FRESHWATER WETLANDS OF ETHEKWINI MUNICIPALITY

What they are and why they are important
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Introduction

This document is intended to be a brief introduction to the field of wetland science and to the freshwater wetlands of the EMA (eThekweni Municipal Area). It is aimed at developers, conservation groups, and members of the public, who wish to understand more about wetlands, why they are important, and why they are protected by various policies and national legislation.

It should be noted that this document is intended as a brief introduction to wetlands in the EMA and should not be regarded as a full and authoritative text on the topic.

A valley bottom wetland in a rural setting
What is a wetland?

Wetlands are defined as areas of land where the top 50 cm of soil shows signs of prolonged soil wetness. “Prolonged”, means long enough for anaerobic (lacking oxygen) conditions to develop. When these conditions develop in the soil, only certain types of plants can survive. These are known as hydrophytes (water plants) and their ability to survive soil saturation ranges from temporary inundation to permanently submerged, depending on the species. These soil conditions develop when the amount of water entering an area exceeds the amount of water draining from it. Thus wetlands are generally found in low lying areas with shallow surface or ground water, which causes anaerobic conditions to develop for at least part of the year.

These areas are often characterised, and are easily identifiable, by the presence of reeds or other hydrophytes. However wetlands are also highly variable in character and many of the wetlands in the EMA, and indeed around the world, do not fit the stereotypical concept of a wetland held by most people. Wetlands can range from shallow reed-fringed lakes with large amounts of surface water, to narrow temporarily inundated valley bottom areas, and thus can be difficult to identify.
Freshwater wetlands of Thekwini Municipality

Phragmites australis
How do I know if I have a wetland on my property?

There are a number of ways to tell if part of your property, or the property as a whole, is wetland. The national Department of Water Affairs (DWA) guideline on wetland delineation in South Africa lists four indicators that should be interrogated in order to establish if an area is a wetland or not. These are as follows:

**TOPOGRAPHY**

Wetlands generally form in areas of poor drainage, so the topography (shape) of the land, should be examined first. Valleys or basins are areas where water naturally accumulates and wetlands are most likely to be found in these low lying areas. However, it must be noted that there are numerous wetland areas within the EMA that are not in low lying areas. These are known as hillslope seepage wetlands, and are discussed further in Table 1.

**VEGETATION**

The type of vegetation growing on your property is a good indicator of how well soil drains. Reeds or bulrushes are a sure sign that there is a wetland on your site. But other vegetation types are also good indicators. In the EMA these include: reeds, such as the Common reed (*Phragmites australis*); rushes such as Bullrush (*Typha capensis*); certain species of water loving sedges, such as Giant sedge (*Cyperus dives*), Dwarf papyrus (*Cyperus prolifer*), and Finger sedge (*Eleocharis dregeana*); water loving grasses such as Wild rice grass (*Leersia hexandra*) and Rat tail drop seed grass (*Sporobolus africana*); certain swamp forest trees species such as Umdoni (*Syzigium cordatum*), Swamp fig (*Ficus trichopoda*), Wild frangipani (*Voacanga thouarsii*).
Freshwater wetlands of eThekweni Municipality

- Giant Sedge (*Cyperus dives*)
- Dwarf Papyrus (*Cyperus prolifer*)
- Finger Sedge (*Eleocharis dregeana*)
- Wild Rice Grass (*Leersia hexandra*)
- Rat Tail Drop Seed Grass (*Sporobilis africana*)
- Bullrush (*Typha capensis*)
- Umdoni Tree (*Syzigium cordatum*)
- Swamp Fig Tree (*Ficus trichopoda*)
- Wild Frangipani (*Voacanga thouarsii*)
How do I know if I have a wetland on my property?

SOIL FORM INDICATORS

Although not often used in KZN, soil form indicators can be used in a confirmatory role in delineating wetlands. The DWA guideline provides information on interpreting soil form, as defined by the Soil Classification Working Group (1991).

