TRIGGERS, TRAPS, AND DISCONNECT: HOW GOVERNANCE OBSTACLES HINDER PROGRESS ON GRAND CHALLENGES

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ABSTRACT

In this paper, we adopt a multi-stakeholder governance perspective to study how people collectively respond to a grand challenge. Specifically, we show how working through governance obstacles, i.e., coordinating and collaborating challenges arising from a multi-stakeholder governance approach to responding to grand challenges, can erode actors' ability to mitigate these wicked problems. We illustrate this process through an in-depth case study of WaterHealthOrg, a multi-stakeholder initiative established to address degrading water health in Australia's critical Great Barrier Reef region. Our findings reveal how, in an effort to avoid group paralysis or dissolution, actors employ specific practices to address governance obstacles. By doing so, actors set off a cumulative self-reinforcing process, driving them to consolidate rather than critically reflect on and adapt their collective response. Drawing on these insights, we develop a conceptual process model of how efforts to manage multi-stakeholder governance obstacles can generate governance traps which shape participants' ability to collectively respond and, ultimately, mitigate grand challenges.

INTRODUCTION

Governments, non-profits, and businesses are under increasing pressure to find solutions to grand challenges (Howard-Grenville & Spengler, 2022), such as climate change (Schüssler, Rüling, & Wittneben, 2014; Wright & Nyberg, 2017), water problems (Fan & Zietsma, 2017; Porter, Tuertscher, & Huysman, 2020), homelessness (Easter, Murphy, & Brannen, 2022), and poverty (Mair, Wolf, & Seelos, 2016; van Wijk, van Wijk, Drost, & Stam, 2020).

As the problem domain is too far reaching to be tackled by any single actor, responding to grand challenges requires the coalescing of actors with different viewpoints and (political) capacities to build collective solutions (Ferraro, Etzion, & Gehman, 2015; Trist, 1983; Weick, 1995). Addressing these issues thus tends to involve multi-stakeholder governance (Huxham & Vangen, 2000; Provan & Kenis, 2008). This governance approach involves coordination and collaboration among independent stakeholders such as businesses, nonprofits, government institutions, and advocacy groups that, in the absence of a central/overarching governing authority, strive to collectively respond to problems beyond their individual organizational capacity (Dentoni, Bitzer, & Schouten, 2018; Gray & Purdy, 2018; Provan & Kenis, 2008). It can take

various forms from cross-sector partnerships (Selsky & Parker, 2005) to networks (Provan & Kenis, 2008). The past two decades have seen a dramatic rise in multi-stakeholder governance, to the point where this approach is now seen as a new paradigm for responding to complex, uncertain, and evaluative problems (Dentoni et al., 2018; Ferraro et al., 2015; Gray & Purdy, 2018; Hahn & Pinkse, 2014).

Literature tells us that multi-stakeholder governance can lead to a stronger sense of shared ownership (Schmitt, 2010), and bolder, more innovative, and more impactful responses than the ones developed by any standalone organization (Kornberger, Leixnering, & Meyer, 2019; Seidl & Werle, 2018) including businesses (Banerjee, 2008; Wright & Nyberg, 2017). Examples of such responses include providing sustained and coordinated support during a refugee crisis (Kornberger et al., 2019); overcoming longstanding barriers to employment for aboriginal people (Sloan & Oliver, 2013); and transforming entrenched patterns of social inequality (Mair et al., 2016).

Engaging in multi-stakeholder governance, however, is particularly rife with obstacles, or "challenges of coordination, collaboration, and participatory action" (Dentoni et al., 2018; Dorado, Antadze, Purdy, & Branzei, 2022: 9; Gillett, Loader, Doherty, & Scott, 2019; Hardy, Lawrence, & Phillips, 2006; Margerum, Robinson, & Genskow, 2016). These can include interpretive (e.g., different interpretation of progress), structural (e.g., financial fragility) and relational (e.g., power asymmetries) issues, making it hard to agree on who should be involved in developing the collective response (Seidl & Werle, 2018) and which governance processes should be favored (Dentoni et al., 2018; Gray & Purdy, 2018; Hardy et al., 2006). These obstacles mean that working together to mitigate grand challenges through multi-stakeholder governance becomes a challenge in itself (Dentoni et al., 2018; Easter et al., 2022; Grodal & O'Mahony, 2017; Seidl & Werle, 2018; Voegtlin, Scherer, Stahl, & Hawn, 2022).

