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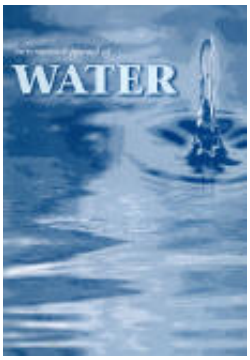

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Perspectives on 2018 'water crisis management' in Cape Town, South Africa: a systematic review

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Perspectives on 2018 'water crisis management' in Cape Town, South Africa: a systematic review

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Abstract: "Day Zero" was the municipality's forecast that Cape Town's water supply would be completely shut off on 12 April, 2018, due to water scarcity. Subsequently, many scholars have offered a multiplicity of narratives that have evolved into an assortment of perspectives to explain how the Day Zero phenomenon emerged, including its framing, impacts on Capetonians, their response, and how it could be avoided in the future. Using a systematic review of literature to examine emerging perspectives on the Day Zero phenomenon, findings revealed varied perspectives that ranged from political; conspiracy; rhetorical; behavioural change; ecological; socioeconomic; to perspectives on water governance.

Keywords: Day Zero; water scarcity; water governance; perspectives; water conservation; adaptation.

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Biographical notes: E. Mudefi is a development practitioner and researcher with expertise in the design and implementation of sustainable livelihood strategies, community development, resilience building, public health, and disaster management. He worked in the NGO sector for six years before joining the Walter Sisulu University in February 2023 for Postdoctoral Fellowship where he is studying community rebuilding and livelihood reconstruction in socio-ecological displacement context. He has published some articles in high-impact journals.

1 Introduction

South Africa is currently grappling with a major water scarcity crisis emanating from incessant droughts, inadequate water infrastructure, failure to service and maintain existing water infrastructure, declining water quality, and inequalities in water accessibility (Viljoen and van der Walt, 2018). The situation deteriorated dramatically following the severe and prolonged drought of 2015–2017, which lasted for three consecutive years for the first time since the 1940s (Donnenfeld et al., 2018). Resultantly, dam levels across the country dwindled from approximately 93% in March 2014 to an

average of 48% in November 2016, before recovering slightly to 59% by the end of 2017 (Conradie et al., 2022; Viljoen and van der Walt, 2018). The Province of the Western Cape, and particularly the Cape Town Metropole, was the hardest hit with dam levels falling close to 20% just before Day Zero was announced in November 2017, compared to the national average of 59% at the time (Department of Water and Sanitation [DWS], 2021). Due to extremely low dam levels, water scarcity became increasingly visible, posing an existential threat to taps running dry in the near future.

Amidst this predicament, municipal managers devised a water crisis 'red flag' in November 2017 which they termed "Day Zero" (Maxmen, 2018). It carried with it apocalyptic overtones with the looming worst-case scenario for Cape Town becoming the only major city across the globe to ever experience a complete shutdown on its water supply (Millington and Scheba, 2021). Day Zero, scheduled for 12 April, 2018, thus marked the day that city reservoirs would reach the lowest level of 13.5%, at which point the city would be unable to meet its daily water requirements and would be forced to implement a citywide water rationing program (McCauley, 2019; Millington and Scheba, 2021). Thus, 'Day Zero' was a government coined term to refer to "a point where the city of Cape Town would run out of water to the extent of having to turn off everyone's taps" (Goodner, 2022, p.99). Although Day Zero was projected to effectively grip the city on 12 April 2018, it became real and an indubitable fact on 18 January which was the mayor's announcement. Consequently, the proclamation was immediately followed by new water tariffs, supplemented by 6B water restrictions. This meant that each individual was limited to using only 87 litres of water per day, which was later reduced to 50 l (Millington and Scheba, 2021). The city endured these water restrictions for eight months before they were lifted in response to the arrival of rains, coupled with state interventions and the voluntary efforts of individual residences to reduce water waste (Ziervogel, 2019).

Although the envisaged worst-case scenario of taps running dry was avoided in Cape Town, several publications have been authored in which the 'Day Zero' phenomenon was scrutinised. Diverse perspectives have since emerged, characterised by narratives that expatiated the city's water crisis drivers, crisis impacts, how Capetonians responded to the shocking Day Zero announcement, how the crisis was managed, and the lessons drawn for the future. The current study employed a systematic review methodology to examine available literature on the perspectives that emerged as a result of the 'Day Zero' phenomenon. These narratives are consolidated to offer a better understanding of 'Day Zero' and the water scarcity challenges confronting numerous cities across the globe. The remaining sections of the paper include the methodological framework; a presentation of the results of the review; a discussion of the results; and a conclusion to wrap up the study.

2 Methodology

This study implemented a systematic review methodology to determine the purpose as well as emerging perspectives associated with the 'Day Zero' phenomenon in all selected studies that focused on this subject. A systematic review is a method of conducting a literature review that employs repeatable steps to identify, select, and integrate all

available research evidence to answer a clearly delineated research question (Sutherland et al., 2018). According to Grant and Booth (2009, p.3), "systematic review combines a thorough search and a critical review to address broad research questions with the best evidence synthesis". Given that the approach allows for a comprehensive literature review scope that accommodates multiple study types, it is ideal for a study of this nature which seeks to exhaust all relevant literature to provide a much more complete synthesis on perspectives that have emerged on the 'Day Zero' phenomenon. Drawing on the works of Carroll et al. (2004), Sutherland et al. (2018) and Pati and Lesa (2018), a systematic review is usually composed of five key phases, namely:

i guiding question preparation

ii searching and identification of literature

iii screening papers for relevance

iv additional search procedures

v critical review of the literature.

These are explained in more detail below.

2.1 Phase 1: guiding question preparation

The guiding question determines the relevance of the studies and the data to be gathered in each chosen study (Pati and Lesa, 2018). In other words, the guiding question serves as the cornerstone for the systematic review process in identifying relevant literature for the study. The overarching guiding question for this study was: "What purposes did each study on the Cape Town Day Zero phenomenon serve, and what perspectives did each study yield?" The assumption here is that the question is broad enough to accommodate any narrative associated with the announcement of Cape Town's Day Zero event.

