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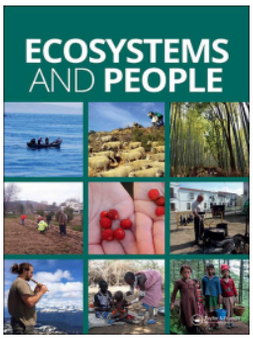

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PERSPECTIVE



# The role of crises in transformative change towards sustainability

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**ABSTRACT**

Path-breaking transformative change is needed in human-environment relations to move towards more sustainable development trajectories at local, national and global scales. Crises may trigger transformative change and learning in the short and in the long term. However, in particular, a short-term response to crises may also be reactive, strengthening established unsustainable practices and further perpetuating vulnerability and inequality rather than supporting transformative change towards a more sustainable path. To understand the nature and response to a crisis in the context of sustainability transformations, this paper elaborates on the following aspects of a crisis: What are the characteristics of a crisis? What and who shapes the narrative(s) of a crisis? What and who shapes the nature of the response to a crisis? Do responses to crises trigger higher levels of learning? Conceptual synthesis is complemented with an exploratory comparative analysis of the Cape Town water crisis and of the COVID-19 pandemic in South Africa. To this end the paper analyzes the interplay between mobilizing individual, collective and relational agency and navigating and transforming power relations to challenge and profit from already weakened unsustainable structures. This approach proves to be promising to understand the role of crises in catalysing and supporting transformative learning to eventually replace unsustainable structures.

**POLICY HIGHLIGHTS**

- During and immediately after crises, it is important to identify opportunities for policy change to address persistent governance failures.
- To support transformative change towards sustainability, governments typically should adopt a network governance style and act more as a convenor for deliberative processes in the later phase of the response to a crisis.
- Formation of innovation platforms bringing together actors from different levels and different roles (e.g. pioneering innovators, investors, scientists, policymakers, regulators) could support the scaling up of local initiatives and innovative approaches that have been developed during crises.

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## 1. Introduction

Our point of departure is the normative assumption that prevailing practices to govern and manage human-environment interactions are not sustainable. Learning and transformative change are required to improve this situation (Pahl-Wostl 2015a; Reyers et al. 2018; Sachs et al. 2019). Such normative statements have been made for years – even decades in many domains. Poor water governance has been identified to be the major cause for many persistent water management problems (Pahl-Wostl 2015a). The intensification of agriculture that has been praised as a panacea for enhancing food security destroys in the long-run the capacity of agro-ecosystems for food production (e.g. McMichael and Schneider 2011). The need for transformation of entire food-systems to ensure food security in the long term has become increasingly evident (van Bers et al. 2019; Bernard de Raymond et al. 2021). Mitigation of and adaptation to climate change has been on the political agendas for years. Greenhouse gas emissions keep rising and climate-related extremes cause catastrophic damages (IPCC 2021a). Despite mounting evidence for the increasing severity of problems and suggestions for improvements, actions to change the political course and societal responses are slow or even absent. Do we need (even more) major crises to trigger transformative change?

Crises may trigger transformative learning and change in the short and in the long term (van Bers et al. 2019; Novalia and Malekpour 2020). Pahl-Wostl

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et al. (2013), for example, analysed the role of severe floods in triggering change towards a paradigm shift in flood management. They could show that recurring disastrous flood events were decisive for promoting change towards more integrated and adaptive flood management approaches. However, they could also show that countries responded quite differently and that transformative change has been a long-term process taking decades. Catastrophic flood events have mainly been a consequence of short-sighted, command-and-control management approaches that have increased the vulnerability to extreme flood events. The situation is exacerbated by climate change which will lead to an increase of climate extremes. An improved understanding of factors that support transformative learning in such crisis situations is thus paramount for building the capacity to respond to climate change. In particular, a short-term response to crises may also be reactive and show signs of single-loop learning which aims at improving and strengthening prevailing practices without questioning their appropriateness. Transformative learning and final changes require triple-loop learning. This implies questioning (double loop) and finally transforming (triple loop) prevailing and institutionalising new practices (Pahl-Wostl 2009). Furthermore, crises may also lead towards undesirable transformative change by the destabilization of mechanisms that are required, and further perpetuate vulnerability and inequality. For example, both social capital and transformation discourse can be used to bolster existing power and resource structures by framing vulnerability as a personal failure and overlooking systemic or structural factors and the role of deeply rooted social injustices (Blythe et al. 2018; Morsut et al. 2021). Social capital itself can reinforce outsider-insider group dynamics (e.g. discrimination and patronage), and its actual benefit during a crisis is influenced by what resources are available and accessible within a social network (MacGillivray 2018).

In this paper, we focus on the role of crises in supporting transformative change towards a more sustainable path of development. Crisis per se is systemic destabilization (Novalia and Malekpour 2020). It is particularly interesting to analyse whether and under which conditions a crisis is destabilizing those structures and power relations on which unsustainable practices are built. A crisis is always a social construct (Brinks and Ibert 2020). Societal perception and discourse determine whether the (expected) impacts of events/disturbances and/or of more long-term developments become a crisis or – in an anticipatory fashion – a looming crisis. Calling out a crisis can foster (collective) agency, as it implies that it is not yet too late to act (Brinks and Ibert 2020). Different narratives may exist around a crisis (e.g. its causes, its severity, solutions to deal with it, role of different actors/actor groups). It is of interest whether and under which conditions a crisis bundles learning processes and available agency and power (e.g. by introducing a joint goal or need). If unsustainable structures are destabilized during a crisis, there might be opportunities to purposefully select alternate, more sustainable features. The COVID-19 pandemic has, for example, led to a disruption of air traffic and the need to have more meetings in a digital format and supported more local and nature-based leisure activities. The question arises if and to which extent such more sustainable practices will be maintained after the Corona crisis will be over and how such a process could be leveraged.

We argue that to understand the nature of and response to a crisis in the context of sustainability transformations, the following questions need to be addressed:

(1) What are the characteristics of a crisis?
(2) What and who shapes the narrative(s) of a crisis?
(3) What and who shapes the nature of the response to a crisis and which aspects of the system are destabilized by a crisis?
(4) Do responses to crises trigger higher levels of learning and why/how does this happen or not?

To address these questions in a holistic way in a case study context, the paper draws on a conceptual framework that has been developed in a collaborative effort over the past three years (Lotz-Sisitka et al. in review). The framework aims at understanding what catalyses and supports transformative learning in the face of resource nexus challenges. The framework makes a distinction between the following processes that are considered to be of relevance for transformative learning and finally change:

- Navigating and transforming **power** relations,
- Mobilizing individual, collective and relational **agency,**
- Challenging and eventually replacing unsustainable **structures.**

We argue that focusing on the interplay between power, agency and structure is instrumental to understand the potential of crises to ignite transformative processes towards sustainability. As pointed out by Pahl-Wostl (2015b), the interplay and interdependence between structure and agency are essential for understanding transformative change. Agency, the capacity of actors to act independently and make free choices, is limited by structural constraints (e.g. formal and informal institutions) which provide

predictability and stability. Actors are diverse and have different interests and values. In their actions, actors interpret and may strengthen or weaken structural constraints. Power relations have a strong influence on the mobilization of agency and the capacity to challenge unstainable structure, in particular in the context of resource nexus challenges (e.g. Allouche et al. (2019) in their analysis of the Water-Energy-Food nexus.

