

Water Crisis in Cape Town: Lessons to be Learnt

PART 1: HOW THE CITY'S WATER SUPPLY AND MANAGEMENT SYSTEM NEEDS TO CHANGE

After the Western Cape had already declared the drought a provincial disaster, the interministerial task team on drought and water scarcity declared the South African drought a national disaster on the 9th of February 2018 (Business Day, 2018). Is this declaration not long overdue? How does the Water system work in the Western Cape and how can 'Day Zero' be avoided in future? This article series aims at giving answers to these questions. Part 1 will deal with the Western Cape Water Supply System and possible alternatives of water supply to prevent 'Day Zero' in future.

A 26-year old woman from Cape Town explains how she uses water collected in a bucket whilst showering to flush her toilet and talks about her nightmares of long, water-wasting showers (NBC News, 2018). A craftsman, who lives just outside of Cape Town, describes how he manages to wash his hands only once a day and elaborates on his plans to build a compost toilet (Times LIVE, 2018). Helen Zille, Premier of the Western Cape, states that she only showers every third day and that oily hair as well as a dirty car are status symbols during a drought period of such severity as the Western Cape Province is currently facing (Times LIVE, 2018). The extreme drought period highlights and reinforces the economic, political as well as social divisions that exist in the Western Cape. While households in affluent suburbs are able to adjust better to the water crisis by either drilling private bore holes or buying bottled water in bulk, households in informal settlements and townships are struggling more to

cope and hence suffer the most from the current water restrictions, which stipulate a daily water consumption per person of a maximum of 50 litres. Politicians are playing a blame game, as the public is wondering why the Western Cape got in this situation and who is really trying to solve the problem.

These are the daily struggles and issues Capetonians face since the summer season has started in November 2017. The Western Cape has been hit with the worst drought since 400 years and whether this will be a permanent characteristic of the South African climate or a short-term occurrence depends on the next winter season and its unpredictable rainfalls (Cape Town Press Club event, 2018). In September 2017 a restriction of 87 litres per person per day was introduced, which was rather unsuccessful. "Despite our urging for months, 60 per cent of Capetonians are callously using more than 87 litres per day," said Cape Town Mayor De Lille (Daily Mail, 2018). Stricter restrictions were introduced on the 1st of February 2018. From that day onwards 50 litres are allocated per person per day and if exceeded, households have to pay substantial fines (Minister Mokonyane at Cape Town Press Club, 2018). The climax of this drought period is expected to be reached on the 9th of July 2018, commonly referred to by the media as 'Day Zero', on which the City of Cape Town and the whole of the Western Cape will run dry. Only schools, hospitals, the central business district and informal settlements will then be supplied with running water, whilst the rest of Cape Town's population will have to line up at 200 public collection points to receive their daily

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ratio of 25 litres per person (Sunday Times, 2017). With a continuous reduction in residential and agricultural water consumption, the predicted date for 'Day Zero' is constantly changing since February 2018. Surprisingly to some, an announcement was made by the City of Cape Town in February 2018 that this date shifted to the 9th of July 2018, due to the positive response by Capetonians to save water and a strong decline in agricultural water usage (The Cape Messenger, 2018). Usually by this time the rainy season has already started. Although this brings a gasp of relief to most Capetonians, the critical phase is far from being over and the limit of 50 litres still has to be adhered to.

This article series aims to draw an accurate picture of events connected to the water shortage and clarify facts about the water management and crisis, which the Western Cape is experiencing at the moment. The focus of the first article will be on the Western Cape Water Supply System, how it is organised, the technical limits of the supply system and which alternative water resources can be used in future to prevent 'Day Zero'. The second article will focus on the water crisis from a political angle – which governmental spheres are responsible for water management and which political factors and relationships are connected to the water crisis.

How does the Western Cape Water Supply System work?

The first goal of this paper is to get an unbiased and clear picture of the structures of the Western Cape Water Supply System. The findings of this article are mainly based on a publication about water services by the City of Cape Town and on an interview with Dr. Kirsty Carden, research coordinator of the Future Water Institute at the University of Cape Town (UCT).