2.2 Phase 2: searching and identification of literature

Literature germane to this study was primarily pooled from four electronic databases, namely: Google Scholar, Scopus, ResearchGate, and ScienceDirect. These sources are more pertinent to this study because they comprise a sizable research database, some of which are listed in Web of Science, which index well-known and rigorously vetted research content and publishers. These sources also ensure the eradication of source biases by removing inconsistencies related to the authors' geographic locations. Also, a high level of consistency, repeatability, and reliability is maintained by examining only papers drawn from these databases.

Since the news about "Day Zero" was officially announced on 18 January, 2018, to take effect on 12 April, 2018 (Millington and Scheba, 2021), all publications on the Day Zero phenomenon from January 2018 to the end of 2022 were included in the systematic search and review. The search strategy for this study was developed using several key phrases from the research question, namely: 'Day Zero'; "water scarcity in Cape Town"; "water challenges in Cape Town"; "climate change in Cape Town"; "dam levels in Western Cape"; and "water governance in Cape Town".

This search strategy was tested on Google Scholar as a pilot study using the above-mentioned phrases to identify studies related to the Day Zero phenomenon. The strategy, which was effective, was replicated on Scopus, ResearchGate, and ScienceDirect. The first round of scouting was conducted on 15 January 2023, generating a total of 47 papers that contained any of the aforementioned phrases. The second round followed on 17 March 2023 to ascertain the aptness of the systematic search process and to find any new papers published since the initial search. This time, only four additional papers were pooled for a total of 51 papers, with the rest being a repetition of what had been pooled previously. Out of 51 papers, Google Scholar had 13, Scopus 18, ResearchGate 11, and ScienceDirect 9.

2.3 Phase 3: screening papers for relevance

The next step was to subject all identified studies to an eligibility criterion screening. This was crucial given that some of the studies might have been duplicates while others might not have adequately addressed the research question as expected. A total of 51 publications were reduced to 36 after duplications were eliminated. To avoid wasting time and resources, each study's front matter, i.e., the study's title (on Day Zero/water challenges in Cape Town); abstract (on Day Zero/water challenges in Cape Town); date of publication (2018–2022); language of publication (English); and publication type (only journal papers accepted), was vetted.

At this point, only papers meeting the following criteria were considered for inclusion if the papers:

i focused on topics and themes related to the Day Zero phenomenon or water challenges in Cape Town

ii were published between 2018 and 2022

iii are written in the English-language only

iv full-text and peer-reviewed.

Papers not meeting these inclusion criteria were thus excluded. Only peer-reviewed journal papers were utilised in this study since they are regarded as superior in terms of validity and quality (Sucharew and Macaluso, 2019). After the screening, only 21 out of 36 journal papers remained.

2.4 Phase 4: additional search procedures

The reference lists of the 21 screened papers were scrutinised further to make sure that all potentially appropriate papers that may have been overlooked or missed during the first and second rounds are included. To help find any additional relevant papers that might have been missed in earlier searches, library officials well-versed in soliciting for papers on ScienceDirect and Scopus were also consulted. At this stage, nine papers were identified. Unfortunately, only two papers remained since the rest were duplicates. The previously described front matter criterion was also used to screen the two remaining

papers for relevance, and both were deemed appropriate, making a total of 23 papers to be critically reviewed and evaluated for eligibility.

2.5 Phase 5: the critical review process

Once it became clear which papers were judged to meet the relevance criteria based on front matter screening, the papers were subjected to eligibility screening through the process of critical review. The process involved using a standard critical review form that was adapted from the widely approved critical review form (version 2.0) used by Letts et al. (2007) which is available online (see Appendix 1). This form is proven and tested for reliability and validity and has become a useful tool for assessing the merits of any study to be included a systematic review study. The form allows for data abstraction on critical aspects of each study which is then juxtaposed against the research question of the current study to determine its suitability for inclusion in the qualitative synthesis. Key aspects of the critical review form include

i an assessment of the study purpose and research question

ii background literature review

iii the design and methods used

iv theoretical perspective(s) identified

v sampling

vi data collection techniques

vii data analysis

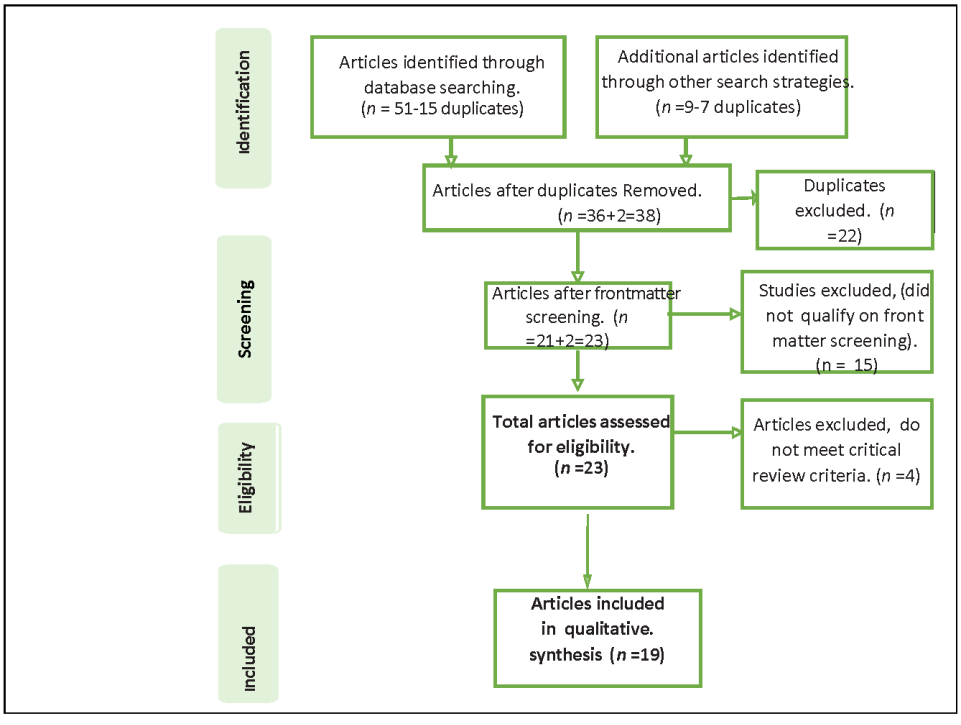
viii study conclusions.

