



case study

Maximising economic and ecological benefits from wetland rehabilitation from the Leliefontein Wetland Project

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Zantedeschia aethiopica (arum lily)



Polluted wetland before commencement of the rehabilitation project

Why is Leliefontein so special?

The Leliefontein Communal Area is located within the borders of the Kamiesberg Local Municipality. The communal area is divided into ten villages of which Leliefontein is the oldest and geographically the highest, sitting at 1 365 metres above sea level. The Kamiesberg upland areas around Leliefontein village contain numerous ephemeral wetlands unique in this semi-arid environment. For centuries the wetlands provided the Nama people with ecosystem services such as drinking water, construction material, medicinal plants, grazing for livestock, and fuel wood. Located in close proximity to the wetland is the first Methodist Church in South Africa, which was erected in 1816 and now declared a National Monument.

The aims of the Leliefontein Wetland Project were to rehabilitate the natural spring and its surrounding wetland and to protect this wetland from further land use impacts. In 2009, the Agricultural Research Council (ARC) – Animal Production Institute based at the University of the Western Cape (UWC) initiated the project in collaboration with the Leliefontein Methodist Church and Agri-Kameelkrans Farmers Union. An application for funding was submitted to SKEPPPIES, which is a small grants facility aimed at funding projects that seek to harmonize nature conservation and socio-economic development in the Succulent Karoo biome. The project received R140 000 of funding SKEPPPIES and the ARC contributed R60 000 of labour time and project coordination.

According to historic records, *Zantedeschia aethiopica* (arum lily) was abundant in the Leliefontein wetland. This wetland degraded under the threats posed by grazing, plant harvesting and the alien invasive poplar trees (*Populus sp.*) that were planted by the missionaries to provide additional sources of fire wood to the community. The alien trees reduced the biodiversity as they out-competed indigenous wetland vegetation for sunlight and space, reduced water supply for communal use, and damaged infrastructure such as fencing and water channels. As a result, nine indigenous wetland plant species, including the arum lilies, became locally extinct. The wetland has lost its ability to provide valuable ecosystem services to the community of Leliefontein.

Leliefontein village is located in the Namaqualand Uplands, which is one of the Succulent Karoo Ecosystem Programme's (SKEP's) priority regions. The area is known for its displays of spring flowers, high diversity and endemism of bulbous flowers. The 33 500-hectare area includes 1 109 species, of which 286 are Succulent Karoo endemics and 107 are Red List species. In addition to its diversity, the region contains large zones of transitional vegetation between succulent and Fynbos habitats.

Project planning, implementation and management involved active input from all project partners including the local community and intermediary school. The following outputs were accomplished from rehabilitation work done at Leliefontein wetland:

- Nine wetland plant species were re-established in the wetland. These species include: *Zantedeschia aethiopica*, *Maariscus thunbergii* (snyriet), *Ficinia nodosa* (knoppiesbessie), *Carpobrotus edulis* (rankvy), *Kniphofia uvaria* (vuurpyl), *Pennisetum macrourum* (jaagbesem), *Pseudoschoenus inanus* (matjiesgriet) and *Stachys rugosa* (boesmantee).
- The survival of the nine wetland species under wet and dry soil conditions was monitored by 34 learners, ranging from grade seven to grade nine of



Learners from Leliefontein Intermediêre Skool at the Leliefontein Wetland Opening, 7 August 2010.



The removing of thirsty Populus trees will be an ongoing process at Leliefontein Wetland

- Leliefontein Intermediary School under supervision of the ARC.
- The extent of the *Populus* trees invasion was established before 52 adult *Populus* trees were selectively cut down mainly to prevent infrastructure damage and prevent soil erosion.
- *Populus* trees were used to create an outdoor conference area with chairs, with more than 184m of edging for footpaths.
- The area was fenced off to protect the wetland from grazing by animals.
- The solid waste was cleaned up from the polluted wetland.
- A weir with an outlet leading to the wetland was built to create a pool of fresh water.
- A rock pool was built with locally abundant sandstone rocks and now acts as a water-feature near the wetland.
- The top section of the historic wells was restored with sandstone and was waterproofed to prevent leaking.

Ecological Benefits

The greatest ecological and biodiversity benefit of this project is the rehabilitation of the wetland and the clearing of alien species. The *Populus* trees were cut down because they are insatiable consumers of water, using up to 150 litres of water per tree per day. Clearing up these invasive trees released more water for use by wetland plant and animal species, as well as the community. Locals have also witnessed an increase in invertebrate and avian species after the wetland have been rehabilitated.

The true value of the water was realised when the municipal pump that supplies water to the Leliefontein community broke down in December 2009, following the completion of the project. December is the driest time of the year and consequently, municipal water was unavailable for 24 days. Water was then supplied from a well in the wetland to the entire village free of charge. For that period of time the ecological services of the Leliefontein wetland equated to about R 2000 for the entire community. The well produces approximately 13.4 kilolitres of water per day and ample water is now available to the community from the spring and wells that were restored.

