



UNPACKING THE CAPE TOWN DROUGHT: LESSONS LEARNED

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When the well is dry, we learn the worth of water.

Benjamin Franklin

Water links us to our neighbor in a way more profound
and complex than any other.

John Thorson

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1. INTRODUCTION

As the drought in Cape Town intensified in 2017/2018 and then abated later in 2018, international and national attention was focussed on Cape Town. Importantly, Cape Town is just one example of how many towns and cities in South Africa, and other semi-arid regions, can be impacted by water stress. It can be argued that Cape Town received such a high level of attention, because of its global status as a tourist destination, an economic hub of South Africa and because of how the political and bureaucratic response culminated in the dramatic “Day Zero” narrative. However, many other metros, such as Gauteng, eThekweni and Nelson Mandela Bay, and smaller municipalities have been, and are, at stress points with regards to their water resources. Of the eight metros in South Africa, seven of them implemented water restrictions in the summer of 2016/2017 due to low dam levels (Eberhard 2018).

The Cape Town drought experience needs to be examined to understand what happened and to extract the lessons for Cape Town, but also for other South African municipalities and metros as well as further afield. Evidence suggests that a significant cause of the drought could be attributed to climate change and that more events of this type can be expected in the future (Schiermeier 2018)¹. Adapting to such vagaries of climate is not easy, particularly in the water sector, where high assurance of supply is needed, climate variability directly impacts on water sources and impacts on all aspects of urban life. Failure to adapt, however, will come at a cost, as became evident in Cape Town (Ziervogel 2018). Importantly, although the role of climate variability was significant, it is clear that many other factors also contributed to the crisis. As with many other African cities, Cape Town has high levels of inequality and informality. Governance is complex, requiring activation of responses and resources across scales. Building a water sensitive city requires a holistic understanding of the system and an ability to adapt at a variety of scales in a range of ways. Reflecting on the drought provides an opportunity to examine how cities might better manage a slow unfolding climate event in future.

This paper aims to understand what happened in the Cape Town drought with a view to learning lessons that are translatable to other contexts. Due to the complex nature of the drought only certain aspects are investigated in depth in this paper namely the governance process, including the role of some of the actors and institutional arrangements. However, in order to provide context, issues related to water management, information and communication are included as well.

Cities Support Programme, within National Treasury, of South Africa commissioned this paper to ensure that lessons learned from Cape Town would inform other municipalities when adapting to drought and water insecurity. The lessons are also relevant at the national level, where support for municipalities could be strengthened. The data for this paper comes from interviews with senior officials and experts who were intimately involved in the drought response. Interviewees were sent a list of barriers and enablers to the drought that was compiled before the interviews, and were invited to add new entries to the list during the interview itself. See Appendix A for the comprehensive list that includes interviewees’ additions.

Twenty-one people were interviewed between August and October 2018, with interviews lasting between one and two hours (two national government officials, three provincial government officials, nine City of Cape Town officials, one City politician, four Non-profit organisation representatives, one NGO representative and one international development organisation representative). Interviewees are not named in this paper in line with ethics protocols and efforts to ensure anonymity.

As the author, I was involved in the drought process, as a member of the Section 80 Water Resilience Advisory committee that the City of Cape Town (from now on the City) established in 2017. Through this I attended monthly meetings where updates on the drought and related issues were presented. I was also involved in some processes related to the 100 Resilient Cities work and two drought learning dialogues, which has given me insight into how the drought unfolded over time.

The paper is structured into three sections. The first section provides context to Cape Town and its water management. The second section tells the story of the drought chronologically, breaking it down into three phases of the drought. Although the drought started from a meteorological perspective in 2015, the more acute phase for the City of Cape Town started in early 2017, which is called the “new normal” phase, followed by the “Day Zero” and disaster management phase from late 2017 and drought recovery in 2018. The third section, based on the themes that emerged during the interviews, puts forward four areas of action that could help municipalities adapt to drought, namely 1) strengthening governance; 2) improving data, knowledge and communication; 3) taking a systemic approach, and 4) building adaptive capacity.

¹ Droughts are complex by nature. A hydrological drought, which is what impacted the Cape’s dams, occurs due to a number of reasons including timing, magnitude and intensity of rainfall, runoff and dam storage (Wolski 2017).

2. OVERVIEW AND UNFOLDING OF THE WATER SITUATION IN CAPE TOWN IN 2017/2018

2.1. CAPE TOWN CONTEXT

The City of Cape Town has an estimated population of just over 4 million people, with 14% of households living in informal housing (CoCT 2017). The growing housing challenge has resulted in increasing numbers of people living in backyard shacks, with increasing demands on water and sanitation services. In terms of water use, residents in formal housing use 66% of the City's water, while informal settlements account for only 4% of the consumption. About 1.5 million people, making up more than a third of the total population in the city, cannot afford to pay for water and therefore are eligible for a free allocation each month. The policy intention is for water tariffs to fully recover the cost of the water service except for the allocation of free water which is paid from a national operation grant, the equitable share. However, in practice, cash revenues are insufficient to cover all of the costs, especially timely rehabilitation and replacement of existing infrastructure.

Cape Town experiences a Mediterranean climate with warm dry summers and wet cool winters, with 70% of its rain falling between May and October. Rainfall in the region varies from 400mm per year on the west coast to 2000mm per year in the surrounding mountains. The drought in the Western Cape developed over a period of three years from June 2015 through to June 2018. Rainfall over this period was 50 to 70% of the long-term average (Wolski 2018). In 2017, many rainfall records were the lowest ever recorded since the first written records in the 1880s (Wolski 2018).

This low rainfall along with low run-off translated into falling dam levels as shown in Figure 1. The overall level of storage in the six largest dams, accounting for over 99% of total system storage, dropped from 100% in 2014 to 71%, 60% and 38% in the subsequent years (as measured at the start of each hydrological year, 1 November, also marking the start of the dry season).

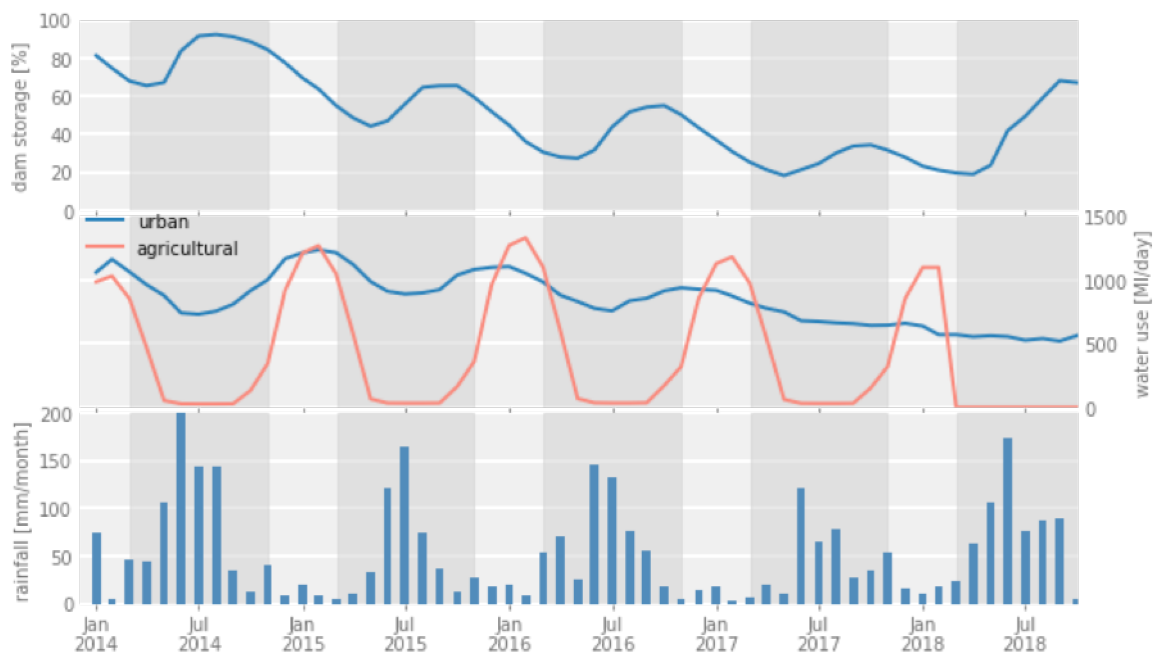


Figure 1: Dam levels, urban and agricultural use and rainfall in the Western Cape from 2014 to 2018 (Source: cip.csag.uct.ac.za/monitoring/bigsix.html)

A group of scientists, using a risk-based multi-method approach, examined the role of climate change in this drought event, and concluded that human-induced climate change tripled the likelihood of the 2015-2017 drought based on historical rainfall and dam inflow data (Otto et al 2018). Although climate change attribution is an emergent science and each method has a range of uncertainty, it does point to changes in climate risk, which need to be better prepared for.

Cape Town gets over 95% of its water from a system of six rain-fed dams that also supply agriculture and other urban areas (see Figure 2). The combined dam total storage volume is about 900 million cubic meters of water, which provides enough water for around a year and a half of normal usage by both agriculture and urban users, after taking into account evaporation. As shown in Figure 1, agricultural use is high in summer but low during winter. The City of Cape Town uses around 58% of the WCWSS available water, agriculture uses 26%, smaller towns use around 6% and around 10% is lost to evaporation and other losses from the bulk water system.



Figure 2: Map of the major dams in the Cape Town water supply system (Source: City of Cape Town)

The integrated WCWSS is managed by the national Department of Water and Sanitation (DWS) in cooperation with the City. The City receives water from the system and is responsible for providing basic water services to its residents. In addition, as a water service provider, the City is required to plan for water management as well as future supply. Water conservation and demand management has been central to the City's water management since the early 2000s. The success of the programme resulted in water demand levelling off despite increased population growth. Other conservation and demand management strategies have included fixing leaks and installing water management devices (Beck et al. 2016)². Before 2017 however, water management devices were installed in low-income houses that had high water bills, primarily due to leaks (Mahlanza et al. 2016).

During periods of low rainfall, restrictions are implemented. These are determined against weighted full supply storage in the WCWSS and annual water demand (domestic and agricultural). Even in a year of below average rainfall, restrictions may not be necessary if the system has adequate storage to cater for demand.

In the WCWSS water was modelled to be supplied at a 98% level of assurance for urban users. That is, for any given year, there was a 49 in 50 probability that there would be sufficient water without the need to impose restrictions for urban water users. The level of assurance for agriculture was designed for a 95% level of assurance. That is, for any given year, there was a 19 in 20 probability that there would be sufficient water without the need to impose restrictions for agricultural water users. Because the level of assurance provided to urban and agricultural users is different, when restrictions are needed, they are implemented differentially between urban and agriculture users. DWS is responsible for managing water releases from the dams and also for implementing and monitoring restrictions. It is the responsibility of the City, towns and agricultural sector irrigation boards to manage adherence to these restrictions.

Many have cited contestations around political alignment as undermining the drought response in the Western Cape (Vogel and Olivier 2018). It is important to note that the City of Cape Town and Western Cape government are both currently Democratic Alliance (DA) led, while the national ruling party is the African National Congress (ANC).

Starting 13 May 2016, 20% restrictions were imposed by DWS on both domestic and agriculture water use in the WCWSS. The City had already implemented its own restrictions earlier that year. On 1 March 2017 restrictions were increased to 30% for agriculture, then to 50% in October 2017 and 60% in December 2017. Domestic water use restrictions increased to 40% in October 2017 and to 45% in December 2017. The City's own restriction levels preceded those imposed by DWS (see Table 1).

