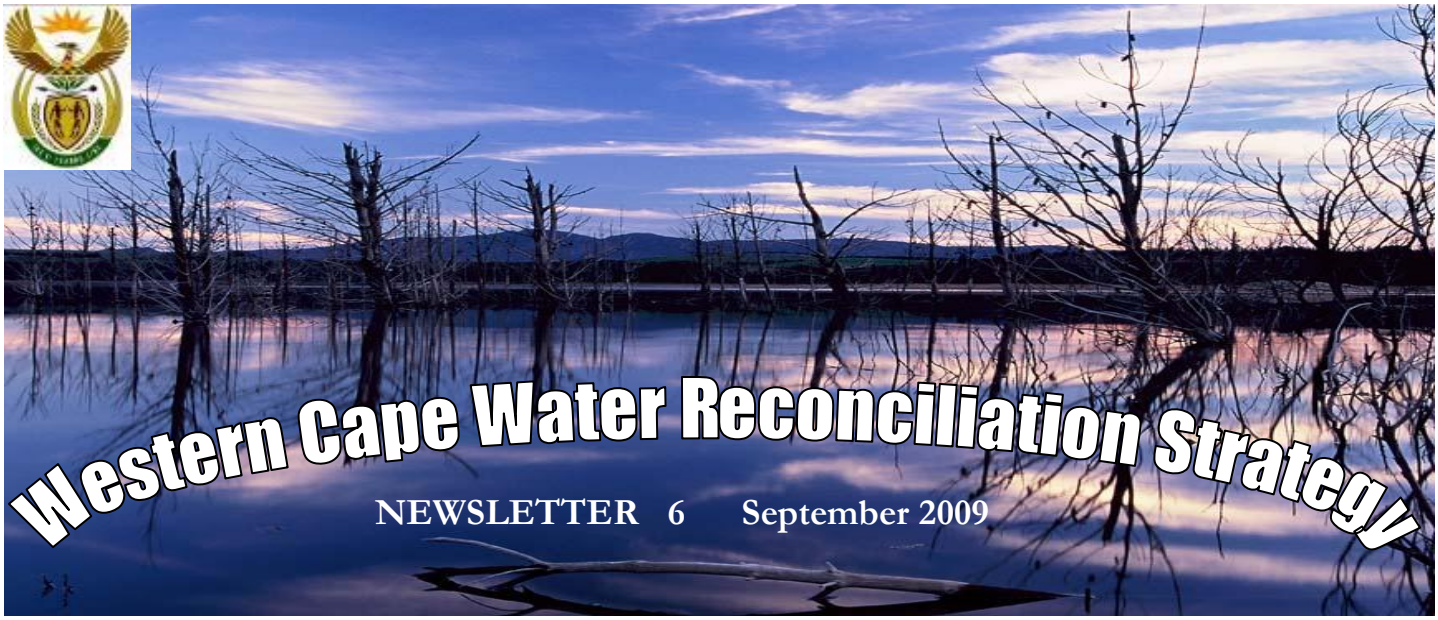


Beyond 2010

With finite water resources and exponential population growth, the global race to timeously plan for new or alternative water resource interventions to keep up with increasing demand is getting tougher and tougher. In the larger Cape Town area, the exact same situation has called for a strategy that will reconcile water requirements with available resources. Initiated as a collaborative venture between the Department of Water Affairs (DWA) and the City of Cape Town (CCT), the Western Cape Reconciliation Strategy (WCRS) makes use of scenario planning to provide trends upon which the decision to implement which identified intervention, and when, are based.

As the implementation of large projects can take up to ten years to implement, potential future sources of supply were identified (refer to the table on the right). To ensure that they are available for implementation, the DWA and the CCT were assigned the responsibility of initiating feasibility and/or pre-feasibility level studies into these interventions. Due to resource constraints, the commissioning dates of most of these studies have been delayed, meaning that interventions have to be fast-tracked.

