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Title: Gated adaptation during the Cape Town drought: Mentalities, transitions and pathways to partial nodes of water security

Running Head: Gated adaptation during the Cape Town drought

Authors

Nicholas Philip Simpson (Corresponding author)
Global Risk Governance Programme, Department of Public Law, University of Cape Town, South Africa.
Africa Climate & Development Initiative, University of Cape Town, South Africa.
Phone: +27721603037
ORCID No.: https://orcid.org/0000-0002-9041-982X
Email: nick.simpson@uct.ac.za

Clifford D. Shearing
Global Risk Governance Programme, Department of Public Law, University of Cape Town, South Africa.
Griffith Institute of Criminology, Griffith University, Australia
School of Criminology, Université de Montréal, Canada.
ORCID No.: https://orcid.org/0000-0002-5036-8335
Email: clifford.shearing@uct.ac.za

Benoit Dupont
International Centre for Comparative Criminology, Université de Montréal, Canada.
Email: benoit.dupont@umontreal.ca

Abstract

Illustrating how mentalities govern private responses to risk, this article highlights the importance of mental frames in the selection of adaptation pathways. Scholarship emanating out of the Cape Town drought (2015-2018) has drawn attention to the effect of the drought on public mentalities and their response to the drought, transitional governance arrangements and off-grid responses to secure water supply. This article focusses on what mentalities and behaviours may not have changed for private actors that secured water through off-grid means. This is a contrarian view to the dominant drought response discourse, yet critical for understanding and charting future governance arrangements. While it is acknowledged that transforming frames have emerged from the drought and are enabling novel pathways, the article questions the distributional and transition effect of such shifts when considering gated actions that link with conventional or untransformed views and behaviours which themselves entrench alternative response pathways for the affluent.

Key Words: Mentalities; transitions; technological pathways; Cape Town drought; climate gating; Off-grid

Highlights

- Conventional frames govern private responses to risk.
- Mentalities drive the selection of available response technologies.
- Range of selected pathways indicate plural and differential views.
- Private off-grid and gated responses contest transformed views or behaviours.

Gated adaptation during the Cape Town drought: Mentalities, transitions and pathways to partial nodes of water security

Introduction

Novel technologies adopted during the Cape Town drought have been lauded for their role in building water resilience (CoCT 2018b), however, the off-grid and gated nature of some technologies, like boreholes and water tanks, have led to nodes of partial water access and compromised the municipal finance model (Simpson et al. 2019). Bai et al. (2016) suggest that landscape-level stability is achieved for a socio-technical regime through favourable constitutional, social and cultural dynamics. These align with and sustain technological, cognitive and institutional factors that generally exclude viable alternatives that compete with the existing system. Major disruption to a regime presents a challenge of legitimacy to existing actors and technologies and is necessary to create vulnerabilities that might be exploited by novel alternatives (Simpson 2019). Transitions scholars have pointed to the alignment of such disruptions at a land-scape level and emergence of alternatives in small-scale niches. Such local-level innovations and experiments can provide viable alternatives to the socio-technical regime (Bai et al. 2016). The term pathway is used here to describe a technological option which matches an existing approach to water, or a water practice mentality. For the purpose of this article, public mentalities are those displayed and encoded in practices set by government entities such as routines, practices, laws, policies and media releases (Foucault 1984). In contrast, private mentalities are those that are displayed in the actions, investments and decisions that such entities engage in when acting to secure themselves or their private interests.

Transitions scholars suggest that during disruption periods, under certain conditions, the regime may lose control and new technologies exploit vulnerabilities within the disrupted system. If the niche is particularly effective, it holds potential to establish new

technological adoption, novel governance arrangements as well as cascade and reconfigure the socio-technical regime (Bai et al. 2016). This has been demonstrated through analysis of a sub-section of public frames of the Cape Town drought (Simpson, Shearing, and Dupont 2019b). Although much has been said of the lessons of the drought (Rodina 2019; Ziervogel 2019; Muller 2018), including the relationship between existing and shifting mentalities in the governance and use of water (Simpson, Shearing, and Dupont 2019b), less is known about private mentalities, those with less incentive to conform to the kind of transformed mentality indicated in the public response.

