

– DAY ZERO AND THE INFRASTRUCTURES OF CLIMATE CHANGE: Water Governance, Inequality, and Infrastructural Politics in Cape Town's Water Crisis

NATE MILLINGTON AND SURAYA SCHEBA

Abstract

From 2015 to 2018, Cape Town, South Africa, was marked by fears of a water crisis in which the city's taps threatened to run dry. We argue in this article that Cape Town's crisis of water scarcity was a product of the convergence of ongoing contradictions in South African water governance as they came into contact with shifting infrastructural priorities associated with climate change. In its response to the possibility of a financial crisis brought on by reduced water consumption, the city withdrew the universal provision of free basic water (FBW) and reconfigured existing tariff structures. Both changes meant that the city moved further into commercialization and valuation practices in the context of restricted monetary flows. Based on an understanding of contemporary governance in South Africa as reflective of an often contradictory need to balance municipal budgets while also correcting for apartheid inequities, we argue that ongoing experiences of climate change are stretching existing municipal budgets in ways that threaten to deepen existing inequalities. Ultimately, we suggest that Cape Town's crisis is critical for understanding how climate change is reconfiguring existing governance dynamics at a planetary scale, thus offering insights into what form urban climate change adaptation may take in the future.

Introduction: anticipating crisis

In late 2016, the City of Cape Town began to call attention to impending and increasingly worrying water scarcity—the result of a multi-year drought. The possibility of a citywide water crisis became a source of deepening anxiety for the city's residents throughout 2016 and 2017. In November 2017, the city's worries about water scarcity became acutely visible as dam levels dropped to around 20%. At this time, the city proposed the idea of Day Zero, a dramatic (and apocalyptic) framing of what was to come if the city's taps were to run dry. Initially scheduled for 13 May 2018, Day Zero referred to the point at which the city's dam levels would reach 13.5%, at which point a system of citywide enforced rationing would be put in place.¹ Day Zero clearly showed just how serious the situation was, and located Cape Town's experience of scarcity in a broader planetary geography of climate change and impending climate crisis. During the weeks that followed the city's announcement of the apparent inevitability of rationing, residents were gripped by panic, a feeling heightened by the continued lack of rain and the city's unremitting demand that residents use less water. In January 2018, the city coupled its warnings about the impending scarcity with the announcement of new water tariffs. These were supplemented by the rollout of Level 6B water restrictions

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1 While framed as an inevitability, Day Zero could more accurately be framed as a tool used by the City of Cape Town to encourage voluntary reductions in water consumption. The date was determined by a relatively simple metric of dividing existing water stores by daily consumption rates.

the following month. Under Level 6B restrictions, residents were initially restricted to the use of 87 litres per person per day, a figure that was soon reduced to 50 litres. These restrictions remained in place for the next eight months, before being rolled back as the city's crisis was averted through a combination of state efforts, voluntary reductions in water usage, and the onset of rain (see Enqvist and Ziervogel, 2019; Ziervogel, 2019).

While other cities in South Africa have faced water crises in recent years, and cities throughout the global South face regularized water shortages (Peloso *et al.*, 2018), Cape Town's experience took on global significance, seemingly owing to its size, its global visibility, and its robust water infrastructure system. The city received considerable attention as a potential harbinger of a future marked by climate change, prompting extensive coverage and analysis (see, for instance, Newkirk II, 2018). The possibility of the city running out of water in the near future appears to have passed, but Cape Town remains under general threat of scarcity owing to a combination of climatological and social factors. As part of a long-term strategy to reduce consumption, the city has attempted to lower its water usage through technical mechanisms and by encouraging reduced usage. In addition, it has modified existing tariff structures while pushing for the acceleration of augmentation schemes including desalination and groundwater access.

Many analysts throughout South Africa and beyond have sought to learn from the City of Cape Town's experience and its management of the crisis. In this article, though, we wish to go beyond this uncritical celebration of Cape Town's crisis management approach towards understanding the effects of the crisis on South African water governance more generally. This study forms part of a broader endeavour to better understand how preparations for a future marked by climate change and climate crisis are deepening present inequalities, particularly in cities of the global South. Cape Town's crisis was, we argue, as much a financial crisis as an economic one, and responses to it were designed to ensure that the city's model of managing water remained financially solvent. The crisis therefore needs to be understood as a momentary event but also as a result of patterns and processes that mark South African water governance in general. Our reading of crisis is therefore dialectical: the city's crisis response reflected a new repertoire of responses but remained path-dependent because of its prioritization of engineered solutions within existing financial models. The consequence of this mobilization was the intensification of existing water governance arrangements already defined by inequality, coupled with an intensification of processes of water commercialization and valuation² that threaten to limit equitable access to water into the future.

We are making this claim not with the intention of denying the existence of a drought, nor to dismiss the city's notable reduction in water consumption (see Wolski, 2018; Muller, 2018, New *et al.*, 2018), but in order to extend the debate beyond a technical discussion on crisis response towards an examination of the relationship between climate change, evolutions in water governance, infrastructural politics, municipal finance and sociospatial (in)equality. In doing so, we counter a dominant reading of the crisis as an unprecedented or unexpected occurrence linked to a changing climate. We contend instead that the appearance of crisis should be read as both rupture and continuation. Crisis reveals inherent contradictions within the existing water governance model that has contributed to a deepening of sociospatial inequality.