Data obtained from each paper were scrutinised based on the research question of this study developed in Section 2.1, namely: "What purpose(s) did each study on the Cape Town Day Zero phenomenon serve, and what perspective(s) did each study yield?" Papers selected for this study were only those that focused on the interpretation of the Day Zero phenomenon, particularly on processes that led to (a) the build-up of the projected water crisis incident, (b) 'Day Zero' framing, (c) implications of the 'Day Zero' announcement, (d) management of the then impending 'Day Zero' crisis, and (e) 'actions and deeds' taken or that must be considered to prevent another Day Zero in the future.

The researcher scouted for this information in each paper from the purpose statement, background literature, and theoretical perspectives identified to the study's findings and conclusions. Papers that were framed outside the above-mentioned scope were rejected. At this stage, 4 papers out of 23 were rejected. The remaining 19 papers were then scrutinised on methodological rigour to establish whether the study was conducted appropriately and whether the findings were authentic. All 19 papers passed this test and were thus included in the final qualitative synthesis. Given that the critical review forms were a handful, and extensive, they have not been included in this paper. However, the author can always make them available on request. Only the critical review form sample

has been attached to this paper. The steps followed in this systematic review process, using the PRISMA Chart are summarised in Figure 1, from the identification of papers to screening for inclusion in the final synthesis.

Figure 1 Summary of the systematic review process (PRISMA chart) (see online version for colours)



3 Results

The 19 journal papers reviewed in this study are summarised in Table 1. Details of each paper beginning with author(s), date of publication, study title, and the name of the journal are provided. The table also contains pertinent information regarding the research question of each study such as the aim of the study, methodology used, summary of the findings, and the emerging perspectives. It is important to underscore that all the included papers were published in reputable peer-reviewed journals. Of the 19 reviewed papers, 9 were published in 2019, 3 in 2020, 5 in 2021, and 2 in 2022.

This section details the orientation of reviewed papers in relation to the Day Zero phenomenon and the perspectives that emerged thereof. The review process revealed, in brief, the political perspective; conspiracy perspective; rhetorical perspective; behavioural change perspective; ecological perspective; socioeconomic perspective; perspective on water governance, rights, and justice; and resilience perspective. These are discussed in more detail below.

Table 1 Data review summaries

Authors (Year): Title	*Journal*	*Aim of the study*	*Methodology*	*Summary of findings*	*Emerging perspectives*
Booysen et al. (2019)	*Water Research*	To assess households' behaviour change related to the municipality's water use restrictions and their response to information trending on mass media regarding the threat of taps having to be turned off	Quantitative – a survey of 400 000 respondents	• Households and individuals, responding more to fears of water shortage than implemented restrictions, drastically cut down on their water usage. • Although the municipality's use of fear was risky, the findings indicate that the strategy paid-off, bringing the best results in influencing Capetonians' behaviour change	Behavioural change
Nhamo and Agyepong (2019)	*Journal of Disaster Risk Studies*	To investigate the complexities around institutional arrangements in the wake of the proclamation of Day Zero	Qualitative –using critical and document analysis; Actor-Actant-Network Theory	• Day Zero narratives were entangled with connotations of administrative failures and political interference. • Day Zero provides an exceptional case scenario for lessons on building water security through climate change adaptation	• Political • Water governance • Ecological
Warner and Meissner (2021)	*International Journal of Disaster Risk Reduction*	To analyse media sources on how they framed Day Zero to gain traction	Qualitative – press and documentary investigation; focus group discussion (FGD)	• Day Zero was viewed as a political ploy that unleashed fear among average water users (who are the majority) for them to reduce water consumption in the face of a drought. • Some scholars worsened the situation by not setting the record straight on how Day Zero water rationing would be done and instead supported the media's incorrect narrative. • Day Zero was also framed as a way to generate positive emotions of solidarity, fun, and so on, in order to reduce water use for the greater good	• Conspiracy

Table 1 Data review summaries (continued)

Authors (Year): Title	*Journal*	*Aim of the study*	*Methodology*	*Summary of findings*	*Emerging perspectives*
Calverley and Walther (2022)	*Frontiers in Water*	An assessment of how policy decisions and physical factors evolved before and during Cape Town's longest drought of 2015–2018	Desktop approach – website data sources on the Western Cape's population dynamics, rainfall patterns, dam level fluctuations and water usage	• Physical data analysis reveals only a slight association between dam levels and rainfall – indicating that water supply decrease was caused by bad governance.	• Water governance
Voci et al. (2020)	*Frontiers in Communication*	To explore "Day Zero" framings from local international news media	Qualitative – Discourse analysis of 111 newspaper papers	• Findings show the use of diverse narratives and rhetoric. Local households viewed the event as a political strategy and hoax.	Conspiracies
Enqvist et al. (2022)	*International Journal of Water Resources Development*	To explore poor Cape Town households' perceptions of their experiences of the Day Zero notice	Qualitative – interviews	• The findings revealed widespread dissatisfaction regarding poor water services provided by the municipality, especially on issues of leaking pipes, deteriorating sanitation, and inaccurate bills.	Water justice
Madonsela et al. (2019)	*Water*	To explore governance steps required for effective implementation of a Water Sensitive Urban Design (WSUD) in Cape Town. To also unearth challenges and prospects of the intervention.	Qualitative – in-depth interviews and document analysis	• Findings underscore the importance of experiments, community/local knowledge, the use of monitoring techniques and the latest management technologies.	Water governance

Table 1 Data review summaries (continued)

