WATER MANAGEMENT

FIRST PUBLISHED

Wetlands to the rescue?

At first glance, artificial wetlands may seem suitable for treating greywater and stormwater but is this method really practical?

BUSINESS SOLUTION

Should water quality warrant an artificial wetland, companies or neighbourhoods could benefit tremendously from this environment-friendly way of recycling water.

Artificial wetlands could help to reduce the burden on municipalities in the treatment of polluted stormwater and provide welcome aesthetic reprieve in the urban environment.

Photos: J.C. Kotzé

Photos: SXC

As many municipal systems are overloaded, greater attention is being paid to the treatment and reuse of stormwater and greywater. The argument is being made that, if water run-off could be managed on property-development sites, the financial burden on municipalities, in terms of extra infrastructure spend, would be reduced. In addition, the "green building" movement is making the property sector increasingly aware of the need to conserve and reuse water resources. At the same time, urban rivers and streams are becoming more polluted. The poor water quality is often a result of stormwater and greywater flowing into these water courses. However, artificial wetlands appear to offer a "natural solution" in the struggle to purify stormwater and greywater.

IMPACT OF URBANISATION ALLEVIATED

"In order to understand the function of a wetland, I think it is very important for people to understand what wetlands do and, specifically, what needs to happen in a wetland for it to treat water successfully," remarks Dr Gwen Theron of Golder Associates. As highly-productive ecosystems, wetlands provide resources of economic and social importance. Indirect benefits offered by wetlands include flood control, nutrient cycling, erosion control, storm protection and groundwater recharging.

According to civil engineer, Chris Brooker of Chris Brooker & Associates (CBA), wetlands alleviate the impact of urbanisation on stormwater systems in various ways. "They provide storage that attenuates the flood peak and the storage takes place mostly above ground as the soil in wetlands is generally saturated with very little additional storage capacity."

In addition, water is released from wetland soils slowly; helping to maintain the downstream base flow. Physical filtration takes place because of the drop in flow velocity, which causes sediment to fall out of suspension. Wetland vegetation "sifts" the flowing water; bringing very fine suspended particles, which would not settle out even under quiescent conditions, into contact with surfaces where they are trapped.

INAPPROPRIATE FOR GREYWATER TREATMENT

Apart from stormwater, artificial wetlands are also being promoted as a solution for the treatment of greywater emanating from buildings. However, Alan Batchelor, a director of Wetland Consulting Services, based at the Council for Scientific & Industrial Research in Pretoria, cautions: "My understanding is that greywater should not be treated any different to sewage because you have absolutely no predictability of the quality of the water that is coming through the system."

IDEAL FOR STORMWATER TREATMENT

"Stormwater is a totally different story, though, and, typically, if you take parking lots, for instance, which might contain hydrocarbon sediments, wetlands work well," says Batchelor. "But, again, the biggest issue is maintaining your biomass during winter." Because stormwater is typically associated with seasonal rain, these systems tend to dry out and, by the time you get your first storms, there is no water in the wetlands.

However, natural and artificial wetlands can be used successfully for the treatment of stormwater, maintains Batchelor. "In my opinion, they should, definitely, be included." Successful examples include the pans on the East Rand – basically, stormwater wetlands. Because the stormwater is being generated off the suburban developments and goes into the pans, the pans function as large oxidation ponds and wetlands, which dissimilate the nutrients and the pollutants.

HEALTH AND ENGINEERING CONCERNS OVERCOME

"There has been resistance to wetlands because of concerns about space, maintenance, uncertainty of design parameters, safety, nuisance insects, smells and technical mindset," says Brooker. However, Theron believes that the resistance was based on engineering solutions that were driven to get the water out of our environment as soon as possible. "Stormwater was seen as a threat to public health and safety in the past. However, today, engineers are more than willing to design stormwater-management systems as long as they are certain of the design parameters."

Constructed wetlands are designed, built and managed to emulate the natural functions of wetlands, and they have an added benefit over other means of treating wastewater because they require little energy, chemical input or maintenance. For Brooker, the issue revolves around space and the lack of it. He says this will pe a major constraint in the future. "There are sufficient, well-documented and successful implementations worldwide to demonstrate the effectiveness of constructed wetlands for water-quality management," he points out.

CATCHMENT MANAGEMENT ESSENTIAL

Perhaps it is Batchelor who sums up the advantages of artificial wetlands best when he says: "The beauty of wetlands in a natural environment is that they collect rainwater, which is filtered through the soil. However, they depend on a healthy catchment area. The minute you change land use, you lose one of the main natural water-filtering processes known to man. Having said that, it is critical that you match the process you require with the right environment and make sure that it doesn't happen by accident but by design". ■