Vanderkloof Dam to the most downstream point of use.

The availability of more water is largely dependent on the successful implementation of several mitigation factors, such as the eradication of unlawful use, Water Conservation and Demand Management (WC/WDM) initiatives, reuse of effluent and desalinated mine water and the introduction of the augmentation options. The eradication of unlawful use, WC/WDM and reuse of treated effluent and mine water are issues which will fall within the jurisdiction, monitoring and control of the Vaal-Orange CMA. The extent of the supply deficit is highly dependent on the success of the proposed mitigation strategies, as is evident from the scenarios in the following figures. There are also challenges to be overcome in replacing the lost yield in the Senqu River to the Orange River System as a result of supplying water to the Vaal River System.

5. Mzimvubu-Tsitsikamma

(The Mzimvubu-Tsitsikamma remains a single WMA and no configuration was done). This catchment includes the coastal catchments between the Mtamvuna and the Mzimvubu rivers, i.e. the Pondoland area).

The Mzimvubu to Tsitsikamma WMA covers the majority of the Eastern Cape, and includes portions of KwaZulu-Natal, Western Cape, and the Northern Cape which comprises of the original Mzimvubu-Keiskamma and Fish-Tsitsikamma WMAs. The WMA covers practically the entire Eastern Cape Province and includes a number of very large and vastly different catchments, from the arid Karoo in the west to sub-tropical in the northeast.

The Mzimvubu and Pondoland catchment areas have a relatively high mean annual runoff but the water resource remains largely undeveloped and no large dams have been constructed. There are no large centres of urban/industrial demand within easy reach of the Mzimvubu River that could carry the cost required to build dams for water supply. The prospect of transferring water into the Orange and Vaal catchments has been examined over many years, but, with other plans in place to supply inland water requirements, these transfers will not be needed for a long time to come.

6. Breede-Olifants

(The Breede-Gouritz and Berg-Olifants WMAs are amalgamated into a single WMA). The original Breede-Gouritz WMA has an established and functioning Catchment Management Agency).

The Breede-Olifants WMA is the result of the amalgamation of the Breede-Gouritz WMA and the Berg-Olifants WMA. The new WMA will be bounded by the Atlantic Ocean to the southwest, the Orange WMA to the north, and the Mzimvubu-Tsitsikama WMA to the East. It will largely fall within the Western Cape Province, with small portions of the upper catchment of the Olifants River falling in the Eastern Cape Province, and portions of the Northern section falling within the Northern Cape Province.

There are four large rivers within the proposed WMA, the Breede, Berg, Gouritz, and Olifants Rivers. The Olifants River is highly impacted by abstraction for irrigation in the upper reaches. A Preliminary Comprehensive Reserve has been determined for the Olifants River with the recommendation that it is impractical to try and restore the river to a more natural system, and that water should not be taken back from existing lawful users for this purpose, due to the negative impact this will have on the area's economy. The protection of the Doring/Doorn) River is aimed at securing the ecological integrity of the lower reaches and estuary of the Olifants River, the latter being a major permanently open estuary and fish breeding area.
The Table Mountain Group (TMG) Aquifer holds significant potential and has been investigated and developed by the Overstrand Municipality, the Koo WUA, and the potential of Oudtshoorn as an option to augment their existing sources of bulk supply. The TMG aquifer situated within the Hottentots-Holland, Franschoek, and Du Toit's mountain ranges are also being evaluated to augment the bulk supply for the Western Cape Water Supply System (Greater Cape Town).

In the Little Karoo, poor quality brackish groundwater (generally unfit for human consumption but supportive of livestock) is associated with Bokkeveld and Cretaceous (Uitenhage Group) aquifers, whilst the quality of water in the primary alluvial aquifers is variable. The regional flow regime, storage capacity, recharge, and discharge patterns of the Peninsula and Skurweberg (Nardouw) aquifers in a north-south corridor between the Outeniqua and Swartberg ranges, centred around the town of Oudtshoorn in the Olifants River valley are being evaluated. In the Great Karoo, around the towns of Prince Albert and Beaufort West, the exploration and potential extraction of deep lain earth gasses through a process of fracking are investigated. The WMA has one Metropolitan Municipality – City of Cape Town and the 30 local municipalities that fall within the proposed Breede-Olifants WMA.

