

WETLANDS

Precious heritage – Project quantifies the value of SA's Ramsar wetlands

*A recently completed Water Research Commission (WRC)-funded project has contributed important baseline information for aquatic ecosystem monitoring at Ramsar wetlands.
Article by Sue Matthews.*



In February 1971, when the Convention on Wetlands was signed in Iran's resort town of Ramsar on the Caspian Sea shore, South Africa was one of 18 countries represented, along with a handful of intergovernmental agencies and international conservation non-governmental organisations (NGOs). It was agreed that the 'Ramsar Convention' would enter into force after accession by seven countries, and South Africa was one of those first seven, depositing its instrument of accession with UNESCO and designating two 'wetlands of international importance' – Barberspan and De Hoop Vlei – in March 1975.

The Convention entered into force on 1 December 1975, but a year earlier the first criteria for identifying wetlands of international importance had been adopted. Given that the original name of the Convention was the 'Convention on Wetlands of International Importance especially as Waterfowl Habitat', it's not surprising that the criteria initially focused heavily on waterfowl, but they have been revised a number of times over the years and now include plants and other animals, hydrological and other ecosystem services, ecological and life-history processes, biogeographical and biodiversity aspects, as well as rarity and threat status.

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A perusal of the Ramsar website reveals that – as of 1 December 2017 – there are 169 parties to the Convention, and 2 289 Ramsar wetlands around the world. South Africa now has 23 sites, the most recent designation being the Bot-Kleinmond Estuarine System in January 2017, but for the earlier sites the ‘Ramsar Information Sheet’ (RIS) has not been updated since the 1990s.

At the Convention’s sixth conference of the parties (COP) in 1996, contracting parties were urged to submit a revised RIS for each Ramsar site every six years, but South Africa is not alone in having neglected to do so. The most recent COP in 2015 passed a resolution noting that 57% of sites worldwide either had no RIS at all, or inadequate maps, or the RIS and maps had not been updated for more than six years.

Contracting parties were requested to comply as a matter of urgency, and the Department of Environmental Affairs subsequently contacted all the relevant management authorities of the South African sites about the need for RIS updates. Since this involves re-evaluating the sites in terms of the latest criteria and submitting information in a format quite different to the original documents, it has been a slow process, but it is anticipated that the updated RIS for each will be uploaded to the Convention’s new online system by the end of the first quarter of 2018.

Part of the problem with updating and fleshing out the RIS is that little, if any, biological monitoring has been done at most of the sites, and where it has been done it may not have been published. In an effort to fill in some information gaps, the WRC awarded funding to North-West University: Potchefstroom for a three-year research project, the final report of which has

recently been completed. Entitled *The aquatic biodiversity and tourism value of selected South African Ramsar wetlands (WRC Report No. TT 732/17)*, the report collates existing information for nine wetlands around the country, provides baseline data for a number of parameters measured by the research team, and includes a literature review on tourism aspects, such as the potential loss of tourism due to environmental degradation, the environmental impact of tourism activities, and the likely effect of climate change.

The nine wetlands selected were Barberspan in the North-West Province, De Hoop Vlei and Heuningnes Estuary near Cape Agulhas in the Western Cape, Kosi Bay and Lake Sibaya on the Zululand coast and Ntsikeni wetlands in the Drakensberg foothills of KwaZulu-Natal, Makuleke wetlands at the north-east boundary of the Kruger National Park (KNP) in Limpopo, Blesbokspruit in Gauteng and Seekoeivlei in the Free State.

“The selection was based on a combination of sites that didn’t have any information that we could find, or completely outdated information, and then also trying to spread it around the country and tackle the different types of systems, from estuaries and coastal lakes to highland wetlands,” explains project leader Dr Wynand Malherbe. “For the Makuleke wetlands, for example, there was really no information available before our project, while Barberspan has a lot of information on birds, but very little published on any other aquatic life.”

Barberspan is a bird sanctuary with provincial nature reserve status, and summer and winter Coordinated Waterbird Counts – generally known as ‘CWAC counts’ – have been conducted most years since 1993. Data contributed by citizen scientists for the South African Bird Atlas Project 2 (SABAP2) is also available, so updating the sections of the RIS relating to avian importance should be relatively straightforward. The project team therefore conducted field surveys for diatoms, zooplankton, macroinvertebrates and fish during April and July 2014, and returned in October 2015 for an additional zooplankton survey. They also trained the reserve’s nature conservation staff and provided equipment allowing them to continue monitoring macroinvertebrates at a number of sites from February 2016 to January 2017.

North-West University



The Makuleke Wetlands in the Pafuri Triangle, consist of a number of floodplain pans, including Kulukulu, Mapimbi and Makwadzi.



Barberspan (top) and De Hoop vlei (above) were among the wetlands surveyed by the project team.

