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The WRC operates in terms of the Water Research Act (Act 34 of 1971) and its mandate is to support water research and development as well as the building of a sustainable water research capacity in South Africa.

TECHNICAL BRIEF

Wetlands

Change in wetlands of the fynbos biome (1980s-2014)

A completed Water Research Commission (WRC) study assessed the ecological health of 65 wetlands in the Western Cape

Background

In this project a set of 65 wetlands originally sampled during the late 1980s in the Western Cape were revisited. For each wetland, a rapid habitat assessment was carried out and the current land-use within and around the wetland examined.

Water chemistry was assessed by taking *in-situ* measurements and extracting water samples for laboratory analysis. Biological samples in the form of diatoms, plants and invertebrates were also collected.

The results of these assessments were used to derive the overall environmental condition (expressed as the Present Ecological State or PES) and were compared to the likely condition during the time of the original survey. From the above results, the type and extent of threats that wetlands of the Fynbos Biome have been exposed to over the past 25 years were identified.

The major thrust of tis WRC project was to better understand the factors leading to wetland degradation and through this to facilitate their conservation.

Survival of the wetlands

On re-visiting the study wetlands, several situations were encountered.

Pinelands crossing, Yzerfontein Inflow and a very small artificial wetland (Soetendalsvlei ditch) are no longer in existence. Areas of the following wetlands have also been lost: Platdrif, Kluitjieskraal, and the lower part of Belsvlei.

Lake Michelle (formerly Noordhoek Salt Pan) and Rooipan still exist but have changed markedly in ecological character. Cape Corps, Peters Bog, and Groot Hagelkraal wetlands could not be located, although they are still likely to exist.

Sederhoutkop, Donkerkloof tributary in the Cederberg and Pearly Beach C on the Groot Hagelkraal River could not be sampled because of snow and flooding respectively.

Importance and benefits of the wetlands

The importance of the wetlands in terms of the ecosystem services or benefits that they currently supply was scored. The study wetlands differed in the benefits they supplied, depending on the hydrogeomorphic (HGM) type and the opportunity for providing the service.

The ecological importance and sensitivity was the highest contributor to the overall wetland importance and benefit score. This is because many of the wetlands are situated in unimpacted areas in vegetation types of high importance.

Direct human benefit scores (DHB) were fairly low among the study wetlands, probably due to the low levels of subsistence use in the Western Cape and the fact that the wetlands were mostly located on private land or in conservation areas.

Changes in water quality over the past 25 years

On comparing water quality for each study wetland during the historical project and the present, it was found that in terms of water quality:

- 3% of the wetlands have improved
- 17% of the wetlands are the same
- 9% of the wetlands are likely to be the same (but data is lacking)
- 9% of wetlands have deteriorated significantly
- 17% of wetlands show a slight deterioration
- 6% of wetlands have possibly deteriorated but data is too limited to be conclusive

The changing in water quality for the remaining 39% could not be determined due to the lack of either historical or present day data.

Changes in plant communities

Differences in sampling intensity and approach between the 1988/89 and 2012/13 surveys may have resulted in some inconsistency in vegetation sampling and may therefore have complicated the interpretation of results. It can be concluded for the study wetlands, however, that although HGM types cannot be identified by plant communities, plant communities can be used to describe HGM units.

Analysis of the plant species data identified four main plant community groups historically and five in the present-day study. The main change seems to have been an increase in dominance of the reed *Phragmites australis* in several of the wetlands showing increased disturbance.

Differences in species composition over time seem to be tied to changes in land-use although these changes were not strongly related to differences in the measured environmental variables. As such, the trajectories of change are not readily predictable from changes in simple physical and chemical attributes.

The lack in most cases of the relationships between nutrient concentrations and plant communities was unexpected but similar results have been found in certain wetlands elsewhere.

The majority of wetlands whose plant communities have changed are depressions, perhaps because depressions are often located in areas vulnerable to human disturbance and because depressions tend to retain water and nutrients draining from their surroundings.

Diatoms

Strong correlations exist between certain, but not all, water quality variables and the diatom-based indices calculated during this study. Despite the once-off sampling regime and the almost complete lack of knowledge of the diatom flora of the south-western Cape wetlands, the wetlands could be separated into water quality classes based on an analysis of their diatom floras.

Assessment of changes in ecological health

The PES of the wetlands was assessed. Historical ecological health sores were estimated for the study wetlands based on all available information, but are likely to be an educated guess.

With regard to the present ecological condition of the wetlands, 25% of the wetlands are in a natural (**A** category), and 24% are in a **B** or slightly impacted category. A further 24% are fairy seriously modified (categories, **B/C**, **C** and **C/D**), and 6% are in a **D** category and lower.

Almost all of the wetlands in a natural state included, unsurprisingly, wetlands in conservation areas. The wetlands currently in the worst condition are Khayelitsha Pool, Kiekoesvlei, and Koekiespan. The former is affected by extensive urban development in the upper catchment while the latter two are affected by agriculture.

Change in conservation status

It was found that for the study wetlands the conservation status of 51% of the wetlands have improved, 38% of the wetlands are the same, and 2% of the wetlands have deteriorated.

For the remaining 9% the change in conservation status is either unknown or not applicable (i.e. wetland no longer in existence).

Apart from the establishment of new conservation areas, initiatives from private land-owners noteably the Nuwejaars Special Wetland Management Area, have resulted in improved protection for some wetlands.

Conclusion

The overall conclusion from this project is that although good progress has been made with regard to the management and protection of wetlands, there is no room for complacency and the future of many wetlands located on private land is uncertain.

There is an urgent need to investigate ways of incentivising landowners to protect wetlands on their property in addition to educating them with regard to the benefits wetlands supply. Thus approaches using 'citizen-science' need to be explored and developed.

Ultimately, landowners need to understand the importance of these systems in the environment. Involving landowners in the monitoring process, and providing them with rapid feedback should encourage them to regard wetlands as important and beneficial features of the landscape.

Further reading:
To order the report, ***Trajectories of change in wetlands of the Fynbos Biome from the late 1980s to 2014*** (**Report No. 2183/1/14**) contact Publications at Tel: (012) 330-0340, Email: orders@wrc.org.za or Visit: www.wrc.org.za to download a free copy.