Both the Berg and Breede Rivers have now been almost fully developed through the need to supply the City of Cape Town. Little or no more water can now be expected from the Breede River system. Long term thinking must consider that water will only become scarcer and much more expensive. The Berg-Olifants system does not have the water, and it is too distant, to provide any solutions for the City of Cape Town.

Water requirements vs. availability

The water availability estimates for the Breede-Olifants WMA component, at a 98% assurance (1:50 Year Yield) of supply. Irrigation is by far the dominant water use sector in the water management area, representing around 85% of the local requirements for water. Urban and rural water use make up 9.4% and 2.3% respectively, while water use for afforestation makes up 2.2% of total local requirements. A large proportion of the local water requirements is consumed in the Upper Breede sub-area (about 47%) which has 28% of the total population of the Breede and Gouritz WMA. The Coastal sub-area uses the second-largest amount of water with about 9% of total local requirements being used in this sub-area.

Most of the water that is transferred out of the Breede area goes to the Berg area and specifically to the City of Cape Town (170 Mm3) where a large proportion of the urban population of the Western Cape resides, and to agriculture (50Mm3). Consideration of how much water will be directed to the city, depending on economic and population growth, from the Breede area will have to be given in the future. This might have a significant impact on the water available for local use within the Breede area and all the economic activities that depend on water availability. Equally, meeting the environmental water requirements may impact water availability in some sub-areas. The current water requirement estimates are also marred by uncertainties. Much uncertainty about water requirements arises from the fact that a significant proportion of the total current irrigation activity lies outside of government-controlled schemes and Water User Associations (WUAs), and figures for irrigation water use from different sources vary considerably.

The current yield balance within the Breede-Olifants WMA, given the water availability and water requirements estimates, is estimated at a 99 million m3/annum deficit. The Breede area has a yield surplus of 19 million m3/annum which can be used for reallocation to the emerging farmers. Though not all this surplus water is available in government-owned dams/schemes, DWS can endeavour to influence the owners into making any long-term surpluses available for use by resource-poor farmers. Several interventions can be put in place to help increase the amount of water available for local use in the Breede-Olifants WMA. The additional water returned to the system as a result of these interventions can be used to better support resource-poor farmers.

ANNEXURE B

THE NATIONAL GROUNDWATER STRATEGY

Introduction

South Africa is approaching increasing water scarcity. Surface water, the traditional source for bulk supply, is becoming limited and even unavailable in many catchments and infrastructure and the costs of construction and maintenance are prohibitive. Giving rise to the importance of groundwater resources development for sustaining water security. Already groundwater's role in South Africa has undergone a major change during the water sector transformation post-1994, from an undervalued resource and a 'private water legal status' to a source of domestic water and general livelihood to more than 60% of communities in thousands of villages and small towns country-wide as part of the national drive to meet basic water needs. These changes present a major challenge for the resource which occurs mainly in hard rock aquifers in which yields are limited and a water sector which had treated it largely as an emergency water supply by drilling boreholes during drought emergencies. Its sustainable utilization by many different role players at thousands of locations will require a unique approach.

The NWRS-3 acknowledges/recognizes the integral role of Groundwater towards integrated water resources management of South Africa for sustainable use and management of the countries water resource. As the country transitions towards a more Integrated Water Resource Management phase, groundwater must be recognized as a valuable resource by land use planners and by municipalities. The issuing of license applications for groundwater use must be expedited in order to promote regulation of groundwater use in the country. Some of the country's major groundwater aquifers are facing challenges of over abstraction, as a result unsustainable use, therefore regulation as well as verification and validation of its use is ever more important. The NWRS-3 through the National Groundwater strategy (NGS) speaks to sustainable protection, use, development, management, conservation, and control of groundwater resources for present and future generations.

The NGS's goal is to ensure sustainable, accessible, and cost-effective groundwater supplies for human survival and socio-economic development, while maintaining the environmental services that groundwater is supporting, in an integrated development approach.

