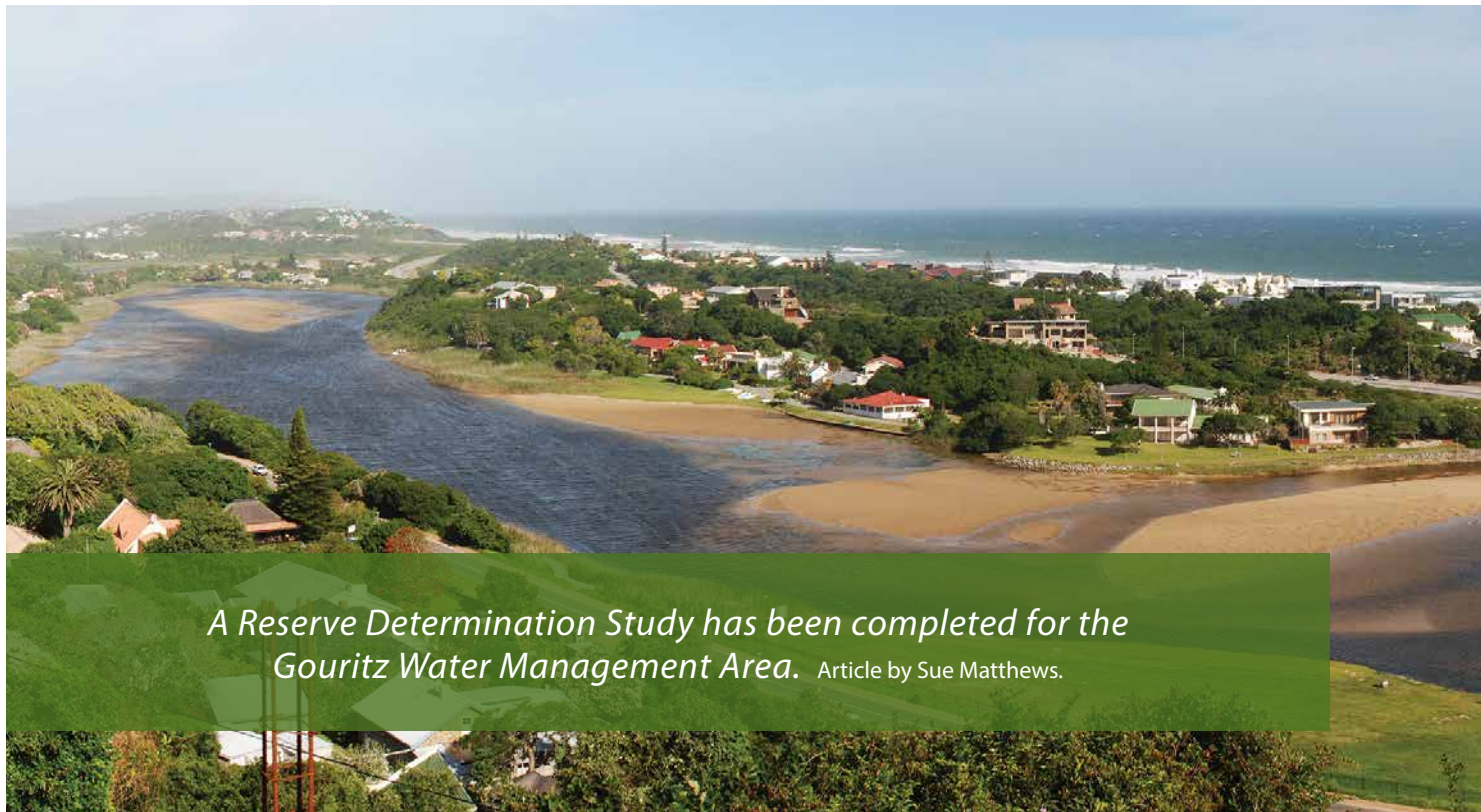


# The environment and water

## New study steers integrated management of Gouritz water



*A Reserve Determination Study has been completed for the Gouritz Water Management Area.* Article by Sue Matthews.