Authors (Year): Title	*Journal*	*Aim of the study*	*Methodology*	*Summary of findings*	*Emerging perspectives*
Shepherd (2019)	*Water*	To examine water politics and its impact on urban dwellers and processes of addressing climate change.	Qualitative – Document analysis	• Day Zero triggered "political Mad Max-style water wars" • Day Zero brought about positive unintended outcomes of solidarity • Day Zero was constructed as a behaviour change strategy • It exposed nature-culture muddles • Day Zero brought to light contentions linked to economic interests	• Political • Ecological • Socio-Economic • Behavioural change
Millington and Scheb (2021)	*International Journal of Urban and Regional Research*	The study explored Cape Town's politics of inequality in water infrastructure and governance at the backdrop of Day Zero.	Qualitative – interviews and participant observations in political lobbying meetings against Day Zero	• Day Zero was a product of enduring governance complexities that were exacerbated by a shift in infrastructural priorities resulting from climate change. • Municipal budgets were found to be overstrained by climate change adaptation engagements in which attempts to resolve longstanding urban inequalities on service distribution were now being neglected.	• Water governance • Political • Water Justice i.e., human rights on equal access to water • Ecological
LaVanchy et al. (2021)	*Water International*	The paper assessed Day Zero beyond the usual climate change-induced rhetoric to unpack the experiences of residents in one of Cape Town's townships.	Quantitative – survey of 501 respondents	• Findings revealed different dimensions of inequalities in the provision of water and sanitation among different social groupings, e.g., water infrastructure maintenance and development was not the same across the board. • Similarly, water governance flaws were exposed by the Day Zero water crisis	• Water justice • Water governance

Table 1 Data review summaries (continued)

Authors (Year): Title	*Journal*	*Aim of the study*	*Methodology*	*Summary of findings*	*Emerging perspectives*
Simpson et al. (2019)	*International Journal of Urban Sustainable Development*	The study sought to establish the level of financial resilience fostered in Cape Town's budgetary framework to support drought-related adaptation practices.	Qualitative – interviews and document analysis	• The trend of budget allocations reflected some shifts with the focus being given to priorities and urgent matters. • While changes in budget allocations appeared to address key concerns, they were on the other hand creating a new set of governance and financial challenges. • Climate change heightened budgetary constraints. • Concerns were raised regarding the sustainability of water and electricity supply and the provision of sanitation utilities. • Findings revealed the lack of coordination between the public and private entities to ensure the delivery of best services.	Resilience – financial side
Rodina (2019)	*Wiley Interdisciplinary Reviews: Water*	To assess the lessons that could be gleaned from Day Zero and the water crisis in Cape Town, especially in relation to resilience building.	Qualitative – Document analysis	• There was a high level of unpreparedness for most government departments to be able to address hydrologic unpredictability caused by climate variability. • Day Zero reveals the need for resilience mechanisms in the form of water buffers like undergrounds sources and water reuse. • Water governance is embroiled by deficits in cooperation and trust both at leadership level and between water governance officials and citizens. This jeopardises the delivery of robust response to adversities and the building of resilience	Resilience – water side

Table 1 Data review summaries (continued)

Authors (Year): Title	*Journal*	*Aim of the study*	*Methodology*	*Summary of findings*	*Emerging perspectives*
Walwema (2021)	*Journal of Technical Writing and Communication*	The study sought to assess how rhetoric shaped the campaigns to overthrow the Day Zero event	Qualitative – using desktop approach to analyse available rhetoric artefacts and materials.	• Mainly metaphorical language was used in awareness campaigns that sought to inform citizens about Day Zero, educate them about behaviour change on water use, monitor their response, and update Capetonians about the water situation. • The rhetoric successfully sustained the water crisis discourse, inspired many to take action, and ultimately shaped the behaviour change outcome. • Rhetoric took the form of visual, aural, and textual messages ubiquitously. • Rhetoric on Day Zero became "a water risk model" that encapsulated the urgency, capturing the attention of citizens, and crystallising the steps to be taken to reduce water use. • Rhetoric artefacts focused on everyday water use practices—such as drinking, cooking, washing, flushing, and bathing—the task was made manageable without placing an overly strong emphasis on science as a foundation for policymaking	Rhetoric
Odoulami et al. (2020)	*Environmental Research Letters*	The study investigates the possibility of mitigating 'Day Zero' risks in drought-prone areas using geoengineering's stratospheric aerosol injection (SAI).	SRM experiment that included stratospheric SO2 injection	• The findings indicate that if global mean temperatures are upheld at the 2020 levels through the use of SAI, then this would offset anticipated 'Day Zero' drought risks by roughly 90%, thereby shifting futuristic drought risks to today's level – a record regression in drought projections.	Ecological

Table 1 Data review summaries (continued)

Authors (Year): Title	*Journal*	*Aim of the study*	*Methodology*	*Summary of findings*	*Emerging perspectives*
Muller (2020)	*International Journal of Water Resources Development*	To assess mistakes associated with traditionally used mechanisms in forecasting water demand and decision-making for investing in supplementary water supply sources in Cape Town.	Desktop approach –available data	• It was demonstrated that water governance through "demand-side planning methodology" such as price mechanisms, has many pitfalls, and hence, is less effective compared to the "supply-side hydrologically based planning methodology. • The diversification of supply sources to increase resilience to climate variability and (eventually) change. • While demand management on water use is not to dominate water governance, it should remain fundamental to water security in Cape Town	Water governance
Robins (2019)	*Journal of Southern African Studies*	To assess the political side of Day Zero through framings of "hydraulic citizenship", and "the creation and dissemination of water facts".	Qualitative – Interviews	• Findings show the rejuvenation of existing racial and class inequalities in Cape Town. • Social movements in their mobilisation maintained that Day Zero encouraged water privatisation, thereby marginalising middle working-class and poor households. • With the chilling anticipation of a total failure in Cape Town's water system, together with apocalyptic media messages and widespread activist mobilisation, all helped Cape Town's water infrastructure become politically salient. • Although Day Zero highlighted numerous opportunities to increasing citizen involvement in water governance, recovering processes still maintained state-endorsed limitations on any of such democratic opportunities	Political

Table 1 Data review summaries (continued)