In the following, we summarize major insights from the scientific literature on the four questions stated above. We then test the applicability of our approach in an exploratory comparative analysis of the Cape Town water crisis and the COVID-19 pandemic in South Africa. The subsequent discussion places the results from this analysis in the broader context of recent crises events related to climate extremes. Finally, we draw conclusions on the need and the potential for both retrospective analysis and for action-research (= active engagement in ongoing processes) on the role of crises in supporting transformative change towards sustainability.

## 2. What are the characteristics of a crisis?

The targets and characteristics of a crisis are important factors that influence response and learning (Lee et al. 2020). However, there is no generally accepted definition of a crisis (Novalia and Malekpour 2020).

Scholarly contributions in the scientific literature differ in acknowledging to which extent the characteristics of a crisis are socially constructed. Some adopt a more technocratic approach and claim that crises can be characterized by 'objective' indicators – comparable to some streams of the literature on risks. For example, Vinke et al. (2020) use a formula to describe crises by a quantitative measure for emergency defined as a product of risk and urgency. They attribute a strong role to science to quantify the degree of an emergency and to assess the various components that contribute to it. Other authors argue that any crisis is mainly a social construct (e.g. Lidskog et al. 2020). A middleway, taking into consideration both perspectives, seems to be the most appropriate. Even when Vinke et al. (2020) quantify the degree of urgency of a crisis by the ratio between time scales of reaction (speed of response) and intervention (speed required for intervention), it should be acknowledged that it is the social construction of a perceived urgency that is decisive for action. If the importance of social construction is not taken into consideration, one risks ignoring the role of power and agency as defining characteristics of a crisis.

Brinks and Ibert (2020) discuss the spatial dimension(s) of crises and argue for shifting attention from understanding the structural conditions causing a crisis to analysing crises as (socially constructed) context for action and intervention. They further highlight uncertainty, urgency and threat as major characteristics of a crisis, and whether sources of causality and uncertainty are 'external' (e.g. extreme weather events or an earthquake) or 'internal' (e.g. water use conflicts or housing policies). Lidskog et al. (2020) introduce what they call the 'social anatomy' of a crisis to compare COVID-19 and climate change. Their analyses of social anatomies are based on temporality (time scales of relevant processes), spatiality (spatial scales of relevant processes) and epistemic authority (how a crisis is represented in knowledge and images).

In summary, the (perceived) characteristics of a crisis have a strong influence on how a crisis unfolds, the response to the crisis, and if and how it may support transformative change. Table 1 summarizes the characteristics addressed in the literature that seem to be relevant in this respect.

All characteristics contain aspects that can be described on the basis of factual knowledge. At the same time, their interpretations in societal debates are socially constructed. Societal debates are influenced by power constellations. Uncertainties about the possible consequences of a crisis and the possibilities of dealing

**Table 1.** Characteristics of a crisis.

| Characteristic of a crisis | Determination based on factual knowledge (examples) | Determination based on social construction (examples) |
|---|---|---|
| Scale in space, jurisdiction (i.e. local, national, global), and time | System analysis of interdependent processes that influence a crisis | Deliberate emphasis of a spatial scale for political reasons e.g. to delegate responsibility |
| Uncertainty | Quantitative scenario analysis | Ambiguities due to different interpretations of the same factual knowledge base |
| Urgency | Quantification based on combination of a measure for damage and time scale of unfolding of a crisis | Downplaying consequences of a crisis and emphasizing negative consequences of crisis responses to delay action |
| Threat | Quantification of imminent dangers (costs, casualties) that may be caused by a crisis | Construction of a catastrophic crisis narrative |
| Internal versus external causes | System analysis of causal factors and their interdependence | Emphasis on external (e.g. climate change, virus) or internal (e.g. poor governance) causes for political reasons |
| (Perceived) ability to control the crisis | Availability of resources and ability to influence key factors that determine a crisis | Emphasizing an alleged ability to control the crises to calm the population |

with them may be used strategically to promote a certain perspective. The process and outcomes of such social constructions are reflected in the crisis narratives.

## 3. What and who shapes the narrative(s) of a crisis?

The narratives developed to frame a crisis are important catalysers for collective agency and thus transformative change. Different actor groups might use an incident to bring a crisis narrative into the public debate. Once public perception of this incident or situation shifts towards seeing it as a crisis, the crisis 'takes off' and it becomes difficult for individual decision makers to ignore it (Vinke et al. 2020), as it unfolds performative qualities, i.e. the crisis diagnosis influences public perception and supports the enactment of crisis (Brinks and Ibert 2020). Following Willi et al. (2020), transformative responses to crises largely depend on which paradigms or narratives dominate decision-making and policy response. They refer to COVID-19 policy responses in Switzerland as an example, where a heavy weight was put on basic liberties and public life, which required higher individual responsibilities, more control and enforcement. We assume that the nature of such framing and subsequent narratives depends very much on the nature of the crisis and the previous state of the social-ecological systems (e.g. environmental problems, perception of government, societal discourses). Structures and power relations are key to assessing why some stakeholders might do everything to avoid announcing a crisis or exploiting and prolonging it.

To understand narratives and their impact, it is enlightening to observe who is shaping them. Lidskog et al. (2020) argue that the construction of the COVID-19 crisis has mainly been expert driven and technocratic. Therefore, numbers, forecasts, and models have been important. The state has played a leading role in shaping the dominant narrative of the COVID-19 crisis, relying heavily on expert knowledge, particularly medical experts (Willi et al. 2020). This narrative highlights that one needs to sacrifice now to be able to go back to the status quo. Obviously, this narrative is not emphasizing transformative change. Governments and experts have shaped this dominant narrative, while NGOs and civil society had little influence on the public discourse in the early stages of the COVID-19 crisis. As the crisis prolonged, civil society, individual and collective agencies began to also shape the narrative. With the unfolding of the crisis and a decline in the perceived urgency to act, societal discourse started to become more pluralistic with some critical voices also addressing the need for transformative change. But the initial response was clearly shaped by the dominant narrative. This is in contrast to Climate Change – here, scientists, NGOs and civil society groups have a strong role, placing the need for transformative change in the focus of the dominant narrative. The role of government is much weaker, with some political actors even dismissing a crisis narrative. Comparing COVID-19 and the climate crises, one may identify two ideal typical configurations (= theoretical abstractions *sensu* Weber) of actor groups shaping a certain kind of crisis narrative:

- A technocratic expert driven approach where government and experts shape the dominant narrative of a crisis which warrants immediate attention. This narrative focuses on how to combat and overcome the immediate consequences of a crisis. Government is in control and acts in a more hierarchical governance mode. Response is often reactive and favours simple solutions. Even when the overarching crisis is global in nature, solutions deal with its regional manifestations.
- A more pluralistic discourse with a significant contribution of civil society shapes the narrative(s) of a more looming environmental crisis such as climate change. Diverse and often contradictory interpretations (i.e. severity, type of response, responsibilities) compete for dominance and the need for transformative change is brought into the public debate. Experts and civil society groups form coalitions. The government does not have a leading role. Policy response is slow and solutions are contested.