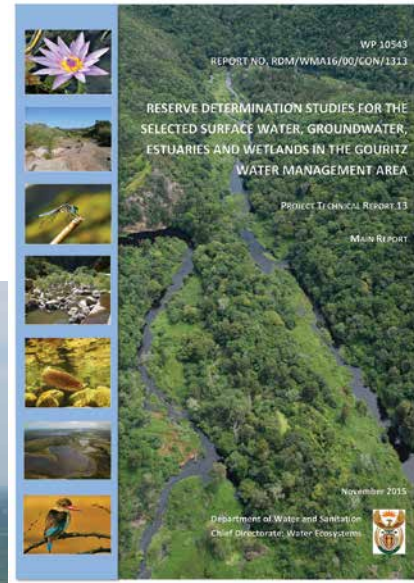
The Gouritz Water Management Area (WMA), covering an area of approximately 53 000 km<sup>2</sup>, was one of 19 WMAs delineated in the 2004 edition of the National Water Resource Strategy, but consolidated into nine in 2012. The Gouritz WMA was merged with the Breede-Overberg WMA to form the Breede-Gouritz WMA, but by then the tender process for the Gouritz Reserve Determination Study had been completed, and project planning was underway. The tender was awarded to a consortium of specialists, with Aldu le Grange of AECOM (formerly BKS) heading up the project management component and Patsy Scherman of Scherman Colloty and Associates the technical component.

The study was motivated largely by the need to determine the Reserve – the quantity and quality of water required to protect aquatic ecosystems and meet basic human needs – before various applications for water licences that had been made to the then Department of Water Affairs (since renamed the Department of Water and Sanitation) could be processed. The 2009 to 2011 drought in the Central Karoo and Southern Cape had highlighted the precarious nature of water supply in

the area, and there were concerns that existing and planned development could aggravate the situation, while also threatening the conservation status of priority water resources.

In brief, Reserve determination studies involve an EcoClassification process and an Ecological Water Requirements (EWR) determination. During EcoClassification, the health of the various biophysical components – such as instream or estuarine habitat, hydrology, water quality, and plant and animal groups – is compared to their likely pristine, natural state, known as the reference condition. The causes of change are identified, and a Present Ecological State (PES) is allocated within a range of ecological categories from A (near natural) to F (critically modified). The Ecological Importance and Sensitivity (EIS) is evaluated – or Estuarine Importance scored in the case of estuaries – and the Recommended Ecological Category (REC) is set, taking into account the importance rating, the potential for restoration and the ability to attain it. The REC is designed to maintain the PES if importance is low or moderate, or improve the PES if the importance is high or very high.

*The Reserve Determination Study which has been completed for the Gouritz Water Management Area.*



Sue Matthews

The EWR Determination component entails assessing the consequences of altered flows, before making recommendations on the volume and duration of high and low flows for each month of the year. Finally, a monitoring programme is designed, incorporating ecological specifications and thresholds of potential concern. Ecological specifications allow predictions made during the study to be tested, while thresholds of potential concern are effectively 'red flags', prompting investigation into the cause of severe change and the need for corrective management action.

### Rivers

The main rivers in the WMA are the Gouritz and its major tributaries – the Buffels, Touws, Groot, Gamka, Olifants and Kammanassie rivers – but smaller rivers drain the coastal belt, which experiences year-round rainfall reaching 865 mm per year in places. The river component of the Reserve determination study was conducted by a team of subject specialists headed by Delana Louw of Rivers for Africa, and began with a desktop EcoClassification exercise to describe the status quo with

respect to water use, river ecology, water quality problems and ecosystem services. It also included the identification of ecological hotspots, where further investigation would be required if development was being considered.

