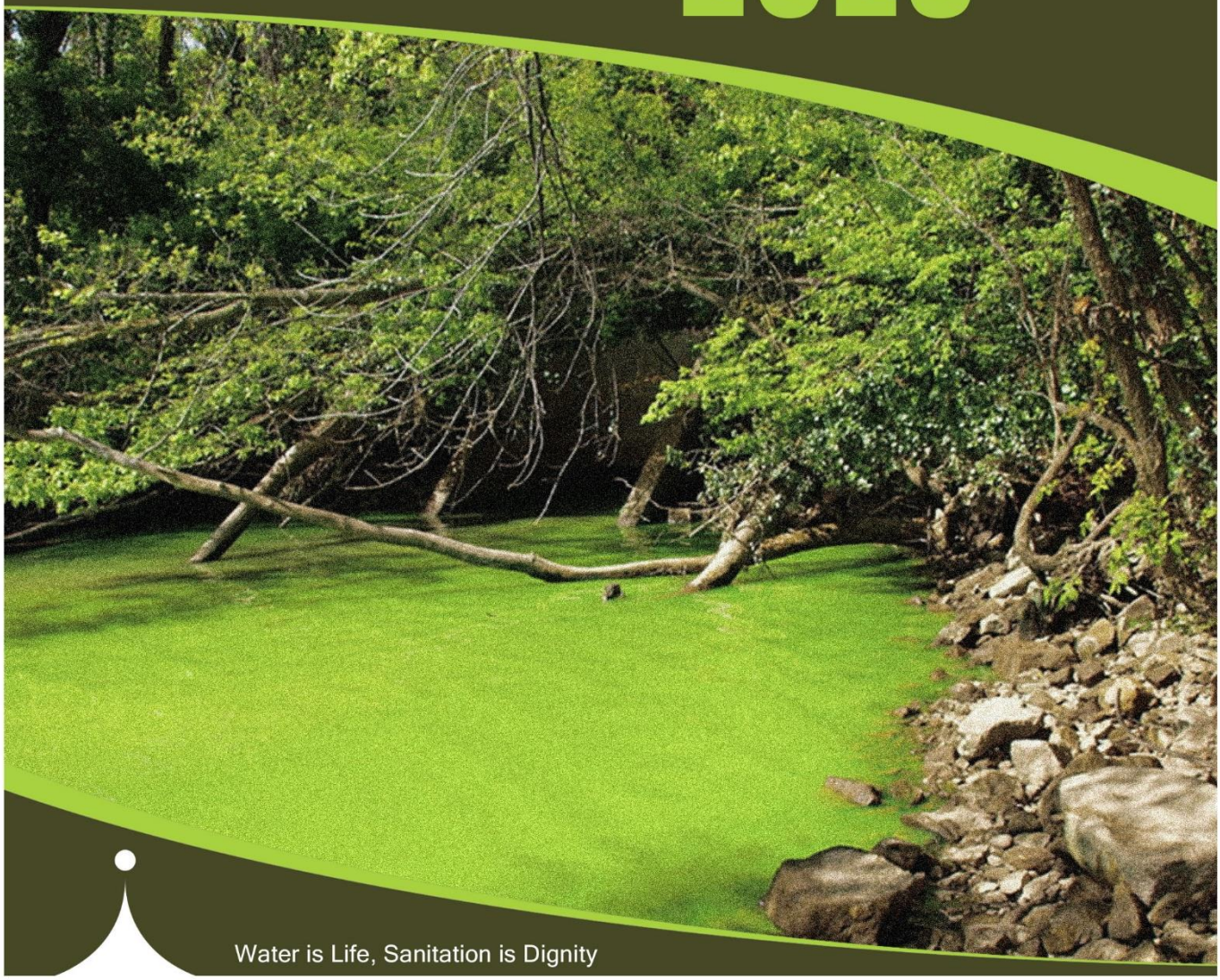
EUTROPHICATION MANAGEMENT STRATEGY for SOUTH AFRICA

STRATEGY INTO PRACTICE 2023



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DEPARTMENT OF WATER AND SANITATION

Water Ecosystems Management

Sources Directed Studies

STRATEGY INTO PRACTICE

Final

October 2023

EUTROPHICATION MANAGEMENT STRATEGY FOR SOUTH AFRICA

PROJECT REPORT NUMBER 5
SOURCES DIRECTED STUDIES REPORT NUMBER RDM/EMSSA/00/IHS/SDS/0722

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2	RDM/EMSSA/00/IHS/SDS/0220	Framework Report
3	RDM/EMSSA/00/IHS/SDS/0320	Situation Assessment and Gap Analysis Report
4.1	RDM/EMSSA/00/IHS/SDS/0421	Eutrophication Management Strategy for South Africa (Edition 1) Report
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7	RDM/EMSSA/00/IHS/SDS/0922	Project Close-Out Report

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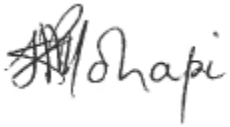

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C	**CARA**	Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983)
	CMA	Catchment Management Agency
	CMF	Catchment Management Forum
	CMS	Catchment Management Strategy
	CSIR	Council for Scientific and Industrial Research
	COGTA	Department of Cooperative Governance and Traditional Affairs
D	**DALRRD**	Department of Agriculture, Land Reform and Rural Development
	DAM Strategy	Data Acquisition Management Strategy
	DEA	Department of Environmental Affairs
	DFFE	Department of Forestry, Fisheries and Environment
	DIRCO	Department of International Relations and Cooperation
	DMRE	Department of Mineral Resources and Energy
	DoE	Department of Education
	DoH	Department of Health
	DoJ	Department of Justice
	DPSA	Department of Public Service and Administration
	DPSIR	Driver-Pressure-State-Impact-Response framework
	DSI	Department of Science and Innovation
	DSI-NRF	Department of Science and Innovation - National Research Foundation
	DWA	Department of Water Affairs
	DWAF	Department of Water Affairs and Forestry
	DWS	Department of Water and Sanitation
	DWS: CME	Compliance, Monitoring, and Enforcement
	DWS: ESR	Economic and Social Regulation
	DWS: HO	DWS Head Office
	DWS: HR	Human Resource
	DWS: HRD	Human Resource Development
	DWS: IP	Information Programmes
	DWS: LA	Learning Academy
	DWS: MIWR	Mine and Industrial Waste Regulation
	DWS: MWwQM	Municipal Wastewater Quality Monitoring
	DWS: RP&W	Resource Protection and Waste
	DWS: RD	Reserve Determination
	DWS: RO	Regional Offices (interchangeable with Provincial Offices)
	DWS: RQIS	Resource Quality Information Systems
	DWS: WARMS	Water Use Authorization & Registration Management System
	DWS: WEM	Water Ecosystems Management
	DWS: WQP	Water Quality Planning
	DWS: WRC	Water Resource Classification
	DWS: WRI	Water Resource Information
	DWS: WRR	Water Resource Regulation (previously, Resource Protection and Waste)
	DWS: WSR	Water Services Regulation
	DWS: WUA	Water Use Authorization
E	**EIA**	Environmental Impact Assessment
	ELU	Existing Lawful Water Use
	EMSSA	Eutrophication Management Strategy for South Africa
	EMSIP	Eutrophication Management Strategy into Practice
	EONEMP	Earth Observation into the National Eutrophication Monitoring Programme
	EWSETA	Energy and Water Sector Education Training Authority
G	**GN-R.**	Government Notice - Regulation
I	**IRiS**	Integrated Regulatory information System
	IWQM	Integrated Water Quality Management
L	**LIMS**	Laboratory Information Management System
M	**M&E**	Monitoring and Evaluation
	MISA	Municipal Infrastructure Support Agent
N	**NEMA**	National Environmental Management Act, 1998 (ACT 107 of 1998)
	NEMP	National Eutrophication Management Programme

	NWRIA	National Water Resource Infrastructure Agency
	NT	National Treasury
	NWA	National Water Act, 1998 (Act 36 of 1998)
	NW&SMP	National Water and Sanitation Master Plan
	NWRS	National Water Resource Strategy
O	**OECD**	Organization for Economic Cooperation and Development
R	**RDM**	Resource Directed Measures
	RSA	Republic of South Africa
	RQO	Resource Quality Objective
	RWQO	Resource Water Quality Objectives
S	**SA**	South Africa
	SALGA	South African Local Government Association
	SDC	Source Directed Control
	SDS	Sources Directed Studies
	SDG	Sustainable Development Goal
T	**the dtic**	The Department of Trade, Industry and Competition
	TWQR	Target Water Quality Range
U	**UN**	United Nations
W	**WC/WDM**	Water Conservation and Water Demand Management
	WDCS	Waste Discharge Charge System
	WDS	Waste Discharge Standards
	WISA	Water Institute of Southern Africa
	WMA	Water Management Area
	WMS	Water Management System
	WQM	Water Quality Management
	WQM-F	Water Quality Management Forum
	WQPL	Water Quality Planning Units
	WQM-SC	Water Quality Management Steering Committee
	WRC	Water Research Commission
	WSAs	Water Services Authorities
	WSA	Water Services Act, 1997 (Act 108 of 1997)
	WSP	Water Service Providers
	WTWs	Water Treatment Works
	WWTWs	Wastewater Treatment Works

EXECUTIVE SUMMARY

South Africa's environmental and water policies reflect a strong message that aquatic ecosystems' health (*i.e.,* acceptable water quality) is a priority issue as they provide ecosystem services and water availability. The Bill of Rights contained in the **Constitution of the Republic of South Africa (1996)** binds the legislature, the executive, the judiciary, and all organs of state in terms of Section 24(a) to make provision for an environment that is not harmful to one's health or well-being; and Section 27 which places a duty on the state to take reasonable legislative and measures, within its available resources to achieve the progressive realization of providing sufficient water to everyone.

In response to the degradation of water quality trends caused by extensive nutrient loading observed in recent years, the **Eutrophication Management Strategy for South Africa (EMSSA)** was developed as a strategy to put eutrophication prevention measures in place, as a provision for the protection of water resources. Therefore, the **EMSSA** was initiated by the Department of Water and Sanitation in 2019 with the aim of addressing issues that are related to the degradation of water resources in South Africa due to anthropogenic nutrient enrichment. Such that it provides a plan of action that needs to be adopted and implemented by the water sector to achieve the goals and objectives of the National Water Act, 1998 (Act 36 of 1998), National Water Resource Strategy, National Water and Sanitation Master Plan (DWS, 2018), and the Integrated Water Quality Management Policy and Strategy (2017), as well as to ensure that the country is in line with the provision of Sections 24(a) and 27 of the Constitution.

The current **Eutrophication Management Strategy into Practice (EMSIP)** report, therefore, supports the EMSSA by providing a structured way to articulate how the EMSSA can be pragmatically implemented by arranging and translating all gaps, actions, and interventions identified in the EMSSA into **measurable outcomes** inclusive of **roles**, **responsibilities, and timeframes**.

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1. INTRODUCTION

1.1 BACKGROUND

The **Eutrophication Management Strategy for South Africa (EMSSA)** is one of the initiatives by the Department of Water and Sanitation (DWS) to address issues related to the degradation of natural resources, particularly eutrophication-related degradation of water resources (surface water, groundwater, wetlands, and estuaries). According to DWS (2017a), South Africa is facing multi-faceted water challenges, which, if not addressed effectively, have the potential to significantly limit the economic growth potential of the country considering the levels of water scarcity and all other factors that impact on the availability of water. Eutrophication is one of the factors that deteriorate water quality and subsequently impact on the availability of water.

Eutrophication is the process of **nutrient enrichment** of waters which results in the stimulation of an array of symptomatic changes, including increased production of algae and aquatic macrophytes, **deterioration of water quality** and other symptomatic changes found to be undesirable and interfering with water users (OECD, 1982). Anthropogenic nutrient enrichment of water resources is a global water resource problem. It is most evident in highly populated and developed areas where industrial effluent, water-borne sewage systems, wash-off from built-up areas, fossil fuel combustion and atmospheric fall-out, and agricultural practices contribute to elevated loads of nutrients entering receiving water resources (DWS, 2021b). According to Mohamed *et al.* (2019), the eutrophication problem is expected to worsen as the human population grows and consumes more resources. In 2017, the Integrated Water Quality Management (IWQM) Policy and Strategy for South Africa, identified eutrophication as an issue of priority and a challenge to water quality, needing urgent attention.

Eutrophication challenges in South Africa are exacerbated by insufficient wastewater infrastructure maintenance and investment; deteriorating ecological infrastructure; recurring droughts, driven by climatic variation, and an inescapable need for water resource development; inequities in access to safe sanitation, against the backdrop of a growing population; water use regulation that is not consistently and adequately protecting South Africa's water resources against eutrophication. Poor water quality, including eutrophication, is already having significant impacts on economic growth and the well-being of South Africans (DWS, 2017b). Thornton *et.al.* (2013), describes eutrophication as a *"wicked problem"* which is facing society, that cannot simply be fixed with only engineering solutions. These *"wicked problems"*, such as eutrophication, can have multiple resolutions, depending on a variety of factors (Thornton *et. al,* 2013). A national approach to eutrophication management must include the application of suitable wastewater treatment technology, catchment management and focused water resource planning (DWS, 2022a).

