

FOR PEAT SAKES – Can SA afford the demise of its natural carbon & water stores for the sake of short-term economic gain?



Despite local and international efforts, South Africa's peatlands continue to be threatened by an array of social and economic pressures. Lani van Vuuren investigates the importance of these natural water and carbon stores.

Bog, mire, fen. These are only some of the terms used to describe what is arguably the most intriguing and remarkable wetland-type in the world.

Peatlands refer to those wetland ecosystems characterised by the accumulation of organic matter (or peat) derived from dead and decaying plant material under conditions of permanent water saturation. Globally, peatlands are extremely widespread, covering an estimated 3% (4 million km²) of the terrestrial and freshwater land surface.

Peatlands are known for their ability to mitigate global climatic impacts through their capacity to store carbon. They also act as huge stores of water – around 10% of the world's freshwater is contained in peatlands. Furthermore these wetlands are hotspots for biodiversity and home to many endangered species.

Millions of people live in and depend on the world's peatlands for their livelihoods from grazing cattle and harvesting reeds to cultivation and catching fish. Unfortunately, these wetlands – like other natural



Lani van Vuuren

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peatlands are mainly formed by reeds, sedges and grasses. This is significant, as it contributes to a much slower peat accumulation rate. In South Africa peat accumulates at an average rate of only 0,5 mm to 1 mm a year compared to a world average of 1 mm to 2 mm a year. Most of our peatlands are less than 10 000 years old.

Eleven peatland eco-regions have been described and occur mainly in the (wet) eastern, central and southern parts of South Africa. More than 460 peatlands can be found in these eco-regions, the vast majority (60%) occurring in Maputaland. The largest peatland in the country is the Mkhuze Delta which, together with the Mbazwana swamp forest, form the largest mire complex in South Africa (about 8 800 ha in extent). Also to be found in this region is South Africa oldest peatland – the Mfabeni Mire, which at 45 000 years old, is one of the oldest active peat accumulating wetlands in the world.

systems – are subject to increased exploitation and degradation. Globally, peatlands are being destroyed at a rate of about 4 000 km²/year mainly as a result of agriculture, forestry and peat extraction. It is estimated that a quarter of all the peatlands on Earth have already been destroyed.

UNIQUE WETLAND TYPE

By far the majority of peatlands occur in the Northern Hemisphere and less than 1% of the world's peatlands are found in southern Africa and South America. In South Africa, peatlands are a rather rare and unique wetland type. It is estimated that only about 10% of South Africa's wetlands contain peat.

Still, despite the low global percentage, South African peatlands are to be found in a variety of landscapes contributing to a rich diversity of peatlands and mires, explains South African peatland expert Piet-Louis Grundling. “These vary from the interdune tropical swamp forests on the east coast to percolation mires in the interior on the southern African plateau and the palmiet peatlands in the Cape Fold Mountains.”

While in the Northern Hemisphere, most peatlands consist of *Sphagnum* moss, South African

Above: Peat can hold up to a 1 000 times its weight in water.

Below: The degradation and draining of the palmiet peatlands of Goukou in the Western Cape have led to severe erosion and washing away of precious agricultural land.



Japie Buckle

Ricky Taylor



Top left: A peat fire in a swamp forest as a result of the lowering of the groundwater table. The fire causes the roots of the swamp forest trees to burn causing them to fall over.

Bottom left: Sphagnum moss, seen growing here in Maputaland, while the main contributor to peat in the Northern Hemisphere, is rare in South Africa.

Ricky Taylor



Research has shown that these wetlands – through their water purification function – reduce algal growth thereby reducing the city's water treatment costs.

Rural communities have long relied on peatlands to provide them with clean drinking water and, historically, small wells were dug on the edge of peatlands and fenced off to prevent muddying by livestock. People also use peatlands for subsistence agriculture and grazing of livestock. In addition, the reeds and sedges that grow on peat have traditionally been harvested and used for weaving and thatching.

These activities are sustainable when undertaken on a small scale, but with larger economic pressures South Africa's peatlands are being degraded at an unprecedented rate. Today, around 40% of the rehabilitation of Working for Wetlands (WfW) is centred on peatlands.

