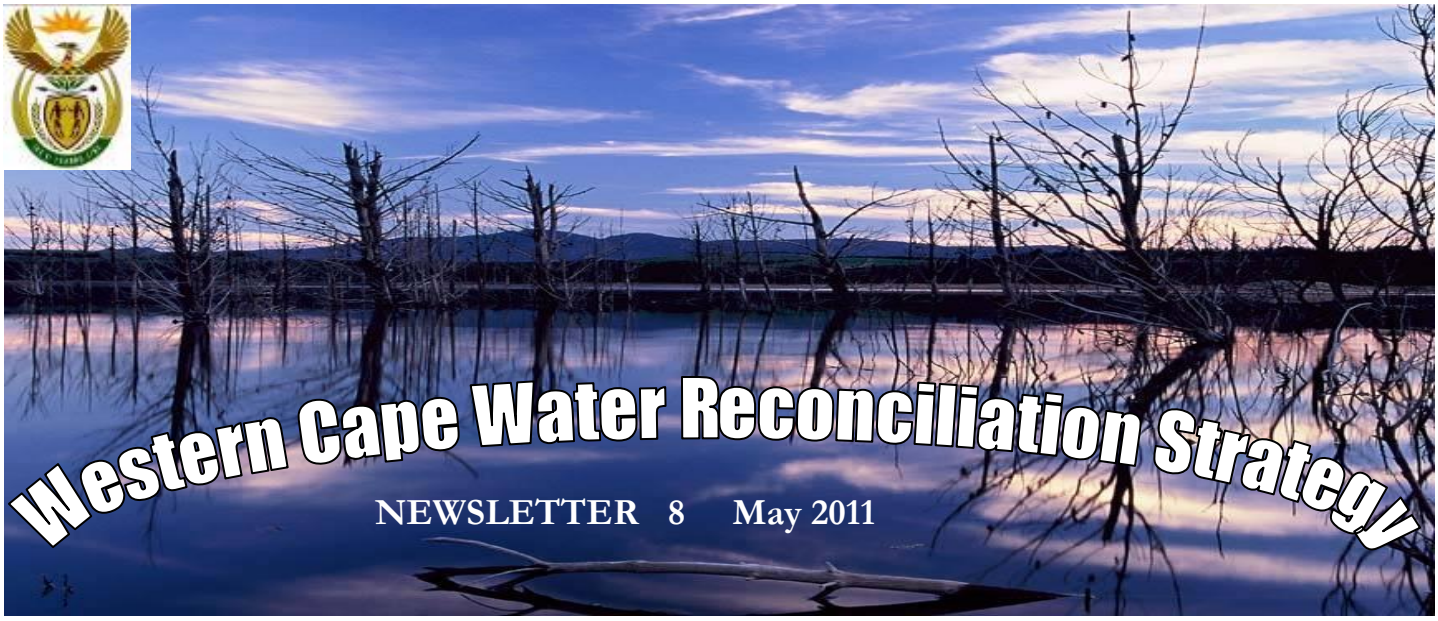


Surface water augmentation options: we are scraping the barrel

Population and economic growth is putting an exponential strain on the water available to the users of the Western Cape Water Supply System (WCWSS). At present the system can safely provide 556 million m^3 per year. The 2010 water requirement was already 511 million m^3, of which 32% was used by the irrigation farmers and 68% by the urban dwellers in and around Cape Town and the West Coast. According to projections, the remaining 45 million m^3 will be fully utilised anywhere between 2017 and 2019 – depending on the growth in the area and the further successful implementation of the City of Cape Town's water conservation and water demand management programme.

In addition, the recently completed Catchment Management Strategy for the Breede-Overberg CMA has indicated that very little additional water is available for possible transfer into the WCWSS, and that no additional water should indeed be made available from the Breede River system before the 20-year old hydrological information has been updated.

The only two surface water options being studied at the moment are the transfer of water from the Berg River for storage in the Voëlvlei Dam, and diverting winter water above an agreed threshold from Michell's Pass (Dwars River, Breede catchment area) to the Klein Berg River for use in the WCWSS.