We respond to the possibility of a financial crisis brought on by reduced water charges owing to reduced consumption by arguing that the city undertook two fundamental changes into the nature of water governance in Cape Town. The first

2 Commercialization entails the use of market-based instruments and institutions in resource governance. These include prioritizing efficiency, full cost accounting and cost-benefit analysis (Bakker, 2014: 465). Economic valuation entails the pricing of resources with the goal of inducing behavioural change—for example, reductions in resource consumption (*ibid.*).

intervention was the withdrawal of the universal provision of the first 6 kl of free basic water (FBW), which had been available in South Africa since 2001. Since July 2017 all water became chargeable within a stepped tariff structure, and FBW is applicable only to households that are able to declare themselves formally indigent. However, the formal registration process for this is arduous, especially for poor residents who are effectively required to prove their status. Secondly, the crisis has led to a reconfiguration of the existing tariff structures through the introduction of a revised water tariff that aims to correct for reduced water usage as a result of the drought. A consequence of the tariff restructuring has been that demand management and the FBW programme are now more deeply intertwined. Despite stated efforts to account for economic, equity and environmental considerations, the city has moved further towards commercialization and valuation practices in the context of restricted monetary flows.³ Both these changes have implications for equitable water access and distribution in the future.

In this article we focus on the relationships between climate change, municipal governance in a Southern city, and infrastructure, in order to contribute to scholarship on urban water governance in human geography and political ecology that recognizes the new uncertainty that climate change poses to water management for cities (Punjabi, 2015: 1038). This is a critical domain of scholarly inquiry that extends past quantitative engagements with water provisioning to instead highlight the intimate relationships between water governance, spatial inequality, increasing climatic and fiscal uncertainty, and infrastructural politics (Jepson *et al.*, 2017). We draw from contemporary literature on the material politics of climate change transitions and decarbonization experiments (see Bulkeley and Castán Broto, 2013; Cohen, 2016; Knuth, 2018) that highlight the degree to which climatic risk is deeply intertwined with financial and governmental risk. Cape Town's crisis is critical for understanding how climate change is reconfiguring existing governance dynamics at a planetary scale, and offers insights into what form urban climate change adaptation may take in the future. In particular, by highlighting the contradictory logics between equitable infrastructural provisioning and the need to ensure that budgets are balanced, our research contributes to a growing body of literature focused on the political ecologies of the climate crisis and the difficult spatialities and materialities of a just transition in the context of structural inequality (Bigger and Millington, 2019; Elliott, 2019; Koslov, 2019; Ranganathan and Bratman, 2019).

Our ultimate concern, and our contention as critical scholars of water governance, is that the climate crisis, and responses to it within the contexts of both municipal and provincial austerity, will further deepen existing inequalities while they are being articulated as part of purportedly new climatic and environmental dynamics. Shifting tariff structures and the alteration of existing arrangements of guaranteed water are suggestive of the kinds of banal yet critical ways in which the climate crisis is articulated within existing infrastructural and bureaucratic pathways. The crisis has accelerated existing tendencies in South African water governance, deepening the tensions between fiscal solvency and water redistribution goals, with consequences for future access. We argue that rather than resolve the contradictory dynamics of water governance in South Africa, the response to the 2015–2018 crisis displaced its effects to marginalized residents and on to the future. This has implications for our understanding of the politics of climate change adaptation, in South Africa and beyond.

Methodologically, this project draws on semi-structured interviews with decision makers and water activists in Cape Town, and on participant observation of meetings and events related to water crisis and political mobilization. Among those

3 We note, too, that the crisis unlocked new possibilities for the expansion of desalination as a means of water provisioning. We intend to explore these dynamics in future work, but for now merely note that the expansion of desalination furthers and complements the arguments made in this article.

interviewed were four mid-level and high-ranking officials within the City of Cape Town Water and Sanitation Department, including the Bulk Water Branch and the Water Demand Management Branch. Further interviews were held with respondents in the academic and civil-society sector who were actively engaged in mobilizing efforts during the drought response period. In addition to conducting interviews, both authors participated in events and meetings related to the crisis called by the City of Cape Town and civil-society actors, as well as a number of forums and presentations related to the city's water crisis as it was happening. These included public and invited talks held by the political and official heads of the Informal Settlements, Water, and Waste Department of the City of Cape Town, and activist meetings convened by the Water Crisis Coalition and the African Water Commons Collective. Second author Suraya Scheba attended two of three water round table events convened during 2018 and 2019 by South African water justice activists. In addition, our research drew from extensive discourse analysis of documents and media coverage related to the water crisis.

The infrastructures of climate crisis in an unequal city

The crisis of 2015 to 2018 emerged within and through an existing South African water governance model that is known for its contradictions. In South Africa, fundamental and intractable tensions hold water governance and its (un)sustainability in place.

– Situating water governance in South Africa

In this article, we argue that the City of Cape Town's responses to the water crisis, largely in the form of tariff restructuring and changes to the provision of FBW, should be read as a response to the threat of a financial crisis as much as a drought crisis. In making our argument we endeavour to offer both a historicized and a systemic reading of crisis emergence and management. We locate this argument in conversation with Gillian Hart's characterization of the post-apartheid period as an 'impossible terrain' defined by a complex, contradictory and volatile relationship between scales of government, the need to address deep existing inequalities, and a simultaneous impetus to maintain fiscal solvency (Hart, 2014: 5). This struggle manifests itself most strongly at the municipal level, as official commitments to overcome poverty and inequality in the post-apartheid context sit uncomfortably with drives for fiscal austerity.

Most notably, local government has been tasked with being the principal agent of service delivery (McKinley, 2005; Dugard, 2010; Palmer *et al.*, 2017), but has simultaneously been severely affected by a drastic reduction in grants and subsidies and a prohibition on operating budget deficits (McKinley, 2005; von Donk *et al.*, 2008; Palmer *et al.*, 2017). The scalar relations and constrained conditions informing the municipal terrain are evident from a recent report by the South African Water Caucus (SAWC) on the state of the Department of Water and Sanitation (DWS). This report reveals that the national department is mired in institutional challenges, including financial mismanagement, escalating debt, capacity constraints and an ensuing deterioration of infrastructure owing to lack of maintenance and investment (SAWC, 2017). One consequence for local government under these conditions of fiscal austerity, coupled with the entrenchment of a service delivery mandate, has been that the public water supply network has experienced a vicious cycle of what Dugard (2016) terms the three lows: low investment, low service standards and low cost recovery.