Once a year (during September), all role-players and decision-makers involved in aspects that have an influence upon or are affected by water supply meet to discuss the latest scenarios and to decide on actions that need to be taken to ensure a continued supply of water. These role-players include agriculture, local government, planning departments and environmental organs of state – at local as well as provincial level.

This year, for the first time, the scenario planning also took climate change into account and a new "worst case" scenario was discussed. Under this scenario, the DWA and the CCT would have to take a decision by 2011 on the intervention(s) that should be fast-tracked to enable it to be designed, implemented and deliver the first water by 2017.

Interventions identified to increase the water resource

Intervention	Study Level
GROUNDWATER	
TMG Aquifer Feasibility Study	Feasibility
Cape Flats Aquifer	Feasibility
Newlands Aquifer	Pre-feasibility
West Coast Aquifer Recharge	Pre feasibility
SURFACE WATER	
Voëlvlei Phase 1	Update feasibility
Michell's Pass Diversion	Pre-feasibility/Feasibility
Upper Wit River Diversion	Pre-feasibility
Raising Steenbras Lower Dam	Pre-feasibility
Lourens River Diversion Scheme	Update Pre-feasibility
Upper Molenaars Diversion	Pre-feasibility
WATER RE-USE	
Water re-use	Pre-feasibility
DESALINATION	
Desalination Plant	Implementation of pilot desalination plant
OTHER INTERVENTIONS	
Invasive Alien Plant Clearance	Ongoing

PLANNING = BEING PREPARED

Scenario planning processes are used to identify, evaluate and assess alternative groupings and phasing of interventions so as to determine the most appropriate combination of interventions that should be implemented to reconcile water supply and requirement. The objective is not to select one "favourable scenario" but to identify which interventions should be studied to allow consideration of a range of possible scenarios. In the case of the Western Cape Water Supply System, this will allow the DWA, the CCT and other stakeholders the maximum amount of flexibility in making informed decisions on which interventions to implement after the Berg Water Project, and beyond. The outcome of such a process is a list of interventions (refer to the table on page 1) that should be studied to feasibility level by specific dates, including timelines and the responsible organisations.

One of the most crucial interventions is the CCT's **water conservation and demand management** (WC/WDM) programme, which is aimed at reducing consumer demand by means of various municipal water saving initiatives. However, despite all efforts made the CCT (often hampered by a lack of capacity), the CCT's actual water requirement (2009) is above the projected water requirement curve. This could be as a result of a higher than anticipated growth in water requirement (population increase / new housing developments), or a less than anticipated success in the implementation of WC/WDM, or a combination of the two above-mentioned factors. Should the CCT be only 50% successful in implementing its WC/WD strategy, planning indicates that the implementation date for new interventions could be brought forward to as early as 2015.

The two supply interventions which could potentially be fast-tracked and would offer significant benefits are the **Michell's Pass Diversion Scheme** and **Water Re-use**. The benefits of implementing the Michell's Pass Diversion scheme are:

- Voëlvlei is on the extremity of the Western Cape Water Supply System (WCWSS); having an alternative source feeding Voëlvlei Dam would increase the security of supply in the region.
- The CCT's existing bulk water supply infrastructure has spare capacity to transfer an additional approximately 19 million m^3 of water per annum into the WCWSS without any additional bulk water supply infrastructure.
- Voëlvlei Dam is currently over-allocated at a 98% level of assurance of supply.
- The water quality transferred from the Dwars River (Upper Breede) would be better than the water quality from the Berg River.
- There are potentially fewer environmental impacts associated with the Michell's Pass Diversion.

City of Cape Town groundwater research

Three of the four groundwater feasibility studies identified as the responsibility of the CCT have yet to commence. It is the intention of the CCT to commence with feasibility studies for the Cape Flats Aquifer, Newlands Aquifer and Lourens River Diversion Scheme by the end of 2009. The CCT plans to appoint a Professional Service Provider to assist with the implementation of the pilot desalination plant by July 2009.

