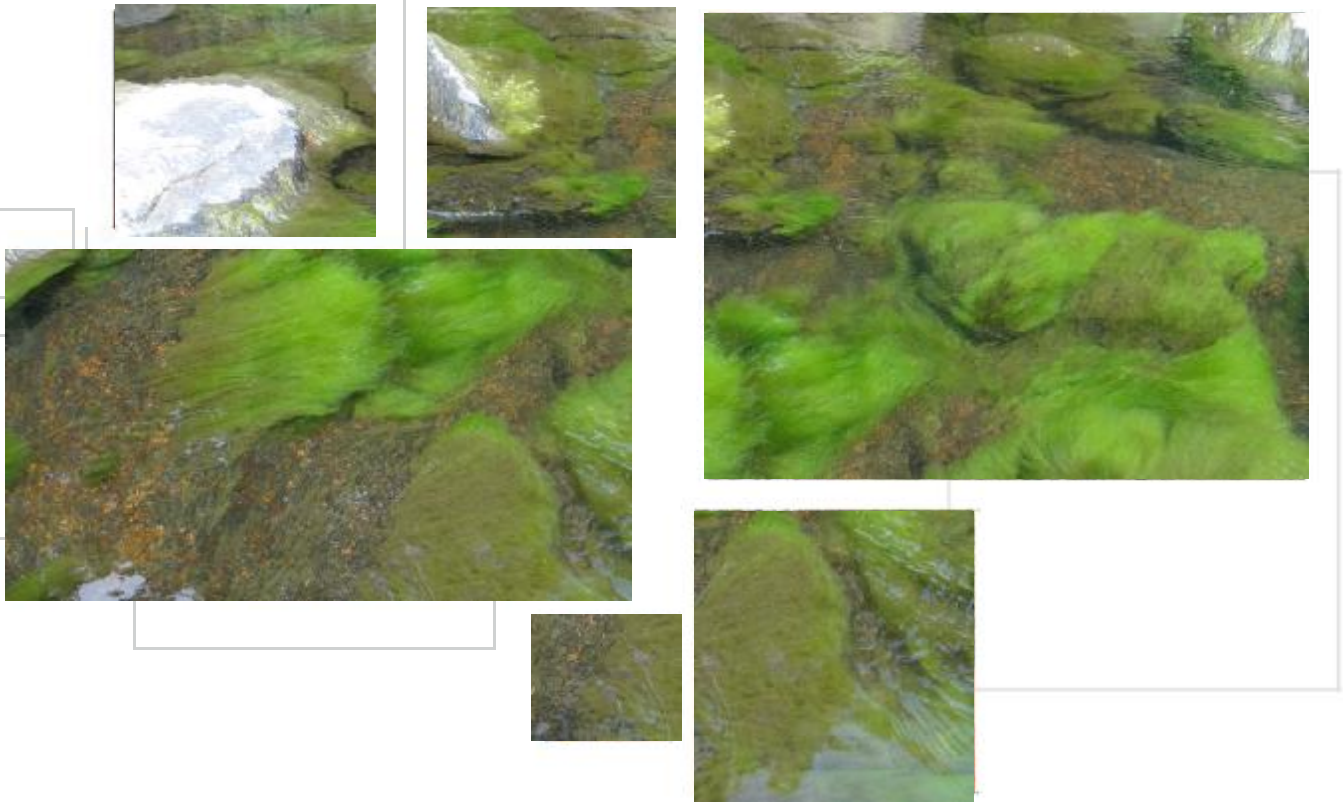
Integrated Water Quality Management Plan (IWQMP)

MAY 2017

IWQMP FOR THE OLIFANTS RIVER SYSTEM

NEWSLETTER

EDITION 4



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Department:
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 feedback on the project and a summary of the most recent tasks as well as an opportunity for comment by stakeholders.

In this newsletter we include various other related projects taking place in the Olifants WMA. Please contact the following Project Team members for more information:

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INTRODUCTION

In terms of the National Water Act (NWA) (Act 36 of 1998) and in line with the Department of Water and Sanitation's (DWS) obligation to ensure that the country's water resources are fit for use on an equitable and sustainable basis, it has adopted the approach of the progressive development and implementation of catchment management strategies (CMS) to fulfil this mandate. The development of the Integrated Water Quality Management Plan (IWQMP) for the Olifants WMA is being undertaken by the National Office in consultation with the Proto CMA, DWS and other relevant stakeholders to support the CMS.