In addition to the research being done on groundwater and utilising the TMG aquifer as a water resource, the City of Cape Town will also be determining the feasibility and cost of water re-use and desalination while other areas will be looking at aquifer recharge

The map shows the main storage dams in the system, and how all these are connected to one another in order to operate the system at its maximum efficiency so as not to let any dam spill unnecessarily

Using the best storage space ever

South Africa's high temperatures and windy conditions often result in great evaporation losses from our storage dams. The vast, flat surface of the Vaal Dam is a specific point in case. So why not utilise underground aquifers?

Known as Aquifer Recharge or Water Banking, utilising our underground aquifers to store excess water during times of plenty for subsequent abstraction is fast becoming an attractive option as an additional water supply – especially for water-stressed communities. However, the beauty of such sub-surface storage is that one can also use aquifers to store treated waste water and storm water, transferring groundwater from one aquifer to another, or to further improve water quality by using sand to filter the water.

In the area of the WCWSS, Atlantis is an excellent example of how the City of Cape Town has already for 30 years been successfully recharging the aquifer with treated waste and storm water. This is done by creating a basin (similar to a wetland – see photograph) and feeding this area with treated water that slowly filters through the sand or gravel into the aquifer. About 30% of Atlantis' groundwater supply is recharged in this way.

A recent study by the West Coast District Municipality to augment the Langebaan Road aquifer by means of injecting surplus winter water from the Berg River into the aquifer for use during the summer months has not been as successful. What was thought to have been a confined aquifer unfortunately seems to be "punctured" by over-abstraction and boreholes being drilled through the impermeable clay layer into the lower aquifer system. Further studies will be done, which will include the possibility of closing off all boreholes penetrating the Lower Langebaan Road Aquifer System.

A study for the Department of Water Affairs on various aquifer recharge options was completed in November last year. Artificial recharge maps have, *inter alia*, been drawn up for each water management area. More information is available on *www.artificialrecharge.co.za*

Integrated Water Resource Management in the Western Cape under the spotlight

At the Western Cape Water Indaba held in Cape Town in December 2009 the national Minister of Water and Environmental Affairs identified the importance that the strategies of all sectors impacting on and dependent on water are aligned with the key water management principles for the province – whether agriculture or mining, manufacturing or housing.

The Provincial Department of Environmental Affairs and Development Planning, in conjunction with the National Department of Water Affairs (DWA), other Provincial Departments and Local Government in the Western Cape has therefore been tasked to develop a Provincial Integrated Water Resource Management (IWRM) Action Plan that identifies short (1-5 years), medium (6-15 years) and long term (15 years +) actions to guide implementation of projects / activities and future development priorities towards achieving integrated water resource management.

As a first step in the process towards developing the IWRM Action Plan, a Status Quo Report has been compiled of the current situation, the existing challenges, and the current and proposed planning in relation to water resource management and growth and development in the Western Cape. This will be a summary of all existing information available to determine the quantity and quality of available resources. In addition, all legislation pertaining to water management will also be perused to identify gaps, inconsistencies, opposing legal prescriptions, and the policies and guidelines (or lack thereof) that make sure that water is taken into account before decisions are made.

The first round of public meetings to relay the information already gathered and to obtain additional information has been held. This information will now be used to inform the development of the IWRM Action Plan, which will once again be communicated to stakeholders by means of public meetings later in the year.

Further information can be obtained by contacting Sunette Ruch at Sunette.Ruch@pgwc.gov.za

Water conservation and water demand management explained

Water Conservation and Demand Management is the efficient use of water, thus ensuring that no excessive or unnecessary demands are placed on our precious water resources. For municipalities and irrigation schemes this means firstly to get their own house in order and minimise water losses from their distribution networks.