Drought responses and mentalities

There is an evolving body of evidence arguing that cities will face increasing water shocks and stressors in coming decades (Rockström et al. 2014; Romero-Lankao and Gnatz 2016). Drought is expected to be more common in urban contexts, particularly for those cities located in Mediterranean climates like Cape Town, Barcelona or Perth (IPCC 2007). Observations of Barcelona's drought (2007-2008) noted that the distribution of the burden of conservation strategies were closely related to perceptions of the drought (March, Domènech, and Saurí 2013). March, Domènech, and Saurí (2013, 1952) also note a shift in public "perception of new technologies" to address and increase the resilience of urban water supply. However, observations of innovations for urban water resilience in Barcelona have remained locked within conventional framings of water scarcity, with drought considered as an "unexpected and unwelcomed" event for both public and private entities with little appreciation for the magnitude or rate of recurrence of anticipated shifts in variability associated with climate change (Domènech and Saurí 2011, 607). Similarly, Beal, Makki, and Stewart (2014) found that water use trends in south-east Queensland, Australia indicate a rebound to high water consumption when a drought breaks. This suggests water saving strategies under drought conditions do not necessarily create stable or enduring water use conduct and conventional frames can continue to influence behaviours towards water.

In the absence of alternative technological pathways, during the Millennium Drought in southeast Australia (2001-2009), Lindsay, Dean, and Supski (2017) found the wide-ranging perception of that drought as a crisis, had a measurable impact on water

conservation across households in Melbourne and Brisbane. However, household boreholes and desalination plants provided a contrasting availability of alternative water that has been demonstrated to associate with to lower concern and less effective water conservation for households in Perth when compared to those in Melbourne and Brisbane without such alternatives (Lindsay, Dean, and Supski 2017). The Perth response therefore contrasts the Brisbane and Melbourne responses at an individual awareness and motivational level and is exemplified through the technological pathways selected. Water resilience actions in these Australian cities suggest that contrasting domestic water cultures that emerge as a response to drought conditions, are closely related to people's perceptions of their available water sources and the broader environmental context of that source.

Mentalities as technological pathway selector

Like many other large cities facing water scarcity (Van Loon et al. 2016), Cape Town's water supply and distribution network is highly engineered. The prevailing mentality of public and private water practices in Cape Town prior to the drought regarded water supply as reliant on precipitation and supply dams. We posit, this conventional view can be thought of as a 'dam-mentality'. It reflects existing infrastructures, the materiality of water and frames an instrumental approach to water - valuing rivers as a means to filling up dams (for examples of such framings in their public and practice forms see CoCT 2016; Yeld 2018). A 'dam-mentality' suggests that the solution to water scarcity is more, larger, and better managed supply dams (Muller 2018), and is reflected infrastructurally with 95 per cent of Cape Town's water reliant on six supply dams (CoCT 2019b). The communication of CoCT's water demand management strategy recognised this 'dam-mentality', as daily and weekly updates of dam levels in the run up to 'Day Zero' (an anticipated point where large sections of the city would be cut off), with ordinary citizens knowing the exact percentage drop in dam levels from the previous week (Ziervogel 2019). The 'dam-mentality' continues, in varying degrees in public and private practices, to what have been identified and promoted as 'alternative' sources to surface water (CoCT 2018a), such as groundwater (underground dams), desalination (a brackish dam), and rain water harvesting tanks (roof-top catchments and private mini dams). This article is concerned with those private expressions of a 'dam-mentality' – the supply sources that are explored and turned to through off-grid

and gated actions – when conventional and public dams, and their management, are perceived to have failed to secure the essential good.