Agricultural and forestry activities have traditionally been the greatest threats to South Africa's peatlands. Forestry, a stream-reducing activity, targets the high-rainfall areas where peatlands are normally found while in agriculture wetlands were, until recently, viewed as 'wastelands' of no value unless drained, excavated or cultivated.

The important role of peatlands as part of the natural landscape is often not realised until it is too late. The Cape Fold Mountains are home to a unique set of wetlands characterised by palmiet and peat. These wetlands play a crucial role in flood attenuation, trapping sediment and slowing down water flow. When cultivation and urban infrastructure led to the draining and degradation of the peatlands, it severely altered their flood attenuating ability leading to severe erosion and the washing away of precious agricultural land.

Tens of thousands of tons of peat have been extracted from South Africa's karst fens outside Ventersdorp and Potchefstroom for the mushroom and horticulture industries. Historically, more than 90% of

BENEFITS FORGOTTEN

Part from the rich biodiversity they support, their water filtering and storage capabilities are perhaps the most important functions derived from peatlands in South Africa. "Peat acts as a sponge, storing water for long periods and releasing it in times of low flow when the downstream water requirement is at its peak," explains Grundling. "Peat also acts as a natural filter, making it highly effective in removing sediment, pollutants and pathogens."

In the Tshwane Metropolitan Area intense rehabilitation has restored the Rietvlei wetland complex which had lost much of its function due to past agriculture, water abstraction and peat mining.

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peat used in the mushroom sector was mined locally. However, thanks to a decision by the South African Mushroom Farmers Association (SAMFA) in 2007 to cease the use of South African peat local demand has dropped significantly and only two peat-mining operations remain.

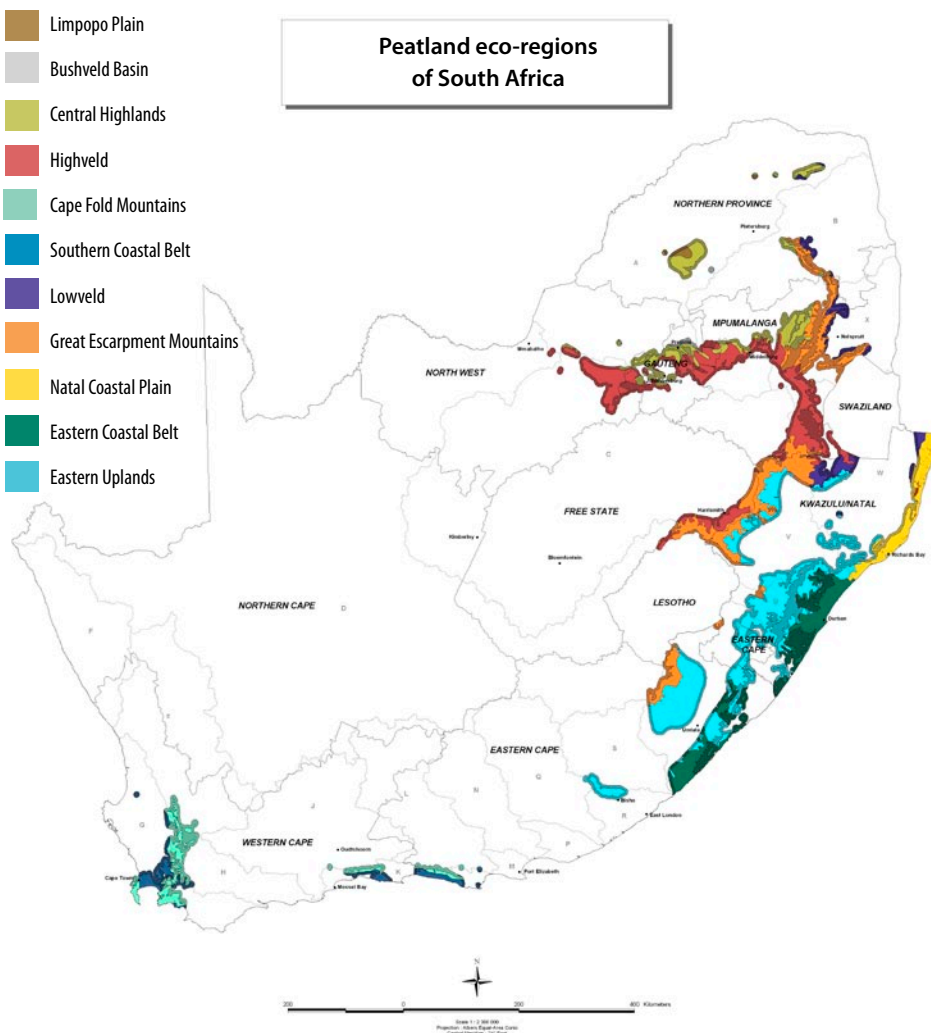
Since peatlands are interdependent on the surrounding landscape they are vulnerable to not only direct impacts but indirect influences as well. Excessive groundwater abstraction has caused the Bodibe peatlands in North West to dry out. Burning for grazing by the local community caused the peatlands to start burning. While multi-million Rand rehabilitation