The ideal-typical characterizations could also be applied to climate-related crises with regional manifestations such as floods warranting immediate response versus long-term desertification. This distinction has some analogy to the two different types of framing identified by Patterson et al. (2021) in their analysis of the role of emergency frames in sustainability. They distinguished between 'emergency as reaction' and 'emergency as strategy'. Emergency frames are thus used as a response to a crisis event or to highlight the need for action in a looming crisis. We argue that for transformative change to take place it will be important that the immediate response narrative opens a window of opportunity for narratives addressing the need for transformative change to become more prominent in the public debate.

## 4. What and who shapes the nature of the response to a crisis?

In the short term, crises may require quick reactions to avert dangers and damages. Such fast responses may be erratic and driven by panic and fear. But even

more thoughtful responses are most likely based on pragmatic strategies and learning-by-doing without much space given to reflexive governance and experimentation. The COVID-19 crisis has been a case in point for such a response. In the mid- to long term, crises offer opportunities for transformative change, in particular if alternative paradigms and practices have already been discussed and developed in niches prior to an acute crisis (Pahl-Wostl et al. 2013; Geels et al. 2016). In their analysis of transformative change in flood management Pahl-Wostl et al. (2013) showed that a group of actors in the Netherlands used recurrent flood crises to develop alternative management paradigms and insert them into policy. However, if and how such opportunities are used by different governance actors depends on the response capacity and on which kind of structures and prevailing practices are destabilized and contested during the immediate crisis response. The COVID-19 crisis, for example, is primarily catalysing changes in the health system and the digitalisation of economies and general life. The sheer scale and speed of the COVID-19 crisis is resulting in renewed pandemic measures and other civil protection activities. In a way these protective measures induced by a crisis could constellate to bring about transformative governance in the long-run (Bosomworth 2018). In exploring the multi-faceted modes of governance that have emerged in managing the COVID-19 crisis and how they shape transformative learning, Willi et al. (2020) emphasize how transformative policy change requires reflexive learning, coordinated decision-making, and the inclusion of multi-level governance actors (including government, civil society, private sector, and opinion leaders) and their diverse perspectives. Crisis response requires coordination, both vertically across levels of various governance domains and horizontally within governance spheres, as well as collaboration with civil society and private actors. Governments typically take a coordinating role during crises. While some governments have been dynamic, participatory, and proactive in their approach – which might encourage more reflexive learning – others have been slow, hierarchical and bureaucratic (Haffajee and Mello 2020; Hirschhorn 2021).

For scholars of public policy, public perception of the role of government in attempting to respond to crises such as climatic hazards and pandemics have emerged as an important arena of research. Sledge and Thomas (2021) found that governments are viewed as more important in responding to crises than non-state actors. This notwithstanding, non-state actors play a critical role in supplementing the capacity of governments to provide needed expertise and services during crises (Walsh et al. 2015; Sledge and Thomas 2019; Maher et al. 2020). The quality of government and non-state actor relations can be gauged along the dimensions of autonomy, partnership, trust, and inward and outward solidarity. By analyzing how the interplay between the political mobilization of actors, policy-making arrangements, and existing political structures shapes crisis response, Hirschhorn (2021) concludes that the COVID-19 crisis did not change or destabilise customary governance and policy-making practices. The various governance actors sought their usual partners and followed existing routines in path-dependent ways to address the policy challenge occasioned by COVID-19. Such a more technocratic approach may exacerbate existing inequalities and vulnerabilities rather than identifying them as key structural problems that warrant transformative change.

To appreciate who and what shapes the nature of response to crises, we propose that the exchanges between multi-level governance actors need to be improved in an inclusive manner to foster collaborative decision-making processes. The interplay of governance modes (hierarchy, market, network – Pahl-Wostl 2019) should be enhanced, to promote context-sensitive integrated response measures, and leverage avenues for positive learning outcomes. This might imply, for example, a combination of hierarchical steering by government, economic incentives to promote the development of innovative strategies to deal with aspects of a crisis and deliberative platforms to engage different stakeholder groups in the process. We emphasize that the role of structures, power relations and agency of the system that are destabilized by a crisis are critical to understanding sustainable responses and possible transformative processes. Such an understanding provides further insights into how a transformative response to a crisis can trigger higher levels of learning, which is the focus of the next section.

## 5. Do responses to a crisis trigger higher levels of learning?

Crises can generate the forces required to temporarily break stabilizing features of a system and bring about windows of opportunity for learning, political contestation and social mobilisations (Novalia and Malekpour 2020). As we are interested in analysing the role of crises in triggering transformative change, higher levels of learning are of particular interest. Higher levels of learning entail the questioning of established beliefs and practices and lead finally to change in social structures and power relations (Pahl-Wostl 2009). Willi et al. (2020) suggest that crises provide opportunities for such reflexive learning through i) the policy response processes, ii) coordination and consultation of diverse actors, structures and institutions, iii) openness and experimentation,

and iv) observing and learning from the responses of the people to policy measures. This is also supported by Herrfahrdt-Pähle et al. (2020), who demonstrate that preparedness for change, particularly awareness of a problem, generation of new knowledge and knowledge integration appeared to be key actions of a cognitive nature in support of sustainability transformation. Cross-level interactions are of key importance for the process of transformation (Herrfahrdt-Pähle et al. 2020), and information flow and transparency are important for organisational learning and thus response to a crisis (Lee et al. 2020). Pahl-Wostl et al. (2013) highlighted the role of agency (by networks and individuals) who seized crises as opportunities to promote innovative ideas and transformative change. Hence, understanding what determines the capacity of actor groups to seize such opportunities and shape the response to a crisis is important.

The timeframe and context of a crisis further shape the space for learning opportunities. Lee et al. (2020) identified three important factors for higher level learning: time, target and context. Experiences, failures and successes of dealing with previous crises are an important feature accumulated over time (Lee et al. 2020). van Mierlo and Beers (2020) provide an overview of established learning traditions addressed in the research on sustainability transitions, pointing towards the diverse ways learning can appear, including unlearning and learning to resist change. They summarize key characteristics for transformative change: actor diversity and interaction; social levels; timeframe; and direction of change (van Mierlo and Beers 2020). In transition research, learning has been noticed as an important feature of transformative change, while research on it remains rather marginal and not well connected to learning traditions (van Mierlo et al. 2020).

Governance styles conducive to learning and allowing for flexibility to manoeuvre such as experimental governance, which are subject to change, learning and adaptation (Willi et al. 2020) and hybrid governance styles (Pahl-Wostl and Patterson 2021) might be particularly suited to enhance higher level learning during crises. In terms of crisis response strategies, several studies tend to draw from attribution theory, which emphasizes that people and organizations are motivated to proactively interrogate the causes of unanticipated and negative events, and these attributions of responsibility can invoke negative emotions and reactions (Weiner 1985). Applying this rationality, Coombs' situational crisis communication theory contends that the more responsibility stakeholders attribute to an institution/organization for a crisis, the greater their negative perceptions and learning outcomes (Coombs 2007). While attributions are critical for understanding stakeholders' perceptions of a crisis, Bundy and Pfarrer (2015, p. 352) also acknowledge that attributions are 'a negotiated feature of crisis response, and, therefore, subject to social influence'.