Based on this information, Ecological Water Requirement (EWR) sites on 10 rivers were selected for more detailed assessments. Half of these – on the Duiwenhoks, Goukou, Doring, Olifants and Kammanassie rivers – were rapid-level assessments, while those on the Gouritz, Gamka, Touws, Buffels and Keurbooms rivers were intermediate-level assessments. All sites were surveyed during two field trips in April and July 2014, the only difference being that the geomorphology component was excluded from the 'rapid' sites. The specialists also relied on existing information from the River Health Programme, Google Earth images and historical aerial photographs, distribution maps of vegetation types and of plant and fish species, and even historical accounts of vegetation by early explorers. However, long-term records of flow and water quality data are most important for increasing confidence in the assessments, and these are not always available because gauging weirs

are few and far between – highlighting the importance of maintaining and calibrating those that do exist.

The Touws River EWR site was found to be in the best overall condition, with a PES of B/C, despite the fact that the mean annual runoff is only half what it was in the pristine, natural state. Although the EIS is high and the REC should therefore be set at a B, any improvement in condition would likely require an increase in baseflows and small floods, which is not possible without additional infrastructure or restrictions of allocation. It was therefore recommended that flows be set to maintain the PES.

## Estuaries

There are 21 estuaries in the study area, from the Bloukrans in the east to the Duiwenhoks in the west, but 11 of these had already been assessed in previous Reserve determination studies. The specialist team, which was led by Susan Taljaard of the CSIR, re-assessed the 2008 Reserve results for the Keurbooms Estuary. Five other estuaries that were rated low priority due to development pressures and/or protection status – the Hartenbos, Blinde, Piesang, Groot (Wes) and Bloukrans – were subject to a desktop assessment.

Rapid-level assessments were done for the Wilderness and Klein Brak estuaries, while the Gouritz, Goukou and Duivenhoks estuaries were selected for more detailed intermediate-level assessments. In December 2013, field surveys were conducted for these five estuaries, and some additional data was collected for the Keurbooms. Where available, the specialists also drew upon existing information from DWS river inflow gauges and water quality monitoring stations, estuary water level recorders, previous surveys, bi-annual sampling by DAFF fisheries staff, and Coordinated Waterbird Counts, better known as CWAC counts.

More than half of the estuaries in the WMA were found to be in good to excellent health, with those in the best state typically being small estuaries in protected areas, such as the Bloukrans in the Tsitsikamma section of the Garden Route National Park and the Goukamma in the provincial nature reserve of the same name. Small estuaries in urban settings, such as the Hartenbos and Piesang, are in a poor condition, while larger estuaries are generally more resilient as they are well flushed by strong tidal exchange or have a higher absorption capacity through, for example, dilution of pollutants or nutrient uptake by plants. However, larger estuaries tend to be more affected by catchment pressures, development in the floodplain and overfishing.

## Wetlands

Wetlands occur at a low density in the dry interior of the Gouritz Water Management Area compared to the coastal belt, but there were nevertheless too many to assess on an individual basis. The Reserve determination – conducted by Mark Rountree of Fluvius Environmental Consulting with input from other specialists and stakeholders – therefore relied upon a desktop-level assessment in which the average PES and EIS for wetlands in each quaternary catchment was determined (although those catchments with less than 0.5% wetlands by area were excluded). The results revealed that where wetlands do occur in the interior they are important for livestock grazing, trapping flood flows and recharging the water table, and they tend to be in better condition on average than coastal wetlands, which are heavily impacted by urban development, agriculture and forestry.

The condition of 33 priority wetlands was also scored in terms of biodiversity, hydrology and physical condition, which gave an indication of the PES. These wetlands were then ranked

**Table 1: The results of the Ecological Water Requirements determination for the river sites, expressed as a percentage of the natural Mean Annual Runoff**