Authors (Year): Title	*Journal*	*Aim of the study*	*Methodology*	*Summary of findings*	*Emerging perspectives*
Enqvist and Ziervogel (2019)	*Wiley Interdisciplinary Reviews: Water*	To review Cape Town's water governance systems, with reference to formal and informal administrative, social, political, and economic arrangements that determine how decisions are made on the management of the water supply side.	• Desktop approach – Review of literature review	• The streams that once drew its founders in the Western Cape have become unreliable due to the growing population and climate change. • Water was considered as significant to attaining economic and social development, especially on poverty reduction strategies, job creation, increasing food security, and on strengthening public health mechanisms. • It is impossible to separate water governance from a "systems approach" that put together the water cycle in its entirety, including urban drainage systems, wastewater-works, and the management of water supply during seasonal shocks. • The floods and droughts in Cape Town show how water governance needs to be coordinated across sectors and scales, particularly in residential areas, agricultural sector, and tourism and ecosystems. • The study revealed contentions between municipality and Capetonians – a problem sustained by the mistrust fostered by the failure to address past unjust policies.	• Ecological • Socio-economic • Political • Water governance

Table 1 Data review summaries (continued)

Authors (Year): Title	*Journal*	*Aim of the study*	*Methodology*	*Summary of findings*	*Emerging perspectives*
Dugard (2021)	*Water*	To assess how Day Zero was framed, including the construction of 'water rights terminologies' at the height of the water crisis in Cape Town.	• Online review of literature • Qualitative interviews	• A closer look at the five media pieces reveals that none of the five clearly referenced the right to water, and that instead, focus was given to water governance and/or water justice. • The themes on 'water justice' and 'water equality' strongly recur in the reviewed literature sources and the generated primary data, online media papers, and much of the literature. • The Day Zero crisis, according to many commentators, was greatly shaped by Cape Town's complicated governance structures for the provision of water services.	• Water justice • Water governance • Water rights
Burls et al. (2019)	*Npj Climate and Atmospheric Science*	To investigate the magnitude of the longest 2015–2017 drought of the Western Cape	Desktop – rainfall data	• The dwindling of rainfall days and intensity contributed to the most severe drought in the Western Cape. • Findings also show a decrease in winter rainfall days in the long-term although this trend was not observable due to variations in rainfall intensity.	• Ecological

Source: Author's compilation

3.1 Political perspective

Four of the papers that were reviewed linked the Day Zero event to the *political perspective*. The first is Nhamo and Agyepong (2019) who subjected Actor-Actant-Network Theory (AANT) to scrutiny on its claim that in any network association, actors begin on an equal ontological footing even though some actors exude more influence and power than others (Müller, 2015). In their findings, Nhamo and Agyepong (2019) revealed that Day Zero was a culmination of political skewedness in which power and dominance in political offices, as opposed to 'equal ontological footing' was used to decide how budgets were crafted and implemented and to which communities of Cape Town. In the process, the maintenance and development of water infrastructure, especially in Black dominated communities such as Khayelitsha, was neglected in favour of White communities. This finding also featured in a study by Millington and Scheba (2021) where climate change was straining municipal budgets in ways that threatened to exacerbate longstanding racial and class inequalities on the distribution of urban services in Cape Town.

Shepherd (2019) also weighs into this debate by what he termed 'the political Mad Max-style water wars'. This, in short, was a prediction that with Day Zero becoming a reality, Cape Town would descend into chaos with the infighting of residents to access the scarce water resource. Also, anarchy would erupt once Cape Town's gang leaders manned waterpoints in order to extort money from residents (Shepherd, 2019). In one of the analysed newspaper papers, Shepherd (2019) confirms this projection by citing a top political leader of the Western Cape Province, Helen Zille, who was contemplating on what to do to prevent anarchy in the event that Day Zero becomes a reality in Cape Town. Even so, in a country such as South Africa, that is entrenched in a strong social activism tradition, Shepherd (2019) suggests a high likelihood of the eruption of Day Zero-leaned social movements. Already, just the announcement of Day Zero had ignited schisms, with movements like the Water Crisis Coalition (WCC) coming to the fore to mobilise residents to pressurise the municipality to attend to issues such as improving transparency and accountability, reducing water tariffs, and to cease water management devices usage as they were deemed inefficient and controversial (Shepherd, 2019). Thus, the arrival of Day Zero would trigger more uprisings and public unrest most likely to be flared by violence. Robins (2019) paper also subscribes to water politics articulated by Shepherd. Robins (2019), however, emersed himself in the discourse of 'civic activism' and 'hydraulic citizenship' that was brought about by Day Zero, precisely within the politics of water technologies framed and sustained for example by politicians, instituted laws, and plumbers. The findings of this study show the rejuvenation of the race and class divisions and further privatisation of water that hurt the working class and poor households the most (Robins, 2019).

3.2 Conspiracy perspectives

A point of departure according to Douglas and Sutton (2023, p.2) is that "all conspiracies suggest alternatives that compete with publicly recognised versions of reality – whether officially or unofficially communicated". Only two papers focused on the *conspiracy perspective* of the Day Zero phenomenon. The first paper, which used a document analysis approach, was premised on "disaster and crisis media spectacle" where mass media play a pivotal role in social amplification of a risk by catastrophising the situation

to create dreadful pictures in the minds of people (Warner and Meissner, 2021). A spectacle approach further suggests that in the event of a catastrophe, speakers tend to magnify the situation by using framings, metaphors, and narratives that carry alarming language (Fischhendler, 2015). The study draws on the voices of media academics considered as authorities on the Day Zero event. However, Warner and Meissner (2021, p.2) described the media voices as "prophets of doom and detractors who made the Day Zero narrative to gain traction". Their findings show that, while Day Zero never arrived, it was treated as a real event because of inaccurately exaggerated information that was circulating and trending in the mass media. For example, Warner and Meissner (2021) note that some "media professors" supported the media's condensed version without setting the record straight, that although majority of taps were to be turned off, yet vital services, including township centres, would not be affected. In the same vein, the then South Africa Water Minister was quoted refuting allegations that Day Zero was government's deliberate craft for some sinister reasons (Breakfast, 2018). The findings also revealed that water challenges in Cape Town have existed for a long time, and this was not new to the media, yet Day Zero was dramatised as 'some kind of an event' with meanings that did not match the established facts on the ground (Warner and Meissner, 2021). Similarly, another paper assessed the media and how meanings were made out of the Day Zero phenomenon using almost the same approach employed by Warner and Meissner (2021). Key findings from this study were that Day Zero was viewed as a hoax, a political issue, an economic issue, a scare tactic for behaviour change, a strategy to build solidarity, as well as an avoidable and unavoidable event (Voci et al., 2020). Overall, the findings of these studies suggest that Day Zero narratives present a good example of digitally disruptive conspiracies that characterise communication on pre-crisis, crisis, and post-crisis events.

