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LOOKING BACK AT DAY ZERO: Is our water supply safe for the future?

In early 2018 in South Africa, Cape Town's drought made international news and terrified its inhabitants at the prospect of running out of water. Now two years after the drought broke, and "Day Zero" was averted, we can take a step back and wonder what will happen when the next drought comes and whether we will be better prepared.

This short guide is to assist in reflecting on the lessons from the city of Cape Town nearly running out of water in 2018. EMG considers the "Day Zero disaster" through the lenses of equity, justice, ecological sustainability and climate change. We consider the financing and distribution of water critically - as running out of money and running out of water are closely linked, at both household and city scales.

As you read this guide and other sources of information about how to respond to drought, we suggest assessing any actions proposed against these principles, that EMG see is being vital:

- Does it make Cape Town (or another geographic region) less or more equal?
- Does it support an ecosystem approach to water?
- Does it burden the future generations with costs?
- Does it contribute to climate change through high fossil fuel consumption?

With these principles in mind, let's look at further aspects of the Cape Town drought period.

1. Water restrictions in Cape Town

During the drought every household was restricted to using 50 litres of water per person per day. Many suburban residents found themselves busy shifting buckets of grey water around their homes to help save water. Some wealthy residents were complaining on social media about 'people in the townships' wasting water – revealing misunderstandings about water usage and management in Cape Town – as well as conditions of water access in working class and poor areas. What is not known is that over 140 000 households have long been living on 'drought' level restrictions of 87 litres per person per day since they had a Water Management Device (WMD) installed (often forcibly) by the City of Cape Town. Installation of WMD's into poor people's homes began in 2007 – for further information on WMDs and their impact on water access and supply read EMG's fact sheet [Water Management Devices: facts and perspectives](#)

The ongoing WMD restrictions continue long after the rains came and wealthier residents gradually returned to 'normal'. With the low dam levels, the once water saving ignorant (suburbanites) suddenly appreciated the challenges of living with water restrictions. This new understanding remains an excellent opportunity for empathy, outreach and education.

2. Is water too cheap? (Let's interrogate tariffs)

Water tariffs are set annually by each municipality in South Africa to meet three key principles:

- i) a minimum amount of free or affordable water to everyone,
- ii) generating enough total revenue to cover the costs of providing water and,
- iii) discouraging wasteful use.

Water tariffs are both a way to generate revenue and a way to modify water use. If water is expensive, you will use less, than if it is cheap. The difficulty in South Africa is that what is expensive for the majority is ridiculously cheap for the minority. It is very hard to price water correctly in a highly unequal society, especially where low volumes of water are used.

If water becomes too expensive, a person might choose to use less than they need and end up getting sick, and costing the state more through being hospitalised. Thus it is imperative that a minimum amount of water is provided free or very cheaply. Until July 2017, every household in Cape Town received 6 kilolitres (kl) of water every month for free.

However, low prices for water creates no financial incentive for people to save and can create a false impression that water is cheap and abundant. In a severe drought, it thus makes sense for water to be very expensive above a life-line amount, with severe penalties for exceeding any restrictions.

It is worth noting that this model of pricing water was not sufficient and viable during the drought. The City of Cape Town had very little room to manoeuvre and it was essential that all people using large amounts of water had to cut their consumption to a fixed amount of 50l per person a day. High water consumers faced having WMDs installed if consumption was not brought down after a household after a warning was given. During the drought, water usage in Cape Town became far more equitable, with wealthy and poorer households using similar amounts of water.

3. Creating more water and diversifying supply for the future

Unless water consumption is radically reduced in the city of Cape Town, demand for water is likely to keep increasing, because of the ongoing growth of the city. At the same time, the average amount of water available from the city's dams will decline as the climate continues to get drier, as the impacts of climate change are felt more strongly.

To cope with this extra need for water, five major sources have been identified, which are detailed below. Each of these comes with particular challenges, environmental implications (good or bad) and will cost money. Some water can be generated and used locally, other systems will feed into the existing bulk supply. Currently costs for bulk supply augmentation will be passed onto water users through increases in the price of water. Costs for home or business-scale innovations will be borne by homes and businesses.

A. Desalination

Small desalination plants can be put up relatively quickly but don't generate a lot of water, up to 10 megalitres (MI) per day. Larger plants will take several years to establish. They are expensive to build and run and are also energy intensive, so they push up the price of water. Given South Africa's reliance on coal to generate electricity they will contribute to climate change, which is not something we want to do.

B. Waste-water reuse (aka 'water reclamation')

This is the most obvious and cost effective source of 'new' water. Currently Cape Town's waste water treatment works discharge into rivers or directly into the sea. In May 2017 the City of Cape Town estimated that 10MI per day could be generated by Zandvliet Waste Water Treatment Works (WWTW) Plant a cost of R120 million. In their October 2017 presentation they list 6 WWTWs, each producing 10 MI per day. The technology used for water reclamation is similar to that for desalination but it is cheaper and less energy intensive because waste water is purer than sea water. Water re-use can also happen at smaller scales, and helps to 'close the loop' of the urban water cycle, reducing the need to bring new water in from outside the catchment.