In South Africa, it has been recognized that managing eutrophication requires a systems-based approach, coupled with adaptive management approaches which should be supported by strong partnerships between government, civil society, and the private sector. During the phase of the development of the EMSSA, several issues were identified, including factors that hinder the implementation of policies and strategies in South Africa. Furthermore, the EMSSA identified numerous existing and new policies and strategies that need to be adopted and implemented to achieve the goal of the National Water Act, 1998 (Act 36 of 1998) (NWA); and the objectives of the National Water Resource Strategy (NWRS), National Water and Sanitation Master Plan (NW&SMP), as well as to take Integrated Water Quality Management Policies & Strategies (IWQM) into action.

1.2 PURPOSE OF THE STRATEGY INTO PRACTICE REPORT

The EMSSA is a plan of action that needs to be adopted and implemented by the water sector in South Africa to achieve the NWA, NWRS, NW&SMP and IWQM goals and objectives. Thus, the development of the Strategy into Practice Report supports the EMSSA and provides a structured way to articulate how this strategy can be pragmatically implemented.

Effective and adaptive management of eutrophication will be based upon the ability to make key adjustments timeously. Adaptive implementation requires ongoing evaluation and progressive organisational shift (**Figure 1).**

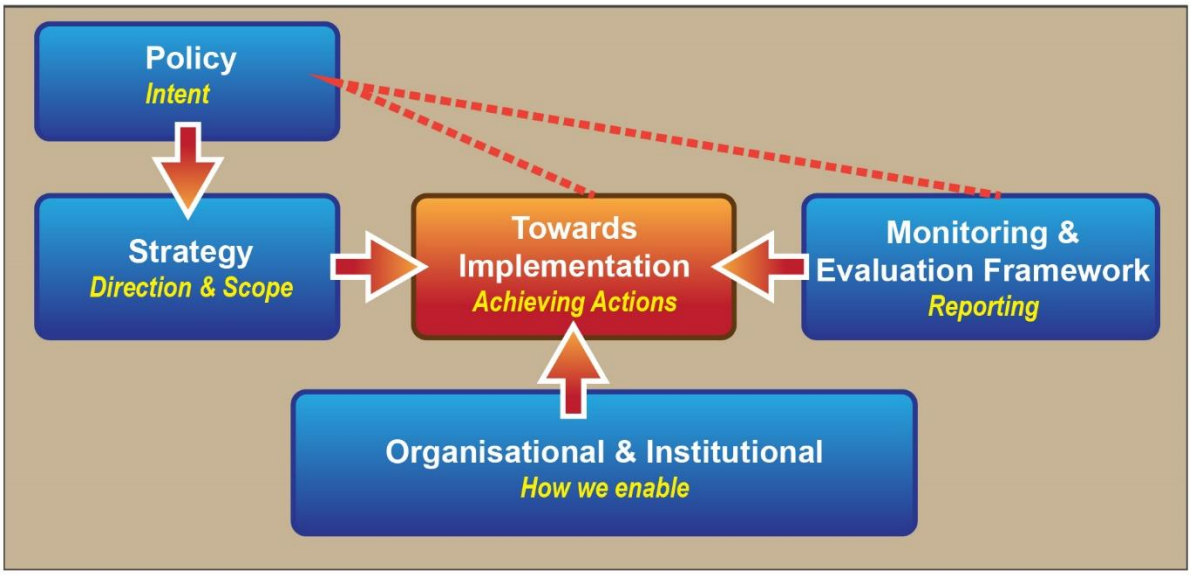

Figure 1: Relationship between policy, strategy, and implementation (DWS, 2017b)

The purpose of the **Eutrophication Management Strategy into Practice (EMSIP)** report is to arrange and translate all objectives, actions, and interventions identified during the development process of the EMSSA into **measurable outcomes** inclusive of **roles**, **responsibilities**, and **timeframes**. Most important, is the development of SMART (Specific, Measurable, Agreed-upon, Realistic, Time-based) targets which will be supported by the development of the Monitoring and Evaluation (M&E) framework (DWS, 2022a), which will allow DWS to monitor and report on progress.

The focus of eutrophication management in the implementation period should be towards:

- **Strengthening the eutrophication management governance:**
  This will involve elements of organisational design, which will focus on roles and responsibilities, as well as determining accountability. The identification of a champion in each province/Water Management Area (WMA)/catchment to lead the eutrophication management function should be a priority. This will be supported by a drive to communicate the EMSSA to the broader sector and to capacitate civil society.
- **Improving eutrophication information management:**
  The need to improve our systems to support adaptive management responses is critical and whilst much effort has been applied within DWS, the need to create more integrated systems across all the relevant Government Departments is becoming increasingly important.
- **Mobilising the sector:**
  There is a need to develop a sector-wide approach which underpins the philosophy of the IWQM and realises the objective of the EMSSA.

- **Realising impact:**
  Priority catchments must be identified, and a process initiated to address the core issues of eutrophication. The development of catchment management plans should be a priority in supporting this drive.

1.3 TARGET AUDIENCE

This EMSIP Report is a national document, based on sets of Strategic Goals, Issues and Actions to support the management of eutrophication in the country while aligning with the NWRS, NW&SMP, IWQM Policy and Strategy, as well as the recently completed EMSSA. The EMSIP (underpinned by EMSSA) is directed to all National, Provincial and Local Government departments, as well as Catchment Management Agencies (CMAs), sectoral institutions, civil society members, non-governmental entities, private sector, and all interested and affected parties involved in environmental management and anyone undertaking socio-economic initiatives.

1.4 LAYOUT OF THE REPORT

The report consists of four sections, excluding document signatories, document index and status, acknowledgements, table of contents, list of figures, tables and acronyms, and bibliography. The layout of the report is as follows:

Section 1	**INTRODUCTION**
	Provides the background of the development of EMSSA, the purpose of developing the EMSIP report, and the structure of this report.
Section 2	**ALIGNMENT WITH BROADER OBJECTIVE**
	Provides linkages between the Strategy into Practice and broader objectives of National Strategies.
Section 3	**TOWARDS IMPLEMENTATION**
	Provides guidance on the implementation of EMSSA; and the prioritized short, to long-term strategic actions to take forward. It also provides supporting tools necessary to support the fruitful implementation.
Section 4	**MONITORING AND EVALUATION FRAMEWORK**
	Provides guidance on the focus of a monitoring framework of the EMSSA.

2. ALIGNMENT WITH BROADER OBJECTIVES

2.1 THE INTERNATIONAL SUSTAINABLE DEVELOPMENT AGENDA

The Sustainable Development Agenda (SDG) programme, which was endorsed by Heads of State (including South Africa), serves as a reporting platform to measure the sustainability of countries; to prompt actions in case of poor performance or deteriorating trends; to bolster local accountability; and for global comparison purposes. SDG Target 6 specifically focuses on clean water and sanitation and must ensure the availability and sustainable management of water and sanitation for all. SDG 6 was unpacked into six SDG targets and two additional supporting SDG targets. Of these, the following four SDG Targets specifically relate to eutrophication management (**Table 1**). A series of twelve indicators, some global, some domestic and other additional indicators, were proposed to collectively measure progress against the said four SDG targets.

Table 1: SDG 6 targets and indicators, with direct relevance to eutrophication management

SDG 6:	**Ensure availability and sustainable management of water and sanitation for all**
SDG TARGET 6.2:	**SANITATION AND HYGIENE**
By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations.	
Indicator 6.2.1:	Proportion of population using safely managed sanitation services, including a handwashing facility with soap and water.
SDG TARGET 6.3:	**WATER QUALITY AND WASTEWATER**
By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally.	
Indicator 6.3.1D:	Proportion of water containing waste lawfully discharged.
Indicator 6.3.2D:	Proportion of bodies of water that complies with water quality objectives.
Indicator 6.3.3A:	Proportion of water containing waste recycled or reused.
Indicator 6.3.4A:	Proportion of waste lawfully disposed of.
Indicator 6.3.5A:	Proportion of waste recycled or reused.
SDG TARGET 6.5:	**WATER RESOURCES MANAGEMENT**
By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate.	
Indicator 6.5.1:	Degree of integrated water resources management implementation (0 - 100).
Indicator 6.5.2:	Proportion of transboundary basin area with an operational arrangement for water cooperation.
SDG TARGET 6.6:	**WATER-RELATED ECOSYSTEMS**
By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes.	
Indicator 6.6.1D(1):	Change in the spatial extent of water-related ecosystems over time, including wetlands, reservoirs, lakes and estuaries as a percentage of total land area.
Indicator 6.6.1D(2):	Number of systems affected by high trophic and turbidity states.
Indicator 6.6.1D(3):	Change in the national discharge of rivers and estuaries over time.
Indicator 6.6.1A(1):	Change in the ecological condition of rivers, estuaries, lakes and wetlands.

2.2 ROLE OF DWS IN WATER RESOURCE MANAGEMENT

South Africa's environmental and water policies reflect a strong message that aquatic ecosystems and water quality are priority issues of environmental concern as they provide ecosystem services and water availability. Water availability (quantity and quality) must be considered for the present and future generation needs, *i.e.,* to cater for the country's transitioning economy in light of the National Development Plan and post-COVID-19 socio-economic pathway. All environmental and water policies are governed by the Bill of Rights which is contained in the **Constitution of the Republic of South Africa (1996).**

The Constitution applies to all laws and binds the legislature, the executive, the judiciary, and all organs of state. The Bill of Rights places a duty on the state to implement reasonable legislative and other measures to protect water resources. *"Other measures"*, in this case, include the roll-out and implementation of the eutrophication management strategy to protect water resources. Additionally, Section 27 in the Bill of Rights places a duty on the state to take reasonable legislative and other measures, within its available resources, to achieve the progressive realization of providing sufficient water to everyone. The foundation for water quality protection in South Africa is provided by Section 24(a) of the Constitution which makes provision for fundamental and dual solidarity rights to an environment that is not harmful to one's health or well-being.

One of the mandates of the DWS, as the custodian of the country's water resources is to **protect water resources** for current use and future generations. This can be achieved through the management of water quality of the resource in an integrated manner. The NWA together with the Water Service Act (Act 108 of 1997) (WSA) promotes sustainability and equity as the central guiding principles in the protection, use, development, conservation, management, and control of water resources. **Chapter 3** of the NWA specifically deals with the **protection of water resources** and focuses on **pollution prevention measures**, whereas the WSA makes provision for basic water supply and sanitation services. The WSA further prescribes the legislative duty of municipalities as water-service authorities (WSAs) to provide water supply and sanitation according to national standards and norms.

Therefore, the EMSIP is directly responding to the objective of putting pollution prevention measures in place, as a provision for the protection of water resources and bridging the gap between the development of strategies and implementation thereafter.

2.3 ALIGNMENT WITH THE INTEGRATED WATER QUALITY MANAGEMENT POLICY AND STRATEGY FOR SOUTH AFRICA

BOX 1: ***IWQM Vision and Mission***

Vision: ***"Government, in partnership with private sector and civil society, secures water that is fit-for-use, for all, forever."***

Mission: ***"To adopt a government-wide, adaptive and systems-based management approach, in alliance with the private sector and civil society, that will improve resource water quality, prevent pollution and ecological degradation, support ecologically sustainable economic & social development and allow an informed use of the nation's water resources."***

The umbrella IWQM vision and mission were adopted for the management of eutrophication in South Africa. In addition, thereto, is a national goal for eutrophication management, namely: **"To manage eutrophication effectively in order to protect aquatic ecosystems and to secure water resources that are fit-for-use**". Collectively, this suite of aspirational goals established a visionary and resolute guiding thrust for the newly developed eutrophication management policy and strategy. The IWQM

policy amongst other things aims to provide the required framework for the development of related policies and sub-strategies related to water quality management, as the aim that enabled the development of the EMSSA.

