

Economic development & the environment

Buffer zones for rivers, wetland and estuaries

The Water Research Commission (WRC) has completed a preliminary guideline for the determination of buffer zones for rivers, wetlands and estuaries as a way to reduce environmental impact on aquatic resources.

Background

South Africa's aquatic ecosystems are under increasing pressure, with impacts such as regulation of flow by impoundments, pollution and over-extraction of water, as well as the breakdown of natural bio-geographical barriers all affecting the ecological condition of these resources.

The need for preventative measures to prevent further degradation of these resources has therefore been highlighted. It is in this context that the establishment of buffer zones to rivers, estuaries and wetlands can play a meaningful role in reducing impacts to aquatic resources and, in so doing, protect the range of services that these resources provide to society.



Wetlands offer important ecological functions, such as water treatment, flood attenuation and as habitat for biodiversity, among others.

What are buffer zones?

Buffer zones have been used in land-use planning to protect natural resources and limit the impact of one land use on another. This project specifically looked at aquatic buffer zones which are typically designed to act as a barrier between human activities and sensitive water resources, thereby protecting them from adverse negative impacts.

Why are buffer zones regarded as important?

Buffer zones associated with water resources have been shown to perform a wide range of functions. On this basis, they have been proposed as a standard measure to protect water resources and associated biodiversity.

These functions include:

- Maintaining basic aquatic processes;
- Reducing impacts on water resources from upstream activities and adjoining land uses;
- Providing habitat for aquatic and semi-aquatic species;
- Providing habitat for terrestrial species;
- A range of ancillary societal benefits.

Despite all their benefits, buffer zones cannot be viewed as a 'silver bullet' that addresses all water resource-related problems. For example, they cannot reduce impacts caused by hydrological changes to streamflow reduction activities (including groundwater) or mitigate against point-source discharges such as sewage outflows.

Selecting an appropriate approach to setting buffer zones

In developing an approach for buffer zone determination, a number of key decisions were made that informed the development of the method. These include:

- Levels of user expertise;
- Precautionary principle;
- Predictability and administration;
- Data collection and assessment; and
- Buffer widths should be tailored according to risk.

Three generic approaches were identified, of which the modified fixed-width approach was regarded as the most appropriate for the South African context. This was principally due to the need to develop a tool that could be applied across different levels, while maintaining a level of predictability and consistency between approaches.

The method outlined in the final guidelines proposes highly conservative buffer widths based on generic relationships

for broad-scale assessments, but allows these to be modified based on more detailed site-level information.

