

UNIQUE DUNE SYSTEM

Shows Sustainable Use is Possible

Courtesy of Steve Newbould, Clockwork Media



In the middle of the Kalahari a seemingly ordinary set of white dunes are demonstrating the importance and benefits of good water management. Lani Holtzhausen reports.

Proclaimed in 1994 the Witsand Nature Reserve is situated 70 km from Postmasburg, just west of the Langberg Mountain Range, in the Northern Cape. An area of flowing white dunes, nine kilometers long and four kilometers wide, Witsand derived its name after the white sand of the dunes, which is in total contrast against the surrounding red Kalahari sands ('Witsand' literally means 'white sand').

It is reported that the white dunes have been created through continual leaching, which has washed the red iron oxide coating from the quartzite grains. Receiving only about 290 mm of rainfall a year, mostly in the form of thunderstorms, Witsand is extremely arid, and every drop of water is precious. Sustaining this unique ecosystem is the Witsand aquifer, which since earliest times has been the only reliable source of permanent water in this parched region.

According to Hesma Cockrell of the Department of Water Affairs & Forestry (DWA), the natural status of the dunes, fauna and flora has shown dramatic improvement since the proclamation of the nature reserve more than a decade ago. She believes that Witsand is a wonderful example of the benefits of good groundwater management. "The fact that water use and management of the groundwater resource was implemented from the start and has been maintained continuously has obviously contributed to the sustainability of the resource today."

PRIMARY AQUIFER

Covering an area of about 1 400 ha, the Witsand primary aquifer is situated in the white sand dunes between quartzite

outcrops of the Matsap formation. The average groundwater level in the dunes system is 2 m below surface, dropping to 90 m below surface in the surrounding red Kalahari sands.

The aquifer not only serves as the lifeline of the nature reserve, but also to the adjacent seven game and livestock farms which depend on its supply of fresh groundwater. Approximately 120 000 m³/y of water is abstracted from the resource through pumping at several locations.



This is much less than the estimated annual recharge volume (970 000 m³). All the water is for Schedule 1 water use only, i.e. for game and stock watering as well as domestic use. Water use for any commercial activities is prohibited. Cockrell tells *the Water Wheel* that the quality of the water is very fresh and correlates well with that of rainwater.

CONTINUOUS MONITORING

Water use in the present three well-fields is monitored extensively, and there is a close working relationship between the Witsand Nature Reserve, DWAF and the farming community. The interest and commitment of the individuals involved, and the fact that this is recognised as a unique ecosystem that must be preserved, are cited as the main reasons for the proficient management of this resource.

Abstraction/water use monitoring takes place monthly. Every production borehole is equipped with a flow meter and the monthly readings are recorded in a logbook. The data loggers have been placed in such a way that they provide data on the effect of pumping as well as natural trends in the water levels.

Water level monitoring is undertaken quarterly. During this monitoring process the data from the data loggers are also downloaded and the instruments checked for errors that might occur (such as flat batteries etc). In turn, water quality samples are taken bi-annually.

SUSTAINABLE USE

Cockrell believes that these observations are enough to ensure the sustainable use of the resource at its current status; however, in her opinion water quality monitoring could be improved. "Biological monitoring samples should also be taken bi-annually at



Courtesy of SA Tourism

Underneath the white sand of the Witsand Nature Reserve lies the lifeblood of the area, the Witsand aquifer.

the source and from the taps in the nature reserve camping area."

Close monitoring of water use in the nature reserve is especially important as tourism numbers are constantly increasing throughout the year, and can lead to problems during the summer holiday season when the camp is fully booked and daily temperatures are high, leading to increased evaporation (temperatures can rise up to 48°C during January and February).

There are also other management challenges. "Keeping communication lines open between the stakeholders has proven to be most difficult," says Cockrell. "Due to the remoteness of the area, the far distances people stay from each other, as well as the unreliable power and telecommunications services, people can be cut off from civilisation for days – sometimes weeks – at a time."



The pangolin is one of the rare creatures to be found in the Witsand Nature Reserve, making the preservation of this area, and the protection of its water resources, all the more important.

The management of the infrastructure is also challenging due to the long kilometres of pipeline that need to be monitored every two weeks to reduce losses as a result of leaking. In addition, power failures cause pumps to be unable to operate.

Cockrell advises that, if future developments of the aquifer are considered, the Northern part of the groundwater resource is targeted, since the largest volume of abstraction at present is from the two wellfields in the southern part of the resource.

What are the main lessons to be learnt from the way in which the Witsand aquifer is managed? "The most important aspect of managing any water resource is acquiring the commitment of all the stakeholders involved. The people dependent on the resource need to take ownership of the management and conservation of the resource," explains Cockrell. "You can have the best monitoring systems in place; however, if it is not managed and maintained, it would all have been in vain."

It is hoped that sufficient management of the Witsand aquifer will continue well into the future so as to ensure the preservation of this unique ecosystem for future generations. 