Together with a prevailing 'dam-mentality', there has been an observed increasing distrust in public and government institutions to secure public goods (Harris, Chu, and Ziervogel 2017; Simpson 2019). These observations link the off-gridding and gating water supply endeavours by private actors – a phenomenon Simpson, Shearing and Dupont (2019a) call 'climate gating' – to similar developments around household level energy (Von Ketelhodt and Wöcke 2008) – where private entities seek to secure their own interests independent of the state or the broader community. When the national energy provider of South Africa failed (Von Ketelhodt and Wöcke 2008), households and businesses that could afford alternative supply technologies installed their own electricity generators entrenching off-grid practices as a means of household energy security. Although new to Cape Town, this is a common phenomenon across Africa (Oyuke, Penar, and Howard 2016). In 2006, it is estimated that ZAR425 million (approx. USD40 million) had been spent on the purchase of generators in Cape Town alone as private entities secured themselves against ongoing disruptions of unreliable energy supply (Von Ketelhodt and Wöcke 2008, 6). The perceived incapacity of government to secure essential goods and a growing pattern of household level energy insecurity, thereby established a mentality of private resourcefulness. Although there are clear differences in the materiality of water and electricity, parallels in private resourcefulness with water are not difficult to imagine as off-grid water solutions proliferated during the drought at even greater scales (Simpson, Shearing, and Dupont 2019a). Further, it is important to acknowledge that while it is possible to live with intermittent energy, the threat of running out of water presented far greater, systemic and potentially cascading risks. Further, the cost of certain alternative water solutions were more cost-effective than energy alternatives such as roof-top solar or generators and therefore embraced at scale to secure private and household level water supply independent of the municipal reticulation grid (Simpson, Shearing, and Dupont 2019a).

Considering the combined effect of a mentality honed by resourcefulness and off-gridding, distrust in centralised energy and water utilities, together with a prevailing 'dam centred' view of water supply, technologies like water tanks and boreholes which enabled private off-grid alternatives make a lot of sense. Driven by heightened

insecurity in water supply, people searched for new and different solutions which they may previously have not considered; yet which were not too expensive, impractical at a household/business level nor too radically different from conventional approaches to water. Domestic water tanks and boreholes became so popular because these technologies provide a low-tech, reasonably priced pathway for household level water supply – which fits existing mentalities towards water. Observable adaptation and resourcefulness under the disruptive conditions of the Cape Town drought - at the household level and for these elites - therefore does not necessarily indicate a fundamental shift in their mentality to one of greater water sensitivity. Rather, there has been an observable transfer of the 'dam-mentality' into perception of new and alternative sources, which allowed for consideration and adoption of available technologies.

Please insert Figure 1 roughly here

Figure 1: Mentalities, transitions and pathways accommodating partial nodes of water security (adapted from Geels 2011)

Figure 1 displays the effect of 'climate gating' activities on the water governance regime in Cape Town, integrating the notion of a 'dam-mentality' with transitions theory (Geels 2011), as a selection factor contributing towards the emergence, diffusion and reconfiguration of the water arrangements that accommodate nodes of off-grid water security. Evolutionary economists argue that when cognitive routines (such as search heuristics, exemplars, guiding principles) become shared within a community, they orient perceptions and actions of actors in local practices (Davoudi et al. 2012). For the majority of people in Cape Town, it can be argued that behavioural nudges had this effect and contributed to a significant reduction in consumption (Brick, De Martino, and Visser 2018), yet there was a small but significant cohort that sought to buy their way out of the drought through investing in alternative supply technologies to secure household level supply (Simpson, Shearing, and Dupont 2019a). It has been noted that over 100,000 households (those consuming more than 20,000 litres of water per month), reduced their consumption as radically as municipal records indicate in the latter half of 2017 (Simpson, Shearing, and Dupont 2019a). The dominant narrative of such 'demand reduction' by the city claims to have helped 'save Cape Town' (Joubert

and Ziervogel 2019; CoCT 2017a). Although the municipal records indicated a drop in consumption, it did not necessarily mean these households curtailed the actual amount of water used nor their 'approach to water' (CoCT 2017b), only that they changed their supply to off-grid options not legible to municipal records. This observation concurs with that of Lindsay, Dean, and Supski (2017) who found access to alternative water sources de-emphasised personal responses to household water conservation.