The IWQM Strategy identified eutrophication as a priority water quality issue, requiring intervention as a matter of urgency. The relationship between IWQM Policy and Strategy and EMSSA is demonstrated in **Figure 2.**

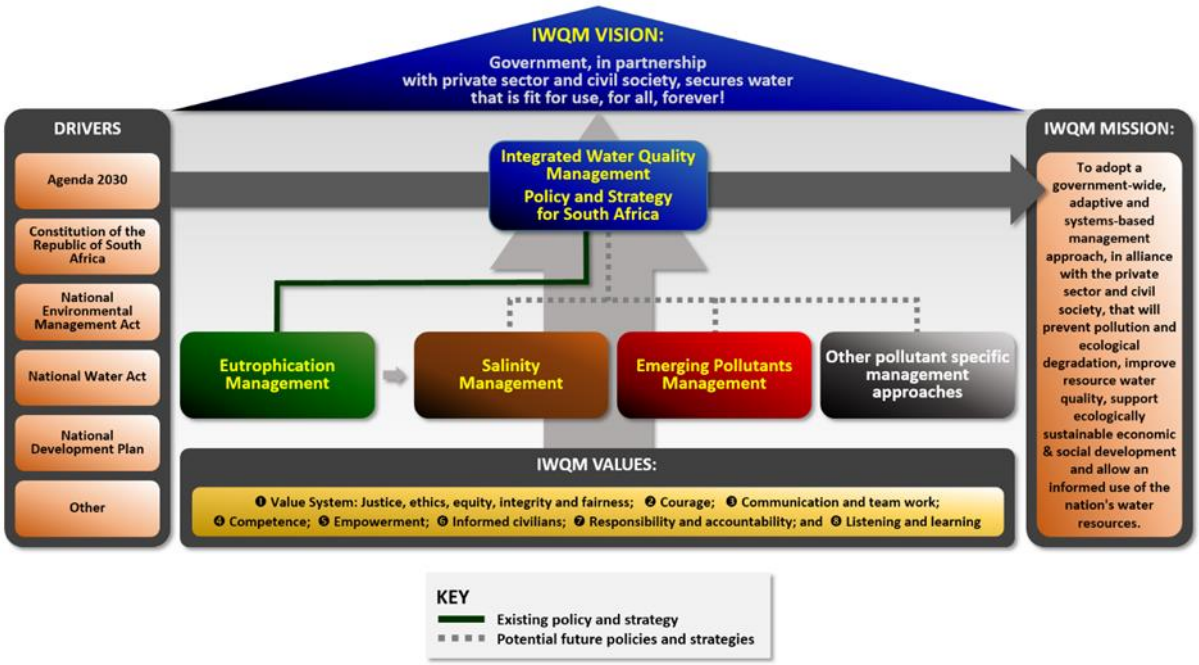

Figure 2: Relationship between the IWQM and EMSSA (DWS, 2022a)

2.4 ALIGNMENT WITH THE EUTROPHICATION MANAGEMENT STRATEGY

BOX 2: ***Eutrophication Management Policy & Strategy Goal***

Goal: ***"To manage eutrophication effectively in order to protect aquatic ecosystems and to secure water resources that are fit-for-use."***

Since the inception of this initiative, supporting documents such as the Inception Report, and the Situation Assessment and Gap Analysis Report were developed with the aim of establishing the status quo with respect to eutrophication challenges, management practices and instruments (https://www.dws.gov.za/WEM/SDCCOactive.aspx). The EMSSA was developed by the DWS in 2021 to provide direction with respect to the management of eutrophication, in particular the control of anthropogenic sources of excessive nutrient enrichment, from a strategic country-perspective. The Eutrophication Management Policy contains fourteen policy statements, which are technical in nature, and five supporting policy statements which are general and cross-cutting in nature, that altogether are regarded as the most pertinent to eutrophication management in South Africa. These policy statements (**Figure 3**) define ground rules, delineate intent, and specify desired outcomes with respect to the management of eutrophication. The EMSSA, further, provides strategic guidance to policy implementation.

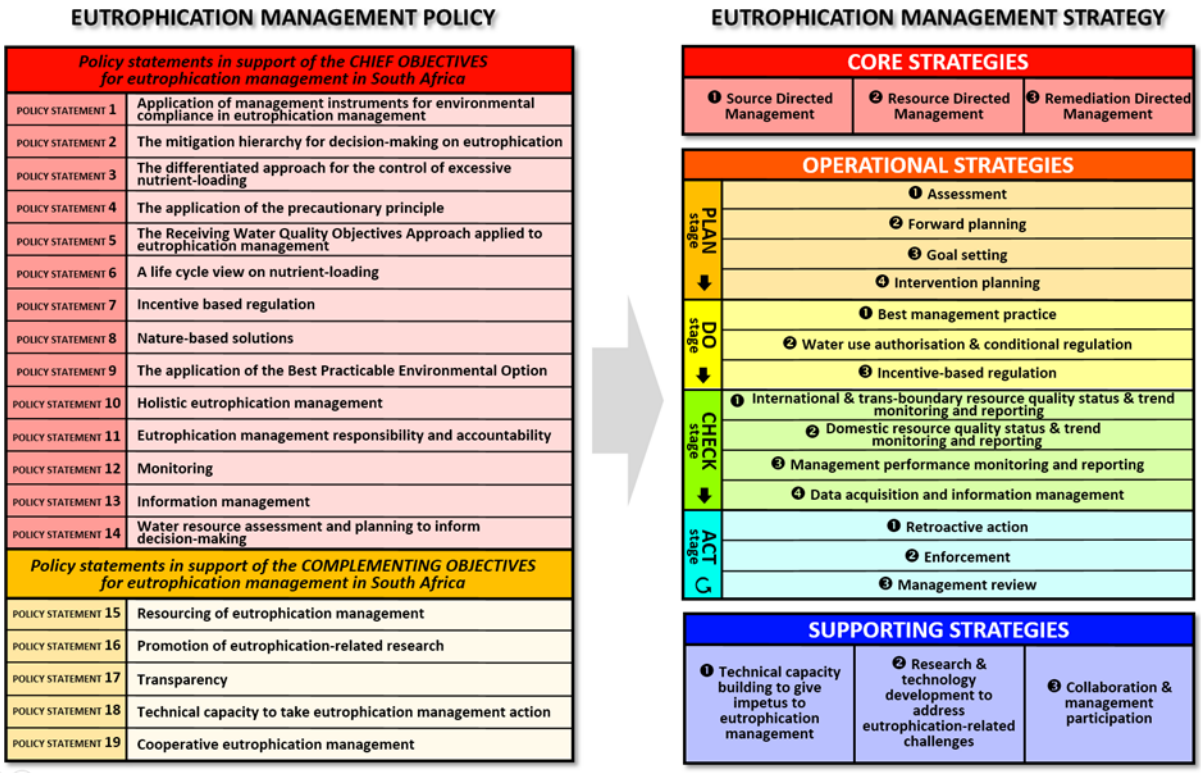

Figure 3: Eutrophication Management Policy and Strategy "ROADMAP" (DWS, 2022a)

From policy objectives, EMSSA adopted three types of interrelated and mutually supporting strategies (**Table 2**), namely:

- **Core strategies** – which give effect to the ambitions of the eutrophication management goal and policy. These strategies focused on the characters of eutrophication management, namely, **Sources** Directed**, Resource** Directed and **Remediation** Directed Management and highlighted the linkages between these strategies.
- **Operational strategies** – which complement the core strategies for eutrophication management by providing additional resolution on the four stages within the water quality and management framework (*Plan-Do-Check-Act*) in relation to eutrophication; and provide further operational guidance to eutrophication management in South Africa.
- **Supporting strategies** – which have been developed to support eutrophication management. Such that strategies for *technical capacity building* give impetus to eutrophication management; *Research and technology development* to address eutrophication-related issues; and *collaboration and management participation,* were developed.

These three inter-related and mutually supporting strategies are directed towards the realisation of the national eutrophication management goal and the associated objectives.

Table 2: Summary of the eutrophication management strategies

Strategy	Characters of Eutrophication Management	Description
CORE STRATEGIES	SOURCE DIRECTED MANAGEMENT	Management of sources of impacts through progressive identification of 'impacting factors and management of root causes. It is endeavoured to control the causes of anthropogenic eutrophication at the sources of impact by employing operational strategies, such as best management practices; authorisations and conditional regulation, including the use of emission standards and pollution management regulations, made in terms of enabling legislation; and others, in accordance with the policy on the application of management instruments for environmental compliance
	RESOURCE DIRECTED MANAGEMENT	The purpose of Resource Directed Management is to ensure continued fitness-for-use of the country's water resources. As such, Water Resource Classes, Reserves and Resource Quality Objectives (RQOs) have been determined for majority of Catchments in the country; implementation of these Resource Directed Measures (RDM) tools on the ground ought to be visible and measurable through evidence of inclusion into water use license conditions and authorizations. In addition, these tools must also be utilised for the purpose of monitoring and evaluating implementation progress.
	REMEDIATION DIRECTED MANAGEMENT	Where water resources have been degraded due to eutrophication impacts, rehabilitation efforts should be initiated.
OPERATIONAL STRATEGIES	PLAN	The planning stage of the eutrophication management framework must ensure that the stakeholders are consulted to establish a common ground and buy-in and to gather suitable base information on the catchment to support the management of eutrophication. Planning to address eutrophication is essential and it must be done in accordance with the accepted framework for water quality planning, namely: 1) assessment, 2) forward planning, 3) goal setting and 4) intervention planning.
	DO	The *Do* stage is about the application which turns the eutrophication strategy into *actions* and *results* to accomplish the eutrophication management goal, objectives and associated policy imperatives. It must be ensured that effect is given to the goals that were determined, and strategies and thematic plans that were established during the *plan* stage in order to manage eutrophication in catchments.
	CHECK	The *check* stage must support transboundary and international monitoring campaigns and generate national and regional intelligence on the nutrient-loading and trophic status of receiving water resources. Land and water use activities need to be monitored to check if they are complying with regulatory requirements that support the limiting of eutrophication impacts. It also evaluates the implementation and effectiveness of management interventions and establishes a suitable information management system.
	ACT	The *act* stage must ensure that all sources of impact are addressed, all regulatory and administration measures are adequately enforced, and management measures are improved.
SUPPORTING STRATEGIES	TECHNICAL CAPACITY BUILDING	Provision of necessary sector leadership with respect to building technical water services and resource management, including eutrophication and capacity. Advancement of capacity across the water value chain requires a robust partnership with stakeholders that have specific roles and responsibilities towards common capacity-building objectives, with the DWS playing a strong direction-giving and coordinating role
	RESEARCH AND TECHNOLOGY DEVELOPMENT	There is a need to address challenges facing institutional and environmental skills, water research, development, and innovation, such as an improvement of coordination and synergising of activities between institutions; strengthening the understanding of the role of all water sector organisations in driving innovation and shifting solutions; promote the upscaling of solutions to be ready for the market and prioritization of funding for innovation.
	COLLABORATION AND MANAGEMENT PARTICIPATION	Collaboration and management participation between the authorities that are responsible, and the private sector and civil society are prerequisites for effective eutrophication management. Thus, the success of eutrophication management relies on appropriate collaboration and support that can be harnessed to aid with the implementation and execution of the Eutrophication Strategy.

3. TOWARDS IMPLEMENTATION

3.1 INTRODUCTION

Policy implementation has been a great challenge for governments across all public sectors since 1994 (von Holdt, 2010). Three processes are reported to be the contributing factors, namely, political transition, state transformation and administrative restructuring linked to the new mandate, missions, and policies under the new dispensation (Bourblanc, 2017). The combination of these factors resulted in massive disorganization within public administrations (Bourblanc, 2017).

There is, and likely will continue to be, a significant change in the institutional arrangements, water governance and organisational responsibilities in the water sector. However, without clarity in these areas, particularly around defined roles and responsibilities, the possibilities for effective management and decision-making, with respect to water resources and their quality, will be seriously jeopardised. This section, therefore, focuses on roles and responsibilities, specifically with respect to the identification of the various responsible authorities who play important roles, and who may potentially impact on the trophic status of water resources. This section must be read in conjunction with the EMSSA Report, which extensively explains all Strategies that need to be implemented "direction and scope".

3.2 IMPLEMENTATION APPROACH

The plan for implementation of EMSSA should function at the catchment level within the existing WMA. However, all levels *i.e.,* National, Provincial and Local Departments [*e.g.,* DWS, Department of Forestry, Fisheries and Environmental (DFFE)/ Department of Environmental Affairs (DEA), Department of Agriculture, Land Reform and Rural Development (DALRRD), and Department of Cooperative Governance and Traditional Affairs (COGTA)] will need to play a role in order to achieve the goals of the implementation and therefore full delegation applied through the Catchment Management Strategy of respective CMA.

The implementation of EMSSA should include the following four steps:

- Defining roles, responsibilities, and timeframes;
- Managing activities necessary to achieve the implementation of EMSSA through the identification of actions;
- Implementation of supporting activities *i.e.,* monitoring, data management, *etc.*; and
- Adaptive management.

3.3 ROLES AND RESPONSIBILITIES

The mandate to manage water resources falls within the DWS as the custodian of the country's water resources. However, the Department understands that the management of water resources requires a multisector-wide approach, across both the private and public sectors, and this is a central theme within the NWRS-2, NW&MP and IWQM which recognize the integration and connectivity of water to national development. There is a general belief that failure to give effect to policy and strategy can often be placed at the door of organizational structure. To be effective, organizations need clear, focused goals and appropriate strategies for achieving their goals (DWS, 2017c). Therefore, management of eutrophication is not only the responsibility of DWS but also the responsibility of various sector role-players and stakeholders. **Figure 4** presents some of the key role-players responsible for the management of eutrophication which is expanded on **Appendix A-1**.