A further consequence has been that many municipalities have been pushed towards the commercialization of basic services in an effort to generate revenue (McKinley, 2005, cited in Dugard, 2010: 183). The subsequent prioritization of commercialization has led to the use of market-based instruments and institutions in water governance, including full cost recovery. This has resulted in municipal utility services being ring-fenced and cost-reflective, that is, these services are being treated

like a business entity: they have to balance their budgets, and account for service revenue and costs. This situation has resulted in an emphasis on recovering the full cost of service delivery, which these services aim to achieve through municipal tariffs (COCT, 2018a; 2018b).⁴ The City of Cape Town has identified the criteria for setting the tariffs, noting that a number of criteria need to be balanced, including financial, environmental, social and economic criteria. The city then states that the ‘aim is for the tariff to reflect the value of water and sanitation services to ensure sustainability and in a manner which provides transparency’ (COCT, 2018b: 4).

The need to manage municipal services at the local level in the context of a dysfunctional national entity and fiscal austerity has meant that infrastructural provisioning and inequality play out in complex, multiscalar ways. This argument builds on a longstanding tradition of critical scholarship examining post-apartheid water governance in South Africa (Hemson, 2000; McDonald and Pape, 2002; Smith, 2004; Loftus, 2005; McDonald and Ruiters, 2005; McKinley, 2005; Peters and Oldfield, 2005; Ruiters, 2007; Jaglin, 2008; Dugard, 2010; Narsiah and Ahmed, 2012; Yates and Harris, 2018; Angel and Loftus, 2019). We draw, in particular, from Yates and Harris (2018), who chart the co-evolutionary relation between neoliberal and human-rights-to-water-oriented transformations in Accra and Cape Town. The authors argue that these concepts ‘co-constitute each other discursively, practically, and in policy implementation’, resulting in a hybrid regulatory landscape (*ibid.*: 75). Critical scholarship on water governance in South Africa has been central in documenting the particular contradictory efforts to balance egalitarian service delivery with cost recovery, demonstrating the ways in which these competing criteria further intensify enduring inequality. These considerations are further complicated by the historical materiality of the South African city, which is marked by intense racialized inequality. As Gastrow (2018, npn) argues, ‘South Africa’s cities were never made for everyone’ (see also Rodina, 2016).

We argue here that the crisis of 2015 to 2018 cannot be understood outside of this critical understanding of the already precarious and contradictory water governance system, which is defined by multiscalar fractures in conjunction with historical and persistent inequality. Instead, it is this existing system, characterized by increasingly constrained efforts to balance multiple criteria, that fused with the uncertainties of climate change to produce the crisis of 2015 to 2018. This reading of the ongoing ‘impossibility’ of balancing competing governance commitments is supported by Hart, who argues:

Broadly speaking, local government has become the impossible terrain of official efforts to manage poverty and deprivation in a racially inflected capitalist society marked by massive inequalities and increasingly precarious livelihoods for the large majority of the population ... While local government contradictions have their own specificities, they cannot be understood simply in local terms (Hart, 2014: 5).

Our specific aim with this article is to reflect on the ways in which the inherent contradictions within this ‘hybrid regulatory landscape’ contributed to the emergence of the crisis and the responses to it. Furthermore, we consider how these tensions are informing a reconfiguration of the landscape, with regressive consequences for future equity. Existing tendencies within South African water governance converged with the uncertainties and shifting infrastructural priorities associated with climate change to produce the localized crisis of 2015 to 2018. By adopting a historicized reading of the

4 The domestic tariff is a stepped tariff, whereas the industrial, commercial and institutional (ICI) tariff is charged at a flat rate.

crisis, we make the case that it was located within an existing path dependency that was guided by a contradictory governance model—one defined by ongoing tensions between ecological, economic and equity imperatives. These inherent contradictions can be regarded as informing the ongoing challenges that the majority face and which manifest themselves at the local level. This is a sustained crisis of unequal distribution that remains unnamed: ‘Poorer, usually Black South Africans, have been dealing with water scarcity for decades’ (Gastrow, 2018: npn). Ultimately, what is spectacular about the crisis from 2015 to 2018 is that it produced a rupture in status quo arrangements that otherwise secured the lifestyles of the wealthier residents of the city, resulting in widespread panic and governance shifts. At its heart, however, the apparent momentary emergence of the city’s water crisis cannot be understood outside of related multiscalar, historical and systemic infrastructural and financial constraints.

– Urban infrastructures, urban political ecology and climate crisis

In our argument we draw on critical engagements with water governance that extend beyond South Africa. These studies have sought to transcend a technical or managerial debate about water governance and infrastructural provisioning through considerations of broader political, social, cultural and ecological domains (see Swyngedouw, 1996; 2004; Kaika, 2005; Swyngedouw, 2009; Anand, 2011; Linton and Budds, 2014; Ranganathan, 2014; Anand, 2017; Carse, 2017; Furlong and Kooy, 2017; Truelove, 2019a). Often framed as a concern with the ‘hydrosocial cycle’, critical engagements with water governance significantly offer a nuanced reading of the insertion of water into market dynamics as part of a broader interest in the longstanding tradition of neoliberal natures within geography (see Smith, 2007; Castree, 2008; Bakker, 2010; Ouma *et al.*, 2018). In this regard, the work of Karen Bakker (see, for example, Bakker, 2010) has been instrumental, as it details the evolving conception and enrolment of water into capitalist markets from a precondition for commodity production towards later inclusions as a commodity in and of itself (Bakker, 2010; 2015; see also March, 2015; Williams, 2018). Bakker (2010) points out that much of this debate has unfolded as a public-versus-private binary. She argues for more nuanced reflection, arguing that water systems in much of the global South are not a public-versus-private binary but a hybrid form of provisioning (Sultana, 2015; see also Furlong and Kooy, 2017; Yates and Harris, 2018). Recent scholarship has also highlighted two further trends, namely an increasing movement towards remunicipalization (Loftus, 2009; Lobina, 2017; McDonald, 2018) and the continued growth of private-sector activity in the water sector (Bakker, 2013; Karunanathan, 2019).