PEATLANDS AND CLIMATE CHANGE

Peatlands are a critical part of the global climate regulation system. Acting as organic sinks, these wetlands store at least 550 gigatons of carbon – twice as much carbon as the biomass of the world's forests. When peatlands are cleared or drained, the organic carbon that was built up over thousands of years and is normally under water, is suddenly exposed to the air. It decomposes and turns into carbon dioxide which is released into the atmosphere.

It is estimated that the present clearing, draining and setting fire to peatlands emit more than 3 billion tons of carbon dioxide every year – equivalent to 10% of global emissions from fossil fuels. There are strong international calls to preserve remaining peatlands to not only protect the biodiversity and ecosystem services they support, but also to prevent more carbon dioxide from degraded peatlands entering the atmosphere. It is believed that investments in conservation and restoration of peatlands can be up to 100 times more cost-effective as other carbon sequestration measures.

- Limpopo Plain
- Bushveld Basin
- Central Highlands
- Highveld
- Cape Fold Mountains
- Southern Coastal Belt
- Lowveld
- Great Escarpment Mountains
- Natal Coastal Plain
- Eastern Coastal Belt
- Eastern Uplands



efforts managed to temporarily cease the fire, the peatlands are now burning again. Not only is the local community exposed to smoke from the fires, it is also endangering their lives as well as the lives of their livestock.

NEW ONSLAUGHT

The country's hunger for resources and commodities is putting many previously untouched peatlands at risk, especially in the Highveld and Central Highveld peatland eco-regions. Uncontrolled exploration for diamonds and coal has already caused damage to many peatlands in these areas. Among the peatlands under threat from prospecting and mining licence applications is the Chrissiesmeer Lake District, Wakkerstroom, the



Piet-Louis Grundling

At around 45 000 years old the Mfabeni Mire on South Africa's east coast is one of the oldest active peat accumulating wetlands in the world.



Piet-Louis Grundling

given carte blanche to prospect as they please,” says Grundling. “Permits are being issued without due consideration for the environment or the long-term needs of society in terms of water. These mines compete directly with wetlands and impact severely on water quality and quantity.”

SHORT-TERM GAIN, LONG-TERM LOSS

On the east coast of South Africa, peatlands are steadily being destroyed through uncontrolled activities of local communities. Encroachment by local farmers increasingly threatens the survival of the country’s peat swamp forests.

Grundling explains that swamp forests are highly threatened ecosystems in South Africa, being the second-rarest forest type in the country. It is only found in isolated patches from the Mozambique border to just south of the Msikaba River, in the Eastern Cape. “We still know very little about the vegetation composition, structure, and functioning of these swamp forests due to their remoteness and inaccessibility.”

But will we ever get the chance to study them? Every day more of this unique habitat – a haven for several rare species – is being drained, burnt, and farmed. Fields of bananas, amadumbes and other crops – some up to commercial scale – are becoming a common sight, some being planted inside proclaimed conservation areas. After a few years the sites become unsuitable for cultivation, so that the damage steadily affects new areas. Aerial surveys have also revealed an increasing number of community *Eucalyptus* woodlots. The trees tap into the regional water table of the primary aquifer, resulting in the desiccation of the wetlands, and in some cases, the burning of the peat.

