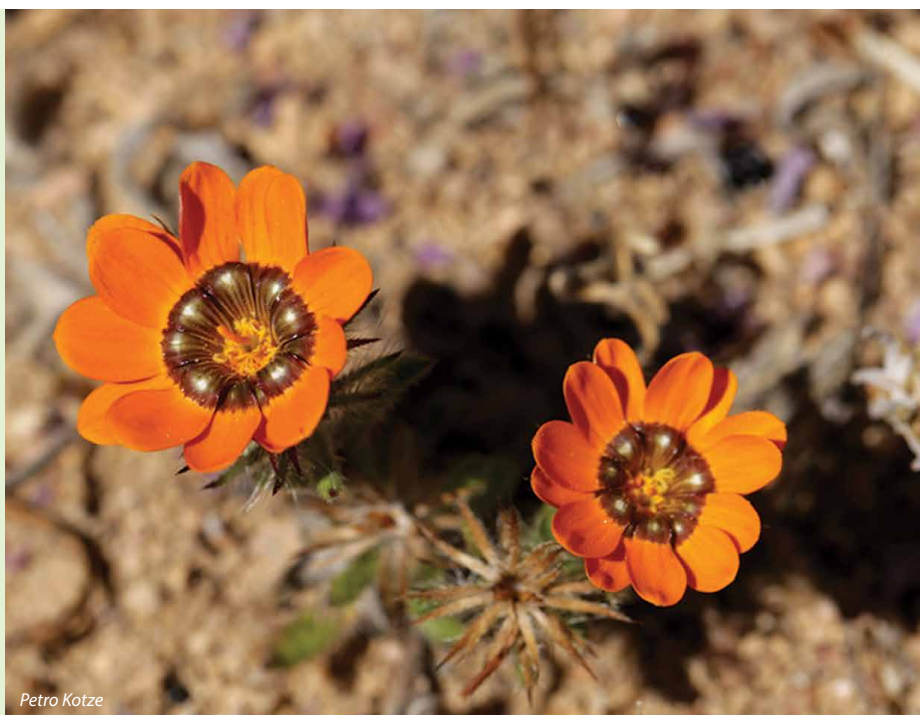


Water and the environment

Monitoring the ecological success of wetland rehabilitation

Millions of Rand have been spent on rehabilitating South Africa's wetland and regaining some of their ecological services. But is it working? Petro Kotzé visited the monitoring project at Kamiesberg Working for Wetlands.



Petro Kotzé

Both the integral role that wetlands play and their endangered status are well known. In South Africa, rehabilitation of wetlands is mostly run under the South African National Biodiversity Institute (SANBI) programme, Working for Wetlands. Their primary focus is wetland rehabilitation, but the protection, rehabilitation and sustainable use of those wetlands are simultaneously entrenched within their core aims.

Concurrently, the project is a vehicle for poverty reduction through job creation and skills development amongst vulnerable and marginalised groups, and forms part of the governmental Expanded Public Works Programme (EPWP). This programme seeks to draw significant numbers of unemployed into the productive sector of the economy, gaining skills while they work and increasing their capacity to earn income.

As such, the programme is aligned to South Africa's progressive 1998 National Water Act, which is based on the principle of managing water resources for environmentally sustainable social and economic benefit. The Act also recognises that water reserves are required for both basic human needs and the protection of aquatic ecosystems.

The success of the programme in training an employing people is well documented. In his recent State of the Nation address, President Jacob Zuma said that 60 000 job opportunities are to be created by environmental programmes such as Working on Wetlands, Working on Waste, Working for Water and Working for Fire in the next financial year.

While it has been easy enough to keep tabs on the amount of jobs created,

the benefits of rehabilitation to the environment has been decidedly more difficult to quantify. Monitoring the immediate ecological outcomes of rehabilitation has mostly been based on best professional opinion, says Heidi Nieuwoudt, SANBI Working for Wetlands Programme coordinator for the Western and Northern Cape. "Few rehabilitation sites have been monitored to measure the extent of success and failure in terms of pre-determined objectives set for rehabilitation efforts," she says. While Working for Wetlands acknowledges this as a critical component to rehabilitation, this need could not be met for all sites due to budget constraints.

Now, a monitoring team has been developed as part of the Kamiesberg Working for Wetlands project, located in the Northern Cape. Team members are from neighbouring communities and were previously unemployed,

while management of the project is shared by Conservation South Africa (CSA) and South African National Parks, which co-selected eight wetlands for monitoring.