Unveiling the ways participants work through these obstacles is crucial as they may be one key reason for the common finding that multi-stakeholder attempts to address grand challenges often have unintended consequences (Huxham & Vangen, 2000). Studies on these unintended consequences point, implicitly or explicitly, to problems arising from efforts by groups to address persistent governance obstacles. Importantly, research shows that despite sustained attempts to address grand challenges through multi-stakeholder governance (Brammer, Branicki, Linnenluecke, & Smith, 2019; Howard-Grenville et al., 2019), we are failing to make significant progress toward mitigating them (Banks et al., 2016; Frey-Heger, Gatzweiler, & Hinings, 2021; Grodal & O'Mahony, 2017; Wright & Nyberg, 2017). As a result, a growing number of scholars argue that multi-stakeholder governance is not a panacea and that we must better understand the dynamics through which such governance falls short of its intended goals (Dentoni et al., 2018; Gray, Purdy, & Ansari, 2022; Grodal & O'Mahony, 2017).

Attention to these dynamics, and the way they are negotiated in practice, would enhance understanding of persistent collective failures to address some of the most pressing issues of our time (Howard-Grenville & Spengler, 2022; Kremser & Sydow, 2022). Heeding this call, we ask: *How are multi-stakeholder governance obstacles addressed in practice? With what implications on the collectives' ability to mitigate grand challenges?* We address these questions through an ethnographic and archival case study (Chatterjee, Ghosh, & Leca, 2022; Eisenhardt, Graebner, & Sonenshein, 2016; Fan & Zietsma, 2017) of WaterHealthOrg, a multi-stakeholder partnership that was formed after a disastrous flood in which coal mine water was discharged into a key basin flowing into the Great Barrier Reef. The partnership was established with the key objectives of enhancing understanding of the cumulative impact of human activities on the basin's water health, informing water management decisions in the region, and ultimately, improving water health.

We develop our findings into a conceptual model on the process of addressing multi-stakeholder governance obstacles in practice and the implications this generates for collective responses to grand challenges. Our conceptual model allows us to make contributions in two key areas. First, we explain that overcoming multi-stakeholder governance obstacles (Dentoni et al., 2018; Provan & Kenis, 2008) can lead to cumulative governance traps that result in unintended consequences in responding to grand challenges (e.g., Feront & Bertels, 2021; Grodal & O'Mahony, 2017; Khan, Munir, & Willmott, 2007; Porter et al., 2020; van Wijk et al., 2020). Second, we theorize the cumulative, self-reinforcing nature of these governance traps by linking them to path dependence theory (Sydow, Schreyögg, & Koch, 2009, 2020). We reveal how and why exogenous triggers, which could break a response path (Stache & Sydow, 2022), can actually reinforce it. We thus extend knowledge on the dynamics of multi-stakeholder governance and its limitations in addressing pressing and escalating grand challenges (Gray et al., 2022; Hahn & Pinkse, 2014; Huxham & Vangen, 2000).

THEORETICAL FRAMING

Governance Obstacles when Collaboratively Tackling Grand Challenges

Grand challenges are large-scale, complex, uncertain, and evaluative problems (Ferraro et al., 2015) that are "culturally, politically, and economically embedded", making them extremely hard to 'solve' in a conventional sense (Howard-Grenville & Spengler, 2022: 282). Scholars argue that organizations should engage with these seemingly intractable problems "through coordinated and collaborative effort" (Brammer et al., 2019; Ferraro et al., 2015). Accordingly, initiatives aimed at tackling grand challenges do not typically follow the traditional command and control corporate governance framework rooted in agency theory (Ansell & Gash, 2008; Dorado et al.,

2022; Sabel & Zeitlin, 2012). Rather, governance in the context of grand challenges is multi-stakeholder, often with diffuse controls (Dentoni et al., 2018; Provan & Kenis, 2008).

