Classification of Significant Water Resources and Determination of Resource Quality Objectives for Water Resources in the Usutu to Mhlathuze Catchments

Project Steering Committee (PSC) meeting no. 3
Background Information Document (BID)
2 December 2022

water & sanitation
Department:
Water and Sanitation
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PURPOSE OF THIS DOCUMENT

The purpose of this background information document (BID) is to inform stakeholders about this study that will determine Water Resource Classes and Resource Quality Objectives (RQOs) for significant water resources in the Usutu to Mhlathuze Catchments.

This BID contains the following:

- A brief overview of the Water Resource Classification System;
- An overview of the study area;
- An indication of where we are in the study process;
- Information about the identification and description of scenarios within Integrated Water Resource Management (IWRM).

This document specifically provides information on **Task 4** of the study - identification and evaluation scenarios within IWRM.

Through this process water resources within the catchments will be classified in accordance with the Water Resource Classification System and RQOs will be determined.

Stakeholders are invited to participate in the process by contributing information at meetings and workshops, or by corresponding with the stakeholder engagement office or the technical team at the addresses provided below.

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BACKGROUND

The National Water Act,1998 (Act No. 36 of 1998), (NWA) is founded on the principle that National Government has overall responsibility for and authority over water resource management for the benefit of the public. It also requires that the nation's water resources be protected, used, developed, conserved, managed and controlled in an equitable, efficient and sustainable manner.

In order to achieve this objective, Chapter 3 of the National Water Act, 1998 (Act 36 of 1998) provides for the protection of water resources through the determination of Resource Directed Measures (RDM).

The Chief Directorate: Water Ecosystems Management of the Department of Water and Sanitation (DWS) is responsible for the determination of RDM which includes the classification of water resources, determination of the Resource Quality Objectives (RQOs) and the Reserve in terms of the Water Resource Classification System (WRCS). These protection measures aim to ensure that a balance is sought between the need to protect and sustain water resources on one hand and the need to develop and use them on the other.

The DWS is progressively determining water resources classes; Reserve and RQOs for all river systems in South Africa to ensure their protection and sustainable use, with the Usutu to Mhlathuze Catchments being among one of the current systems to be classified and RQOs determined.

This study is managed by a Project Management Committee (PMC) consisting of relevant DWS representatives and the Professional Service Provider.

The PSC is represented by various sectors of society and meets on a regular basis to steer this study towards the acceptable scientific direction. Members of the PSC provide feedback to the constitutions / organisations which they represent.

Information Documents (such as this document) are developed and made available to stakeholders to inform discussions especially at PSC meetings. This study's final results will be presented at a public meeting before the gazetting process commences, which will provide further opportunity for comment.

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WHAT IS THE WATER RESOURCE CLASSIFICATION SYSTEM?

The Water Resource Classification System (WRCS) is a set of procedures for determining the three protection measures which are:

- Water resource classification
- Reserve and
- Resource Quality Objectives

The implementation of the WRCS therefore, requires considerationof the social, economic and environmental landscape in a catchment in order to assess the costs and benefits associated with utilization versus protection of a water resource.

The actual process of applying the WRCS procedures to establish the Class is called the Classification process. The Classification process is a consultative process that allows stakeholders to participate in the setting of the Classes.

The outcome of the Classification process will be the approval of the Water Resource Classes.

Water resources must be classified into the following:

Class I water resource is one which is minimally used, and the overall ecological condition of that water resource is minimally altered from its predevelopment condition.

Class II water resource is one which is moderately used, and the overall ecological condition of that water resource is moderately altered from its predevelopment condition.

Class III water resource is one which is heavily used, and the overall ecological condition of that water resource is significantly altered from its predevelopment condition.

Once the classes have been established, RQOs are determined to give effect to the classes established. These protection measures will be gazetted in a government gazette and are binding on all authorities or institutions.