Our work draws on an extensive body of scholarship concerned with urban political ecology (Heynen *et al.*, 2006; Heynen, 2014; Ranganathan and Balazs, 2015; Heynen, 2016; 2018; Truelove, 2019b) and the politics of urban infrastructural systems (Larkin, 2013; Amin, 2014; Furlong, 2014). For von Schnitzler (2016), attention to the infrastructural can open up space for attending to politics that exist outside of normative articulations of where politics take place and by whom (see also Anand, 2017). A focus on what von Schnitzler—following Michell (2002) and Hecht (2012)—calls ‘techno-politics’ considers ‘the ways in which political actions are embedded within technical forms and, conversely, the ways in which the technical shapes political questions’ (Schnitzler, 2016: 10; see also Larkin, 2008; Amin, 2014; Meehan, 2014). While the scholarship on infrastructure has become expansive within geography and urban studies in recent years, our attention is on the banal dynamics of budgeting for and governing of urban infrastructural systems in a context of shifting climatic and environmental dynamics at a number of scales. We are ultimately concerned with how infrastructures are rendered political in crisis contexts.

In contrast to more spectacular or apocalyptic framings of crisis events, our intervention in this article is aimed towards the banal, everyday dynamics of municipal governance. We highlight forms through which governance is being reconfigured by

new uncertainties borne from climate change, but note that these shifts are located within existing historicized dynamics. In contrast to the spectacular forms through which the water crisis in Cape Town was framed in the media and within governmental discourses, responses to the crisis have largely been operationalized in and through the everyday mechanics of governance, including drought-related task-team meetings, and concerns centred on fiscal solvency and restructured water tariffs (see COCT, 2019). Our aim with this article is therefore to push against apocalyptic imaginaries of the water crisis to focus on the mundane but nevertheless absolutely critical fiscal and governmental dynamics into which the climate crisis is inserted, with the intention of highlighting the path dependencies of existing approaches to water governance to show clearly that the emergence and management of the city's crisis was produced in and through existing contradictions that mark the water sector.

Managing contradictions: water crisis and urban governance in Cape Town

South Africa has had a FBW policy since 2001, based on citizens' right to water, as laid down in Section 27 of the South African Constitution and the Water Services Act No. 108 of 1997. This policy at present sets the minimum standard for FBW supply at 25 litres per person per day, or 6 kl per household per month, within 200 m from the home (SERI, 2013; 2018; Rodina, 2016). Municipalities can decide how to apply the FBW policy—the only legal requirement being the guarantee of FBW to (registered) indigent households (SERI, 2018; Yates and Harris, 2018).⁵

The development of FBW demonstrates the complexities of balancing competing criteria for water provision, which include a commitment to water availability alongside a push towards commercialization. Municipalities have struggled to manage this requirement while simultaneously having to balance their budgets. As a result, they have created mechanisms for managing FBW allocations that include the deployment of technologically mediated forms of water management linked to debt recovery. Ruiters (2016) explains these apparently contradictory tendencies by arguing that the FBW policy was developed to be integral to cost recovery, and remains a feature of commercialization (Ruiters, 2016; see also Dugard, 2010; Dugard *et al.*, 2017; Yates and Harris, 2018).⁶ Until recently, the City of Cape Town's response to this policy and the constitutional guarantee of access to sufficient water had been through the universal provision of 6 kl of FBW per household per month, and 10.5 kl to registered indigent households per month (Kaiser and Macleod, 2018: 10). Residents' experiences of water access are however, spatially variegated, with low-income townships in the city defined by lower levels of access, especially when considered qualitatively (see Dugard and Tissington, 2013; Hellberg, 2014; Rodina, 2016).

– Remaking free basic water

In the context of the ongoing water crisis the universal FBW allocation was further eroded by and subsumed within a demand management approach (SERI, 2018; Yates and Harris, 2018). Municipal anxiety about demand management stretches as far back as 2007, with the city drawing on experiences in Durban (during 1998) and Johannesburg (in 2001) in developing its ten-year water demand strategy.⁷ This strategy, designed to address cost recovery in service provision and to support water conservation, resulted

5 Census data from 2011 revealed that 96.6% of households in Cape Town had access to piped water within 200 meters of their home and 87% had access to water inside their dwelling or yard (COCT, 2012; Rodina, 2016).

6 Similarly, Bakker (2013) maintains that while apparently contradictory, arguments for the human right to water are not incompatible with movements towards commercialization, and monetary management of access. Instead, 'the current international human rights regime is fully compatible with private property rights and private management' (*ibid.*: 257). This analysis has prompted Bakker and other critical scholars to suggest that the call for the human right to water might be an insufficient tactic by anti-privatization activists (*ibid.*, see also Bond, 2013).