Individual responses are another key feature in social systems, as their interplay can give rise to new phenomena (emergence) or stabilize old ones. Reese et al. (2020) discuss this from a social psychological perspective. When discussing why strict measures are accepted to address the COVID-19 pandemic, but not for climate change mitigation, they identify as important factors psychological distance to the climate crisis; higher uncertainty associated with climate change; that measures against the COVID-19 crisis are only temporary; people might feel more collectively efficacious in the case of a pandemic; and that COVID-19 has more tangible consequences for individuals in risk groups. While the characteristics of a crisis are given, the narratives around it are socially constructed, which leaves some space for interpretations of the factors influencing individual responses. In addition to individual responses to crises (e.g. (changes in) values or behavioural adaptation), the 'social glue' of a society, entailing collective identities, solidarity, norms, and cooperation behavior, is another important factor for individual behaviour and societal responses (Reese et al. 2020). Whether such behavioural changes persist will largely depend upon the breadth of those changes (namely, does the new behaviour become a norm, Nyborg et al. 2016) and institutionalization/structures supporting the new behavior (such as new/changed infrastructure or technology).

Comparing responses to COVID-19 and climate change, Lidskog et al. (2020) find that the dominant response for COVID-19 is short term and largely involves single-loop learning. For the climate crisis, other actors shape a more pluralistic discourse (including scientists, NGOs, and civil society groups), placing transformative change at the centre, which is contested and causes conflicts in the form of societal challenges to the status quo. Maintaining and monitoring the balance between fast, often hierarchical decision-making and deliberation in crisis response, decisions can enable sustainability in the transformative learning process (Kalkman et al. 2018). When all aspects of a crisis response are claimed by key stakeholders, decision-making is very fast, but may suffer from a lack of careful deliberation and higher-level learning. Transformative learning requires balancing and contextualizing competing interests and values by promoting deliberation. In the end, a post-crisis analysis to foster collaborative decision-making processes and promote an appropriate course of action and leverage avenues for positive learning outcomes seems important for transformative learning.

However, some actors may also try to prevent a reflexive process, as they have a biased interest maintaining the status quo and avoiding change. Response strategies adopted during the crisis itself determine if such a post-crisis analysis will take place at all and which voices will be heard during such a process.

## 6. Exploratory case study analysis comparing two recent crises

The exploratory analysis compares two recent crises that could have catalysed transformative change in South Africa: i) the severe Cape Town water crisis in 2015–2019; and ii) the COVID-19 pandemic in South Africa from 2020 to 2021. We distinguish a crisis for example, the Cape Town water crisis, from the drought. As already argued, we see a crisis (e.g. the Cape Town water crisis) as a social construct (Brinks and Ibert 2020), whereas we see the drought as a physical phenomenon. Viewed this way, the drought is a primary contributing factor to the water crisis, whereas the crisis as a social construct encompasses societal perceptions and discourses. The same distinction can be made of the characterisation of the COVID-19 pandemic as a crisis and the COVID-19 disease. Whereas the former is a social construct, the latter is a biological phenomenon, which constitutes the leading cause of the COVID-19 crisis. Our comparison is thus about the two crises rather than the leading physical and biological phenomena that may have given rise to them. This way, we discuss the crises in its entirety (triggers, narratives, responses, etc.).

To analyze the role of a crisis in sustainability transition, we compare the Cape Town water crisis and the COVID-19 pandemic. Our analysis of the two crises focuses on i) the characteristics of the two crises, ii) the narratives (who and what) of and the responses to the two crises, iii) evidence of systemic structure change owing to the crises and iv) evidence of higher levels of learning.

### 6.1. What are the characteristics of a crisis?

The two crises, the Cape Town water crisis and the COVID-19 pandemic, had quite different features. However, the preconditions of both speak to a lack of preparedness as well as existing weaknesses in governance systems. In both case studies, the complacency to prepare for a 'predicted' crisis seems to have been an 'optimism bias', a well-researched cognitive bias describing an unreasonably confident assumption that a negative or detrimental event will not happen and belief that an outcome will be positive (Sharot 2011). Communities of experts are indeed not immune to this bias (e.g. see Hultman and Koomey 2007).

The key characteristics of each case study are summarised and compared in Table 2.

#### 6.1.1. Cape Town water crisis

The actual causes and triggers of the Cape Town water crisis that took place over several consecutive years beginning in 2015 were attributed to a combination of population growth, unsustainable water consumption (particularly by the elites and upper middle class), and systemic governance weaknesses (Chan et al. 2018; Enqvist and Ziervogel 2019).

**Table 2.** Comparison of the characteristics of the COVID-19 pandemic and Cape Town water crisis.

| | COVID-19 | Cape Town water crisis |
|---|---|---|
| Spatial scale | Global, manifesting at national and local scales | Local, but with global events (e.g. climate change and foreign tourists) as key contributors |
| Time scale* | 2020 to 2021 (current?)<br>Unexpected emergence within months, expected duration - a few years until endemic | >2015 to 2019<br>Slow development over years, culmination over months, solution years to decades |
| Perceived urgency | Urgent, imminent with disastrous consequences for all | Latent, slow at the beginning but become imminent with time |
| Causes and triggers | Development and spread of the novel COVID-19 virus – the impact exacerbated by a limited health system, and governmental capacity to manage the crisis | A combination of a growing population, unsustainable consumption and governance failures in responding to predicted water demands exceeding supplies, exacerbated by drought |
| Uncertainty | High levels of uncertainty including origin, vulnerability, and potential impact | Climate change projections inherently include some uncertainty, but the potential for a water crisis event has been a strongly documented likelihood due to other events e.g. demand exceeding supply as a result of population growth, and supply augmentation not at a pace to meet demand. |
| Threat | Initially unknown, but comorbidities, old age and working in high-risk areas (e.g. hospitals) significantly increased likelihood of hospitalisation or death | Significant, with Cape Town potentially becoming the first major city in the world to run out of water |
| Ability to control the crisis | Limited control of a global pandemic driven by an airborne pathogen with potential for mutations | Limited control on directly increasing water supply (i.e. rainfall), but extensive control to decrease demand and potential control to pre-emptively increase supply (e.g. diversifying water sources) |

*The timelines used are intended for orientation, rather than clearly demarcated periods as it can be disputed when exactly the crisis emerged, peaked, and then petered out. For example, the COVID-19 pandemic is still in effect at time of writing, yet lockdown measures have been notably eased.

These were aggravated by inter- and intra-party politics, as well as climate-induced changes (e.g. increased rainfall variability and drought). A particular trigger of the crisis was the onset of an extensive drought.

