

DEPARTMENT OF WATER AND SANITATION

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NATIONAL WATER ACT, 1998 (ACT NO. 36 OF 1998)

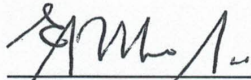
REVIEW OF THE NATIONAL WATER RESOURCES STRATEGY

I, Mr Senzo Mchunu, in my capacity as Minister of Water and Sanitation, and duly authorised in terms of section 5(5)(a) of the National Water Act, 1998 (Act 36 of 1998), hereby publish the draft National Water Resources Strategy for public comments.

Any person who wishes to submit written representations or comments on the revised National Water Resources Strategy is invited to do so within 90 days of publication of this Notice. All representations and comments must be submitted in writing to:

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178 Francis Baard Street, Pretoria
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MR S MCHUNU
MINISTER OF WATER AND SANITATION

Date:

2/6/22

REVISED NATIONAL WATER RESOURCES STRATEGY**Preamble**

The National Water Resources Strategy (NWRS) provides the framework for the protection, use, development, conservation, management, and control of water resources of South Africa. It also provides the framework within which water will be managed at regional or catchment level, in defined water management areas. It is the primary mechanism and legal instrument of operationalizing or implementing the National Water Act. The National Water Resources Strategy is binding on all authorities and institutions exercising powers or performing duties under the National Water Act, 1998 (Act 36 of 1998). The National Water Resources Strategy has been established in a phased and progressive manner in separate components over time.

The Draft National Water Resources Strategy Third Edition (NWRS-3), version 2.6 consists of the following chapters and list of annexures:

Chapters:

Chapter 1	Introduction
Chapter 2	National Strategic Imperatives
Chapter 3	Context
Chapter 4	Reducing Water Demand
Chapter 5	Increasing Water Supply
Chapter 6	Redistributing Water for Transformation
Chapter 7	Managing Effective Water and Sanitation Services
Chapter 8	Regulating the Water and Sanitation Sector
Chapter 9	Managing Water and Sanitation Under Changing Climate
Chapter 10	Promoting International Cooperation
Chapter 11	Improving Raw Water Quality
Chapter 12	Protecting and Restoring Ecological Infrastructure
Chapter 13	Creating Effective Water Sector Institutions
Chapter 14	Data Collection, Analysis and Information Management for Effective Monitoring, Evaluation and Reporting
Chapter 15	Building Capacity for Action
Chapter 16	Ensuring Financial Stability
Chapter 17	Enhancing Research, Development, and Innovation
Chapter 18	Addressing Legislative and Policy Gaps

List of Annexures:

Annexure 1	Reconfiguration of Water Management Areas
Annexure 2	Government Notice on the proposed 6 New WMA's in South Africa

The detailed Draft National Water Resources Strategy Third Edition (NWRS-3) can be viewed from the Department of Water and Sanitation website, www.dws.gov.za under documents or visit the Department of Water and Sanitation Map Shop at Emanzini Building, 191 Francis Baard Street, Pretoria.



water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

NATIONAL WATER RESOURCE STRATEGY 3

DRAFT 2.6

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VISION OF THE NATIONAL WATER RESOURCE STRATEGY 3

“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.”

To be finalized after consultations...

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PREFACE

Message from the Minister.

To be included upon finalization after consultations...

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WATER SECTOR PRIORITY FOCUS AREAS 2020 TO 2030

- Reducing water demand and increasing supply
- Redistributing water for transformation
- Managing water and sanitation services under a changing climate
- Regulating the water and sanitation sector
- Improving raw water quality
- Protecting and restoring ecological infrastructure for the green economy
- Creating effective water sector institutions
- Promoting international cooperation
- Building capacity for action
- Ensuring financial sustainability
- Managing data and information in line with 4IR and global knowledge
- Enhancing research, development and innovation
- Addressing legislative and policy gaps

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FOREWORD

Message from the DG.

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EXECUTIVE SUMMARY

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VISION DIAGRAM

To be updated upon finalization after consultations...



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ACRONYMS AND 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	Central Adoption Resource Authority
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

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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.	<i>etcetera</i> ; 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
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

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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.	<i>id est</i> ; 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
IWT TSA	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

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m³/a	cubic meter per annum
mm/year	millimetres per year
mg/l	milligrams per litre
MI/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

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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, 2021)
ODA	Official Development Assistance
OECD	Organisation for Economic Cooperation and Development
ORASECOM	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

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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
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

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UNEP	United Nations Environment Programme
GEMS	Global Environment Monitoring System
UNFCCC	United Nations Framework Convention on Climate Change
UNESCO	United Nations Educational, Scientific and Cultural Organisation
VGG	Vaal Gamagara
WAR	Water Allocation Reform
WAS	Water Accounting System
WARMS	Water Registration Management System
WARS	Water Allocation Reform Strategy
WCWSS	Western Cape Water Supply System
WCWDM	Water Conservation and Water Demand Management
WDCS	Waste Discharge Charge System
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
WWC	World Water Council
WWTW	wastewater treatment works
WUL	Water Use Licence

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1. INTRODUCTION

1.1. Purpose and Scope

The National Water Resources Strategy (NWRS) is currently the legal instrument for implementing or operationalising the National Water Act (Act 36 of 1998) and it is thus binding on all authorities and institutions implementing the Act. It 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 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 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 NWA, the NWRS-3 and the NW&SMP is illustrated below:

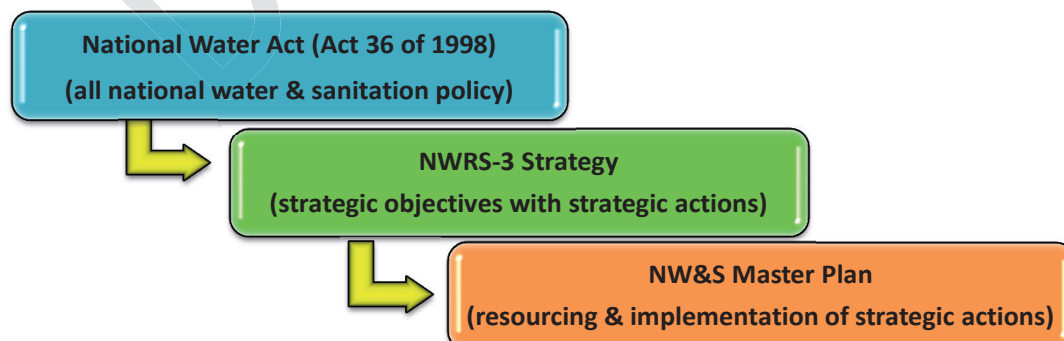


Figure 1: Relationship between NWA, NWRS-3 and NW&SMP

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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 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) is 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.

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The 3rd revision of the NWRS has been 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 in order to give effect to the National Water and Sanitation Master Plan (NW&SMP), which is subsidiary to, and operationalizes the NWRS-3.

1.3. Process to Develop the NWRS-3

The NWRS-3 builds on the NWRS-2 that was published in 2013. 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 internalization 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 internalization 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 found that the level of internalization of the NWRS-2 in the Sector Departments and Sector Partners strategies and plans was as follows:

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- 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

- The National Water Monitoring Strategy was finalised and included in the NDP.
- A maintenance program and costing model for gauging stations was finalised and implemented.
- 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.
- Establishment of 300 000 smallholder farmers as mentioned by the New Growth Path and additional hectares of land identified for HDIs for irrigation was initiated.
- Completion of the feasibility studies for uMkhomazi, Ncwabeni, Umzimvubu and Western Cape Water Supply System Augmentation will enhance water availability.
- Rehabilitation of all delineated buffer zones and water courses should result in an improvement in water quality as well as an increase in water quantity.
- New opportunities envisaged for Broad-Based Black Economic Empowerment in the country generally and forestry specifically followed the introduction of the B-BBEE Amendment Act.
- 1 462 Resource Poor Farmers were provided with access to water for economic development.
- The identification and implementation of adaptation strategies and the correct application of the operation rules will ensure increased water availability.
- A WWF-funded project explored appropriate legal mechanisms for protecting the water resources in SWSAs.
- In the last three years, 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 and are awaiting final gazetting.
- Legal requirements that are spelt out in the National Water Act were developed as NWRS-2 implementation plans and implemented in collaboration with all sectors.
- Organised agriculture supported the establishment of CMAs for their capacity to fight illegal water users and to enforce water restrictions.

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- 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 three years under review the DWS installed roughly 3 316 water tanks in different provinces.
- 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.
- Successful food production through neutralized mine water presented an innovative and cost effective solution for social upliftment.
- 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 under the guidance of an FSA EMC Editorial Subcommittee and was completed in 2015.
- The implementation of regulations that ensured that the 300-day time frame for all environmental authorisations is achieved, including water use licences, was supported.
- The Groundwater Governance Framework was finalised.
- The WRC funded the development of a wetlands monitoring programme which was finalised in 2015.
- The Forests Act required that commercial forest plantations be established at a specified distance from rivers, streams and wetlands.
- The wetland network formed part of the 10 main national monitoring networks.
- DWS partnered with the Wildlife Environmental Society of Southern Africa (WESSA) to implement an Eco-School project.
- DWS required WSAs and water boards to prioritise investment in the refurbishment and upgrading of wastewater treatment plants to prevent the pollution of water resources.
- 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 DWA worked with the DHE, the SETAs and DSI to support investment in knowledge production and innovation capacity within education and training institutions.

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- The DWS draft policy on sustainable Hydro Power generation was developed.
- It was expected that the IWQM Policy would be gazetted for public comment in 2017.
- The Strategy for Compliance Monitoring was approved - the Enforcement Strategy was still under development.
- The development of the Climate Change Policy Position was in progress.
- The WRC established a range of local and international MoUs / partnerships that could be drawn upon.
- 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.
- DWS, Dutch Water Authorities and VNG International signed an Agreement in 2014 on the Kingfisher Project.

NWRS-2 Ongoing Challenges

- To reduce water demand and increase efficiency of water supply.
- To increasingly redistribute water for transformation.
- To manage water and sanitation services more effectively.
- To expand and improve water and sanitation sector regulation.
- To better manage water and sanitation under a changing climate.
- To improve raw water quality and increasingly protect and restore ecological infrastructure.
- 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 monitor, evaluate and reporting accurately on the successful implementation of the NWRS.
- To innovate and implement new technologies in the sector.
- To meaningfully reduce water demand by effectively implementing WCWDM measures.
- 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 water quality situation.
- To effectively maintain pumping infrastructure.
- To finalize a Water Offset Policy or water stewardship policy.
- To implement the No Drop certification tool.
- To effect significant challenges in the roll-out of water-borne sanitation.
- To quantify and eradicate unlawful irrigation.
- To establish the Vaal CMA.
- 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 War on Leaks Programme.
- To address water use license applications.

Table 1: NWRS-2 Successes and Ongoing Challenges

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1.5. What is new in the NWRS-3

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

- ④ Focus on priorities of the 6th Administration of the Government of the Republic of South Africa.
- ④ Alignment with the Global Sustainable Development Goals (SDGs), Africa's Agenda 2063, the National Water Security Framework Version 5.0, the DWS Strategic Plan (2020 to 2025) and the DWS Annual Performance Plan (2020/2021).
- ④ Forward looking in terms of the possible consolidation of the National Water Act (NWA) and Water Services Act (WSA) into one proposed new Water and Sanitation Act.
- ④ Greater focus and content included on Integrated Water Quality Management and setting of stricter minimum requirements for WWTW effluent discharges.
- ④ Support for technological advances in new knowledge and real time data acquisition for Water Resources Management (WRM).
- ④ Improved audit compliance of self-regulating water and sanitation sector institutions as per their water use authorisation conditions.
- ④ Alignment with the National Water and Sanitation Master Plan (NW&SMP) as the "execution arm" of the NWRS-3 (i.e. time lines, responsibilities, budgets per Strategic Action).
- ④ Better alignment between Strategic Objectives and Strategic Actions within all chapters.
- ④ Incorporation of refinements and improvements informed by NWRS-2 three year review outcomes so as to improve the strategy layout.

1.6. Communication and 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:

- ④ Stating the background, purpose and objectives of the NWRS-3 strategy.
- ④ Establishing a communications plan with key identified messages.
- ④ Establishing clear rollout and co-ordination mechanisms nationally and provincially.
- ④ Identifying key sector partners, role-players and stakeholders that will participate – with particular focus on the private sector (locally and internationally).
- ④ Identifying various target audiences and different platforms to reach these target audiences.
- ④ Identifying rollout campaign requirements, resources, materials and a clear rollout plan.
- ④ Resourcing and implementing the rollout of the NWRS-3 communications and advocacy strategy.

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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 they require alignment with respect to implementation and progress reporting as illustrated below.

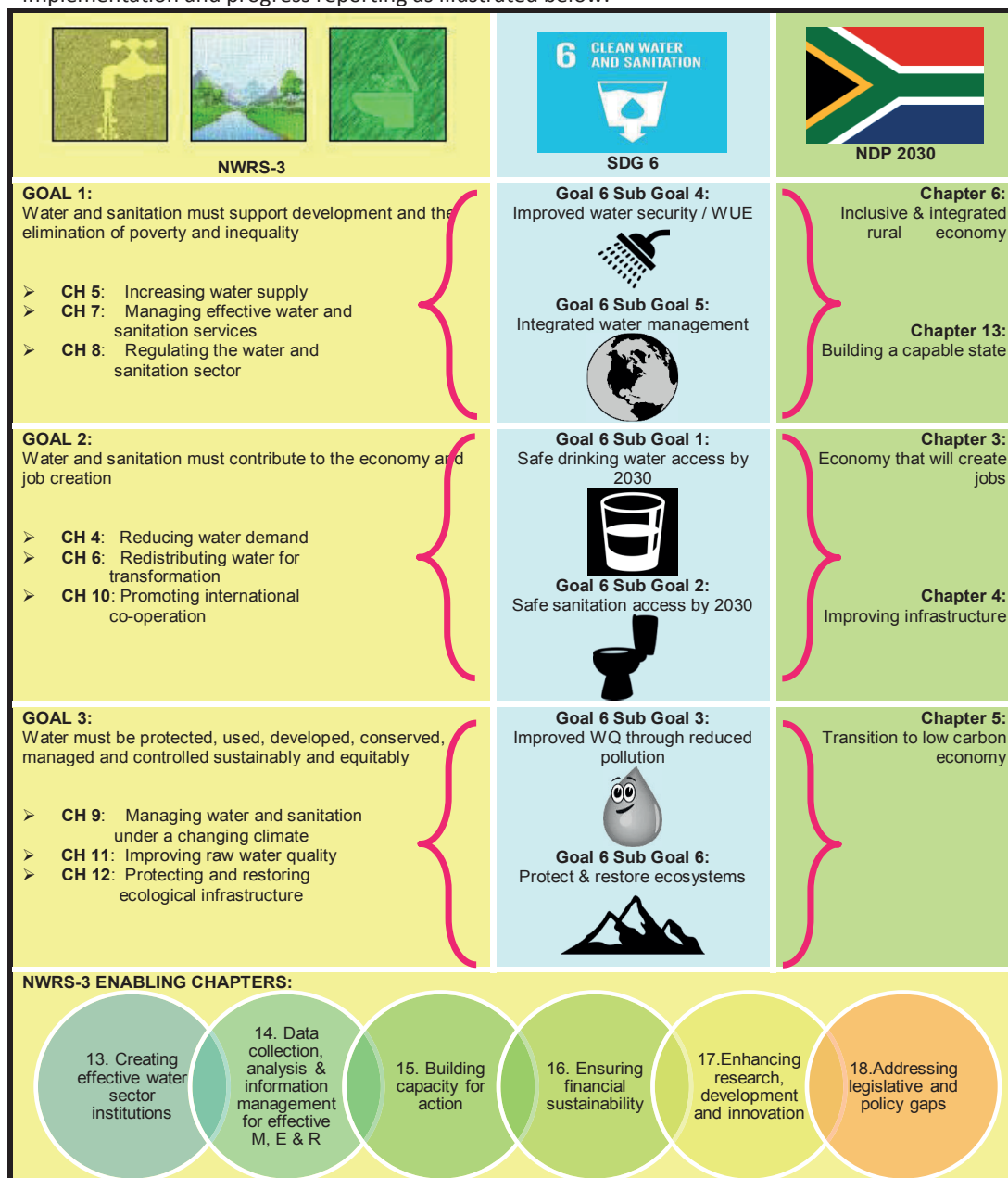


Figure 2: Relationship between NWRS-3, SDG 6 and NDP 2030

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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 dedicate 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 and its 6 Sub-Goals

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

South Africa was one of the early supporters 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.

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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 similar to 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.

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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.

The NWRS-3 provides a framework that ensures that water resources, water and sanitation services 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.

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 in the table below.