The Western Cape Water Supply System is the main supply system of Cape Town and consists of dams, pipelines and distribution networks. Around 98 per cent of the water supply comes from six main dams. The other two per cent are composed from smaller dams, groundwater and surface runoffs. Only two per cent of the drinking water is ob-

tained from groundwater sources, such as the Atlantis Aquifer, the Cape Flats Aquifer and Table Mountain Aquifer. The water retrieved from these various sources then flows through pipes to consumers – households, informal settlements, companies, the agricultural and industrial sector as well as schools and hospitals. Wastewater comprises sewage and grey water. Sewage is water from flushing down the toilet, whilst grey water is water from baths, showers, sinks and other drains. After leaving households and other facilities, the wastewater then gets treated in wastewater treatment facilities (Water Services and the Cape Town Urban Water Cycle, 2017). A lot of people are wondering whether there are enough treatment facilities in place. Cape Town has 23 treatment facilities and Dr. Carden reassured us that this is an adequate number for the size of Cape Town.

After the wastewater treatment, the water gets discharged back to the environment – into rivers, canals, aquifers or the sea. The result of this process is that only 8 to 10 per cent of the treated water gets reused for industrial purposes or sprinklers. Dr. Carden informed us that this is a low amount of reused water, which has to be increased to meet future water supply needs. At the moment there are pilot projects in place to transfer wastewater to potable water – but these are not yet serviceable (Interview with Dr. Carden, 2018).

Where did all the Water go?

The question, how Cape Town and the Western Cape reached this desperate state is of high interest. Politicians and the Western Cape population have openly asked, that although the drought was already foreseen in 2015, why did no one act and put measures in place to be prepared?

The scientific point of view is very sober: The drought could not have been foreseen (Dr. Carden, 2018). Trevor Balzer, Deputy Director-General in the Department of Water and Sanitation, stated at a recent Cape Town Press Club event in January 2018, that this is a one-in-400 years event and no one could have been prepared for this to

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happen. Dr. Carden brought some light into this discussion, by confirming that three consecutive years of drought period were very unlikely to happen. Because of this low probability, no water engineer and no water augmentation plan accounts for the event of a three-year drought period. Scientists did expect periods of droughts with low rainfall, but this was not expected before 2020 (Dr. Carden, 2018). "Consequently, measures to cope with lower amounts of water supply were set to be introduced in 2020. Despite a lot of voices being raised by some politicians and journalists, that the 3-year drought period could have been foreseen in 2015, it is a fact that this particular drought is an unforeseeable event", summarises Dr. Carden. "Cape Town has worked intensely on securing a strong and working water system by improving leakages, ensuring maintenance, investing in deepening water holes and raising the walls of dams; making the Western Cape Water Supply System one of the best water augmentation systems", so Dr. Carden. Despite aspects of management failure, one has to acknowledge the unlikelihood of the current natural phenomenon.

One measure for the high quality standard in the Western Cape is that all water used in a household is of drinkable standard. But does this have to be the case? Dr. Carden stated that an important benefit of exclusively using water of drinkable standard is hygiene and the lower risk of health issues. When asking the question, whether ocean water could be used to flush the toilet, Ian Neilson, Deputy Major of Cape Town, answered, that sea water "could corrode parts of the reticulation infrastructure and our (the Western Cape) wastewater treatment facilities are not designed to handle high salinity", (GroundUp, 2018). A positive example of using seawater and a dual reticulation system can be seen in Hong Kong. Since 1972 seawater is supplied to all households for toilet flushing and evaporative cooling free of charge. This has helped to ensure that the city is able to meet its water demands. Before the introduction of this system, water shortages and rationing were very common (Hong Kong Municipality). This is not a short-term solution for

Cape Town's water crisis as it is related to high costs and infrastructural changes, but could be a future solution to alleviate the impact of droughts.

The Groundwater Solution

An emphasis has been set on finding long-term solutions by drilling for groundwater and making use of aquifers. "There are three major aquifers that could supply Cape Town and the Western Cape with water and which usage can be expanded in future", according to Dr. Carden.