We define multi-stakeholder governance as coordination and collaboration among independent stakeholders as they strive to collectively respond to a problem reaching beyond their organizational knowledge-base, without relying on a central/overarching governing authority (Dentoni et al., 2018; Gray & Purdy, 2018; Provan & Kenis, 2008). Multi-stakeholder governance is different from collaborative governance, which is government-led and involves the implementation of public policies (Ansell & Gash, 2008; Gray & Purdy, 2018; Pradilla, da Silva, & Reinecke, 2022), and common-pool or environmental management of shared natural resources such as water, fisheries, or land (Fan & Zietsma, 2017; Hahn & Pinkse, 2014; Kallis, Kiparsky, & Norgaard, 2009; Ostrom, 1990). Multi-stakeholder governance to address grand challenges can take various forms such as multi-stakeholder initiatives (van Wijk et al., 2020), cross-sector collaborations (DiVito, van Wijk, & Wakkee, 2021), trans-national associations (Dentoni et al., 2018), community-based collaborations in grand challenges' hot spots (Gray & Purdy, 2018; Kornberger et al., 2019; Mair et al., 2016), networks (Provan & Kenis, 2008), and online platforms (Porter et al., 2020; Tello-Rozas, Pozzebon, & Mailhot, 2015).

While multi-stakeholder governance is the *modus operandi* for addressing grand challenges (Dentoni et al., 2018; Gray & Purdy, 2018; Hahn & Pinkse, 2014), it is also known to be fraught with difficulties that actors must navigate when developing collective responses to a particular challenge (DiVito et al., 2021; Dorado et al., 2022; Voegtlin et al., 2022) (see Table 1). These can relate to interpretive, structural, or relational obstacles.

First, participants can experience governance obstacles due to their diverse interpretations of the grand challenge (Ferraro et al., 2015). Misaligned and multi-layered interests, agendas

(Grodal & O'Mahony, 2017; Hardy et al., 2006; Porter et al., 2020), assumptions, and values (Easter et al., 2022; Fan & Zietsma, 2017; Le Ber & Branzei, 2010) amongst participants can generate persistent tensions (Hilbolling, Deken, Berends, & Tuertscher, 2022). Interpretive obstacles can also arise from participants' struggles to grasp the "vexing nature of grand challenges" (Howard-Grenville & Spengler, 2022: 282) and to consider this complexity when implementing governance processes (Dentoni et al., 2018; Gray & Purdy, 2018; Hardy et al., 2006).

Second, even when participants' interpretations of the problem converge, they may nevertheless experience structural obstacles (Huxham, Vangen, Huxham, & Eden, 2000). For example, deciding who gets to participate in developing collective responses to grand challenges can be difficult (Seidl & Werle, 2018) and trigger important trade-offs in terms of inclusion and efficiency (De Bakker, Rasche, & Ponte, 2019; Henry, Rasche, & Möllering, 2022; Schüssler et al., 2014). Groups can also struggle to adapt their strategic tools (Burke & Wolf, 2021) and processes (van Wijk et al., 2020) to the long-term and shifting nature of grand challenges because of shorter-term funding availability or political cycles (DiVito et al., 2021; Margerum et al., 2016: 372).

Lastly, participants may experience relational obstacles. Uneven resources or capabilities (Banerjee, 2008), and the presence of power asymmetries (Gray et al., 2022) can, for instance, seriously impeed governance processes. Hahn and Pinkse (2014) show how rivalry between firms participating in a cross-sector partnership to address global environmental challenges can hamper collaborative governance, especially when competitive forces are misaligned with the collective goals. Relational obstacles can also refer to historical feuds between participants, making trust-building and collaborating extremely difficult (Sloan & Oliver, 2013; Vangen & Huxham, 2003).