The Usutu-Mhlathuze study will follow a project plan which is based on the Integrated Steps for Classification and determining RQOs.

WHAT ARE RESOURCE QUALITY OBJECTIVES?

Resource Quality Objectives (RQOs) are a set of narrative and/or numerical management objectives defined for any particular resource.

RQOs encompass four components of the resource:

- Water quantity;
- Water quality;
- Habitat integrity; and
- Biotic characteristics.

RQOs are important management objectives against which resource monitoring will be assessed. Monitoring of set RQOs will provide an indication as to whether the Class is being maintained or achieved.

INTERGRATED PROCEDURE FOR DETERMINING THE WATER RESOURCE CLASSES AND SETTING RQOs: THE STUDY PLAN

The following tasks are undertaken for determining the Water Resource Classes and for setting the RQOs. Tasks 1 and 2 have been completed. The duration of the study is 30 months – December 2021 to May 2024.

Task 1	**Delineate the Resource Units and Integrated Units of Analysis (IUAs) and describe the status quo of the water resources**	
Task 2	**Prioritise Resource Units (RUs) and select study sites**	
Task 3	**Quantify Basic Human Needs and Ecological Water Requirements (EWRs)**	
Task 4	**Identify and evaluate scenarios within Integrated Water Resource Management**	
Task 5	**Determine Water Resource Classes based on Catchment configurations for the identified scenarios**	
Task 6	**Determine RQOs (narrative and numerical limits) and provide implementation information for stakeholder review**	
Task 7	**Input into legal notice and Gazette the Class configuration and RQOs**	

AN OVERVIEW OF THE STUDY AREA

The Usutu to Mhlathuze catchments are situated in the northern part of the KwaZulu-Natal province and also occupy the south-eastern corner of the Mpumalanga province (west of Swaziland). The catchments borders both Swaziland and Mozambique and share two major river systems (the Usutu and Pongola) with these countries. The catchments in the area are as follows:

- Mhlathuze,
- Mfolozi
- Mkuze/Hluhluwe
- Pongola
- Usutu and Lake Sibaya

These catchments are all mostly independent of each other and they all form part of the Usutu Basin, also referred to as the Maputo River Basin. The Usutu to Mhlathuze catchments

have been divided into six drainage areas, or secondary catchment areas, which are:

- Mhlathuze, including all the W1 catchments;
- Umfolozi, including all the W2 catchments;
- Mkuze, including all the W3 catchments;
- Pongola, including all the W4 catchments and part of this catchment falls within Swaziland;
- Usutu, including all the W5 catchments and much of this catchment falls within Swaziland; and
- The W7 catchment which is unique in that its water resources are dominated by groundwater.

The Mbuluzi secondary catchment, W6, is part of the Usutu to Mhlathuze Water Management Area (WMA6), however it falls completely within Swaziland and Mozambique. It is therefore not included as part of this study because it does not contribute to the Pongola and Usutu River systems.

The primary rivers in the area are the:

- Mhlathuze, Matigulu and Mlalazi rivers in W1;
- Mfolozi river in W2;
- Mkuze and Hluhluwe rivers in W3;
- Pongola and Bivane rivers in W4; and
- Assegaai, Usutu, Mpuluzi and Hlelo rivers in W5

The main contributors to the local economy are manufacturing, mining, agriculture and transport. Land-use includes commercial agriculture and irrigated crops, mostly sugarcane and citrus, dryland sugarcane, and farm dams that support irrigation. Afforestation exists in the upper parts of most catchments and communal lands support cattle and subsistence farming. The area also has conservation and ecotourism, with several nature reserves including Hluhluwe, Mfolozi, Mkuze, St Lucia, Sodwana and Itala. In addition, Lake St Lucia is a proclaimed World Heritage Site, also forming part of the key economic sectors within the area. Key industries in the area include pulp and paper manufacturing, aluminium smelting, and dune mining for titanium and other heavy metals. The manufacturing sector is linked to railway infrastructure with a harbour at Richards Bay (the largest coal exporting terminal in South Africa).

