

# GREEN INFRASTRUCTURE

## Why green spaces should be valued in Rands and cents rather than beauty alone

*Towns and cities should place a financial value on their wetlands, rivers and other vital 'green infrastructure'. Tony Carnie reports on a recent case study to count the benefits of some of the muddier council assets in suburban Pretoria.*

Tansyn Sherwill



*A youngster wanders through a field of cottonwool grass (Imperata cylindrica) in the Colbyn Valley Wetland.*

Municipalities have large fleets of cars and trucks, along with all manner of pumps and machinery that grind to a halt unless they are oiled and serviced to keep them running smoothly. Other vital infrastructure, such as roads, bridges, power lines and stormwater drains, also need to be inspected and maintained to prevent potholes, cracks, rust or blockages. And, strange as it seems, rivers, wetlands and other 'green infrastructure' also require some regular TLC to make sure that they keep delivering free services to the communities that surround them.

One tangible example of free services from nature comes from the rivers and wetlands that feed the Roodeplaats Dam, a major

source of clean drinking water for thousands of residents in the City of Tshwane. When river water is polluted with sewage or choked up with alien weeds and muddy sediments, it costs municipalities – and ratepayers – more money to purify the fouled waters that were previously filtered and purified at no cost by 'nature'.

This often overlooked value of natural spaces in towns and cities across the country is examined in recently completed project for the Water Research Commission that could pave the way for other municipalities to begin counting and valuing their 'green assets' in a more formal and methodical manner. Project leader

Dineo Makate and a group of seven fellow researchers note that by valuing and managing natural assets alongside traditional concrete and steel infrastructure, municipalities can help to safeguard cities from floods and other climatic challenges, restore biodiversity and improve the overall quality of life for residents.

Unfortunately, the researchers say, money spent on protecting the environment is often viewed as an expense, rather than an investment. They argue, however, that green infrastructure, such as wetlands, rivers and water catchments, should be classified, managed and audited as 'assets' in formal municipal balance sheets.

To demonstrate the feasibility of incorporating green infrastructure into municipal asset management, they selected the City of Tshwane as a case study. The specific area covered parts of the Pienaars/Moretele rivers, including the Colbyn Valley Wetland, Roodeplaat Dam, Moreletaspruit and Hartbeesspruit.

The ecological state of most of these river systems were classified as category E, apart from Colbyn Valley, which was classified as category D – indicating that all the case study rivers were significantly degraded or modified in terms of a classification system that ranges from A (near natural) to F (critically modified). They calculated that it would cost nearly R12.2 million per year to maintain or rehabilitate these degraded rivers by clearing away alien vegetation; building and maintaining gabion walls and retention ponds, or replanting vegetation to improve the water quality.

That was one of the financial 'downsides' to river maintenance. However, these costs would be cancelled out by the financial benefits of ensuring a cleaner raw water supply at three key water treatment works: Roodeplaat, Wallmansthal and Klipdrift. Due to cleaner water from river restoration, it was estimated that water treatment costs at the three plants would be reduced by about R13.2 million per year due to savings in electricity and chemical treatment costs.

Rehabilitating the rivers would also result in further annual cost savings to the city of Tshwane of around R55 000 by extending the useful life of stormwater infrastructure and a further R24.2 million annual increase in property rates in adjoining green belts. Overall, the analysis showed that the financial benefits of river restoration and maintenance "significantly outweigh the cost of mitigation."

Elaborating on how these costs and benefits were determined, the researchers note that the Roodeplaat Dam (about 24 km northeast of Pretoria) is a critical water resource for parts of Gauteng and North West province, but its feeder rivers are becoming increasingly polluted by poorly treated domestic wastewater as well as farming and informal settlements. "Despite its importance, the Roodeplaat Dam suffers from high levels of eutrophication, algae, and water hyacinth, which degrade its biophysical integrity," they write in the final report.

Closer to the urban heart of Pretoria, the 60 ha Colbyn Valley Wetland Nature Reserve also helps to purify water, control flood damage and erosion of the river banks. Along with the

Meintjieskop ridge, Pretoria National Botanical Gardens and the University of Pretoria experimental farm and sports grounds, Colbyn Valley plays an important role in forming a 'green' corridor in Pretoria's urban landscape, as well as providing a refuge and migration route for wildlife.