² Water management devices (WMDs) are a technology attached to a household water meter that restricts households' water supply to a predefined daily quota. These were introduced in the City in 2007 and set at limit of 350 litres of water per household per day.

DATE	RESTRICTION LEVEL (%)			REGULATORY AUTHORITY
	CITY	WCWSS		
	URBAN	URBAN	AGRICULTURE	
1 January 2016	20%			City of Cape Town Level 2.
13 May 2016		20%	20%	DWS DG. Signed, unnumbered gazette
1 November 2016	30%			City of Cape Town Level 3.
1 March 2017			30%	DWS regional director. DWS letter, 23 February 2017
1 June 2017	40%			City of Cape Town Level 4. Target 500 MLD
1 October 2017		40%	50%	DWS DG. Gazette 41145 28th September 2017
12 December 2017		45%	60%	DWS DG. Gazette 41317
1 January 2018	45%			City of Cape Town Level 6.
12 January 2018	45%	60%		DWS DG. Gazette 41381 (extended to groundwater) 5 January 2018
1 February	50%			City of Cape Town Level 6B 450 MLD target
1 December 2018	30%			City of Cape Town Level 3
3 December 2018		10%	10%	DWS DG Gazette 42075.

Table1: Restrictions imposed on water users in the WCWSS system

Although a decision on restrictions had been taken in November 2016, the agriculture restrictions were only effected in March 2017, too late to affect the 2016/17 irrigation season. The restrictions for agriculture were also not enforced during the summers of 2015/17 and 2016/7. In addition, the total allocations from the system exceeded the available yield.

There was marked shift in approach for the following summer (2017/18). Data on agricultural releases was published and releases from the dams were physically restricted by DWS so that the 60% restriction requirement was substantively met with some minor exceptions. More extensive metering of agricultural use had also been installed making the task of monitoring and enforcing restrictions easier.

Although there had been alien vegetation clearing in the catchments, follow up clearing has not implemented to any significant extent. This resulted in low runoff in certain areas, due to the impact these trees and shrubs have on decreasing surface water runoff and groundwater recharge. The operation of the system was not optimized due to non-operational pumps, silted canals and other factors. These factors contributed to dam levels being reduced to 38% at the end of the winter rains in 2017. So although the climate variability and low rainfall was significant, management of the water system also contributed to the severity of the crisis.

³ The City of Cape Town Water Outlook released at the end of 2018 (CoCT 2018c, pg 3) suggests that if the system had been operated optimally in accordance with the documented allocations and rules, dam levels could have been significantly higher at the end of winter 2017. Although this is unlikely to have been achieved in practice it points to “the importance of all role-players being actively involved in the management of the overall system” which would have “significantly lessened the severity of the crisis.”

2.2 RAMPING UP THE RESPONSE TO THE DROUGHT

In response to the low rainfall, there were a range of technical and institutional responses, some of which helped to reduce the risk of a crisis and others that contributed to it. Although there were a number of responses before 2017, early 2017 was when responses intensified. Figure 3 below presents a timeline showing the three phases of the drought outlined in the below section, along with some key moments during these phases.

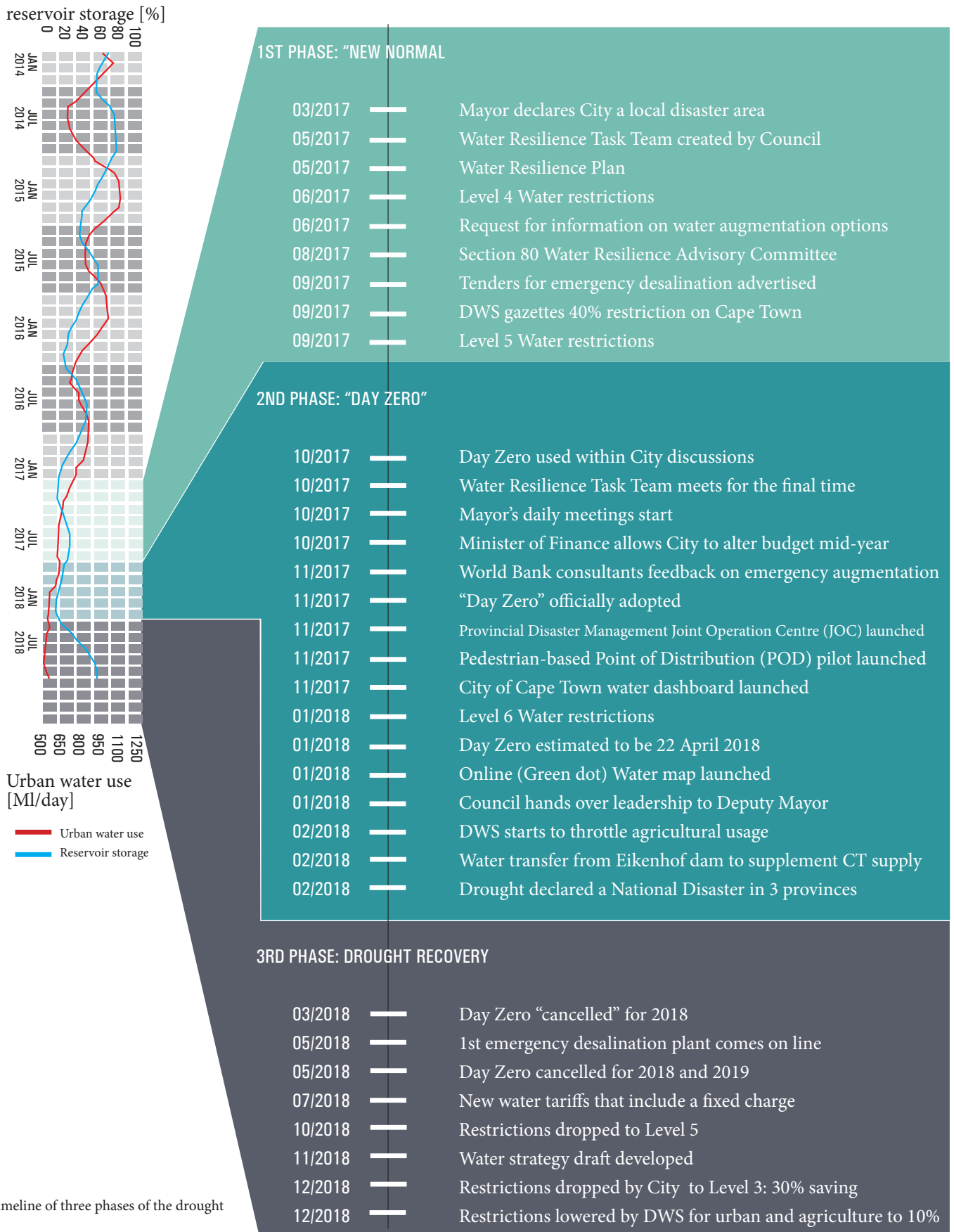


Figure 3: Timeline of three phases of the drought

2.2.1 FIRST PHASE OF DROUGHT RESPONSE: “NEW NORMAL” (FEBRUARY – SEPTEMBER 2017)

Disaster Management in the City and the Western Cape Government (hereafter referred to as the Province) were concerned about the drought in 2015. As the drought progressed various assessments were undertaken. Provincial Disaster Management requested National Disaster Risk Management to declare a disaster in the Province, but this status was only granted to three towns in 2016.

In February 2017, the City released a list of the roads where the top 100 water consumers in the city resided. Following soon after, on 3 March 2017, Executive Mayor Alderman Patricia de Lille, declared City of Cape Town a disaster area and on 23 May 2017 Cabinet declared a Provincial disaster. A year later on 13 February 2018, a national disaster was declared, with three provinces having declared drought, making it the first national disaster in South Africa.

City council appointed a Water Resilience Task Team (WRTT) in May 2017, headed by the Chief Resilience Officer, based in the Directorate of the Mayor. The team was politically accountable to the Executive Mayor and she was closely engaged in the process. The Task Team was supported by a leadership group that consisted of four other people from the Directorate. The Task Team started by developing three possible scenarios. The “new normal” scenario that was put forward considered the consequences for water supply and the response needed if winter rainfall in 2017 was substantially lower than the historical record – planning for the worst. The Task Team finalised a Water Resilience Plan on 31 May 2017 that prioritised the emergency and tactical phases. It set a goal of securing 500 megalitres (1 Ml = 1 million litres) non-surface water and a target of reducing water usage to 500 megalitres a day. Given that water usage in early 2016 was over 1000 Ml a day, it was an ambitious target and important for designing new restrictions. Although usage did not drop immediately, at the height of the “Day Zero” campaign in early 2018, daily usage did drop to just below 500Ml. Regarding augmentation, the plan was to ramp up to providing an additional 500Ml per day, starting with an immediate first tranche that included the procurement of 100Ml per day from temporary desalination from nine small containerised plants. The proposed 500Ml included 200 Ml per day from ship and barge-based temporary desalination and proved to be too ambitious (in terms of the proposed timing, the total quantity and the total cost). Nevertheless, it provided a firm target to work towards. Some of the assumptions in the Water Resilience Plan included not being confined by resources and not relying on the national government.

The WRTT identified a number of options for supplementing surface water through other water augmentation projects to try and build the way out of the crisis. The first request for proposals for desalination was released on 16 July 2017, with three small-scale temporary desalination plants procured in 2017 (for 16 Ml per day in total). The first desalination water came online in May 2018, showcasing a rapid procurement and implementation process, albeit for a small quantity.

Groundwater extraction was seen as an immediate avenue to pursue for the Atlantis, Cape Flats and Table Mountain Group (TMG) aquifers, with 100 Ml per day planned in the emergency phase from these sources. The rehabilitation of the Atlantis groundwater system added 14 Ml per day by January 2018 and 20 Ml per day by January 2019. Building on groundwater planning and monitoring that had taken place over the previous ten years, the first contract for TMG was awarded in August 2017. By January 2019 five boreholes were providing 10 Ml per day. Drilling for both production and monitoring purposes is still underway. During 2018, 159 boreholes were drilled into the Cape Flats aquifer with a total yield of 41 Ml per day. Of this yield, 19 Ml per day was good quality water. The infrastructure to treat and connect the groundwater into the network is still under development and no water was delivered into the network during 2018.

A further 60 Ml per day was planned from direct water reuse for potable purposes, from six small reuse plants. Ultimately one temporary reuse plant of 10 Ml per day was contracted for a period of two years at Zandvliet wastewater treatment works (with first water expected in June 2019).

During the emergency phase of the Water Resilience Program, planning and procurement took place at a breakneck speed. Tenders were prepared in three weeks, and tenderers were given two weeks to submit a fully compliant bid. The fast pace increased the costs of the tendered prices.

The WRTT needed to respond to a range of feedback during this time. When the first request for proposals came back from the market, they had to re-evaluate their cost assumptions and delivery estimates. These lessons were reflected in a detailed decision tree of new assumptions that was presented to decision makers in October 2017, including the near-impossible revised cost estimate of 500 ML of augmentation.

During this phase the City looked carefully at budget reprioritisation, froze posts to make available operational funds and identified the need for additional contract and permanent staff in water-related areas.

Building on the water conservation and demand management strategies that the City had developed over previous decades, a number of interventions were strengthened (CoCT 2018a). This included scaling up existing responses and developing new ones as described below:

HOUSEHOLD FLOW REGULATORS

- During the drought the implementation of flow restrictors or Water Management Devices (WMDs) were scaled up to target households using large amounts of water. This led to installations in both high-income and low-income areas, unlike previously when they were targeted at low income households.

WATER RE-USE RECLAMATION PLANTS UPGRADED

- Treated effluent re-use schemes were scaled up to increase the amount of potable water that could be off-set.