This is not only affecting the cover vegetation but also the hydrology of the peatlands. The peatlands are an important source of fresh

Above: Starved of water as a result of excessive groundwater extraction, the Bodibe peatland in North West has burnt for several years.

Left: Bananas growing in an area that was previously swamp forest in Maputaland. Note the commercial scale of the plantation.



Ricky Taylor

Verlorenvlei Ramsar site and the Lakenvlei Wetland Complex.

One of South Africa’s larger peatlands, Lakenvlei, provides an important habitat to several important species, such as the rare white-winged flufftail (*Sarothrura ayresi*) which

migrates from Ethiopia. The other South African peatland frequented by this shy bird, the Watervlei mire, on the Drakensberg escarpment, will be inundated by Eskom’s Ingula Pumped Storage Scheme.

“It seems mining companies are

water and thus draining them inadvertently affects the water supply of the local population, especially in times of drought.

“Peat as a resource for clean drinking water is probably much more important than any of the other uses, especially in remote rural areas. Its value in terms of commercial exploitation must be weighed up against the value of permanent and clean water,” says Grundling. “While it is recognised that the local communities depend on this ecosystem for survival, the continued damage to swamp forests will not only destroy the ecosystem and its biodiversity, but also the subsistence base of the communities depending on them.”

The Water Research Commission (WRC) is funding projects worth several million Rand in peatlands, including the Mfabeni Mire. According to Director: Water-linked Ecosystems, Dr Stanley Liphadzi, the knowledge gained through these projects is contributing significantly to the international peatlands knowledge base.

Among others, WRC research has shown that water from the Mfabeni Mire flows into Lake St Lucia, providing freshwater refuge for biota in times of drought. “With looming climate change wetlands such as this will play an even more important role in maintaining the biodiversity of this World Heritage Site,” notes Dr Liphadzi. “We cannot afford for such a system to be degraded up to the point where valuable ecosystem services are lost.”

Among others, current research is focusing on quantifying the water balance of the peatland, the contribution of freshwater to Lake St Lucia and evaluating the effects of climate change and land use on the water flux.

CO-GOVERNANCE QUAGMIRE

Wetlands are adequately protected under the legislation of the Departments of Agriculture, Forestry and

MINING FOR MUSHROOMS

Peat mining has resulted in the severe degradation of wetlands, especially those outside Ventersdorp, Potchefstroom and Tarlton. In South Africa peat extraction is quite a simple process. Since our deposits are relatively young and usually occur close to the surface, the water table is lowered. As water drains from the peatlands the peat is excavated using small excavators. For larger deposits larger excavators on barges are used, which can take peat out to a depth of 7 m to 9 m.

Historically, the greatest consumers of local peat have been the horticulture (potting soil) and mushroom sectors. Its water holding capacity and structural properties make peat an ideal casing material for mushroom growing.

In consultation with conservationists and the government, the South African Mushroom Farmers Association (SAMFA), which represents the vast majority of the sector, has made an active decision not to support the use of local peat. It is reported that today, none of the large producers of mushrooms use local peat. Instead *Sphagnum*-based peat is imported from countries such as Ireland and Germany where it is removed to make way for, for example, housing developments.

“We as an industry simply do not believe that depleting natural resources can be a sustainable practice, we needed to find a workable alternative,” explains SAMFA Chair Ross Richardson. “Our decision to look towards the Northern Hemisphere for a solution is not the perfect answer in the long term, but because of the abundance of peat there, we believe that it is the only solution for our industry until a suitable local substitute is found.”

As a result local peat mining has fallen drastically, and there are only two peat-mining operations still remaining. There are still mushroom producers in South Africa who use local peat, but they are believed to make up far less than 5% of the sector. The *Sphagnum* peat is also of higher quality than South African reed-based peat leading to increased production.

The move to use international peat has resulted in a 10% cost increase of mushrooms, mainly as a result of import and transport costs, but, says Richardson, this has largely been accepted by retailers and consumers. At the same time, the sector is supporting programmes investigating effective casing alternatives to peat. This has proved easier said than done, however, with cost playing a major role. “If we can find a suitable alternative material the South African mushroom sector will be one of the first in the world not to make use of peat at all,” notes Richardson.



