



EUTROPHICATION MANAGEMENT STRATEGY FOR SOUTH AFRICA (EMSSA), A POLLUTION PREVENTION TOOL AGAINST NUTRIENT ENRICHMENT IN WATER BODIES

WATER IS LIFE, SANITATION IS DIGNITY

SOUTH AFRICA IS A WATER SCARCE COUNTRY



water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA





INTRODUCTION

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. Therefore, appropriate strategies should be developed and implemented to prevent the degradation of aquatic resources and water quality. One of the mandates of the Department of Water and Sanitation, as the custodian of the country's water resources, is to **protect water resources** for current use and future generations. This can be achieved by managing water quality in an integrated way. The National Water Act (NWA) 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 **pollution prevention measures**. Therefore, the development of the Eutrophication Management Strategy for South Africa is a pollution prevention measure against nutrient enrichment in water bodies and one of the provisions for the protection of water resources. The Eutrophication Management Strategy is aligned with other strategic policies such as the Sustainable Development Goals (SDG-6), National Water Resources Strategy, and National Water and Sanitation Master Plan.

WHAT IS EUTROPHICATION?

"Eutrophication" is a process by which a waterbody becomes enriched with plant nutrients. During this process, the water-body accumulates organic matter (both living and decaying) and progressively changes its character from that of a deep water-body to that of a wetland and ultimately, to that of a terrestrial system. One of the most widely accepted definitions of eutrophication is that of the Organisation for Economic Cooperation and Development, which describes the eutrophication process as: **"... the nutrient enrichment of waters which results in the stimulation of an array of symptomatic changes, amongst which increased production of algae and aquatic macrophytes, deterioration of water quality and other symptomatic changes are found to be undesirable and interfere with water users"**. The two types of eutrophication can be distinguished:

Naturally occurring eutrophication is dependent on the geology and natural features of a catchment. It is not reversible and continues *ad infinitum*, albeit at a slow rate; and

Human-induced eutrophication is related to anthropogenic activities. Some references also refer to the latter process as *"cultural eutrophication"*, as it is associated with human activities (social and economic) and accelerates the rate of ageing of water-bodies. Anthropogenic eutrophication is reversible, although at a cost.