The evolution of the Cape Town water crisis is marked by an apparent lack of anticipatory preventative action despite early warnings regarding demand exceeding supply due to population growth (Muller 2017; Visser 2018). Part of the reason for this is that in a way the water crisis had evolved slowly and latently over a prolonged period, with policy and decision makers unwilling to take decisive preventive action. For example, scientists had long predicted the occurrence of serious water shortages in Cape Town as a result of projected demand exceeding supply (e.g. Streek 1990), but these predictions were largely ignored by decision and policymakers (Visser 2018). From 2007, a newly-formed strategic steering committee took responsibility for monitoring the water scarcity situation and implementing a reconciliation strategy in the City of Cape Town (Muller 2017). This committee commissioned projections on supply and demand. Retrospectively, their 2014 report was overly optimistic due to a few years of above average rainfall and a reduction in domestic water consumption. Unfortunately, several years of below average rainfall followed, and the Cape Town population continued to grow rapidly, leading to a persistent increase in domestic water consumption (Muller 2017; Enqvist and Ziervogel 2019).

In summary, although the drought was an immediate trigger of the Cape Town water crisis, other factors such as population growth, unsustainable water consumption and governance failures in responding to predicted demand exceeding supplies, are the remote causes of the water crisis. A combination of these factors implies that the city was not adequately prepared when the drought struck, culminating in the devastating effects of the water crisis.

#### 6.1.2. South African Covid crisis

The COVID-19 pandemic at first glance constitutes an unprecedented crisis, given its sudden onset, duration and global dimensions. However, the risk of a global pandemic was not an unforeseeable event (for example see Madhav et al. 2017), and the weaknesses in South Africa's public health system were already well documented.

Broadly, it is agreed that the key cause for the pandemic was the introduction and spread of the SARS-CoV-2 virus in humans. This was further aggravated by close physical contacts among infected and uninfected people as well as globalisation. The actual origin of the virus is still a debated and politicized issue. Some claim that it was ultimately triggered by close animal-human interactions, while others allege a so-called lab leak (Bloom et al. 2021). Whichever the case may be, this has shaped the framing of the COVID-19 crisis as particularly convoluted. Indeed, the COVID-19 crisis was novel, with high levels of uncertainty which fuelled anxiety and regimented control measures in many jurisdictions, including South Africa (Heiat et al. 2021).

Shortly after the first COVID-19 patient in South Africa was reported in March 2020 (Schröder et al. 2021), a strict national lockdown regime was declared (Simon et al. 2021). This initiated a pandemic crisis set in an already precarious context. From a public health perspective, South Africa has a high infection-rate of immune-compromising diseases such as Tuberculosis (TB) and Human Immunodeficiency Virus (HIV) (de Groot and Lemanski 2021), as well as an already strained healthcare system (Maphumulo and Bhengu 2019). Furthermore, the crisis emerged during a time when South Africa was experiencing a strained relationship between the government and the citizens, with growing mistrust and a troubled economy (Naudé and Cameron 2021).

What and who shapes the narrative(s) of a crisis, and the nature of the response to a crisis?

The narrative of the crises changed over time and influenced how the crises were framed, i.e. what the crisis is, what caused the crisis, what would be the best response to the crisis, and who is to blame for negative impacts of the crisis itself or the responses taken. The previous section already gave an overview of the key characteristics of each crisis, which in a way influence the narrative around each of the crises.

In both case studies, the initial narrative was technocratic and mainly determined by the specialists of a dominant disciplinary field of each crisis. However, as the crisis developed, other actor groups became involved and the narrative diversified. These emerging narratives countered, reinforced or elaborated on each other and the initial narrative. Namely, other interpretations and framings of the crisis narrative emerge as different groups started voicing their experiences of the crisis as the impact spread, and the consequences of the initial responses began to emerge.

#### 6.1.3. Cape Town water crisis

*Public* discourses on water shortages in South African urban spaces tend to be framed either from an implementation perspective highlighting supply-demand dynamics and a pragmatic optimistic view of policy; or from a governance perspective emphasising corruption, politics, and social justice (Bischoff-Mattson et al. 2020). These perspectives are influenced by the disciplinary field and expertise or roles of actors. In the case of the Cape Town water crisis, the narrative

was mostly controlled by both government and civil society. In the beginning, it was dominated by biophysical considerations (i.e. low dam levels, variability in rainfall events). This narrative directed the response as a combination of responses from government (i.e. top-down and market-driven) and responses from civil society network governance. This included the government imposing phased restrictions on water users, increased tariffs, reduced reticulation pressure, and water rationing (Enqvist and Ziervogel 2019).

The initial technocratic response (e.g. increased tariffs, etc.) to the water crisis contributed to an unequal exposure of citizens to the crisis, which was exacerbated by existing high inequalities, historical legacies, and apartheid spatial planning that discriminated against the majority of the people (Enqvist and Ziervogel 2019; Bischoff-Mattson et al. 2020). Some considerations were given to social-economic factors through block tariffs. However, the enforcement of stricter measures and the insistence on re-registration of indigents in order to benefit from the free basic water supply harshly affected poor households (Enqvist and Ziervogel 2019). Households with means began to exploit alternative water sources such as groundwater, thereby enhancing their preparedness for future crises. This potentially escalates the divide between the 'haves' and 'have not'. For example, before 2018 whilst the upper-middle class and upper class in suburbs such as Bishop Court and Constantia enjoyed daily supply of water, the lower class in townships such as Philipi, Langa, and other informal settlements experienced frequent chronic water shortages (Savelli et al. 2021). As a consequence, exposure through water restrictions was unevenly felt and spatially distributed. The imposed restrictions mainly affected the poor because in most cases they tend to live in larger households, sharing less water as per allocation. Further, these households are also less likely to exploit alternative sources such as groundwater or bottled water due to economic constraints. This is in addition to the fact that low-income households were the first target of water metre installations. City elites and upper-middle class with economic means adapted and bypassed restrictions by using alternative water sources such as groundwater, spring water, bottled water, and rainwater. Therefore, water restrictions (i.e. 50 L per person per day) and increased tariffs further exacerbated inequalities and inequities (Savelli et al. 2021). The implication is that a technocratic response to a crisis without due considerations to historical, social and economic contexts may produce or enforce other forms of unintended crisis such as deepened inequalities and poverty.

The water crisis narrative was also characterised by an aggressive media campaign which included the declaration of a 'Day Zero' by the Cape Town Mayor (Shepherd 2019). 'Day Zero' refers to a point of time at which the city would effectively run out of water (Chan et al. 2018). In technical terms, it referred to when the dam levels would fall to 13.5% of capacity, and it would be impossible to draw water for consumption (Shepherd 2019). The 'Day Zero' narrative was at first optimistic in tone, focusing on avoiding a crisis and potential solutions (Bruns 2019). However, it soon turned more 'apocalyptic' as the crisis peaked. It also needs to be noted that the 'Day Zero' narratives in media and the broader public discourse, was perhaps more of an oversimplification and exaggeration of this technical interpretation (Warner and Meissner 2021). In practice, it was used as a narrative to galvanise public action to decrease water use.