For the past three years the City of Cape Town's water conservation and demand management (WC/WDM) programme has accomplished the following:

- Pressure management was successfully implemented in 13 settlements, including the installation of pressure reduction devices at 49 schools.
- 1 693 Consumer water meters were audited in the Automated Meter-reading Pilot Project (Epping, N2 Gateway and Sunset Beach).
- A total of 1 775 consumers were fitted with automated meter-reading devices.
- 20 574 dysfunctional consumer water meters were replaced, 17 998 consumer meters were re-located and fixed and 70 652 water connection leaks were fixed.
- 95 users were supplied with treated effluent which accounts for 80.5 Ml/day of re-use.
- 341 Caretakers of flats and schools were trained.
- 41 Schools were visited and leaks repaired.
- 160 *Hlonipha Amanzi* workshops were held, reaching 14 813 participants.
- Water by-laws awareness campaigning at 5 workshops, 12 shopping mall promotions, and with industry and commerce.
- More than 50 000 households were visited as part of the integrated leaks repair project.

During the last financial year alone the CCT invested some R60 million in infrastructural upgrades and replacements, metering, pressure management etc. to reduce their unaccounted for water. (This unaccounted for water is the result of losses in the distribution system due to pipe bursts or leaks, reservoir overflows and metering inaccuracies. It is calculated by determining the difference between the water supplied and the water billed.) These efforts have culminated in a substantial decrease in the average volume water. For example: the percentage of unaccounted for water decreased from 24,4% in February 2010 to 19,9% in February 2011.

Unfortunately (and mainly due to capacity constraints) the CCT has not been able to annually spend the funds allocated to the 10-year WC/WDM strategy (initiated in May 2007) for identified projects. This could be one of the reasons why the CCT has not been able to achieve its projected water savings. The CCT has met with the DWA to discuss the matter, and it was agreed that more achievable short-term targets must be set.

Other municipalities that obtain water from the Western Cape Water Supply System have also commenced with in-house WC/WDM measures. Some of them are, however, restricted because of the time delay in the allocation and approval of funds.

What happens if….?

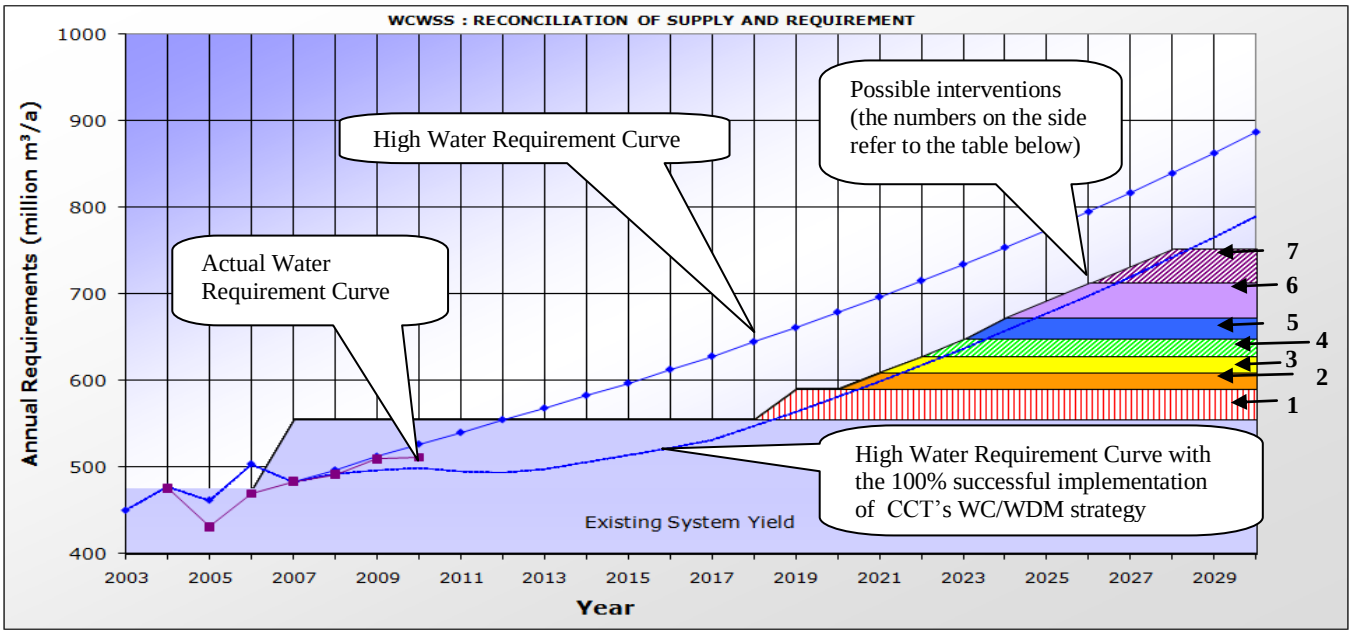
Should water conservation and demand management (WC/WDM) be successfully implemented by the CCT and other municipalities that rely on the Western Cape Water Supply System for their water supply, the water requirements of the system are expected to remain in balance with the supply that is currently available until 2019.