7 Concerns centred on demand management were tied into the construction of the Berg River Dam, the recognition of limited opportunities for further construction of large-scale water infrastructure in the region, and earlier periods of water scarcity necessitating restriction (in 2000/2001 and 2004/2005).

in the installation of water delivery technologies such as water management devices (WMDs) (Yates and Harris, 2018: 78). These devices are designed to restrict water access above the FBW quantity by automatically cutting off the water supply once the limit has been reached. The city started installing these as a credit control measure in 2007. An extension of the prepaid devices detailed by von Schnitzler (2017),⁸ these devices allow residents to receive 350 litres of FBW per household per day. Since 2007, around 250,000 of these devices have been rolled out, largely in homes deemed indigent (Galvin, 2018).

As prepaid devices had largely been installed in indebted homes over the past decade, the installation of WMDs affected poor households disproportionately and have been widely contested in the post-apartheid period (Peters and Oldfield, 2005; Loftus, 2005; von Schnitzler, 2008; Yates and Harris, 2018; Angel and Loftus, 2019). The devices were declared legal following the Mazibuko ruling,⁹ with the regular dynamics of device breakdown becoming a longstanding complaint of activists and residents. In a study conducted in 2012, the Environmental Monitoring Group (EMG) identified a number of failures in the implementation of these devices. EMG argued that the installation of WMDs gave rise to ‘a high incidence of technical failures leading to cut-offs, recurrent leaks leading to the allocated 350 litres per day running out quickly, a poor (or non-existent) consultation process, and slow response times from the City when people reported problems’ (Wilson and Pereira, 2012). Moreover, these technologies could result in restricted water allocations, as household surveys often did not account for the number of household members nor for the number of households on a single plot. This reveals the complex, uneven landscape of overlapping infrastructural inequalities in the City of Cape Town, especially in a context where plots are often subdivided due to limited incomes.¹⁰

Despite historical resistance and critique of the conjoinment of FBW and demand management approaches (Yates and Harris, 2018), FBW became increasingly central to a demand management approach in the context of the water crisis. The number of devices that were being installed increased substantially to 2,000 per week as part of the city’s drought response, as the city ‘accelerated the rate at which we installed devices on all those indigent properties, and all those people who were also getting in debt who were not indigent properties’ (interview with an official of the Water Demand Management Branch, 19 August 2019). This expansion was based on a change in the nature of FBW, in particular the decision in July 2017 to make FBW entirely dependent on residents’ registration as indigent. Non-indigent households were from then on required to pay a charge for the first 6 kl unless they were declared indigent.¹¹ The reasoning for expanding the use of WMDs was related to concerns about balancing municipal revenue in the context of the drought situation. According to official sources, the imposition of increased water restrictions under drought conditions, from 1 January 2018, resulted in significantly reduced revenue, with less than one quarter of the cost of water provision covered at the time (Kaiser and Macleod, 2018).

Under this approach, where access to FBW is no longer universal but instead dependent on need, indigent households receive their first 10.5 kl of water and 7.35 kl

8 WMDs are often referred to as ‘prepaid meters in disguise’, since most of the arguments against prepaid meters seem to continue with them, including the limiting of allocation and the targeting of poor households.

9 This refers to the matter of the City of Johannesburg and Others v Mazibuko, which concerned two main issues related to the City of Johannesburg’s water services policy and provision: the reasonableness and sufficiency of the city’s FBW allocation of 6 kl per household per month, and the lawfulness of the city’s imposition of prepaid water meters on poverty-stricken households in Phiri, Soweto. The court ruled prepaid meters to be lawful.

10 Furthermore, this technologically mediated conjoinment of FBW, demand and debt management has led critical scholars to write about the paradox of FBW and cost recovery, showing its effect on increasing household debt and municipal financial loss (Peters and Oldfield, 2005). Loftus (2005) and von Schnitzler (2008) have argued for an understanding of these technologies as instruments of water commodification, which transform FBW into a free basic commodity. In her reflection on prepaid water meters, von Schnitzler (2008) argues that these can ‘be seen as the capillary ends of “cost recovery” that turns basic needs into new spheres of accumulation’ (*ibid.*: 901).

11 This charge was initially set at R4 per kilolitre for the first 6 kl, and rose to R33.24 per kilolitre during imposition of Level 6 restrictions.

of sanitation free per month. However, the allocation of free water is linked to the installation of a WMD, conditional upon indigent registration and thus not voluntary. Hence, while claims of skewed WMD distribution are difficult to verify empirically, given limited data availability from the city administration, it is likely that WMDs were being disproportionately installed in poor households based on the relationships between debt, indigent status, infrastructure and implementation. Inequity here is likely to have been less a consequence of malicious design than a product of existing infrastructural inequality and failure, which interlink to determine how inequality is experienced materially (see Millington, 2018). However, regardless of intent, the effects are the same. Significantly, the narrow targeting of indigent households for FBW provision, coupled with the installation of a WMD, is reflective of a wider trend across South African cities (SERI, 2018: 9). According to a representative of the Western Cape Water Caucus (WCWC),¹² ‘this is a move that we are seeing more and more ... as the Water Caucus, it worries us because the universal free basic water ... provides a safety net to those who don’t quite register as indigent or for some reason cannot’ (interview with representative of the WCWC, 2019).

The condition of registration as a requirement to receive free basic services is a worrying trend in a context of already intense inequality and can quickly become regressive, as it ‘will inevitably exclude poor households who could benefit ... because several factors emerge that serve as a deterrent’ (SERI, 2018: 40). First, this narrow targeting approach fails to recognize that the registration process can be exclusionary, as households are required to prove their eligibility. This practice has historically proven to be burdensome, and to exclude many poor and vulnerable people as it presents ‘a significant cost to the poor and in instances where individuals are employed in the informal economy it becomes almost impossible’ (*ibid.*). Furthermore, the complexity of the process serves as a deterrent to many (Dugard, 2016). Finally, the definition of ‘indigent’ is inconsistent across South Africa, resulting in the exclusion of many who are in need of benefits. The net effect is that indigent residents are under-representative of those in need of services (SERI, 2013; 2018; see also Yates and Harris, 2018). But, as the same WCWC representative as above notes: ‘To register as indigent you have to have an SA ID [South African identity document book], you have to jump through all of these hoops’ (interview with representative of the WCWC, 2018). An ID book or card is only one example of the ways in which indigent registration can be burdensome for members of low-income communities in particular.