3.3 Rhetorical perspective

The conspiracy perspective on Day Zero could further be substantiated by the *rhetorical perspective* that emerged in Walwema's (2021) study. Rhetoric is usually used in generating persuasive messages (Evans, 2018). Accordingly, rhetoric is defined as "the study of how communication artefacts are composed (proper organisation of message parts, and choice of language and style to be used), sent and received" (Ross, 2010, p.119). Walwema (2021) utilises document analysis to study Day Zero messages communicated via newspaper papers, websites, hashtags, and photographs. Findings show that campaign messages were disseminated using multiple strategies to draw people's attention to the water crisis; instruct them on what to do; monitor their response; and provide updates on progress that was made in averting the water situation (Walwema, 2021). The nature and character of the messages were also described as a composite of visual, aural, and textual styles that captured Capetonian's attention, infused a sense of immediacy, and crystallised the actions that could change water use behaviours. In addition, the papers focused on the everyday practices of water use and how residents could assist in spreading the information by means of everyday routine 'deeds' and 'actions', such as water drinking, cooking, flushing, bathing, and laundry (Walwema, 2021). In such processes, conspiracies also began to circulate in discourses around Day Zero, for example, as a strategy to introduce water privatisation (Warner and Meissner, 2021).

3.4 Behavioural change perspective

From the reviewed papers, only Booysen et al. (2019) and Shepherd (2019) discussed *behavioural change* vis-à-vis the Day Zero phenomenon. Booysen et al. (2019) conducted a survey that explored household and individual water-saving behaviours in the wake of official water restriction proclamation, and messages circulating in the media about the realistic threat of Day Zero. The study was informed by the theory of protection motivation which states that households' responses to threats at any given time depend on outcomes of threat appraisal as well as the household's capacity appraisal to deal with the threat (Rogers, 1975).

Building on the above-mentioned theory, Witte and Allen (2000) established that behaviour change was to a greater extent influenced by fear appeals when people learned their vulnerability. Two behavioural landmarks were established based on this thinking and the survey data. Households' responses were higher on threats of taps having to be turned off in comparison to water restriction levels that were executed by the municipality (Booysen et al., 2019). In other words, the use of force does not necessarily contribute to behaviour change, although subjects may yield to pressure and comply. This suggests that the threat of Day Zero only was significant enough to trigger new behaviour patterns among households in their everyday water use practices.

However, Shepherd (2019) contends that, the reduction was rather partly caused by increased surveillance and tariffs as well as individual and households' deliberate choices to reduce their water consumption after internalising the risk of Day Zero. Another finding was that, while stirring fear among households through Day Zero announcement was a risky undertaking for Cape Town's water governing board, it might have been one of the most successful interventions in profoundly effecting behaviour change among households (Booysen et al., 2019). Thus, Day Zero was viewed as a fearmongering strategy to promote behaviour change on water management and use.

3.5 Ecological perspective

In terms of the *ecological perspective*, Enqvist and Ziervogel (2019) maintain that today's ecological imbalances are vividly visible to the extent that the Western Cape's streams which once drew its founders have become unreliable due to growing population and climate variability. Moreover, humans, like all other living organisms, are inextricably connected to nature/the environment for, inter alia, food, water, oxygen, and shelter. However, the environment is dramatically changing due to many factors, with climate variability being one of them, where significant differences have been reported concerning rainfall patterns, temperature, and wind speed (Burls et al., 2019). This has a direct impact on the availability of key resources such as food and water. In their interpretation of Day Zero, for example, Nhamo and Agyepong (2019) applied the AANT which is both "a 'sensibilities' and 'material-semiotic' analysis tool" (Law, 2007, p.2). In simple terms, AANT proposes that systems and processes are influenced by both the 'social' and 'non-human actors'. From this perspective, Burls et al. (2019) demonstrate Cape Town's susceptibility to experiencing more Day Zeros due to increasing climate variability. Based on their climate modelling results and observations, rainfall and seasonality disruptions would most likely reduce total annual precipitation by at least 30% in the next 50 years.

In line with this thinking, Nhamo and Agyepong (2019) found that Day Zero was primarily related to incessant droughts which caused water level declines for Cape Town's six largest dams, from 92.5% capacity in 2014 to 51.2% in 2015, 32.6% in 2016, and 23% in 2017. These authors conclude that Day Zero was primarily attributed to climate change and rising water use by residents of Cape Town. This human–nature interaction was described in another paper as "the entanglement of nature and culture" (Shepherd, 2019, p.12). Here, Shepherd argues that the Day Zero water crisis was a more layered incident engendered by the convergence of climate variability together with other factors such as politics, economics, and 'the social'. He refutes the notion that only climate change was to be blamed for the possible emergence of Day Zero, as this tends to downplay the human agency.

To this end, Millington and Scheba (2021) indicate that the human footprint in Day Zero was caused by bad water governance at a time when environmental dynamics and climate are shifting. Moreover, the study by Shepherd (2019) underscores 'climate change unthinkabilities' in which cultural practices keep failing to equip people to acknowledge and respond to the realities of nature dysfunctionalities through ruptures, nature derangements, and abrupt discontinuities. Moreover, Odoulami et al. (2020) take this debate further by suggesting that when people break out of these cultural fixations, and embrace science and other initiatives, they can minimise climate change impacts. These authors support this idea by experimenting with the potential to avert Day Zero by using geoengineering's stratospheric aerosol injection (SAI), with findings pointing to the offset of projected droughts similar to the Day Zero phenomenon.