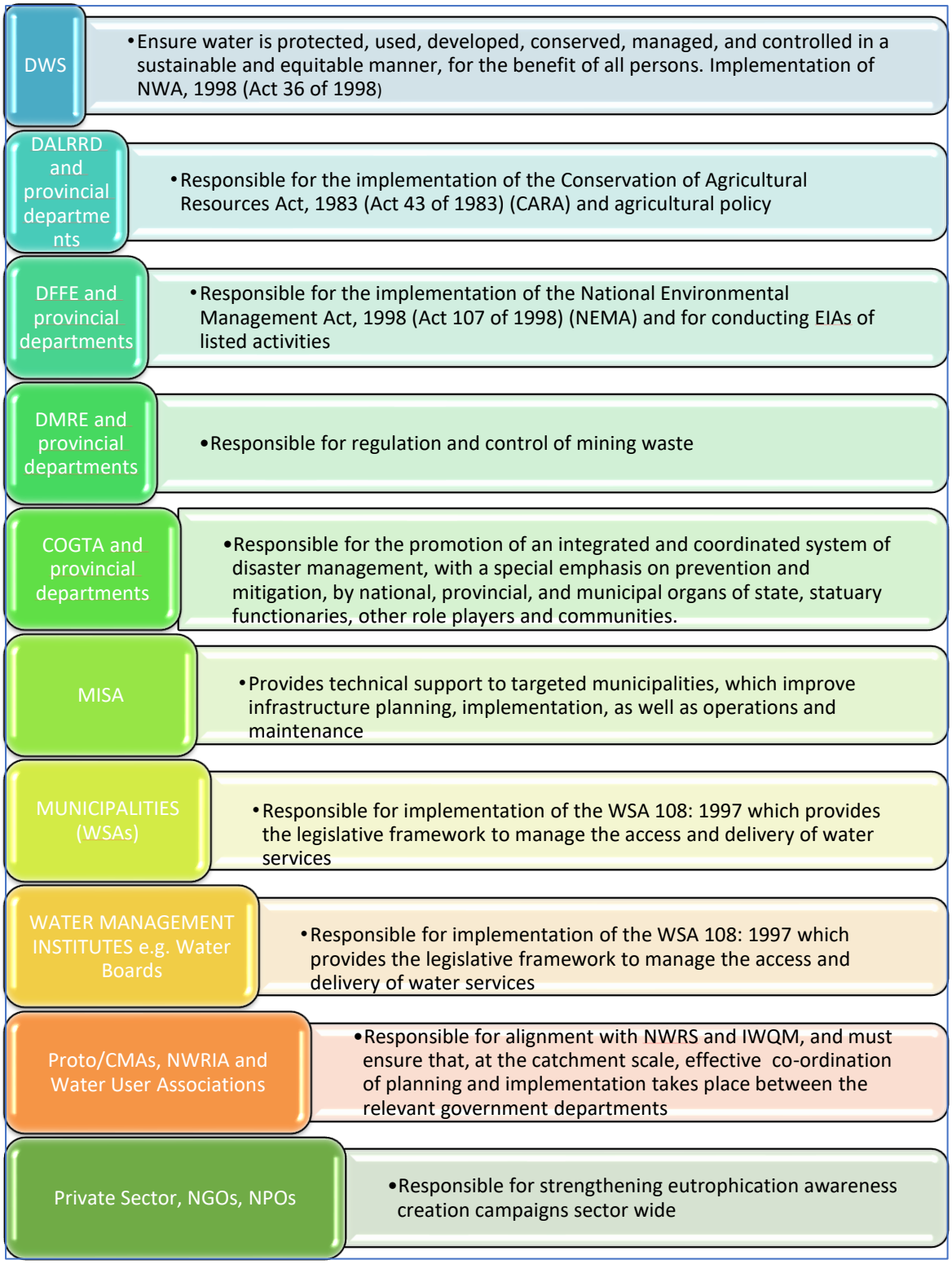

Figure 4: Relevant authorities and roles in eutrophication management

Prioritized actions that were identified in the EMSSA and expanded during consultations within DWS for the effective roll-out of the Strategy are presented in **Table 3**. The objective is to get all parties involved in the management of eutrophication, such that they take ownership and responsibility for their portion of the programme.

Table 3: Prioritized actions, responsible authorities, and timeframes. Short-term = 0 – 5 years; long-term = over 5 years

No.	Strategies	Type of Strategies	Prioritized Actions and Required Interventions	Responsible Authorities	Timeframes
1.	CORE STRATEGIES	SOURCE DIRECTED MANAGEMENT	SHORT-TERM (0-5 years)		
			Develop and implement (an) approach(s) to ensure that the conditions in water use authorisations, including those that specify WDSs, ensure compliance to statutory RDMs, specifically RQOs.	DWS Head Office (HO), Regional Offices (RO), Proto/CMA	2024 for development; 2025-2028 for implementation
2.			Evaluate and/ or develop model by-laws, in support of local government, to limit excessive nutrient-loading and to protect raw water quality.	COGTA, Water Service Authorities (WSAs), DWS: (Water Services Regulation (WSR), Economic and Social Regulation (ESR), Sanitation Services)	2023 for evaluation of existing by-laws; and 2024 for development
3.			Develop and/or gazette water management regulations for impacting sectors (*e.g.,* feedlots, industries, etc.) that also contribute towards anthropogenic eutrophication.	DWS: Regulation, DALRRD, the dtic	2024
4.			Compile and publish specific sector offset policies for wetlands and for water quality to enable the rolling out of offsetting for eutrophication management.	DWS, DFFE	2024
5.			Evaluate suitability and/ or effectiveness of those measures that deal with the control and regulation of sources of anthropogenic eutrophication – consideration must be given to the development and publication of such regulations.	DWS: Regulation	2023, and thereafter on-going
6.			Finalise/Update and Implement Diffuse (Non-Point) Source Management Guidelines for South Africa that harmonise with and support the Eutrophication Management Strategy for South Africa.	DWS: Water Resource Regulation (WRR), WRC	2024 for finalising/updating. 2027 for implementation
			LONG-TERM (Over 5 years)		
7.			Implement sector-specific action plans to reduce diffuse source pollution (in support of the Diffuse Source Management Strategy for South Africa).	DWS: WRR, Sanitation Services, DoH, water use sectors (*i.e.,* agriculture, industrial, mining, municipal/domestic, power generation, *etc.*	After the implementation of the diffuse strategy and Faecal Sludge Management Strategy

No.	Strategies	Type of Strategies	Prioritized Actions and Required Interventions	Responsible Authorities	Timeframes
8.		RESOURCE DIRECTED MANAGEMENT	SHORT-TERM		
			Operationalise the Resource Directed Management (RDM) Approach and achieve compliance to the requirements of the Water Resource Class(es) (RQOs and Reserves) and/ or supporting RWQOs/ WQPLs. Better integration between Source and Resource Directed Management is essential.	DWS: (Water Resource Classification (D: WRC), Reserve Determination (D: RD), Compliance Monitoring and Enforcement (CME), RO), Proto/CMA	Implementation of the RDM Operational Guidelines project was initiated in 2021
9.			Gazette regulations to protect high yield water source areas, particularly the strategic water source areas (*i.e.,* strategic surface water source and critical groundwater recharge areas).	DWS: Regulation, DFFE	2024
10.			In cases where the enabling legislation allows for the making of regulations that could assist with the protection of water resources against the effects of anthropogenic eutrophication, but such regulations do not exist, consideration must be given to the development and publication of such regulations.	DWS: WRR	2025
11.			Support SDG 6.3.2D and internalise reporting on the fitness for use of South Africa's water resources	DWS: RQIS RO, Proto/CMA to support RQIS	Ongoing
12.		REMEDIATION DIRECTED MANAGEMENT	SHORT-TERM		
			Implementation of financial provision for the remediation/rehabilitation of degraded water resources.	DWS: (ESR, WRR), DFFE, DMRE, DALRRD, WSAs, NT, water use sectors (agriculture, industrial, mining, municipal/domestic, power generation, *etc.*)	2023/24 financial year
13.			Develop and implement dedicated Remediation Guidelines for South Africa to guide the removal of contaminants from, amongst others, soil, surface water, groundwater, and sediment, which may also exacerbate eutrophic conditions in receiving water resources.	DWS: SDS, DFFE	Ongoing, DWS Projects to develop Rehabilitation Guidelines and to conduct studies on Cleaner Technology Options for Water Quality are underway and coordinated by SDS. 2025/26 for implementation

No.	Strategies	Type of Strategies	Prioritized Actions and Required Interventions	Responsible Authorities	Timeframes
14.			Ensure the implementation of financial provision, in conjunction with the WDCS, to cover the cost of remedial action.	DWS, DFFE, DMRE, DALRRD, WSAs, NT, water use sectors (agriculture, industrial, mining, municipal/domestic, power generation, *etc.*)	2024
15.			Develop a risk-based approach to prioritise remedial action.	DWS: (WRR, CME, Source Coordination), DFFE	2025
16.			Develop rule-based best management practice measures to inform remedial action.	DWS: Mine and Industrial Waste Regulation (MIWR), WRC, DFFE, SANBI	2026
17.			**LONG-TERM**		
			Develop and implement programmes to remediate priority impoundments and water resources, in accordance with relevant geographical water quality management strategies and thematic plans, utilising revenue from the WDCS.	DWS: (RO, Resource Protection, SDS) Proto/CMA, DFFE	Immediately after the implementation of the WDCS
18.	OPERATIONAL STRATEGIES	PLAN	**SHORT-TERM**		
			Determine statutory RDMs, *i.e.,* Water Resource Class(es), RQOs and Reserves, for outstanding significant water resources.	DWS – D: Water Resource Classification (D: WRC) and D: RD	In progress for implementation
19.			Determine/review RWQOs/ WQPLs, based on the South African Water Quality Guidelines, in support of statutory RDMs, specifically the RQOs.	RWQOs by Proto/CMAs, and WQPls by the DWS: Water Quality Planning (WQP)	WQPLs to be reviewed in 2025
20.			Develop and roll-out the methodologies to determine Nutrient Load Objectives (NLOs) (e.g., developing TMDLs).	DWS: Source Coordination, WQP, WRC	3-5 years after the implementation of EMSSA
21.			Establish and implement geographical water quality management strategies and thematic plans for three priority areas (namely, Crocodile (West) Marico, Upper Vaal, and Olifants) first, followed by the establishment and implementation of water quality management strategies and plans for the remaining WMAs. Waste load accounting, goal setting, and water quality allocation plan development constitute important components of this process.	DWS: WRR, National Water Resource Information Management, RO, Proto/CMA	During the implementation of WDCS

No.	Strategies	Type of Strategies	Prioritized Actions and Required Interventions	Responsible Authorities	Timeframes
			LONG-TERM		
22.			Influence Water Services Development Plans (WSDPs), Integrated Development Plans (IDPs), and any other relevant strategies, plans or frameworks to reflect eutrophication management priorities and management requirements.	DWS: WSR, WSAs, COGTA	Starting from 2024
23.			Establish and implement geographical water quality management strategies and thematic plans for the remaining WMAs.	DWS: WRR, National Water Resource Information Management, RO, Proto/CMA	2027 and thereafter on-going
24.		DO	**SHORT-TERM**		
			Reduce phosphorus loads in wastewater from WWTWs and render these in line with the assimilable capacity of receiving water resources.	DWS: RO, Proto/CMA	To be aligned with RQOs
25.			Promote the reduction, recycling and re-use of excessive nutrient-load containing waste and/ or wastewater, and faecal sludge in accordance with relevant geographical water quality management strategies and thematic plans.	DWS: (Sanitation Services, RO), Proto/CMA, WSAs, Dep. Education (DoE)	Ongoing, Faecal Sludge Management Strategy is awaiting approval by the Minister of DWS
26.			Gazette uniform mandatory national WDSs, specifically revising all eutrophication-related standards, in support of water use authorisations.	DWS: WRR	2025
27.			Address shortcomings with respect to the authorisation conditions of some ELUs that cause, or may potentially cause, excessive nutrient-loading and anthropogenic eutrophication.	DWS: Water Use Authorization (WUA), RO Proto/CMA	2026
28.			Develop and implement a protocol to differentiate between water users in terms of risk. The differentiated control and management of sources of excessive nutrient-loading will enable the prioritisation of action and resources.	DWS: CME, RO, Proto/CMA,	2023
29.			Develop and implement a protocol for an integrated licencing process to streamline authorisations, including CMA engagement, as well as strengthen the regulation of licence conditions. An efficient authorisation is vital to effective eutrophication control and management.	DWS: (WUA, RO), DMRE, DFFE, Proto/CMA	2024
30.			Finalise Waste Discharge Charge System (WDCS) strategy for implementation nationally, including waste discharge charges for nutrient-loading.	DWS: WRR	WDCS strategy is being reviewed
31.			Establish financial incentives to promote water reuse and recycling, including the reuse of municipal wastewater, when the water budget allows for it.	DWS: ESR, Local Government, Water Users, WSAs, COGTA	3 years after the implementation of WDCS
32.			Maintain a National Pollution Register, which, amongst others, shows compliance with nutrient standards.	DWS: Resource Protection, CME, RO	Monthly Reporting

