



Water: at what cost to our unique flora?

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During the current drought (2015-18), water consumption in Cape Town and adjacent municipalities has outstripped water replenishment of the bulk water supply dams. We have, so far, narrowly avoided 'Day Zero' in 2018 – when supplies will run so low that the taps run dry – but it remains a concern for 2019. In a rush to partially make up this shortfall, the authorities are targeting (mainly) ground water, including the Atlantis and Cape Flats sand aquifers and the Table Mountain Group (TMG) fractured rock aquifer. Whereas the first two are low-lying and may be recharged with treated wastewater, this will not be the case for the TMG aquifer.



Pristine fynbos around Steenbras Dam.



Fine sediments that escaped silt traps now coat the veld and adjacent streams.

From a flora point of view there are risks in abstracting ground water: firstly, the immediate, localised and negative impacts of borehole construction and operation on the adjacent native ecosystems, as has already been observed; and secondly, the longer-term impacts of extraction on water tables, natural springs and related ecosystems. The extent, magnitude and duration of this latter impact cannot be quantified or meaningfully predicted.

While there is a definite need for new water sources, or at least a new approach to water harvesting, there has to be both public and management awareness of the potential environmental impacts of groundwater abstraction.

IMMEDIATE IMPACTS

For the Cape Flats and Atlantis aquifers, drilling sites are predominantly located outside both protected and critical biodiversity areas, minimising biodiversity impacts. There is, however, a proposal to drill in the Swartklip Core Flora Conservation area between Mitchell's Plain and Khayelitsha, which could have significant negative impacts on flora – particularly in wetlands. By contrast, most (>330) proposed borehole sites targeting the TMG aquifer are located in fynbos or adjacent to conservation areas (the Cape Floral Region designated areas of the World Heritage Site: including Table Mountain National Park,

Kogelberg Biosphere Reserve, as well as other protected areas, critical biodiversity areas and ecological support areas). These mountains comprise the heart of the Cape Floristic Region which is renowned as a global biodiversity hotspot. The proposed boreholes potentially could impact over 250 plant species of conservation concern.

Construction of the larger production boreholes for the TMG aquifer requires percussion drilling creating tons of sediment that is extracted using a mixture of water and a chemical called "Rotofoam". This chemical is highly alkaline and high in phosphorus, in contrast to fynbos ecosystems which are acidic and low in phosphorus. Large quantities of this water chemical mix are released during drilling and the "blow out" operations to clear the borehole. It is difficult to contain this high volume and flow within sumps and silt fences, with the result that water – laden with fine silt and Rotofoam froth – flows over the landscape and enters nearby water courses. The footprint of damage therefore extends beyond the ±300 m² area impacted by each drill operation. Full development of infrastructure for abstraction from each borehole affects a much larger area, including construction of roads (if not already present), a pump house (~3x10 m) and potential mini treatment plant, and powerlines and pipelines. All of these construction activities will have negative impacts on pristine fynbos ecosystems and specifically on rare and endangered species.

Where drilling has already occurred, severe impacts have been evident. A lack of pre-screening at Wemmershoek Vlei, for example, resulted in a pipeline trench being dug and two production boreholes sunk across the last remaining population of *Erica bakeri* (Critically Endangered). This site supports many localised and threatened species, including the last viable population of *Diastella buekii* (Critically Endangered). Any change to local soil conditions and hydrology could spell the end for these species in the wild. Fine sediments and chemicals from drilling have spilt from many drill sites. These have deposited on the fynbos and smothered stream beds, causing dieback of aquatic organisms as well as fynbos plants, such as *E. fastigiata*. This could be a highly significant negative impact in situations where a species of conservation concern is directly impacted, such as *E. multiflexuosa* (Vulnerable), known only

from around the Steenbras Dam. As yet there is no understanding as to the long term effects of the water-sediment mix flowing into the veld during construction, but it is very likely to cause a change in floral communities with the more sensitive species being eliminated.

LONGER TERM IMPACTS

The sustainability of abstracting from the TMG aquifer in the mountains around Cape Town is not fully understood. While a research programme was started in the early 2000s, funding was cut and the research halted for almost a decade, leaving critical gaps in our understanding. Research following TMG abstraction in the Kammanassie area indicated a lag period after which springs and associated wetlands – fed by TMG ground water – were negatively impacted on by abstraction, and in some cases totally drying up.

During the current emergency, some of the proposed TMG boreholes target potentially unconfined aquifers that may be directly linked to the water table and surface springs and wetlands. This is of enormous concern as this abstraction is likely to drive ecological change, with the wetter habitats that support many of the rare floral species being most negatively affected. The amount of water that can be sustainably abstracted from the deeper, confined aquifer is not known and the extent to which this deeper aquifer is linked to the unconfined, shallower aquifer and surface water is also not known. What areas and which species will be affected may only become evident after several years of abstraction.

Lastly, the combination of surface impacts, altered hydrology and fire exclusion to protect borehole infrastructure is very likely to encourage invasion by alien species such as pine trees and Australian wattles having a further impact on biodiversity and hydrology.



Drilling in process, with Rotofoam mix and fines spilling over sumps and silt traps.



Fine sediment from the drilling process spread 200 m from drill site in pristine veld.



Thick coating of fine sediment smothering natural soil in pristine veld.

ALTERNATIVE SOLUTIONS?

By abstracting from the TMG aquifer, we not only put our biodiversity and unique flora at risk, but we are 'robbing Peter to pay Paul'. In other words, abstracting groundwater from mountain catchment areas may actually reduce the flows into our main supply dams in the long term. Until there is a clear idea of sustainable levels of abstraction from the TMG, drilling in fynbos protected areas should be halted and diverted to a limited number of alternative sites in highly modified areas and the impacts of abstraction on groundwater carefully monitored.

One immediate solution is to improve the management of our catchment

areas. Alien species, particularly pines in the mountains and wattles in the water courses, have spread rampantly in recent decades and consume much more water than fynbos shrubs. Currently it has been estimated that these invasive tree species reduce runoff into our dams by more water than the City of Cape Town hopes to derive from the TMG aquifer (at most, 150 million litres/day). Controlling invasive alien plants would simultaneously restore the fynbos ecosystems, essential for delivering clean water.

Other obvious solutions are to continue to promote low water usage, even in the next wet cycle, and to increase rainfall capture into storage tanks, recycling and re-use of treated grey water.

FURTHER READING:

Articles relating to water use by alien vegetation: www.ecologist/post/aliens.
www.groundup.org.za/article/rush-drill-water-could-threaten-our-future-water-supply.
www.dailymaverick.co.za/article/2018-05-02-alien-trees-are-a-major-threat-to-water-supply-so-why-doesnt-this-reflect-in-cape-towns-draft-budget.

Maze, K.E. & Rebelo, A.G. 1999. Core flora conservation areas on the Cape Flats. *FCC Report 99/2*, The Botanical Society of South Africa.

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