However, the water requirement scenario drawn up in October 2010 for the strategy steering committee indicates that the CCT's water requirements are growing at approximately 2.5% to 3.5% per annum. Should this growth continue, and should the CCT's WC/WDM be only 50% successful, a new intervention would be required two years earlier – by 2017. At the moment the earliest date at which a surface water intervention can be implemented, is in 2019.

Alternative water resources being investigated at the moment include the desalination of seawater and the re-use of water. A decision on which intervention to implement next will be made at the committee's meeting in March 2012 (taking into account unit costs, cost benefit figures and associated challenges and problems) – provided that enough data on the various options is available to make a decision. In the mean time the successful implementation of WC/WDM as a means to curb and/or decrease water requirements, is critical.

Planning for the future

Scenario planning is used to determine when new interventions are required to supplement the Western Cape Water Supply System (WCWSS). This is done by comparing the water used each year and determining the growth trend in the water requirement from the system. This graph below looks at three scenarios – one if no water conservation and demand was exercised and the water demand continued unabatedly (top line), and the second if the WC/WDM programme initated by the CCT in 2007 was 100% successful (bottom line). The middle line represents the (third) actual trend, and is used to determine when a new intervention has to be 'on stream'.



The numbers on the right-hand side of the graph above represent the possible future interventions. They include the existing two surface water options, as well as some of the other alternative water resources being investigated by the CCT. Not included is the possible introduction of desalinated seawater.

No	Intervention	Year of First Water	Yield (million m^3/a)
1	Voëlvlei Phase 1	2019	35
2	Lourens River development	2021	19
3	Cape Flats Aquifer	2022	18
4	TMG Scheme 1 (groundwater)	2023	20
5	Raise Lower Steenbras Dam	2024	25
6	Water Re-use Scheme Generic 1	2025	40
7	Water Re-use Scheme Generic 2	2027	40

Removal of invasive vegetation as a water supply strategy

The removal of invasive alien vegetation has not previously been regarded as an actual intervention for water supply. A recent study done by Aurecon for the Strategy Steering Committee has indicated that the removal of these vegetation types upstream of dams (i.e. in mountain catchment areas) could substantially improve the runoff to dams, and subsequently the yield from the WCWSS.

Unqualified studies have indicated that invasive alien vegetation in the areas upstream of the major dams in the WCWSS could reduce the yield to the system by up to 18 million m^3/a. This is equivalent to the estimated yield that would be obtained from one of the smaller augmentation options being considered by the CCT, for example the Lourens River diversion (19 million m^3/a) and the Cape Flats Aquifer (18 million m^3/a).

Due to uncertainties in the existing mapping, the calculation of streamflow reductions, and the spread rates of invasive alien plants, the impact of invasive alien plants on the yield of the WCWSS cannot be definitely calculated at present. However and despite these uncertainties, it is clear that the potential future impact on yield will be significant if clearing is not undertaken on an on-going basis.

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