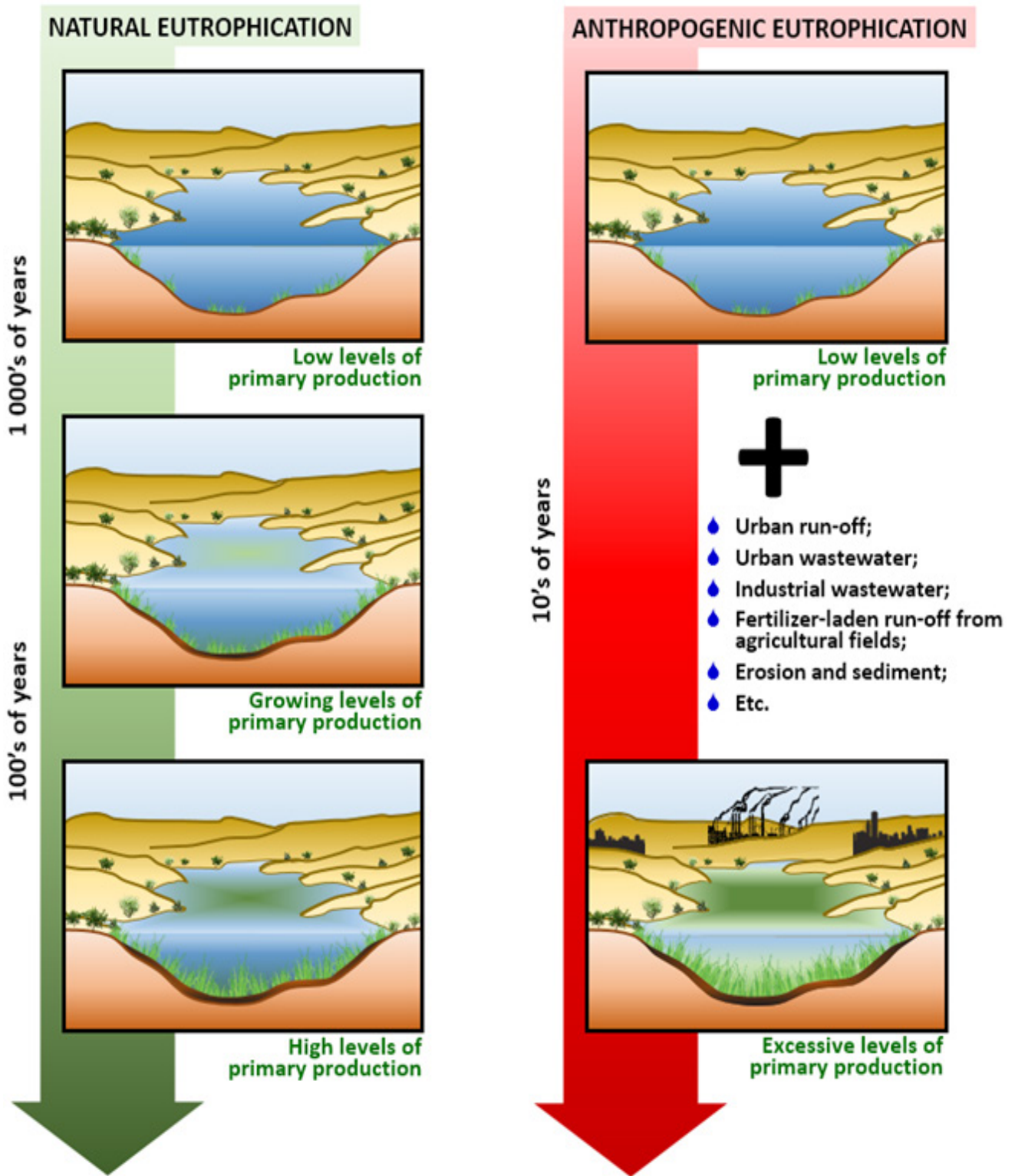


Illustration of natural and anthropogenic eutrophication

KEY CHALLENGES ASSOCIATED WITH EUTROPHICATION

Anthropogenic nutrient enrichment of water resources is a global challenge contributing heavily to the water resource pollution problem. It is associated with highly populated and developed areas where industrial effluent, water-borne sewage systems, wash-off from built-up areas, fossil fuel combustion and atmospheric fallout, and agricultural practices contribute to elevated loads of nutrients entering receiving water resources.



Streams of poorly treated and untreated sewage and industrial wastewater



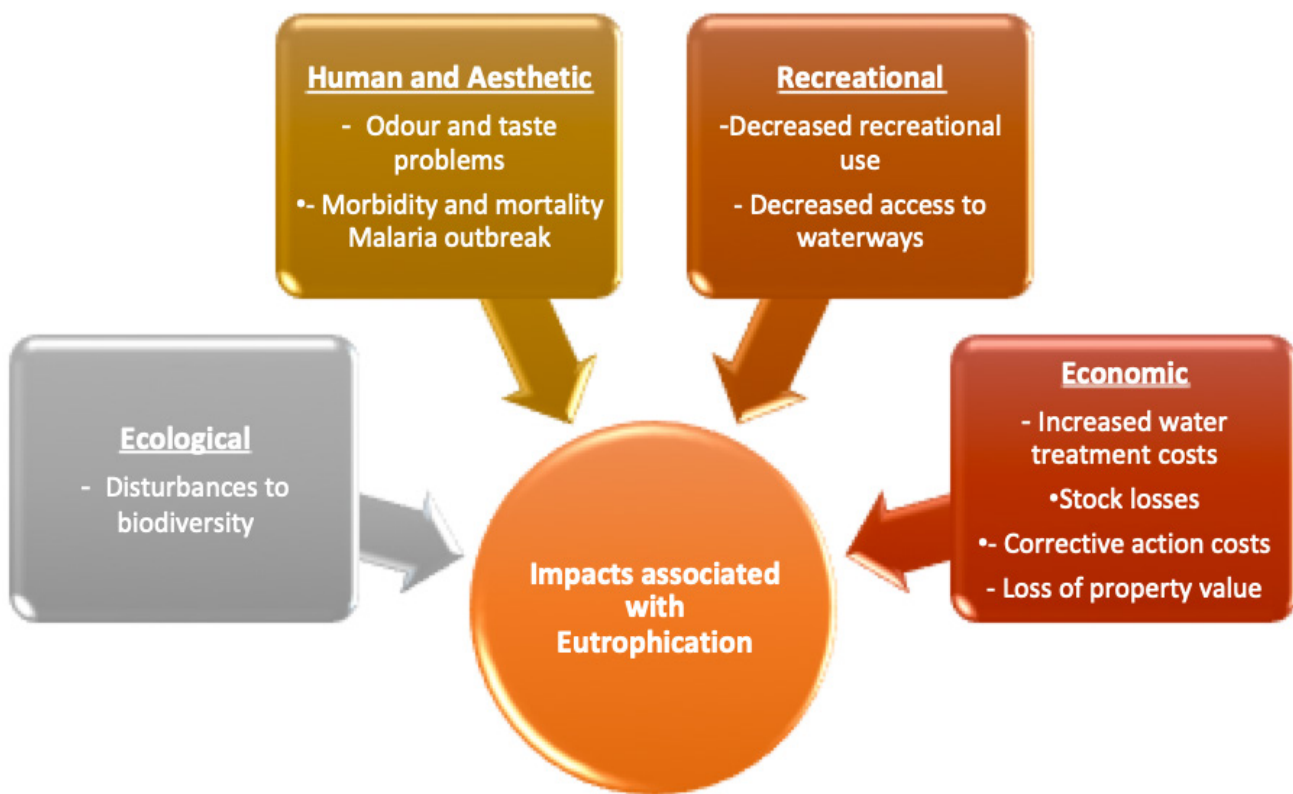
Vandalism, ageing infrastructure and insufficient maintenance of sewage infrastructure