The Inception Report (Report No: P WMA 04/B50/00/8916/1) and Water Quality Status Assessment and International Obligations With respect to Water Quality Report' (Report No: P WMA 04/B50/00/8916/3); and Water Quality Planning Limits Report: (Report No: P WMA 04/B50/00/8916/4) have all been completed and are available on the DWS web-site. The Scenario Analysis Report; Reconciliation and Foresight Report and Management Options Report are due at the end of June 2017.

DEVELOPMENT AND ANALYSIS OF SCENARIOS

The Status Assessment and Water Quality Planning Limits reports (P WMA 04/B50/00/8916/3 and P WMA 04/B50/00/8916/4 respectively) have indicated specific areas of concern in the six delineated sub-catchments of the Olifants WMA, with the major issues identified as the impacts from mining; wastewater discharge; urban run-off, and industrial and agricultural activities that have a bearing on its future management and operation.

Non-compliant wastewater treatment works contributing to organic, microbiological and nutrient loads are a serious threat to the water resources of the WMA. This situation appears to be continuing unabated, and until such time as this matter is addressed by all the role players at the appropriate levels, water quality management goals will not be achieved. This must be prioritised by the larger municipalities as well as local authorities of the smaller towns and will form part of the implementation plan for this project.

Figure 1: Poorly managed WWTW

The Green Drop Report notes that there is adequate capacity to meet the future demand without creating new capacity, however a significant portion of surplus capacity is not be 'readily available' because of inadequate maintenance and operational deficiencies

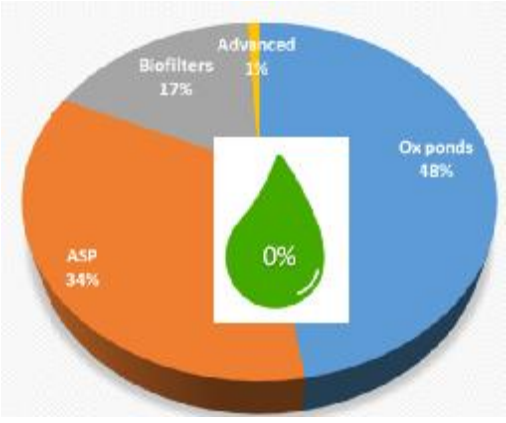


Figure2: WWTW types in the Olifants WMA with no Green Drop certification

Mining activities are impacting significantly on the water quality of the water resource system which is changing the characteristics of some of the water resources to such an extent that its ecological infrastructure value has been lost. Complete or partial loss of wetlands, and impacts on water quality due to mining activities has, and continues, to impact on the water resource system of the WMA. Decisions around future mining need to be informed by a better understanding of the cumulative long-term effects on the water resource system. In addition a strategy needs to be developed and implemented to deal with the water discharging from the defunct mines as well as existing mines post-closure and will form part of the implementation plan for this project.

Figure 3: Wetland in study area

Runoff from commercial agricultural areas contains agro-chemicals, which are causing eutrophication or contamination of water with pesticides downstream of the irrigated areas. While the impacts from the use of pesticides (including herbicides) are still relatively unknown a strategy must be developed to get a better understanding of these impacts.

Erosion, turbidity and sediment deposition are diminishing the potential of the hydrological system and loss of natural filters such as wetlands are also resulting in an increase in sediments in the water, increased erosion and terrestrial alien invasion.

Models have been run to determine the extent of the salinity and nutrient concerns and scenarios for the main areas impact have been put forward as follows.

Scenarios for salinity management

In respect of water quality the strategy for salinity will need to consider: defunct mines, operating mines, industries and power stations and the irrigation return flows in the case of the Lower Moses and Elands rivers. The main sources of pollution contributing to salinity that need to be addressed, and for which scenarios interventions will be considered are:

- Reduction of load due to seepages from the mine, industrial and power station waste storage facilities and mining operations in the Upper Olifants sub-catchment, some load from the Steelpoort sub-catchments and the Ga-Selati in the lower Olifants sub-catchments:
- Reduction of load due to excess mine water on the mining operations threatening to decant or starting to flood the coal reserves in the Upper Olifants sub-catchment; and
- Reduction of load from irrigation return flows in the Upper and Middle Olifants.