Further downstream, however, the Pienaars (Moretele) River flows through several informal settlements in Mamelodi with poor sanitation services and also suffers from illegal dumping. To alleviate these problems, the researchers say it is important to build or maintain gabion structures (rocks packed in metal cages) to reduce soil erosion of the river bed and channels, while water retention ponds help to slow down the speed of floodwaters. Further maintenance work includes refuse clearance and maintaining fire breaks to reduce damage to grassland and wetland vegetation from uncontrolled fires.

While these costs can be significant, the report states that the long-term benefits often outweigh the expenses. For example, healthy wetlands act as filters, removing excessive levels of nutrients, such as nitrogen and phosphates. They also help to settle suspended particles and sediments, thereby reducing turbidity in water.

Additionally, wetlands serve as buffers, slowing down and capturing runoff, allowing for the natural settling of pollutants. The combined actions of filtration, nutrient regulation, microbial activity, and pollutant retention underscore the vital role of wetlands in purifying water and sustaining healthy aquatic ecosystems. This ultimately reduces the cost of purifying tap water at municipal treatment plants.

Healthy rivers also play a vital role in managing stormwater by acting as sponges and preventing further wear and tear on concrete stormwater infrastructure. A further spin-off benefit from maintaining healthy rivers and green spaces in urban areas comes from higher property values.

The authors note that properties near wetlands often enjoy higher market rates due to their scenic and aesthetic value. Wetland areas also offer recreational opportunities for water-based activities, birding and hiking. The scenic appeal of wetlands also makes such properties attractive to buyers seeking



Peter Thompson

*This African Finfoot was spotted in June 2024 swimming in the Hartbeesspruit in Derdepoort Recreation Resort, about 6 km downstream of the Colbyn Valley Wetland.*

Tamsyn Sherwill



*Frost-tipped grasses shiver on an icy winter morning in a wetland outside central Pretoria.*

visually pleasing environments and environmental connection. "Hence, if wetlands are to be rehabilitated and conserved, the municipality will benefit from the increased rates from high-value property."

"The case study revealed that property values near green belts could increase by an average of 23% and enjoy higher market rates due to their scenic value, aesthetic appeal, and enhanced safety from flood mitigation provided by the wetlands. This, in turn, could result in increased property tax income for the City of Tshwane. The additional revenue from property rates is around R24.2 million per year."

As an example, a 2014 study focused on the Groenkloof Nature Reserve and Fountains Valley recreation resort suggested that more than R150 million in additional rates revenue in Tshwane was attributable to increased property values for homes within 500 metres of urban green infrastructure.

However, despite increasing global awareness about the

importance and economic value of green infrastructure, the group of eight researchers says there are a few (if any) formal institutional arrangements in South African cities to formalise decision-making around these assets into day-to-day economic decision-making. "In this study, we investigate the potential of using municipal asset management systems as a mechanism for institutionalising such financial net benefits within municipal accounting systems, and thus creating incentives for investing in green infrastructure."

To do this, they examined asset management systems used in South Africa and other countries, along with the regulations governing the public sector. In South Africa, the regulatory framework for asset management is guided by the Constitution, the Municipal Systems Act (MSA), and the Municipal Finance Management Act (MFMA). They also mapped the geographical boundaries of each green infrastructure wetland area using desktop studies and ground truthing, and carried out valuations based on the financial benefits the municipality derives from these assets.