SOIL WETNESS INDICATORS

The most telling sign is soil colour and structure. In soils that have been saturated for long periods of time (a few weeks at a time over a number of years is usually sufficient), metal oxides (rust) which give soil its colour are dissolved and washed out of the soil. Thus soils appear grey or black in colour sometimes with tints of green or blue. If soils are permanently saturated the colour is usually a uniform grey or black, but when water levels fluctuate and oxygen is temporarily allowed to enter the soil, metal oxides begin to precipitate out of the soil (the soil begins to rust). This precipitation of metal oxides causes coloured spots known as soil mottles, which range in colour from red to orange to yellow or even blue, green, and black (depending on the type of metal oxides).
Figure 1: An example of a wetland delineation map.
Wetland types

Wetlands are highly variable and range in wetness from permanently wet shallow lakes or pans, to periodically wet valley bottoms. Scientists have tried to group wetlands in various ways, but the two most commonly accepted ways are by vegetation type and by hydrogeomorphology.

The “hydro” in hydrogeomorphology refers to the way water moves through the wetland, while “geomorphology” refers to the shape of the land. In KZN wetlands have been broadly classified, using hydrogeomorphology, into five categories as shown in Table 1.

Table 1: Wetland hydrogeomorphic types in eThekwini

<table>
<thead>
<tr>
<th>Wetland Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channelled valley bottom</td>
<td>situated in the bottom of valley, small channel, fed by ground water from slopes and occasional over bank flooding</td>
</tr>
<tr>
<td>Unchannelled valley bottom</td>
<td>situated in the bottom of valley, no channel, fed by ground water from surrounding slopes</td>
</tr>
<tr>
<td>Floodplain</td>
<td>large flat area, usually on either side of a significant river channel, fed by overbank flooding of river, oxbow lakes and meander scars often present.</td>
</tr>
<tr>
<td>Hillslope feeding a watercourse</td>
<td>wet patch on a hill slope or hilltop rather than in a valley, natural water course joining the system to other wetlands, streams, or rivers.</td>
</tr>
<tr>
<td>Hillslope not feeding a watercourse</td>
<td>wetland patch on a hillslope that does not have any natural, direct watercourse link to other wetlands, streams, or rivers.</td>
</tr>
</tbody>
</table>
The most commonly encountered wetland types in the EMA are valley bottom wetlands both with and without a channel. This is largely due to the undulating or hilly nature of the Municipality. The largest and best known wetland types in the EMA are floodplain wetlands. They are closely associated with larger rivers such as the Mdloti, Mgeni, and Mlazi Rivers, but they do occur along many of the EMA’s smaller rivers too.
Why can’t I just drain a wetland and build on it?

**WETLANDS PROVIDE GOODS AND SERVICES**

Wetlands provide a number of important benefits to society, known as “ecosystem services” or “eco-services.” These benefits can either be direct or indirect and are vital to the provision and maintenance of both aquatic and terrestrial ecosystems linked to them. Direct and indirect benefits are presented in Table 2.

<table>
<thead>
<tr>
<th>Direct Services</th>
<th>Indirect services</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Raw materials</strong></td>
<td>Water quality maintenance</td>
</tr>
<tr>
<td>Many rural communities within the municipality rely on wetlands for building and craft materials such as reeds.</td>
<td>Certain wetland types are known to remove pollutants from water thus improving water quality and reducing the amount of processing required. This is particularly important in the urban context where runoff from roads and parking lots contain high level of hydrocarbons from exhaust fumes.</td>
</tr>
<tr>
<td><strong>Water provision</strong></td>
<td></td>
</tr>
<tr>
<td>Many rural communities extract water directly from wetlands for their daily needs which highlights the vital importance of wetlands.</td>
<td></td>
</tr>
<tr>
<td><strong>Food production</strong></td>
<td></td>
</tr>
<tr>
<td>Some wetlands provide fertile well watered soils. Thus certain important crops are grown in wetlands including Madumbi, and bananas.</td>
<td></td>
</tr>
<tr>
<td><strong>Recreation and education</strong></td>
<td></td>
</tr>
<tr>
<td>Bird watchers and fishermen are familiar with the great value of certain kinds of wetlands for birding and fishing, while wetlands in general are the subject of hundreds of university theses and scientific papers.</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Wetlands provide goods and services (Adapted from Kotze et al, 2005)
Indirect services (continued)

**Flood attenuation**
Many wetlands are able to reduce the effects of floods by holding back excess water during high flow periods. Recent floods in the country have revealed the importance of systems that reduce the effects of floods. This is not to say that wetlands can eliminate all flooding, rather they contribute toward reducing the effects of floods.