No.	Strategies	Type of Strategies	Prioritized Actions and Required Interventions	Responsible Authorities	Timeframes
33.			Achieve and ensure compliance to the requirements of all water use authorisations, specifically including water users that contribute towards anthropogenic eutrophication.	DWS: (CME, RO), Proto/CMA	2023, and thereafter on-going
34.			Promote cleaner production and technologies, specifically to combat anthropogenic eutrophication.	DWS: (Sanitation Services, SDS), Proto/CMA, Local Government, WSAs, Dep. Science and Innovation (DSI) WRC, the dtic, DMRE, COGTA	2022/23
35.			Investigate and establish stormwater quality measures to control nutrients ingress.	WSAs, COGTA DWS: RO, Proto/CMA to support WSA	Ongoing
36.			Investigate and establish measures and controls for diffuse pollution.	DWS: WRR, WSAs, mines, agriculture, industries	Non-point Source Strategy was part of the development of WDCS. It needs to be finalized by 2027
			LONG-TERM		
37.			Implement (a) management system(s) to support an integrated licensing approach.	DWS: WUA	2027
38.			Develop and implement sectoral off-setting policies for water quality, wetlands and estuaries, based on the Overall Policy on Environmental Offsetting in South Africa.	DWS, DFFE	2027
39.			Develop a publicly accessible register of all offsets to facilitate compliance monitoring.	DWS, DFFE	2027
40.		**CHECK**	**SHORT-TERM**		
			Ensure the availability of back-to-back laboratory services with appropriate accreditation and analytical sensitivity to support eutrophication management on a continuous basis.	DWS: RQIS	Ongoing
41.			Undertake routine national eutrophication monitoring, considering the recommendations of the Review of the South African Water Resource Monitoring Network report.	DWS: RQIS Supported by Water Service Providers (WSP), Proto/CMAs	Ongoing
42.			Strengthen the NEMP and establish a TSI for rivers and streams.	RQIS	2025
43.			Realign/ revive regional eutrophication monitoring programmes, in cooperation with all relevant role-players, and undertake routine regional eutrophication monitoring.	DWS (RQIS & RO), Proto/CMA	Ongoing

No.	Strategies	Type of Strategies	Prioritized Actions and Required Interventions	Responsible Authorities	Timeframes
44.			Current gauging networks should be upgraded and maintained to undertake appropriate flow measurements, as part of the national and regional eutrophication monitoring programmes, to enable nutrient load monitoring and apportionment on a WMA and sub-catchment basis.	DWS: Hydrology, RQIS, RO, CMAs, WSAs	Ongoing
45.			Consider and, where desirable, develop and implement citizen science eutrophication monitoring programmes, in support of other resource quality monitoring programmes.	DWS (RO), WSPs, and Proto/CMA RQIS to provide support	Ongoing
46.			Consider and, where necessary, introduce and mainstream advanced technology to monitor eutrophication, *e.g.,* remote sensing, drone technology, *etc*.	DWS: (RQIS & RO, Spatial Information), Proto/CMA, WRC, WSAs, and WSP	2024
47.			Achieve and ensure compliance to the requirements of all water use authorisations, specifically including water users that contribute, or may potentially contribute towards anthropogenic eutrophication.	DWS: (CME, RO), Prot/CMA	2023, and thereafter on-going
48.			Improve the effectiveness and efficiency of the water quality data management system(s) through the implementation of the findings of the Data Management Strategy. Good data management is a prerequisite for effective eutrophication management.	DWS: IP, RQIS	Ongoing
49.			Update and gazette regulations to compel water users to register and upload waste discharge water quality and volumetric data, specifically data and information that will aid eutrophication management, on the Integrated Regulatory Information System (IRiS), or alternative system(s).	DWS: WARMS, Municipal Wastewater Quality Monitoring (MWwQM)	2025-2027
50.			Expand IRiS to capture data and information from water users that monitor the disposal of waste/ discharge of water containing waste for compliance monitoring purposes. The availability of suitable data and information will improve the management of eutrophication.	DWS: MWwQM, CME	Ongoing
51.			Generate and compile annual national eutrophication-related compliance monitoring status reports.	DWS: RQIS	D: RQIS to input in the NSoW annual report
52.			Generate and compile biennial national eutrophication status reports.	DWS: RQIS	2025, then biennial going forward
53.			Generate and compile annual catchment eutrophication status report(s).	DWS: RO, Proto/CMA RQIS to provide support	2024, then annual going forward
54.			Learn from the SDG Programme, and expand South Africa's domestic monitoring programmes, in support of effective eutrophication planning, regulation, and management, to incorporate the useful concepts from the SDG Programme.	DWS: RQIS	In implementation

No.	Strategies	Type of Strategies	Prioritized Actions and Required Interventions	Responsible Authorities	Timeframes
55.			Harmonise the systems and approaches being used across sector departments and catchments for resource water quality data and information management.	DWS: Water Resource Information (WRI)	In implementation, Data Acquisition Strategy is being developed by the DWS
56.			Structures, such as the National Water Quality Management Forum, the Anti-Pollution Task Team (APTT) and the Water Quality Management Steering Committee, must be utilised as platforms for regular reporting, performance tracking and deliberating.	DWS: WRR, CME	Quarterly
57.			The DWS will be responsible for the national assessment of water quality and will report annually on the state of eutrophication in the country.	DWS: RQIS, Regulation	2024, then going forward report annually
58.			Law review to enforce monitoring within the municipal water value chain, especially monitoring and submission of data by commercial and industrial activities that discharge to municipal sewer network systems.	COGTA, WSAs, DWS: (MWwQM, Regulation, Policy & Strategy)	Ongoing
			LONG-TERM		
59.			Government to ensure the harmonisation of data and information systems pertaining to source control, especially with respect to land use that contributes towards anthropogenic eutrophication.	DWS: WRI, DARLLD, DFFE, DMRE, water-sector	2027
60.		**ACT**	**SHORT-TERM**		
			Committee structures, such as the National Water Quality Management Forum, the Anti-Pollution Task Team, and the Water Quality Management Steering Committee, must be utilised as platforms to effect improvement; and Catchment Management Forums (CMFs) must be utilised for early warning and local level feedback.	DWS: WRR to coordinate committees. DWS RO, Proto/CMA to coordinate CMFs	2023, then Annual onward
61.			Achieve compliance to the requirements of in-water resource water quality objectives, *i.e.,* the RQOs and supporting RWQOs/ WQPLs, to ensure fitness-for-use of receiving water resources through the implementation of adaptive, systems-based catchment eutrophication management, and adjust the control of impacts on the trophic status of receiving water resources.	DWS: CME, WRR	2023/24
62.			Implement programmes to rehabilitate and manage resource water quality *"hotspots"* in priority catchments, in accordance with the relevant geographical water quality management strategies and thematic plans (if justified, utilising revenue from the WDCS).	DWS: (ESR, RO, WQP), Proto/CMA	2023/24
63.			Undertake targeted compliance monitoring and enforcement of key polluting sectors, specifically those that contribute to anthropogenic eutrophication.	COGTA & DWS: CME, WQM-SC/APTT	2024

No.	Strategies	Type of Strategies	Prioritized Actions and Required Interventions	Responsible Authorities	Timeframes
64.			Turn the performance/ functionality of currently non-compliant/ dysfunctional WWTWs and initiate an accompanying publicity campaign, followed by a programme to address remaining non-compliant/ dysfunctional WWTWs, including WSA' Green Drop performance.	DWS: CME, WSR	2023
65.			Roll-out of intervention plans to address priority non-compliant industries.	DWS: RO, Proto/CMA	2024
66.			Restructure the grant funding mechanisms and conditions for water supply and sanitation to ensure a focus on maintaining and restoring existing infrastructure, rather than the construction of new infrastructure. Where appropriate new and innovative technology should be considered.	DWS: (WSR, ESR, CME), COGTA, WSAs, NT, MISA	2025
67.			Establish a mechanism for applying Administrative Penalties.	DWS: ESR, CME, Dept. of Justice	2023/2024 financial year
68.			Standardise and enforce required Operation and Maintenance (O&M) budgeting and expenditure for eutrophication management.	DWS: (ESR, CME) NT, COGTA, MISA, SALGA	As of 2023/2024 Municipal financial year
			LONG-TERM		
69.			Continuous updates on the water resources eutrophication status.	DWS: RQIS	2028, then every after five years
70.	**SUPPORTING STRATEGIES**	**TECHNICAL CAPACITY BUILDING TO GIVE IMPETUS TO EUTROPHICATION MANAGEMENT**	**SHORT-TERM**		
			Develop and implement a programme for recruiting and retaining experienced and qualified technical and managerial staff.	DWS: Human Resource (HR), COGTA, Dept. International Relations and Cooperation (DIRCO), Dept. Public Service and Administration (DPSA)	Ongoing
71.			Invest in good training programmes to ensure continuous learning and a clear professional development path for incumbents. This will require the reviving (and inclusion of an introductory section on eutrophication) of some of the old water quality training programmes, such as the Water Quality Management Orientation Course. Whilst the introductory courses could be made available in-house, financial resources must be allocated to support the development and roll-out of more detailed and phased programmes that address the technical and detailed complexities of IWQM, and specifically reservoir limnology and eutrophication management, to improve performance, productivity, skills development, and to gain and increase knowledge.	DWS: Knowledge Management, WRR, HR	2024
72.			Define (and reinstate in some cases) career paths with defined training and on-the-job experience to build a cadre of sector professionals.	DWS: (Learning Academy (LA), HRD), WSAs, CMA	2025

No.	Strategies	Type of Strategies	Prioritized Actions and Required Interventions	Responsible Authorities	Timeframes
73.			Provide bursaries and/ or leadership pertaining to water quality management at tertiary institutions.	DWS: LA, other institution bursaries such as WRC, CSIR, DSI-NRF, etc.	Ongoing
74.			Establish and strengthen eutrophication awareness creation campaigns at the national, WMA, and municipal levels.	WQMF, APTT, DWS (RO, Water Services Operational Support, Sanitation Services), CMAs, water sector	2023
			LONG-TERM		
75.			There is a shortage of specific critical skills within various institutions, across the water value chain, *i.e.,* limnology, engineering skills, artisans, socio-economic, environmental health, and management skills, which also negatively impact the management of eutrophication. The demands for these skills should be addressed.	Water sector, DPSA, EWSETA, DSI-NRF and other private sectors.	2028
76.			Develop and implement a capacity-building programme for officials in DWS, CMAs and other sector departments, and for the private sector and civil society on systems-based, adaptive IWQM, applicable legislation and law enforcement.	DWS: (WRR), Dept. Higher Education and Training (DHET), (Institutions of Higher Learning)	2027
77.			The DWS' Learning Academy initiative in conjunction with on-the-job training and mentorship has made strides in filling the skills gap within the water sector and should continue to receive the necessary support.	DWS: LA, water sector, and Higher Institutions (Universities, FETs, etc.)	Ongoing
78.		**RESEARCH AND TECHNOLOGY DEVELOPMENT TO ADDRESS EUTROPHICATION-RELATED CHALLENGES**	**SHORT-TERM**		
			Promote, demonstrate, validate and encourage the use of alternative sanitation, such as water-less and off-grid sanitation solutions, and urine-diversion toilets. This potentially includes the development of strategies and regulations to mainstream appropriate sanitation technology.	WRC, WSAs, COGTA, DWS: Sanitation services	2024
79.			Investigate recent innovative treatment technologies to improve water quality such as green infrastructure to treat stormwater and non-compliant maturation pond effluent.	DWS: (SDS, Sanitation services), SANBI, WRC	D: SDS project for the financial year 2023/24 – 2025/26
80.			Develop and demonstrate appropriate domestic and industrial wastewater, and faecal sludge treatment technologies for cost-effectiveness, energy efficiency, and beneficiation.	WRC, DWS (Sanitation Services, Water Services Planning), Water Institute of Southern Africa (WISA)	2024
81.			Continue to do research on land use impacts on water-linked ecosystems and raw water quality.	DWS, WRC	Ongoing

No.	Strategies	Type of Strategies	Prioritized Actions and Required Interventions	Responsible Authorities	Timeframes
82.			Test a suit of information and communication technology, and citizen science tools for data sourcing.	DWS: (RO, RQIS), Proto/CMA RQIS to provide support	2024
83.			Review all relevant guidelines and R&D products to understand where eutrophication training modules need to be developed around new knowledge.	DWS: WRR	Ongoing
			LONG-TERM		
84.			DWS and the WRC will lead the sector in developing national eutrophication research, and innovation.	DWS, WRC	Ongoing
85.		**COLLABORATION AND MANAGEMENT PARTICIPATION**	**SHORT-TERM**		
			Participate and strengthen intra-departmental structures for IWQM to also address the management of eutrophication, including the National Water Quality Management Forum (NWQMF), the Anti-Pollution Task Team (APTT) and the Water Quality Management Steering Committee (WQM-SC), to ensure efficient coordination and joint action, supported by regular reporting.	DWS: (WEM, RO), Proto/CMAs	2023
86.			Nominate Eutrophication Management Champion(s), preferably at both Head, Regional Office, and CMA levels.	DWS, RO, Proto/CMA	2023
87.			Strengthen and foster strategic sector partnerships and enable active participation of civil society.	DWS, RO, Proto/CMA	2023
88.			Establish and support Catchment Management Forums or similar forums such as Estuary Management Forums.	DWS RO, Proto/CMA	On-going (*e.g.,* EMSSA has been presented in various CMFs
			LONG-TERM		
89.			Provide eutrophication support to Integrated Water Quality Catchment Management and Integrated Regional Water Monitoring Committees.	DWS, RO, Proto/CMA	2026
90.			Provide eutrophication support to the Inter-Governmental Task Team on IWQM, once established.	Water sector, DMRE, DOH, CMFs	2026
91.			Provide eutrophication support to the Regional Water Quality Functional Management Committees, once established.	DWS	2027
92.			Provide eutrophication support to the Water Quality Functional Management Committee, once established.	DWS	2027

3.4 SUPPORTING TOOLS AND PROGRAMMES FOR IMPLEMENTATION

3.4.1 Eutrophication Monitoring Programme

In 2002, DWS implemented the National Eutrophication Monitoring Programme (NEMP). It was implemented to highlight eutrophication problems at a national scale and provide a database that allowed for regular dissemination of NEMP reports. The main purpose of NEMP is to measure, assess and report, on a regular basis, the status, and spatial and temporal trends relating to excessive nutrient-loading and anthropogenic eutrophication in South African water resources, in a manner that will support strategic eutrophication management decisions nationally, in the context of fitness-for-use and aquatic ecosystem integrity.