By describing both the historical practices and the remaking of FBW as a fundamental crisis response, we seek to point out the extent to which this remaking threatens to further intensify existing urban inequalities by tying the crisis to a deepening of the relationship between FBW and demand management infrastructures and practices. The City of Cape Town’s crisis response has linked access to water explicitly to the requirement of indigent registration and the conditional installation of a WMD—itsself already a controversial technological intervention. As Angel and Loftus note in their study of similar dynamics in Durban (see also Hellberg, 2014; Dugard, 2016; Yates and Harris, 2018), ‘the development of indigent policies by individual municipalities from the late 2000s has meant that the state is not only able to decide what is and what isn’t a just distribution of water but also who is and who isn’t the deserving poor in relation to municipal service provision’ (Angel and Loftus, 2019: 208). Hence, instead of lauding Cape Town’s approach uncritically and extracting lessons from its drought response that other cities can learn from, we express concern about the future implications of the city’s regressive practices, particularly for the already marginalized residents of the city.

12 The WCWC is affiliated with the Coalition for Environmental Justice and the South African Water Caucus, which operates nationally.

– Changes in water tariffs, and valuing water

In July 2018, the City of Cape Town instituted revised water tariffs that consisted of three parts: a fixed service charge, restriction-related water costs that included charging for the first 6 kl of water for non-indigent households, and sanitation costs. The service charge is a newly introduced fixed charge for infrastructure to supply water to the home. While linked to temporary price increases following water restrictions, the new service charge was calculated based on the size of the connection to the property and will remain in place irrespective of restriction levels.

Restrictions imposed during the crisis resulted in a sharp rise in water costs within each of the stepped block tariffs.¹³ At Level 6, the cost of up to 6 kl was R33.24 per kilolitre (Step 1 tariff), followed by a cost of R52.90 per kilolitre up to 10.5 kl (Step 2 tariff), with costs rising further for Steps 3 and 4. As these costs were linked to water restrictions, they were reduced as dam levels rose and restriction levels were lowered, first back to Level 5 in October 2018 and then to Level 3 in December 2018 (COCT, 2018). Despite this price reduction, it should be noted that the drought affected water valuation, as reflected in the water cost per kilolitre. When comparing Level 3 restrictions in December 2016 to Level 3 restrictions in December 2018, for example, it becomes clear that the cost per kilolitre for the first 6 kl increased from R0 to R15.73 per kilolitre. When comparing the cost per kilolitre for the next block, from 6 kl to 10.5 kl, the cost increased from R16.54 per kilolitre to R22.38 per kilolitre. It is also significant that six tariff blocks were in place in December 2016, with those using in excess of 50 kl per month paying R200.16 per kilolitre. Within the current tariff structure this changed to four tariff blocks, with a maximum charge of R69.76 per kilolitre for usage that exceeds 35 kl.

The reasoning for the tariff restructuring resulted from the need for municipalities to be financially sustainable in the context of reduced water usage. This concern to balance cost recovery with commitments to equitable access and water conservation is not new, and has been a consistent feature of the post-apartheid water governance model. The resulting contradictory hybrid framework has been widely contested by communities living on the receiving end of technologically mediated cost recovery practices and extensively documented by critical scholars over time. As we argued earlier in this article, this inherent historical tension contributed to the emergence of the Cape Town water crisis in the first place, as defined by the ‘impossible terrain’ documented by Hart (2014). However, the experience of crisis deepened these dynamics, as existing modes of cross-subsidization were altered by reduced water consumption across all spheres.

The financial resilience of the DWS within the City of Cape Town was precarious before the start of the drought owing to the limitations of the city’s financial model and historical underfunding (COCT, 2018b). As the May 2018 Water Outlook Report documents, historical underfunding contributed to the initial emergence of crisis conditions as a factor that extended beyond environmental considerations:

Water and Sanitation operations have been underfunded for a number of years due to approved tariffs being at levels insufficient to cover costs. This resulted in ... concern regarding expenditure on asset renewal and maintenance, and postponing planned augmentation (COCT, 2018a: 11).

Furthermore, the September 2018 Water Outlook Report states: ‘Pressure to keep the tariff as low as possible has resulted in the business being underfunded for a number of years’ (COCT, 2018b: 5).

13 South African municipalities make use of block tariffs, which entail a rising tariff curve per block. These tariffs are designed to ensure access to water for low-income residents and support cross-subsidization. However, there has been extensive debate about the outcomes of this approach in practice (see Wilson and Pereira, 2012).

Tariffs that are too low only make sense in the context of an underfunded water distribution system where cost recovery is mandatory. The drought exposed the limitations of this financial model and pushed it to the brink. During the drought, less revenue was generated as a result of imposed consumption restrictions and voluntary water usage reductions across the city. This occurred at the same time as demand management and augmentation infrastructure expenditure increased, while the fixed costs of infrastructural provisioning remained the same. This placed strain on the DWS as a trading service and required the city to re-prioritize its overall expenditure to provide additional support (COCT, 2018a; 2018b; Kaiser and Macleod, 2018; Ziervogel, 2019).