Scenarios for nutrient management

The largest impacts are from poorly managed wastewater treatment works (highlighted in the fish kill report discussed) and contaminated run-off from urban and agricultural areas. The scenarios for which interventions will be considered for nutrient management are:

- Reduction of nutrient load from domestic WWTW that discharge to the water resources, by considering a reduction of the orthophosphate concentration to 1 mgP/l;
- Reduction of nutrient and sediment load from densely populated areas;
- Reduction of nutrient and sediment load from agricultural areas; and
- Improved reuse of effluent from domestic wastewater treatment works not designed to meet the general discharge limits.

Scenarios for groundwater management

Interaction between groundwater and surface water resources play an important role in the overall water quality signatures in the study area. There is a concern that certain land use activities may impact the water quality of local, shallow groundwater systems which could support the groundwater contribution to baseflow in surface water systems. Groundwater contribution of baseflow supports the head waters regions of the Letaba River System, as well as the head waters of quaternary catchments (QC's) of the Olifants River System (i.e. Klein Olifants River, Blyde River, Elands River, Wilge River (Grootspruit and Saalboomspruit tributaries) and Steelpoort River (i.e. Grootspruit and Dwars tributaries).

Most of the groundwater quality risks are related to expanding of point source sanitation systems (pit latrines), mining/industrial related activities, and agricultural (stock kraals and irrigation fertilisers applications) practices.

The scenarios to be considered for groundwater management are therefore related to protection of groundwater in supply areas and treatment options for potable supply.

Figure 4: Borehole in study area

Considering Management Options

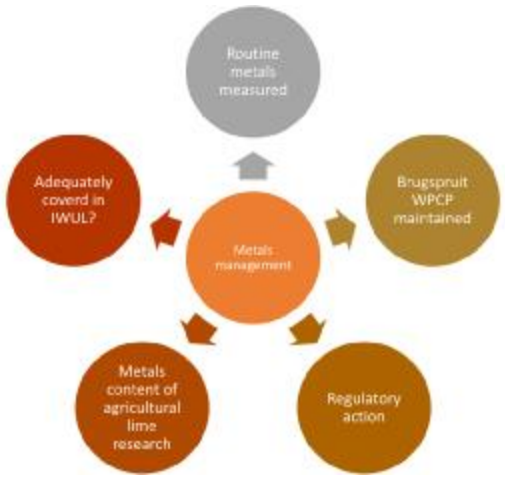
The determination of management options currently being undertaken will involve identifying and developing proposed management measures for the scenarios identified and options that will improve the non-compliance cases and deteriorating trends and utilise the available assimilative capacity to the benefit of the water users and ensure the sustainability of the system. The following illustrations set out some of the proposed management options to be considered.

Salinity Management Options

The salinity strategy will focus on source control and is divided into a strategy dealing with the defunct mines, operating mines, industries and power stations and the irrigation return flows in the case of the Lower Moses and Elands rivers.

Metals Management Options

Due to the coal mines and heavy industry in the Upper Olifants as well as around Phalaborwa in the Lower Olifants, metals are of concern. In addition, it has been noted that certain lime used in the agricultural sector results in elevated aluminium concentrations in the upper parts of the Middle Olifants. This lack of metals data is a gap. Some options include:



Nutrient Management Options

Currently WWTWs are managed by a water use authorisation: in many cases a General Authorisation due to size or an integrated water use license. There are at least 103 wastewater treatment works (WWTW) in the Olifants WMA. At least 75% of the hydraulic load emanates from the Upper Olifants sub-catchment, so focussing on this area will reduce the nutrient load considerably.

Groundwater management Options

The current status of the groundwater is impacted specifically by total hardness, salinity, nitrates at levels toxic to human health and fluoride related to specific rock-aquifer decomposition (or weathering, specifically certain granites and granite-gneisses. The management options for groundwater will therefore be focussed on treatment options, depending on the groundwater use.