The initiative has drawn some valuable ideas and lessons from a Working for Wetlands wise use initiative at the Makuya wetland, Limpopo province, which piloted the involvement of community monitors, and is being implemented by the Association for Water and Rural Development (AWARD).

First, a look at the ideal state of a wetland

The scope for rehabilitation of drained wetlands in urban areas is very limited, and as such rehabilitation efforts are mostly focused on wetlands that were once used as farmlands but are now abandoned for cultivation, says wetland ecologist Dr Donovan Kotze (Research Fellow at the University of KwaZulu-Natal). Mostly, these wetlands would historically have been drained, and the artificial drainage channels are still present.

"This gives us the opportunity to reinstate the historic, pre-conversion wetland area while at the same time, a farmer does not have to forgo land," he says. Yet, due to a lack of historic data the original state of the wetland is not known with precision. "We need infer

based on current indicators," says Dr Kotze.

Sometimes, historic aerial photographs can assist but often farming activities started before the earliest available photographs. We can infer, for example, that flow used to be spread through the wetland because the area doesn't have a natural channel, notes Dr Kotze. "Now, the farmer has dug what is usually a straight artificial channel, and we judge the effectiveness of rehabilitation in terms of how effectively we have blocked this."

"You can see if the interventions are obviously not working, but without before and after data it's quite difficult to measure your success conclusively," Dr Kotze explains further. This challenge forms the backbone of the monitoring efforts at Kamiesberg. "We will have at least a year's worth of data before rehabilitation starts."

There are three wetlands in the Kamiesberg that are forming the basis of the monitoring project, namely Xharas, Schaaprivier and Natpad.

Xharas is very much a system that naturally lacks a clearly defined channel. During wet seasons flow is spread out over the wetland. However, a large portion of the wetland has a straight, artificial drainage channel. The wetland

was cultivated until five or ten years ago, but the farmer no longer intends to cultivate it anymore. Therefore, it presents the opportunity to plug the furrow and reinstate a naturally diffused flow. Because a portion of the wetland has not been drained, there is a reference site in addition to the data of the state of the wetland before and after interventions, that will be collected.

According to Nieuwoudt, "Xharas's structure will be built in a year, and we view this as the 'mother ship' for monitoring. We've already done the first level monitoring and the team is continuing with their monthly baseline data gathering. We will thus have a relatively good data set before implementation.

Natpad is similar to Xharas, but it currently has the added impact of very intensive grazing. The rehabilitation plan involves working closely with the livestock owner who has agreed that the area will be allowed to recover for the next few years. This wetland's structures will be built in two years but in the meantime they continue with the gathering of baseline data there, explains Nieuwoudt.

There are a number of key impacts to address at Schaaprivier. Gully erosion in the wetland is eating its way into an area of intact, natural wetland. The purpose



Gully profiles are taken twice a year for every monitoring point during the dry season.



The team taking livestock counts. Afterwards, they discuss losses or new arrivals with the owner or herder and document the reasons.

National Wetlands Award

The Kamiesberg Working for Wetlands monitoring team's efforts have been so successful that they were recently nominated, together with CSA, in the category 'Wetland Education and Skills Development' at the 2014 National Wetlands Awards. Nieuwoudt says they will also aim for the 'Wetland Science and Research' category at this year's wetland awards due to the amount of baseline data that they have contributed to research.

Source: www.sanbi.org

of rehabilitation would be to halt that. Erosion in Schaaprivier wetland has been aggravated by increased surface runoff from the uplands that feed it, and rehabilitation efforts are focused on the causes of the erosion. "Some of the areas are well outside of the wetland and interventions are specifically designed to slow down and promote infiltration and vegetation cover," notes Dr Kotze. "It's not so much bringing back a wetland area, but rather the prevention of more degradation."

According to Nieuwoudt, Schaaprivier's structures are currently being finalised, so they should be able to make a comparison by 2016. Yet, she points out that the information will still be limited because they don't have a long data set.

The five remaining wetlands are mainly monitored for the impact of livestock in collaboration with CSA. While there is not a direct link to the rehabilitation work done by Working for Wetlands, two of the wetlands have been fenced off from the livestock in order to let the wetlands 'rest'. "Here we can pick up noticeable visual changes but we will need at least two years' data to verify this," says Nieuwoudt.

Monitoring the state of a wetland

The project's monitoring framework is divided into three levels. The top level is the most complicated and entails in-depth monitoring, and needs to be done by an experienced person or wetland ecologist. The second level is based on Wet-Health and can be done by a person with good knowledge. The third level is the base level. Laymen can be

trained to do this work, and this is where the Kamiesberg ground-team fits in.