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Vision 2030 Theme	Targets and Actions for Vision 2030	Water and Sanitation Sector Programme and Alignment
Economy and employment	11 million jobs created by 2030	<ul style="list-style-type: none"> • 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
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	<ul style="list-style-type: none"> • Development, operation, maintenance and refurbishment of water resources infrastructure (which excludes 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 • 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	<ul style="list-style-type: none"> • Promotion of water conservation and water demand management programme in all sectors and put in place measures for water loss reduction in urban areas. WCWDM is a priority programme and actions have been developed to address targets set

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Vision 2030 Theme	Targets and Actions for Vision 2030	Water and Sanitation Sector Programme and Alignment
	Complete Lesotho Highlands Water Project Phase 2 by 2026	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Institutional establishment process already considering options for configuration of regional water utilities
Transition to a low carbon economy	Stimulate renewable energy and retrofit buildings	<ul style="list-style-type: none"> Department of Mineral Resources and Energy (DMRE), DWS and Eskom partnership established and task team already considering sites for hydropower stations
Inclusive rural economy	Substantial increase investment in irrigation infrastructure in Makatini Flats and Mzimvubu River Basin	<ul style="list-style-type: none"> Planning and assessment of Mzimvubu Dam options well advanced
	Active rural economies through improved infrastructure and service delivery	<ul style="list-style-type: none"> Water supply programme Accelerated Community Infrastructure Programme Water Allocation Reform Regional Bulk Infrastructure Grant
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	<ul style="list-style-type: none"> International relations and cooperation Trans-boundary treaties, agreements and institutional arrangements
Education and innovation	Improve the system of skills planning and shaping production of skills Develop a set of strong qualification and support for non-formal programmes	<ul style="list-style-type: none"> DWS Learning Academy Water Sector Skills Development strategy developed to improve skills planning and production of relevant skills for the sector
Social protection	Number of public works jobs should rise from the present level to 2 million by 2030	<ul style="list-style-type: none"> Align all infrastructure development programmes with public works jobs and labour-intensive methods Water conservation and water demand management fixing of leaks programme

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Vision 2030 Theme	Targets and Actions for Vision 2030	Water and Sanitation Sector Programme and Alignment
		<ul style="list-style-type: none"> • Operation and maintenance and wastewater treatment rehabilitation programmes • Water supply projects
Building a capable state	A formalised graduate recruiting scheme for the public service, skills strategies for managers, technical, professional and local government staff	<ul style="list-style-type: none"> • DWS Learning Academy • Mentorship programmes • 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	<ul style="list-style-type: none"> • Establishment of regional water utilities

Table 2: NDP Vision 2030 Themes, Targets, Actions and alignment with the W&S Sector

2.3. National Government Priority Outcomes

Delivering his third State of the Nation Address (SONA) in Parliament in June 2019, 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 announced the following seven priorities (2019 - 2024) in order to fast track South Africa's path to prosperity:

- Economic transformation and job creation;
- Education, skills and health;
- Consolidating the social wage through reliable and quality basic services;
- Spatial integration, human settlements and local government;
- Social cohesion and safe communities;
- A capable, ethical and developmental state and
- A better Africa and World.

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 25 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.

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Some of the goals — aimed at tackling poverty, inequality and unemployment, the pillars of the National Development Plan — will mean that:

- No person in South Africa should go hungry.
- The economy should grow at a much faster rate than the population.
- Two million more young people should be in employment.
- Schools should have better educational outcomes and every 10-year-old should be able to read for meaning.
- Violent crime should be halved.

In order to meet desirable growth targets, 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. Government will also pursue key interventions, including a plan to expand the agriculture and agro-processing sector, by supporting key value chains and products, developing new markets and reducing reliance on agricultural imports.

The NWRS-3 sets the strategic direction for water and sanitation resource management and services provision in the country over the next five years, subject to continuous review, as required, with a focus on priorities and objectives for 2021 - 2026.

The NWRS-3 seeks to develop an appropriate balance between supply and demand-driven approaches, considering the specific constraints pertaining to the resources.

The NWRS-3 also recognizes that all people in South Africa will have full access to affordable and reliable water and sanitation is envisaged before 2030. Most sectors and the national and sector strategies now acknowledge the importance of water and sanitation that social justice and development cannot happen without water and sanitation planning and development or corresponding budget allocations.

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3. CONTEXT

3.1. Constitutional, Legislative and Policy Mandates

The Vision and the Mission of the 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 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 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.

The NWRS-3 has been compiled at a time when water and sanitation legislation in South Africa is being re-aligned, revised and combined into a single coherent piece of water and sanitation legislation that addresses the entire water and sanitation value chain. This necessitates a phased establishment of the strategy in terms of section 5 (4) of the National Water Act (Act 36 of 1998).

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 amalgamation of the National Water Act (Act 36 of 1998) and the Water Services Act (Act 108 of 1997) needs to address the situation where more water is currently allocated for supply purposes by municipalities than is feasible from an ecological perspective, and also address the disconnect between Resource Management and Supply and Housing and Sanitation.

Prior to the consolidation of these Acts the DWS and the sector draw their primary mandate from the following legislative framework:

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

- 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.
- 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.
- To establish suitable institutions in order to achieve its purpose.

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

- 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.
- To prescribe compulsory national water and sanitation sector standards and tariffs.

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

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

Over and above the Constitutional and legislative mandates, the DWS need 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 NWA is a Specific Environmental Management Act (SEMA) and where sections of NEMA apply to DWS compliance, monitoring and enforcement work.

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. 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.

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Principle 3: 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 constantly measure the extent to which citizens are satisfied with the service or products they receive from the department.

Principle 4: Responding to people's needs; citizens are encouraged to participate in policy-making: 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 5: 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.

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3.3. Water for Sustainable Growth and 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 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.

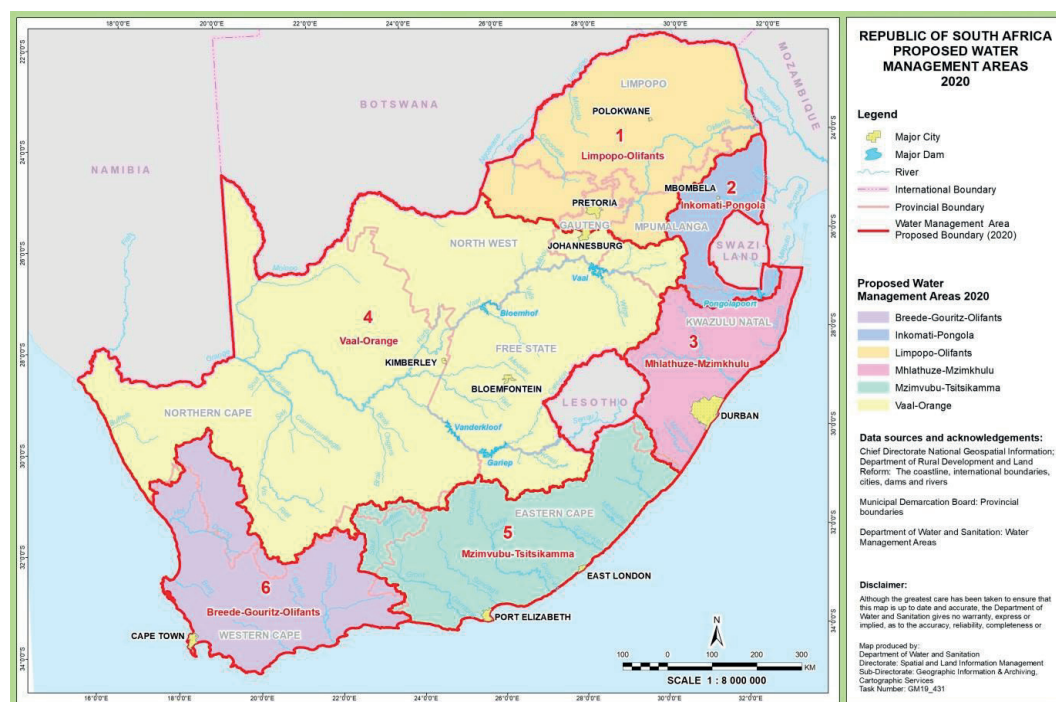
South Africa is still heavily reliant on surface water and where additional water is still available, such as in the uThukela, Mzimvubu and Pongola basins, it is located in areas far from the existing centres of demand. It is thus important for South Africa to focus its water resource planning to improve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

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

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



- | | |
|-------------------------|----------------------------|
| 1. Limpopo-Olifants | 2. Inkomati-Pongola |
| 3. Mhlathuze-Mzimkhulu | 4. Vaal-Orange |
| 5. Mzimvubu-Tsitsikamma | 6. Breede-Gouritz-Olifants |

Figure 4: Proposed Water Management Areas within South Africa

The Constitution of the Republic of South Africa provides that everyone has the right 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.

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 infrastructure, and available capacity.

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The distribution of water use by sector in South Africa is shown in the diagram below:

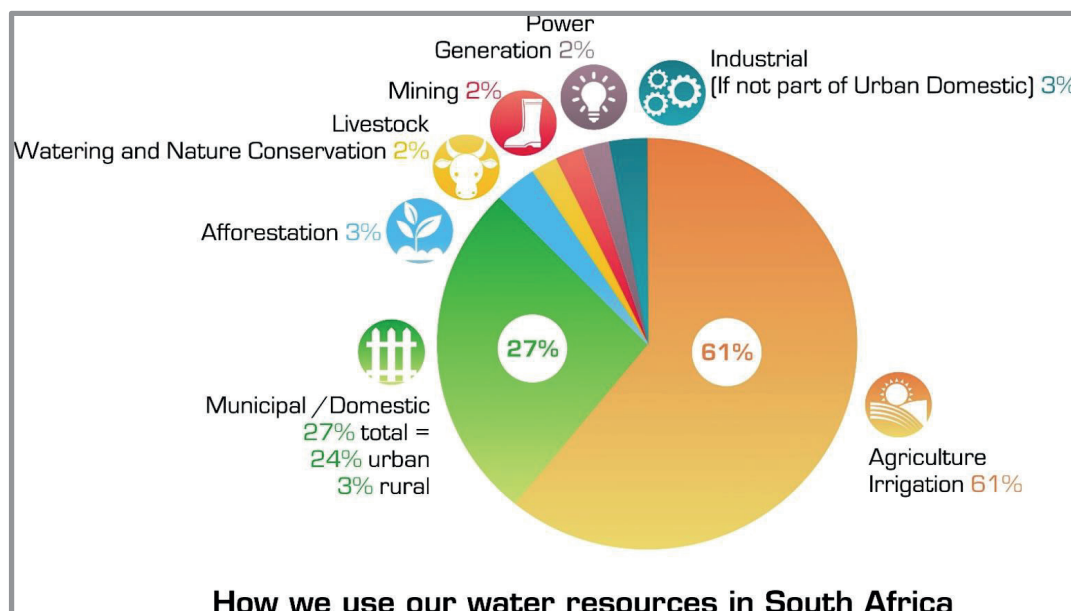


Figure 5: Water Use by Sector in SA

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 the 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 Catchment Management Agencies (CMA) that will manage Water Management Areas (WMAs).

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

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- 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 m³ per year through nonrevenue water - at a unit cost of R6/m³ 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.

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

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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 and 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 and sanitation sector

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

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Managing water and 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 raw 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 and restoring ecological infrastructure

To ensure that South Africa's aquatic ecosystems are protected effectively at different and appropriate levels, and that decisions concerning levels of protection take transparent and just account of environmental, social and economic well-being.

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.

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Date collection, analysis and information management for effective monitoring, evaluating and 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 research, development and 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 and policy gaps

To address emerging legislative and policy issues through the proposed revision of the National Water Act (36 of 1998) and Water Services Act (108 of 1997) to be combined into a single coherent piece of water and sanitation legislation addressing the entire water and sanitation value chain.

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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:

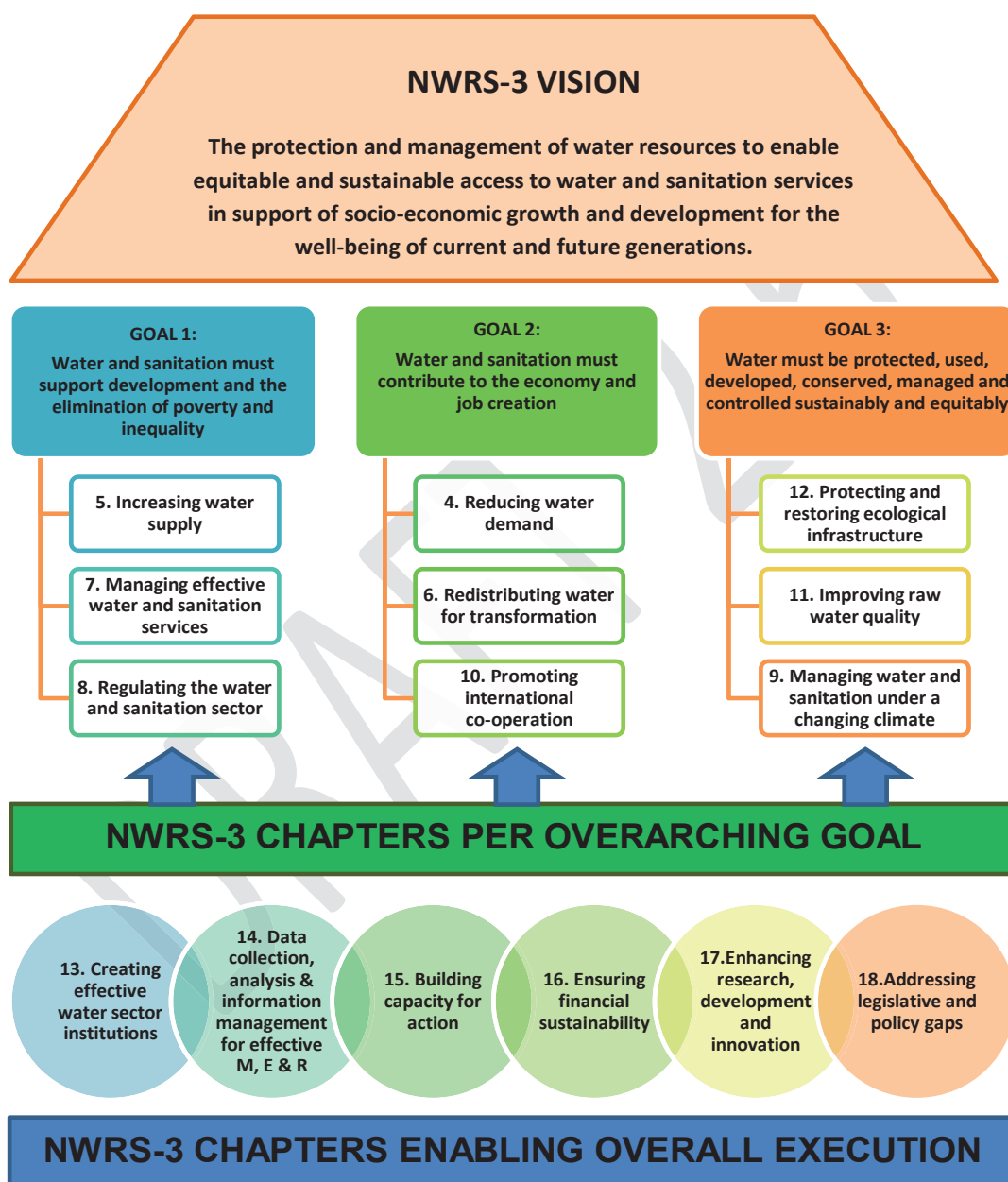


Figure 6: Overview of the NWRS-3 Vision, Goals and Chapters

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4. REDUCING WATER DEMAND

4.1. Context and 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 rainfall for the country of about 450 mm per year (mm/a), well below the world average of about 860 mm/a, while evaporation is comparatively high. As a result, South Africa's water resources are, in global terms, scarce and extremely limited (NWRS-1, 2004).

In addition, South Africa's water resource is highly developed especially surface water systems through a myriad of large dams built all over the country. These limit further opportunities to augment future supply through the building of additional dams. It is moreover compounded by the fact that best sites for building dams have already been used up and future sites will come at a high social, economic and environmental cost.

Water conservation is the minimization 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 in order 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.

Goal 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 demand reductions on this scale will require active programmes to reduce water leakage in distribution networks, and to increase the efficiency of water use by domestic and commercial water users and use of incentives and disincentives should be considered in achieving water reduction targets to all users. The Plan furthermore requires targets to be in place for the 2022 horizon.

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It further states that agriculture uses the largest volume of water (albeit at far lower levels of reliability than urban and industrial uses). As a result, the farming sector will have to increase the efficiency of its water use to expand production and allow transfers to other users in water scarce areas, as well as for expansion in irrigated agriculture. The commission proposes a dedicated national programme to provide support to local and sectoral efforts to reduce 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.

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). 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.

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.'*

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 Water Conservation and Water Demand Management (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, and a lack of enforcement skills also in streams to manage ecological supplies/flows.

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- No real time monitoring and management of water conveyance system which causes high water losses and return flows.
- Canal infrastructure is old and deteriorating leading to high water losses and wastages, and there is a lack of adequate operation and maintenance with a lot more focus needed on maintenance aspects.
- Water losses and wastages are high on the farm and no monitoring of soil moisture content, scheduling of irrigation and optimum operation of irrigation systems.