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Multi-stakeholder governance to address grand challenges is thus important but also challenging (Bryson, Crosby, & Stone, 2015) and raises obstacles (Bryson et al., 2015; Dorado et al., 2022; Jarzabkowski, Bednarek, Chalkias, & Cacciatori, 2019, 2022; Voegtlin et al., 2022). While collective responses to grand challenges have been studied from a variety of perspectives (Brammer et al., 2019; Howard-Grenville & Spengler, 2022), there are still few insights into how participants work through these governance obstacles (Bryson et al., 2015). This is surprising as multi-stakeholder governance is essential "to ensure that participants engage in collective and mutually supportive action, that conflict is addressed, and that network resources are acquired and utilized efficiently and effectively" (Provan & Kenis, 2008: 231). In particular, understanding the practices and processes that exacerbate or surmount governance obstacles may provide insights into the prevalence of unintended consequences arising from mutli-stakeholder efforts to address grand challenges.

Unintended Consequences of Multi-stakeholder Governance of Grand Challenges

Existing literature indicates that the plethora of collaborative efforts to address grand challenges often result in means-ends decoupling (Wijen, 2014). That is, participants end up committing to governance processes even though they result in different outcomes than those for which they were designed (Huxham & Vangen, 2000). Means-end decoupling is particularly prevalent in fields where the effects of actions are difficult to measure (de Bree & Stoopendaal, 2020; Wijen, 2014) and where the environment is fragmented and dispersed across multiple audiences and stakeholders, as is the case with grand challenges (Bromley & Powell, 2012, p. 498; Grodal & O'Mahony, 2017).

Examples of means-ends decoupling include participants successfully accommodating different viewpoints into their governance, which both broadens governance goals but also dilutes the response so that it becomes less ambitious (Grodal & O'Mahony, 2017; Schüssler et al., 2014), or too ambiguous to be relevant and actionable (Feront & Bertels, 2021; Porter et al., 2020). In their study of a multi-stakeholder network seeking to build a more inclusive dairy industry in Ethiopia as a means to eradicate poverty, van Wijk et al. (2020) revealed how governance mechanisms can enable initiatives to profoundly shift power relationships and enable a better distribution of resources. However, when they do not take into consideration the complex nature of the grand challenge, these mechanisms can also lead to a "vicious cycle of cascading failures" (van Wijk et al., 2020: 1392). In their case, participants failed to acknowledge the government and the incumbents' interests, and the sector's capacity to engage in deliberation processes, which led to key industry actors accusing them of making the market unfair as opposed to more inclusive (van Wijk et al., 2020). More critically, when underlying assumptions and power asymmetries are left unchecked, governance mechanisms can enable groups to superficially address complex issues, while actually exacerbating the grand challenge (Gray et al., 2022; Khan et al., 2007). For example, Khan, Munir, and Willmott (2007) show how, while the response formulated by a cross-sector initiative successfully eradicated child slavery from one of the biggest clusters of soccer ball manufacturing in the world, it actually deepened patterns of poverty and gender inequality in the region.

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Our review of the unintended consequences experienced by multi-stakeholder initiatives seeking to address grand challenges suggests that these groups may be prone to means-ends decoupling; they become trapped into (re)producing a specific response even when that response

is ill-suited to addressing their particular grand challenge (see Table 2). The literature suggests multiple mechanisms to explain how means-ends decoupling occurs over time, including analysis paralysis (Langley, 1995), escalating indecision (Denis, Dompierre, Langley, & Rouleau, 2011), and path dependence (Sydow et al., 2009). Some of these mechanisms, such as analysis paralysis and escalating indecision, tend to arise in situations where multiple actors must make decisions despite their diverse goals (Denis et al., 2011: 225; Langley, 1995). Others, such as path dependence, tend to occur in complex contexts (Pierson, 2000: 260) where "causal links between actions and outcomes render the organizational field inherently ambiguous" (Sydow et al., 2009: 701) and can result in "a rigidified, potentially inefficient action pattern built up by the unintended consequences of former decisions and positive feedback processes" (Sydow et al., 2009: 696). These mechanisms have been used to explain instances of means-ends decoupling both in terms of sub-optimal and yet sustained organizational processes (Denis et al., 2011; Rindova & Kotha, 2001) and technological responses (David, 1986) and could thus be important to explaining the implications of practices aimed at tackling multi-stakeholder governance obstacles.