When a wealth of knowledge is built around experience and practice, it can lead to a range of cognitive rules, or what sociologists of technology call 'technological frames' (Geels and Raven 2006). These 'technological frames' are considered to guide decision making and affect perception and interpretation (Geels and Raven 2006). Understanding mentalities therefore requires an appreciation of the implicit and explicit assumptions of business-as-usual within a regime as it relates to a particular technology and behavioural patterns (see regime level of Figure 1). The expression of mentalities in selected investments and the pathways they signal illustrate that decentralised responses to disruption, although disruptive of the reticulation and governance arrangements of water (belonging to the socio-technical regime), do not necessarily indicate a homogeneous or aligned shift in the mentality of such private actors with those of the regime.

How (public) urban water managers regard (private) household level responses like tanks and boreholes and their users, can illuminate what they understand about social sustainability (Sofoulis 2015). Such technologies and their off-grid use, confront and disrupt conventional distinctions (such as provider/consumer - indicated by 'disruption' in Figure 1) and present a novel hydropolitics (Sofoulis 2015; Scheba and Millington 2019; Farrelly and Tawfik 2020), one that demands accommodating governance arrangements (Simpson, Shearing, and Dupont 2019a; Simpson et al. 2019; Scheba and Millington 2019; Enqvist and Ziervogel 2019). As Figure 1 indicates, the City of Cape Town is currently grappling to accommodate off-grid nodes of water security through a range of regulating measures (Simpson, Shearing, and Dupont 2019a), such as water intermediary licences, self-monitoring of boreholes and major adjustments to the compromised tariff structure (Simpson et al. 2019).

A mentalities view therefore cautions against assumptions of a homogeneously adopted 'new approach to water' (CoCT 2019a), as those who secured private sources through the adopted alternative technologies may not have had their mental frame challenged as such a claim might assume. For such off-grid and gated entities that secured themselves against the severity of shock, like those listed above in Barcelona, Queensland and Perth, it is likely that their conventional mentality and behaviour towards water, like their lush gardens, have not been as radically affected by the drought as ordinary citizens and public actors.

Conclusion

The technologies that align with the existing 'dam-mentality' are proving both popular and a lucrative industry for providers of alternative water supply technologies (Simpson, Shearing, and Dupont 2019a). Transitionary and evolving frames (mentalities) and approaches (behaviours) to water in response to the drought have seen noteworthy contest and revision at higher levels of governance. Such changes in public mentalities indicate the potential flux in the socio-technical regime which may or may not stabilise over time. However, despite potential for transformations at the utility scale (Simpson, Shearing, and Dupont 2019b), for entities with the capacity to secure their own water, through what Simpson, Shearing and Dupont (2019a) call 'climate gating', it is likely that their understanding and approach towards water resists similar degrees of change.

Further research needs to clarify how private relationships towards public goods, such as water and energy - particularly those expressed in the combination of off-grid and gated forms - further our understanding of water management and urban sustainability (Sinclair-Smith and Winter 2019; Dobbie, Brookes, and Brown 2014; Brown, Keath, and Wong 2009), and cognitive theories which aim to understand transitions (Hof et al. 2019; Verbong and Geels 2010; Geels and Raven 2006). Such work could build on the observations here by considering a 'whole of society' approach (Dubé et al. 2014), where private and public pathways intersect or diverge as an expression of their view of what is needed to secure their essential goods at multiple levels of risk governance.

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