The objectives of the National Groundwater Strategy (NGS) are as follows:

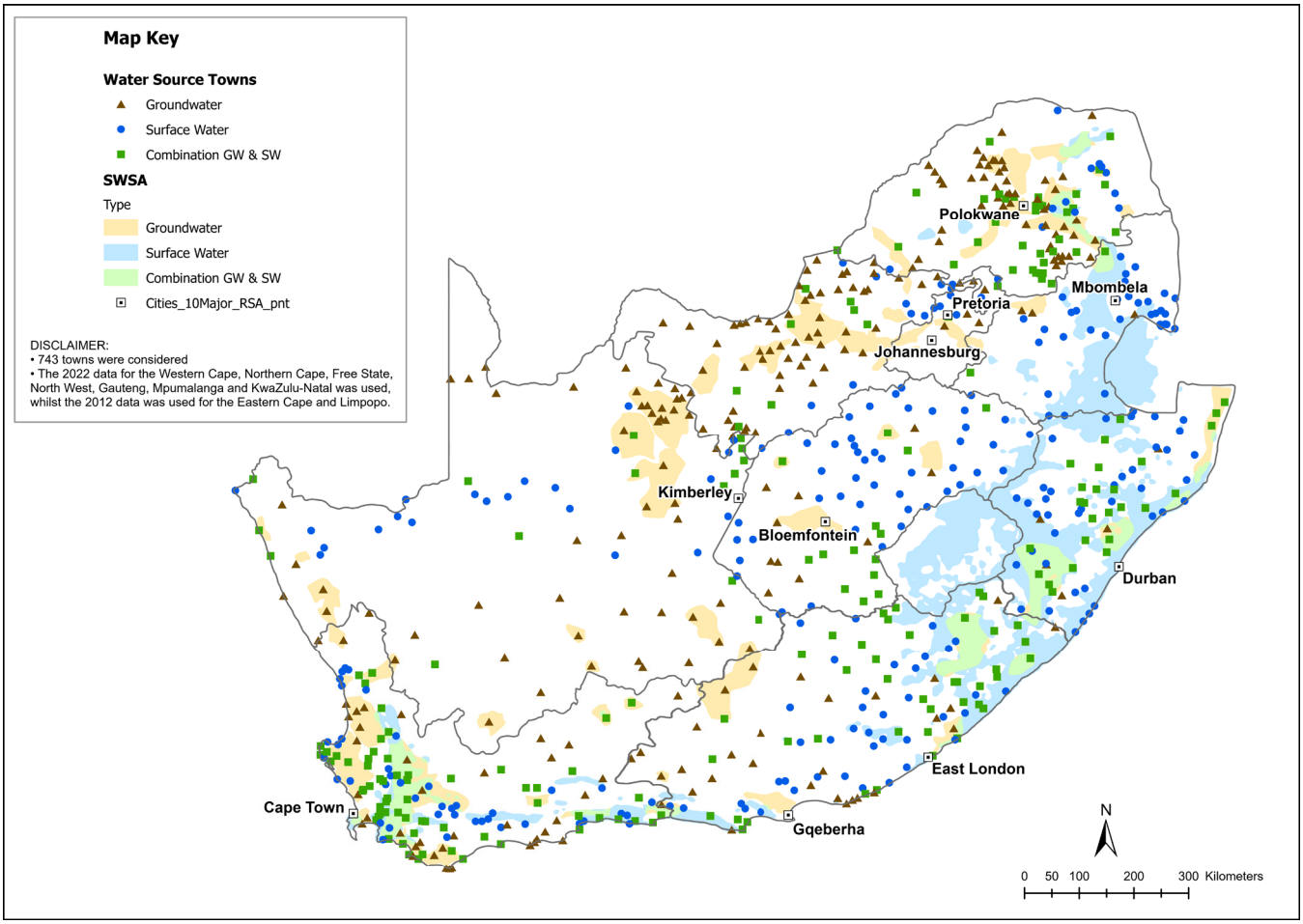
1. To achieve improved rural water supplies for basic and livelihoods needs from groundwater and other local sources.
2. To achieve sustainable small town / village supplies from groundwater, practicing integrated water resource management at local scale.
3. To improve water security for urban development from groundwater through a range of conjunctive-use options, integrated with wastewater management.
4. To expand irrigated agriculture, especially for small-scale and supplementary irrigation from groundwater, with focus on sustainability and appropriateness and cost-effectiveness of technology.
5. To develop new groundwater sources in increasingly complex locations, including brackish water, for industrial / mining supply in situations of increasing water scarcity.
6. To actively pursue the protection and conservation of groundwater resources by all sectors of society, taking cognisance of its general vulnerability and of the range of essential services, including vital ecosystem services, which the hidden resource can provide.
7. To achieve sustainable resource utilization through appropriate groundwater resource governance resulting in capacitated local participative resource management, enabled and supported by a coordinated national / regional water sector.