EWR Site	River	EC	nMAR (MCM)	pMAR (MCM)	Low flows (MCM)	Low flows (%)	High flows (MCM)	High flows (%)	Total flows (MCM)	Total flows (%)
H8DUIW-EWR1	Duiwenhoks River	D	83.7	79.8	14.2	17	8.2	10.2	22.7	27.1
H9GOUK-EWR2	Goukou River	C/D	54.1	46	7.1	13.1	4.3	13.9	11.4	21.0
J1TOUW-EWR3	Touws River	B/C	45.2	22.3	1.15	2.6	11.5	25.6	12.7	28.2
J2GAMK-EWR4	Gamka River	C	85.5	61.7	3.9	4.6	17.4	20.4	21.4	25.0
J1BUFF-EWR5	Buffels River	C	29.3	18.7	1.4	4.7	6.9	23.3	8.2	28.0
J4GOUR-EWR6	Gouritz River	C	543.5	310.4	27.1	5.0	102.5	18.8	129.6	23.8
J1DORI-EWR7	Doring River	C/D	4.5	2.0	0.4	8.5	0.6	14.3	1.03	22.8
K6KEUR-EWR8	Keurbooms River	B/C	49.8	30.5	10.7	21.4	8.7	17.4	19.3	38.8
J3OLIF-EWR9	Olifants River	C	13.8	11.3	0.5	3.9	3.1	22.2	3.6	26.1
J3KAMM-EWR10	Kammanassie River	C/D	20.6	19.6	1.8	8.9	2.8	13.5	4.6	21.0

nMAR: natural Mean Annual Runoff  
MCM: million m<sup>3</sup>

pMAR: present day Mean Annual Runoff  
EC: final Ecological Category for management of the rivers



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*The Gouritz Estuary (left) end river (right)*

according to their threat status, so that highly threatened wetlands with high PES could be identified. Two of these – the Bitou floodplain and the Duiwenhoks unchannelled valley bottom wetland – were selected for rapid field assessments, conducted during December 2014. The information collected was used to verify the desktop data, determine the Ecstatus (PES, EIS and REC) and recommend management actions aimed at halting or reversing degradation.

On a broader scale, nine Wetland Resource Units (WRUs) – areas with similar wetland types and processes – were delineated for the WMA, and ecological specifications for the management of wetlands within these WRUs recommended.

### Groundwater

Groundwater is the dominant water resource in the drier inland region of the Gouritz WMA, becoming even more important during droughts, when dams dry up. The specialists – Koos Vivier and Reuben Grobler of Exigo – delineated groundwater resource units (GRUs) in the WMA and then conducted a desktop, rapid-level Reserve determination for all 130 quaternary catchments. The results indicated that 28 of these catchments are potentially stressed, and were used to identify priority areas for further investigation in a field survey. Almost 100 boreholes and springs were surveyed, and information on groundwater levels, utilisation and quality collected.

Using this information, these 28 catchments were modelled in more detail as part of an intermediate-level Reserve determination. The results showed that – if the Reserve requirements are to be met – eight of the catchments would potentially have a groundwater deficit under normal rainfall conditions, increasing to 22 during droughts. The team therefore recommended that the general authorisations in all 28 catchments be reviewed and reduced to sustainable levels, which may be zero in some cases.



Sue Matthews

Further groundwater development is still possible in about 70% of the catchments, although alien vegetation could significantly reduce this potential.

The Gouritz Reserve Determination Study included an economic overview, which showed tourism to be the dominant sector in the coastal area of the Garden Route, replaced by agriculture in most other areas. Likewise, the value of ecosystem services mostly related to tourism, recreation and aesthetics, since few communities are dependent on rivers and estuaries for any subsistence needs. The Basic Human Needs Reserve for each quaternary catchment was also determined, based on the assumption that 1% of the population was dependent on rivers or streams as the primary water supply. This was in accordance with data from Census 2011, which revealed that on average only 0.2% of the resident population relied on local rivers of streams, while the highest dependency rate was 1.5%.

The findings of the Gouritz Reserve Determination Study will now feed into a two-year project to determine the water resource classes and resource quality objectives for water resources in the entire Breede-Gouritz WMA, in line with the requirements of the Water Resources Classification System, gazetted in September 2010.

In terms of the WRCS, water resources are categorised into one of three specific management classes depending on their ecological condition and their level of use in meeting social and economic needs, while resource quality objectives describe the conditions that should be met to maintain the resource in the management class to which it has been assigned, with its associated protection level. The aim is to strike a balance between the utilisation and protection of water resources, in keeping with the principle of sustainable development.