Main towns include Richards Bay, Mtunzini, Ulundi, St Lucia, Vryheid, Paulpietersburg, Piet Retief, Armsterdam, Hluhluwe, St Lucia and Mkuze, Jozini and Pongola. Large dams in the area include the Klipfontein Dam, Goedertrouw, Hluhluwe, Bivane and Pongolapoort.

There are also a number of transfer schemes in the area, namely the Usutu (providing water for the cooling of coal-fired power generation plants in the Vaal and Olifants systems), Thukela-Mhlathuze, Mfolozi-Mhlathuze and Senekal Trust Transfer.

The Usutu to Mhlathuze catchments are amongst many water-stressed catchments in South Africa. These catchment areas are important for conservation and contain a number of protected areas, natural heritage sites, cultural and historic sites and other conservation areas that need to be protected. There are six RAMSAR sites within the catchments, which include Ndumo Game Reserve, St. Lucia, Kosi Bay, Lake Sibaya, Natal Drakensberg Park, Turtle Beaches / Coral Reefs at Tongaland.

STUDY APPROACH

This study focuses on the classification of significant water resources (rivers, wetlands, groundwater and the estuaries) and determining associated RQOs in the Usutu to Mhlathuze catchments.

The process begins by defining the current state of the water resource (or part thereof) in terms of the ecological and biophysical elements. A detailed status quo assessment of the catchment (water resource quality, water resource issues, existing monitoring programmes, infrastructure, institutional environment, socio-economics, sectoral water uses and users) is undertaken to understand the current conditions.

The catchment is then delineated into Integrated Units of Analysis (IUAs), where the catchment area is divided into basic units of assessment for the Classification of water resources, and into Resource Units (RUs, i.e. smaller units) for determining ecological water requirements (EWR or the Ecological Reserve). The assessment of EWRs is undertaken as Step 3 of the process. These steps form Tasks 1, 2 and 3 of the Study Plan.

A process of modelling, taking into account the protection requirements and development demands, is undertaken to understand consequences of different development scenarios on the state of resources (Tasks 4 and 5 of the Study Plan). A consultative process will then be undertaken, whereby the outcomes of the scenario analysis are discussed, taking into account the ecological, social and economic aspects, to define a future desired state of a water resource, namely the Water Resource Class. RQOs are then determined to ensure that the Classes that have been set can be met (Task 6 of the Study Plan). Once the consultation on the proposed classes and RQOs is complete, they are gazetted. (Task 7 of the Study Plan).

TASK 4: IDENTIFY AND EVALUATE SCENARIOS WITHIN INTEGRATED WATER RESOURCES MANAGEMENT

Task 4 requires the identification and description of operational scenarios within IWRM. The objective of this task is to identify operational scenarios which are then modelled to provide the output in the formats required to evaluate the scenarios. Note that these scenarios could consist of any changes to the water resource in terms of quantity and quality. As such, it can include groundwater scenarios as well as water quality scenarios (those associated with wastewater treatment works), amongst others. A scenario incorporating possible differences due to climate change is included. These scenarios are to be tested with stakeholders and an agreed list of scenarios are finalised for further analyses. The main purpose of PSC 3 will be to present proposed scenarios to the stakeholders and obtain inputs.

The scenarios are in most cases modelled using the WRYM (Water Resources Yield Model) and WRPM (Water Resources Planning Model) and the outputs are evaluated to determine a range of consequences (e.g., ecological and socio-economic) which are then compared through a Decision Support System in order to rank the scenarios.

The details of the task are further described below:

Define Scenarios

This step encompasses the identification and description of scenarios that will be evaluated to arrive at the desirable balance between the protection of the ecology and the utilisation of the water resource for socio-economic purposes. The scenarios need to be coherent by appropriately accounting for the relevant aspects (variables) in the catchment's water balance pertaining to each scenario's narrative. The scenario narrative definitions are tested with stakeholders to ensure that a complete list of scenarios has been identified.