Exploratory drilling of the **TMG Aquifer** is progressing, with the contract completion scheduled for September 2009. At the start of February 2009, 1887 m out of the planned approximately 3000 m of exploratory diamond core holes had been drilled. It is anticipated that the Exploratory Phase will be completed by the mid to end of 2010 and that the Pilot Wellfield Phase of the project will be completed by 2012/13. The aim of the core drilling to be done during this contract is to obtain hydrogeological information that will inform the selection of a site to establish a pilot wellfield in the next phase of the study. The timing of the Pilot Wellfield Phase is dependent on the outcome of the Environmental Impact Assessment which has to be undertaken.

USE IT – OR LOSE IT

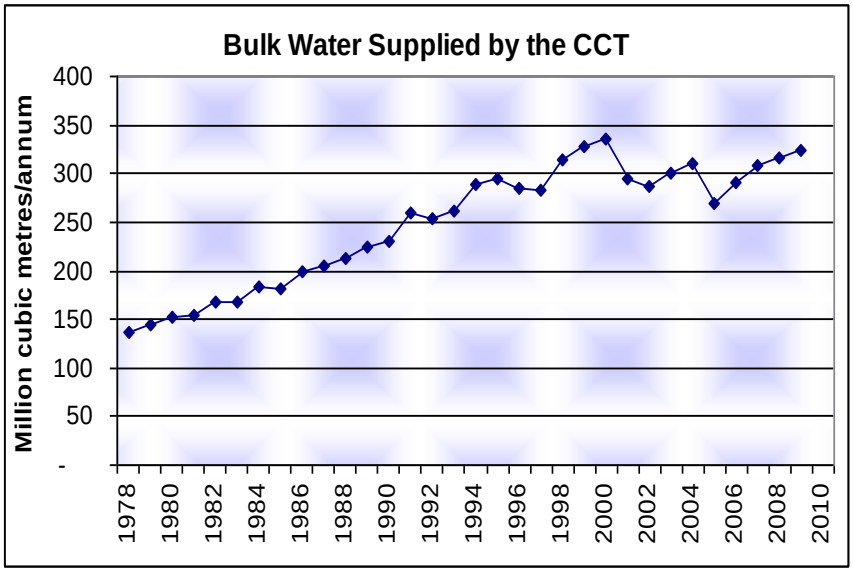
One of the proposed interventions for alternative water supply, is a pilot sea water desalination plant (refer to pg 1). The CCT's planned pilot desalination plant will, however, only add approximately 1 million m^3/a to the available supply. This amount is too small to impact on the reconciliation of supply and requirement, as well as on the implementation dates of future interventions. It was therefore agreed that a large-scale desalination plant (± 230 megalitre/day (Ml/day)) should rather be investigated.

In the mean time a practice implemented successfully by many countries in the world and never considered on a large-scale in South Africa before, reared its head. Called water re-use, its aim is to make available resources go beyond the once-off use thereof.

The bulk water supplied by the CCT in their 2007/2008 financial year was 315.7 Mm^3/a, and in their 2008/2009 financial year this volume increased to 324.4 Mm^3/a. The table below provides illustrates the increase in water supply over a 30-year period, the decreases in the early 2000s being directly attributed to the implementation of the CCT's WC/WDM programme.

Whether used by industry, agriculture or human mankind, most of this water is discharged in one way or another, and usually ends up in the CCT's wastewater treatment works, where it is treated and discharged into rivers that flow into the sea.

Bulk Water Supplied by the City of Cape Town



Research world-wide has shown that, rather than treating this water and releasing it into rivers (where it often is re-used by communities downstream, agriculture etc), this water could be treated to a higher level, discharged into existing storage units such as dams or lakes where it mixes with the natural inflow, and then used to provide treated potable water to communities or raw water to agriculture and industry. This is referred to as the *planned indirect re-use of water*.

Treating the water to a "higher level", makes use of the same process (reverse osmosis) used in the desalination of sea water. The CCT was therefore requested to investigate the feasibility of large-scale desalination in parallel to investigating water re-use.