City documentation clearly indicates that the crisis responses were informed by a concern with financial sustainability in the context of shifting climatic terrain, stating that the ‘current tariff structure is not resilient to drought’ (COCT, 2018a: 11). This can be attributed to the fact that water tariffs need to cover the full long-term cost of delivering the service, excluding capital and operating subsidies for free basic services. For this reason, cost recovery is vulnerable to changes in consumption patterns, while it still needs to account for fixed costs and the costs of providing infrastructure (COCT, 2018a; 2018b). In their detailed explanation of the reasoning for the tariff restructuring, Kaiser and Macleod state: ‘While pricing is not always the most effective mechanism to entrench the concept of value, it was a necessary move to establish financial sustainability for the Water and Sanitation Department as a utility service’ (Kaiser and Macleod, 2018: 10–11). Furthermore, in their future vision for city resilience in respect of water availability and finance, the authors explain: ‘As a ring-fenced, cost-reflective service, the tariff structure needs to cover costs to ensure continuous service provision’ (*ibid.*: 11).

Critically, the drought experience resulted in reduced consumption levels throughout the city, but in particular among wealthier, higher-volume consumers whose consumption habits typically served to cross-subsidize the usage of the poor (a standard and longstanding dynamic of South African infrastructural governance). One respondent noted that:

normally we would have progressive step tariffs ... The theory behind that, obviously, would be that you’re utilizing the rich people to pay for the poorer people. So it’s part of your cross-subsidization. What the drought has done is the people that were utilizing in Step 2—sorry, Step 3 and 4 [of the tariff blocks]—is no longer doing that ... the consumption in those steps has evaporated. Pun intended. What that meant is that your whole cross-subsidization model was sort-of pulled away from you because you no longer have those high volumes in those steps to actually do the cross-subsidization. So what happens is that you can only now go to where you know there is certainty. Okay, so where normally you would have had quite low tariffs at the bottom end and high tariffs at the high end, because there’s none left, you need to immediately start bringing your Step 1 and 2 much closer to your actual cost of what it costs you to produce that. No more cross-subsidization. Now, obviously, that immediately has impact for your poorer people. And the people that previously paid more, you know, they can probably absorb it, but your lower middle class is also struggling. So, that whole thing is something that has been pushing on us. Because you have to make that change, because what you need to realize is we need to run a sustainable service ... So I think what I’m trying to say to you is that the drought has significant impacts on your financial model. It had an impact on the cross-subsidization model. And it had a very big impact on your base information (interview with representative of the DWS’s Financial and Commercial Sector, 25 September 2019).

More recently, the city sought to reduce the restriction levels, and Level 3 restrictions were instituted in December 2018. However, consumption patterns have not changed substantially relative to the restricted usage of 500 Ml per day during peak Level 6 restrictions. Local residents have thus highlighted the disjuncture between water demand management and the need to properly fund water services through tariff restructuring. A poster on a Facebook group that emerged during the crisis noted:

Unless we use more water we can expect to pay further levies instead. Thus we will forever pay more for water (than necessary) and essentially therefore pay for not using water ... all the while when we currently have abundant supply ... Our current relationship with water, though it saved us from a Day Zero crisis, is now problematic. We need to consume more in times of relative plenty (and stabilize COCT water revenues) otherwise we will simply keep using less and less while having further levies introduced and relatively full dams in summer ... nice to look at and photograph perhaps, but hardly a sensible relationship to have with stored water (Watershedding Facebook group, December 2018).

The tariff restructuring reflects the evolving management of tension between economic, equity and environmental considerations. Restructuring, which can be attributed the limitations of the existing water finance model (see Ziervogel, 2018), is defined by a ring-fenced water department of a municipality that is required 'to cover costs to ensure continuous service provision' (Kaiser and Macleod, 2018: 11). It is the result of tensions that are a feature of historical continuity and have been reconfigured in response to the intensification of the contradictions in the context of the drought crisis. The emergence of tariff restructuring is therefore an effort to avert a funding crisis. However, it has not led to a fundamental redesigning of the model (*ibid.*: 10–11). Instead, in our view, the South African water governance regime is defined by internal tensions and contradictions, most notably a concern to manage a commitment to equitable distribution while simultaneously needing to ensure full cost recovery. The crisis management approach thus exposes and engenders these contradictions, resulting in a negotiated outcome that further prioritizes economic over equity commitments. This is evident from the reconfigured and binding relationship between FBW, debt and demand management, WMDs, indigent registration and tariff restructuring.

– Crisis, change and stasis

By drawing these arguments together, we have attempted to advance an understanding of Cape Town's water crisis as historically situated, relational and systemic. We began by arguing that post-apartheid water governance is defined by multiscalar infrastructural and financial constraints. These constraints have resulted in an 'impossible terrain' (Hart, 2014) defined by contradictory commitments to equitable water provision and water marketization. One consequence of this 'impossible terrain' is a spiral of infrastructure underinvestment. We therefore argue that these existing tendencies and tensions within the system fused with the uncertainties presented by climate change to contribute to the crisis of 2015 to 2018. Reading the crisis in this way allows us to acknowledge the temporality of the crisis, as it is located within existing path dependencies. In this sense, the crisis can be understood as a systemic rupture that reveals the contingency and ongoing contradictions inherent to the system.

The City of Cape Town's crisis interventions were concerned with navigating drought risk, but its actions unfolded in relation to ongoing concerns centred on fiscal austerity and systemic resilience. Thus, drought resilience was from the outset deeply intertwined with existing concerns to ensure financial resilience. In and through this complex navigation, the promoted interventions led to an intensification of the marketization of water and an erosion of equity considerations. Therefore, these

interventions need to be understood as a continuation and deepening of an existing path dependency, defined by commercialization and valuation tendencies in the context of fiscal austerity. Furthermore, the city's management of the water crisis clearly showed that there are no distinctions between a financial and an ecological crisis (see Moore, 2011; 2015). In other words, these crises are entirely relational.