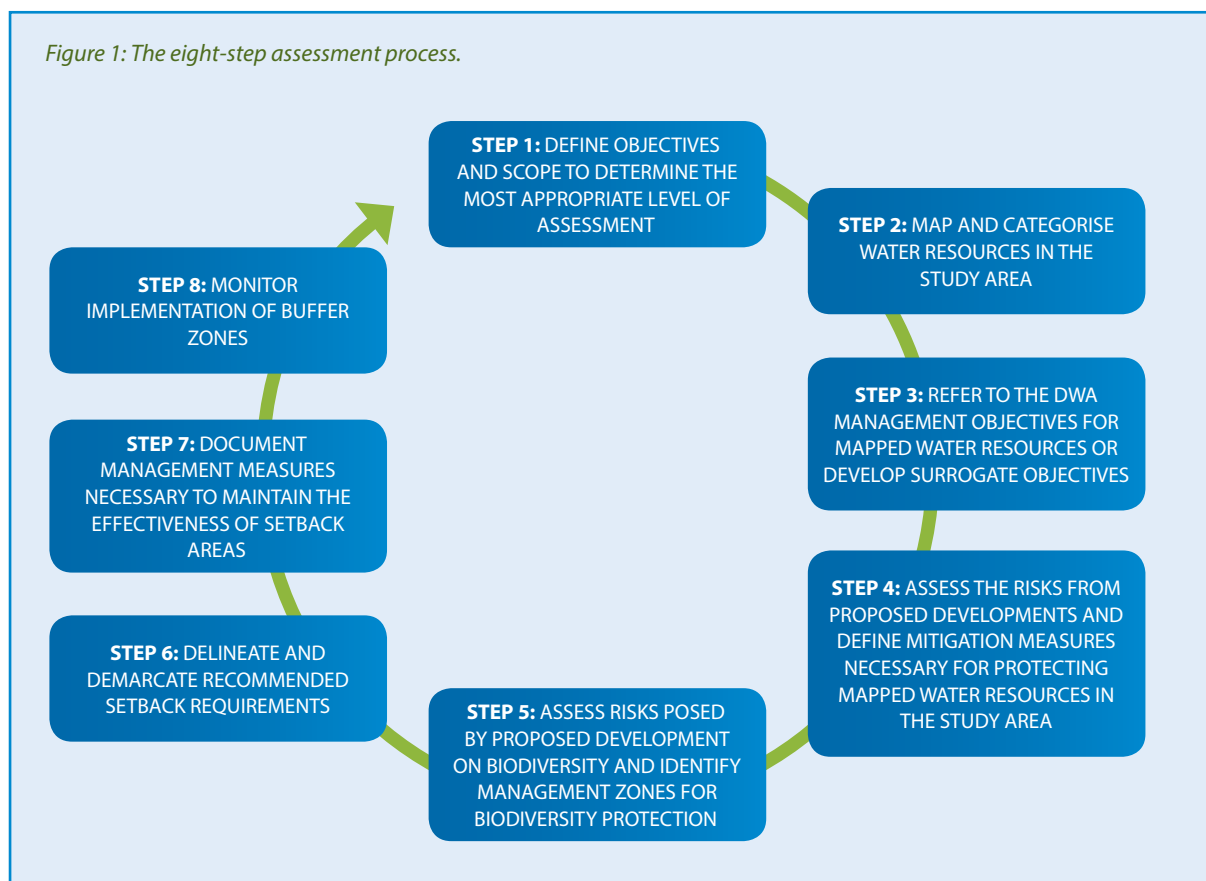
Resultant buffers therefore range from highly conservative, fixed widths for different land uses at a desktop level to buffers that are modified based on a more thorough understanding of the water resource and specific site characteristics.

The assessment procedure

The assessment procedure (Figure 1) is largely the core of the final publication. An eight-step assessment procedure provides the user with a step-by-step approach for determining appropriate buffer zones, or rather setback areas that take into consideration the following:

- The aquatic impact buffer zone;
- Potential core habitats;
- Potential ecological corridors; and
- Relevant additional mitigating measures.

Figure 1: The eight-step assessment process.



Appropriate management measures for aquatic impact buffer zones

Determining appropriate management measures for aquatic impact buffer zones is largely dependent on the threats associated with the proposed activity adjacent to the water resource.

These threats include, among others, increases in sedimentation and turbidity; increased nutrient inputs; increased inputs of toxic organic and heavy metal contaminants; and pathogen inputs.

Appropriate management measures for biodiversity conservation

A review of international literature found that in general, significantly larger buffers are required for the protection of biodiversity that is dependent on a water resource in comparison to those adequate for providing water quality protection.

Many aquatic and semi-aquatic species depend upon water resources for only portions of their lifecycles and they require terrestrial habitats adjacent to the water resources to meet the rest of their life needs.

Without access to appropriate terrestrial habitat and the opportunity to move safely between habitats across a landscape, it will not be possible to maintain viable populations of many species. Therefore, core habitats and corridors need to be developed for the protection of species or habitats of conservation concern.

Additional aspects requiring consideration

There are many aspects that need to be considered to ensure that, once established, setback areas continue to provide their required functions. Overlooking these aspects highlighted below may result in the degradation of setback areas over time:

- Regulating aquatic impact buffer zones;
- Aquatic impact buffer zone demarcation;
- Aspects that may require the expansion of the aquatic impact buffer zone;
- Maintenance of supporting mitigation measures;
- Buffer zones in urban areas;
- Rehabilitation or enhancement of buffer zones; and
- Buffer zones and climate change.

It is believed that the Buffer Zone Tools developed during this project will provide policy-makers and practitioners with the primary tool for determining appropriate buffer zones. Further site specific testing and monitoring by policy (DWS) is currently underway in order to strengthen the role of buffer zones.

Further reading:

To order the report, *Preliminary guidelines for the determination of buffer zones for rivers, wetlands and estuaries* (Report No. TT 610/14) contact Publications at Tel: (012) 330-0340, Email: orders@wrc.org.za or Visit: www.wrc.org.za to download a free copy.