The NGS Groundwater Governance Framework

To address the groundwater vision and objectives and the present inadequate groundwater management situation in South Africa outlined above, a groundwater governance framework for action has been developed. Its concept is based on the Global Groundwater Governance Framework completed recently (UNESCO et al., 2015), while its detail has been informed by local context, both by hydrological and by overall governance and macro-economic objectives, and most of all by stakeholder inputs from across the country and from every economic sector. Governance will have to happen at three essential levels, namely: a national enabling level; a national strategic level; and a local level. Over time, the local action level will fully unfold and will mirror every strategy theme presently required at the national / regional facilitation level and will convert strategies into actions. The Global Groundwater Governance Framework illustrate the 12 overarching themes of the NGS.

National Level (enabling environment)								
0. Enabling legislation & strategy (is in place) 1. Stakeholder-driven development 2. National Groundwater Leadership								
National / Regional / Basin Level								
3. Regulatory Framework	4. Groundwater Protection	5. Sustainable Utilization	6. Institutional Development	7. Awareness Skills & Capacity	8. Redirecting Finances	9. Planning & Development	10. Information Management	11. Regional/ International Partnership
Implementing regulations at aquifer level	Protecting aquifer resources	Achieving aquifer sustainable development	Establishing local institutions	Building local skills & capacity	Collecting & utilizing local funds	Planning & developing shared aquifer resources	Monitoring & managing aquifer information	Enabling aquifer management regionally & globally
12. Local Action								

Figure on the NGS Groundwater Governance Framework



NATIONAL GROUNDWATER STRATEGY THEMES - THEME 1: Stakeholder-Driven Development & Implementation	
OBJECTIVE: To continuously improve stakeholder understanding & collectively agree on and work within an expanding framework of local level participative management & 'good groundwater governance'	
STRATEGIC TARGET	**ACTION**
1. National Stakeholder Core Group to guide and carry the groundwater institutional development process forward	1.1 Establish a National Groundwater Stakeholder Core Group institutional development
	1.2 Identify a mechanism for ongoing productive engagement of stakeholders
	1.3 Agree on a common Groundwater Code of Practice
	1.4 Involve stakeholders in local level aquifer management through appropriate
	1.5 Undertake awareness campaigns at all levels on improved groundwater management
	1.6 Establish a South African Groundwater Trust
	1.7 Establish a Stakeholder Communication Strategy
THEME 2: National Groundwater Leadership	
OBJECTIVE: To develop & maintain the national groundwater champion that must hold the overall groundwater governance framework together & facilitate & support its rollout, smooth functioning & growth	
STRATEGIC TARGET	**ACTION**
1.Groundwater Governance Unit established within DWS	1.1 Undertake Needs and Constraint analysis
	1.2 Identification of the key groundwater oversight functions
	1.3 Establish a groundwater governance unit (Chief Directorate or Directorate level)
THEME 3: Responsive Groundwater Regulatory Framework	
OBJECTIVE: To anchor a shared understanding of groundwater governance in appropriate policy & regulations that will enhance sustainable & efficient use of groundwater resources	
STRATEGIC TARGET	**ACTION**
1. Specific regulations for all sectors using & impacting groundwater	1.1 Valuation of all groundwater resources
	1.2 Promote self-regulation by certain sectors as part of participative management
	1.3 Development of groundwater norms and standards
	1.4 Develop national regulations for drillers and pump installers (Enforcement of drilling standards or code of practice)
2. Alignment & harmonization of land, water & environmental policies	2.1 Review of municipal by-laws to ensure protection and sustainable management and use of groundwater
	2.2 Ensure by-laws include control of drilling boreholes and registration of these as part of resource quantification and awareness raising
	2.3 Ensure all sectors have enforceable core infrastructure approval process before any development can take place
3. Groundwater authorization processes that achieve administrative efficiency & effectiveness & user cooperation	3.1 Establish compulsory borehole registration through a Permit or Pre-Authorization System
	3.2 Ensure uploading into relevant databases of all borehole information before any groundwater Authorization is issued
	3.3 Undertake Compulsory Licensing in all areas declared as Subterranean Government Water Control Areas under the Water Act 1956
4. Groundwater use verification as well as license compliance	4.1 Undertake country-wide groundwater use verification, especially in vulnerable groundwater resource areas
	4.2 Ensure compliance monitoring of groundwater use, especially in vulnerable groundwater resource areas