C. Groundwater

It is difficult to know with certainty how much available groundwater there is at any time, how it has been affected by the drought, or how much is currently being extracted by industry, agriculture and individuals. In Cape Town, the Atlantis, Silverstroom and Cape Flats Aquifers and other sources of groundwater are already being used as an alternative source of water, and it is clear that groundwater will play a role in the augmenting water supply. However, if groundwater is over-abstracted without being recharged by runoff, boreholes can run dry; and if coastal aquifers are over-abstracted, saltwater might contaminate the aquifers. *"There are tens of thousands of boreholes on private properties throughout Cape Town already, and before digging more we should think about distribution and access from these boreholes"* said Kevin Winter at an EMG seminar on 18 October 2017. Future Waters estimate that around 5% of Cape Town's current water supply could be sustainably harvested from well managed aquifers.

D. Rainwater

Cape Town's average rainfall, within the 2000 km² area covered by the municipality, is three to four times as high as our annual demand, Kevin Winter put forth at the same seminar. If we were to transform our water infrastructure, and think of the city as our catchment, rather than bringing water in from neighbouring catchments over the mountains, a lot of the current inefficiencies would be addressed. Many suburban households have invested in rainwater tanks, and are able to supplement their household use significantly using water harvested from their roofs and gutters - but there are implications for our water financing system when middle class households go 'off the grid' - see point number 6 below. Storm water, which currently runs off of roads into drains and is channelled out to sea, is an enormously wasted resource. There are many innovative ideas and prototypes for retaining and harvesting storm water in urban areas and this drought can be an opportunity for implementing some of these designs.

E. Clearing aliens

Clearing alien invasive vegetation in water catchments is another important way of preserving water supply. For example, clearing alien invasive vegetation above Wemmershoek dam would release 6% more water run-off into the dam. [If this is indicative of all the catchments supplying Cape Town's six dams, an additional 58 000 ML of water could be released annually – a volume of water equal to the size of Wemmershoek dam.](#) Clearing aliens will not only benefit water supply to humans, but will also contribute towards biodiversity and healthy rivers.

4. Reflecting on the "Day Zero" drought

On 18 January 2018 the Cape Town mayor Patricia de Lille released a scathing statement announcing that Day Zero - the day on which most of Cape Town's water supply would be switched off – was inevitable and projected for the 21st of April 2018. In her statement, she heavily criticised the citizens of Cape Town for not saving enough water, saying that over 60% of residents were ignoring the then 87 litres/person/day restrictions – read the statement [Day Zero now likely to happen – new emergency measures](#)

Day Zero was scheduled as the day on which Cape Town's storage dams drop to 13.5% of their capacity, at which point the City said they would turn off almost all taps in the city. The City of Cape Town said they would then set up 200 distribution points, where residents could collect their allocated 25 litres per person per day, every day. Understandably, this announcement, sparked a flurry of anxiety, criticism and unanswered questions from the citizens of Cape Town. The logistical nightmare of taking time out from work/school (if you could), negotiating transport and queues to collect heavy containers of water for oneself and one's family, under police and military guard on a daily basis, was extremely daunting and difficult to comprehend. There were well founded fears that the City of Cape Town will not be able to manage this scenario properly, and that violence and anarchy may erupt.

In the darkness of this worrying time, there were a few small beacons of light. The ingenuity and resourcefulness of people trying to figure out how to go completely off the water grid was heartening, and hopefully some long terms adaptations have been developed and shared widely between communities. Rainwater harvesting is happening far more, even at very small scales to augment water supply. Many middle class people started exploring dry sanitation options, such as composting toilets, for the first time, which is something environmentalists have been calling for a long time. Many neighbourhoods began organising street-level WhatsApp groups to assist each other with water collection, should that have become necessary. There are many people who because of age, illness or transport options would not have been able to collect their own water.

In emergency situations good leadership with clear and accurate communication of information is essential, as well as support for people to deal with the anxiety and stress of the situation. This is so that everyone would be able to display the most generous humanity towards one another. At EMG we consistently heard from water experts including Kevin Winter that although supply was extremely tight that Day Zero was extremely unlikely, as long as people reduced their consumption to 75l/person a day.

A key dynamic in predicting Day Zero was the impact of the drastic 60% cut in agricultural water allocation. Once farmers had used up their given allocations in February and March 2018, the outflow of water from the dams quickly reduced to levels that would avert Day Zero. On the face of this, it seems the City of Cape Town went into panic mode and failed to correctly interpret the situation, or at least to better explain the predicament. Another factor was that relations were so strained between the Department of Water and Sanitation (DWS) and the City of Cape Town, that there was never any assurance that agricultural water use would in fact be cut as planned.

Nonetheless the prospect of Day Zero did seem to help shift major behaviour changes and led to household users massively cutting water usage.