For each operational and development scenario the standard DWS Water Resources Yield Model (WRYM) will be configured to represent the scenario conditions (variables), tested for consistency after which time series of monthly flows will be simulated for use in the ecological evaluations. Alternatively, difference analysis based on an appropriate base scenario will be carried out in cases where different abstractions or discharges need to be evaluated. Appropriate statistics of the simulated time series will be compiled for interpretation and application in the other tasks.

Intermediate scenarios will be defined to provide for a practical range of conditions (settings) for comparison and to find the best balance between protection and level of water use. A maximum of five scenarios will be considered (over and above those for natural and presentday conditions).

Task 4 contains seven sub-steps which are depicted below. Sub-steps are represented by second tier numbering e.g. Step 4.1 represents a sub-step within Integrated step 4.

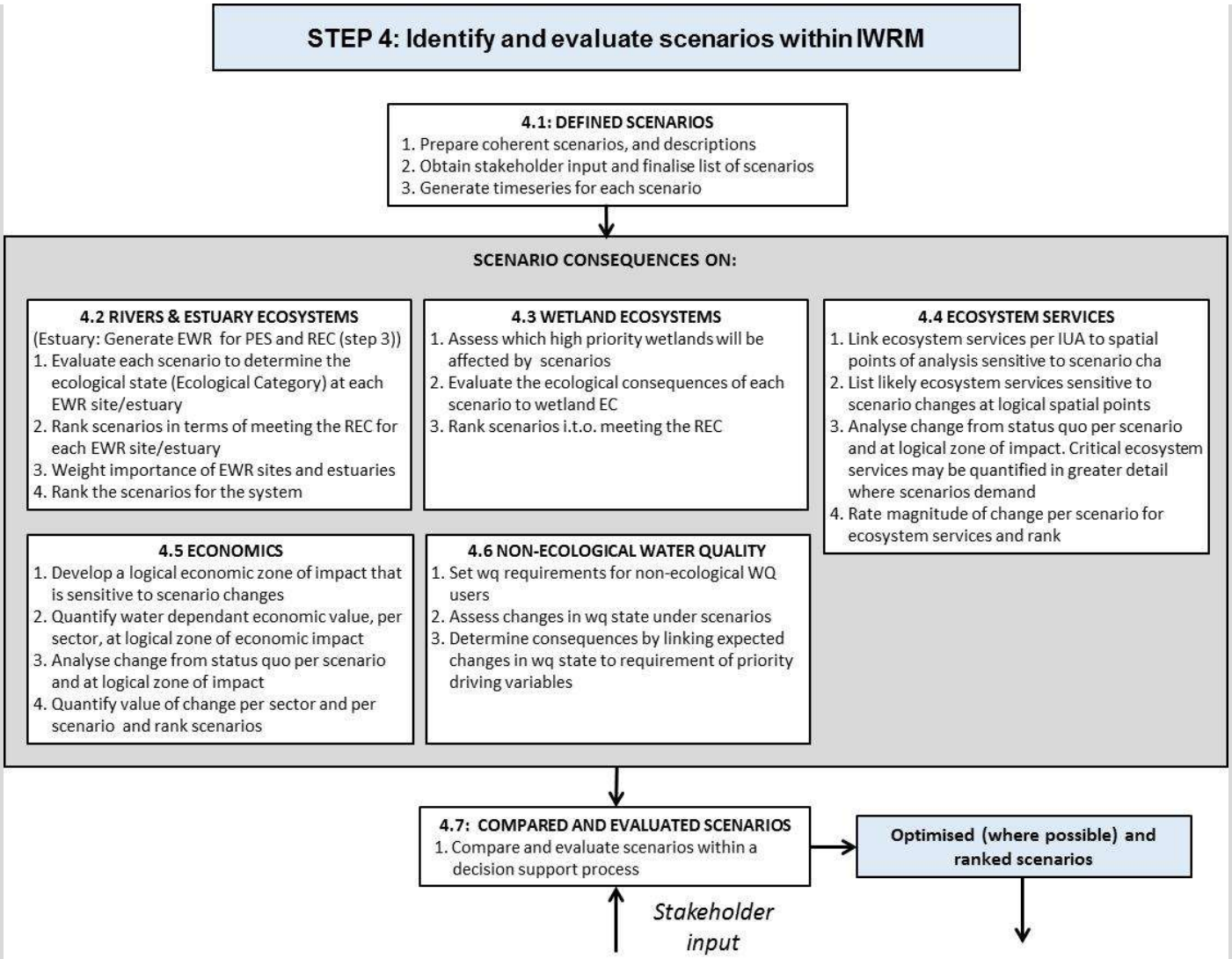

Illustration of the sub-steps for Step 4: Identify and evaluate scenarios within IWRM

DESCRIPTION OF SCENARIOS

Scenarios that will affect the Comprehensive EWR sites selected in the rivers as well as the Estuaries will be defined. The following Table provides an overview of the proposed Scenarios which will be elaborated on at the PSC 3 meeting.

Site	River	2040 domestic growth	2040 other growth	Climate Change	Infrastructure	Unique
MA 1	Matigulu			x		
NS 1	Nseleni			x		
WM 1	White Mfolozi	x		x	Raise Klipfontein Dam	
BM 1	Black Mfolozi			x		
MK 1	Mkuze	x	Irrigation	x		
UP 1	Pongola	x New Frischawaard WTW		x		
AS 1	Assegaai	x	Eskom decrease	x		Dam releases
NG 1	Ngwempisi	x	Eskom decrease	x		Dam releases
Estuaries	Multiple	x Mtunzini WWTW increase		x	New Dam: Mfolozi	Restoration for Nhlabane

THE WAY FORWARD