THEME 4: Groundwater Resource Protection	
OBJECTIVE: **To develop & maintain approaches for proactive protection of groundwater resources & aquifer-dependent ecosystems to secure a sustainable supply of water for human survival & socio-economic development, while maintaining essential groundwater environmental services**	
STRATEGIC TARGET	**ACTION**
1. Groundwater Quality Management Policy and Strategy alignment	1.1 Align Policy and Strategy for Groundwater Quality Management with the Resource Directed Measures Framework
	1.2 Align Policy and Strategy for Groundwater Quality Management with the Waste Act of 2008 in terms of groundwater protection, and ensure emphasis on groundwater remediation
	1.3 Ensure that Acid Mine Drainage, Unconventional Gas developments and others are covered during the alignment
	1.4 Clarify different institutional roles and responsibility
2. National assessment of the impact of pollution on groundwater resources	2.1 Establish formal cross-sector collaboration to enhance sustainable utilization of the resource
	2.2 Identification of main pollution pressures, different aquifer classes and vulnerability to pollution
	2.3 Undertake public awareness and understanding of groundwater issues, putting more emphasis on precautionary approach to groundwater protection
	2.4 Install water meters in every household and involve citizens in local groundwater protection
3. Groundwater use verification & groundwater authorization	3.1 Undertake groundwater use verification to obtain detailed groundwater use information to enable practical protection measures
	3.2 Utilize the aquifer importance, vulnerability and stress condition as criteria for prioritisation
	3.3 Ensure groundwater use conditions provide for the collection of groundwater quality monitoring information and uploading to the national database
4. Review the Resource Directed Measures methodology as it relates to groundwater	4.1 Enable addressing the unique hydrogeological characteristics and vulnerability of groundwater systems
	4.2 Address the unique groundwater-dependent ecosystems as well as the role that these groundwater systems play in the country's development
	4.3 Develop an appropriate groundwater resource classification approach, as an integral part of the RDM Classification System
	4.4 Undertake a revision of Groundwater Resource Assessment 2 (GRA2), with emphasis on resource exploration, assessment, monitoring and information storage and sharing
5. Protection of groundwater sources for Domestic Supply	5.1 Ensure groundwater sources for domestic use should receive the highest protection priority
	5.2 Initiate implementation of protection zones around boreholes, well head protection zones and larger no-go zones
	5.3 Increase the level of knowledge of each of the specific areas, based on which an adjustment of the zoned areas could be considered
	5.4 Use the latest knowledge and technology when managing the local use of groundwater
6. Regulation & Prohibition of Land-Based Activities	6.1 Develop regulations for land-based activities which may affect the quantity and quality of groundwater
	6.2 Develop a suite of guidelines and best practices to underpin the regulations in 7.1
	6.3 Ensure that the national policy of integrated water and sanitation development act as a precautionary way to protect the investment that is being made in groundwater infrastructure and in the health benefits of uncontaminated groundwater sources
	6.4 Evaluate, monitor and ensure control the Groundwater Protocol, which is part of all on-site sanitation implementation
	6.5 Develop a comprehensive water policy framework to deal with water issues at abandoned and derelict mines
	6.6 Ensure the regulation of groundwater related issues such as construction of septic tanks at different areas, development of cemeteries next to wetlands and construction of pit latrines on shallow aquifers or dolomitic areas