An apocalyptic narrative could potentially catalyse change. Studies suggest that the threat to lifestyle and social norms via the 'Day Zero' media campaign had more effects on users than government-imposed restrictions (Brick et al. 2018; Brick and Visser 2018). Individual, collective, and relational agencies were decisive in preventing Day Zero through behavioural change. Indeed, at the height of the crisis, water consumption savings of more than 55% were achieved (Savelli et al. 2021). Consumption dropped from 1.2 billion litres per day in early 2015 to about 510–520 million litre per day in early 2018 (Shepherd 2019). Relational agency played a key role in encouraging good behaviour among neighbours (Brick et al. 2018; Brick and Visser 2018; Bruns 2019).

However, negative narratives around Day Zero began to build with time. The apocalyptic narrative was framed as catastrophic instead of 'transformative' by the public and possibly hindered behavioural change (Bruns 2019). The negative tone pressured politicians and accentuated the economic impact of the restrictions. Indeed, the crisis narrative progressed beyond the initial biophysical directive to be dominated by more socio-political and economic considerations. Collective agency through civil society and social activism was mobilized to demand transparency, accountability and oppose government punitive measures, e.g. a proposed drought levy, increased tariffs, and installation of inefficient water management devices (Shepherd 2019). Consequently, the Democratic Alliance (DA) political leader decided to introduce the slogan 'Day Zero Heroes' to reframe the narrative to promote proactive efforts to delay Day Zero, instead of framing it as an unavoidable or inevitable catastrophe. It needs to be noted that there was a notable time lag between exercise of agency and crisis due to the slow, latent nature of this climate-induced development.

#### 6.1.4. South African COVID-19 crisis

As the global narrative, the South African Covid crisis narrative was controlled largely by the government and experts in the field of medicine and epidemiology (de Groot and Lemanski 2021; Muller 2021). This shaped mostly a technocratic driven response involving pharmaceutical (e.g. vaccines) and non-pharmaceutical measures (e.g. social-economic measures such as restrictions on movement, social gathering, border closure, economic stimulus packages, and mandatory wearing of face masks in public places) (de Groot and Lemanski 2021). The initial strict lockdown regulations of March 2020 were eventually eased on 1 July 2020, but restrictions returned with consecutive waves in December 2020 and winter of 2021 (Simon et al. 2021).

The implementation of these lockdown responses revealed both external and internal power dynamics. The national-scale response was mediated by global events, including a 'vaccine diplomacy' and 'vaccine politics' (Jennings et al. 2021). In a way, the notion of vaccine politics exposes the global inequalities in the North-South divide in vaccine access. However, there was a gradual return to global solidarity as wealthier States in the global North secured enough vaccines for their population (Makau 2021).

At the local level, the initial responses were mostly blind to power dynamics and socio-economic differentiations (de Groot and Lemanski 2021). Health considerations alone (e.g comorbidity, age) seemed to override social-economic factors in vaccine access in some cases e.g. vaccinating those in low paid and high-risk jobs (in addition to medical workers). An approach to vaccine access that considers health and social-economic considerations has been advocated because those in low paid and high-risk jobs such as supermarket attendants and taxi drivers, were seen as being at high risk of infection and more likely to be greatly impacted by a lack of income (Francis et al. 2020). Indeed, the COVID-19 crisis had a *perceived* equal exposure, but in reality it was unequal because of a range of social-economic and health factors (Mein 2020). Informal settlements were particularly badly affected (Simon et al. 2021). Overcrowding in housing units, poor access to water and sanitation facilities, low paying, and highrisk jobs were factors that rapidly spread the virus among poor households (Patel et al. 2020). For example, occupations deemed essential during lockdowns such as transport, fuel sales attendants, supermarket salespersons etc. present little opportunity for physical distancing yet these jobs are mostly occupied by poor individuals. The consequences of job losses due to COVID-19 restrictions were mostly felt by the most vulnerable with little financial reserves, including rural communities, informal workers and women (Spaull et al. 2020; Visagie and Turok 2021).

*Perceived* risk was another distinction between different socio-economic groups. Kollamparambil et al. (2021) reported an exaggerated perceived risk among higher income and more educated groups, and an underestimated risk among lower income groups. This distinction may have resulted from *inter alia* the following factors. Firstly, COVID-19 infections were introduced to the country initially through higher income groups, namely, those who were able to travel internationally. From this, part of the initial narrative included a 'rich man's disease' perception (Kollamparambil et al. 2021). Secondly, lower income groups have limited access to responses favoured by higher income groups including social distancing and sanitisers (Kollamparambil et al. 2021). Therefore, an optimistic bias may be a strategy to cope with a risk which one cannot effectively mitigate with available resources.

The initial technocratic narrative, although at first supported (Naudé and Cameron 2021), soon experienced more push back once the realities of context were more explicitly revealed. The narrative was soon challenged by an anti-lockdown rhetoric, catalysed by a governance failure expressed as reports of extensive corruption, police brutality on enforcing lockdown rules, and the public questioning the reasoning for some of the lockdown regulations and policies (Naudé and Cameron 2021). Some labeled this narrative as 'performative scientism' which caused both social and economic harm because of its narrow perspective disregarding social implications of policies (Muller 2021). Naudé and Cameron (2021) describe how the business sector particularly started pushing back. Representatives of this sector challenged the crisis narrative, emphasising the economic impact and losses, and claimed that the lockdowns were exceptionally severe when compared to the global standard. Reflecting on Kollamparambil et al. (2021) with Naudé and Cameron (2021), one can ask: 'Who decides when enough is enough, when the cons of a response outweighs its pros?'

The top-down narrative and response of the crisis was primarily a state-based agency expressed through regulatory institutional measures. However, collective and relational agencies were observed at the sub-national and communities' level. For example, these were mobilised through organised civil societies which were decisive in averting hunger in poor communities due to prolonged lockdowns (Hamann et al. 2020; de Groot and Lemanski 2021). Overall, there was a small time lag between the exercise of agency and the crisis due to the rapid pace of crisis development and its imminent, novel nature and uncertainty surrounding it.

### 6.2. Do responses to crises trigger higher levels of learning and why/how does this happen or not?

It is still too early for both case studies to determine evidence of crisis-induced sustainable higher levels of

learning. However, some preliminary changes of the status quo have been observed.

#### 6.2.1. Cape Town water crisis

For the water crisis, there seems to be a sustained heightened awareness of Cape Town's vulnerability to water shortages among the citizens (Herzog-Hawelka 2021; Savelli et al. 2021). There is strong evidence of civil society mobilisation and citizens' activism as 'watch dogs' over water management issues that may persist even after the immediate threat has passed (Herzog-Hawelka 2021). However, the crisis also revealed a debilitating lack of trust between key public and civic stakeholders (Enqvist and Ziervogel 2019).

Furthermore, at the peak of the drought, the city developed a range of innovative measures across the water value chain in response to the crisis, including supply, demand, and behavioural change innovations (Taing et al. 2019). Most of these measures are short term in nature and may not lead to transformative change. However, drawing lessons from the drought, the city developed a water strategy informed by five pillars: i) safe access to water and sanitation, ii) wise use, iii) sufficient, reliable water from diverse sources, iv) shared benefits from regional water resources, and v) a water sensitive city (City of Cape Town 2020). Critically, political will to implement plans from the strategy will be required to make the transformative difference as evidence of higher levels of learning.