A draft short list of Scenarios will be circulated after the PSC Meeting for comments by PSC members up until 15 January 2023 after which, the short-listed scenarios will be finalised. The information will be included in the Scenario Description Report, and then work on assessing the impact of the Scenarios will begin.

Abbreviations and Glossary

BHN	Basic Human Needs
BHNR	Basic Human Needs Reserve
BID	Background Information Document
DFFE	Department of Forestry, Fisheries and the Environment
DWS	Department of Water and Sanitation
EC	Ecological Category
EGSA	Ecological Goods, Services and Attributes
EIS	Ecological Importance and Sensitivity
ES	Ecosystem service
EWR	Ecological Water Requirements
IEI	Integrated Ecological Importance
IUA	Integrated Unit of Analysis
IWRM	Integrated Water Resource Management
MAR	Mean Annual Runoff
MC	Management Class
NBA	National Biodiversity Assessment
NWA	National Water Act
PES	Present Ecological State
PMC	Project Management Committee
PSC	Project Steering Committee
RDM	Resource Directed Measures
REC	Recommended Ecological Category

RQOs	Resource Quality Objectives
RU	Resource Unit
SQ	Sub Quaternary
WMA	Water Management Area
WRCS	Water Resource Classification System
WRYM	Water Resources Yield Model
WRPM	Water Resources Planning Model
WTW	Water Treatment Works
WWTW	Waste Water Treatment Works
WQ	Water Quality
Some terminology explained:	
BHNR	Water needs to be set aside for basic human needs such as drinking, food preparation, and health and hygiene purposes.
Biophysical nodes	A point in the river which can be a survey site or a hypothetical point ("site"). Survey sites are EWR sites or Key Biophysical Nodes. Hypothetical points are Desktop Biophysical Nodes.
Sub-quaternary (SQ)	A finer subdivision of the quaternary catchments (the catchment areas of tributaries of main stem rivers in quaternary catchments), to a sub-quaternary reach or quinary level.