Forestry

- While forestry in South Africa is critical for timber and fibre production, income generation and job provision, it comes at an environmental cost, notably an impact on water resources.
- The ongoing spread of invasive alien plant species also reduces water availability in the country.

Water and Sanitation Services Institutions and Local Government

- Lack of adequate funding.
- Lack of skilled personnel and capacity.
- Non-institutional prioritization of WC/WDM.
- Lack of adequate planning.
- 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.
- No implementation of WC/WDM Plans.

Industry, Mining, and Power Generation

- Not adequate implementation of meaningful WC/WDM initiatives by the sector.
- No agreed key performance standard for the industries.
- No reporting and monitoring system in place.
- Weak WC/WDM enforcement tools.
- Need to strengthen existing partnership with various sector partners.

Social Awareness and 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.

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- 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

There are various principles guiding the development and implementation of WC/WDM and some are provided below:

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.
- Water Conservation /Water Demand Management should be considered as part of the planning processes for water resources, water supply (to Agriculture, Domestic, Industry, Mines and Power) and water and sanitation services. The implementation of WC/WDM measures could provide a more cost-effective or appropriate solution to the reconciliation of the growing water demand on existing water resources or infrastructure. Where water is used inefficiently, WC/WDM could postpone the need for capital infrastructure such as dams and bulk treatment works. The resources, scope of work and prioritisation of WC/WDM activities should be determined through an integrated planning process.

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.

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4.3. Baseline and Status Quo

Agriculture Sector

The irrigation sector is by far the largest water user in South Africa. Any percentage reduction in water use in this sector will therefore have a significant effect on the total water requirements. Efficiencies can be targeted both in terms of distribution networks (leaking pipelines and canals) and application (choice of crops and technologies employed).

The Department, through the Strategic Water Partnership Network (SWPN) has implemented the Water Administration System (WAS) Release Module at a number of irrigation schemes i.e. Hartbeespoort IB, Sand-Vet WUA, Orange-Riet WUA, Vaalharts WUA, Impala WUA, LORWUA and Loskop IB. With the WAS Release Module it is possible to release the correct amount of water from a dam (source) according to applications (demand).

If more water is released than requested out of our dams, the water will be wasted. 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%. It was determined that the seepage and evaporation loss in concrete canals, which is unavoidable, is about 12% of the total loss.

Most of the country's water supply systems and dams are controlled by Water Control Officers. Their task is to distribute water to DWS clients and to improve water use efficiency in the Agricultural Sector. WCOs need to be better equipped to improve and ensure timeous delivery of irrigation water to water users at a certain flow rate with the minimum water loss. They are capacitated through Water Measurement, Water Distribution and Dam Control courses and should be located within CMAs in future and not in NWRI since they manage water and not infrastructure.

Water and sanitation services Institutions and 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 following map represents the eight large water supply system areas with water use efficiency targets for 2017 and 2022 and water savings performance for the year 2016 for each system:

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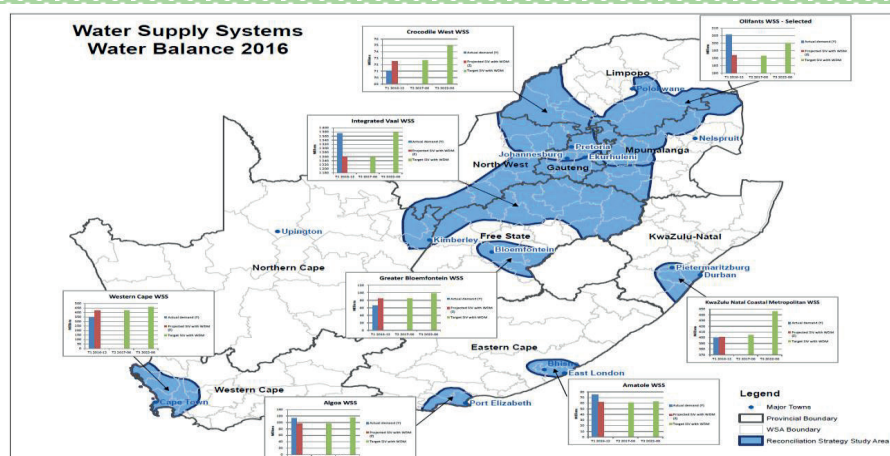


Figure 7: Water Supply Systems and Water Balance in SA (2016)

The Department of Water and Sanitation monitor and analyse the progress made with the implementation of WC/WDM and targets set during the development of Reconciliation strategies, at municipal level, within the eight large water supply systems (WSS). The eight large water supply systems include, the Integrated Vaal River WSS, Crocodile West River WSS, Kwa-Zulu Natal Coastal Metropolitan WSS, Western Cape WSS, Algoa WSS, Amatole WSS, Greater Bloemfontein WSS and Olifants River WSS.

The results for the target versus actual savings achieved for the 8 large water supply systems are summarised in the table below, which indicate a total of 8.6% achieved savings by December 2016 compared with a target of 11.3%. Savings of 3.6% have been achieved between June 2016 and December 2016 which is encouraging as water restrictions were imposed in most of the water supply systems. The Western Cape WSS, Kwa-Zulu Natal Coastal Metropolitan WSS and Greater Bloemfontein WSS have reached their targets while the remaining five WSS are generally following the high population without WC/WDM demand projections (DWS, 2017).

System	Projected SIV without WDM kl/annum	Projected SIV with WDM kl/annum	Projected % savings	Actual demand kl/annum	Actual % savings	Situational Analysis
IVRS (Integrated Vaal River System)	1 414 954 845	1 259 521 968	11.0 %	1 374 064 291	2.9%	The 2.9 % reduction in demand is positive considering that this municipalities have exceeded the high population with no WDWDM demand projections
CWRWSS (Crocodile West Water Supply System)	81 896 986	72 505 548	11.5%	75 149 020	8.2%	Results indicate that progress has been made, although municipalities are following the high population without

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System	Projected SIV without WDM kl/annum	Projected SIV with WDM kl/annum	Projected % savings	Actual demand kl/annum	Actual % savings	Situational Analysis
KZNCMWSS (Kwa Zulu Natal Coastal Municipality Water Supply Systems)	440 429 750	400 929 750	9.0%	399 750 304	9.2%	WC/WDM demand projections Municipalities have been able to reduce their demand and achieved their target
WCWSS (Western Cape Water Supply System)	481 866 055	420 515 925	12.7%	363 416 316	24.6%	Municipalities achieved savings of 24.6% against their 12.7% target.
AWSS (Algoa Water Supply System)	131 372 286	95 678 395	27.2%	113 623 290	13.5%	Municipalities have been following the high population growth without WC/WDM demand projections and achieved 13.5% savings compared with 27.2% target
AmWSS (Amatole Water Supply System)	66 893 713	61 493 713	8.1%	74 797 137	-11.8%	Municipalities have been following the high population growth without WC/WDM demand projections with no savings achieved
GBWSS (Greater Bloemfontein Water Supply System)	94 743 067	84 663 067	10.6%	65 780 175	30.6%	The status could only be made based on data from Mangaung Metro, which achieved a 30.6% savings compared with 10.8%, mainly due to 20% restrictions
ORWSS (Olifants River Water Supply System)	204 882 982	191 858 953	5.7%	199 681 021	1.1%	Results show that progress has been made with reduction in demand although with very low confidence level
Total	2 917 039 684	2 587 167 319	11.3%	2 666 261 554	8.6%	
Capital investment required to implement the programme					R 10 Billion/ 10 years	

Table 3: Situational Analysis in the 8 Large Water Systems in SA (2016)

The national International Water Association (IWA) water balance for water losses and non-revenue water indicates that both items are growing at a higher rate in spite of WC/WDM work and projects been implemented. In the year 2012, it was recorded as 38% (WRC Report TT 522/12) but it has since grown to 41% in 2016 (DWS, 2017a). This means stakeholders have to intensify implementation of WC/WDM measures to ensure growth of both variables is contained and targets as set out in the reconciliation strategies are achieved.

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In the table below, the National IWA water balance reflects the current state of water losses and non-revenue water as part of work done in the year 2015/16 in Mm3/a (DWS, 2017a):

System Input Volume = 4046,463	Authorised consumption = 2594,135 64.1 %	Billed authorised = 2386,875	Billed metered = 1974,574	Revenue water = 2386,875 59.0%
			Billed unmetered = 412,301	
		Unbilled authorised = 207,260	Unbilled - unmetered = 153,987	
	Water losses = 1452,329 35.9%	Apparent losses = 302,249	Apparent losses = 302,249	Non-revenue water = 1659,589 41.0%
		Real Losses = 1150,079	Real Losses = 1150,079	

Table 4: The National IWA Water Balance in SA (2017)

The Department, as the custodian of all the water resources, concerned about the risk regarding the country's water security and the knowledge that large volumes of water (and revenue) are lost at municipal level, sought ways to collaborate and work in partnership with stakeholders to 'close the water gap by 2030'. The Department and the Water Resource Group launched a partnership with private partners at the World Economic Forum in 2011; this partnership is 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 (No Drop Strategy, 2015).

First Order No Drop Assessment Results

The results are based on the findings of a No Drop assessment which formed part (3%) of the 2014 Blue Water and sanitation services Audit as Criteria 6. The No Drop component focused on 3 KPAs namely: 1) water balance (30%); 2) strategy, planning and implementation (30%), and 3) performance and compliance (40%). All the 152 WSAs (949 water supply systems) participated in the No Drop assessment. In total:

- 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

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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 the figure below:

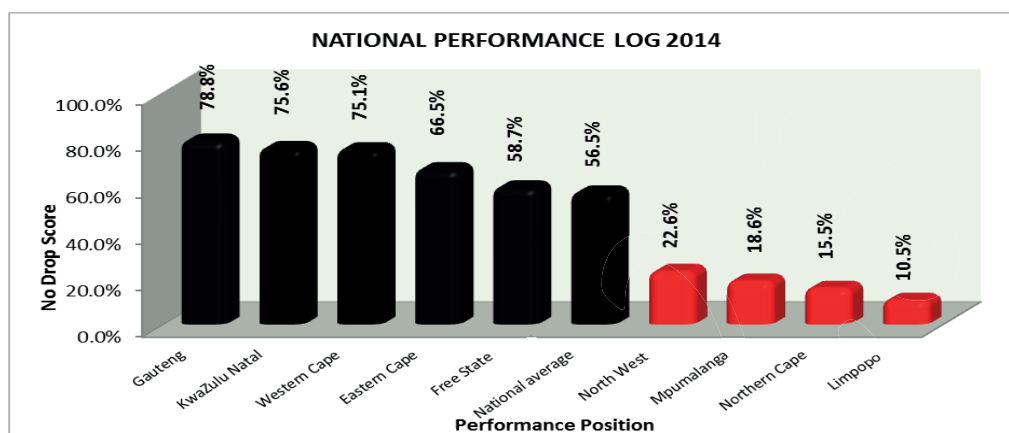


Figure 8: The National No Drop Performance per Province (2014)

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 improvement in the quality of planning and the intensity and acceleration of implementing the No Drop Programme going forward. The following figure shows the submissions made for No Drop assessment as pertaining to WCWDM planning:

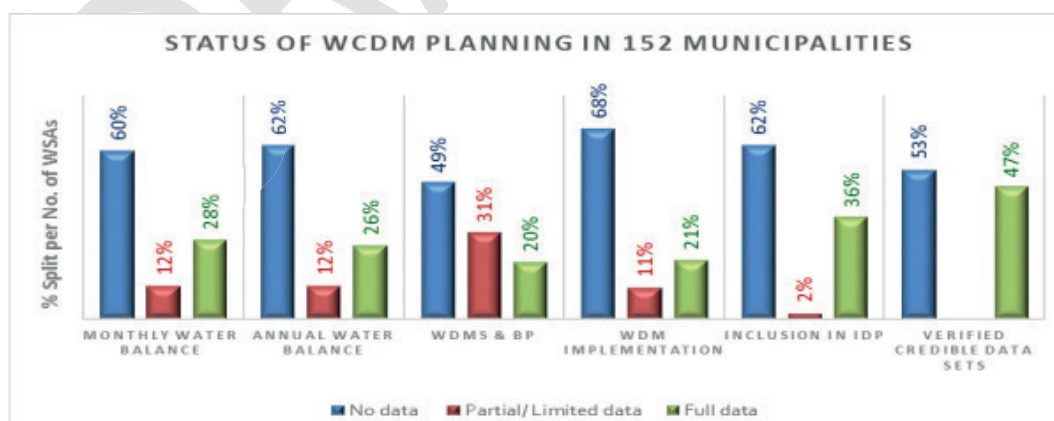


Figure 9: The Status of WC/WDM Planning in 152 Municipalities in SA (2014)

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Industries, Mining and Power Generation Sector (IMP)

Manufacturing Industries

The manufacturing sector contributes 15.5% to the GDP and 13.3% to jobs in 2009 (GCIS, 2011). The NGP has set a target of 350 000 new jobs for this sector by 2020. Water is an input in the manufacturing processes and it also used for cooling. The food and beverage sectors are highly dependent on water for the production of their products; however, the precise contribution of the food and beverage industries to the South Africa economy has still to be reckoned. Manufacturing Sector is the pillar sector required to drive economic growth and social development of the country. Thus the sector is rightfully earmarked for future growth in the water demand and need for WC/WDM in the sector cannot be over emphasized.

Mining Sector

According to the Minerals Council of South Africa, the mining sector contributed 8.8% directly and 10% indirectly to the GDP of SA in 2009 (GCIS, 2011). It creates about 1 million direct and indirect jobs. The sector accounts for approximately one third of the market capitalization of JSE and it is also the major attractor for foreign investments. The NDP has set a potential employment target of 140 000 new jobs by 2020 for the mining sector (DED, 2010). Mining and related activities require significant quantities of water whilst also impacting on the environment with associated potential pollution. The development of new mines in water scarce areas requires forward planning to make arrangements for the transfer of water and development of new sources. The water allocation to mining industry currently represents about 2.5 % of total water allocation in South Africa.

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.

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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.

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 (GN 704).

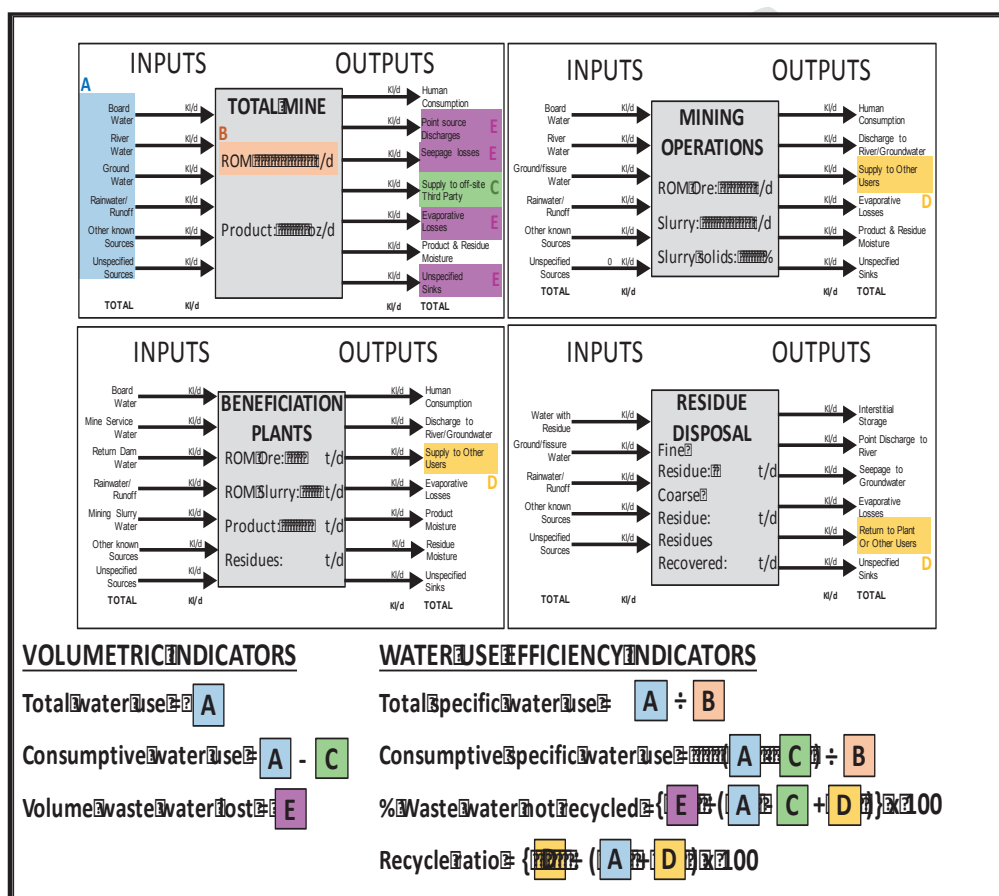


Figure 10: Water Use Indicators for the Mining Sector

The DWS has developed a methodology to guide the implementation of WC/WDM within the mining sector.