Indeed, Jones et al. (2022) found that news media mostly framed the cause of the crisis as a failure in water governance, including intersectional links with other sectors, namely implicating agriculture as a contributor to the crisis while linking the energy sector with potential interventions such as desalinization. However, this critique of governance structures and some insights of the systemic nature of the crisis, were lacking in the solutions discourse, which were still technocratic demand-supply interventions. Even calls to diversify water resources lost momentum as the crisis passed. Other authors such as Rawlins (2019) argue that challenges of reallocation, and of balancing equity and efficiency imperatives were key contributors to the water crisis in Cape Town.

#### 6.2.2. South African COVID-19 crisis

For the Covid crisis, there have also been traces of civil societies-induced transformation for example social entrepreneurship, social innovations, networks, and partnerships and mobilisation of local resources and knowledge (Hamann et al. 2020). Civil societies and community activists in South Africa responded in diverse ways to the COVID-19 lockdowns. The response ranged from averting hunger in poor communities to questioning or challenging the government-led lockdown regulations (Seekings and Nattrass 2020).

Another notable potential transformation was the extensive digitisation of primary, secondary and tertiary education (Mhlanga and Moloi 2020). The rapid digitisation of the education sector to facilitate online or remote learning. Although this change could decentralise education especially higher and tertiary for South Africans, it is hindered by limited computer literacy and restricted access to learning-conducive environments and technology as experienced during the pandemic (Fouche and Andrews 2022).

Finally, key insights from this overall analysis regarding crisis narratives, responses and systemic and/or structural changes of both case studies are summarised in Table 3 (the Cape Town water crisis) and Table 4 (the COVID-19 pandemic). The following section will further elaborate on comparing these case studies.

## 7. Discussion and conclusions

The two case studies in South Africa show that crises expose general weaknesses and structural deficits of the governance system. Despite the difference in the underlying causes and characteristics of the crises, weaknesses in governance capacity and high societal inequalities amplified the negative effects of both crises, especially for the marginalized social groups without access to adequate resources. These problems have been addressed by some voices in the public discourse accompanying the crises. But has this generated sufficient momentum that steps will be taken to address these fundamental societal challenges?

The initial narratives of both crises had clear dominating actors who also led the response in some instances. What can be seen from both crises, is that the initial technocratic narrative and thus the responses to the crises changed to a more pluralistic narrative, although for the COVID-19 pandemic, technocracy still dominates the way the crisis is framed and the various responses. The change to a more pluralistic narrative was largely due to as it engaged with the agency and power dynamics of civil society groupings and citizens on the one hand, and the government on the other hand. Both crises revealed vulnerabilities and a lack of resilience, which expressed existing systemic problems of agency and power structures. Sometimes, this 'revealing' redirected the dominating narrative and thus responses to a more inclusive framing incorporating broader social and economic considerations. The redirection of narrative has also been accompanied by innovative action led by different civil society groups.

Will changes endure and transform systems and structures?

**Table 3.** Overview of key insights and supporting literature cited on how the Cape Town water crisis unfolded in terms of narratives and responses, and emerging evidence of systemic and/or structural changes as potential indicators of learning towards transformative change. Additional literature is cited in the relevant subsections where needed to clarify context or examples.

| | Insights from the Cape Town water crisis case study | Key supporting literature |
|---|---|---|
| Initial narrative and response | Technocratic, framed by biophysical considerations and driven by government | Bischoff-Mattson et al. (2020) |
| | Response focused on increased tariffs, water restrictions, reduced reticulation pressure, and water rationing | Enqvist and Ziervogel (2019); Millington and Scheba (2021) |
| | Uneven and unequal impact as elites and upper-middle class were able to by-pass these responses by accessing alternative water sources, but later social-economic considerations began to also take central stage. | Bischoff-Mattson et al. (2020); Enqvist and Ziervogel (2019); Savelli et al. (2021) |
| | Implementation of measures, which sharpen the equity-efficiency trade-offs and brings to bear the imperatives for water reallocation in South Africa | Rawlins (2019) |
| Emerged narratives and responses | Pluralistic narrative promoted by diverse actor groupings | Bischoff-Mattson et al. (2020) |
| | Civil society promoted the narrative on socio-political and economic dimension, and supported the mobilising collective and relational agencies to respond to the crisis beyond technocratic interventions | Bruns (2019); Brick et al. (2018); Brick and Visser (2018) |
| | Government promoted a Day Zero narrative which resulted in induced short-term behavioural change but proved unsustainable in the long-run | Bruns (2019); Shepherd (2019); Warner and Meissner (2021) |
| Emergence of systemic and/or structural changes | Civil society mobilisation and citizens' activism as "watchdogs" over water management issues | Herzog-Hawelka (2021) |
| | Innovative interventions regarding supply-demand management and behavioural change (benefiting some, but not others) | Taing et al. (2019); Savelli et al. (2021) |
| | Individuals with means using alternative water resources, e.g. going "off-grid" and decreased dependence on municipal-supplied water | Savelli et al. (2021) |
| | Recognition of the need to change structures and for a more systemic approach to water governance in terms of causes and the unfolding of the crisis, but these did not manifest in the solution discourses in the media | Jones et al. (2022) |

**Table 4.** Overview of key insights and supporting literature cited on how the COVID-19 pandemic unfolded in terms of narratives and responses, and emerging evidence of systemic and/or structural changes as potential indicators of learning towards transformative change. Additional literature is cited in the relevant subsections where needed to clarify context or examples.

| | Insights from the COVID-19 pandemic case study | Key supporting literature |
|---|---|---|
| Initial narrative and response | Technocratic, framed by epidemiology, and driven by government and experts | de Groot and Lemanski (2021); Muller (2021) |
| | Response focused on pharmaceutical (e.g. vaccines) and non-pharmaceutical measures (e.g. social-economic measures such as restrictions on movement, social gathering, border closure, economic stimulus packages, and mandatory wearing of face masks in public places) but was critiqued to be too narrowly technocratic overlooking socio-economic inequalities and other disparities | de Groot and Lemanski (2021); Francis et al. (2020); Mein (2020); Patel et al. (2020); Spaull et al. (2020); Simon et al. (2021); Visagie and Turok (2021) |
| Emerged narratives and responses | As the crisis prolonged, diverse actor grouping promoted diverse narratives e.g. anti-lockdown rhetoric, social-economic impacts on livelihoods and social security | Muller (2021); Naudé and Cameron (2021) |
| | Different perceptions of risk between socio-economic groups, possibly linked to having the means to follow the lockdown restrictions and regulations or not | Kollamparambil et al. (2021) |
| | Mobilisation of collective and relational agencies at the sub-national and communities' level to e.g. avert hunger in poor communities due to prolonged lockdowns | de Groot and Lemanski (2021); Hamann et al. (2020) |
| Emergence of systemic and/or structural changes | Actors constellation and mobilisation forming new structures, networks, reorganisation, roles and processes | Hamann et al. (2020); Seekings and Nattrass (2020) |
| | Digitisation of education (for some) | Mhlanga and Moloi (2020); Fouche and Andrews (2022) |

Indeed, the test of whether innovative actions that sprung up during the case studies are transformative would be determined by the extent to which they become sustainable, with lasting impact. Already, as the crisis recedes, some of the organisations that sprung up during the COVID-19 crisis are now exploring ways of transforming from a donation-based model to a more sustainable market-based income generating model (Hamann et al. 2020). The question also remains to what extent the revealed and exacerbated inequalities will be addressed, or if 'the ability to transform one's life in response to COVID-19' will remain a 'privilege' (de Groot and Lemanski 2021), as with the Cape Town water crisis (Savelli et al. 2021). The whole trajectory leading to the water crisis does not give too much hope for expecting major transformative change as response to this crisis.