Fisheries (DAFF), Water Affairs (DWA) & Environmental Affairs (DEA). However, the lack of capacity to apply the legislation and regulations are contributing to the present exploitation of South African peatlands. Action is further hampered by the apparent inter-provincial variations in interpreting and implementation of applicable legislation and policies.

Peat extraction is now a listed activity under the National Environmental Management Act, which means that any intention to extract peat must be foregone by an Environmental Impact Assessment. Even this admirable legislation does not appear to have improved matters.

It is reported that the challenges regarding coordination between national departments as well as provincial departments which must implement legislation results in a situation where our peatlands are at risk. The Peat Working Group (PWG) was established in 1997 to

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monitor and/or co-regulate peat mining in South Africa. While the PWG did not have an official standing, it was an informal arrangement that handled peat mining-related issues and applications. The PWG did manage to stop several illegal peat-mining operations. However, this group is no longer functioning.

The major problem of peatlands is the lack of skilled resources on the ground. When culprits are caught in the act, it becomes difficult to obtain convictions. Achieving cooperation between State departments in these cases is often a nightmare.

The management of subsistence farming on communal land is a grey area and, in many cases, a political hot potato. This situation is exploited by unscrupulous developers who drain and cultivate large tracts of peatland in communal

areas. While they rake in huge profits, the affected community loses the benefits of an ecosystem they depended on for hundreds of years.

At the time of writing, there was a draft Memorandum of Understanding (MoU) regarding cooperative co-governance awaiting signature by the relevant authorities. This is seen as a positive step in the right direction. The MoU aims to formalise legal mandates and protocols between Working for Wetlands, DWA, DEA and DAFF, developed to formalise wetland-related rehabilitation funded by WfW.

South Africa's peatlands should be regarded as non-renewable. It is hoped that efforts to protect what is left will succeed and so prevent the extinction of this precious natural resource. □

Piet-Louis Grundling

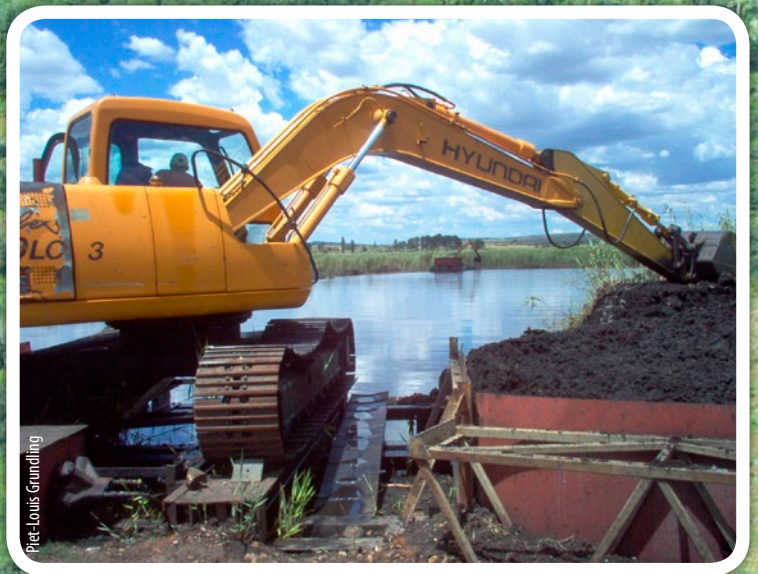
The illegal and uncontrolled expansion of Eucalyptus plantations pose a severe threat to wetlands in Maputaland. The trees tap into the regional water table of the primary aquifer, resulting in the desiccation of wetlands.

Peat swamp forest is one of the rarest wetland types in South Africa. Uncontrolled draining and cultivation of swamp forests have brought them to the brink of extinction outside the boundaries of conservation areas. Note the lighter green areas (bananas) within the remains of the swamp forest.



Below: Peat is extracted in the Mooi River catchment using excavators.

Bottom: Restoration of the peatlands in Rietvlei Nature Reserve is saving the City of Tshwane millions of Rands in water treatment costs.



Piet-Louis Grundling



Lani van Vuuren