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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 below:

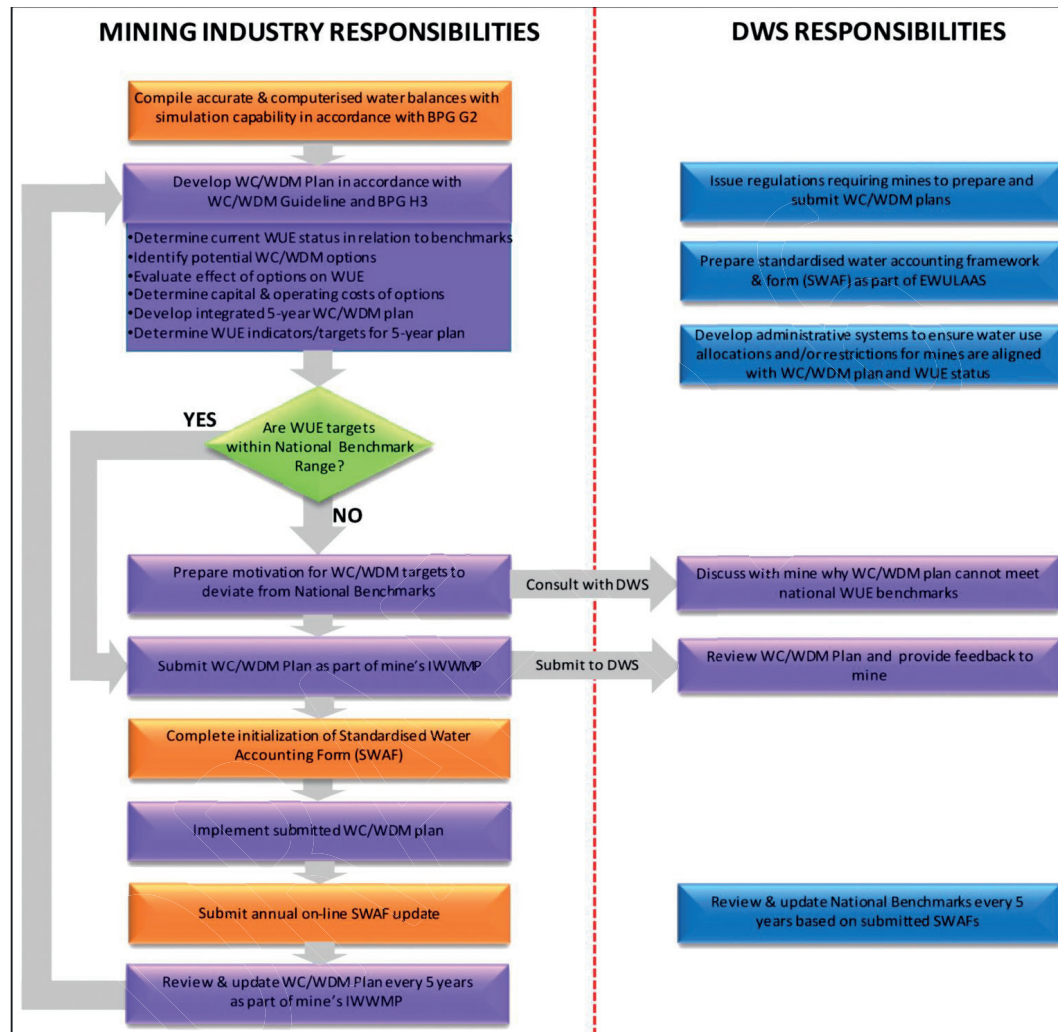


Figure 11: Mining Industry Responsibilities VS DWS Responsibilities

Power Generation Sector

The energy sector although only using 2% of water, contributes about 15% to the GDP of South Africa and creates jobs for 250,000 (GCIS, 2011). It generates about 95% of the electricity in South Africa and also exports it to countries in Africa. 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

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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”.

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. Within the context of the current Integrated Resources Plan, South Africa’s energy mix is bound to change in order 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.

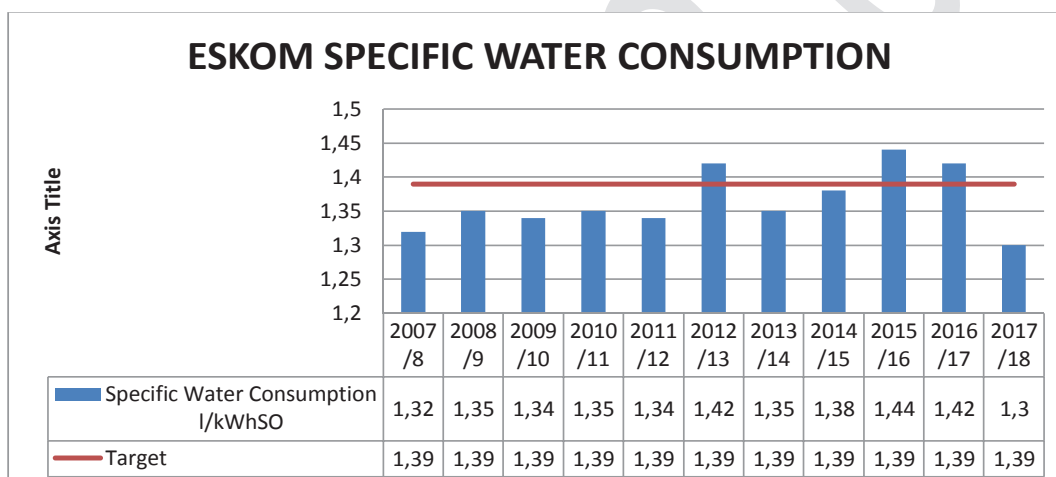


Figure 12: Eskom Specific Consumption against Target (2007/08 to 2017/18)

WC/WDM Social Awareness and 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.

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The WC/WDM education and awareness campaigns that the department has implemented are as follows:

“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.

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Education and 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 and 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.

In order to achieve the above strategic objective the following strategic actions must be undertaken:

- Obtain and monitor WC/WDM plans from all water management and water and sanitation services institutions.
- 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.
- Drive the reduction of physical leakage as part of the WC/WDM programmes through improved regulation and compliance.
- Encourage water management and services institutions to use the latest technologies in water release and distribution systems.
- Encourage all WSAs to submit monthly water balances so as to assist in monitoring the state of non-revenue water.

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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.

In order 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.
- To ensure that water waste preventative maintenance programmes are put in place for users and consumers.
- Ensure that the concepts of environmental awareness and protection are promoted and accepted by all stakeholders.
- Encourage water users and WSAs to participate in the planning of water resources within 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.

In order to achieve the above strategic objective the following strategic actions must be undertaken:

- Reduce Non Revenue Water (NRW) and water losses in all municipalities.
- Set cap on municipal water use with reducing targets over time.
- Reduce the water demands and water losses at all major irrigation and agricultural schemes by 2030, without affecting production.
- Reduce water demand and increase water efficiencies of industrial users.
- Ensure adequate information to support implementation of WC/WDM measures and decision-making.
- Ensure the implementation of WC/WDM best practices in new developments.
- To 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.
- Obtain sector reports on the achievement of set targets and monitor progress against meeting these targets.
- Adopt integrated planning principles.
- Ensure that sufficient WC/WDM measures have been implemented before new infrastructure development is considered.

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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.

In order to achieve the above strategic objective the following strategic actions must be undertaken:

- Align the water use license authorisation process with WC/WDM priorities.
- Ensure that water allocations promote equitable and optimal utilisation of water.
- Enforce compliance with the conditions of authorization of water use license.

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.

In order 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.
- 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 to facilitate the implementation of WC/WDM.

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5. INCREASING WATER SUPPLY

5.1. Context and Current Challenges

South Africa has four internationally-shared river basins that contribute 45% of the country's total river flow. These resources must be shared equitably with 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, 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, and high levels of water pollution 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.

Without demand management, currently planned infrastructure development and the broadening of the water mix will not be sufficient to balance supply and demand. However, 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 20 year planning horizon.

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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, water 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.
- 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.
- Infrastructure must be properly operated and maintained.
- Planning for water resource development and water supply, including design, construction, operation, maintenance and management of water infrastructure, must take full account of the possible consequences of climate change.
- Opportunities for developing the hydro-electric potential of the country must be promoted wherever viable.

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5.3. Baseline and Status Quo

South Africa has a dry climate, with an average annual rainfall of roughly half the world average and therefore producing less than the world average total annual runoff. Groundwater potential does exist and is currently underutilised.

Agriculture is the largest water use in South Africa, followed by municipal use (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 use.

Agricultural consumption is largely unmetered, and there are concerns about unauthorised abstraction and water wastage in the sector. 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%. 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 of SA but over used in the Northern Cape. 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 (both sea and wastewater) may soon be cheaper than new surface water developments. While the utilisation of desalinated sea water is only financially feasible for coastal areas, it may free up surface and ground water for upstream and/or inland use where water is currently transferred or released for use in coastal areas. 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.

5.4. Strategic Objectives and Strategic Actions

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

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5.4.1. Strategic Objective 1

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

In order to achieve the above strategic objective the following strategic actions must be undertaken:

- Update the National Water Balance.
- 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.
- 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 and protection.
- Saline water sources need to be explored and the treatment process revisited to ensure a good water quality is achieved; and that the production of brine (which is declared as hazardous waste by NEMWA) does not cost more than the production and treatment of potable water.
- Promote other water source uses such as wastewater reuse, desalination, storm water harvesting and acid mine drainage and other options for secondary use (i.e. not for potable use).
- Support the evaluation of sites identified by the DMRE as possible hydroelectricity generation sites where economically viable.
- Improve the effectiveness of water resource planning by continuously updating the scenario projection tools to take into consideration climate change and water quality changes.
- Develop, update and maintain reconciliation planning studies to achieve optimal water mix (surface water, groundwater, re-use and desalination, and incorporate climate change into studies).
- Undertake detailed feasibility study (including EIA) of high priority interventions (identified in Reconciliation Strategies) and develop bankable projects, with business case of required infrastructure, financing, institutional arrangements for ownership and operations as implementation mandate.
- Undertake RQOs and Water Resources Catchment studies and ensure implementation of these plans and hydrological monitoring in order to improve the resiliency and sustainability of the available sources on account of future climate change.
- Develop a National Drought Preparedness Management Plan.
- Develop a guideline for the protection, recharge, use and monitoring of groundwater.
- 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).

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- Increase groundwater use (including artificial recharge through the identification of groundwater stressed catchments for the removal of alien vegetation), re-use and saving of water (i.e. low flush toilets in reticulated settlements).
- Identify groundwater's crucial role in drought preparedness and emergency response as part of drought risk management.

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 funding requirements for the water sector over a 10 to 20 year horizon.
- Develop an appropriate funding model.
- Develop a funding model for multi-purpose social and economic related investments where goes to the rehabilitation of ecosystems and the investment in green infrastructure and that the pricing strategy of DWS makes provision for these types of costs.
- Undertake socio-economic studies.
- 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.
- Consider implementing an asset replacement and upgrading strategy (e.g. the pump transfer system along the Usutu-Vaal scheme is old and inefficient).

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:

- Develop and implement all operating rules and / or management plans.
- Monitor the success and effectiveness of the operating rules.
- Produce a National Treasury approved Water and Sanitation Master Plan for maintenance, rehabilitation and refurbishment of infrastructure.
- Produce an approved refurbishment implementation plan for all irrigation and transfer canals, dams, and water and sanitation infrastructure.

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- Support all water and sanitation institutions to develop and implement asset management and maintenance plans for all assets and systems under their operation.
- Develop strategic water resource infrastructure.
- Refurbish existing gauging stations and implement new gauging stations where necessary.

5.4.4. Strategic Objective 4

To use water resources infrastructure, particularly major storage dams, to promote multi-purpose stakeholder use.

In order 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.
- Promote hydroelectric power development, aquaculture and recreation where feasible at dams and canals.
- Ensure all infrastructure investment projects have mandatory job creation components.
- Ensure all infrastructure investment projects meet specific return on investment criteria to adequately demonstrate equitable social and economic development.
- Ensure communities situated near large storage dams are prioritised and receive access to basic water supply.

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6. REDISTRIBUTING WATER FOR TRANSFORMATION

6.1. Context and Current Challenges

The perpetuation of inequitable water allocation is still an issue that needs to be addressed. At the present moment the proposed Water and Sanitation Act is under development 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.
- 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.
- 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) in order to reduce 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 or to access to basic water and sanitation services. 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.

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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 DWS dedicated to redressing inequity (race and gender) and poverty eradication. Historically some WULAs were motivated on the basis of 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 on a scorecard basis may be used to facilitate WAR and these should also be regularly audited to ensure that they are of real benefit to HDIs.
- To facilitate the achievement of sustainable reform targets through viable sector economic activities, financial support in the form of subsidies, grants, funding of infrastructure, voluntary donations and technical inputs (including all forms of extension services) will be made available to the beneficiaries of WAR.
- Business initiatives and local and regional economic development programmes will be used to attract targeted beneficiaries of 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 reallocated according to specific imperatives, needs and requirements is one of the mechanisms of WAR. The reasons for introducing compulsory licensing may be any or all of the following:
 - Achieve a fair allocation of water from a water resource.
 - Promote beneficial use of water in the public interest.
 - Facilitate efficient management of the water resource.
 - Protect water resource quality.

6.2. Guiding Principles

The principles that guide the equitable allocation and provisioning of water resources and water and sanitation services 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.

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- 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 electricity generation, are prioritized.
- Water for domestic or "primary" consumption always receives priority.
- Equitable regional allocation of development resources. The limited national resources available to support the provision of basic services should be equitably distributed among regions, taking account of population and level of development.
- It is recognized that both water and sanitation has social, economic and ecological value.
- Ensuring universal access to basic sanitation is recognised as a Constitutional responsibility of the national sphere of government, with Constitution responsibility of provision of basic sanitation services at the local sphere of government.

Collectively these guiding principles will inform the strategic objectives to be achieved towards the implementation reforms in water allocations, water use authorisations, providing access to water and sanitation services.

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 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 and Status Quo

Equitable access to water resources and water and sanitation services are 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.
- Most of the piped water distribution is to the previously advantaged groups.
- Most of the hygienic and water-borne sanitation is largely in the hands of previously advantaged groups.

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

- Water allocations have not yet become available from water conservation or the water demand management (WCWDM) process to be set aside for HDI users – mainly because the V&V process has not yet been completed or systematically implemented to yield results.
- There has been not water becoming available from the verification and validation process to be set aside for HDI users – mainly because the process is far from complete.
- There is a 12% backlog in the provision of basic water supply infrastructure and a 22% backlog in the provision of basic sanitation facilities (as at 2019).

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- Compulsory licensing, as one of the mechanisms of WAR, has only been completed in only three catchments as such not very much helping the WAR programme. 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 five clear priorities for allocating water in South Africa:

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 riparian 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 marginalized, 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.

6.4. Strategic Objectives and 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.

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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.

In order to achieve the above strategic objective the following strategic actions must be undertaken:

- Identify alternative sources of water and water that is not utilised (e.g. as mines are closing resulting from War on Leaks, etc.) for transformation.
- Identify where more water can be made available in government water schemes for transformation.
- Implement the Water Administration System on all government irrigation schemes for transformation.
- Implement a pilot project on voluntary contributions from farmers for water reallocation in prioritized catchments.
- Identify areas where small dams or groundwater development can provide water for small scale HDI farmers.
- Align water, land and agrarian reform programmes and link to the Irrigation Strategy.
- Monitor progress and impacts through Provincial quarterly reports.
- Complete water use validation and verification projects country-wide.
- Implement a subsidy system for HDIs to contribute to operating expenses of all government water schemes so as to ensure financial viability of these schemes and then phase out the subsidies with time once the HDIs become established.

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.

In order 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 and implement processes to allocate water (new/saved) to HDI applicants.
- Produce water allocation plan (plan describing the relevant principles and approaches to that will inform water allocation and authorisation processes) to clear way for compulsory licensing.
- Produce catchment assessment reports that clear way for compulsory licensing and give the status of water resources, water and sanitation services, water availability and local and regional plans and the implementation of Resource Quality Objectives.
- Implement and streamline the process of compulsory licensing as envisaged by the NWA.

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6.4.3. Strategic Objective 3

To be fair, reasonable and consistent in providing access to water use and basic water and sanitation services.

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

In order to achieve the above strategic objective the following strategic actions must be undertaken:

- Monitor progress and impacts through Provincial quarterly reports.
- Complete water use validation and verification projects country-wide.
- Accelerate the implementation of the National Water Policy Review (2013) to dismantle water trading as it impedes the implementation of Water Allocation Reform negatively.

6.4.4. Strategic Objective 4

To reduce the administrative burden of water use authorization.

Mechanisms that reduce the administrative burden of authorizing water use must be implemented.