The optimism bias, mentioned as a possible contributing factor to the Cape Town water crisis, could have been exacerbated by an evident lack of learning. In the references documenting and analysing the crisis, there was a complete absence of higherlevel learning, i.e. assessing the deeper underlying causes

of a potential crisis and aiming at transformative change. There was also no clear evidence for even single-loop learning, for example to improve measures to increase supply and reduce demand. This was observed despite sufficient evidence and knowledge in the scientific community that could have led to other conclusions. Vogel and Olivier (2018) reported a persistent lack of learning from past drought experiences in South Africa.

In the South African context environmental and social factors contributing to water crises are closely intertwined. Hence, it is impossible to tackle the underlying causes of such crises without addressing fundamental societal challenges. Society is characterized by highly persistent inequalities, power structures and entrenched conflicts between different societal groups. The deterioration of good governance principles (i.e. transparency, respect for the rule of law, inclusiveness, effectiveness, efficiency) are key contributors to inequalities in society. For transformative change to lead towards more sustainability, there is a need for the strict observance of the principle of good governance.

The COVID-19 crisis has strengthened the role of government as the key actor in the response to the crisis. But has it also increased trust in the government? A trustful relationship would be required to provide momentum to transformative change and multi-level processes connecting the different bottom-up initiatives and a broader process of governance reform. However, it would be too simplistic to attribute the absence of higher levels of learning despite mounting evidence to poor governance and weak government and lack of resources that have characterized the situation in South Africa. Also, in a rich country like Germany where principles of good governance are respected and resources are not scarce, higher levels of learning with respect to water management have largely been absent. The flood disaster July 2021 which cost the lives of almost 200 people and caused damage amounting to nearly 30 billion Euros, revealed failures in water and land management in recent years. Despite scientific evidence that extreme flood events are becoming more likely due to climate change and despite numerous recommendations on the need to change practices in agriculture, forestry and flood risk management, established practices have been maintained. Prior to these flood events Germany had experienced three years of very low precipitation (2018–2020) and situations of severe water scarcity even in regions that had not been suffering from water shortages in the past. As a response a national water strategy has been developed that asks for nothing less than for attributing a key role to water in land management and land use decisions. This reframing towards a cross-sectoral management approach can be seen as a clear indication of double loop learning paving the way for triple loop learning. However, if its implementation will lead to transformative change and thus triple loop learning remains yet open. Possibly another drought crisis might be required to speed up the process.

Another example for recent flood disasters from the African continent is given by Ghana. Ghana is prone to floods, with devastating impacts especially on poor urban communities (Gough et al. 2019). As flooding has become an annual occurrence, cascading flood crises, which claim lives and disrupt livelihoods and critical infrastructure, are becoming increasingly common (Kayaga et al. 2021). In June 2015, a major flood and fire disaster in the capital city of Accra killed around 150 people, while over 8,000 were displaced, many were injured, and built structures to the value of millions of dollars were destroyed (UN Country Team Ghana 2015; Quarshie et al. 2018). Again, here these crises exposed governance failures and sustainability deficits. Government's response has been largely reactionary and failed to build climate resilient infrastructure. Individuals have become more aware and prepared for flooding events and intensified their coping and adaptive strategies. This is triggering some degree of transformative change at the community level albeit more sustainable transformative approaches and interventions are needed at the national and local levels to enhance preparedness, response and resilience.

As extreme drought and flood events are predicted to become more frequent and severe due to climate change (IPCC 2021b), the urgency for transformative change and learning from recent and recurring crises events is high. However, it is questionable if a crisis and threat narrative and emergency frames could and should be sustained over longer periods of time. Regarding the Cape Town water crisis, Rodina (2019) proposed that the crisis narrative could have hindered resilience building by potentially narrowing the framing of the problem and interventions to perceived critical factors that overlook other social or environmental implications. Similarly, Patterson et al. (2021) argue that emergency frames may prevent more inclusive responses by prioritizing urgency over deliberation and by encouraging government to act in a hierarchical and authoritarian governance style. What is required seems to be a reframing towards a more inclusive and forward-looking narrative empowering and mobilizing the agency of different societal groups. The question thus arises how to mobilize individual, collective and relational agency and how to navigate and transform power relations in order to move from challenging to replacing unsustainable structures.

During and immediately after crises, it would be important to identify opportunities for policy change. Crises bring persistent problems to the fore and the

societal discourse. According to the model of Kingdon (1984) such societal awareness needs to encounter receptive politics and policy streams to generate a window of opportunity for policy change. These streams are influenced by changes in power relations and the weakening of established structure. Strategic agency e.g. by so-called policy entrepreneurs (Huitema and Meijerink 2010) would be key to take advantage of and contribute to shaping such policy windows.

Another important aspect would be some kind of institutionalization of learning and transformative change. One possibility could be the formation of innovation platforms bringing together actors from different levels and different roles (e.g. pioneering innovators, investors, scientists, policy makers, regulators). Such platforms could support the scaling up of local initiatives and innovative approaches that have been developed in niches.

The role of governments also requires special attention. Immediate threat requires fast responses. Government typically acts in a hierarchical governance mode. Ideally, governments would adopt a network governance style and act more as a convenor for deliberative processes in the later phase of the response to a crisis.

Science could and should play a more active role in such processes and engage in transdisciplinary research. This implies the co-production of knowledge between science and actors from outside academia who engage in joint problem identification and the co-design of solutions. Scientific analyses of ongoing crises could support reflexive governance and deliberation and empower groups whose voices may not be heard. The analytical approach addressing learning, power, agency and structure has proven to be useful to understand the role of crises in transformative change towards sustainability. To this end the paper analyzes the interplay between mobilizing individual, collective and relational agency and navigating and transforming power relations to challenge and/or profit from already weakened and eventually replace unsustainable structures has proven to be useful to understand the role of crises in catalysing and supporting transformative learning. It has been used in this paper for retrospective analyses. It could and should also be used in analyses supporting reflexive governance in ongoing processes. Such analyses could address questions such as: Who sets the agenda? Are critical voices heard? Are complex interdependencies and systemic failure addressed in the public discourse? Science should further become more active in supporting experimentation with and drawing lessons from comparative analyses of institutional innovations – which kind of platforms and actor networks could be established that would support and foster an inclusive and transparent public discourse on transformative change.

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