The NEMP implementation model proposed a three-level approach to the roll-out of eutrophication monitoring; namely, national, regional, and local levels. The national monitoring programme is supported by the local programme and regional programmes (covering a WMA). The DWS national office has been facilitating and coordinating most of the eutrophication monitoring effort. To date, the establishment of functional CMAs in the various WMAs has made it possible to decentralise monitoring. The CMAs have started with water quality monitoring (including eutrophication monitoring) in their respective areas of operation. In 2018, about 380 sites had been registered under NEMP and were actively monitored across the country. Monitoring collapsed in 2019 and resumed in 2020, there are currently 126 active NEMP sites (including 90 dams and 36 rivers) representing about 33% coverage of sites monitored before 2018 (**Figure 5)**.

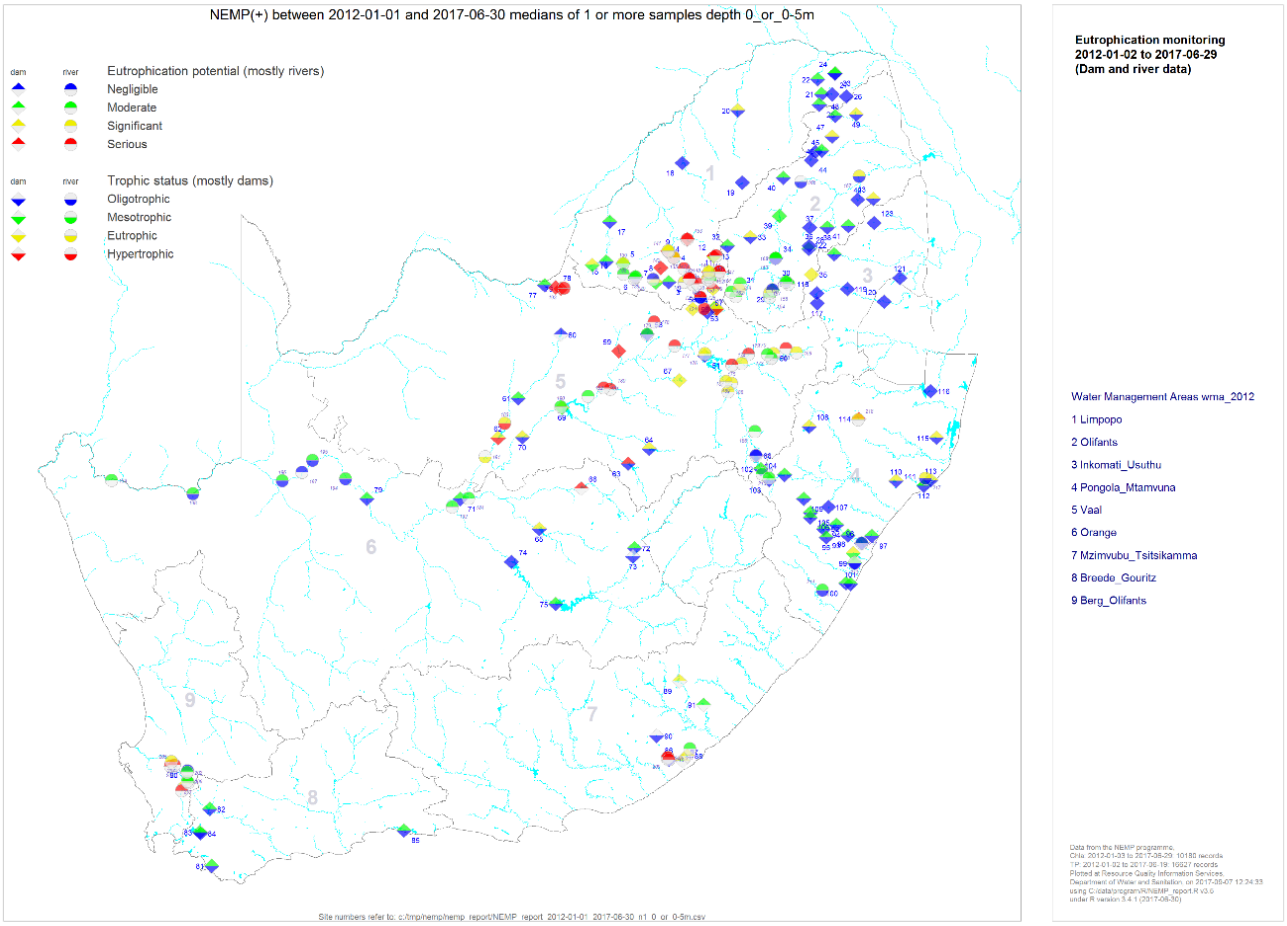

Figure 5: Active NEMP sites for the January 2012 to June 2017 period (DWS – WMS)

In 2017, DWS completed a study titled 'Review, Evaluation and Optimisation of the South African Water Resources Monitoring Network'; the main objective of the study was to develop a strategy for implementing and maintaining an optimal South African Water Resources Monitoring Network (DWS, 2017d). One of the recommendations from the study was to increase the number of monitored dams to 389. The increased monitoring was to ensure spatial representation and effective monitoring of trends and status in South African reservoirs. The consideration of the recommended 389 sites aimed to provide a baseline for sites to consider to effectively implement water quality monitoring for eutrophication strategy. In addition, DWS (2021b) indicated that an expansion of monitoring network coverage for Eutrophication Monitoring Programmes to other WMA remains the main priority action for the next five years**.**

Table 4 provides the trophic status of key sites monitored from 2020 to 2021. The Monthly State of Water Bulletin – February 2022 (DWS, 2022b), reported that there was insufficient data for 2022 due to challenges in water quality monitoring and analysis across the country.

Table 4: Trophic status of key sites monitored in 2020-2021

DAM	RIVER	2020	2021
Bon Accord	Apies	Hypertrophic	Hypertrophic
Vaalkoop	Elands	Hypertrophic	Hypertrophic
Bospoort	Hex	Eutrophic	Eutrophic
Hartbeespoort	Crocodile	Eutrophic	Eutrophic
Klipvoor	Pienaars	Hypertrophic	Hypertrophic
Rietvlei	Hennops	Mesotrophic	Mesotrophic
Roodekoppies	Crocodile	Mesotrophic	Mesotrophic
Roodeplaat	Pienaars	Eutrophic	Eutrophic
Leeukraal	Apies	Hypertrophic	Hypertrophic
Centurion Lake	Hennops	Mesotrophic	Mesotrophic
Lindleyspoort	Elands	Mesotrophic	Mesotrophic
Koster	Koster	Mesotrophic	Mesotrophic

Having data gaps is an indication that the water sector needs to venture into the integration of Earth Observation into the National Eutrophication Monitoring Programme (EONEMP), which provides weekly forecasts for cyanobacteria blooms and water pollution based on satellite earth observations (remote sensing) and early warning system. Remote sensing has been identified to be an important tool to enhance the NEMP. The EONEMP was piloted by the DWS in 2018, the project was a collaboration between the WRC, the Department of Science and Technology (DST) and DWS. The Situation Assessment of the EMSSA noted that the chlorophyll-a (Chl-*a*) estimates from the satellite were integrated into the Water Management System (WMS) database to supplement and fill the information gaps in the NEMP, which proved EONEMP as a valuable tool to enhance the NEMP and provide an opportunity for more sites to be monitored.

3.4.2 Eutrophication Compliance Monitoring and Reporting

As established in the EMSSA, acknowledging the obligation to establish a monitoring system for water resources [NWA, 1998, Chapter 14], eutrophication-related data and information must be collected to assess:

- sources of anthropogenic eutrophication and their relative load contributions, especially in the case of point discharges – compliance with Waste Discharge Standards (WDSs);
- the application of wastewater and waste reuse and recycling strategies;
- the status of and effects on receiving water quality, especially nutrient-loading of receiving water resources, and compliance with RDMs and Resource Water Quality Objectives (RWQOs)/ Water Quality Planning Limits (WQPLs);
- the integrity of aquatic ecosystems, as an indicator of system health;
- the efficacy of remediation projects;
- whether offset initiatives are yielding the agreed offset improvement impacts; and
- causal chains and linkages with the socio-economic domain, and root-causes of failure.

Additionally, eutrophication-related monitoring must:

- contribute meaningfully to efforts to facilitate ecologically sustainable development;
- reflect the ecologically interdependent nature of water resources, including the dependence on water quantity, whenever appropriate; and
- become an essential enabling component of adaptive and integrated water quality management.

Domestic resource quality status and trends monitoring and reporting

Domestic resource quality status and trends monitoring and reporting, specifically with respect to eutrophication management, should remain focused, cost-effective, and sustainable, and must ensure that (DWAF, 2006):

- monitoring programmes have well-defined objectives;
- the monitoring designs provide the maximum amount of demonstrably useful information at minimum cost;
- data assessments and reports support informed decision-making;
- no duplication of effort occurs at any stage of implementation; and
- appropriate partnerships should be created with stakeholders who will share costs and benefits.

Acknowledging the limitations that may exist with respect to financial, and other resources, it is essential that suitable and quality verified resource quality data and information must be collected on an uninterrupted basis to support high-confidence water resource planning, informed decision-making, and efficient eutrophication management.

Unnecessary duplication of monitoring must be avoided, and monitoring efforts must be harmonised and integrated, where possible and desirable – especially across the various spheres of government, with other existing monitoring programmes. Monitoring programmes must be appropriately resourced and strengthened to support the heightened efforts to clamp down on excessive nutrient-loading and anthropogenic eutrophication. The following programmes for domestic resource quality status and trends monitoring and reporting must be maintained:

- Compliance monitoring;
- National eutrophication monitoring; and
- Regional eutrophication monitoring.

Compliance monitoring programmes

The **purpose of compliance monitoring** is to measure, assess and report, on a regular basis, the degree to which–

- municipalities comply with the requirements of certification schemes, such as the Green Drop System, which is applied as part of non-economic incentive-based regulation; and
- individual land and water use comply with local or regional water resource quality, relevant regulatory requirements, such as Best-Management Practices (BMPs) or the WDSs stipulated in water use authorisations, or conditions stipulated in alternative authorisations, or the requirements of voluntary certification schemes, such as Global G.A.P for "good agricultural practice".

In the interim, until revised, the General and Special Standards for the purification of Wastewater or Effluent can be used to assess effluent data [Government Notice – Regulation (GN R.) 991, 1984]. The South African Water Quality Guidelines, in the absence of suitable RDMs, can be used to assess water resources (DWAF, 1996). Where RQOs and supporting RWQOs/ WQPLs are determined, these should be sensibly back-calculated to WDSs to assess effluent data.

3.4.3 Eutrophication Data Management

Data management plays a fundamental role in DWS and in the water sector at large as the information required for sound decision-making depends on the data collected from various water resources. DWS in collaboration with key sector stakeholders has successfully developed the Data Acquisition Management (DAM) Strategy for Water and Sanitation in South Africa. The purpose of the DAM strategy is to develop a national database management model that will be used to coordinate and facilitate sector-wide management of data and information required to populate the national information system (DWS, 2021).

Eutrophication data can be classified into two basic data streams, namely:

- The laboratory data generated for NEMP is captured on a Water Management System (WMS) via Laboratory Information Management Systems (LIMS) – a software-based solution that supports laboratory operations; and
- The laboratory results are captured by the data owner (whether an authority, regional NEMP or a land or water user) on a centralised database such as the Integrated Regulatory Information System (IRiS) and Water Use Authorisation and Registration Management System (WARMS

The NEMP information consists of data from laboratory analyses and on-site observations. The on-site observations (temperature, Dissolved Oxygen, pH, Secchi, etc) are recorded by the sampler in the field and together with the laboratory-analysed data, they get captured on WMS which is an integrated information system designed for standardisation of the business practices of Water Quality Management throughout the Department. Then, all water information is integrated into the National Integration Water Information System (NIWIS), which is an electronic information system that integrates information needed by water management institutions, water users, the public, researchers, scientists, decision-makers, and those interested in getting a deeper understanding and knowledge of the water status in the country. Users are able to access reliable eutrophication-related information from the NIWIS dashboard, such as historic water quality, regulation, trophic status of different water resources, etc. Systems are therefore in place within DWS for effectively managing eutrophication data and ensuring its accessibility to stakeholders internally and externally.

