Integrated Water Quality Management Plan (IWQMP)

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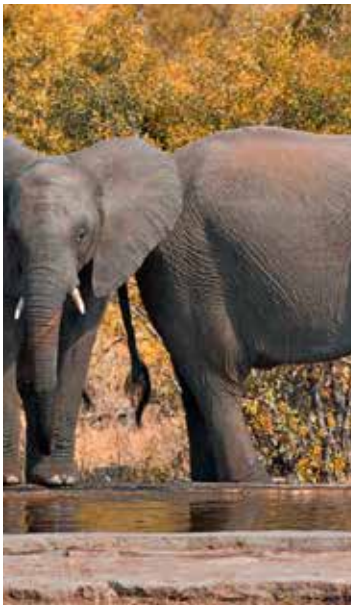

IWQMP FOR THE OLIFANTS RIVER SYSTEM NEWSLETTER

EDITION 2

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water & sanitation

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Water and Sanitation
REPUBLIC OF SOUTH AFRICA

PURPOSE OF THIS DOCUMENT

The purpose of this document is to provide water users in the Olifants River Water Management Area (WMA) with information about the Department of Water and Sanitation's project to develop an Integrated Water Quality Management Plan for the Olifants River system. This document provides the background to the project, a description of the project area, motivation for the project, approach to the study, anticipated outcome of the project and future implementation, the opportunities for comment and the stakeholder engagement process. Please contact the following Project Team members for more information:

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INTRODUCTION

The quality of any body of surface water or groundwater is a function of both natural and human influences. If there were no human influences water quality would be determined by the weathering of bedrock minerals, by the atmospheric processes of evapotranspiration and the deposition of dust and salt by wind, as well as by natural leaching of organic matter and nutrients from soil, hydrological factors that lead to run-off and by biological processes within the aquatic environment that can alter the physical and chemical composition of water.

The water quality of a particular body of water is determined by measuring the physical, chemical, aesthetic and biological characteristics of the water and typically, the fitness for use of the water is determined by comparing these characteristics against water quality guidelines or standards for a particular water use. In South Africa, the South African Water Quality Guidelines series (DWAF, 1996) is essentially a series of documents that was developed based on different user specifications (including use by the following sectors: domestic, industrial, livestock watering, irrigation and aquatic ecosystems) and were based on scientifically assessed acceptable levels of toxicity to either humans, aquatic organisms or commercial crops.

Declining water quality has become a global issue of concern as human populations grow, industrial and agricultural activities expand, and climate change threatens to cause major alterations to the hydrological cycle.

The Olifants River system faces a number of water quality concerns impacting on both surface and groundwater resources including salinisation, sedimentation, nutrient enrichment and microbial and agrochemical pollution, all at different scales within the sub-catchments of the Water Management Area (WMA).

Over the years significant catchment development, including industrial growth and power stations, widespread mining activities, especially in the upper catchments, irrigation and formal and informal urbanisation has impacted on the surface and groundwater resources of the Olifants River System.

SITUATION ASSESSMENT

As part of the development of an Integrated Water Quality Management Plan (IWQMP) for the Olifants Water Management Area, a situation assessment report has been compiled. The report includes a discussion on integrated water resources management in the South African context and stresses the importance of aligning with and complementing the results of the Reserve, classification and Resource Quality Objectives (RQO) projects that have been undertaken in the WMA, as well as the importance of incorporating the final Implementation Plan of the IWQMP, into the Catchment Management Strategy that will be developed for the Olifants WMA. As this WMA is on the border of Moçambique, the report includes a chapter on International Obligations with respect to water quality management.

Key to the IWQMP development for the Olifants WMA, is the alignment with the policies and strategies being developed by the DWS, Directorate: Water Resource Planning Systems under the project: Development of an Integrated Water Quality Management Strategy for South Africa.

WATER QUALITY STATUS

Surface water, groundwater and wetlands are being considered throughout the project. The results of the situation assessment indicate that there are a spectrum of issues that need to be considered including salinisation, nutrient enrichment, metals contamination and concerns around emerging contaminants such as agrochemicals that may not have previously been considered. In addition the poor management of domestic wastewater treatment works and sanitation facilities in informal areas located close to water resources have led to microbiological contamination and increased nitrates in groundwater resources.

The greatest impacts (surface water, groundwater and wetlands) are seen in the Upper Olifants catchment from mines, including defunct mines, and urbanisation which impacts considerably on downstream users. Impacts from agriculture and poor functioning municipal wastewater treatment works and other sanitation facilities are the main pollution sources in the Middle, Lower, Letaba and Shingwedzi sub-catchments. Impacts are also seen from small illegal mining operations, such as the sand mining in the Letaba catchment and illegal gold miners in the Pilgrims Rest area. Mines and industry in the Phalaborwa area also have a major impact on the lower reaches once the Olifants River enters the Kruger National Park.