We understand crisis to be a general condition of South African water governance. It is a systemic crisis that exists in 'normal' times too, and results in differentiated experiences of water access in general (see Rodina, 2016). What the named water crisis (Day Zero) did was disrupt the existing inequity of the system by limiting the access of those who are otherwise privileged. This meant that the broader structural crisis of water governance was generalized as a result of an environmental shock. This named crisis was then resolved through changes to the city's tariff structures and the renegotiation of the FBW policy, disproportionately affecting the city's most marginalized residents.

The crisis and the anticipatory apocalyptic framings of Day Zero emerged in and through historicized dynamics in spite of the oft-repeated refrain that 'doing nothing is simply not an option' (COCT, 2019). As a result, future water management outcomes remain trapped in past contradictions and may therefore result in what Anand *et al.* (2018: 27–28) call 'the ruins of the future'. This form of ruination is arguably already materializing through infrastructural incompleteness and breakdown and the deepening of marginalization as a result of the restructuring outlined in this article. Hence, by tracing interventions and their consequences, we argue that instead of resolving the existing contradictions in the system, the response has simply shifted the problem. We suggest that this displacement has taken place in at least two senses. The first is a geographic and social displacement, which has led to a deepening of the crisis for the already marginalized residents of the city through the erosion of FBW and tariff restructuring, indigent registration requirements, and WMD installation. Consequently, historical inequity has been merged with climatic uncertainty to create forms of continuing and intensifying eco-apartheid (Cohen, 2018). The second is a temporal displacement, which has led to a shifting of the crisis towards a future moment, because the root causes of the crisis remain unresolved and have been contained only temporarily.

Conclusion: water crisis, anticipation, climate justice

The City of Cape Town's crisis management response, which attempted to manage demand through revised FBW provision, the installation of WMDs, and the restructuring of tariffs, suggests a degree of both stasis and change. In this article, we considered how Cape Town's water crisis marked a point of discontinuity and continuity in Cape Town's water governance, and we cautioned against a framing of the city as having both experienced and surpassed the crisis. While the crisis resulted in the governance reconfigurations that were highlighted here, we argue that these changes are located within a historical path dependency that is influenced by the financial model the water sector uses and by the contradictory commitments of equity, water conservation and economic performance. In this sense, the Cape Town crisis management response can be read by paying attention to the 'contradictions, limits and constraints' within the sector (Yates and Harris, 2018). In Cape Town, the infrastructure–finance nexus has emerged as key to water delivery (Palmer *et al.*, 2017).

The water management strategies that the city instituted in the context of the water crisis have served to reinforce the logics of commercialization and water valuation, threatening to deepen inequality. Tensions between the demands for financial solvency and for reduced water usage emerged in the form of crisis and led to responses that are concerned not only with returning water access to pre-crisis conditions but also with finding ways to manage existing tensions that have been heightened by the city's experience of crisis. Our concern is that equity considerations have largely

been subsumed within the commitment to financial sustainability, which has been complicated further by the threat of environmental crisis. The city's response to the crisis can be understood through changes to the regulatory and infrastructural landscape that served to displace these contradictions through intensified commercialization and water valuation.

While we acknowledge that the City of Cape Town has to walk a tightrope to balance these demands, we argue that without fundamental restructuring in distribution practices and the financial model underpinning this, inequality will deepen. The city performed well in many respects, especially by avoiding Day Zero, not committing to larger-scale desalination (for now), and encouraging substantial buy-in for consumption reduction. However, co-existing tensions around budgeting, inequality and climate change reflect complex relations. If these are to be managed in ways that support more just futures, a more profound shift in the fundamental logics that are shaping water governance will be required. The fundamental tension between economic and equity considerations that inform the current water distribution model are further complicated by environmental imperatives and increasing pressures to manage changing climatic conditions. We believe that equity considerations have been subsumed under economic considerations as a result of the city having to operate within an increasingly constrained budget. This has been the case historically, and has informed the city's commercialization approach. However, the drought has intensified the unsustainability of the current model. Surpassing this existing dynamic requires fundamental rethinking and action.

Ultimately, the current dynamics are indicative of the forms and pathways through which climate crisis is materializing. Climate crisis is generating new dynamics of governance (see Paprocki, 2018), and these are occurring in and through relationships with existing arrangements. Cape Town's experience with scarcity appears to suggest that climate change will not lead to more equitable distributions of existing urban services, but rather to the deepening of existing inequalities. Cape Town's experience also demonstrates how the deepening of inequality in the face of climate change is by no means inevitable. Rather, it is mediated and produced through specific decisions and responses. In this sense, Cape Town's experience with scarcity highlights the need for political mobilizations that prioritize democratic and equitable infrastructures in the future. While we acknowledge the energy and effort that went into the city's response to the water crisis from 2015 to 2018, we strongly caution against treating these practices as strictly exemplary. Instead, we have sought to show that the 'crisis of the status quo' was overcome by adopting measures that displaced the crisis disproportionately towards the already marginalized residents of the city. The challenge and the central question emerging from this article, then, is how climate change and associated climate politics might be articulated in ways that lead towards greater future equity.

Nate Millington, Department of Geography and Manchester Urban Institute, School of Environment and Development, University of Manchester, Oxford Road, Manchester, M13 9PL, UK, nate.millington@manchester.ac.uk

Suraya Scheba, Department of Environmental and Geographical Science, University of Cape Town, Environmental and Geographical Sciences Building, South Lane, Upper Campus, Rondebosch, 7701 Cape Town, South Africa, suraya.scheba@uct.ac.za

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