COMMUNICATION CAMPAIGNS AND STAKEHOLDER ENGAGEMENT

- A focus was put on ensuring everyone in the city was aware of the crisis. The city launched numerous communication campaigns in both traditional and social media to assist people in reducing their consumption, such as household leak detection and repair, how to use 100 litres, then 87 litres in September 2017 and then 50l in early 2018, and messages through radio, print and social media.
- Linked to communications were a number of products and tools as highlighted on the City's Think Water site.
- A programme of extensive stakeholder engagement with civil society, residential and business groups

In August 2017, a Section 80 committee, known as the Water Resilience Advisory Committee (WRAC), was established in the City. A Section 80 committee can be established by local government to engage external advisors on a specific topic. As the terms of reference for the Water Resilience Advisory Committee (WRAC) state, "Building a water resilient city ... requires supportive actions and knowledge sharing from a number of stakeholders outside of the municipal administration." Council ratified around 15 members, co-opted from academia, business, NGOs, NPOs, Provincial and National government among others. The committee has met monthly since its inception.

2.2.2 SECOND PHASE OF DROUGHT RESPONSE: DEMAND MANAGEMENT AND "DAY ZERO" (OCTOBER 2017 – FEBRUARY 2018)

As the scale of the crisis became clear, after the very poor winter rains, National Treasury's Cities Support Programme engaged the World Bank to provide input from international experts. In October/November 2017 two international advisors contracted through World Bank visited the city (a water management expert and a desalination expert). In the one report, where progress was reviewed, the water management expert stressed the importance of water demand management for seeing the City through the summer of 2017/2018 stating that "efficiency in the network and reduction of excessive consumption", needs to "become the cornerstone of any resilience plan" (Mariño, 2017, iii). The report suggested that augmentation would only be able to contribute a small amount, as new water would come online later than needed to get through the summer. The recommendation was that highest priority be given to demand management and to developing groundwater sources and that the City consider reducing the number and size of the emergency small desalination plants (Mariño, 2017). Concern was also raised around how to finance the emergency investments.

At this point, towards the end of 2017 the technical response reverted away from the WRTT back to Department of Water and Sanitation. The WRTT had their last meeting in October 2017 and officially closed out in January 2018 (Kesson 2018). In late January 2018 Council handed over leadership of the drought response to the Deputy Mayor, who was supported directly by the Executive Director: Informal Settlements, Water & Waste and the Water and Sanitation department.

During this phase temporary desalination was scaled back nearly completely from 300ml down to 16ml per day. Priority was given to groundwater which was expected to be quicker and have a lower cost than temporary desalination, although in the end the groundwater development was both slower and more costly than expected.

In parallel to the technical shifts that were occurring, political tactics were at play. In late October 2017, the Mayor started taking a more hands-on role with her "daily water meeting". The daily meetings were held with a broad group of people ranging from technical to communication experts. At this point a consultancy called Resolve were brought on as crisis communicator advisors. Resolve's strong Democratic Alliance links raised some questions but seemed to be accompanied by a change in the communications from the City for the better. The Mayor started to deviate from the plans linked to the "new normal" scenario. Although initially the City was averse to using the term "Day Zero", Resolve pushed for it and made it a more visible part of the crisis communications.

Day Zero was used by the City to denote the day when a different way of rationing would be rolled out, as there would still be enough water in the dams for limited supply. The plan was to turn water off in neighbourhoods if the dams reached 13.5% full, which would require citizens to fetch a daily 25 litre per person allocation at public Points of Distribution (PODs). The PODs would be able to operate for around three months before dam levels reached 10%, although Theewaterskloof and Voelvlei emergency schemes are able to abstract water below 10%. Although never implemented, concerns have been raised regarding the practical operation of these PODs from a logistical perspective (number of people needing to access the PODs, queue times and the movement of large numbers of people).

In October 2017 the Critical Water Shortages Disaster Plan, was released, that laid out three phases; Phase 1 referred to the current rationing at the time, Phase 2 would be disaster restrictions and Day Zero, where water to households and businesses would be reduced and water would be collected from PODs and Phase 3 would be full-scale disaster implementation when water would not be available from the WCWSS, resulting in households and businesses unable to access water and a reduction in water to critical services. The City intended to avoid ever reaching Phase 2 if possible, but significant planning went into preparing for Phase 2 and 3. Although the Critical Water Shortages Disaster Plan was never implemented it was an ambitious exercise that mapped out 200 potential water collection points in the event they would be needed, taking into account infrastructure that would be working. Before this plan, there was no plan in existence for a city-wide water shortage, which seems to be the case for most South African cities.

“Day Zero” is a term that became synonymous with the Cape Town drought. It was first used in this context by Colin Deiner, Chief Director, Disaster Management and Fire/Rescue Services, Western Cape Government. Along Cape Town freeways, the electronic boards, or Variable Message Signs (VMS), were being used to communicate the number of days of water left in the dam in early 2017. Colin saw the day, when there would be no water left in the dams, as Day Zero. He had to make a presentation to cabinet about the drought and used the term for the first time in May 2017. The Premier then used it in a 30 July 2017 article in Daily Maverick, where she said:

“The term ‘Day Zero’ has been coined to describe the day – which we are doing everything possible in the Western Cape to avoid – when the demand for water to meet essential needs exceeds the supply. According to current projections, unless we take decisive action, Day Zero could arrive in March 2018.”

On the 18 January 2018, the Mayor released a press statement saying:

“It is quite unbelievable that a majority of people do not seem to care and are sending all of us headlong towards Day Zero. At this point we must assume that they will not change their behaviour and that the chance of reaching Day Zero on 21 April 2018 is now very likely.”

The Mayor’s message in January was the point when things shifted significantly in how the drought was viewed and experienced across the city. It was also the point where the burden of responsibility shifted from the City, saying they were in charge and could augment water supply, to citizens being responsible for reducing water to avoid a crisis. Fear arose, people started stockpiling water and neighbourhoods, NGOs, services, businesses and others started thinking about what it would mean if there was no water in the taps. International media attention was placed on the city and tourists started cancelling trips. Widespread fear resulted in a tumultuous time characterised by increased collaboration between some actors and tense relations between others. As the message was spread, residents and businesses started reducing their water usage, with daily use finally driven down to just below 500Ml a few times, which was about 50% of the pre-drought usage. No other city has ever achieved this level of reduction without resorting to intermittent supply. The International Water Association (IWA) recognised this achievement in 2018 with an award for achieving a 55% reduction.

In terms of communication aimed at increasing awareness and reducing water demand, a number of information sources were developed. The Water Dashboard was launched in November 2017, which gave weekly updates on dam levels and water use on the City’s website. The dashboard became widely accessed at the height of the drought as a reliable source of information. The first 2018 Water Outlook was released in January 2018, which provided the first detailed description of what the City was doing in terms of management of the system, augmentation, and demand management. For those who were aware of these Outlooks, they were a welcome opportunity to understand the details of the response that were not easy to come by in 2017. A novel Water Map was developed and launched in January 2018 that used green dots to show low water use per household for free-standing houses. This helped citizens to see how their water use was faring compared to the restrictions, their neighbours and other homes across the city (Sinclair-Smith et al 2018). Communications efforts were galvanised in early 2018 with many from the private sector increasing their communication around water saving too, including major retailers and shopping centres. Resource packs of water-saving materials were made available on the City’s ‘Think Water’ website page, including downloadable posters, leaflets, guide booklets, stickers, presentations, videos, hospitality materials etc. Figure 3 shows some of the communication material from the City of Cape Town.



Figure 4: Communication from the City of Cape Town on the drought

Aggressive pressure management, instituted from January 2018, made a significant contribution to the reduction in water use. An ongoing programme was accelerated through a contract with the private sector to isolate the network into zones that could be pressure managed. Pressure in these zones was drastically reduced, with an estimated saving of 50 million litres per day, in the first three months of 2018. Through this process, using both automatic pressure reduction valves as well as manual controls, the city was able to reduce water use at the same time as retaining a 24/7 pressurised system. The City received an international award from the International Water Association for this significant achievement.

Guidelines for the safe use of alternative water systems were developed when the City recognised how “micro” water self-supply and recycling was mushrooming across the city. Households and businesses were securing water through rainwater, groundwater, greywater, treated effluent and surface water. The guidelines emphasise the importance of reducing health and environmental risks, related regulations and best practices. A guide for the safe use of greywater was also produced for those doing manual ‘bucketing’ rather than installing systems.

In December 2017 agricultural restrictions were set at 60%, with National DWS responsible for regulating and controlling use, including releasing water for agriculture. At the end of February 2018 DWS stopped releases to irrigation boards that had reached their allocation, which increased confidence that the agricultural restriction target could be met.

Another shift during this time was away from an inward focus of the Water Resilience Programme of Cape Town to a recognition that the City had to proactively engage with the WCWSS to ensure optimal management over the crisis. This involved engagement around enforcing restrictions and exploring options for transferring water from the agricultural sector. DWS regional office facilitated the transfer of 7 MCM (million cubic meters) from Groenland Water User Association (in Grabouw) to supplement the City’s water supply in February 2018. DWS in cooperation with Eskom pumped the water over the watershed to Steenbrass Upper Dam. The City of Cape Town then reimbursed DWS for the pumping cost paid to Eskom.

From 1 January 2018 Level 6 restrictions were enforced, and Level 6B from 1 February 2018. The City set a target of trying to reach 450ml per day, to meet the DWS-imposed restriction of 45%, although this was never achieved. The daily individual consumption allowance was dropped from 87 litres to a maximum of 50 litres per capita per day.

The restrictions went hand-in-hand with tariffs. Special permission was obtained from National Treasury to change the tariff within the year. The cost of water for non-domestic use, which accounts for about 30% of city usage, more than doubled (to over R40 or US\$3), making it very expensive to use more water than restrictions allowed. Commercial and industrial water use declined by about 20%. The City maintained its social tariff, providing 10.5 kl3 per month at no charge to the approximately 270 000 residential properties with a property value below R400 000 (which is about 30% of the total formal housing), and free water through public standpipes to a further 180 000 households living in informal settlements. Other domestic users faced a very steep inclining block tariff with very large increases if they used more than restrictions allowed. Domestic water savings accounted for the majority in the drop in demand.

2.2.3 THIRD PHASE OF DROUGHT RESPONSE: DROUGHT RECOVERY (MARCH 2018 ONWARDS)

On 7 March 2018 “Day Zero” was deferred or “cancelled” (as some referred to it) for 2018 and in June, when there has been some good early rainfall, it was cancelled for 2018 and 2019. After this, the City shifted their approach, given the reduced need to focus on enduring a city-wide crisis. There was apprehension about the amount of winter rains but as the winter progressed, the steady rains filled the dams to above 75% by the end of the winter, as shown in Figure 1.

During Phase 2 of Day Zero the focus on demand reduction resulted in a loss of focus on the broader system, which needed to be rectified as the City moved out of immediate danger. The City’s Water Outlook (DWS CoCT 2018b) described the responses being considered to increase the security of the water supply going forward to include:

- Manage the dam system optimally
- Update hydrological information to confirm yield of dams and integrated system. This will help develop safe yield rather than over allocate.
- WCWSS management
 - Update the reconciliation strategy
 - Determine optimal augmentation volumes and timing aligned with reconciliation strategy
 - Better define governance responsibilities in the reconciliation strategy
- Improve catchment management with a focus on clearing alien vegetation that can increase the system yield
- Review level of desired supply assurance for the City (currently 1 in 50 years)

In response to the crisis, an increased understanding of the water system and the need for better governance, the City of Cape Town is developing a Water Strategy that will be finalised in 2019. This is in addition to WCWSS strategy that will be updated in 2019. The City’s water strategy aims to take a more holistic approach to water management and focuses on what is needed to build resilience (Kaiser and Macleod 2018). Specifically, the strategy sets out five commitments, namely:

1. Safe access to water and sanitation
2. Wise use
3. Sufficient, reliable water from diverse sources
4. Shared benefits from regional water resources
5. A water sensitive city

The aim of the strategy is to implement responses through a collaborative approach, that recognises that multiple actors need to be engaged to enable a more holistic framing and management of water. Responsibility for implementing the strategy will not be the sole responsibility of the City's Water and Sanitation Department, but include other departments and will aim to engage actors beyond the city more extensively than before. The strategy recognises that building a more robust approach to complex water realities will require attention to increasing capability, collaboration and learning.