THEME 5: Sustainable Groundwater Resource Utilization	
OBJECTIVE: **To translate practical understanding of groundwater resources into appropriate guidance material to fully capacitate those responsible at all levels for sustainable groundwater resource utilization, covering planning, development, management & protection**	
STRATEGIC TARGET	**ACTION**
1. Sustainable Groundwater utilisation Objectives and Plans	1.1 Develop a series of specific, prioritized objectives and implementation plans
	1.2 Develop sector and institutional (e.g. WSDPs and CMS) groundwater plans
	1.3 Ensure proper system understanding, adequately monitoring and modelling system behavior and adapting groundwater utilization and aquifer management accordingly, jointly
2. Good hydrogeological practice with informed stakeholders	2.1 Ensure proper system understanding for source development
	2.2 Ensure adequately monitoring and modelling system behavior during use
	2.3 Adapt groundwater utilisation and aquifer management approach
	2.4 Continuous review of groundwater tender documents to achieve continuity in approach and information from source development to O&M
3. Review and Development of Guidelines (Setting of standards and guidelines must go hand in hand with regular auditing of the implementation of these)	3.1 Develop and adopt focused guidelines for the above objectives to become part of a series of official, widely available and regularly reviewed guideline documents and involve stakeholders in guideline development
	3.2 Training Programmes should be introduced in support of the Guidelines Implementation for the specific stakeholder groupings
	3.3 Implement and strengthen inter-departmental cooperation through formal agreements and focused guidelines
	3.4 Ensure integrated authorization system to improve the regulation of environmental management, water resource management and related activities / land- uses such as mining
	3.5 Ensure the ongoing auditing and awareness-raising (e.g. Blue Drop Assessment) is updated to allow for the groundwater assessment is implemented as part of an overall strategy to improve local groundwater management
4. National Capacity for Groundwater Governance	4.1 Ensure support for sustainable groundwater resource utilization as a key responsibility of the groundwater governance structure in the Department of Water and Sanitation
	4.2 District and Local municipalities must appoint hydrogeologists to manage their aquifers, if necessary in terms of appropriate regulation
	4.3 Groundwater consultancies should "adopt a municipality" by providing a free service to attain sustainable municipal groundwater management

THEME 6: Appropriate institutional development	
OBJECTIVE: To develop, facilitate, capacitate & support appropriate institutions that will allow effective local-level participative management of groundwater resources	
STRATEGIC TARGET	**ACTION**
1. Strategic Governance Framework for groundwater	1.1 Develop a strategic framework with key stakeholders as an essential precursor and progressive instrument for effective groundwater governance
	1.2 Ensure it is a formal part of the National Water Resource Strategy and catchment management strategies
	1.3 Undertake an analysis of the relevant vocational and professional inputs needed into groundwater management
2. Systematic groundwater capacity development at local level	2.1 Target capacity building at municipalities in cooperation with the whole sector
	2.2 Undertake councilor induction programme to inform and capacitate on the benefit of groundwater and the role it can play in water and sanitation service delivery
	2.3 Ensure awareness raising, guidelines and training and targeted support, with a special focus on potentially underutilized local government capacity
3. Achieve Compliance with existing Government Requirements	3.1 Compel Water Utilities to report on both surface and groundwater including the quality of groundwater supplied in terms of Water Services Act, 1997 (Act 108 of 1997)
	3.2 Ensure that an Asset Register is kept and to include boreholes and borehole equipment in terms of Public Finances Management Act, 1999 (Act No 29 of 1999)
4. Appropriate Local Participative Management Institutions	4.1 Develop, capacitate and support local management institutions, monitoring committees to collect data and source management solutions, aquifer management committees and water user associations
	4.2 Create platforms for information sharing, consensus-building and joint resource enhancement and protection
	4.3 Have champions within each sector who understands local groundwater management issues and solutions
	4.4 Develop practical guidelines on all aspects of groundwater scheme operation and maintenance and institutional arrangements
	4.5 Ensure national sector and Catchment Management Agencies support for local-level management to achieve sustainable local action