Information was sourced from various reports and theses as well – four MSc projects on fish, benthic organisms and plankton were found to have been conducted by Potchefstroom students in the 1960s, reflecting the city's relative proximity (± 200 km) to the pan. The different wetland types within the Ramsar site were also classified according to the National Wetland Classification System, developed by Ollis et al. (2013) with WRC co-funding, and the ecosystem services assessed. This kind of information

will be vital in completing sections of the RIS that did not exist when the document was last updated in the early 1990s.

Although Barberspan is protected within a nature reserve, it is not immune to threats posed by humankind. In fact, it had already been fundamentally altered by the time the reserve was proclaimed in 1954, because it was originally an ephemeral wetland that dried up most winters. In 1918 a canal was constructed to connect the pan to the nearby Harts River, with the result that it became a perennial system, completely changing the hydrology and ecology. As a permanent waterbody it provided ideal habitat for fish, and it soon became a popular recreational angling destination. While indigenous fish such as sharptooth catfish, smallmouth yellowfish, moggel, Orange River mudfish and southern mouthbrooder occur, there are also invasive aliens like common carp, mosquitofish and probably largemouth bass, although none of the latter were recorded in the project team's surveys.

The connection to the Harts River also brings in nutrients from agricultural runoff and municipal wastewater treatment works upstream. The Earth Observation National Eutrophication Monitoring Programme, developed by Cyanolakes with WRC funding, reveals that the resulting eutrophication often manifests in extensive blooms of cyanobacteria, which may be toxic. The project team likewise found that most of the 22 different

diatom taxa collected during their own surveys are indicative of eutrophic conditions.

Dr Malherbe notes that this highlights the value of increasing knowledge about diatoms, zooplankton and macroinvertebrates in the Ramsar wetlands, even if there are no particularly 'important' species present. (Criterion 2 for designating a Ramsar wetland relates to its supporting vulnerable, endangered or critically endangered species or threatened communities, according to the IUCN Red List of Threatened Species, but only a few groups of freshwater macroinvertebrates in South Africa, and certainly no diatoms or zooplankton, have been assessed in terms of IUCN criteria.)

"Many of the birds depend on diatoms, zooplankton or macroinvertebrates through the food web," says Dr Malherbe. "The theory is that if you can monitor the food, and pick up that something is going wrong there, you still have enough time to take corrective measures before your bird diversity takes a knock because the food web they rely on has collapsed due to pollution, habitat loss or other anthropogenic impacts."

Some 700 km to the north-east of Barberspan – as the crow flies – are the Makuleke wetlands, designated a Ramsar site in May 2007. The site is within the 'Pafuri triangle' formed by the Luvuvhu and Limpopo Rivers at South Africa's border with Zimbabwe and Mozambique, and is part of the concession area owned by the Makuleke community and managed as part of the KNP. The wetlands mostly consist of floodplain pans, which support a high diversity of species and provide an important refuge for water-dependent frogs, fish and birds, although most of the pans dry up either seasonally or during drought years.

The Makuleke RIS from 2007 is very detailed and comprehensive – having been compiled by SANparks' Dr Andrew Deacon, who played an instrumental role in the KNP Rivers Research Programme – but the focus is naturally on the more obvious wildlife found in the KNP. However, the field surveys conducted by the project team revealed an extraordinary diversity of diatoms and macroinvertebrates. Ten pans were sampled, with a total of 70 diatom and 108 macroinvertebrate taxa identified. The project report highlights the importance of this finding.

"The assessment indicated that each pan was unique and contributes to the overall diversity of the system. If one pan is degraded, it could impact on the overall diversity within the Ramsar wetland," it states. "The conclusion from this is that management of the systems should be site-specific and no single monitoring programme would appropriately suit the uniqueness of each Ramsar site."

This sentiment is expanded upon in the recommendations section of the report. "It is essential that the correct components for each Ramsar wetland be monitored. These should be selected based on the information available, protocols that align with the proposed National Wetland Monitoring Programme and communication with local stakeholders that rely on resources from the system. At a minimum, monitoring should be completed on components of the Ramsar sites that align with or

are directly attributed to the Ramsar criteria used for designating the specific site a Ramsar site," it states, adding: "This project has shown that monitoring for water quality, diatoms and aquatic macroinvertebrates should be priority at many of the freshwater Ramsar sites."

As for the tourism component of the study, the project team found that ecotourism could be invaluable in generating income for the Ramsar sites, but this potential is not being fully realised. "Detailed studies should be carried out at each Ramsar wetland to assess the viability of ecotourism, as well as the extent to which it will benefit the site and not be detrimental to the environment."



A water lily in bloom at Kosi Bay.

Apart from generating useful baseline information on the Ramsar sites, the project has provided a hands-on, feet-wet training opportunity for young scientists. Six MSc students – four from North-West University: Potchefstroom and two from University of Johannesburg – have submitted their research theses on different wetlands, and a number of BSc Honours students were involved too.