3.6 Socio-economic perspective

The *socio-economic perspective* of Day Zero appeared in two of the reviewed papers (Enqvist and Ziervogel, 2019; Shepherd, 2019). First, discussions around the significance of water for socio-economic development were inescapable in the water governance paper authored by Enqvist and Ziervogel (2019). This is premised on the fact that water is at the centre of almost all strategies that seek to reduce poverty, boost food production, generate employment, and increase equality. Second, it is at this point that Shepherd's (2019) paper highlights the existence of contentions related to economic interests that surfaced from the Day Zero phenomenon. But more importantly, without water (i.e., for domestic uses), in an urban environment, most businesses would shut down, thereby crippling the economic life of a city (Shepherd, 2019). Even other key industries and producers such as food (farmers) would be affected. In essence, there will be no life without water.

3.7 Water governance, rights, and justice perspective

Proponents of the *water governance, rights, and justice perspective* argue that Day Zero was not simply about the question of a 'water crisis' alone. Rather, it is viewed as a 'governance crisis' – one in which institutions depend upon but have failed to set up systems and structures to enable adequate adaptation and resilience to adversities and changing conditions in an ethical and equitable manner (Ziervogel et al., 2017). Water governance entails "a collection of formal and informal political, social, economic, and administrative frameworks for managing and developing water resources" (Woodhouse and Muller, 2017, p.2). Once governance flaws are addressed, the assumption is that gaps

in water rights and water injustices will be easily corrected. Using a systems approach to examine water governance in the Cape Town Metropolitan, Enqvist and Ziervogel (2019) found that Day Zero was a manifestation of the complex legacies of racial inequality responsible for the displacement of most 'Black' and 'Coloured' families into low-lying areas with high flooding risks and water accessibility and sanitation challenges. The City of Cape Town was found to be struggling with governance issues on water supply, flood management, drought management, and water justice (Enqvist and Ziervogel, 2019). For Madonsela et al. (2019), the water governance crisis in Cape Town could be linked to the lack of smart monitoring methods, effective water management mechanisms, and continuous research and development in the water sector.

However, papers authored, for example, by Enqvist and Ziervogel (2019), Millington and Scheba (2021), and Muller (2020), reviewed materials from the media or other document sources that dwelt much on, or repeated 'water justice/injustice' and/or 'water governance/misgovernance', without even mentioning water rights. With water injustice, most papers revealed widespread dissatisfaction with local government's failure to resolve the issues of leaking pipes, faulty bills, and sanitation, with climate change-induced shifting budgetary demands threatening to worsen the existing inequalities (Enqvist et al., 2022; LaVanchy et al., 2021; Millington and Scheba, 2021). Only Dugard (2021) used Day Zero to investigate water rights infringement with qualitative data obtained from interlocutors who experienced water challenges in Cape Town. While the Water Service Act, No. 108, of 1997 (Republic of South Africa, 1997) outlines several water rights provisions to guarantee citizens' access rights to basic water supply, these were not pursued or incorporated in the framings of contestations against the Day Zero crisis (Dugard, 2021). The study rather established that, besides 'the right to water', there are other human rights clauses such as the right to decent living, which can be used in mounting water-related claims.

3.8 Resilience perspective

Resilience generally speaks of a system's ability to withstand adversity or at least recover from a disturbance caused, and still maintain its form, or even move to a better position (Blake et al., 2017). In urban governance, resilience seeks to foster the protection and efficient utilisation of natural, financial, and infrastructural resources that the city thrives on (Ziervogel et al., 2017). In terms of the Day Zero phenomenon, two papers were found to have deliberated on the *resilience perspective*.

Firstly, Simpson et al. (2019) focused on the resilience of Cape Town Municipality's financial resources. After analysing available financial documents, the study unearthed manifestations of revenue sustainability concerns regarding water, sanitation utilities, and electricity supply. In addition, there was some evidence of a poorly coordinated public-private response to ensuring high reliability service delivery in Cape Town. In simple terms, the municipality lacked some financial resilience to deal with adversities such as the Day Zero crisis.

Secondly, Rodina (2019) explored physical constraints to attaining short- and long-term water supply resilience goals. The study revealed that most municipal departments were generally unprepared to deal with the hydrologic cycle's unpredictability – a sign that Cape Town lacked resilience for the Day Zero crisis. According to the findings of Rodina (2019), Cape Town lacked water buffers, for example, in the form of alternative supply sources like groundwater and water reusing in the event that a water crisis has

occurred. Within resilience's multidimensional framework, a fallback plan (Blake et al., 2017) in the event of an adversity happening, forms part of the resilience of preparedness which, according to the findings of Rodina (2019), was not available in Cape Town's water governance.

4 Discussion

As displayed in the findings of this study, discourses around the Day Zero phenomenon generated a multiplicity of perspectives which to a greater extent provide an accurate overview of how the water crisis in Cape Town started; how Day Zero was used 'intentionally/unintentionally' to manage the situation; the consequences of Day Zero on Capetonians and water governance structures; and the need for resilience building for the future. In more specific ways, the politics of water (Shepherd, 2019) emanating from the legacy of apartheid inequalities – including access to water and sanitation for inferior groups such as Black people – was blamed for contributing to Cape Town's water crisis. This political discourse is intertwined with the *water governance, justice, and rights perspective* in which adequate resources were deliberately not being allocated towards maintaining and developing water infrastructure in communities dominated by inferior groups. The announcement of Day Zero only triggered shock waves that potentially caused political instability in Cape Town as people vented their anger and discontentment over the infringement of their rights, especially access to basic water. While the studies reviewed mostly highlighted changes in the political landscape of Cape Town at macro-level owing to Day Zero, they overlooked the micro-level politics at the family unit that the Day Zero triggered.

The announcement of a crisis, namely the Day Zero phenomenon, automatically ignited conspiracies and rhetoric that shaped discourses around Day Zero, including the response and actions of ordinary Capetonians, institutions, and academic narratives. One important take away from the emergence of conspiracies and rhetoric over Day Zero is that, according to Booysen et al. (2019), they can be used to shape people's behaviour in certain ways. Yet, it is not always the case that rhetoric and conspiracy deliver the intended outcomes. Indeed, as demonstrated in this study, Day Zero rhetoric and conspiracies delivered positive outcomes such as solidarity building and positive behaviour change in instances where messages were crafted even in ways that could cause despondency (Booysen et al., 2019; Walwema, 2021). The opposite is also true, as the municipality's craft of the Day Zero event with the intention of turning around water use behaviour among Capetonians could have caused the eruption of many other unintended consequences such uprisings. Thus, while behaviour change could be easily achieved through fear appeals (Witte and Allen, 2000), there is a need to explore other means and ways that do not cause panic and pandemonium to the detriment of the city.