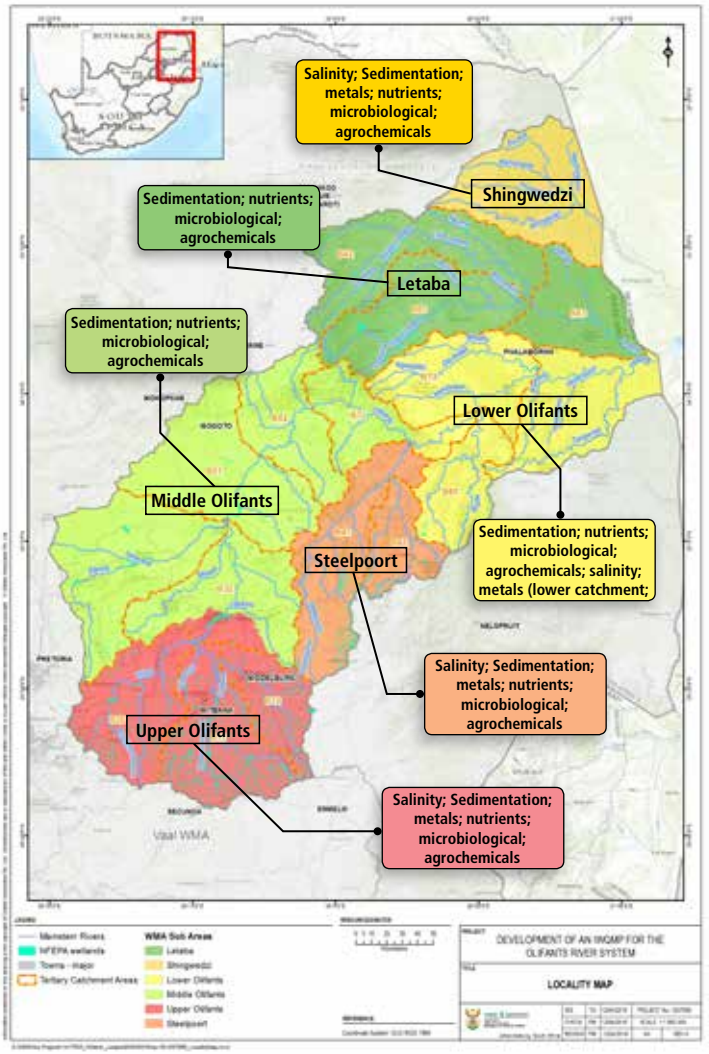
In summary the following areas have been identified as priorities to be taken forward as part of the development of the IWQMP, and particularly in the development of the implementation plan:

Direct impacts emanate from the mining activities and mine closure, including illegal mining, sand mining and decants from abandoned mines; wastewater treatment works discharges; and run-off from urban areas and irrigation schemes. The key areas of concern in the catchment include:

- Impacts of the mining activities (active and abandoned mines) and mine closure: The management of mining activities in the system, especially in the Upper Olifants sub-catchment, is crucial to the management of water quality both in the short term to alleviate the current salt loads being released to the Witbank, Middleburg and Loskop Dams, and long term to manage the impacts of mine closure and mine decants. While the complex dynamics of this situation is accepted in terms of maintaining base flows in the system, permitting active mining, and promoting wider socio-economic imperatives, a major intervention in terms of current mining development practices is required if the situation in the Upper Olifants and Steelpoort sub-catchments and Phalaborwa area is to be alleviated. Of further concern is the final decant points and the management of Water Reclamation Plants within the system once all the mines within this area close down.
- Management of wastewater treatment works discharges: The lack of compliance of wastewater discharges from the many smaller wastewater treatment plants in the system to discharge standards, as well as constant incidents at those wastewater treatment works that are not authorised to discharge, is of great concern. The Green Drop results indicate that this situation is not improving.

Photo courtesy of MTPA

- Urbanisation: This focus area is linked to the issue of wastewater treatment works to some degree, however it also related to the uncontrolled development and urban sprawl that is being experienced in many of the urbanised centres of the Olifants WMA.
- Irrigation Schemes: A strategy to optimise water use and reduce the impact of irrigation return flows (links to land-use) need to be developed in collaboration with the relevant WUA and National and Provincial Departments. The intervention strategy will require water quantity, WCWDM and water quality approaches. By improving water quality, the water may be made available to other users in the WMA.