Tamsyn Sherwill

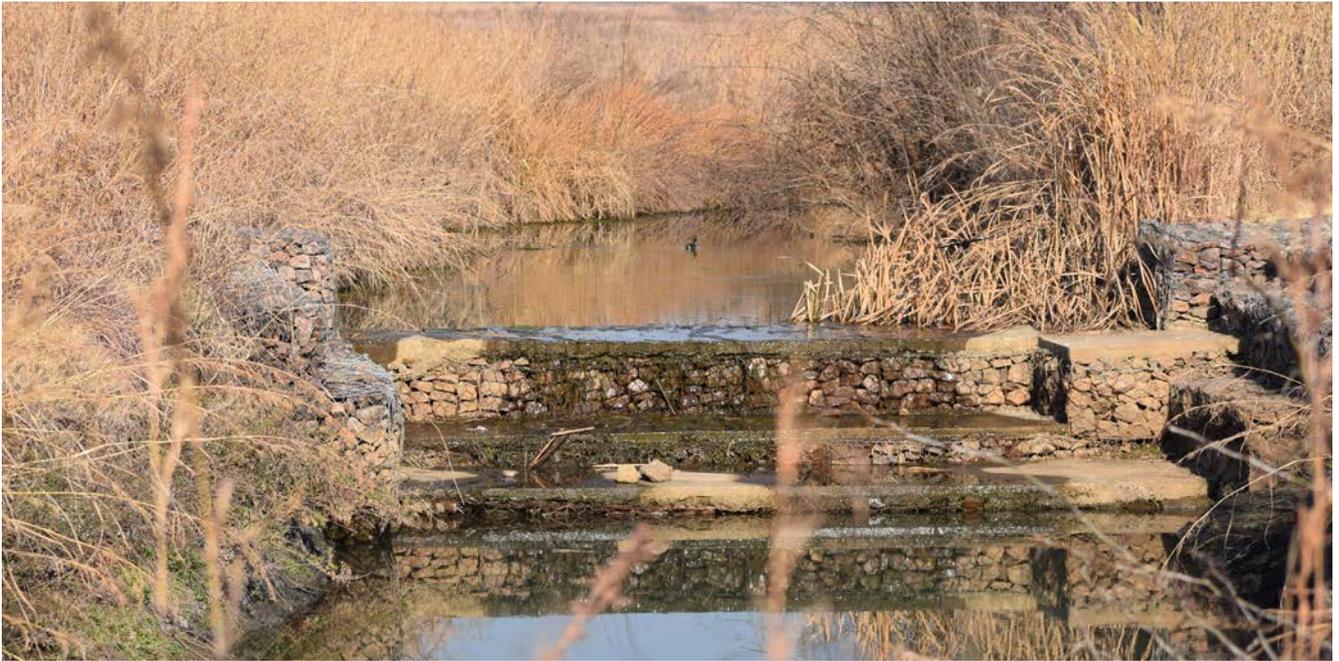


*This large gabion structure helps to reduce stormwater erosion in the 60 ha Colbyn Wetland Reserve.*

Tamsyn Sherwill



*A view of the same gabion structure as shown left almost concealed by raging stormwater during a heavy downpour in 2019.*



*A close up of the gabion structure in the Colbyn Valley Wetland.*

Then came the somewhat more complex task of integrating these assets into the municipality's asset management system. "The assessment showed that municipalities do have available tools, frameworks and standards required for integration analysis."

While the Auditor-General did not provide explicit guidelines, the researchers conclude that rivers and wetland areas can be classified under "property, plant and equipment" in municipal asset registers, as green infrastructure was seen as the nature-based equivalent of built or hard infrastructure.

But there were also challenges ahead in ensuring that municipal personnel have the right skills to conduct economic valuations of natural assets. Another significant challenge is the substantial cost of conducting assessments, mapping, and monitoring green infrastructure. "Unfortunately, limited financial resources often result in a lack of skilled personnel, technical equipment, and resources necessary to conduct comprehensive assessments ... Furthermore, insufficient financial support can undermine the capacity to address ongoing maintenance and monitoring needs, thus compromising the effectiveness and longevity of the incorporated green infrastructure.

"To address this challenge, innovative funding mechanisms, public-private partnerships, and sustainable financing models should be explored. Increased investment in green infrastructure should be considered not only for its environmental benefits but also for its potential to improve the general public's quality of life while generating economic returns in the form of ecotourism and ecosystem services. To conclude, many of the systems necessary for the successful integration of green infrastructure into the City of Tshwane's register (and other municipalities) are already in place."

However, potential challenges include the need for additional technical capacity (skills) and budget to manage the increased workload. "For further work, it is therefore recommended that

these challenges be further explored, as they hold the key to the successful implementation of the framework. The framework must also be tested with several Metros to gain acceptance by the South African Local Government Association (SALGA)."

The following researchers were involved in the project: Dineo Makate, Christian Griffiths, Elsie Leshaba, Kyle Harris, James MacKenzie, Nompilo Mazibuko, Wendy Maiwashe and Jackie Crafford.



*A party of visitors squelch through a muddy section of the Colbyn Valley Wetland.*



*Early morning mist hangs over the 60-hectare Colbyn Valley Wetland in suburban Pretoria.*