Our review indicates that these obstacles appear prone to unintended consequences, especially means-ends decoupling (Wijen, 2014), and that these may arise from lock-in mechanisms, such as analysis paralysis, escalating decisions, and path dependence. Yet, we lack sufficient understanding to theorize about the practices and processes involved in addressing these obstacles or their implications for collectives' ability to mitigate grand challenges (Bryson et al., 2015; Howard-Grenville & Spengler, 2022). To better understand why multi-stakeholder initiatives seeking to mitigate grand challenges overwhelmingly fail in their endeavors, an investigation of these practices and their influence on the development and impact of collective responses is needed (Kremser & Sydow, 2022). This gap in knowledge is the focus of our paper.

METHOD

Case Context

We employ an in-depth interpretive case study to examine this undertheorized phenomenon (Miles & Huberman, 1994). We investigate a multi-stakeholder partnership developing a collective response to the grand challenge of degrading water health in a strategically important water basin feeding into the Great Barrier Reef. WaterHealthOrg collates monitoring activities performed by regional organizations and provides an easy-to-understand assessment to the public that can be used to improve the management and health of the basin.

In 2008, the region experienced heavy precipitation, flooding two-thirds of the region; thousands of people had to evacuate their homes, essential transport to and from key cities was disrupted, and multiple areas were declared "disaster zones" by the regional government. Simultaneously, a mining company struggling with completely flooded coal pits, discharged billions of liters of contaminated water into the basin. Downstream water quality degraded, negatively impacting communities and wildlife habitats, prompting the regional government to commission independent research and a water management review. Investigators attributed these failures to the absence of comprehensive and coordinated long-term monitoring of water health. Monitoring in the region involved land users collecting data on their sites to comply with its specific regulatory requirement, but not connecting these data between land users, thus limiting understanding of the cumulative impact of all these activities on waterway health. Assessors thus recommended the formation of a multi-stakeholder collaboration to monitor and assess waterway health across sites.

This process was complex and slow, but after another disastrous flooding event some years later, WaterHealthOrg was established. It brought together 25 partner organizations, including

non-profit, mining, agriculture, government (local, state, federal), academic, and consultancy. It was supported by four staff members funded by annual contributions, and an independent science panel composed of aquatic ecologists, marine botanists, biogeochemists, and microbiologists.

Informed by earlier responses to similar issues in the region and following investigators' recommendations, WaterHealthOrg's collective response to the grand challenge of degrading water health centered on producing a three- to four-page annual report card that publicly disclosed information about water health as an easy-to-understand map. The basin's overall water health status was evaluated using an A-to-E, color-coded grading system. Areas with a grade of A appeared in green to indicate excellent water health, and areas with a grade of E appeared in red to indicate failure to meet desired water health levels. These grades were attached to a series of carefully selected indicators such as pH, salinity, acidity, and turbidity, that were analyzed when grading the collected samples. The data used to produce these annual report cards were based on hundreds of thousands of samples processed by WaterHealthOrg's secretariat. Once the data were compiled, the science panel determined whether samples were representative and results scientifically robust. The report card is the central tool used by members to monitor water health and also to inform water health management decisions: "You don't just monitor for the sake of monitoring. The purpose of monitoring is to actually elicit changes or improvements or reward management practice on the ground. That's always been an overarching principle in the partnership" (Science Panel member, Interview, 2018).

This setting enabled us to study how governance obstacles influence the process of developing collective responses to grand challenges. First, degrading water health in the Great Barrier Reef region has the identifying features of a grand challenge (Ferraro, Etzion et al. 2015): it is *complex*, as the bodies of water surrounding the region have no clear-cut boundaries, making

it incredibly difficult to assess the degradation of water health in any specific region; it is *uncertain*, as actors are unable to predict how water health will evolve; and it is *evaluative*, affecting a vast array of disparate actors and key industries with various opinions on how to respond (Ferraro et al., 2015; George et al., 2016). Water crises have often been used as extreme cases to study inter-organizational collaboration (see Espeland, 1998; Fan & Zietsma, 2017; Lewicki, Gray, & Elliott, 2003; Mair et al., 2016; Ostrom, 1990).