**Carbon storage**
Over time permanent wetland soils trap carbon through the formation of peat. This means that large amounts of potential greenhouse gases are trapped within wetland soils (See Box 2)

**Biodiversity maintenance**
Wetlands contribute to maintaining biodiversity by providing refuge and habitat for a wide variety of plants and animals. They also provide an interface for terrestrial and wetland species to interact.

These eco-services are more effectively provided by wetlands that are in good ecological condition, and are ecologically linked to other ecosystems. Service provision will also cumulatively increase with greater wetland coverage in a particular catchment. (see Box 1 on page 12).

Pikersgill’s Reed Frog (*Hyperolius pickersgilli*)
Why can’t I just drain a wetland and build on it?

Box 1

Even small wetlands scattered throughout the landscape are valuable as collectively they work to provide us with these services. Thus it is important to think of wetlands on a systems level rather than just on a case by case basis. Although large wetland systems are important, the collective effect of thousands of smaller systems scattered throughout the various catchments should not be underestimated. In fact it should be considered that the larger systems in general are dependent on the smaller systems to function properly.

Cumulative loss of wetlands in the EMA has become a major problem and may in the future contribute to an increase in the cost and scarcity of potable water, the costs associated with flooding impacts, and the impacts of climate change, among others.

Box 2

One of the eco-services that wetlands provide is carbon storage. Through interactions between plants, soils, and the atmosphere, wetlands are known to absorb carbon, in the form of CO₂ (carbon dioxide) from the atmosphere, and to release it in the form of methane gas. Both CO₂ and methane are greenhouse gases which play a role in determining the climatic conditions we experience. The release of these gases to the atmosphere as a result of human activities will lead to accelerated global warming or climate change, which can result in negative impacts such as sea level rise and changing weather patterns. Wetlands can become carbon sinks when they absorb more carbon than they release. Permanent wetland soils in subtropical areas such as the EMA contain high levels of organic carbon, usually in the

GEOTECHNICAL

Wetlands are often waterlogged for long periods of time and are more prone to flooding than other environments. Even with extensive artificial drainage and engineering old wetland areas are still vulnerable to flooding during high rainfall events.

Wetland soils are also usually very high in clay and are subject to wet and dry periods which causes many clay types to expand and contract.

Thus, wetlands are generally not good places to build upon due to the high soil moisture content and unstable soils. Although these problems can be overcome with engineering solutions they are generally expensive and are not always successful in the long term.
Wetlands are protected by South African national legislation. They are broadly protected by the Constitution of the country which states that everyone is entitled to an environment that is safe and healthy. Since wetlands contribute to providing society with a safer healthier environment, they deserve to be protected. Other legislation regarding the protection of wetlands is included in Table 3 on page 14.

Form of peat. When wetlands are cleared and drained the organic carbon trapped in the soils is exposed to air which releases CO₂ into the atmosphere. Thus the protection of wetlands keeps large amounts of CO₂ out of the atmosphere.

Wetlands will also help society to adapt and cope with the expected effects of climate change. Changing intensity and frequency of rainfall in our region means that the eco-services such as flood attenuation, and stream flow augmentation will become increasingly important. Well vegetated wetlands will help to reduce the intensity of floods and will continue to provide resources such as water and grazing land during dry periods. Thus wetlands are critical in helping society to combat and survive climate change.

Figure 2: Disturbance within 32m of a wetland requires Environmental Authorisation.
Why can’t I just drain a wetland and build on it?