An important aspect will be the development of an integrated information management system, to: link, allow access to all users to input data, act as an early warning system, flag hotspots, allow easy reporting, allow upload of pollution incidents including photographs).

OTHER CATCHMENT INITIATIVES

Lower Olifants River Operations Committee (LOROC): an example of cooperative governance

In recent years the Olifants River has shown signs of non-compliance with the legal requirements of the Ecological Reserve or environmental water requirements (EWR). Serious concerns were raised in January 2016 during extreme drought conditions when the flow of the Olifants River at Mamba weir (B7H015) dropped close to 1m^3/s, representing less than 25% of the EWR at 99% assurance (highest drought severity).

Figure 5: Mamba weir in KNP (photo from: DWS, Water Management Systems)

Collaborative efforts and a rapid response was created through the establishment of a Lower Olifants River Operations Committee that includes DWS, KNP, AWARD, Lepelle Northern Water, other water users and Ara-Sul in Mozambique. Agreement from the Acting DG allowed for temporary shifts of some of LNW demands from the Blyde Dam to De Hoop Dam during these times of stress. Flow releases were determined using the AWARD/ RESILIM-O De-Hoop release model. These were tested and adjustments were made accordingly. In the main, compliance with the Reserve requirements was met from 23rd September to 18th October 2016. As part of the process, agreements were also secured from commercial farmers for no uptake of the additional flows. Post release sampling indicated significant improvements in water quality and riverine health within the KNP.

This indicates that such a management system can greatly improve IWRM for the Olifants under extreme stress conditions. These are anticipated to increase under climate change. It is anticipated that there will be greater reliance on such co-operative activities in the years to come in order to ensure sustainable management of the Olifants system.

In order to help institutionalise the above tools and protocols, a training session was held in Nelspruit in September 2016.

Technical documentation can be accessed from: http://award.wordpress.hupu-labs.biz/wp-content/uploads/sites/2/2017/04/Technical-Documentation_Lower-Olifants-Op-Rules_Final.pdf

Reflection report can be accessed from: http://award.wordpress.hupu-labs.biz/wp-content/uploads/sites/2/2017/04/Reflection-Report_Lower-Olifants-Operations-2016.pdf

(Thanks to Eddie Ridell and Hugo Retief for contributions)

FISH KILLS IN THE BRONKHORSTSPRUIT AREA

A fish kill in the Bronkhorstspruit River highlighted it as an area that is currently receiving some attention, but requires more focus. A report was compiled in February 2017 (Dabrowski, 2017) because of a fish kill and water pollution reported on 26 January 2017.

Figure 6: Fisk kill in Bronkhorstspruit area (Photo: J. Dabrowski, 26 Jan 2017)

The event was significant as it affected both the Bronkhorstspruit and Wilge Rivers. There were thousands of dead fish, and it highlighted water hyacinth as having a significant impact in this catchment.

Figure 7: Hyacinth in Bronkhorstspruit River (Photo: J Dabrowski)

(Thanks to Jackie Dabrowski for contributions)

This is a concerning situation because it keeps recurring. On 8 April 2017 residents along the river distributed video footage of poorly treated sewage effluent being pumped into the river (with mountains of white foam) and hundreds of fish gasping at the surface and dying downstream. It has happened on several occasions. The area most affected is immediately downstream of Bronkhorstspruit Town and upstream of the Premier Mine Dam.

The Wageenbietjieskop WWTW discharges into this area and there also appear to be issues with wastewater management at the Zithobeni WWTW.

Flow tracker: 're-envisioning the way near real-time data is utilised and made accessible to the public and key partners'

The Android mobile application "Flow tracker" designed for the Olifants River is the first of its kind. It enables near real-time flow and dam monitoring, and includes a weather forecast facility. It is designed for use by residents to improve catchment awareness. Although South Africa has robust water related policies with the National Water Act (1998) being applauded internationally, implementation – and especially regulation - faces many challenges. For example although a number of benchmarks have been developed for flow or water quality, monitoring these for compliance (especially in real time) is notoriously difficult. This is particularly true of environmental water requirements (known as the Reserve in South Africa) which are developed to ensure long-term sustainability. This is a critical issue for IWRM, and in the Olifants River where water quality and flow are severely compromised and likely to worsen under climate change.