In order to achieve the above strategic objective the following strategic actions must be undertaken:

- Use general authorisation to enable small scale water use by HDI farmers.
- Standardize auditable items and clauses in the water use authorization process so that non-applicable clauses can be deleted and only clauses added specific to the water use and water resource such as redress targets, abstraction limits etc. in order to streamline the process.
- Implement the water use authorisation process in order 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.
- Gazette general authorizations.

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.

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In order to achieve the above strategic objective the following strategic actions must be undertaken:

- Work with Land Bank, DFFE and DALRRD to integrate land, water and agrarian reform programmes.
- Establish the task teams for planning the joint implementation of integrated programmes.
- Develop collaboration, implementation and reporting protocols for the task teams.
- Develop and allow joint project implementation and reporting protocols.
- Sign Memoranda of Understanding to ensure commitment to the joint implementation mechanisms.
- Update the water authorisation and registration management system (WARMS).
- Keep the WARMS information up to date.

6.4.6. Strategic Objective 6

To achieve and adhere to the five (5) national priorities of WAR.

Water re-allocations need to adhere and achieve the national priorities. Where water is re-allocated from one sector or user to another, and where this re-allocation could impact on the quality of the water resource, licensing of the waste discharge or non-point source impacts of the recipient should be considered.

In order to achieve the above strategic objective the following strategic actions must be undertaken:

- Maintain regular updates and general communiqués on the implementation progress of WAR.
- Monitor progress and impacts through Provincial quarterly reports.
- Accelerate the implementation of the National Water Policy Review (2013) to dismantle water trading as it impedes the implementation of Water Allocation Reform negatively.

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7. MANAGING EFFECTIVE WATER AND SANITATION SERVICES

7.1. Context and Current Challenges

The fundamental function of water and sanitation services is to ensure the delivery of portable 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 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

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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 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 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

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sanitation services. It has not been established how these will be structured in the proposed Water and Sanitation Act. 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, taking into account 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 taking into account 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 with regard to impacts on water resources.

Principle 8: The user pays principle. Charging for water and sanitation services is essential in order to generate funds for operating, maintaining and investing in water systems. However, tariffs must

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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.

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.

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7.3. Baseline and Status Quo

South Africa is a water stressed country and facing a number of 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:

- South Africa has relatively well developed water and sanitation services infrastructure, but there are a number of challenges pertaining to the operation, maintenance and refurbishment of country's infrastructure, the escalating costs of operating, maintaining and reinstating this infrastructure.
- There are major challenges with appropriate faecal sludge management for on and off site sanitation systems which have the potential to pollute water resources.
- Drinking water quality standards in rural areas is problematic.
- Numerous budgets are allocated towards new infrastructure through various funding programmes, such as; Municipal Infrastructure Grants (MIG), Water Services Infrastructure Grant (WSIG), Regional Bulk Infrastructure Grant (RBIG), etc. but there are major challenges with these programmes, such as, fragmented management of the grants, emphasis on new infrastructure and less focus on water conservation and water demand management (WCWDM). WCWDM should be maintained as one of the top priorities and monetary assistance should be allocated from the fiscus for maintenance of existing infrastructure.
- The challenges are experienced with regard to the capabilities of Water Services Authorities to effectively manage the water and sanitation services systems on a sustainable basis. This issue needs to be dealt with decisively with the current mandates and policies or through some reviews of the mandates and policies in relation to the management of water and sanitation services infrastructure, and available capacity.
- There are challenges with cost effectiveness of some large investments in the water sector and the appropriateness of the technology used in water and sanitation services in some circumstances is of concern.
- Challenges such as not valuing water, poor accountability, non-payment for services, new-infrastructure syndrome, vandalism, theft, pollution, wastage and abuse also exist.

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- The government is committed to the National Development Plan (NDP) and the new global Sustainable Development Goals (SDG) target of 100% reliable, sustainable and safe water and sanitation services before 2030.
- There are challenges with accountability, coordination and leadership due to the complexity of the water and sanitation services sector and with water and sanitation services being extremely dispersed between role players.
- The South African population is increasing at an average of 1.58% on an annual basis while the number of households has been increasing at a faster rate than the population due to the in-migration of communities into urban areas that immediately increases the number of people unserved in the urban areas while the out-migration from the rural areas does not reduce the number of households.
- Although institutional arrangements, effective regulation, decentralisation and transformation are some of the key success factors for the water and sanitation services, these are not responsible for increasing backlog, failure of water and sanitation services and ineffective and inefficient operation and maintenance of water and sanitation services. The key issues are inability to collect revenue, non-sustainability of government institutions, unaccounted for water, water losses and irresponsible use of water. These issues need to be faced head-on.
- The conflicting roles of the DWS, such as; a policy maker, policy enforcer, policy regulator, policy subject (operator) is a major challenge in aspects such as accountability and objectivity.

7.4. Strategic Objectives and 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.

In order 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.

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- 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 and wastewater treatment performance turnaround plan.
- 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 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.

In order 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.

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- 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 O&M.
- 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.

In order 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 (taking into account 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 in order 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.

In order 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.

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7.4.5. Strategic Objective 5

To effectively regulate water supply and sanitation services.

In order to achieve the above strategic objective the following strategic actions must be undertaken:

- Develop 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

In order 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.

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8. REGULATING THE WATER AND SANITATION SECTOR

8.1. Context and Current Challenges

Regulation of the water and sanitation sector is a critical element of effective, equitable and sustainable water and sanitation 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 a number of 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 regulatory function in the water and sanitation sector will be more streamlined and consolidated in the proposed Water and Sanitation Act, when issued, in a way that will facilitate the whole scope of regulation.

The scope of water and sanitation regulation encompasses:

- **Water use authorisation:** to ensure the equitable and sustainable use of water in the public interest. At the present water use 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:** is encouraged in order to ensure that strategic water source areas are 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

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provision of potable water and a need for authoritative statutes to encourage potable water compliance within set standards.

- **Wastewater discharge and faecal sludge management regulation:** promotes that minimum standards 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 statutes 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 comply with their water use authorization conditions and 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.

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- **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.
- **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 over the whole value chain, covering water resources, water use, pricing (tariffs), water and sanitation services and discharge standards and draft unconventional oil and gas development regulations in terms of water supply, monitoring and effluent discharge requirements.

8.3. Baseline and 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 water abstraction, waste discharge, and dam safety, and setting the charges for the use of raw water.

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 may be summarised as follows:

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Water use authorisation

- The backlog of licence applications has largely been removed.
- Most raw water users are registered even though there are challenges in ensuring the accuracy of this data.
- 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.
- Unconventional oil and 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 oil and gas 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.
- Support Regulations aimed at the regulation of unconventional oil and gas development activities in relation to water resource protection have been drafted for publication.
- Unconventional oil and 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 oil and gas development.
- 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 or oil leakage is occurring or endangering the environment or shallow groundwater or surface water resources.

Water resource regulation

- Sustainable management of water resources through resource directed measures and source directed controls is needed.
- Protection and maintaining of freshwater ecosystems priority areas in good condition must be done.

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- Rehabilitation and protection of ecological infrastructure, including Strategic Water Source areas is important.
- The prevention of pollution of water resources from point and non-point source pollution by managing at source is required.
- 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 and sanitation services regulation

- Draft norms and standards for levels of Water and Sanitation Services have been Gazetted.
- 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 Regulatory Performance Management System monitors 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 a number of towns.
- Draft water policy and draft unconventional oil and 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.
- Water from unconventional oil gas development 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 carcinogenic materials being present in the water.

Classification of works

- Construction of large water infrastructure is regulated under DFFE requirements.
- 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 water treatment works must be strengthened.

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- Waste water treatment works regulation needs to be further enforced.

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, implemented, and is under review.
- The aggregate of revenues collected from the sale of raw water still does not cover the cost of supplying the water due to the fact that 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 have been implemented and are under review and improved systems for revenue collection are also needed.

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- 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 position on the establishment of an Independent Economic Water Regulator still needs to be reached including a business case to show how the independence of such a regulator will be ascertained.

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..
- High levels of illegal water use and pollution from various sources still exist due delays in the legal system and DWS CME officials often do not have the necessary skills and background knowledge of the various industries in order to exercise their functions with authority and need additional support from DWS legal services.
- 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 on the basis of 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.
- 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. Only after the Chief Inspector and the DWS have confirmed in writing that provisions have been complied with pertaining to health and safety and management of potential pollution to water resources may a mine closure certificate be issued and may the financial contribution be returned.
- 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 DWS.
- Acid mine drainage (AMD) is a major source of pollution.
- Unconventional oil and 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 oil and gas

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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.
- Unlawful wastewater discharge into streams, rivers and other watercourses still exists and creates a big water quality challenge, and due to capacity challenges within the Department some industries discharging illegally are not audited and therefore the challenge remains.
- 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.
- Unconventional oil and gas development activities namely (shale gas, UCG and coal bed methane) fall within the ambit of the declaration of controlled activities as per Government Notice 39299 of 16 October 2015 and since these activities pose a risk to water resources and the environment, be it surface, groundwater or land, these activities require extensive regulation and the Department is therefore in the process of publishing regulations to govern the implementation of these activities.

8.4. Strategic Objectives and 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.
- Prioritize 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.
- Define and implement measures to address the challenges in streamlining the process of water use licence approvals and prevent new licence backlogs from developing.

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- 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.
- Develop specific regulations for all sectors using and impacting groundwater.
- Follow up and ensure the implementation of action plans and corrective measures captured in Green, Blue and No Drop programme reports so as to address the impact on water resources.
- Revise and establish norms and standards.
- 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.
- Replace all Existing Lawful Use (ELU) with licences with enforceable water use conditions.
- Prohibit the use of potable water for unconventional oil and gas development activities in overused catchments so as to protect water supply and promote efficient use of water.
- Undertake social regulation.

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.

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- Publish supporting regulations aimed at regulation of unconventional oil and gas development activities in relation to water resource protection.

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.
- Support local government in developing and implementing bylaws aimed at promoting compliance and protection of water resources.
- Conduct a national campaign to identify and prosecute big polluters across the country, including municipalities, with the proviso that the DWS first exhausts all other remedies in terms of section 41 (3) of Chapter 3 of the Constitution of the RSA.
- Audit compliance of self-regulation of Institutional Water Sectors as per their water use authorisation conditions.
- Establish a mechanism for applying administrative penalties.
- Develop improved regulatory approaches to manage pollution from land-based and in-stream activities.
- Implement the compliance monitoring and enforcement strategy.
- 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.
- Ensure trans-boundary compliance monitoring and enforcement engagements with countries of common or shared water resources.
- Include the number of mining compliance notices and other sanctions imposed, including the proportion of successful interventions and/or criminal prosecutions undertaken against non-compliance include in DWS annual reports.
- 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 in water source areas alongside the use of a host of legal tools, including section 26(g) of the Regulations of the National Water Act, s 49 of the MPRDA, 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.

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- Compile regular reports on the current state of water use monitoring that include: (1) Mechanisms to conduct regular determination of the water reserve, including how the DWS accounts for anticipated migration and population growth, limitations or inadequacies in municipal-infrastructure as well as other potential impacts on the availability of water resources, such as drought; (2) An audit of all existing WULs to ensure they adequately protect the water reserve, including basic needs and ecological requirements; (3) Steps taken to monitor compliance with WULs and its impacts, particularly in mining areas; and (4) The impact mining has, and will have, on the water reserve and how this aligns with the National Strategic Plan for Water.

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 require the measurement of water abstracted from the resource for irrigation use and regular reporting on the quantity of water used.
- Provide guidance on economic regulation to the water and sanitation sector, and with respect to the proposed establishment of an Independent Economic Water Regulator to improve the effectiveness of water provision and appropriate water price setting aligned with regulation.
- Regulate water management and water and sanitation services institutions, to ensure dispute resolution and good corporate governance of these institutions.
- 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 oil and 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.

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- 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.

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9. MANAGING WATER AND SANITATION UNDER A CHANGING CLIMATE

9.1. Context and 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. Climate change is 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:

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- 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 Climate Change Response Strategy for The Water Sector in South Africa. This strategy provides guidance on adaptation to water-related impacts of climate change and to maximize 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 natural infrastructure (ecosystems) and physical infrastructure must be protected, maintained and enhanced.
- Riparian vegetation and buffer zones must be rehabilitated and restored (SDGs 6, 13 and 15).

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- Physical infrastructure is planned for a changing future using a no-regrets and low regrets approaches.

9.3. Baseline and 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 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:

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- 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).
- 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.

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- 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.

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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 and 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 in order to achieve this objective:

- Develop and review climate change 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 in order 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.

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 in order to achieve this objective:

- Conduct studies on risk and vulnerability assessments of the systems.
- Use appropriate tools to protect climate sensitive water sources.

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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 in order to achieve this objective:

- Establish a ring fenced budget for implementation of the climate change response strategy including capacity development and possible links with green infrastructure and the pricing strategy.
- 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 in order 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 to increase 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 recognizing 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 in order 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.

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10. PROMOTING INTERNATIONAL COOPERATION

10.1. Context and 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 organizations 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:

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- 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.

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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.

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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 2016 – 2020.
- AMCOW Work plan.
- Ramsar Convention (DWS/DFE/DALRRD management of wetlands of international importance).
- Sharm el Sheik Declaration of AMCOW.
- Ethekeini Declaration on sanitation of AMCOW.
- The International Sustainable Development Goals (SDGs), Agenda 2030.
- The 2030 Agenda for Sustainable Development, 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 and 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.

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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 Tripartite Permanent Technical Committee (TPTC).

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.

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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 below:



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

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

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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 Ethekeini 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 a number of 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.

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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 a number of 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 brain child 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 on October 2018.

10.4. Strategic Objectives and 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 in order to achieve this objective:

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- 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 in order 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 in order 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.

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10.4.4. Strategic Objective 4

To enhance technical and development cooperation regarding international resources.

The following strategic actions must be undertaken in order 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 in order 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.

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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 in order 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.

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11. IMPROVING RAW WATER QUALITY

11.1. Context and Current Challenges

The integrated 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 raw 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.

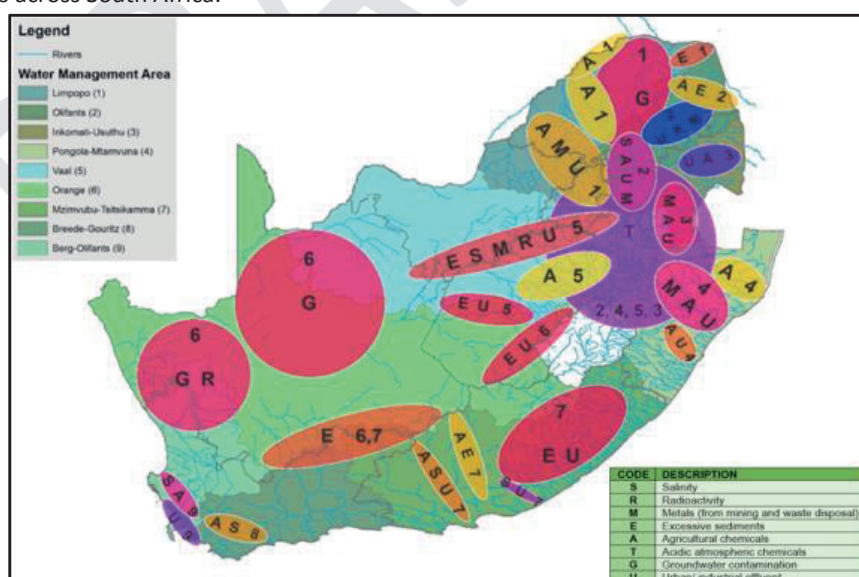


Figure 14: Water Quality Problems occurring across SA

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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 prioritized 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.

Water Quality Issue	Source of Pollution
Eutrophication	Agricultural sources, domestic wastewater, urban storm-water runoff and diffuse sources.
Salinization	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.

Table 5: Water Quality Issues and Sources of Pollution

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.

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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, the private sector and organised civil society.

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.

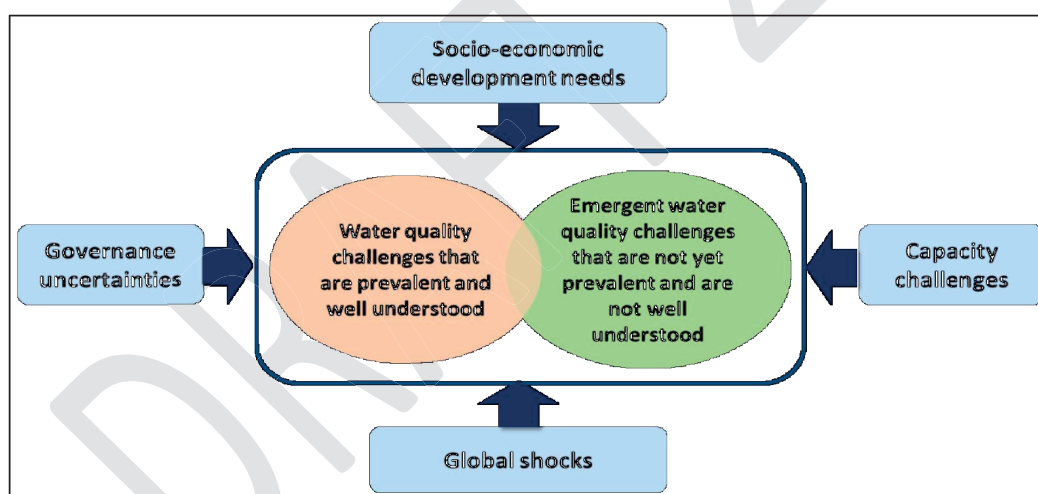


Figure 15: Water Quality Challenges in SA

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;

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- 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 timeous submission of mining rehabilitation plans;
- Lack of funding for implementation of mining rehabilitation plans;
- Non-performing municipalities;
- Mushrooming of informal dense human settlements; 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 green 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 oil and 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.