Agricultural (irrigation) return flows



Runoff from informal settlements



EUTROPHICATION MANAGEMENT STRATEGY FOR SOUTH AFRICA

Scope of the Eutrophication Management Strategy

Eutrophication management strategy applies nationally to the country as a whole, to address issues of nutrient-loading which might affect the country's water resources, mostly due to anthropogenic impacts that might lead to excessive nutrient enrichment; and

Eutrophication of surface water resources and eventually the marine environment causing nuisance concerns, affecting property, impairing fitness-for-use and potential utility, and risking ecologically sustainable development, ultimately having undesirable social economic consequences.

PURPOSE OF EUTROPHICATION MANAGEMENT STRATEGY FOR SOUTH AFRICA

The purpose of the eutrophication management strategy document is:

- To give direction with respect to the management of eutrophication, in particular the control of anthropogenic sources of excessive nutrient enrichment, from a strategic country-perspective;
- To provide a reference for the control of triggers that cause excessive primary production in receiving water resources and for eutrophication management;
- To provide the foundation for operational consistency at the Water Management Area (WMA), subcatchment and local levels, by stipulating ground rules and prescribing overarching implementation approaches for the management of eutrophication;
- To address pertinent issues of eutrophication management integration and alignment with other processes;
- To facilitate improved eutrophication management cooperation and participation;
- To provide the basis for identifying priority actions and interventions necessary to control significant triggers of anthropogenic eutrophication; and their root causes of failure, acknowledging the need for the efficient and wise utilisation of scarce resources;
- To facilitate capacity building in respect of the control of the causes of excessive nutrient enrichment and eutrophication management; and
- To provide a point of departure for the monitoring and evaluation of eutrophication management strategy implementation progress.

EUTROPHICATION MANAGEMENT STRATEGIES FOR SOUTH AFRICA

The EMSSA was developed 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 define ground rules, delineate intent, and specify desired outcomes with respect to the management of eutrophication.

From policy objectives, the Eutrophication Management Strategy adopted three interrelated and mutually supporting strategies, namely:

- Core strategies;
- Operational strategies; and
- Supporting strategies, for eutrophication management.

EUTROPHICATION MANAGEMENT POLICY

<i>Policy statements in support of the CHIEF OBJECTIVES for eutrophication management in South Africa</i>	
POLICY STATEMENT 1	Application of management instruments for environmental compliance in eutrophication management
POLICY STATEMENT 2	The mitigation hierarchy for decision-making on eutrophication
POLICY STATEMENT 3	The differentiated approach for the control of excessive nutrient-loading
POLICY STATEMENT 4	The application of the precautionary principle
POLICY STATEMENT 5	The Receiving Water Quality Objectives Approach applied to eutrophication management
POLICY STATEMENT 6	A life cycle view on nutrient-loading
POLICY STATEMENT 7	Incentive based regulation
POLICY STATEMENT 8	Nature-based solutions
POLICY STATEMENT 9	The application of the Best Practicable Environmental Option
POLICY STATEMENT 10	Holistic eutrophication management
POLICY STATEMENT 11	Eutrophication management responsibility and accountability
POLICY STATEMENT 12	Monitoring
POLICY STATEMENT 13	Information management
POLICY STATEMENT 14	Water resource assessment and planning to inform decision-making
<i>Policy statements in support of the COMPLEMENTING OBJECTIVES for eutrophication management in South Africa</i>	
POLICY STATEMENT 15	Resourcing of eutrophication management
POLICY STATEMENT 16	Promotion of eutrophication-related research
POLICY STATEMENT 17	Transparency
POLICY STATEMENT 18	Technical capacity to take eutrophication management action
POLICY STATEMENT 19	Cooperative eutrophication management