3. LESSONS LEARNED: IDENTIFYING AREAS OF CONTESTATION AND POSSIBLE WAYS FORWARD

This section draws primarily on the 21 interviews with City, Province, National and NPOs to interrogate the governance of the drought. It starts by focusing on the horizontal governance, looking at the extent to which there was collaboration across City departments, often referred to in the City as 'transversal' management. It then considers intergovernmental coordination, and the nature of collaboration across local provincial and national spheres followed by an examination of the nature and extent of leadership and partnerships. When interrogating governance in the interviews several other themes emerged that were important to strengthening water resilience in future. These included the importance of data, drawing on expertise and prioritising communication. Another set of themes linked to the importance of taking a systems approach, which includes the nature of water supply, and the financing of water also emerged. Lastly some suggestions are provided on specific adaptive capacity that could be developed related to building a water sensitive city vision and integrating climate change scenarios in water planning. These are explored below.

3.1 GOVERNANCE

3.1.1 TRANSVERSAL MANAGEMENT WITHIN CITY OF CAPE TOWN

Transversal management, aimed at breaking down silos and increasing collaboration between departments, was institutionalised in the City of Cape Town in 2012. Further efforts were made to institutionalise transversal management by hard-wiring it into operations and bureaucratic processes, rather than just working on cross-cutting issues. This was done by creating the Project Portfolio Management (PPM) unit in the Directorate of the Mayor. The intention was to assess and implement changes that required a more holistic and integrated understanding of the city, rather than relying on sectoral departmental approaches or relying on regulatory mechanisms to drive implementation. Some interviewees see this as a resource-heavy and top-heavy institutional structure that gives increased power to the Mayor and led to tensions between politicians and technocrats. Others spoke about this as an important way to ensure that cross-department activities do not stop at working group discussions with no authority or resources to implement integrated responses.

As mentioned above, in May 2017, the Mayor shifted responsibility for managing the drought to the Water Resilience Task Team (WRTT), based in the Directorate of the Mayor. This took responsibility away from the City's Department of Water and Sanitation, which had historically managed water-related issues in the City. This shift can in part be attributed to a breakdown in communication and trust between the Mayor and the Department of Water and Sanitation. In practice this moved responsibility away from a department that had tended to focus more on techno-managerial approaches to managing water and water-related infrastructure, to one that could enable a broader view that conceptualised water as part of the city that impacts on business, residents and the broader socio-ecological system.

Some argue that this move was a "costly distraction" as an unrealistic programme was developed during this time and some of the technical experts were alienated as a result. One person commented that this approach "separated the thinkers from the do-ers" suggesting that although some of the top decision makers might have understood the institutional context and procurement barriers, they did not necessarily understand the technical implications of their suggested responses. Although the WRTT drew in people from the Department of Water and Sanitation early on, some were unhappy with this shift in leadership which led to a breakdown of trust. Getting various parties on board was challenging at times and speaks to the need for strong leadership that can build trust if transversal management is to be effective.

One interviewee felt that placing the WRTT in the Mayor's office enabled the crisis response to be broadened to the city scale very quickly, and to get support from council on a number of decisions, including securing finance for augmentation. A few interviewees felt that these were maybe not the best technical decisions, in terms of the emphasis placed on augmentation and the associated expenses. But some commented that it brought the Executive Directors of the different departments into the fold, which enabled engagement with a broader set of departments in a way that would not have been possible otherwise.

The politics of the moment also fuelled events, making it hard to untangle personal and party politics from administrative management decisions. Unfortunately, the political uncertainty during this time led to an atmosphere of apprehension and caution around stepping out of line and potential negative consequences, particularly at the senior levels. At the senior level there were low levels of trust among the Executive Management Team (EMT) and the Mayor and politicians which undermined the potential for more successful transversal management. Moving from a "command and control" approach to increased collaboration and experimenting with possible responses is difficult under these circumstances.

Some interviewees spoke of challenges engaging with different departments, around accessing data or working together. Others described how certain challenges and the need for collaboration was identified early on, but it took a long time before this type of engagement occurred. For example, one senior official stressed the importance of engaging with agriculture early on but only at the height of the crisis was this addressed.

Although there were challenges with transversal management, there were also examples of it working. Project management was brought on board early on. The rapid procurement processes for augmentation that the City enabled are considered by many to be a significant achievement, showing the importance of portfolio and project management during times of crisis and how this could provide the City with flexibility and speed in procuring new projects.

The environmental management department was brought on to work on authorisations and impact assessments. Communications was integrated as a stream of the response plan and there was an evolution through the crisis in the way the new strategic approach encompassed partnerships both within the City of Cape Town and with external partners.

The work done by the Water Demand Management department demonstrates an area where there were good examples of cross-departmental collaboration. Officials felt that because the department had been set up as a separate entity years ago, with its own leadership structure, it was well established and sufficiently independent. Over the years they have tried and tested many approaches to reducing water demand and so measures were in place when they needed to be scaled up, such as pressure management and leak fixing. They felt that during the drought extensive collaboration was encouraged. For example, they worked closely with the Facilities Management to retrofit buildings and put water devices in rental stock and worked with the Information Systems and Technology, Corporate GIS and Communications Departments on the Green Dot Water Map. As one of the staff said:

“It was a fantastic time to work here as we got cooperation from all departments and were able to get things done that we weren’t able to do before.”

3.1.2 ENGAGEMENT WITH NATIONAL AND PROVINCIAL GOVERNMENT

One interviewee shared a document outlining the responsibilities that different spheres of government have. In the document it talks about Section 154(1) of the Constitution that states: “The national government and provincial governments, by legislative and other measures, must support and strengthen the capacity of municipalities to manage their own affairs, to exercise their powers and to perform their functions,” particularly to ensure that the objectives of local government can be achieved “to ensure the provision of services to communities in a sustainable manner and to promote social and economic development.” National Department of Water and Sanitation (DWS) therefore has an important role to play in supporting other spheres of government, as do Provincial government, particularly during a disaster.

Other national departments that were involved in supporting the City of Cape Town including Department of Environmental Affairs (DEA), the Department of Cooperative Governance and Traditional Affairs (CoGTA), National Treasury and many of the Western Cape Government departments, most notably Department of Environment Affairs and Development Planning (DEADP), Department of Economic Development and Tourism (DEDAT), Disaster Management and Fire Rescue Services, Department of Transport and Public Works and the Premier. The engagements between these departments and the City were frequently subjected to the vagaries of personalities and politics that are hard to pin down but influenced outcomes both for better and worse.

INADEQUATE SUPPORT FROM NATIONAL DWS

Support from National DWS was inadequate in a number of ways according to City officials. Officials’ frustration with DWS included delayed responses including announcements of restrictions and delays in funding infrastructure projects as well as national’s lack of leadership on the drought. One interviewee felt that if the Minister had spoken about the drought and the importance of cutting water use, it would have helped the communication campaign to get households and business to curtail water use, before having to revert to a campaign such as Day Zero, that induced fear.

Throughout the drought the need to respond rapidly to a changing water system and shifting water demand was clear. However, DWS made this challenging as their responses were often slow and there was lack of leadership on numerous issues. This impeded flexibility at the local level, which emerged as one of the most important characteristics that the City needed to exhibit. This points to the importance of understanding intergovernmental cooperation or cross-sphere governance, and how this can enhance or undermine adaptation responses across scales. Building capacity in all spheres of government is therefore important.

ASSESS EXISTING POLICIES AND RESPONSIBILITY

Through the crisis, officials realized some areas where governance was unclear. For example, there was a shift to using alternative water sources, such as borehole or rainwater, during the drought but lack of clarity from DWS on requirements for

⁴ The terms water sensitive city and Water Sensitive Urban Design (WSUD), used in this paper, can create some confusion. The following quote helps to explain these concepts, “In its broadest context, WSUD encompasses all aspects of integrated urban water cycle management, including water supply, sewerage and stormwater management. It represents a significant shift in the way water and related environmental resources and water infrastructure are considered in the planning and design of cities and towns, at all scales and densities. WSUD is now often used in parallel with the term water sensitive cities. However, there is a subtle but important distinction between these two terms; water sensitive city describes the destination (the objective), while WSUD describes the process” (Fletcher et al., 2014).

authorisations required for alternative water sources. In response to this the City of Cape Town developed Alternative Water Installation Guidelines. Going forward it is clear that a range of policies need to be examined, particularly given shifts towards local water supply, including policies related to greywater use, Water Sensitive Urban Design (WSUD) , rainwater harvesting and groundwater .

Fisher-Jeffes et al (2017) suggest that in order to move towards water sensitive services in the South African urban context it is useful to consider how WSUDs might differ in informal areas that require basic services and improved access versus formal areas, where there might be a focus on managing pollution and fit-for-purpose water. The concept of ‘water sensitivity’ increasingly used internationally, seldom recognises the challenge of working in a developing country context.

The other issue that needs to be addressed as part of intergovernmental collaboration is the how much responsibility the City of Cape Town might take for securing water supply. Water resources management is the responsibility of the national Department of Water and Sanitation but requires collaboration with others. If the City relies on DWS and they do not deliver, the City is in trouble. Therefore the City has an interest in taking on additional responsibility. Although all municipalities might not have capacity for this, it was felt that those municipalities that do should be allowed more space to govern local water supply if they wish. But questions remain about how this might be governed and financed. If the City acquires additional water supply at its own cost, will DWS demand access to this water in future, given it is a national resource? Going forward, partnership models between cities and national government need to be explored along with establishing clear mandates and strong leadership.

CHALLENGES IN MANDATING FLEXIBLE GOVERNANCE

The National Water Act regulations states 300 days maximum period for water use licensing (WUL) processing. During the drought, there was increased demand for water use licenses, required for storing water and discharging wastewater. DWS is responsible for issuing these and during the drought they did their best to speed up the licensing and authorization of WUL and groundwater application in the disaster declared municipalities. The Act also allows for temporary licensing for 2 years in emergency situations, which was used in the Cape Town case, but still requires the application to follow the detailed license process in parallel.

Water Service Intermediaries (WSI) and Water Service Providers (WSP) are catered for in the Water Services Act and managed by the City as the relevant authority. WSIs generate their own water and use it on site, but WSPs generate water and then feed into the network for the consumers of that particular catchment to access. During the drought, there was an increase in applications for WSIs, mainly wanting to use borehole water. In these cases the WSI agreement is issued by the City, subject to all other regulatory requirements including a WUL, which they need to get from DWS. WSPs, initiated by municipalities, have to go through a public process involving supply chain and Council approval. During the drought the City did issue a call for Water Service Providers. An interviewee from Province talked about the challenge that businesses had, as they were unclear about how to proceed with WULs or did not want to wait for approval, so secured their own water without licenses, which raises compliance concerns.