MAIN USERS IN THE CATCHMENT – water use may be consumptive and/ or non-consumptive and all uses produce constituents of concern (indicated in each sub-catchment on the map)	
Upper Olifants	Domestic (cities, towns and villages) Mining (including illegal and defunct mines) Industry Agriculture (dry land and irrigation, subsistence)
Middle Olifants	Domestic (towns and villages) Agriculture (dry land and irrigation, subsistence)
Steelpoort	Domestic (cities, towns and villages) Mining (including illegal and defunct mines) Industry Agriculture (dry land and irrigation, subsistence)
Lower Olifants	Domestic (cities, towns and villages) Mining (including illegal sand mining) Industry Agriculture (dry land and irrigation, subsistence)
Letaba	Domestic (towns and villages) Agriculture (dry land and irrigation, subsistence)
Shingwedzi	Domestic (towns and villages) Agriculture (dry land and irrigation, subsistence)

- Monitoring, data collection and handling, and management: The water quality data of the surface water resources data captured by the Department for the Olifants catchment, although exhibiting some gaps, is available and useable. However, data of the water users in the system especially wastewater discharge information from mines and wastewater treatment works is extremely difficult to obtain. It is important that data gathering and handling and monitoring including variables and frequency of monitoring receive a high priority as such information forms the basis for water quality management within the system. This applies to all historical and future water resources related data as well as co-ordinating with other organisations.
- Waste Discharge charges: There is a need for the implementation of a Waste Discharge Charge System. Loads need to be determined for catchments where pollution is severe.
- Research needs: Decision-making with imperfect and incomplete data and information is never easy, and there are considerable risks associated with it. With funding the necessary research, and ensuring that data is shared across organisations, it will be possible to reduce the risks of decision-making by improving the knowledge base, and especially extending long-term studies in the Olifants River system.
- Integrated management: Environmental and conservation issues need to be placed within the context of social and economic uses of the river by the community and therefore requires the perception of local residents, landowners, the water industry and other stakeholders to be taken into account. Science has an important role to play in the decision-making process. Integrated management should be adaptive, constantly producing new mechanisms, ideas and tools. This can only be achieved with solutions and activities at the local level with political and managerial support. In this context awareness creation and education at all levels plays a fundamental and unique role. Public participation and awareness, practical focus, skills development and institutional capacity are some of the essential components of integrated water resource management.
- Research needs: Additional research into emerging variables of concern, particularly in the field of agrochemicals.

THE NEXT STEPS IN THE PROJECT

The next step in the project involves the definition, development, integration and balancing of water quality planning limits (WQPLs) that will maintain or improve the systems water quality, using as a point of departure the existing WQPLs (previously known as Resource Water Quality Objectives (RWQOs)) and RQOs. The second component will be to establish how the system complies with the WQPLs, which will be determined through analysis of available data and undertaking modelling of possible future scenarios. The analysis will show where non-compliance occurs and will indicate areas with available assimilative capacity. This task will identify areas where particular attention will have to be given to the development of options in the management option analysis.

Key to the development of the plan is an understanding of the sources of pollution. This is best done through modelling. In this respect salinity and nutrient balances will be developed for key areas of the study area to get a good understanding of the loads to the system. In areas where nutrients have been identified as issues requiring management, a nutrient balance will be based on the available instream water quality information, point source and typical unit load runoff factors for urban and agricultural areas. In this way the major sources of nutrient loads will be identified and the nutrient balance model can be used to assess the effectiveness of the management options identified to achieve the WQPL. The concerns around assimilative capacity as well as the need for other water quality variables will be assessed.

The third step will involve identifying and developing proposed management measures and options that will improve the non-compliance cases and deteriorating trends and utilise the available assimilative capacity to the benefit of the water users and ensure the sustainability of the system.

It may be that existing management options are the right ones to follow, however that implementation and enforcement have not been done effectively. An overview of the current management options being applied as well as an assessment of their effectiveness and possible reason(s) for failure (including institutional arrangements) will be undertaken, after which the management options (existing or

new) will be considered and will include options that could address the reasons for failure.

The successful management of the water quality in the Olifants River System will be the formulation of management measures that will integrate all the relevant aspects that have a bearing on the water resources. This requires assessments of the physical, economic, social, institutional, statutory and ecological aspects in the system in order to understand the current situation and be in a position to find strategies (management options) that will be able to handle the existing as well as anticipated future challenges. Furthermore it is expected that the growing economy, in the Olifants River System, will intensify the pressures on the water quality of the resource and it is therefore necessary to find innovative measures that offer economical and sustainable management solutions. The study team, in consultation with relevant stakeholders, will identify and screen possible management measures with the aim to find the most feasible options for implementation.

Sub-catchment IWQMPs will be developed for the six sub-catchments to address the localised WQ issues and achieve the WQPLs that have been set. These sub-catchment plans will address the thematic strategies that need to be developed and will be informed by the water resource management activities and initiatives already in place within a catchment area. The IWQMPs will take account of influences of cascading effects, neighbouring catchment dynamics and international requirements; and will be aligned to the overarching system IWQMP.

The Integrated Water Quality Management Plan is the main report from the study that will bring together all the information from the above tasks, into one document summarising the priority system WQ issues, presenting the recommended WQPLs, describing and motivating the recommended management options and implementation strategies and, finally, presenting the implementation and monitoring programme. An implementation programme will clearly indicate the short, medium and long term management activities that are required for implementation.

Please contact the Public Participation Office should you wish to be kept informed of the project and progress:

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