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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 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 and 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 and 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.

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- If the above options have been exhausted, then apply a precautionary approach using agreed minimum standards.
- Reuse and recycle, where possible, in order 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 and 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 costs of remedying pollution, degradation of resource quality and resulting adverse health effects, and of preventing, minimising or controlling pollutions is the responsibility of the polluter.

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.

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11.3. Baseline and 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 work days 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 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

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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).

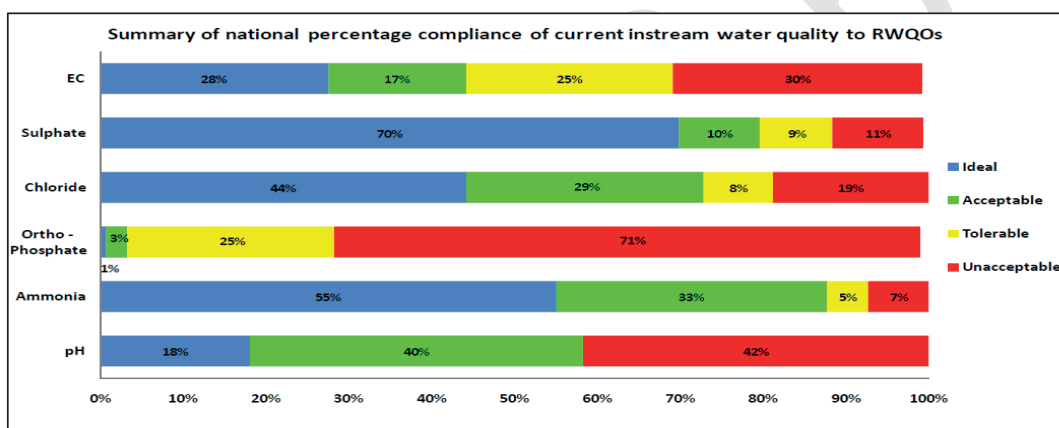


Figure 16: Percentage of Compliance of Instream Water Quality to RWQOs in SA (2011)

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.

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.

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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 is 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 oil and 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,

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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).

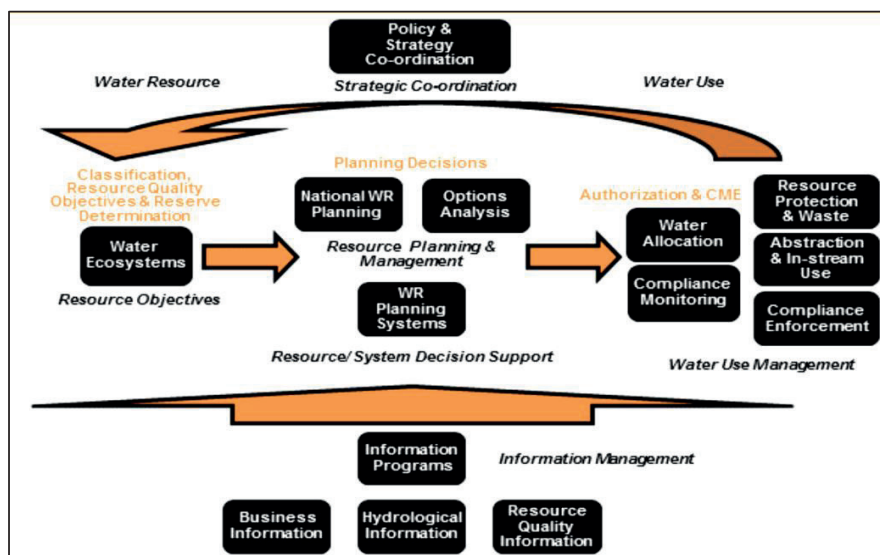


Figure 17: DWS Integrated Water Resource Planning Component

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 and 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.

In order to achieve the above strategic objective the following strategic actions must be undertaken:

- Ensure that policy development and refinement within DWS addresses IWQM.

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- Harmonise policies and strategies to support IWQM.
- Finalise and implement the non-point source pollution strategy.
- Develop, finalize 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 Oil and Gas Developments and others are covered during this alignment and ensure that waste and water regulations address the issue of brine produced through desalination being a hazardous waste and potential ground and surface water pollution caused by unconventional oil and gas development.

11.4.2. Strategic Objective 2

To undertake legislative reviews and amendments to effectively enable IWQM.

In order to achieve the above strategic objective the following strategic actions must be undertaken:

- Amend the NWA and WSA to provide effective support to IWQM (*i.e. ensure the proposed Water and Sanitation Act provides effective support to IWQM*).
- Develop guidelines and protocols on the effective use of IWQM instruments.
- Promulgate a Money Bill for the Waste Discharge Levy.
- Identify and amend relevant legislation to strengthen IWQM.

11.4.3. Strategic Objective 3

To improve IWQM related governance.

In order 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.
- Identify a strategic water quality management champion either at DWS National or Regional offices or in the CMAs that will drive and monitor the implementation of the IWQM Policy and 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.

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11.4.4. Strategic Objective 4

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

In order 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.

In order to achieve the above strategic objective 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.

In order to achieve the above strategic objective the following strategic actions must be undertaken:

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- 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 defensible 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.

In order 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.
- Determine RQOs for South Africa.

11.4.8. Strategic Objective 8

To achieve fiscal support for IWQM.

In order 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 an investment framework including innovative mechanisms to mobilise funding for sustained support to IWQM.
- Review municipal conditional grants and identify financial support required for Local Government based on size and impact.

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- 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.

In order to achieve the above strategic objective the following strategic actions must be undertaken:

- Implement the WDCS in all catchments.
- 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).
- Develop the legal and institutional mechanisms for introducing administrative penalties for environmental noncompliance including water pollution.

11.4.10. Strategic Objective 10

To strengthen IWQM monitoring and information management.

In order 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.
- Ensure the harmonisation of data and information systems pertaining to source 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.

In order to achieve the above strategic objective the following strategic actions must be undertaken:

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- 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.

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12. PROTECTING AND RESTORING ECOLOGICAL INFRASTRUCTURE

12.1. Context and Current Challenges

Well-functioning ecosystems deliver a valuable service to people and healthy water ecosystems are imperative to sustain the water resource, which, in turn, provides the goods and services on which communities depend. 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 socioeconomic 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.

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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 of the sites of nature conservation interest that are being protected today may be increasingly vulnerable to irreversible changes of habitat and species. 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, organizations, 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.

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Communities are at high risk of being affected by waterborne diseases when drinking water directly from the river without any treatment and using the water for recreation, washing and irrigation purposes.

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 left in the rivers to sustain ecosystem functioning, that the quality of the resource is protected at the source and that the water environment has an 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).

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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 as social-ecological systems must be recognized and the aquatic ecosystem (water quantity and quality, habitat and biota) are to be managed in an integrated manner.

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. 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 and 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.

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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 (NFEPA). 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 land owners and developers. Currently a statutory minimum setback line to mitigate impacts is implemented. Other legislation (NEMA and CARA especially) 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. A number of 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 develop 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.

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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 private wastewater treatment works, 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.

Appropriate management of Strategic Water Source Areas, can produce significant returns in terms of water quality and quantity. Investing in Strategic Water Source Areas is also an important mechanism for long-term adaptation to the effects on climate change on water provision growth and development.

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 and 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).

In order to achieve the above strategic objective the following strategic actions must be undertaken:

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- Determine Resource Quality Objectives, Classes and Reserve for all significant water resources.
- 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 minimize 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.

12.4.2. Strategic Objective 2

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

In order to achieve the above strategic objective the following strategic actions must be undertaken:

- Implement the National Wetland Monitoring Programme (NWMP).
- Monitor 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).
- 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.

In order to achieve the above strategic objective the following strategic actions must be undertaken:

- Declare strategic 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.

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- Establish innovative ways for collective action through taking a stewardship approach to improve 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 data base for all sand mine activities and rehabilitate past impacts.
- Create large scale constructed wetlands to assist with water purification.
- Include AMD treatment for all 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.

In order 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.
- 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 a scientific buffer.

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.

In order to achieve the above strategic objective the following strategic actions must be undertaken:

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- Conduct community education and awareness campaigns in every catchment as part of the work undertaken by community development officers in CMAs (e.g. implement an Adopt-a-River programme or a Citizen Science programme working with other stakeholders).
- Provide information on the ecological state of water ecosystems.

12.4.6. Strategic Objective 6

To monitor the ecological health of our water resources through an integrated information management system.

In order 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.

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13. CREATING EFFECTIVE WATER SECTOR INSTITUTIONS

13.1. Context and Current Challenges

The National Water Act (Act 36 of 1998) (Is to be amended in line with the proposed National Water and Sanitation Act.) 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.

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.

The key elements of the institutional framework are to ensure that:

- Roles, responsibilities and accountability within the water value chain are better defined, 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.

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

13.2. Guiding Principles

The key guiding principles for achieving the objectives of institutional arrangements are 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.

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13.3. Baseline and Status Quo

The current situation, with regard to 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.

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

- Out of the envisaged establishment of nine (9) CMAs in NWRS2, only two (2) are operational i.e. Inkomati-Usuthu and Breede-Gouritz.
- The Limpopo North-West, Vaal, Olifants and Pongola-Umzikulu CMAs have been gazetted for establishment.
- The Orange, Berg-Olifants and Mzimvubu-Tsitsikamma have been gazetted for public consultation.

Moving forward, the Department will establish appropriate institutions to manage water resources at the catchment level supported by the National Water Act. The Department has reviewed the reconfiguration of the Water Management Areas (WMAs) from nine (9) to six (6). Once the reconfiguration is approved by Cabinet, the WMAs will be gazetted. Details of the reconfigured WMAs are provided in **Annexure 1** and the gazette notice is provided in **Annexure 2**.

The current situation, with regard to managing regional water Infrastructure and supporting local government in the delivery of water and sanitation services is that approval was obtained to consolidate schedule 3B utilities, (water boards) into Regional Water Utilities (RWUs) to manage regional water resources and regional bulk water and wastewater infrastructure, as follows:

- Rand Water has been expanded to incorporate Bushbuckridge Water.
- Sedibeng Water has been expanded to incorporate Botshelo Water and Pella Drift Water.

Economies of scale will enable Regional Water Utilities to provide improved support to rural municipalities and to better deploy their limited financial and technical resources across

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disadvantaged areas, and care needs to be taken to maintain local participation in the consolidated utilities. Economies of scale will also reduce the number of institutions that the Minister has to regulate and oversee.

The current situation, with regard to the managing 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 representivity) 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 a number of factors including difficulties in achieving the representivity 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 management institutions to perform their functions and effectively address the transformation agenda of government.
- There are 90 WUAs established, including new associations and transformed boards. Approximately 205 Irrigation Boards still needed to be transformed to become WUAs.

13.4. Strategic Objectives and 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 an institutional model for National Water Resources Infrastructure Management.

In order to achieve the above strategic objective the following strategic actions must be undertaken:

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- Establish a business case for streamlining institutional arrangements in the water and sanitation sector.
- 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.
- Empower the institutional model for National Water Resources Infrastructure to efficiently and effectively own, finance, develop, operate and maintain national water resources infrastructure.
- 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 and Water Trading Entity.
- Manage the transfer of other specific activities, such as, hydrometry, certain monitoring functions, human resource management and information technology to the institutional model.
- Empower the institutional model to contract out the operation and maintenance of national infrastructure.
- Continuously improve stakeholder understanding and collectively agree on and work within an expanding framework of local level participative management and 'good groundwater governance'.
- Develop and maintain the national groundwater champion that must hold the overall groundwater governance framework together and facilitate and support its rollout, smooth functioning and growth.
- Develop, facilitate, capacitate and support appropriate institutions that will allow effective local-level participative management of groundwater resources.
- Manage and maintain actions on all strategy fronts in a concerted effort from government at different levels, from municipalities and utilities, the private sector, civil society, educational institutes, media and professional associations to achieve the essential local level actions for sustainably managing shared groundwater resources.

13.4.2. Strategic Objective 2

To implement the approved consolidation of schedule 3B utilities, (water boards) into Regional Water Utilities (RWUs).

In order to achieve the above strategic objective the following strategic actions must be undertaken:

- Determine the optimal configuration of water boards to manage regional bulk water supply, and assist municipalities to perform their primary water and sanitation services mandate, and where necessary, manage regional water resources infrastructure, and manage regional bulk WTWs and WWTWs.

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13.4.3. Strategic Objective 3

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

In order to achieve the above strategic objective the following strategic actions must be undertaken:

- Establish the National Water Resources Infrastructure Agency.
- Establish the National Water Resources and Services Regulator (NWRSR).
- Transfer functions with associated authority and responsibilities and budgets to the National Water Resources Infrastructure Agency and the National Water Resources and Services Regulator.

13.4.4. Strategic Objective 4

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

In order 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.

In order to achieve the above strategic objective the following strategic actions must be undertaken:

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

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13.4.6. Strategic Objective 6

To finalise the governance arrangements of the Water Tribunal.

In order to achieve the above strategic objective the following strategic actions must be undertaken:

- Identify and conclude any activities required to ensure effective governance arrangements for the Water Tribunal.
- Establish a Municipal Support Unit for Water and Sanitation in DWS, staffed with highly competent experts to drive a national programme of intervention at municipal level.

13.4.7. Strategic Objective 7

To establish the national appeal process.

In order 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.

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14. DATA COLLECTION, ANALYSIS AND INFORMATION MANAGEMENT FOR EFFECTIVE MONITORING, EVALUATING AND REPORTING

14.1. Context and 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.

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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 Of 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 etc. which RSA accedes to.
- 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.

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- 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 and 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 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.

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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. In order 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.

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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, the Knowledge Management Strategy, etc.

14.4. Strategic Objectives and 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 in order to achieve this objective:

- Review and develop comprehensive and appropriate 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.
 - Harmonization of monitoring actions by all responsible institutions.
 - Performance information of V&V audits.
- Align monitoring institutions to support National, Continental and International reporting programmes, e.g. SDGs, Africa Agenda 2063, Citizen Science and Adopt-a-River Programmes.

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- Develop and implement an integrated water resources and water and sanitation services infrastructure plan, information system and monitoring network.
- Establish monitoring networks and programmes relating to all emerging requirements, including unconventional oil and gas development that include water level monitoring and water quality (macro, trace, methane isotopes, stable isotopes, chlorine isotopes, strontium isotopes, methane, ethane and propane and butane gas concentrations analysed in water).
- Grow and maintain the groundwater resource knowledge base, focusing on the resource itself, its socio-economic role and its appropriate management.
- Develop and maintain effective and efficient information and information systems, as a shared national objective and an integral part of water management strategies.
- Ensure the digitisation of all monitoring networks and information systems across the entire water and sanitation value chain.

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 in order 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.

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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 in order 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 in order 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 for integrated monitoring.
- Report on the status of transboundary water resources, water and sanitation services and water use in the region.
- Ensure water services information systems and networks are given priority within the DWS Data Management Strategy (DMS) and Integrated Regional Water Monitoring Committees (IRWMC).

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 in order to achieve this objective:

- Monitor and assess for compliance.
- Monitor for outcomes.
- Monitor and assess for impact.

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- Establish 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 in order to achieve this objective:

- Provide data and information for monitoring networks.
- 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.
- 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.

14.4.8. Strategic Objective 8

To ensure that adequate skills, human resource capacity and professional development for monitoring and information management is developed.

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

- Develop and implement a national cross-cutting educational programmes (WC/WDM, FETwater, WSSD, etc.) on water and sanitation monitoring and information management and involve members of the public and WUAs in the collection of mass data where needed.
- Ensure knowledge management and provision of information on skills, technology and human resource capacity for research and professional development and registration.
- Ensure that employment and mentoring are available for qualified graduates, whether in government, academia or the private sector.

14.4.9. Strategic Objective 9

To develop, implement and maintain a viable and adequate funding model for monitoring and information programmes.

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

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- Clarify the funding model for the development, extension and maintenance of monitoring and information systems.
- Increase investments in IT infrastructure, gauging stations and operational infrastructure for accurate and up to date data on rainfall, stream flows, water quality, and groundwater levels.
- An effective procurement system must be put in place that will be able to maintain supplies in central stores for distribution to all testing sites.