THEME 7: Water Sector Awareness, Skills & Capacity	
OBJECTIVE: To develop & maintain skills & capacity for the sustainable development & management of groundwater resources at all management levels & with participation of all stakeholders as part of a long-term, ongoing process	
STRATEGIC TARGET	**ACTION**
1. Appropriate groundwater capacity development	1.1 Undertake a capacity gap analysis for groundwater within the groundwater governance framework, groundwater research planning and existing capacity building initiatives in different sectors
	1.2 Develop a national groundwater sector capacity building strategy linked to the National Water Resources Strategy
	1.3 Anchor groundwater capacity building in MOUs or MOAs with national as well as more local academic institutions
	1.4 Synchronize groundwater research with national development objectives
	1.5 Systematic capacitate municipalities and other local institutions in groundwater development and management
	1.6 Introduce understanding of groundwater systems at school level
2. Structured Framework to focus the contribution of National Water Research, Development, and Innovation (RDI) activity to the implementation of national policy, strategy and planning in water resources management	2.1 Increase ability to make use of more sources of water, including alternatives
	2.2 Improve governance, planning and management of supply and delivery
	2.3 Improve adequacy and performance of supply infrastructure
	2.4 Run water as a financially sustainable "business" by improving operational performance
	2.5 Develop a South African groundwater center of excellence to undertake the leadership and coordination required
3. Groundwater technical capacity-building improvement through Technical Education and Training	3.1 Initiate formal training courses for groundwater personnel at local level from pump operators to technicians and managers
	3.2 Development, management, education & training and governance of this resource should be practiced by competent persons
	3.3 Non-groundwater practitioners / contractors involved groundwater resource development need to be led by norms and standards and regulations
4. Groundwater awareness-raising	4.1 Undertake major ongoing awareness campaign at all levels to achieve the long-term transformation towards good groundwater governance
	4.2 Include science and applied technology to enhance education and outreach programs in order to broaden stakeholder understanding

THEME 8: Redirecting Finances	
OBJECTIVE: To redirect incentive policies & public expenditures impacting groundwater by & within different sectors to achieve a combined, much stronger focus onsustainable & efficient groundwater management	
STRATEGIC TARGET	**ACTION**
1. Understanding groundwater development for a better planning of investment in groundwater	1.1 Develop and understand the different stages of groundwater development under different physical and demand conditions, and the time and costs involved
	1.2 Align all public groundwater finance with the new priorities
	1.3 Encourage private investment in sustainable groundwater management through systems of regulations and incentives
	1.4 Align funding of groundwater governance with its strategic importance
2. Improve Efficiency of Charging for Groundwater Use	2.1 Charge groundwater use as incentive to conserve and protect the resource
	2.2 Ensure efficiency in measurement and charging (monitor abstraction points)
	2.3 Set tariffs according to the (groundwater) management needs of a catchment

THEME 9: Groundwater Resource Planning & Development	
OBJECTIVE: To achieve integrated water resource planning at national, regional &local levels that will fully & sustainably establish the unique potential of groundwater for socio-economic development	
STRATEGIC TARGET	**ACTION**
1. Incorporate groundwater option into all water development plans (National, Regional and Local)	1.1 Include groundwater development priority in catchment management strategies and WSDPs and IDPs
	1.2 Develop groundwater in a conjunctive manner with other local resources (such as surface resources, reuse, desalination and rainwater harvesting)
	1.3 Develop groundwater management plans at catchment and priority aquifer level
	1.4 Ensure inclusion of a groundwater management plan as part of the catchment management framework
	1.5 Establish guidelines for the groundwater content of emerging Catchment Management Strategies (CMS)
	1.6 Develop and implement "Best Practice Guidelines" for the mining sector as well as for the municipal, agriculture, energy and forestry sectors to ensure the protection of groundwater resources
	1.7 Conduct groundwater resource assessment and development programmes (including the rehabilitation of existing water supply boreholes) for towns threatened by water shortages as water needs increase
2. Groundwater's crucial role in drought preparedness and emergency response as part of drought risk management	2.1 Establish ongoing implementation of drought-proofing measures
	2.2 Develop regional and sub-regional information on areas expected to be most affected by drought
	2.3 Develop plans for monitoring and targeting drought-proofing measures during and ahead of droughts (e.g. rehabilitation of groundwater supply infrastructure and well deepening)