There were also concerns about pushing through environmental authorisations and the potential implications of not considering these thoroughly. However, the nature of the crisis required a more rapid response than normal. The City (and all other local authorities in the Western Cape) were issued a directive in terms of section 30A of NEMA by the WCG DEA&DP. National Department of Environmental Affairs issued a similar directive to the City for activities within its jurisdiction. The section 30A directive instructs the City that it can commence listed activities without environmental authorisation in order to address the drought disaster. The conditions attached to the directive include the approval of detailed Method Statements before commencement, the approval of an Environmental Management Programme for water projects, environmental auditing and monthly reporting, as well as the submission of a water plan for approval. Typically a Basic Environmental Impact Assessment (which would normally be required as a minimum) takes 9 months or more to complete. In order to address the emergency drought situation, alternative water sources were needed urgently to avoid a day zero scenario.

These examples show why it is important that municipalities are able to work collaboratively with DWS and other national departments, particularly in an emergency. It also shows how flexibility depends on human capacity to respond along with institutional agility. However, along with this flexibility there needs to be the caution that rapid responses might not adequately consider the implications because there is often limited time to gather sufficient information.

MANAGING WATER ACROSS SCALES

As outlined earlier, the National Department of Water and Sanitation is responsible for managing the WCWSS. Some City officials felt that the system was not adequately managed in the early stages of the drought which led to less water being available in the dams by the end of winter 2017 than they might otherwise have been the case with better management (see CoCT 2018c). However, a DWS official disagreed saying that they worked to ensure “the system secures water to all sector within their restricted allocations without running dry”. Despite these differing views, there were low dam levels which resulted in the City of Cape Town taking more responsibility than they constitutionally should have, in order to avert Day Zero, as they did not want to rely on DWS.

Because Cape Town’s water supply and use is intricately linked to the catchment beyond its border, collaboration between the City, Province and other municipalities is also important. The City has been previously criticized for not working closely

enough with these other municipalities and the Province. Through the drought this shifted in some instances, but needs to improve further given the need to think about water at a catchment scale. Taking on more responsibility for governing water is a central part of the new Water Strategy. One example of this is the role of alien vegetation clearing in the catchment. Although the broader catchment clearing is not the responsibility of the City, alien vegetation in the upper catchment directly impacts water availability in the system and hence for the City of Cape Town. Going forward, the City will be more engaged in ensuring this clearing happens, where possible. The allocation of water in the catchment is another point that needs to be addressed, to look more closely at which sectors and municipalities get what, and when, and how this is governed. Emerging from the crisis, better management of the water system is a priority.

IMPORTANCE OF DATA AND RELATIONSHIPS

Although there are challenges with DWS there are also strengths. The DWS has a lot of information on various water related topics. For example, there is significant knowledge about groundwater resources. However, accessing this information is difficult and there is a need to invest in better means of sharing information and expertise.

The regional DWS staff played an important role during the drought. Some staff have been in the department for decades and so have significant technical and institutional knowledge as well as established relationships. The DWS was instrumental in securing an agreement to transfer the 10MCM (million cubic meters) from the Eikenhof dam, Grabouw in the first quarter of 2018. The DWS drew on their longstanding relations with the Groenland farmers and was able to reach an agreement in the preceding October 2017 to transfer water from their associations' privately owned dam for use in the WCWSS. In return the farmers could apply their own level of restrictions from the remainder in storage. The inter-basin transfer of the water released into the Palmiet River, required close cooperation between the DWS, Eskom Hydro Power Pump Storage Scheme and the City of Cape Town. The water could only be transferred incrementally to the Steenbras Upper Dam.

3.1.3 LEADERSHIP

Throughout the drought there were examples of both strong leadership and lack of leadership, with a particular concern around how politics interfered with leadership. Although the Mayor's initiation of a city-wide process was important for getting attention across the city early on, there were other concerns around her role in driving the response. Some felt that although she showed leadership, some of her decisions were driven by political reasons rather than securing water supply.

In late October when the Mayor started her daily meetings some of the communication staff appreciated being directly involved and having insight into what was happening. For others, the frequent meetings were frustrating when operating in crisis mode with so much else to do. The inclusion of Resolve, as crisis communicator consultants, was appreciated by some who felt that their input helped to gear up the urgency about reducing water use. Others felt that because of their daily presence Resolve started to drive some of the operational decisions, which was not appropriate.

The constant change in leadership, from the WRTT during the first phase, to the Mayor for the last few months of 2017, to the Water and Sanitation department in 2018, resulted in confusion around the approach to the crisis. Part of the underlying tension is that constitutional mandates lead to competition rather than supporting collaboration, as do differences in political party affiliation. When mandates are overridden by another person or department, people feel put out, rather than wanting to collaborate.

Another challenge to building an integrated response that a number of people commented on was how the response to the drought shed a light on the difficulty of getting political representatives, senior management and technical officials onto the same page. One person said that at the beginning of the drought political decisions dominated at the expense of technical but when politicians realized that the risk of water scarcity trumps everything, technical needs were then prioritized. To reduce this tension in future, political representatives need to better understand the complexity of the issue and technical officials need to improve their understanding of the political structure of the municipality. Training for officials from skilled, professional communicators in effective communication of technical information could help to address this. This training should include a focus on how officials might frame and present different options appropriately.

One of the Western Cape provincial government officials said that there was good collaboration within Province on drought-related issues from 2015. When it became a crisis with political involvement, cooperation reduced in some ways. In other ways it improved. From within disaster management at the City level and Provincial level, early action was taken. Senior leadership in these departments could see the crisis brewing and started the process of declaring a disaster. The response from disaster management at the provincial level was impressive. Resources and personnel were mobilized, the Premier got very involved and held weekly meetings at the height of the drought for a few months in early 2018. Numerous plans were developed alongside careful preparation for implementing plans. The weekly meetings also lead to increased collaboration between technical water specialists, strategic managers and political representatives, which was further supported by WhatsApp groups to maintain frequent communication. The ability to mobilise at this level speaks to elements of political and administrative leadership.

Leadership at the individual level within the City was shown by the exceptional dedication from many officials within the City of Cape Town and Western Cape government. These people went beyond the call of duty and put in thousands of additional hours. The psychological cost on many was high, and although it has been recognized, it has possibly not been dealt with sufficiently.

The space for adaptive management and learning within cities needs to be driven by leaders. The high level of pressure on officials during the drought made it hard to create reflective spaces and at present there is little institutionalised space for learning in the City. Yet, reflecting on responses is critical to adapting well. In the drought recovery phase, the City has reflected on lessons learned which they have integrated into their new Water Strategy. Moving from a “command and control approach” to one that is reflective, adaptive and flexible is necessary but is not going to be easy without organisational change.

3.1.4 COLLABORATION AND PARTNERSHIPS

The scale of the crisis brought to the fore the complex nature of what responding to the drought might entail. This complexity brings with it a web of actors that are both dependent on water and influence the use and management of water. As captured above, when talking about transversal management between municipal departments, relationships between certain departments in the City of Cape Town improved in some instances. These should be celebrated and used to build future collaboration upon. However, collaboration across departments and between certain people was limited for some operational decisions. Although transversal management was put in place to try and address these silos, it is still maturing and there was not sufficient trust for it to be successful. During a crisis, flexibility to change approaches often requires a range of actors to be involved in decisions or to make changes to support an intervention. This requires collaboration, which needs to be seen as part of people’s job requirement rather than a.

At the provincial level, in the agricultural sector, water restrictions impacted on farming and lead to a loss of agricultural work, particularly for seasonal labourers, but response from social or rural development for example to address this was lacking. It is not surprising that a government structure built on siloed departments might struggle to respond holistically through partnerships. Rapid environmental and social change demands that this changes.

Across spheres, there is a tendency to “not step on each other’s toes”, as one interviewee put it. Opportunities to test how collaboration might work across departments and spheres have therefore been limited to some extent in the past. This is partly based on departments wanting to maintain their independence and have a sense of control which they feel might be undermined if they shift to a collaborative approach. Unfortunately it is also about the lack of understanding of the importance of collaboration. This mindset needs to be challenged and changed to better respond to future complex problems.

The sheer scale and nature of the crisis forced some actors to work together in ways they had not before. Relations both within the city, between the city and province and between the city and other actor groups have strengthened in many ways. Disaster management had good relations across spheres before the crisis, which meant they were in place and could be activated when the crisis hit. In the business sector there were certain relationships in place before the crisis, but these relations between the City, Provincial government, GreenCape, Wesgro and various businesses and industry became much stronger during the crisis, through active partnership processes. Names and lists of people in different sectors are now better known and communication has been made easier through this. Individuals in the business sector now understand the role of government better and who the actors are they need to engage with.

The role of intermediaries in supporting collaboration was evident during the drought. Not-for-profit organisations (NPO) such as GreenCape and Western Cape Economic Development Partnership (EDP) played an instrumental role in linking up different groups and connecting them to government. They also acted as knowledge brokers and were able to pull together information from sources outside of government, which was important. Organisations such as WWF also played an important role in sharing information with citizens, through platforms such as their Wednesday water files. Certain academics worked closely with certain officials on specific issues, and often shared their perspectives with the media, which helped to provide different perspectives on the challenges the City was facing.

Collaboration was less successful in other instances. Stories are told about neighbourhoods that pulled together at the height of the crisis to identify vulnerable households, collaborate on water saving responses, think about working together on water access. The City did not manage to link in well to what these groups were doing. Through the EDP, there were a number of initial meetings and some documents developed on how to take community engagement forward. These partnerships between the City, citizens and NGO groups are critical to building robust responses and to improving understanding of multiple experiences and perspectives. Vogel and Olivier (2018) emphasise how important the process of bringing different stakeholders together around drought was historically at the national level. This needs to be strengthened at the local level as well, so that if there is another crisis, the City can rapidly mobilise and work with various groups. This requires capacity and resources to be allocated to it as well as trust, which is built on relationships. Citizens need to know who to communicate with and how.

LESSONS LEARNED REGARDING GOVERNANCE

- Strengthen transversal management between municipal departments
- Build systems and relationships of mutual accountability for effective water management between spheres of government
- Strengthen leadership and the capacity to enable flexible, adaptive decisionmaking
- Invest in partnerships beyond the City government

3.2 DATA, EXPERTISE AND COMMUNICATION

3.2.1 EXTENT OF DATA AVAILABLE

One of the challenges in deciding on appropriate responses to managing water supply depends on what data is available. At the beginning of the drought, data on water supply and the status of the catchment was not well understood or communicated, which made it difficult to pull information together clearly in one place. Since then there has been significant progress, which has made products, such as the Water Outlook, possible. Securing this information is not easy. However, understanding the details of the water system, who is using what and expected use is critical for planning.

As stated earlier, management of the WCWSS is central to securing Cape Town's water. Data related to the WCWSS was insufficient at the start of the drought. Although the WCWSS Strategy steering committee did meet in the years preceding the drought, there was not a full complement of the committee. Consultants, that feed into the process to facilitate meetings and model the water system, were not appointed because of problems in securing the contract. This meant that the models and associated data were limited. Although the DWS and City draw on the same data sets, they use it differently which creates confusion. In addition, the enforcement of regulations in 2015 and 2016 were limited which lead to more water being used, and did not align with the input the City of Cape Town was using in their modelling.

As stated earlier, management of the WCWSS is central to securing Cape Town's water. Measured and reported data related to rainfall and associated run-off in the WCWSS was insufficient at the start of the drought in 2015 and 2016. Although the extended WCWSS Strategy steering committee did not meet in the years preceding the drought, there was a full complement of the Strategic Operating Forum that met regularly and included representatives from DWS (regional and National Water Resources Planning), municipalities in the region, other national and provincial representatives and agricultural users amongst others.