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15. BUILDING CAPACITY FOR ACTION

15.1. Context and Current Challenges

The National Water Resource Strategy 3 (NWRS-3) acknowledges the fact that strategies to give effect to the provisions of the proposed Water and Sanitation Act will only be effective and successful if there are 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 in the Department of Higher Education, through the various Sector Education and Training Authorities (SETAs).

The Skill 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 is that water and sanitation services are local government functions, which is LGSETA space and whilst EWSETA 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.

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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 in order to achieve the objectives of putting in place a well-coordinated, coherent capacity-building system within the water and sanitation sector.

It would be necessary, when the proposed Water and Sanitation Act is gazetted:

- For the DWS to develop the latest a Water Sector Competency Framework that lays out all the water and sanitation sector occupations (including their specialisation) and their skills requirements to deliver on the water and sanitation sector new consolidated mandate.
- For all water institutions to review all of their skills development plans based on the new consolidated updated mandates as defined in the proposed Act in order to determine the revised demand for skills and capacity.

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 in order to meet the challenges of growth and development, particularly within the local sphere of government.

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15.3. Baseline and 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 work place).
- 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. A number of initiatives have been initiated and implemented by various stakeholders within the sector, including those listed below:

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- 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 Metsee, 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 a 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 a number of 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.
- A number of 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.

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- 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 and 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.

In order to achieve the above strategic objective the following strategic actions must be undertaken:

- Develop the revised Water and Sanitation Sector Occupations Framework based on proposed consolidated Water and Sanitation Act.
- Ensure that planning for SETA skills development is based on primary resources such as an Organising Framework for Occupations that is reflective of the sector in order 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.

In order 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.

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15.4.3. Strategic Objective 3

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

In order 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.

In order 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.
- Develop and maintain skills and capacity for the sustainable development and management of groundwater resources at all management levels and with participation of all stakeholders as part of a long-term, ongoing process.
- 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.

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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).

In order 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 (post graduate) 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 organizations.

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16. ENSURING FINANCIAL SUSTAINABILITY

16.1. Context and Current Challenges

The chapter on financial management is a key cornerstone of the NWRS-3. The necessary financial resources in place, 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 of 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.
- 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 updated progress on the establishment of a debt management desk to support the DWS Water Trading Entity, Water Service Authorities, Catchment Management Agencies, the Regional Water Utilities, Water User Associations and Water Service Providers.
- The revised Pricing Strategy to give effect to matters such as the pro-poor water tariffs, the waste discharge levy, 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.
- The updated aspects of value engineering and appropriate fit for purpose technology solutions.

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.

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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, Regional Water Utilities, 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.
- Establish a debt management desk to support the DWS Water Trading Entity, municipalities, CMAs, Regional Water Utilities, and WSAs and WSPs with debt recovery.
- Lead the water and sanitation sector in dealing decisively with inadequate governance, fraud and corruption.

In order 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:

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- 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, the polluter pays principle is 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.

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- **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 must be available for the full lifecycle cost of the investment and must include for operations and regular refurbishment.
- **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.

16.3. Baseline and Status Quo

Capital investment in new water infrastructure and in the refurbishment of existing infrastructure is projected to require an estimated R898 billion over the next 10 years. Based on industry norms, additional investment of approximately R560 billion will be required for sustainable water management programmes. In total, an amount of R898 billion will be required to be invested by the water sector over the next 10 years, or an equivalent of R90 billion per year.

Currently, only R33 billion per year is accessible water sector investment. This includes DWS MTEF allocations, as well as transfers to local government and private sector investments. To put the figures in perspective, the DWS's total budget allocation from the fiscus for 2018/19 is R33 billion. While a portion of the required investment will be provided by the public sector, the private sector will have to contribute substantially. The public sector alone will not have sufficient funds to enable full value chain financial management in the sector. DWS will also need to consider including a cost benefit analysis as a standard factor in all planning programs so that it is clear from the onset how much it will cost to implement water sector projects. In the future a proper investment framework will need to be put in place that spells out the institutional arrangements between the private and public sectors and clearly defines what the DWS's contributions to water sector project will be.

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. All organs of state, whether the DWS, a regional water utility, a municipality or water service authority, a CMA or a Water User Association are, at present, are not recovering full costs from water users so they are unable to break even.

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:

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- 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 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 Regional Water utilities.

The 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 financial resources required, available or that may be made available as well as the actions and programmes that may be funded and the objectives that may be achieved are shown below:

(Schedule to be compiled and included here in future when available).

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.
- Inadequate debtor management leading to non-enforcement of obligations to pay.

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;
- The failure to get the Pricing Strategy gazetted;
- The inability to develop a credible Funding Model;
- The inability to resource and adequately fund the government policies;
- Ineffective and inefficient revenue management;
- Serious interface challenges between SAP and WARMS which needed to be resolved;
- Financially unsustainable water institutions;
- The inability of municipalities to collect water and sanitation revenue; and
- Inadequate debtor management leading to non-enforcement of obligations to pay.

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16.4. Strategic Objectives and 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 in order to achieve this objective:

- Develop and implement institutional arrangements that recognise the diversity of circumstances across South Africa and allow for regional cross subsidisation.
- Roll out ring-fenced institutional models to increase private sector investment.
- Develop a comprehensive National Water and Sanitation Investment Framework.
- Position the National Water and Sanitation Investment Framework in the sector.
- Develop a Water and Sanitation Funding Model.
- Gazette the Pricing Strategy.
- Mobilise the private sector to contribute towards the funding of economically viable projects and multi-purpose projects.
- Provide investment and funding inputs for all strategic objectives identified in the NWRS-3.
- Ensure that all investment decisions in water and sanitation are value engineered.
- 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 acceptable levels of this SO need to be quantified following consultations and policy adoption*).

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

- Ensure that all conditional grants are dependent on meeting of current payments to the next entity in the value chain, improvements to Blue Drop, Green Drop and No Drop Scores, and to meeting targets and audit outcome.
- Allow conditional grants to be used for operation and maintenance costs.
- Put in place mechanisms in all entities to deal with accumulated debt.
- Ensure that the skills development levies collected from the water sector are accounted for.

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- Develop and implement a programme for collecting outstanding water charges from water users and to improve financial management.
- Establish a debt management desk to support municipalities and other water institutions to recover their costs.
- Develop and implement a turnaround strategy for the management of the National Water Trading Entity.

16.4.3. Strategic Objective 3

To monitor and report on financial regulation and governance. *(This SO to also be ratified by WTE and whoever drives the norms and standards for financial assistance).*

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

- Develop regulations in terms of Section 139 (8) of the Constitution, which allow for a national entity to take over the water and sanitation service functions, including revenue and billing, in a municipality if service deliver criteria are not met.
- 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 set norms and standards for revenue management applicable to bulk and reticulated potable water and sanitation.

The following strategic actions must be undertaken in order 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 revenue management of bulk and reticulated potable water supply and sanitation approved.
- Implement norms and standards for revenue management of bulk and reticulated potable water supply and sanitation.

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16.4.5. Strategic Objective 5

To provide financial assistance to historically disadvantaged households, other water-based rural livelihoods and food security initiatives (*the acceptable definitions of this SO to be clarified following consultations and policy adoption*). (*This SO to also be ratified by WTE and whoever drives the norms and standards for financial assistance*).

The following strategic actions must be undertaken in order 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 (*wider sector approach on this SO and SAs to be clarified following consultations and policy adoption*).

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

- Implement accurate billing and effective revenue management systems in all entities in the water value chain with a strict “no payment = no water” approach to agriculture / industrial / commercial users and restricted supply to domestic users.
- Ensure the database of the validation and verification process of water users is concluded and finalised.
- Approve the validation and verification of water users database.
- Facilitate the conclusion the verification of completeness and accuracy of WARMS information.
- Adequately resource the compulsory licensing in the remaining catchments.
- Complete and implement the catchments compulsory licensing programme.

16.4.7. Strategic Objective 7

To promote investor confidence through the establishment of incentives for new investment in the water and sanitation sector.

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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 in order 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.

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17. ENHANCING RESEARCH, DEVELOPMENT AND INNOVATION

17.1. Context and Current Challenges

Research and innovation is a major contributor to meeting the ever increasing demands for and challenges in water and sanitation in South Africa. The development of skills in the water 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.

Research and innovation in the water and sanitation sectors is crucial to achieving both national and international imperatives of water conservation and demand management, water security and the public health benefits of sanitation.

The key focus area needs to be on developing tools to develop the skills and capacity required to address current and future water and sanitation sector's needs.

Emphasis is placed on the desirability of close ties between:

- The WRC and the DWS, to ensure that the latter's research needs are known and dealt with.
- 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.

The DWS, as the sector leader, has the primary responsibility for liaison with DSI and for the drafting of a sector Research and Innovation (R&I) strategy that meets the needs of the sector and dovetails with the national R&D (research and development) policy and strategy.

The government, research institutions, academic institutions, non-profit organisations, and all water users need to contribute to effective decision-making in water use and management and sanitation services. This is only possible when supported by coherent and consistent policies and the coordinated dissemination of new knowledge, new technologies and skills.

A number of water role players make significant and independent input into water 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.

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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.
- Research and innovation is well coordinated within the sector.
- Research and innovation coordination role is well established within the sector.
- Research and innovation cuts across traditional research boundaries in line with agreed high-level objectives.
- Research and innovation is geared towards aligning products, services and knowledge within the sector.
- 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.
- Knowledge derived from water and sanitation research informs policy development and strategic decision-making at all levels of government and across the water value chain.
- Transformation, equity and empowerment of marginalised groups inform the design of research and development projects.

17.3. Baseline and Status Quo

The Research, Development and Innovation (RDI) Community is diverse and made up of many role players, institutions and activities. This makes tracking and monitoring all water RDI related activities complex. There are broadly 3 areas that must be taken into account to understand the outputs of the system – these are as follows:

- The Water Research Commission Corporate Plan and associated Annual Report: In 2015 the WRC investment constituted 62% of all public funding in the water innovation 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. However, a change in approach to catchment management related research project should be undertaken in future so that the research projects can be of increased benefit in the day to day management of water resources.
- Bibliometric water RDI ecosystem mapping studies: to independently assess the outputs of the Water RDI system. The Water RDI Roadmap Portfolio Management Unit funded a baseline study to understand the 2015 baselines for water RDI. This study can be updated again in 2020/21.
- Finally, the narrative of the major water RDI initiatives, shifts and projects needs to be captured. The Water RDI Roadmap Implementation Unit tracks this narrative in its annual report.

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Notably, the responsibility for achieving these outputs sits with a diverse set of partners and institutions as a single institution cannot manage the investment requirement or complexity alone.

While much progress has been made with regard to research since the promulgation of the Water Research Act (Act 34 of 1971), the following key strategic issues still require attention:

- Sustainable utilisation of groundwater resources.
- Development of human research capacity.
- Degradation of water quality and water ecosystems resulting from industrial and agricultural development, mining and rapid human settlements in peri-urban areas.
- Increased health risks to humans and animals as a result of contamination of water by hazardous pollutants.
- Uncertain impacts of climate change on the availability of water.
- Insufficient provision of basic water supply and sanitation to some rural areas.
- In-equitable access to water for productive use.
- Faecal sludge management.
- Successful implementation of innovative technologies.
- Lack of uptake in the alignment of water research objectives, thrusts and programmes with the broader national policies and strategies relating to water resources management and water use.
- Limited participation of sector-wide stakeholders in the setting and execution of the water-and sanitation-related research and innovation agenda for the country.
- Insufficient allocation of financial resources for water sector research and innovation.
- The ability of the sector to quickly adapt to change so as to give to effect to research.
- Enabling factors such as ICT, support structures and resources.
- The Blue-Green Economy must be embraced so that water and sanitation sector challenges can become entrepreneurial opportunities.

More than half of water research activities, funded and coordinated through the Water Research Commission are conducted by universities, science councils, organs of state, the private sector, water utilities and other agencies such as the CSIR. There is currently not sufficient evidence that the sector benefits from research in terms of policy development.

The table below shows the 2030 RDI targets:

Roadmap Pillar	Indicator	2030 Target	General Comments	Tracking Insights
Research	New research projects	85	Based on the WRC Corporate Plan targets.	The anchor for tracking this in the WRC Annual report.
	Publications	1940	1770 were produced between 2005 and 2015.	Ecosystem Mapping study needs to track progress on a 5 yearly basis.
	Chairs	7	Variety of NRF and utility funded	

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Roadmap Pillar	Indicator	2030 Target	General Comments	Tracking Insights
Skills	Students supported	500	models being explored. Number of supported students are tracked on an annual basis in the WRC Annual Report and PMU Annual report.	The anchor for tracking this in the WRC Annual report.
	Doctorates	240	In the period 2000-2015 between 14 and 30 PhDs graduated per year.	Graduation output needs to be tracked through the 5 yearly ecosystem mapping study.
	Masters	800		
Innovation	Patents	40	Based on the insight that 47 USPTO registered patents were produced between 2000 and 2015.	Needs to be tracked through the 5 yearly ecosystem mapping study.
	Demonstrations	32	The Water Technologies Demonstration Programme along with the technology testing capabilities of metros and utilities are key to tracking this.	Ecosystem Mapping study needs to track progress on a 5 yearly basis.
	Professional Communities of Practise	4		Narrative tracking. Sector partners to share insight with PMU.

Table 6: Research, Development and Innovation 2030 SA Targets

17.4. Strategic Objectives and 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 in order to achieve this objective:

- Link test bed partners with key water sector institutions in order to accelerate innovations to the market/public sector.
- Continue to invest in understanding emerging contaminants (detection and treatment) in order to improve the transition towards reuse, reclamation and recycling of water.
- Improve raw water quality through investing in communities of practise that bring together built and ecological infrastructure experts and solutions.
- Undertake research on land use impacts on water linked ecosystems.

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- Undertake ongoing research and planning around climate change and its impacts on water security and water infrastructure needs.
- Initiate a hydrological monitoring centre for South Africa in order 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 barriers in the uptake.
- Identify health and environmental risks.
- Develop, pilot and test a suite of alt sources in a relevant location.

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 in order to achieve this objective:

- Implement and regularly review and / or revise Research, Development and Innovation Policies, Plans and Roadmaps across the sector.
- Strengthen partnerships with key water sector institutions to accelerate research and solutions into practice.
- Review all relevant guidelines and R&D products to understand where training modules need to be developed around new knowledge.
- Understand the political economy of water.
- Establish a professional service centre for water resources and for water and sanitation services.
- Increase research into accountability (technical and political).
- Implement rural innovation pilots.
- Advise on the implementation of water smart cities.

17.4.3. Strategic Objective 3

To improve adequacy and performance of supply infrastructure.

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

- Embrace the UN Decade of Ecosystem Restoration (2021–2030) and implement ecological infrastructure in key resource areas and ensure 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 solutions.
- Develop and demonstrate appropriate domestic and industrial waste water technologies for cost effectiveness, energy efficiency and beneficiation.

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- 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.
- Recognize 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 as a sustainable “business”.

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

- Coordinate, and where needed establish new platforms, to enable a synergised set of institutions to enable the shifting of innovations into the market (including business development and SME support).
- Apply the concepts of water sensitive urban design to a robust city-wide case study to demonstrate and learn how a city can transition to a sustainable city.
- Develop, and test at scale, early warning systems and tools for agriculture.
- Scan and sort the innovation sector for solutions that are ready for application and invest in their implementation.
- Link the Global Environment Fund 6 project on Water Pricing and Ecosystems to Water Master Plan implementation and position DWS to be closely involved in this process.
- Partner with institutions to fund training of water sector practitioners in the curation, management and use of data as well as the associated technologies.
- Develop a financial model for charges and tariffs in the water sector.
- Conduct a water resources assessment to gauge planning and investment.
- Enhance the role of the private sector in the water sector.
- Implement professional resource centre for municipalities.
- Establish the value of water 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 in order to achieve this objective:

- Fund research into new models to better understand implementation approaches for water allocation reform and equity issues.

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- Develop technologies, guidelines and implementation support tools that enable SA to use alternative and appropriate sources as part of water supply.
- Implement water conservation and demand management.
- Develop technology and systems for improved water productivity.

17.4.6. Strategic Objective 6

To improve performance of pricing, monitoring, billing, metering and collection.

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

- Unlock investment, procurement and other localisation barriers to reposition the sector to implement new/niche solutions and approaches and roadmap the NMIU.
- Test a suit of ICT and citizen science tools for data sourcing.
- Develop a citizen science monitoring paradigm.
- Develop a partnership model for disruptive technology and monitoring.
- Monitor and evaluate socio economic rights.
- Identify emerging contaminants.
- Link monitoring data to Strategic Adaptive management.