THEME 10: Information Management	
OBJECTIVE: **To grow & maintain the groundwater resource knowledge base, focusing on the resource itself, its socio-economic role & its appropriate management. Develop & maintain effective & efficient information & information systems, as a shared national objective & an integral part of water management strategies, in support of groundwater development & management at all levels**	
STRATEGIC TARGET	**ACTION**
1. Appropriate Groundwater Knowledge Base	1.1 Establish a Groundwater Research and Development Plan
	1.2 Achieve ever wider sharing, archiving and effective communication of information and knowledge products
	1.3 Share information, knowledge and experience across and far beyond national boundaries to achieve benefits from understanding global and regional patterns and processes and recognize potentials, problems and trends related to groundwater
2. Groundwater data and information management as foundation for improved management and cooperation of stakeholders	2.1 Assessment of current information needs such as, inter alia, Acid Mine Drainage (AMD), fracking and gas from coal
	2.2 Identify sources of existing data, information and major gaps
	2.3 Develop a more detailed level of information products, in particular groundwater vulnerability and risk maps at catchment and aquifer level in mining areas, industrial areas and areas of high vulnerability
	2.4 Review the current standards for groundwater data collection and management
	2.5 Establish a data culture nationally, with the consideration of a legal requirement for private companies and organisations to capture their data on the NGA
3. Integrated groundwater monitoring at the different levels (National, Regional and Local)	3.1 Establish aquifer monitoring as an integral part of aquifer management by all sectors
	3.2 Develop a comprehensive groundwater monitoring strategy (quantity, quality, use, supporting measurements like rainfall, isotopes and chlorides), based on proper valuation of the resource
	3.3 Integrate the groundwater monitoring with surface water monitoring and coordinate with the monitoring of ecosystems, including aquifer dependent ecosystems
	3.4 Define standard information products to provide an integrated groundwater information service at municipal and aquifer management level
	3.5 Achieve a streamlined flow of data and appropriate processes/systems to manage it through analysing the expected flow of data and information from and to different stakeholders and levels in the water management hierarchy
	3.6 Information systems should be geared for regular, integrated and streamlined national and regional state of water resources reporting
4. Groundwater Use and infrastructure Information	4.1 Verify water use from groundwater according to the General Authorisations and/or licensing conditions
	4.2 Implement programmes to enforce compliance with respect to water use license conditions
	4.3 Enforce non-compliance with respect to water use license conditions
	4.4 Prioritise major and stressed aquifers
	4.5 Implement legal regulations regarding capturing of information on the NGA
	4.6 Implement a groundwater equipment asset register for all public institutions

THEME 11: Regional & International Partnerships	
OBJECTIVE: To actively participate in & grow appropriate regional & international partnerships towards groundwater resource understanding & optimal utilization, including transboundary resource management	
STRATEGIC TARGET	**ACTION**
1. Sharing knowledge and experience with due consideration of transboundary issues	1.1 Participate in Groundwater Management Programme for the SADC Region i.e., the SADC Groundwater Management Institute
	1.2 Participate in joint management of identified transboundary aquifer systems (TBAs)
	1.3 Ensure implementation of groundwater management plans for each of the River Basin Commissions
2. UN Sustainable Development Goals	2.1 Develop groundwater targets which can be directly related to the respective Target Areas of Goal 6 of the SDG

THEME 12: Local Action	
OBJECTIVE: To manage & maintain actions on all strategy fronts in a concerted effort from government at different levels, from municipalities & utilities, the private sector, civil society, educational institutes, media & professional associations to achieve the essential local level actions for sustainably managing shared groundwater resources	
STRATEGIC TARGET	**ACTION**
Achieve local level management of the shared groundwater resources within an appropriate enabling and supporting environment	CMAs develop a groundwater management plan for its catchment with the full involvement of the relevant stakeholders
	Develop aquifer management plans at local level, starting with the most vulnerable and most stressed systems
	Apply operation and maintenance of groundwater infrastructure by local municipality (WSA or WSP) and the conservation and protection of their groundwater sources to achieve sustainable water service provision, from local groundwater resources
	Composition of special stakeholder group (agriculture, mining and industries) in groundwater governance to work in partnership with government and each other to develop and operationalize institutional measures for self-regulation and local collective management
	Local water utilities must secure their groundwater sources and control leakage and discharge of untreated wastewater
	Media and civil society to contribute towards wider awareness of groundwater challenges and opportunities, including the need for more effective groundwater governance

To download the National Groundwater Strategy please visit:

https://www.dws.gov.za/Groundwater/Documents/ NWRS3_2023.pdf