Table 1: Summary of services generated by the Leliefontein Wetland Rehabilitation Project

Water	Value
Water saved per annum by 52 <i>Populus</i> trees cut down	R119 956.64
Potable water produced by well per annum	R103 162.71
Potable water produced by spring per annum	R103 162.71
Firewood	
6 bundles per day for the last 100 days at R25 per bundle	R15 000.00
Furniture	
210 <i>Populus</i> blocks use as chairs at R30 per block	R6300.00
<i>Populus</i> trees carved into pulpit	R200.00
Pathway edging	
<i>Populus</i> edging: 184m at R65 per metre	R11 960.00
Construction	
35 Poles for matjies hut at R25 each	R875.00
100 Droppers for fencing at R5 each	R500.00
50 Corner poles for kraals at R60 each	R3000.00
Total	R364 117.05

Socio-economic Benefits

Twenty five part-time jobs were created for local people. This also served as providing a means of income for local households of whom some did not have an income prior to the project. Those employed were equipped with new skills such as building, maintaining infrastructure and the rehabilitation of wetland landscapes. In a post-project interview they acknowledged that they gained a lot of ecological knowledge that includes the ecological importance of wetlands, the threats of alien invasive plants and the necessity to conserve biodiversity.



SKEP Richtersveld learning exchange participants at Leliefontein Wetland, July 2011.

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The wood from *Populus* trees was used for firewood (cooking and baking), furniture (blocks used as chairs), fencing materials (poles for building animal kraals) and construction materials (poles for building traditional 'matjieshuts').

The Leliefontein wetland project now serves as place of learning, offers tranquility and incites conservation action. The rich history of Leliefontein attracts tourists and has increased awareness of the area.

Lessons Learnt

The greatest lesson learnt from the Leliefontein Wetland Project is that the success rate of community projects is largely determined by how well the people involved work together. This project drew its strength from the fact that Ivan Roberts managed the project very well and everybody involved felt a strong sense of ownership. There is no information available as to whether the individuals employed on a part-time basis for the project have been able to use these skills elsewhere. The ARC continually provided technical advice and support on the project's progress. Removing the alien *Populus* trees was no easy task and follow-ups will need to be done in order to manage regrowth of these trees. Working for Wetlands is currently clearing the entire area from Poplar trees.

Water rates in Kamiesberg are R21.07 per kilolitre (kl) for more than 30kl water used per month. The real cost to get water to the community if tap water is not available would involve calculating transport cost (hiring a vehicle and fuel) to Tweerivier which is the closest village to Leliefontein. Two thousand rand may seem little to us but it is a lot to the community of Leliefontein.

Leliefontein Intermediate School is a registered Eco-school with WESSA. The ARC held a monitoring session with the learners where they counted species survival, trees that were felled, large tree trunks and the tree trunks cut as foot path edging. The learners monitored five of the rehabilitated species. There are some missing data, but the indication is there that survival of these species is better in the wet areas. The data is therefore not credible, but has given 34 students valuable experience in monitoring plant rehabilitation. The school won a bronze medal for their efforts from WESSA. A follow-up will be done as soon as Working for Wetlands has completed their work, which entails the cutting down of all remaining Poplar trees on the site.

Sustainability and the Future

Shade and the replacement with indigenous trees were the biggest considerations, and the next step for the project would be to eradicate all *Populus* trees and replace them with indigenous trees, such as *Olea europea-africana*, *Rhus undulate*, *Salix macrolata*, *Acacia karoo*, *Acacia galpinii*, *Pappea capensis* and *Scotia afro*. These trees were chosen as they were recommended to the ARC by Mr Joel Syphus from the Department of Agriculture, Forestry and Fisheries who worked for many years in the Kamiesberg region. This will further enhance the biodiversity of the wetland and surroundings by attracting more birds and insect species.

The project has caught the attention of people from the rest of Namaqualand, and the Methodist Church community across the Western and Northern Cape Provinces. Many travellers now make the effort to stop and have a look at the achievements of the project. There is the opportunity to do a follow-up project in enhancing the tourism potential and marketing of the Leliefontein Wetland. The project manager Mr Ivan Roberts, along with two other community members, have during the course of the project completed a short course on business management which was arranged by Conservation South Africa, formerly known as Conservation international (CI). The course equipped them with valuable skills, and they now consider tourism as an alternative option to provide permanent employment in Leliefontein.

Conclusion

Wetlands play an important role in providing essential ecosystem services. The case study has demonstrated that the wetland in Leliefontein plays a role in the livelihoods of its people. The removal of the alien *Populus* tree and rehabilitating the

wetland to its former glory has resulted in education, awareness raising, plant propagation and enhancing recreational activities at the wetland. These interventions will contribute to improved ecosystem services that may strengthen resilience to climate change.