EUTROPHICATION MANAGEMENT STRATEGY

CORE STRATEGIES		
1 Source Directed Management	2 Resource Directed Management	3 Remediation Directed Management
OPERATIONAL STRATEGIES		
PLAN stage ↓	1 Assessment	
	2 Forward planning	
	3 Goal setting	
	4 Intervention planning	
DO stage ↓	1 Best management practice	
	2 Water use authorisation & conditional regulation	
	3 Incentive-based regulation	
CHECK stage ↓	1 International & trans-boundary resource quality status & trend monitoring and reporting	
	2 Domestic resource quality status & trend monitoring and reporting	
	3 Management performance monitoring and reporting	
	4 Data acquisition and information management	
ACT stage ↻	1 Retroactive action	
	2 Enforcement	
	3 Management review	
SUPPORTING STRATEGIES		
1 Technical capacity building to give impetus to eutrophication management	2 Research & technology development to address eutrophication-related challenges	3 Collaboration & management participation

Eutrophication Management Policy and Strategy "ROADMAP"

The **Core Strategies** focus on the “*three faces*” or characters of eutrophication management, namely Source Directed, Resource Directed and Remediation Directed Management, and highlight the linkages between these strategies.

The core strategies for eutrophication management are devised within an adopted management framework, comprising of Source Directed, Resource Directed and Remediation Directed Management. Source Directed and Resource Directed Management employ measures and controls proactively, whereas, Remediation Directed Management employs measures and controls reactively to address residual causes and effects.

The focus of the **Operational Strategies** is on the operational management of eutrophication, and strategic guidance on multiple operational aspects of eutrophication management had been included by packaging them into an internationally accepted framework, known as the “**Plan Do Check Act**” or **P-D-C-A** cycle.

The operational eutrophication management strategies have a dual purpose, namely to:

- **complement the core strategies for eutrophication management**, by providing additional resolution on the four stages within the water quality management framework, specifically in relation to eutrophication; and
- **provide further operational guidance to eutrophication management** in South Africa.

The **Supporting Strategies**, lastly, focus on strategic measures that support eutrophication management, and strategies for “Technical capacity building to give impetus to eutrophication management”; “Research and technology development to address eutrophication-related challenges”; and “Collaboration and management participation” were developed. The outlines of all these strategies and their components overlap and necessitates an integrated and comprehensive approach towards addressing anthropogenic eutrophication effectively in South Africa.

COOPERATIVE GOVERNANCE IN RELATION TO EUTROPHICATION MANAGEMENT

Cooperative governance is important in the context of eutrophication, where the national, provincial and local spheres of government make and administer legislation, often, with wideranging impacts on water resources and, specifically, also potentially on the trophic status of receiving water resources.

Cooperative governance

Chapter 3 of the Constitution introduces the concept of “Cooperative governance” and requires that the three distinctive, interdependent and interrelated spheres of government (and all organs of state) must conduct their activities in the national interest and within the spirit of cooperation.

PRIORITY ACTIONS THAT NEED TO BE ADDRESSED FOR IMPLEMENTATION

- Addressing **noncompliance of Waste Water Treatment Works (WWTWs)** to the **phosphorus standard of 1 mg/ℓ** orthophosphate;
- Feasible and appropriate **Waste Discharge Standards (WDSs)** should be developed and implemented;
- The **Receiving Water Quality Objectives Approach must be operationalised** - calculation of Total Maximum Daily Loads (TMDLs) for dams;
- The **Waste Discharge Charge System (WDCS)** must be implemented to give effect to the polluter-pays principle and to incentivise nutrient load reduction;
- The role and feasibility of technology to treat nutrient-laden wastewater should inform processes to improve eutrophication management. **The Best Practicable Environmental Option (BPEO)** should be implemented;
- **Compliance monitoring and enforcement** must be intensified to deal with unlawful and non-complying water uses;
- Better **cooperation with government, private sector and civil society roll-players** needs to be put into action;
- The **introduction of zero-phosphate detergents** into South Africa should be pursued, linked to consumer education;
- The **rehabilitation and restoration of affected water resources**, including the implementation of bioremediation initiatives in dams should be supported;
- Development and implementation of programmes for recruiting and retaining experienced and qualified technical and managerial staff **with water quality specialization**;
- Investigation of the recent innovative **treatment technologies to improve water quality** such as green infrastructure to treat stormwater and agricultural run-off; and
- Provide bursaries and/ or training pertaining to water quality management at tertiary institutions.



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