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18.ADDRESSING LEGISLATIVE AND POLICY GAPS

18.1. Emerging Legislative and Policy Issues

The National Water Act (Act No 36 of 1998) and the Water Services Act (Act No 108 of 1997) are currently being amended separately as opposed to being revised (as outlined in the NWRS-2) and combined into a single coherent piece of water legislation that addresses the entire water value chain. The Department of Water and Sanitation has taken a different approach and it has currently embarked on the amendment process and the National Water Amendment Bill and National Water Services Bill have been developed. The 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 in order to enable sustainable socio-economic development within the water and sanitation sector.

In the interim, 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 further investigation before any new policy positions, or amendment to a policy position, can be recommended:

- Addressing legislative and policy gaps.
- Developing new policies.
- Effecting institutional reform.
- Achieving redress and equity.
- Ensuring planning and implementation.
- Implementing sustainable delivery mechanisms.
- Exploring unconventional oil and gas development (e.g. hydraulic fracturing).

18.2. Policy Principles

The policy principles 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).

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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 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. Developing New Policies

The Department will continue to work towards finalization of the Draft Policies that are under currently in different stages of development. The approach to all policy development seeks to prioritize and address the most critical challenges throughout the value chain. As at November 2021 the following policies, among others, are currently under development and at various stages:

- **Draft Mine Water Management Policy:** The draft policy seeks to provide policy guidance to the mine sector to safely manage mine water including Acid Mine Drainage. This is turn will protect the water resources within the regions where there is mine activities.
- **Sustainable Hydropower Generation Policy:** The draft policy has been developed to provide a framework to assist the Department to use water resource infrastructure to generate hydropower.
- **Draft Integrated Water Quality Management Policy:** This policy intervention is aimed at consolidating all past policies on water quality that were segmented in nature.
- **Wetland Management Framework:** The draft framework provides 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 utilized to address the challenges in terms of wetland protection, management and conservation in South Africa. The Framework will lead to an integrated / joint

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national policy on wetlands being developed that would address the mandates for wetland management, conservation and protection of the three key Departments, i.e., DFFE, DWS and DALRRD.

18.3.3. Effecting Institutional Reform

An institutional 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 services.
- 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 service 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.

18.3.4. 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.

18.3.5. Ensuring Planning and Implementation

It is expected that the proposed water and sanitation legislation effectively deal with the issues of aligning and legislating integrated water and sanitation planning, development and management,

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water cooperation, wise water usage, centrality of water, unity of the water cycle, the changing climate environment, awareness and education and the creation of effective water institutions. Some of the specific areas for alignment and emphasis expected from the proposed Water and Sanitation Act are:

- The policy and the legislation need to be reviewed and aligned with the proposed developments in international water and sanitation management and SADC policy.
- In line with the needs for stronger policy and legislation on sanitation hygiene and end user education, the policy and legislation need stronger positions on wise water use awareness and education.
- The policy and legislation position is expected to focus and expand on efforts to ensure water security, such as reduce, reuse, and recycle and recovery practices.
- The proposed policy and legislation is expected to address issues of vulnerability and resilience of country relating to climate change. The legislation is expected to provide the policy framework that will enhance human, legal, regulatory, institutional, governance and financial resources and capacity to assist with effects of climate change.
- The consolidation of monitoring and information management and dissemination for the water and sanitation sector.
- The policy and legislation need to establish and emphasise the link or inter-dependence of water and sanitation and energy generation, mining and industry sectors
- The proposed Water and Sanitation Act needs to address policy and legislative position on groundwater planning and development including municipal by-laws on household bore-holes.
- The proposed Water and Sanitation Act provides the opportunity to legislate policy position on wetlands and buffer-zones in order to stabilise banks, trap sediments and filter out pollutants.

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.

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There is a need to align the water and sanitation act with other national legislation that governs local government, particularly as they relate to development planning, regulation of water and sanitation services provision (national and provincial intervention in local government), regulation of local government's reporting obligations in accordance with the provisions of national legislation, regulations, as well as the determination of norms and standards on issues of common interest.

18.3.7. Exploring Unconventional Oil and Gas Development

The policy and legislative framework needs to expand on the mining of shale gas and the associated hydraulic fracturing and coal-bed methane extraction regulatory framework to ensure that the limited available water source is protected from exploitation and pollution.

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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.
Aquifer	Aquifer means a geological formation which has structures or textures that hold water or permit appreciable water movement through them.
Biodiversity	The number and variety of organisms and life forms, including all species, representing the totality of all their genes, found in an ecosystem or in a region.
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.

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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.
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 in order 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 or manner of governing by implementing sound rules and 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°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

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	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.
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.
Rain water 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.

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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.

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Sand mining	The removal of sand (mainly from river beds 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 audit 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.
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 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

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	<p>of the production chain. Water footprint includes 3 components:</p> <ul style="list-style-type: none"> • 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	<p>Protection in relation to a water resource, means:</p> <ol style="list-style-type: none"> 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

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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.

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20. ASSOCIATED LEGISLATION, POLICIES AND STRATEGIES

To be updated upon finalization after consultations.

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DCoG, *Professionalisation Framework for Local Government* (2013 draft 1). Pretoria: Department of Cooperative Governance and Traditional Affairs, 2013

DE, *Integrated Resource Plan for Electricity*. Pretoria: Department of Energy, 2010

DEA, *White paper on the national climate change response*. Notice 757. Pretoria: Department of Environmental Affairs, 2011

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DPW, Ministry of Public Works, CSIR, CIDB: *The national infrastructure maintenance strategy in support of ASGISA and government growth objectives*. Pretoria: Ministry of Public Works, 2007

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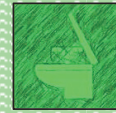
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21.OTHER REFERENCES

To be updated and included upon finalization after consultations.

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22.SUBMISSIONS RECEIVED

To be updated and included upon finalization after consultations.

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23.CONTACT INFORMATION

To be updated and included upon finalization after consultations.

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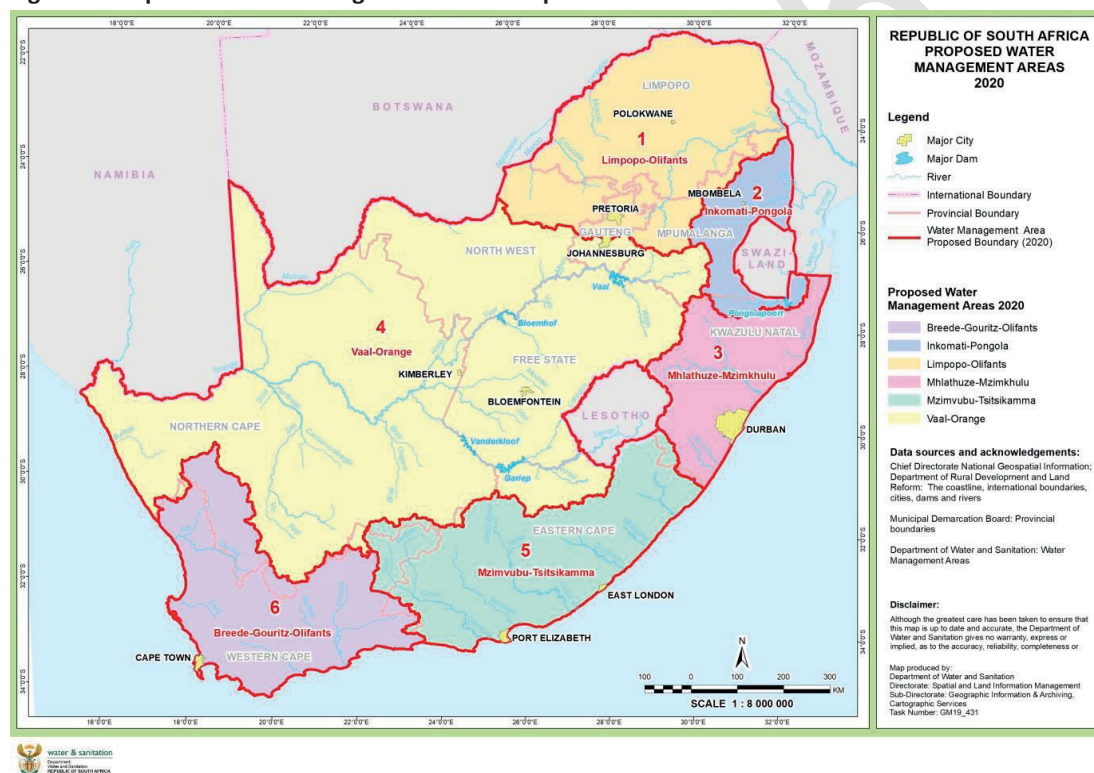
24. ANNEXURES

To be updated and included upon finalization after consultations.

ANNEXURE 1: RECONFIGURATION OF WATER MANAGEMENT AREAS

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

Figure 1: Proposed Water Management Areas Map



The proposal for re-configuration of WMAs is as follows:

- The **Breede-Gouritz and Berg-Orlants 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.

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- 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 Pongola will be added to the Inkomati-Usuthu. The Usutu rise from the Republic of South Africa (RSA) and traverse through Eswatini and emerges again in RSA where it joins the Pongola River close to the Ndumo Game Reserve (Catunene in Mozambique) and becomes the Great Maputo River once it crosses the border into Mozambique. The Pongola and Maputo Rivers are Trans-Boundary Rivers that are subject to international agreements. This configuration supports having one point of contact from South Africa to engage with the international counterparts.
- The proposal will align with the establishment of the Inkomati Maputo River Basin Organisation, South Africa, Swaziland and Mozambique which will be providing oversight to the integrated water resource management in line with the revised Southern African Development Community (SADC) protocol on shared water resources.
- The remaining part of the Pongola-Umzimkhulu WMA from Mhlathuze-Matamvuna will remain as a WMA. With the inclusion of the Pongola catchment in the Inkomati-Usuthu WMA, the Pongola-Umzimkhulu WMA will be reconfigured as the Mhlathuze to Mtamvuna WMA to remain as single WMA to service the KwaZulu-Natal area and to manage all coastal rivers in this area.
- 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.
- The Mzimvubu-Tsitsikamma WMA will remain unchanged from the previous configuration.

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ANNEXURE 2: GOVERNMENT GAZETTE NOTICE ON PROPOSED 6 NEW WMAs IN SOUTH AFRICA

DEPARTMENT OF WATER AND SANITATION

GOVERNMENT NOTICE

No.

Date:

PROPOSED NEW SIX (6) WATER MANAGEMENT AREAS OF SOUTH AFRICA

I, Lindiwe Nonceba Sisulu, MP, the Minister of Human Settlements, Water and Sanitation hereby, in terms of Section 5(1) of the National Water Act, 1998 (Act No. 36 of 1998) invite written comments on the establishment of these water management areas within 60 days of the gazette notice, establish the water management areas and determine their boundaries as contained in the Schedule hereto as a component of the National Water Resource Strategy (NWRS). Included are the old water management areas (Table A.1) for comparison with the current water management areas (Table A.2).

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, Lephalele, 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

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Water management area (number & current names)	Boundary description
	<p>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.</p> <p>The Water Management Area boundary then follows the mentioned farm boundary up to the farm boundary of Vaalboschoek 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, Benaauweheidsfontein 442, Olifantskop 196, Sussana 197 and Olifants Dam 170. The Water Management Area boundary then follows the eastern boundary of Olifants 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.</p>
<p>6. Orange: Major rivers include the Modder, Riet, Caledon, Kraai, Ongers, Hartbees and Orange.</p>	<p>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;</p> <p>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 D73E), 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.</p> <p>Primary drainage region F (excluding quaternary catchments F50D, F60B, F60C, F60D and F60E).</p>
<p>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.</p>	<p>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.</p>
<p>8. Breede-Gouritz: Major rivers include the Breede, Sonderend, Sout, Bot, Palmiet, Gouritz, Olifants, Kamanassie, Gamka, Buffels, Touws, Goukou, and Duiwenhoks.</p>	<p>Primary drainage regions H and J; Tertiary drainage regions G40 (excluding quaternary catchment G40A) and G50; Tertiary drainage regions K10 to K70.</p>

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Water management area (number & current names)	Boundary description
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 quaternary catchment F50D.

Table A.2: Revised (2020) 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-Pongola: Major rivers include Nwanedzi, Sabie, Crocodile (East), Komati, Usuthu and Pongola.	Primary drainage regions X, W11 to W13 and the portions of tertiary drainage regions W51 to W56 falling within the boundary of the RSA.
3. Mhlathuze-Mtamvuna: Major rivers include, Mhlathuze, Mfolozi, Mkuze, Thukela, Mvoti, Umgeni, Umkomazi, Umzimkulu and Mtamvuna.	Primary drainage regions X and the portions of tertiary drainage regions W51 to W56 falling within the boundary of the RSA. Tertiary drainage regions 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.
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, Benaauweheidsfontein 442, Olifantskop 196, Sussana 197 and Olifantsdam 170. The Water Management Area boundary then follows the eastern boundary of

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Water management area (number & current names)	Boundary description
	<p>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;</p> <p>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.</p> <p>Primary drainage region F (excluding quaternary catchments F50D, F60B, F60C, F60D and F60E).</p>
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.	<p>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.</p>
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.	<p>Primary drainage regions H and J; Tertiary drainage regions G40 (excluding quaternary catchment G40A) and G50; Tertiary drainage regions K10 to K70.</p> <p>Tertiary drainage regions G10 to G30 and quaternary catchment G40A.</p> <p>Primary drainage regions E and tertiary drainage regions F60 (excluding quaternary catchment F60A) and including quaternary catchment F50D.</p>

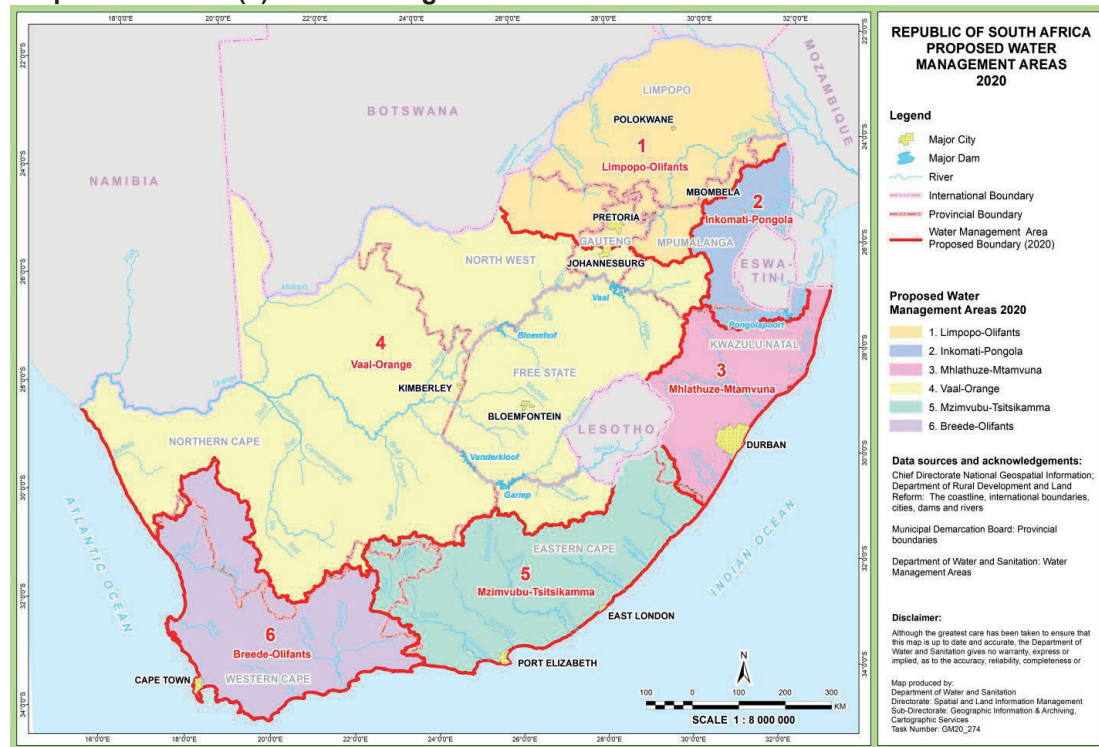
Table A. 3: Details of amendments to Water Management Areas boundaries

Water Management Area Boundary	Proposed Boundary Amendment
1. Limpopo- Olifants	The Limpopo and Olifants WMAs are amalgamated into a single WMA.
2. Inkomati-Pongola	The Pongolacatchment which includes Pongola and Maputo rivers is added into Inkomati-Usuthu WMA.
3.Mhlathuze-Mtamvuna	The remaining part from Mhlathuze-Mtamvuna will remain as a WMA.
4.Vaal-Orange	The Vaal and Orange WMAsare 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.

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Proposed new six (6) Water Management Areas



All interested persons are invited to comment in writing on the proposed new water management area which is available for comment for a period of 60 days. All such comments must be addressed to:

**Director-General
Department of Water and Sanitation
Private Bag X313
PRETORIA
0001**

**For attention: Ms T Sigwaza
Email: sigwazat@dws.gov.za
Tel: 012 336-6600**

**L N SISULU, MP
MINISTER OF HUMAN SETTLEMENTS, WATER AND SANITATION
DATE:**