Table 3: Legislation related to wetlands

<table>
<thead>
<tr>
<th>Legislation</th>
<th>Requirements</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>The National Water Act (No. 36 of 1998)</td>
<td>For certain activities a water use licence is required</td>
<td>These activities include extracting water for any form of use, and diverting or obstructing the flow of a water course.</td>
</tr>
<tr>
<td>The National Environmental Management Act 107 of 1998 (NEMA)</td>
<td>Certain activities that require government authorisation before commencing</td>
<td>No disturbance of more than 50m² can occur within 32m of a watercourse (which includes wetlands) without environmental approval from the DAEA&amp;RD.</td>
</tr>
</tbody>
</table>

A water use license is required before a wetland may be disturbed or destroyed, and often this will require additional approval from the Department of Agriculture, Environmental Affairs and Rural Development (DAEA&RD) following an Environmental Impact, or Basic, assessment process. Obtaining these approvals for development within wetlands is very difficult and time consuming given the value assigned to wetlands by governmental and other bodies.

Summary

In summary no disturbance is allowed within wetlands without an environmental authorisation from the DAEA&RD and a water use license from the Department of Water Affairs.
What should I do if I suspect I have a wetland on my property?

1. The eThekwini Municipality Environmental Planning and Climate Protection Department provides guidance to the public at no charge. As part of this process you will be provided with additional information and further guidance regarding the likelihood of there being a wetland on your property. This process can potentially save you money in application fees, by avoiding referrals of development applications.

2. Seek the advice of a qualified wetland specialist and have the boundary of the wetland delineated using standard scientifically accepted techniques. Seeking specialist input is advisable as wetlands are often much more extensive than the vegetation or even topography shows.

Summary

Knowing the extent of the wetland area on your site will help you to plan properly, avoiding costly delays and helping to protect our environment.
## Threats to wetlands

Given the importance of wetlands in the Municipality, they need to be protected and in some cases properly managed. Although fairly resilient systems, wetlands are sensitive to certain man-made impacts.

Table 4 shows the most important threats to the wetlands of the eThekwini Municipality.

<table>
<thead>
<tr>
<th>Threats to wetlands in the municipality</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alien invasives</strong></td>
</tr>
<tr>
<td>● Reduce water available to wetlands</td>
</tr>
<tr>
<td>● Smother and out compete indigenous vegetation reducing biodiversity</td>
</tr>
<tr>
<td>● Some species also increase soil toxicity</td>
</tr>
<tr>
<td><strong>Artificial Drainage</strong></td>
</tr>
<tr>
<td>● Drying out of the wetland and the eventual loss of any benefits.</td>
</tr>
<tr>
<td>- Once the wetland area has dried sufficiently it usually becomes invaded with alien vegetation.</td>
</tr>
<tr>
<td>- Release of stored carbon into the atmosphere as CO$_2$, and loss of water resources.</td>
</tr>
<tr>
<td>In many cases such drainage is irreversible without expensive engineering solutions</td>
</tr>
<tr>
<td><strong>Platforms for development</strong></td>
</tr>
<tr>
<td>● Complete loss of wetland habitat and associated services</td>
</tr>
<tr>
<td><strong>Sand mining</strong></td>
</tr>
<tr>
<td>● Stripping of vegetation leading to alien species colonisation and loss of biodiversity</td>
</tr>
<tr>
<td>● Severe disturbance to soil profile</td>
</tr>
<tr>
<td>● Increase in water turbidity and sediment transport</td>
</tr>
</tbody>
</table>

Sand mining is difficult to control as mining rights and permits are granted by the Department of Mineral Resources (DMR), and not the Municipality. While the DMR does its best to ensure that environmental best practises are applied, many cases occur when unscrupulous sand miners extend their operations beyond those permitted by the DMR and don’t rehabilitate the mines once they have finished mining.

continued on next page
Pollution

- Hydrocarbons from exhaust fumes and oil spills have detrimental effects on biological processes if found in high enough concentrations.
- Litter that gets washed into stormwater systems and eventually ends up in watercourses is another serious pollutant in wetlands in the urban areas of the Municipality. High volumes of plastic can smother habitats and organisms, while other types of litter can contain toxic chemicals that also adversely affect biological processes.
- In the rural areas of the Municipality, excess nutrients in wetlands can cause eutrophication, which often leads to one type of plant or animal benefiting and becoming dominant, thus reducing the natural biodiversity of the wetland.