At times of extreme water scarcity, we're all asking the question: who – or what – needs water the most? We were struck that the City of Cape Town's tariffs until late 2017, still permitted the filling up swimming pools with tap water, whilst poor households were restricted in getting the water needed to grow food or, for that matter use any water above the 87kl they were restricted to. In a place as water stressed as Cape Town, should we allow wealthy people to pay vast sums of money to use large volumes of potable water for swimming pools and irrigating decorative gardens for example? The same questions apply to the use of borehole water, as all water is too precious to waste.

When water is abundant, the logic of use as much as you can pay for is less awful than when water is scarce. With a limited amount of water to go round, pricing is not a fair or sensible mechanism for allocating water. If we can't use price, then who is to decide whether my need for a shower is less or more important than your need to grow spinach? What mechanisms should be put in place to determine this?

Going off the grid: middle-class households respond

Many people reported to EMG that during the drought they started taking their homes off the water grid – or at least using public / municipal services much less by putting in multiple rainwater tanks and mini-purification systems for example. If you can't recycle water to drinking water standards, it can at least be clean enough for washing and toilet flushing. We heard that it was not only households, but also commercial enterprises and industries that were becoming less reliant on the grid. Brilliant!

But this comes at a cost, which is the loss of their revenue to the public system.

Another issue is the relationship between potable water and waste water. Some households and businesses might be able to generate sufficient water through rainwater harvesting or a borehole, but they still rely on the municipality to treat their waste water. Currently waste water is charged as a percentage of the water consumption on your bill, so if you have no municipal water coming in, your sewage treatment is free!

For one or two households, this is not a big deal, but if it becomes a strategy (and there is every reason that it should) then we have to seriously rethink the financing of water. Because we do need a municipal water system. Having drinking quality water coming out of taps in every home is essential for human rights, public health and a decent living standard, as is a functioning sewerage system. Let us open for public debate this question of financing in a world where we are trying to use less, not more.

These remain questions that EMG continues to grapple with and are questions that we need to find the answers for, if we are to avoid another Day Zero in the near future or risk growing conflict around water supply - with the wealthy being able to buy their water security, and the poor being left without basic access to water.

5. Involving residents as though they matter

The Mayor framed the City of Cape Town's drought response within the language of 'resilience', meaning that they were responding appropriately to climate change. Their water resilience task team which was assembled to develop a new water management approach consists of engineers, desalination specialists, hydrologists, and two communication posts – but no social development specialists, or facilitators, or community engagement officers. True resilience to climate change is inextricably linked to reducing inequality, reducing poverty and participatory democracy whereby all citizens have agency to improve their lives.

Facilitating citizen and civil society engagement and robust public participation is challenging at the best of times, and requires a lot of careful trust and capacity building. But these participatory processes seem to go out the window at times of crisis, as the urgency of the situation leads to hasty, sometimes secretive, centralised decision making. In fact, at times like these, robust community engagement and participation is critical, so that everyone understands what is going on, so that all perspectives are represented, and so that we can strengthen relationships across the different parts of our society.

6. Will it ever rain again?

Cape Town's rainfall pattern is predictable in the sense that we expect winters to be rainy and summers to be dry. But while this pattern always holds, the amount of rain we get in any particular year varies widely. Some years are wet (rainfall is above normal), some very wet, some are dry, some are very dry and others are neither wet, nor dry. The Western Cape province has recently experienced a few consecutive very dry years. [Some analysts claim that statistically a drought this severe should not occur more than once in 1150 years.](#)

The good news was that the drought did end! It did rain again! Rainfall has always varied from year to year and will continue to do so. On the other hand, another dry year next year is possible. It would be statistically very rare (one-in-a-million-year event perhaps?) but not impossible. Like tossing a coin, the outcome of a toss is not influenced by the outcome of prior tosses.

Of course Cape Town is certainly not 'back to normal.' The supply dams were so depleted by the end of 2017/18 summer that water restrictions have remained in place, although they have been progressively loosened. Cape Town's population will probably continue to increase and there will be more and more demand for water.

Climate models predict that the Western Cape will become drier over the next 50 to 100 years, but rainfall variability from year-to-year will remain. Some future years will be wet, some dry and some in-between. But the general trend will be that wet years in the future will be not as wet as we have come to expect; and dry years will be drier. An "average" rainfall year in 2100 will be drier than today's average. How rapidly and severe this trend will be, is something that climate modellers are working hard at understanding.

All of this means that spending millions in a quick-fix panic – merely to get us through the next summer – will be a big mistake (a tour of the Garden Route's rusting desalination plants should be made compulsory for all City of Cape Town councillors). Spending millions on solutions that secure water supplies in the long-term, in the most cost-effective, least environmentally damaging way – and measures that should have been put in place a long time ago

SOURCES OF REFERENCE:

- City of Cape Town [Day Zero now likely to happen – new emergency measures](#) 18th October 2018
- de Villiers, J. [Cape Town's groundwater plan targets 'impossible'](#) 11th October 2017, News24
- EMG: [Dr Kevin Winter - Seminar 18th October 2017](#)
- EMG: [Water Management Devices: facts and perspectives](#)
- Wolski, P. [How severe is this drought, really?](#) 2017 Climate System Analysis Group (CSAG) - University of Cape Town