The significant benefits attributed to water re-use include the following:

- Water re-use is a potentially significant resource (the yield of the intervention could be in the region of 80 million m^3/a). A comprehensive re-use scheme has a significant yield compared to the small yields of available surface water interventions
- A water re-use intervention could be implemented in a phased manner.
- A water re-use intervention is not climate dependent. This would provide for a diversification strategy and would mitigate the potential risks associated with the implementation of additional surface water Interventions.
- A water re-use intervention provides water in both summer and winter water, whilst surface water interventions with a low unit reference value (URV) are run-of-river abstraction schemes (only winter water).
- Studying water re-use may be essential to get EIA approval for next augmentation scheme.
- It utilises "water" that would otherwise have been discharged into the sea (economic value).
- It assists CCT with compliance to DWA discharge standards.
- It is significantly cheaper than desalination.

It is, however, important to undertake a feasibility study to test the "acceptability" of proposed re-use interventions.

WHAT DO SCIENTISTS SAY?

In the most recent research article (*ScienceDaily; Aug 7, 2009)* researchers from Oregon State University and other institutions conclude that it is actually the known wobbles in Earth's rotation that caused global ice levels to reach their peak about 26,000 years ago, to then stabilise for 7,000 years and to begin melting 19,000 years ago, eventually bringing to an end the last ice age. They claim that the melting was first caused by increased solar radiation, not changes in carbon dioxide levels or ocean temperatures, as some scientists have suggested recent years. According to their research, changes in the earth's axis and rotation are caused primarily by the gravitational influences of the larger planets, such as Jupiter and Saturn, which pull and tug on the earth in slightly different ways over thousands of years. This can change the earth's axis – the way it tilts towards the sun – about two degrees over long periods of time, which changes the way sunlight strikes the planet. Those small shifts in solar radiation caused multiple ice ages during about the past 2.5 million years, which reach their extremes every 100,000 years or so.

Sometime around now, they say, the earth should be changing from a long interglacial period that has lasted the past 10,000 years and shift back towards conditions that will ultimately lead to another ice age – unless some other forces stop or slow it. These processes literally move with glacial slowness. However, due to greenhouse gas emissions, the earth has already warmed as much in about the past 200 years as it ordinarily might in several thousand years.

Climate Change:

Fact or Fiction?

Call it climate change, global warming... It remains a controversial issue with many people truly believing that it is taking place, whilst others categorically disagree with the concept thereof. Yet mother earth has proved that it is used to climate change and has seen many such events over the past estimated 4.54 billion years – hence the presence of sea fossils in the Karoo and dinosaurs becoming extinct.

Whether fact or fiction, one cannot negate that there have been climate changes during the past 20 years. In the Western Cape, scientific predictions of future climate change suggest that the region could, for example, experience more drought periods. Coupled with increased evaporation and higher temperatures, this will negatively impact water supply. Regional predictions suggest a drying trend from west to east, with a weakening of winter rainfall, possibly slightly more summer rainfall (mainly in the eastern mountainous regions), a shift to more irregular rainfall of possibly greater intensity, and less intense winter temperatures.

This highlights the importance of protecting our water resources from over-abstraction, degradation and the spread of invasive alien plants (which consume more water than indigenous plants). Of critical importance is the management of mountain catchment areas, as they are the primary source of our water supply. A fynbos mountain catchment can, for example, lose up to 68% of its water yield when densely covered with invasive alien shrubs or trees. In the face of climate change we cannot afford such losses.

Do we take cognisance of climate change – or not?

Whether we believe in climate change or not, just the mere fact that the entire world is of the opinion that climate change is a relevant issue indicates why the possibility thereof should be taken into consideration in all planning and decision-making processes. Hence the reason why role-players in water-related issues took cognisance of climate change when determining the stage at which additional/alternative water supply interventions need to be "on line" (refer to page 1). They agreed that, on the longer term, we should use diversification to build in resilience in our water supply system.

At their September 2009 meeting these role-players also decided to establish a broad-based task team that would monitor climate change by analysing existing hydrological data for trends and try to find reasons for these trends.

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