The DWS has the overall responsibility to manage and operate the three largest dams in the system, the Theewaterskloof-, Voelvlei- and Berg River Dams (including potential inter-basin transfers from Palmiet River) and direct the City on where and when to take more water from or into their dams, to minimise any potential spillage.

Consultants are appointed to feed into the process to facilitate meetings, update data records and run an operating model for the water supply system at the onset of every hydrological year (1 November to 30 October). At the onset of the drought the consultants were not yet appointed. The DWS did however appoint ad-hoc consultants to run the system operating model.

Although the DWS and City draw on the same data sets, they apply and perceive them differently which can create confusion. In addition, the enforcement of regulations in 2015 and 2016 were limited which lead to two out of seven irrigation boards exceeding their restricted seasonal water allocations, which resulted in a lack of alignment with the input data that the City of Cape Town applied in modelling the prediction dates for Day Zero.

The integration of climate change data was limited before the drought. It has become clear that knowledge of climate change scenarios is important in order to consider how the current water management approach might fair under climate change scenarios. Although the climate change scenarios tend to reflect what might be expected in forty years time, assessing the ability of the current system to manage expected changes is necessary. Climate change contributed to the increased probability, and magnitude, of the Cape Town drought and cities need to build their adaptive capacity to respond.

There was limited data on how much water businesses were using and how they might be contacted. As the crisis progressed, information on these business users became available which enabled a shift in how City of Cape Town, Western Cape government and GreenCape were able to work with business. The ability to engage with businesses was instrumental in driving a shift in water efficiency. This engagement between government and the business sector was one of the successes that stood out among interviewees. Although it took time to develop, there are now stronger relationships between businesses and the public sector in place that address water concerns.

3.2.2 ABILITY TO DRAW ON EXTERNAL EXPERTISE

Collaboration is important during a crisis when expertise is needed from different quarters. The establishment of the Water Resilience Advisory Committee (WRAC) was important, and showed awareness of the need for external input to the drought response. Some feel that the WRAC played an important role in providing City officials with a platform to share what they are doing and receive the type of comments and questions they don't usually receive internally. It has also lead to stronger relations between some officials and some Section 80 members, which is seen as instrumental, particularly going forward given the need for a more holistic response to managing water. However, some argue the committee was not used sufficiently and it played more of a rubber-stamping role rather than creating a space to engage more critically and draw on external expertise.

Within the City of Cape Town, there were not well-established networks that officials could access to gather information. Officials spoke about doing internet searches to find out best practice in other cities. This approach relies on information that is online. More organized networks with academics or information providers would be useful in this regard. Similarly, there are a number of people around with experience in water-related issues, such a previous government employees or private sector experts. These were drawn on in some instances, but in other instances they were not adequately considered.

The role of external experts from the World Bank has been noted earlier in terms of how it shifted the focus of the response away from small scale temporary desalination towards demand management and groundwater. This shows the importance of engaging with experts at critical points. Given that this expertise was enabled by Cities Support Programme, through National Treasury, it also points to how a national department can support needs at the city level and help to access the necessary funds, particularly where strong relationships are already in place.

Although expertise and input is important, it can also be overwhelming and contradictory. In order to effectively manage and navigate all the support a fair level of readiness is required. There were examples in the City of certain external technical advice being pushed without any due diligence, which was in conflict to some other external technical advice. Watching for this and managing it is important.

3.2.4 COMMUNICATION

Although the City produced a range of excellent communication products, there were challenges with communicating the drought to citizens. Some interviewees felt that insufficient attention was paid to explaining the drought, its severity, particularly related to climate variability, and what the city was doing in response. Political upheaval during the drought, as touched on earlier, contributed to this, making it hard to decipher what was politically driven and what was an appropriate technical response.

An important part of the water demand management response was implementing restrictions. As one interviewee from the City said, restrictions often tend to be viewed as an indication that a city has not done enough and need to resort to restrictions. Better communication around the technical nature of these decisions might have helped citizens to understand the importance of restrictions, as well as the reasons behind the City's interventions. This could have helped to win public support earlier on rather than making citizens sceptical. The gap in information from the City left a space for others to fill, which may have enabled the development and spread of various rumours, often unfounded, that created concern among citizens and businesses. Unfortunately the City seemed to be insufficiently prepared in terms of skills and capacity to manage social media diversions and the associated 'fake news'. The City felt the negative impact of this when they tried to introduce a "drought levy", which was dropped. Cities are going to have to think strategically about how to engage with such matters.

The extent of detailed information shared around dam levels and water use was limited in 2017, which frustrated many citizens and journalists wanting a thorough understanding of the situation. This shifted significantly in early 2018 when the Water Outlook started being shared online with comprehensive details on augmentation and water demand management. An important lesson was to share more information early on; even though it can come with the risk of exposure to criticism, it helps people to feel they know what is going on, which is very important.

Communication around when dam levels would reach a critical level was complicated. Issues around water use and management became oversimplified and the City's intentions were misinterpreted or misunderstood in several cases. One City interviewee was frustrated around the reporting of Day Zero, which they felt was naïve. Some interviewees in the City felt that "Day Zero" was an unfortunate choice of words, but no alternative term ever made it to the table. Booyesen et al.'s (2018) study, that draws on smart meter data and municipal household water data, suggests that the release of the disaster plan and related communications around Day Zero had more impact on behaviour change and reducing household water usage than restrictions or tariffs. But several officials expressed, that the Day Zero campaign and the panic it caused, came at a high price.

LESSONS LEARNED ABOUT DATA, KNOWLEDGE AND COMMUNICATION

- Understand the local water system
- Actively seek external expertise and experience
- Share information about the water situation to build public trust

3.3 THE IMPORTANCE OF A SYSTEMS APPROACH

In order to build the robustness of the water system and the City's water supply, it is clear that a broad systems view is needed, that includes the environmental, physical, social, financial, economic and political aspects. This requires understanding the system better, how it might change and a new approach to managing the system beyond focusing on infrastructure. For example, one part of the system that water managers have a new appreciation for is the need to shift from relying almost entirely on surface water and to diversify water sources. Another interviewee emphasized the realisation that greater attention should be placed on the importance of social relationships in the system. He saw partnerships and adaptive management as central to building a robust and flexible water sensitive city. Another interviewee referred to the need to think more carefully about how to use sources of water such as groundwater, springs, rivers, small dams and storm water.

Interviewees emphasized the need to think more about how the type of water used is fit-for-purpose. This shift is starting to occur and since the drought many buildings have started to use non-potable water for toilets or outside purposes. In Cape Town this has been piloted in council buildings. As one interviewee said, "This is the new way, the new normal. That change has happened, to now use non-potable water for non-potable use." Developing this further is important. But this shift to recycling water and using water in new ways will require leadership and a change of mindset.

Through the evolution of the drought, it became increasingly clear how much all parts of society and the economy rely on water. If water availability is severely limited, the economy could collapse along with social stability. There is a need to move away from seeing water as solely the responsibility of the Water department to understanding how multiple departments and citizens' organisations can play a role. The drought also made it clear that citizens' use of water was central to managing demand. One interviewee said that the City paid insufficient attention to understanding behaviour change, both in terms of understanding how citizens used alternative water and in terms of how citizens responded to price and non-price water conservation approaches. They felt that in future, this capacity, for understanding behaviour change, could be further developed within the City.

3.3.1 SHIFT IN NATURE OF WATER SUPPLY

The drought reminded people of how closely linked climate variability, rainfall and dam levels are. Emerging from this, attention has been placed on ensuring a diversity of water sources going forward as mentioned above. It was also a reminder that it can be challenging to adapt large built infrastructure to changing stressors. In response to the increased awareness of the level of reliance on a central supply, different approaches emerged within different groups. At the city level augmentation was considered both to respond to the crisis and to build long-term security of supply. At the business level, investment in alternative water self-supply was implemented to get through the crisis. Some of those businesses will maintain their own supply and others will go back to using municipal water. And at the household level, many citizens and organisations installed their own “micro”-water sources, including boreholes, rainwater tanks and greywater systems. Trade-offs and decisions need to be made if micro-sources are to be supported going forward, as it may undermine fiscal resilience given the current system of covering water-related costs.

The shift in securing water supply among private households, businesses and public institutions, was difficult for the market to absorb. There was often not sufficient stock of rainwater tanks and other materials to supply demand. Information about alternative water was limited at first. However, new businesses did emerge and initiatives were developed at both the small and large scale to address this gap.

3.3.2 CREATING OPPORTUNITIES IN TIMES OF WATER STRESS

Periods such as the water ‘crisis’ in Cape Town also hold opportunity particularly for entrepreneurs and job creation. There was an increase in organisations, for example, outside of the City, wanting to supply water. Water Service Intermediaries took on water provision roles and had to be endorsed by Water Service Intermediary licenses, a contract they sign with the City of Cape Town. This took pressure off the municipal water supply. Currently these intermediaries generally only have licenses to operate for 2 years or until they have paid back the costs of implementing their own supply. One interviewee was concerned about the uncertainty for intermediaries over what will happen in the future and suggested that this should be carefully considered.

Rainwater harvesting has become more commonplace which is good from an environmental perspective as water gets harvested across the city rather than just in dams. Although the city has guidelines and by-laws supporting Sustainable Urban Drainage Systems (SUDs), such as encouraging porous paving and reducing pollution loads, the move to increase stormwater harvesting has been limited. A number of interviewees felt that there should be more support from the City for integrating these different approaches into water management more explicitly.

3.3.3 GROUNDWATER

The drought brought the importance of sub-surface water to the fore, particularly around the challenge of managing groundwater. Given that groundwater is a national responsibility, the City consequently has limited resources and capacity to manage it although City bylaws are expected to spell out how groundwater is managed locally.

During the crisis, groundwater was seen as one of the water sources that needed to be developed at the City level. Exploration and drilling has gone ahead, with numerous challenges around drilling in sensitive environmental areas, the need for monitoring and the different nature of groundwater in the different aquifers. Given that integrated and responsible groundwater should be part of Cape Town’s water future a number of issues will need to be addressed related to revenue, governance and the environment.

As the drought progressed, increasing numbers of private boreholes were sunk. As water came online from boreholes, less municipal water was used which decreased the revenue from water sales. During the drought the offset of not needing to use potable water was welcomed but going forward it raises questions about the revenue model. As the drought abates, use of boreholes will continue and questions are being raised about how to get some revenue from those using groundwater.

In terms of governance, the City obtained a directive from DWS to require people to register their boreholes and restrict borehole water use under level 6 restrictions. This important shift shows one way in which the City might be able to engage in groundwater governance more than they have before. But as restrictions change, it is unclear how this might be taken forward and how the City will ensure aquifer protection. The Department of Water and Sanitation is currently preparing a generic groundwater use by-law for adoption at local municipal level, which spells out terms and conditions and requires a full public consultation process. This bylaw describes the categories of use and the associated documentation and information required by the different institutions. Engaging with this process will be important, as will investigation into how to integrate groundwater into the City’s Water Strategy.

The environmental impact of the increase in boreholes on the water table and water quality seems to be unclear. The large groundwater sources that the City plans to implement will be carefully monitored but the impact of the distributed smaller boreholes are less clear. This concern points to the importance of improving monitoring and data assessment of ground water.

3.3.4 FINANCING WATER SUPPLY

Municipalities are required to be financially sustainable, which requires that water tariffs are able to cover the full long-term cost of delivering the service, excluding capital and operating subsidies for free basic services. Cost recovery on a volumetric basis (in accordance with the amount consumed) thus not only needs to account for the long-term costs of providing infrastructure but is also vulnerable to fluctuations in usage. During a drought, as less water is used, less is paid for water. Although restrictions were accompanied by increased tariffs, the lower water use resulted in a significant loss from reduced sales for the City of Cape Town. This can be more of a challenge for smaller municipalities who have fewer options for alternative finance.