The project started out as a pilot over four months to test the viability of full implementation. A formal training programme was facilitated to equip the ground-team to implement a number of monitoring techniques.

"Some of the areas are well outside of the wetland and interventions are specifically designed to slow down and promote infiltration and vegetation cover. It's not so much bringing back a wetland area, but rather the prevention of more degradation."

Firstly, they are monitoring measuring wells, enabling them to document the rise and fall of the water table in the wetland. They take a measurement every two weeks to get a seasonal picture. "The challenge is that these systems are highly seasonal," says Dr Kotze. "Naturally it changes considerably across seasons and the ideal would be to have data over five or ten years."

Furthermore, rainfall is measured and fixed-point photos taken across the system, in part to monitor vegetation change.

Erosion is measured with the use of erosion profiles and erosion pins. The first allows for the profile of the valley floor to be drawn, by taking vertical measurements every 20 cm, from a fixed horizontal transect line. Over time, the profiles will indicate change in the landscape. Erosion pins, again, are used in areas where sheet erosion is expected and indicates if there is more or less soil.

In the Kamiesberg, the focus of the monitoring is not only on the immediate ecological outcomes of the rehabilitation interventions (like re-instating the water table of the wetland and halting the advance of erosion head-cuts) but also on the use of the wetland for livestock grazing. "We recognise that livestock is probably the principle current impact on the wetlands," says Dr Kotze.

It is agreed that in order for rehabilitation to be sustainable in the long term it must be very closely aligned with the continued use of the wetland for this purpose. As such, the team was also taught how to monitor livestock on the wetlands, particularly in close collaboration with CSA.

According to Dr Kotze, this is one of the aspects that highlight the holistic approach that the project is following.

"The ground-team is working really hard," adds Nieuwoudt, "and they are now monitoring eight wetlands and 43 stock posts monthly."

The top level monitoring is mostly done by Nieuwoudt and Kotze. They have set up 2 m x 2 m monitoring plots to survey vegetation at Xharas and Schaaprivier.

Dr Kotze says that they are interested in vegetation cover and species composition, as well as the functional groups that the species belong to. "For example, we are interested to see if there is a shift, and to what extent, from terrestrial annuals to wetland (hydric) perennials." Improved vegetation cover and composition would then be an indication of an improved soil saturation condition.

Implementation of data and final thoughts

Lessons learnt from the project could inform the development of a national programme to monitor and evaluate the ecological effectiveness of Working for Wetlands, says Nieuwoudt. In the meantime, the first monitoring team will also start in Ratelrivier close to the Agulhas National Park in the Western Cape at the end of February.

Yet, the exercise at Kamiesberg has not been without its challenges. It's a small team working with limited resources. This is a particular challenge when it comes to the top level monitoring, where expert knowledge is called for.

Dr Kotze notes that they are hoping that there are some individuals, part of the ground team, who can be trained to

eventually do this. He adds that this is part of their vision – to give community members the opportunity to gain this expertise knowledge.

Another challenge is the intensive attention the monitoring calls for. The system is hugely dependent on the monitors, and cannot run by itself. For example, some "creative research" was called for when livestock decided that the poles planted for the gully profiles, which need to be fixed in the same position over time, are the ideal rubbing posts. "We're still on a learning curve" Dr Kotze admits.

Furthermore, it is a challenge to involve individuals with no scientific knowledge in the gathering of rigorous data, he says. "What we do hope to do is really look at what extent this model can be applied across the country." He admits that it could perhaps not be a model that can be applied everywhere, but that it is encouraging to see that the programme is opening up opportunities beyond the physical labour most often called for from EPWP beneficiaries.

Significantly, data from the programme is being fed into another research project (funded by the WRC) that will be looking at the long-term and short-term social and ecological outcomes of rehabilitation work.

Another big challenge that's so often overlooked is that the monitoring starts out and there are many good intentions, but after the initial data is collected it's not carried through to evaluation and reflection on management or rehabilitation. "In this project we've thought pretty hard about this and tried to coordinate implementation of the findings," says Kotze. He says they made sure that the data they are collecting feeds into the needs of the WRC research project.



A dipwell is installed, by first drilling a hole with an auger and sinking a dipwell into it for long-term monitoring of the water table.



Fixed point photography: Photos are taken in four wind directions, from the same point. Information on the specific point is indicated with the small, black board.