Ecologically, the study brings to the fore the impacts of climate variability on water availability in Cape Town's reservoirs. While studies that offer the ecological perspective argue that singling out climate variability as the only cause of Day Zero is rather misleading, they only highlight the human footprint of Day Zero at the level of water governance. Yet, it is a fact that the human hand is also responsible for having caused

climate change in the first place (Qu et al., 2022). Indeed, there is an interplay between natural and human factors in the events leading up to Day Zero (Shepherd, 2019). On the human side, population dynamics; increased demand for water and sanitation in urban areas; increased use of water for food production in farms and other industrial works; and increased siltation of rivers and the emission of pollutants into open and underground water bodies are just some examples of how Day Zero could be viewed from a socio-economic perspective (Enqvist and Ziervogel, 2019). Even so, these socio-economic complexities are entangled in the water governance crisis (Woodhouse and Muller, 2017; Ziervogel et al., 2017), one in which Cape Town has failed to manage water supply including its infrastructure, floods, and droughts. This study presents the governance perspective as central to the emergency of Day Zero and how it was ultimately managed. It touches on all of the other perspectives discussed here, including water justice and rights. More importantly, an effective and efficient governance system addresses most water concerns and builds water resilience against future shocks and adversities.

5 Conclusion

This paper reviewed studies that interrogated the Day Zero event of Cape Town from diverse perspectives. Several perspectives have emerged including, inter alia: the political perspective; conspiracy perspective; rhetorical perspective; behavioural change perspective; the ecological perspective; socioeconomic perspective; the perspective on water governance, rights, and justice; and resilience perspective. The findings of this study revealed the problem areas that any municipality needs to focus on to prevent a Day Zero experience. It is evident that complexities around water governance are intensifying in more recent years owing to the need to adjust budgets in response to climate variability. This means that water governance must be approached with adequate knowledge (more research), the latest technologies and equipment, accountability, and equality to build resilience and transformability that allows for a shift from old governance systems to more recent and appropriate approaches. Again, the findings of this study established that several of the emerging perspectives are greatly intertwined and not independent entities with an obvious beginning and end point. For example, the governance perspective affects and is also affected by almost all other perspectives. With a good water governance system, resilience, water rights, water justice, and a balanced political ecology and socioeconomic systems of water are guaranteed.

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Topic	*Comments*
STUDY PURPOSE: Was the purpose and /or research question stated clearly? □ Yes □ No	Outline the purpose of the study and/or research question
LITERATURE: Was relevant background literature reviewed? □ Yes □ No	Describe the justification of the need for this study. Was it clear and compelling?
SUITABILITY[1]:	How does the study apply to the research question of this study? Is it worth continuing this review?
STUDY DESIGN: What was the design? □ Phenomenology □ Ethnography □ Grounded Theory □ Participatory action research □ Other ……..	Was the design appropriate for the study question? (i.e., rationale) Explain
Was a theoretical perspective identified? □ Yes □ No	Describe the theoretical or philosophical perspective for this study e.g., researcher's perspective. *How does this apply to the current study?
Method(s) used: □ Participant observation □ Interviews □ Document review □ Focus Group Discussions □ Other ……	Describe the method(s) used to answer the research question. Are the methods congruent with the philosophical underpinnings and purpose?

SAMPLING: Which sampling method was used? □ Probability sampling □ Non-probability sampling	Describe the sampling methods used. Was the sampling methods appropriate to the study purpose or research question?
SUITABILITY Was informed consent obtained? □ Yes □ No □ Not addressed	How is the sample applicable to your research question? Is it worth continuing?
DATA COLLECTION: **Descriptive Clarity** 1. Clear and complete description of: Site □ Yes □ No Participants □ Yes □ No 2. Role of researcher and relationship with participant: □ Yes □ No 3. Identifications of assumptions and biases of researcher □ Yes □ No	Describe the context of the study. Was it sufficient to understanding of the whole picture? What was missing and how does that influence your understanding of the research?
Procedural Rigour Procedural rigour was used in data collection strategies? □ Yes □ No □ Not addressed	Do the researchers provide adequate information about data collection procedures e.g., gaining access to the site, field notes, training data gatherers? Describe any flexibility in the design and data collection methods.
DATA ANALYSIS: **Analytical Rigour** 1. Data analyses were inductive? □ Yes □ No □ Not addressed 2. Findings were consistent with and reflective of data? □ Yes □ No	Describe methods of data analysis. Were the methods appropriate? What were the findings?
Auditability 1. Decision trail developed? □ Yes □ No □ Not addressed 2. Process of analysing the data was described adequately? □ Yes □ No □ Not addressed	Describe the decisions of the researchers regarding transformation of data to codes/themes. Outline the rationale given for development of themes.

Theoretical Connections Did a meaningful picture of the phenomenon under study emerge? □ Yes □ No	How were concepts under study clarified and refined, and relationships made clear? Describe any conceptual frameworks that emerged
OVERALL RIGOUR: Was there evidence of the four components of trustworthiness? Credibility □ Yes □ No Transferability □ Yes □ No Dependability □ Yes □ No Confirmability □ Yes □ No	For each of the components of trustworthiness, identify what the researchers used to ensure each. ****What meaning and relevance does this study have for your research question?
CONCLUSIONS AND IMPLICATIONS: 1. Conclusions were appropriate given the study findings? □ Yes □ No 2. The findings contributed to theory development and future OT practice/research? □ Yes □ No	What did the study conclude? What were the implications of the findings for practice and research? What were the main limitations in the study?

When doing critical reviews, there are strategic points in the process at which you may decide the research is not applicable to your question. You may decide that it is not worthwhile to continue with the review.