3.4.4 Communication

Stakeholder Consultation

A focused stakeholder engagement process was undertaken during the EMSSA development that was aligned with the technical steps of the strategy development. As a standard DWS approach, linkages

and alignment to existing stakeholder engagement structures were made by linking to regional champions and catchment management forums for communication of the Eutrophication Strategy. A wide and extensive stakeholder database was set up and updated on a continuous basis. Stakeholders representing specific sectors of society such as national departments, Provincial (Regional) offices, Proto/CMAs, parastatals, NGOs, agriculture, mines and conservation were identified and invited to serve on a Project Steering Committee (PSC) for the duration of the project. Two PSC meetings were held during the development of the strategy whereby stakeholders were updated on the status of the project. This was done through the distribution of **a)** the announcement Background Information Document (BID); and **b)** a letter to all stakeholders on the database, informing them of progress made and background information documents related to stakeholder meetings. An Issues and Response Report was compiled and updated continually throughout the period of the development of the EMSSA and submitted to the Department at various intervals and made available to all stakeholders through the website link. All stakeholder meeting registers and minutes were kept and distributed at relevant times.

The Strategy was shared with stakeholders on various platforms including Catchment Management Forums on a quarterly basis, Water Quality Management Meetings, and recently at the Ministerial Water and Sanitation Summit. Broad stakeholder consultation meetings are envisaged for the 2022/23 financial year to be held on a national level to take the strategy to the sector at large.

Eutrophication Management Progress Report

The EMSSA implementation needs to be executed on the ground at the catchment level. Monitoring and Evaluation of the progress in the implementation of EMSSA ought to be undertaken on an annual basis to ensure uptake of the Strategy provisions. This should be achieved through an ad-hoc progress report to track the status of catchment performance with the aim of consolidating a one-stop progress report through the SDS Directorate that compiled the EMSSA.

4. MONITORING & EVALUATION

Monitoring of the project will assist project/WMA/CMA managers and eutrophication champions to understand whether the project is progressing on schedule and to ensure that project inputs, activities, and outputs are proceeding as planned. Monitoring should involve the ongoing observation of a range of criteria that provide data and information regarding progress in terms of policy and strategy implementation. Therefore, monitoring needs to be understood as an ongoing function with indications of progress and achievement of objectives and progress (DCEC, 2009). Whereas **Evaluation** can be used as a tool to help planners and managers assess to what extent the projects have achieved the objectives set forth in the implementation plan. It is an objective analysis to assess performance in terms of efficiency or effectiveness, as well as value for money. Evaluations typically provide recommendations on the way forward to address specific challenges and strengthen programme delivery.

There are three types of M&E activities (DWA, 2010) that are required for a successful implementation of the Eutrophication Management Strategy, namely:

- **Monitoring and auditing (evaluation) implementation:** to check if we are doing what we said we are going to do. This type of monitoring and auditing is designed to determine if the schedule for implementing management options is adhered to and to check if implementation is adequately resourced;
- **Assessing performance towards meeting operational management objectives:** this type is designed to assess compliance with the short-term operational management option and to assess if eutrophication management options for the selected implementation are effective. This auditing should be done at least on an annual basis; and
- **Assessing performance towards meeting strategic management objectives:** this type is designed to assess if the mix of strategies and instruments that have been employed are having the desired effect, and if not, a change in direction of approach may be required.

Implementation of the strategy requires a **Monitoring and Evaluation** (M&E) framework for the management approach. This implementation requires active support from various mandated stakeholders in the spirit of Cooperative Governance; as well as support from interested and affected members of society. This M&E framework would be used as a tool to enhance the effectiveness of the implementation of the Strategy by outlining the plan for monitoring and evaluation in clear and concrete steps. Therefore, the main purpose of the EMSSA M&E framework is to articulate all indicators to be monitored (all actions identified in **Table 2**), to determine the progress of all the actions to be implemented, and to provide the foundation required to manage eutrophication adaptively.

The M&E framework should contribute to improved governance and therefore, the process should be:

- **transparent** such that all findings in monitoring and evaluation are available to the public,
- **accountability** such that the use of resources by public officials is open to public scrutiny,
- **participatory** such that the voices of the historically disadvantages are heard, and
- **inclusive** such that the interest groups that were historically excluded are represented throughout the monitoring and evaluation processes.

5. WAY FORWARD

To ensure effective implementation and follow-up, an ongoing monitoring and evaluation framework of the EMSSA should be embedded into Business/ Operational plans of the relevant Government Departments, Proto/CMAs, WSAs as well as all other affected and interested parties involved in environmental management (as indicated in **Table 2** and **Appendix A - 1**). Such that, the framework addresses all issues according to the ***who***, ***what***, ***how***, and ***when*** of monitoring and evaluation actions. Without a proper M&E, it will be impossible to judge if the Strategy is being implemented properly, whether progress and success could be claimed, and how future efforts might be improved. Lessons learned from M&E can also be used to inform best practice guidelines and other relevant supporting tools. It is important to note that the implementation plan must take into consideration the technical, financial, and institutional aspects of eutrophication management as depicted in **Table 2** above.

EMSSA Reporting and Review

The recommended objective of the EMSSA reporting and review is to use the monitoring data to report on the status and compliance of eutrophication at delineated WMAs/catchments. Reporting is an integral part of monitoring and evaluation. Reporting is the systematic and timely provision of essential information at periodic intervals. As such, the implementation schedule needs to describe a clear and achievable time plan for the implementation of different management interventions. The review schedule will describe when the overall effectiveness of the plan will be reviewed and what key performance assessment criteria will be effective.

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APPENDICES

Appendix A: Sectors, relevant authorities, and roles in eutrophication management

Appendix A - 1: Sectors, relevant authorities, and roles in eutrophication management

COMPETENCY	RELEVANT AUTHORITY	ROLE IN THE MANAGEMENT OF EUTROPHICATION
Agriculture	▶ *Department of Agriculture, Land Reform and Rural Development (DALRRD); and* ▶ *Provincial departments of agriculture*	Are responsible for the implementation of the Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) and for agricultural policy. Responsible for promoting agricultural practices that reduce water pollution, including anthropogenic eutrophication. In reviewing the CARA (43:1983), the DALRRD and provincial departments will take into account the need to reduce excessive nutrient-loading arising from current agricultural practices. The DALRRD and provincial departments will, in line with the approach outlined in the draft Policy on Sustainable Agriculture, promote sustainable agricultural practices that, amongst other things, will contribute to the reduction of nutrient-loading arising from agricultural areas. The DALRRD and provincial departments will also ensure improved enforcement.
	▶ *Department of Water and Sanitation (DWS); and* ▶ *Catchment Management Agencies (CMAs)*	Must ensure that water is protected, used, developed, conserved, managed and controlled in a sustainable and equitable manner, for the benefit of all persons; Are responsible for the authorisation of agricultural water use, including the regulation of agriculture-related industrial water use and intensive animal units, and, thus, must protect water resources against both agricultural point and diffuse impacts. The DWS must ensure that water resources remain fit for agricultural use.
	▶ *Department of Forestry, Fisheries and the Environment (DFFE); and* ▶ *Provincial departments of environmental affairs*	Are responsible for the implementation of the NEMA (107:1998) and for conducting EIAs of listed activities. The DFFE must ensure, in consultation with DWS and CMAs, that water quality impacts, including excessive nutrient-loading, are sufficiently dealt with in EIAs and through a co-ordinated compliance monitoring and enforcement approach with the DWS.
Disaster management	▶ *Department of Cooperative Governance and Traditional Affairs (CoGTA);* ▶ *National Disaster Management Centre (NDMC)*	Supports inter-governmental cooperation. Must promote an integrated and co-ordinated system of disaster management, with a special emphasis on prevention and mitigation, by national, provincial and municipal organs of state, statuary functionaries, other role players and communities. Water pollution, including excessive nutrient-loading and sewage spills, can cause disasters; a *"disaster"* being defined as: *"the progressive or sudden, widespread or localised, natural or human-caused occurrence which– causes or threatens to cause– death, injury or disease; damage to property, infrastructure or the environment; or disruption of the life of a community; and which is of a magnitude that exceeds the ability of those affected by the disaster to cope with its effects using their own resources".*
	▶ *Department of Water and Sanitation (DWS)*	Must ensure that water is protected, used, developed, conserved, managed and controlled in a sustainable and equitable manner, for the benefit of all persons; Must ensure and maintain fitness-for-use of water resources; Responsible for the establishment of national monitoring systems to provide information to Water Management Institutions, the NDMC, water users and the public, *inter alia* for public safety and disaster management purposes.
Education	▶ *Department of Basic Education (DBE)*	Responsible for providing learner and teacher support materials; developing skills for a changing world; planning for the migration of the early childhood development function from the social development sector to the basic education sector; providing support to improve matric completion rates; preparing learners for jobs; and facilitating the increase in supply of quality teachers. Learning includes environmental awareness, which should also address aspects of eutrophication.

COMPETENCY	RELEVANT AUTHORITY	ROLE IN THE MANAGEMENT OF EUTROPHICATION
	▶ *Department of Higher Education and Training (DHET)*	Must develop capable, well-educated and skilled citizens who are able to compete in a sustainable, diversified and knowledge-intensive international economy, which meets the development goals of the country, by: reducing skills bottlenecks, especially in priority skills areas; improving participation rates in the system; correcting distributions in the shape, size and distribution of access to post-school education and training; and improving the quality and efficiency in the system, its subsystems and institutions. Additionally, DHET is over-all responsible for the harmonization of education, training and skills development, across sectors, including the water sector, including skills to control and manage anthropogenic eutrophication.
	▶ *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 water sector, in accordance with the relevant national skills and human resource development strategies and agreements between government, business and labour.
	▶ *Department of Water and Sanitation (DWS);* ▶ *Catchment Management Agencies (CMAs)*	DWS must provide the necessary sector leadership with respect to the building of technical water services and resource management capacity, including capacity to manage eutrophication. CMAs play a supporting and operational role.
	"Research" authorities, such as ▶ *Water Research Commission (WRC);* ▶ *Department of Science and Innovation (DSI);* ▶ *Etc.*	Works closely, *inter alia* with other research and academic institutions and organisations to develop knowledge within the water sector, explore new thinking and to develop applied solutions to problems, including eutrophication knowledge development, thinking and addressing challenges.
Environment	▶ *Department of Forestry, Fisheries and the Environment (DFFE); and* ▶ *Provincial departments of environmental affairs*	Are responsible for the implementation of the environmental management acts, including NEMA (107:1998), and for conducting EIAs for listed activities. The DFFE must ensure, in consultation with the DWS and CMAs, that water quality impacts, including excessive nutrient-loading, are sufficiently dealt with in EIAs. DFFE, with DWS and other relevant regulators, are also responsible for a co-ordinated compliance monitoring and enforcement approach to enforce the SEMAs.
	▶ *South African National Biodiversity Institute (SANBI)*	Leads and coordinates research, and monitors and reports on the state of biological diversity in South Africa. The institute provides knowledge and information, gives planning and policy advice and pilots best-practice management models in partnership with stakeholders. Engages in ecosystem rehabilitation and restoration, leads the human capital development strategy of the biological diversity sector and manages the National Botanical and Zoological Gardens as 'windows' to South Africa's biological diversity for enjoyment and education. Eutrophication threatens biological diversity and must be controlled in a manner that promotes ecologically sustainable development.
	▶ *South African National Parks (SANParks)*	Responsible for inclusive nature conservation and to advance nature conservation policies in line with the National Development Framework for Sustainable Development and the National Development Plan. Eutrophication adversely affects *"nature"*, *i.e.* aquatic ecosystems, biological diversity, etc.; sense of place; and tourism.