Firstly, the Table Mountain Aquifer, ranging from Cape Town to Port Elizabeth, could be a sustainable source of water supply. Unfortunately, this aquifer recharges very slowly, which is why Trevor Balzer, Deputy Director-General in the Ministry of Water and Sanitation announced that the state has restricted the drilling into the Table Mountain groundwater. Secondly, the Atlantis Aquifer designed for water supply to the municipality of Atlantis. The Aquifer just recently has been upgraded by Cape Town's Mayor Patricia De Lille to increase its capacity. This aquifer infiltrates with storm water during rainy seasons. Unfortunately, if it does not rain, the recharging process is disturbed. The third and best-qualified aquifer for future supply is the Cape Flats Aquifers. In winter it quickly recharges due to flooding and has an extra benefit of being manually rechargeable (Dr. Carden, 2018).

After being advised by the World Bank to set the focus from desalination to optimising the use of aquifers for the short-term increase in supply, the City of Cape Town has concentrated on this more cost effective and quicker solution. By abstracting groundwater, the city will be able to supply more water at a lower cost. "The Cape Flats aquifer will deliver 80 million litres per day, the Table Mountain Group aquifer will deliver 40 million litres per day, and the Atlantis aquifer will deliver 30 million litres per day over 2017/18 and 2019/20", (GroundUp, 2018).

In addition, a lot of Capetonians have invested in drilling for private groundwater. This on the one side is positive as it reliefs

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the city system, but on the other side bears some uncalculated risk. One of the risks associated with the usage of private boreholes is that people use groundwater in an uncontrolled manner without monitoring the recharging process. The importance of recharging the aquifers can be seen when looking at the example of California. California has suffered severely from droughts in the past, leading to intense drilling and usage of groundwater. As a consequence, the US state is facing the problem of sinking land (CNBC, 2017). "It is not in the City's mandate to regulate the usage of groundwater sources, but we have tried as far as possible to drive the message home that unlimited usage of boreholes is not sustainable", (Day Zero and Water-related FAQs, City of Cape Town, 2018)

The Seawater Solution

Desalination plants have risen in popularity all over the world in countries facing problems of water supply. At the moment no such plant is in place, but the City of Cape Town has plans to have desalination plants up and running from March/April 2018 onwards (GroundUp, 2018). Introducing a desalination plant is not as easy as it might seem. The concept, also known as reverse osmosis, involves forcing seawater through a permeable membrane to extract sea salt. The action of pumping water requires a high amount of energy – this in turn equals a high amount of cost. In addition to high costs, desalinated water can include pollutants, which bear potential health risks. Furthermore, the process of desalination includes the by-product of a high amount of salt, which is pumped back into the sea and can cause a disruption of the marine-ecosystem. Consequentially, the potential impact of desalination plants cannot be assessed fully. But the technology used in desalination plants is strongly improving as demand is increasing (WIRED, 2018). During the Millennium drought in Australia, Melbourne built a desalination plant and a pipeline to divert water at a cost of \$3.1 billion. While the project was politically controversial, the plant now meets more than 50 per cent of Melbourne's water demand (The Guardian, 2018).

The Need for Diversifying the Water Supply System

'Day Zero' is now expected on the 9th of July 2018. From that day onward 25 litres per person will be allocated by the city at public water sources (CNN, 2018). At the moment it seems as if the Western Cape will just scrape through the water crisis, but what can the whole of South Africa and other parts of the world learn from the water crisis? The first and by far most important one is the need for diversification of the water supply. In future groundwater, dams, desalination plants, grey water – and maybe even dual reticulation systems – have to be combined to ensure that such a precarious situation will not happen again. Secondly, South African politicians across the political spectrum and from all three tiers of government have to learn to collaborate and communicate better with each other. Multi-partisan efforts have to be concentrated on solving the crisis and are fundamentally in dealing effectively with the crisis.

The role of political involvement in the water crisis will be closely analysed in the next upcoming article on the Western Cape water crisis.

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