Putting policy into practice:
The mobile app is part of AWARD's work on supporting IWRM which started in the Inkomati and has now extended to the Olifants Catchment. Since the emphasis is in South Africa – and for AWARD - has now moved from policy reform to implementation, it is emphasised that one does not simply "implement the Reserve": rather it is the synergistic effects of a collection of strategies that together deliver the Reserve. These should be held in the catchment management strategy and include planning, water allocation, monitoring, regulation and enforcement.

Given their focus on putting policy into practice for IWRM, these issues have been explored in depth by AWARD over the past decade (http://www.award.org.za/resources/). One issue has been how compliance monitoring can be supported in practice. Nonetheless monitoring in real-time is notoriously difficult.

Thus, Award works with the proto-Olifants Catchment Management Agency, the Department of Water and Sanitation and other stakeholders, especially water users, on issues of good governance for sustainability. This version of Flow Tracker 1.0 is designed for use by the general public as part of an effort to support greater involvement by stakeholders in IWRM. Through its use, it is hoped that knowledge and awareness about the Olifants River will be increased. Flow Tracker integrates data from 62 DWS gauges and 4 AWARD gauges, located across the Olifants River Catchment. This allows the end user to retrieve, chart and share near real-time data that is updated on a six hourly basis. AWARD is currently developing a method to simulate dynamic environmental water requirements in near real-time. This will be available in the near future with the release of Flow Tracker version 2.0. The current version of Flow Tracker is only available on Android 5.0 enabled phones, a IOs version will be released in the near future. The mobile application can be downloaded from the Google Playstore using the following link:
https://play.google.com/store/apps/details?id=flowtracker.award.org.za.flowtracker&hl=en

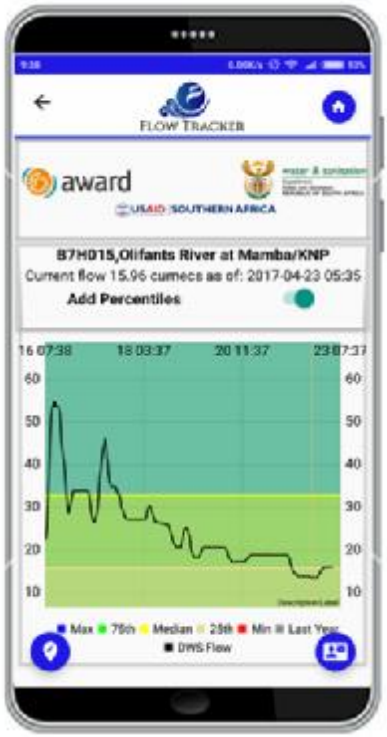


Figure 8: Flow tracker android screen

(Thanks to Sharon Pollard and Hugo Retief for contributions)

STAKEHOLDER ENGAGEMENT PROCESS

Stakeholder Engagement will take place as follows:

- PSC 3: 6 June 2017

To present and discuss the reconciliation, scenarios and management options

- Sub-catchment meetings to be convened in consultation with the Olifants Proto CMA, SALGA and COGTA Provincial Offices: 17 to 28 July 2017

The purpose of these meetings will be to discuss the reconciliation, scenarios and management options as well as further detail for each of the sub-catchments. The meetings will take place at a venue to be confirmed in the following sub-catchments:

- Upper Olifants;
- Middle Olifants;
- Lower Olifants;
- Steelpoort;
- Letaba and Shingwedzi.

WHAT NEXT?

The following components are now underway:

- Scenario Analysis Report;
- Reconciliation and Foresight Report;
- Management Options Report;
- Integrated Water Quality Management Plans for each Sub-catchment:
  - § IWQMP for the Upper Olifants sub-catchment;
  - § IWQMP for the Middle Olifants sub-catchment;
  - § IWQMP for the Lower Olifants sub-catchment;
  - § IWQMP for the Steelpoort sub-catchment; and
  - § IWQMP for the Letaba and Shingwedzi sub-catchments,
- Monitoring Programmes Report;
- Overarching IWQMP for the Olifants River System; and
- Implementation Plan Report.

Figure 9: Olifants River in Kruger National Park