The City faced not only the fixed costs of service delivery associated with existing infrastructure and staff, but also a rising expenditure requirement to introduce demand management measures (metering) and augment water supply (such as boreholes). This created an immediate stress on the water department as a trading service and required the city to re-prioritise its overall expenditures to provide additional support. This impact on revenue can make certain actors within cities concerned about implementing water conservation approaches too early or too aggressively. A drought strategy that considers financial impacts can help in this regard to outline restrictions, with associated tariffs, before the drought and identify trigger points, such as dam levels, as to when restriction levels should change.

To support the strain of funding water services, long-term funding is required to build and maintain robust water infrastructure, as current investment is often insufficient. Different financing options to support water augmentation and infrastructure need to be explored as part of the city's long-term financing plan. Long-term financing and tailored borrowing instruments such as Green Bonds could help to address this. Tariff restructuring can also be used to explicitly fund fixed costs of the water system, which Cape Town introduced in June 2018. Care is required to prevent this being a regressive "tax" on poorer consumers.

Given that over 40% of households in Cape Town are provided with water at no charge (indigent plus informal households), cross subsidization of water is important. A few interviewees commented that in the future, it is likely that the percentage of household not paying for water will increase. One interviewee pointed out that during the level 6 restrictions, fewer households paid their water bills, leading to a reduction in the collection ratio. The rates account has been able to subsidize water over the two years, given their high collection ratio, but they cannot continue to cross-subsidise in future.

One of the challenges with changing tariffs has been that citizens objected to the proposed drought levy and to the change in water tariffs. One of the lessons around this relates to the importance of communicating these changes and providing the opportunity for citizens to engage with the suggested tariffs rather than presenting it as a done deal. Increased citizen participation may have helped to reduce resistance and objections, although the time needed for this was limited due to the 'crisis'. In the end, the negative response from citizens possibly undermined a more sustainable tariff model.

The Cape Town drought highlights the challenge of acquiring bridging finance to support new augmentation. The City was able to look at the Integrated Development Plan (IDP) and reprioritize spending, although this was met with some resistance from certain politicians. The City froze posts to allow money to be used elsewhere if needed. When it became clear that money was not needed, the posts were unfrozen. The urgency of the drought required rapid decisions and funding, and some felt that the current revenue model caused delays and so is not responsive enough in these types of situations. However, one interviewee pointed out that the Municipal Finance Management Act (MFMA) is in place to reduce the likelihood of rapid decisions being implemented without careful consideration. The Cape Town case suggests that having a bit of a delay on securing funding was a good thing as it gave time to consider whether all the small augmentation projects were necessary. In the end it was decided that some would be too expensive and take too long; in these cases the bureaucratic inertia saved the city from unwise investments

LESSONS LEARNED ABOUT TAKING A SYSTEMS APPROACH

- Actively manage and integrate diverse part of the water system water
- Create a robust networked system of water supply
- Recognise the limitations of the current financial model for water

3.4 BUILDING ADAPTIVE CAPACITY

The drought showed how important it is to be prepared for extreme events, be they climate-related or other. Shocks that impact on the whole city have a myriad knock on effects to livelihoods, the economy, the environment and politics. Strengthening adaptive leadership and building capacity to be better prepared for these risks requires significant visioning, resources and time. This type of approach is likely to benefit cities in multiple ways.

Responsibility for who should build adaptive capacity needs to be explored. In some instances, capacity can be built locally. In other instances, capacity might be best built through intergovernmental or international support or external experts.

It is clear that many of the previous themes contribute to building adaptive capacity, such as strengthening leadership and partnerships, improving data repositories and understanding of the social ecological system. Two additional activities are presented below, namely developing a vision of what a water sensitive city would mean and explicitly integrating climate change into water resource planning.

3.4.1 DEVELOP A VISION AND GUIDANCE ON WHAT A WATER SENSITIVE CITY LOOKS LIKE

Increasingly attention is being placed internationally on building water sensitive cities that are resilient, liveable, productive, and sustainable. This involves making them water-wise through increasing the efficient use of water, protecting waterways and wetlands, implementing sustainable drainage and long-term planning that recognises diverse needs and planning for uncertainty. This means different things to different places. It is important that each city develop a vision of what they might look like as a water sensitive city, given the city's priorities and local context.

Across South Africa, guidance could be shared on how to develop a water sensitive approach. It would be helpful to think about what makes sense in coastal cities for example. All South African municipalities should have water demand management strategies, but these are not always in place. Providing templates or material on how to develop these might speed up this process. Included in this could be a discussion on the role of privatization and what is acceptable in the South African context.

3.4.2 INTEGRATE CLIMATE CHANGE INTO WATER PLANNING

Climate change is a concern that could be better integrated into water planning as outlined in Ray and Brown's (2015) book, *Confronting climate uncertainty in water resources planning and project design*. Increasingly climate change needs to be considered given the increase in uncertainty that accompanies it and its direct impact on water resources. Climate change means that climate patterns, including rainfall amounts and timing, are shifting which impacts on water resource planning. In future, higher chances of extreme climate impacts are becoming more probable. Better monitoring of the historical climate variability and current trends can prompt a more flexible response to managing water in line with how the climate is changing.

However, the uncertainty associated with climate change scenarios, makes it hard to integrate the long-term scenarios into planning for future water resources. More support is needed across spheres of government to increase awareness and get buy-in from municipalities around the importance and options for integrating climate change in planning. Given that cities have not done their own water resource planning in the past, finding ways of integrating climate information at the city scale needs to be explored. Support for developing training and/or guidance material on how to integrate climate change scenarios in decision making would be useful in this regard.

3.4.3 IMPROVE ENGAGEMENT BETWEEN POLITICIANS AND OFFICIALS

Although there are some constructive spaces where politicians and technocrats engage, during the Cape Town drought it became clear that there were tensions around this engagement that undermined trust. Some technical experts found it hard to get their points across to politicians and some politicians found it hard to understand the technical issues holistically. Strengthening the engagement and understanding between the two groups is important for ensuring that drought-related responses addresses citizens' concerns as well as technical, resource and institutional imperatives and constraints. Support is needed to help technical officials to communicate better and to understand the political dynamics better.

LESSONS LEARNED ABOUT BUILDING ADAPTIVE CAPACITY

- Develop a water sensitive city vision and plan for implementation
- Integrate climate change into water planning
- Strengthen capacity for engagement between politicians and officials

4. CONCLUSION

In this paper, the Cape Town drought has been described, interrogated and carefully probed. The 'messy' realities of what the drought exposed are useful to interrogate. Outsiders have been quick to voice their opinions on what the City should have done, including listening to earlier warnings about climate change and putting in place various measures. What has emerged through this paper are, however, the need for a more nuanced and holistic response that recognises the role of people, partnerships, leadership and the holistic water system. This is not a story that describes the City of Cape Town as well adapted to such challenges. Rather, there are parts that show the competence and capacity in some regards as well as the challenges and gaps in other regards. Emerging from this are 12 lessons that other municipalities can consider when trying to build an adaptive water sensitive city. See Figure 5 for the 12 lessons and Figure 6 for how the lessons might play out across the city system.

Big cities are complex organisations trying to balance goals that are often contested and sometimes incompatible. This is particularly the case in cities where inequalities are high. Trade-offs have to be made. Being clear about what these are is often difficult but can help others to see how decisions came about.

As climate variability increases and the impacts of climate change become more acute, it is critical for cities to take an honest look at their preparedness. Building capacity to adapt is critical. Many of the skills that are needed are not traditional technical skills but rather how to foster stronger partnerships, adaptive management and the ability to facilitate learning. Government systems are often not well equipped to be flexible and collaborative, so changes are needed.



Figure 5: 12 Lessons from the Cape Town drought

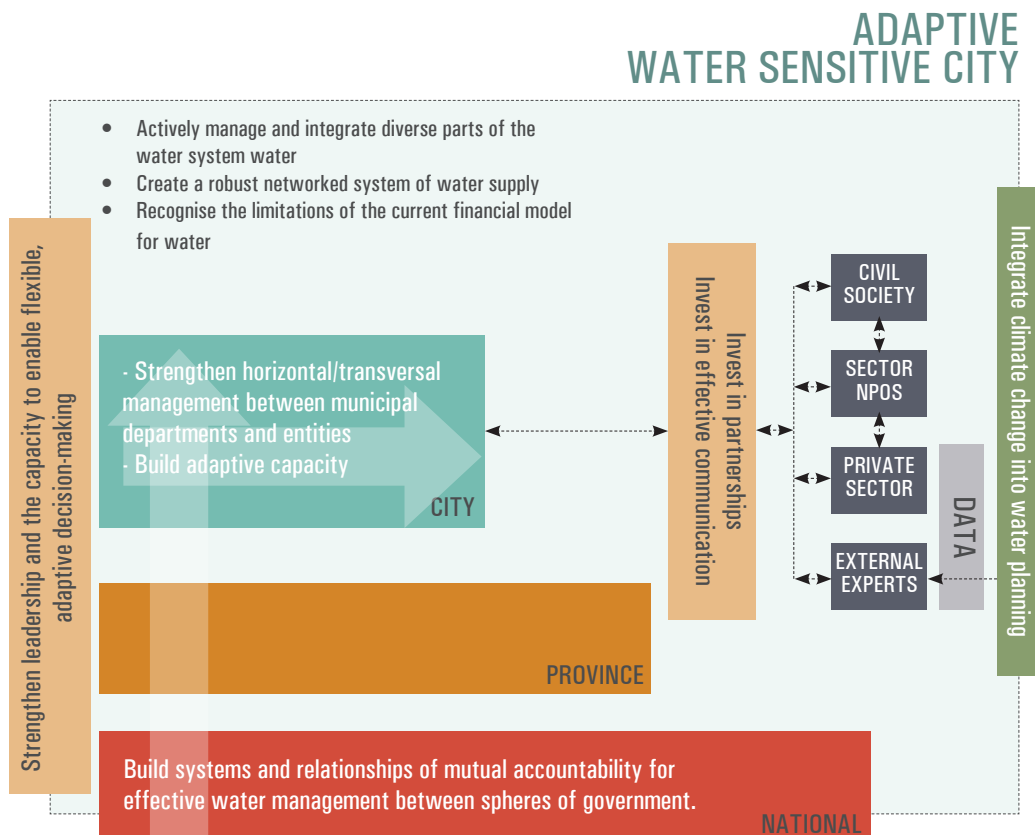


Figure 6: Towards an adaptive, water sensitive city

Some have argued that this period of climate variability shows what may be a ‘new normal’ climate state that we are entering into. As has been shown in this paper it is not enough to know only about the changing climate and about technical responses, although these are very important. What is also needed is a ‘new normal’ approach to the governance of such situations at the national through to local and personal household levels. Clear and credible processes need to be sustained once the ‘crisis’ passes. Failure to build on the engagements made will mean that cities, such as Cape Town, will lurch from crisis to crisis eroding much needed human and financial resources that could be spent on serious development challenges.

The drought has highlighted these lessons through the lens of water that is highly susceptible to climate variability and change. The question remains as to how these lessons will be reflected on and integrated into the City of Cape Town and other municipalities going forward to make them well adapted and resilient.