COMPETENCY	RELEVANT AUTHORITY	ROLE IN THE MANAGEMENT OF EUTROPHICATION
	▶ *Department of Water and Sanitation (DWS);* ▶ *Catchment Management Agencies (CMAs)*	Must ensure that water is protected, used, developed, conserved, managed and controlled in a sustainable and equitable manner, for the benefit of all persons; Must ensure and maintain fitness-for-use of water resources, including fitness-for-use for the aquatic ecosystem. Must implement the mitigation hierarchy for eutrophication management. Must compiled and publish sector offset guidelines for wetlands and water quality to enable the rolling out of offsetting for eutrophication management.
Health	▶ *Department of Health (DOH)* ▶ *Provincial departments of health*	Have a critical role to play in epidemiological studies to understand the impacts of poor water quality, including eutrophication and the sub-standard treatment of wastewater, on human health.
	▶ *Department of Water and Sanitation (DWS);* ▶ *Catchment Management Agencies (CMAs)*	Must ensure that water is protected, used, developed, conserved, managed and controlled in a sustainable and equitable manner, for the benefit of all persons; Must ensure and maintain fitness-for-use of water resources to *inter alia* protect human health and wellbeing. The Basic Human Needs Reserve constitutes a right and protects human health.
Human settlements	▶ *Department of Human Settlements*	To facilitate the creation of sustainable human settlements and improve the quality of household life and to determine, finance, promote, communicate and monitor the implementation of housing and sanitation programmes.
	▶ *Department of Water and Sanitation (DWS);* ▶ *Water Services Institutions* ▶ *National Water Resource Infrastructure Agency (NWRIA)*	To ensure that the country's water resources are protected, used, developed, conserved, managed and controlled by regulating and supporting the delivery of effective water supply and sanitation. This is done in accordance with the requirements of water-related policies and legislation that are critical in delivering on people's right to have sufficient food and water, growing the economy, and eradicating poverty.
Infrastructure	▶ *The Presidency*	The Presidential Infrastructure Coordinating Commission (PICC) was formed to provide for the facilitation and coordination of the National Infrastructure Plan which is of significant economic and social importance to the country; To ensure that infrastructure development is given priority in planning, approval and implementation; To ensure that the development goals of the State are promoted through infrastructure development; To improve the management of such infrastructure during all life-cycle phases, including planning, approval, implementation and operations.
	▶ *Department of Works and Infrastructure;* ▶ *Provincial departments of public works;* ▶ *Municipal Public Works*	Contributes to the national goals of job creation and poverty alleviation through public works programmes; Ensures the effective management of the state's immovable assets; The Constitution (108:1996) gives concurrent functions to municipalities for municipal public works, with either national or provincial government able to regulate how they exercise these functions in line with applicable norms and standards. Most municipalities carry out their own infrastructure planning and delivery functions in relation to the services they provide, such as water, sanitation, municipal roads and electricity distribution. The operation and maintenance of the WwTWs of many municipalities are currently unacceptable.
	▶ *Department of Cooperative Governance and Traditional Affairs (CoGTA);* ▶ *Municipal Infrastructure Support Agent (MISA), an agent of CoGTA*	GoGTA supports inter-governmental cooperation. MISA provides technical support to targeted municipalities, which will improve infrastructure planning, implementation, as well as operations and maintenance. MISA also manages deployment of professional service providers to municipalities, ensuring that sufficient technical capacity is built within municipalities, which will result in effective and efficient service delivery in the long-term. This includes all training administration activities, and provides comprehensive generic strategic support to the technical support and capacity development programmes.

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	▶ *Department of Water and Sanitation (DWS);* ▶ *Catchment Management Agencies (CMAs)* ▶ *National Water Resource Infrastructure Agency (NWRIA)*	Must ensure that water is protected, used, developed, conserved, managed and controlled in a sustainable and equitable manner, for the benefit of all persons; Must provide sector support with respect to water purification and treatment and wastewater treatment infrastructure operation and maintenance.
Land use and development planning	▶ *The Presidency*	The National Planning Commission was established to develop a long-term vision and strategic plan for South Africa. The main objective of the Commission is to rally the nation around a common set of objectives and priorities to drive development over the longer term. The Commission advises government on cross-cutting issues that influence the long-term development of South Africa.
	▶ *Department of Forestry, Fisheries and the Environment (DFFE); and* ▶ *Provincial departments of environmental affairs*	Are responsible for the implementation of the environmental management acts, including NEMA (107:1998) and the Environmental Management Framework (EMF) regulations that aim to ensure that environmental limits to development are included in spatial planning. EMFs attempt to achieve the desired developmental and ecological balance by utilizing early identification and mapping of sensitive ecosystems and resources to assist in pre-empting potential future land use conflicts. The EIA process provides an environmental instrument for local planning.
	▶ *Municipalities*	Municipalities are required to establish Integrated Development Plans (IDPs). An IDP is a plan for an area that gives an overall framework for development. It aims to co-ordinate the work of local, and other spheres of government, in a coherent plan to improve the quality of life for all the people living in that area. It takes into account the existing conditions and problems and resources available for development. It looks at economic and social development for the area as a whole. It is used by municipalities as a tool to plan short and long-term future development, including the water infrastructure.
	▶ *Department of Water and Sanitation (DWS);* ▶ *Water Management Institutions; and;* ▶ *Water Services Institutions*	To ensure that the country's water resources are protected, used, developed, conserved, managed and controlled by regulating and supporting the delivery of effective water supply and sanitation. The Water Services Development Plan (WSDP), as required by the WSA (108:1997), constitutes the water chapter of a municipality's IDP and deals with the long-term planning for the provision of water supply and sanitation services. Catchment Management Strategies, as required by the NWA (36:1998) and deals with water resource management in WMAs. Catchment Management Strategies should influence development planning, and *vice versa*. Geographical water quality management strategies and thematic plans provide content to Catchment Management Strategies and WSDPs
Mining	▶ *Department of Mineral resources and Energy (DMRE)*	DMRE promotes mining. Is responsible for approving Environmental Management Programme Reports (EMPRs) and for the regulation and control of mining waste. In exercising this responsibility, DMRE is required to ensure that the DWS and CMAs are involved throughout the process of mine authorisation, and that no authorisation for mining is given without a water use authorisation from the DWS, which will include stringent water quality management conditions. Additionally, DMRE is also required to involve DWS and DFFE in the process of mine closure in order to effectively address the potential long-term water quality impacts of mines.

COMPETENCY	RELEVANT AUTHORITY	ROLE IN THE MANAGEMENT OF EUTROPHICATION
	▶ *Department of Water and Sanitation (DWS);* ▶ *Catchment Management Agencies (CMAs)*	Must ensure that water is protected, used, developed, conserved, managed and controlled in a sustainable and equitable manner, for the benefit of all persons. Blasting and the mining of *"nutrients"*, such as phosphorus bearing rock, may contribute to excessive nutrient-loading of water resources and to anthropogenic eutrophication. The mine-water management policy should be implemented, and mine water regulation and authorisation processes must address relevant eutrophication-related issues. DWS and DFFE/ provincial departments of environmental affairs will develop a co-ordinated and joint water quality compliance monitoring and enforcement system to optimize the use of government resources and to achieve maximum impact.
	▶ *Department of Forestry, Fisheries and the Environment (DFFE); and* ▶ *Provincial departments of environmental affairs*	Are responsible for the implementation of the NEMA (107:1998) and for conducting EIAs for listed activities. The DFFE, in consultation with DWS and CMAs, must ensure that water quality impacts, including excessive nutrient-loading, are sufficiently dealt with in EIAs and through a co-ordinated compliance monitoring and enforcement approach.
Monitoring and evaluation	▶ *The Presidency*	The Department of Planning, Monitoring and Evaluation (DPME) must facilitate the implementation of the NDP through the development of sector specific and outcome-specific medium-term plans and delivery agreements, and monitor and evaluate the implementation of these plans; ensure the alignment of departmental strategic and annual plans and budget allocations with government's medium-term strategic framework; facilitate socio-economic impact assessments of legislation and regulations; monitor the performance of individual national and provincial government departments and municipalities, and related improvement plans, and facilitate targeted intervention programmes; monitor frontline service delivery; develop and implement the annual national evaluations plan and support the national evaluations system; and promote good planning, monitoring and evaluation practices in government.
	▶ *Department of Public Service and Administration (DPSA)*	To establish norms and standards to ensure that the state machinery functions optimally, and that such norms and standards are adhered to; implement interventions to maintain a compliant and functioning public service; promote an ethical public service through programmes, systems, frameworks and structures that detect, prevent and combat corruption; and contribute towards improved public administration. The DPSA is required to facilitate and support efforts that seek to, among others, improve service delivery quality and access; human resource management and development (Performance Management and Development System); business processes; systems and accountability management; anti-corruption and integrity; and effective public participation. Employee performance and corruption are aspects that relate to effective eutrophication management
	▶ *Department of Water and Sanitation (DWS)*	To ensure that the country's water resources are protected, used, developed, conserved, managed, and controlled through oversight and supporting the delivery of effective water supply and sanitation. Establish monitoring systems for water resources and services with suitable publicly available data and information.
Research and development	▶ *Department of Water and Sanitation (DWS)*	The DWS, the DSI and the WRC are driving water research, development and innovation, nationally.
	▶ *Department of Science and Innovation (DSI);* ▶ *Technology Innovation Agency (TIA)*	The DWIS, the DWS and the WRC are driving water research, development and innovation, nationally.
	▶ *Water Research Commission (WRC)*	The WRC, the DWS and the DSI are driving water research, development and innovation, nationally.

COMPETENCY	RELEVANT AUTHORITY	ROLE IN THE MANAGEMENT OF EUTROPHICATION
	▶ *Science councils, such as the Council for Scientific and Industrial Research (CSIR); the Agricultural Research Council (ARC); etc.*	Has a catalytic role in establishing a strong and diverse science, engineering and technology base for South Africa; Maintains a stable pool of knowledge workers and allows for advanced human capacity development; Supports the innovation continuum from discovery to application; and often finds integrated solutions to complex problems or emerging research areas.
	▶ *South African National Biodiversity Institute (SANBI)*	Leads and coordinates research, and monitors and reports on the state of biological diversity in South Africa. The institute provides knowledge and information, gives planning and policy advice and pilots best-practice management models in partnership with stakeholders. Engages in ecosystem rehabilitation and restoration, leads the human capital development strategy of the biological diversity sector and manages the National Botanical and Zoological Gardens as 'windows' to South Africa's biological diversity for enjoyment and education.
Water and Sanitation	▶ *Department of Water and Sanitation (DWS)*	DWS is the apex department in relation to water quality management and will lead the co-ordination, alignment and implementation of policy, strategy and legislation that address aspects of eutrophication. DWS will establish the necessary institutional arrangements under the Inter-Governmental Relations Framework Act, 2005 (Act No. 13 of 2005) to ensure a government-wide approach to IWQM, including the management of eutrophication. DWS and DFFE/ Provincial departments of environmental affairs will develop a co-ordinated and joint water quality compliance monitoring and enforcement system to optimize the use of government resources and to achieve maximum impact.
	▶ *Catchment Management Agencies (CMAs) and proto-CMAs*	Are agencies of the DWS with delegated functions under the NWA (36:1998). As such, they must act in alignment with the NWRS2 and the IWQM Policy of the DWS, and must ensure that, at the catchment scale, effective co-ordination of planning and implementation takes place between the relevant government departments. In line with the principles of subsidiarity, the management of water quality (including eutrophication) will be delegated to CMAs, with the DWS providing the necessary oversight, national strategic guidance, and control of transboundary matters. The CMAs will also build the necessary capacity to take action under section 19(3) to (6) of the NWA (36:1998), which is a responsibility allocated to them by the NWA (36:1998). The Catchment Management Committees, Catchment Management Forums (CMF) and other Water Management Institutions will be used as appropriate to manage or control eutrophication.
	▶ *Department of Forestry, Fisheries and the Environment (DFFE); and* ▶ *Provincial departments of environmental affairs*	Are responsible for the implementation of the NEMA (107:1998) and for conducting EIAs on development projects. The DFFE must ensure, in consultation with DWS and CMAs, that water quality impacts, including excessive nutrient-loading, are sufficiently dealt with in EIAs and through a co-ordinated approach with the DWS to compliance monitoring and enforcement. Waste is administered and managed under the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) and should not cause nutrient-loading of water resources.
	▶ *Department of Cooperative Governance and Traditional Affairs (CoGTA)*	Must improve cooperative governance across the three spheres of government, in partnership with institutions of traditional leadership, to ensure that provinces and municipalities carry out their service delivery and development functions effectively. CoGTA, *inter* alia, publishes information on municipal support and also assist through capacity-building programmes.
	▶ *South African Local Government Association (SALGA)*	SALGA is the constitutionally mandated organisation responsible for local government oversight. As protector, SALGA robustly enforces the rights of the local government sector.

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	▶ *Municipalities*	Municipalities have a regulatory role in relation to ensuring that by-laws regarding solid waste management and stormwater management systems reduce water pollution from municipal areas, and in this regard, they carry part of government's responsibilities for preventing and reducing water pollution and must ensure that management and control of such forms of diffuse water pollution are clearly addressed in their WSDPs. At the same time, municipalities are responsible for sanitation provision and WwTWs, which are critical in improving the trophic conditions in water resources. In this regard, the DWS, working with the national and provincial departments of cooperative government, has a regulatory role to ensure that WwTWs are duly licensed under the NWA (36:1998), that Municipalities ensure that their WwTWs meet WDSs, and to take action to ensure compliance by municipalities. In this regard, the DWS will implement its internal protocol on engagement with municipalities, including taking legal action where necessary.
	▶ *Department of Finance; and* ▶ *National Treasury (NT)*	To promote government's fiscal policy framework; Coordinate macroeconomic policy and intergovernmental financial relations; Manage the budget preparation process; Facilitate the Division of Revenue Act, 2013 (Act No. 2 of 2013) which provides for an equitable distribution of nationally raised revenue between national, provincial and local government; and monitor the implementation of provincial budgets. Financial resources are important and is needed to manage eutrophication. Involving NT officials at important stages of managing eutrophication will ensure a better understanding of challenges and needs, and *vice versa*.