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7. APPENDICES

APPENDIX A: BARRIERS AND ENABLERS TO RESPONDING TO THE CAPE TOWN DROUGHT

BARRIERS TO A REDUCING RISK OF CRISIS FROM DROUGHT

INSTITUTIONAL/GOVERNANCE

- Poor coordination and poor relationships between spheres of government
- Opacity in law on the assignment of bulk water functions, including around operation of dams and building desalination
- Capacity constraints in national government, e.g. to maintain WC water system model
- WCWSS Reconciliation Strategy Steering Committee did not meet for a few years during early phase of drought
 - Yet it could have built relationships to convene multi stakeholder system
- Uncertainty whether national government would enforce agricultural restriction in 2018 as they did not in 2017, and have limited metering technology
- Tensions between ANC and DA across municipal-provincial-national levels
- Political tensions (Mayor's position in City under threat which had consequences for leadership and decision making during the drought)
- Decision making power around drought response moved away from Water Dept to Chief Resilience Officer in May 2017 and back to Water Dept later in 2017
- Poor coordination and collaboration between political representatives, technical water specialists and strategic managers in the beginning that improved over time
- Role of Disaster risk reduction and water management was unclear - linked to Critical Water Shortages Disaster Plan (launched October)
- Limited engagement between research community and government to harness best available knowledge
- Public-private platform for sharing risk was missing
- Poor relationships within the city

REGULATORY

- PFMA and MFMA – inhibited the ability to respond rapidly and flexibly in a crisis, especially relating to public procurement regulations
- Take up of new technology (through New Technology Evaluation committee) was not set up to be all encompassing which made it challenging to purchase new technology
- Disaster act not tested in law and potentially has a lot of holes
- EIA – made borehole drilling challenging when sites in nature reserve needed national sign-off (though City got given authority)
- Insufficient enforcement capacity – for restrictions transgressions, and alternative water use authorisations, checking notifications etc.
- Initially it was thought that tariff changes could only happen at certain times (although this changed)
- Alternative water guidelines had to be developed, as there was lack of clarity on the authorisations and regulations. Eg use and installation of a range of alternative water
- Water services intermediaries (WSI) – City helped to make the process clearer and got permission to issue though wants to limit these
- Water use licence applications – Business applied for ground water licence, as willing to invest but takes 300 days to process, which meant many then didn't apply
- Quality of business effluent decreased due to increased reuse

INFORMATION & COMMUNICATION

- Availability of up-to-date models of water demand and WCWSS were limited
- Ability to integrate climate change scenarios and increased change of drought probability in city decision making not present
 - partly a result of limited, weak engagement between government and academia / scientific community
- Reluctance by the City to publicly share what information they had early on
- Use of term Day Zero as being “inevitable”, linked to Mayor's announcement in Jan 2018 caused fear
- Hype and fear around Day Zero and PODs perpetuated by social media
- International media focused on CT as first major city to run out of water without acknowledging that Day Zero would be about rationing, used in many cities already
- Mayor of Cape Town releases list of top 100 water users in the City but it led to backlash
- Conspiracy theories in social media, narrative of drought being a made-up story to privatise water (or achieve other nefarious objectives) and stories about the City trying to make money
- Lack of awareness by citizens of value of water and extent of engineering required to ensure supply
- Slow response to queries and issues from citizens and businesses by both City and Provincial govt who faced an unprecedented scale of queries and requests for stakeholder engagement
- Mixed messaging from govt – moving from we're fine to we're not

- Different communication campaigns from different spheres of government
- City's communication around augmentation was confusing
- Unprecedented scale of need – call centre was overwhelmed and didn't have answers to many questions

TECHNICAL

- Temporary small scale desalination was expensive and difficult to implement on short timeline and only contributed small amount of augmentation
- Large scale desal, groundwater use and wastewater treatment all too costly and reliant on new infrastructure to execute quickly enough to make an immediate difference
- Lack of tested technology and feasibility studies to execute more unorthodox solutions, e.g. towing icebergs, designing and protecting urban areas for groundwater recharge
- Decentralised solutions were not rolled as fast as they could be – households and businesses systems weren't readily available and quality assurance was limited
- City's New Tech Evaluation Committee was not well utilized so hard for city to advance new technologies
- Pioneering PODs but questions about less than 200 PODs would be able to serve a City of 4 million

FINANCIAL/ECONOMIC

- Financing augmentation was difficult – rearrange city budgets and secure additional finance
- Cross-subsidization threatened because former high water using households bills dropped significantly so water services under-funded
- Drought charge proposed for higher value properties, met with strong public opposition and dropped, and a connection charge for all was implemented instead.
- Lack of available financing for disaster management from other spheres of government
- Loss of revenue versus economic stability/impact
- Municipal revenue model relies on water sales which is misaligned with ensuring future water security
- City has not created enabling conditions for homes and businesses with waterefficient technologies or rainwater harvesting etc, primarily for financial reasons.

SOCIAL

- Public support was lacking for some of government's attempts to reduce demand e.g. opposed the drought charge, initially slow to respond/adhere to water restrictions and requests to reduce water use although this improved over time
- Public outcry in protest against raised water tariffs
- Civic protest and outcry against installations of WMDs and tariffs
- Lack of experience with and established ways for government and civic groups to engage and collaborate with each other
- Concern over safety at PODs and role of military
- Economic inequality highlighted tensions between rich and poor, and disagreements about responsibility for water use, access and payment
- Historically disadvantaged areas with poorer quality infrastructure were seen to be more vulnerable to disruptions from demand management (WMDs, pressure reduction, etc)
- Wealthier households going "off grid", causing loss of revenue (but also seen as alleviating pressure)
- Citizen empowerment and mobilization was underutilized – suddenly social responsibility was taken to report leaks, tell neighbours not to water grass etc and this could have been built on

ENVIRONMENTAL / ECOLOGICAL

- Increase in private, municipal and provincial boreholes that are insufficiently regulated and/or not monitored and/or don't have recharge plans which impacts groundwater
- Concern over water contamination
- Ability of sewage system to be flushed out
- Unknown effects of proposed technologies, e.g. brine disposal, aquifer recharge, freshwater from offshore icebergs
- Continued uncertainty regarding future climate change and expected rainfall in coming years, making cost/risk assessments for response options unreliable
- Alien invasive species exacerbating water loss in catchment area
- Environmental impact of large borehole drilling in sensitive environmental protected areas
- Increased surface hardening due to grass areas being replaced with paving/fake grass reducing infiltration and increasing heat island effect

ENABLERS TO A REDUCING RISK OF CRISIS FROM DROUGHT

INSTITUTIONAL/GOVERNANCE

- Existing Organisational Development and Transformation Plan (ODTP) helped to support transversal management
- Water Resilience Task Team created by Council
- Scenarios of New Normal and associated Water Resilience Plan developed before the 2017 winter rains
- Increased interaction between businesses, City, Province and civil society
- Provincial Disaster Management Centre (PDMC) Drought Joint Operations Centre (JOC) established
- Day Zero Disaster Committee established, with many workstreams – including PODs planning, Procurement, Comms and external engagement etc
- International expertise brought in, supported by Treasury/CSP
- Conflict between Mayor and Chief Resilience Officer lead to shifts in responsibility
- Section 80 Water Resilience Advisory Committee constituted
 - yet advisors were underutilised and was not 2-way
- External partnerships strengthened such as the Western Cape economic security workstream (including WesGro, City, DEDAT, DEADP, EDP, GreenCape, NBI)
 - Shared work out where relevant and all took on different aspects
- Weekly water communicators coordination meetings for a few months at the end of 2017; Involved those in different aspects of communications within City and contracted service providers
- DWS brought squad of enforcement from around country to visit farmers to ensure they had stopped abstracting
- Water strategy being developed to work across departments and have more holistic response going forward

REGULATORY

- Harsh restrictions partially adhered to
- EIA requirements reduced due to disaster declaration - DEADP issued CoCT with a Section 30A directive
- Alternative water guidelines developed - not a document with legal status but shows what's legal and recommended
- WSI process – legal team got clarity from DWS and made easier.
- Departures from MFMA assessed in treasury which allows for cross-check which was important for being cautious about new augmentation
- Updated Water Bylaw - process started before the drought crisis, but reviewed to add further drought-related considerations (e.g. more efficient plumbing fittings, sub-metering on multi-unit private properties, and requirements for new building developments and alterations/ additions to have water demand management or alternative water from the start).
- City updated the Water Star Rating Certification system - it recognizes large (mostly industrial/ commercial) water users which are doing a good job with water management and stewardship e.g. comply with regulations; discharge water which is not too polluted; use water efficiently etc.

INFORMATION & COMMUNICATION

- International expertise brought in to advise on water strategy
- City of Cape Town Water Dashboard
- Water outlook summary (first released in January 2018)
- Day Zero scare tactics changed behaviour
- Far-reaching public information campaign in newspapers, radio, public notice boards, social media, mailers through civil society channels etc.
- Increased communication amongst residents about water issues, e.g. creation of WhatsApp groups
- High use of WhatsApp amongst City staff and with colleagues from WC Govt and other key partners. E.g. Water One Team set up by WCG
- Important role of Enterprise and Investment team in City, Province's DEADP and GreenCape working with businesses
- Extensive direct (face-to-face) stakeholder engagement with Cllrs, staff groups, civil society and business
- The City's Water Star Rating rating certification, which previously recognised large water users which managed water well in terms of minimising pollution outputs, was updated to include other aspects relevant to drought context
- 3D modelling of large user buildings (combining info of square meterage and water used) to identify those using higher-than-average amounts of water
- Business dialogues and workshops helped get message across along with communication material
 - Webpages such as ThinkWater, started with residents then also business support – linked to each other eg city page etc
 - FAQs and technical support documents
- Community water plan document (developed by EDP and published on City website) with message of connect and communicate.
 - Engaged with different groups around this including neighbourhood watches, civic groups, social movements

TECHNICAL

- Pressure management zones*
 - Water management devices*
 - Leak fixing*
 - Water re-use reclamation plants upgraded and established
 - Water map (Green dot map)
 - Diversification of water source to include ground water and temporary desalination
 - Transfer of water from Eikenhof dam to Steenbras to supplement CT water supply
 - Repairing intake at Lourens River so that additional water could be added into the system
 - Management of springs - closed down access to the spring at Kildare Road due to congestion, but City/ SAB set up alternative spring water collection point next to Newlands Swimming Pool site
- *Advantage that these had been going on for years before drought struck. Indicates that “slow” problem solving can help build capacity for ramping up efforts when “fast” action is needed.

FINANCIAL/ECONOMIC

- Ability of CoCT to shuffle budgets
- Ability of CoCT to change tariffs mid year (this ignored economic impact on businesses which has not been considered retrospectively through a tariff relief process)
- Drawing on behavioural economics to test effects of ‘nudges’
- Businesses have improved water efficiency and own augmentation
- Water technology and service businesses have flooded in (not always handled well)

SOCIAL

- Individual households in middle and high income areas invested in water security – alternative water systems e.g. rainwater tanks, boreholes, greywater re-use systems
- Social collaboration within some neighbourhoods – civil society groups, neighbourhood watch groups
- Created a sense of community among Capetonians. Exceptions of course, but overall a sense of “we were in it together”
- Improved relations between CoCT and academics, business, civil society and others

ENVIRONMENTAL

- Individual awareness of water system and how water is used increased
- Oranjezicht springs were connected to Molteno reservoir, and Albion springs water also added into the bulk supply system.
- Existing springs “trained” people to get used to the idea of queuing for water (and test out equipment such as water containers, trolleys, etc.)
- Existence of (and strong pride in) rich local water-wise flora enabling conversion to water-saving homes and public gardens and other green spaces
- Discussions on water sensitive urban design have been opened up
- Financial support (from CSP) for Working for Water helped to increase clearing of aliens in the WCWSS catchments



AFRICAN CENTRE FOR CITIES
urbanism from an african perspective

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