Second, despite the complexity of addressing the grand challenge, WaterHealthOrg has persisted for over ten years and continues to be well regarded in the region. This enabled us to investigate their relative progress in developing a collective response to the grand challenge over time (Grodal & O'Mahony, 2017). Third, secretariat employees and science panel members kept a detailed record of projects, plans, and decisions which, when combined with interviews and real-time observations, provided a rich longitudinal dataset from which to draw empirical and theoretical insights (Denzin & Lincoln, 2008; Miles & Huberman, 1994; Timmermans & Tavory, 2012).

Data Collection

Our data included observations, interviews, and archival documents—the "big three" of qualitative research (Langley, 2009, p. 411). Utilizing a technique common in longitudinal case studies (see Chatterjee et al., 2022; Dutton & Dukerich, 1991; Fan & Zietsma, 2017; Grodal & O'Mahony, 2017; Jarzabkowski, 2008; Pache & Santos, 2013; van Wijk et al., 2020; Zilber, 2002), we collected contextualized retrospective data about the historical context in which WaterHealthOrg was established (2008–2011) and the first five years of WaterHealthOrg (2012–2017), as well as real-time data on WaterHealthOrg's activities (2018). The historical data covering the 2008-2017 period enabled us to understand the context prior to our real-time data

collection (2018) and trace the antecedents of the social dynamics observed in real-time (Denzin, 2017; Langley & Tsoukas, 2017). We detail our data sources below.

Observations. We collected over 500 hours of data during an intensive three-month period in 2018 when the first author was co-located at WaterHealthOrg's headquarters (nine hours of observation per day, on average) and punctuated visits throughout the year (seven visits, 13 hours of observation per visit, on average). During this period, the first author observed all aspects of WaterHealthOrg, including the social dynamics arising from different viewpoints (Seidl & Werle, 2018). This included formal observations of regular meetings, conferences, workshops, and annual events organized by WaterHealthOrg (60 hours); special events, such as community events, mining site visits, and regional, national, and international gatherings for water health practitioners (122 hours); and informal workplace observations such as coffee and lunch breaks, phone calls, and social gatherings (320 hours). Furthermore, observing daily activities of several founding members provided ample opportunities to discuss past and present critical events, partnership dynamics, and practices. These observations were supported by extensive field notes with a focus on including as many verbatim excerpts as possible (Yin, 2003).

Semi-structured interviews. We also conducted 30 semi-structured interviews with partners, science panel members and WaterHealthOrg staff, along with proximal third-party individuals in 2018 (e.g., academic researchers, consultants, conservation groups, and regulators). These hour-long interviews focused on exploring 30 informants' perspectives on WaterHealthOrg's mission, understanding their activities as members/stakeholders, their reflections on the group and its responses, and their overall understanding of the grand challenge. 23 informants were involved in WaterHealthOrg during Cycle 1; 20 during Cycle 2 and 15 in

Cycle 3, enabling us to discuss the overall evolution of the partnership and its collective responses over the years.

Documents. Documents provided further evidence of key dynamics unfolding during decision-making processes that affected the group's efforts to collectively respond to the grand challenge (Langley, 2009). In particular, we traced the evolving efforts of actors to address governance obstacles and how these shaped WaterHealthOrg's collective responses through documents such as report cards, internal documents (meeting minutes, strategy plans, reports, and emails), academic and government environmental reports, case studies, and media clips. These documents offered snapshots of internal actions, obstacles, and processes that unfolded during specific periods. Furthermore, we had the opportunity to discuss our theoretical hunches and cross-check our work with WaterHealthOrg members both formally (through interviews) and informally, thereby ensuring that our findings captured the complexity and context of partnership dynamics (Denzin & Lincoln, 2008) and minimizing retrospective bias (Golden, 1992). We provide an overview of our data sources in Table 4.

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Data Analysis

Our interpretive analysis unfolded over three steps. To ensure trustworthiness, we carefully documented each step involved in developing our findings (Langley, 1999; Lincoln & Guba, 1985). We kept rigorous track of collected data, logging all activities and procedures involved in producing this research, including key information for each data input (e.g., source, location, role/purpose, date collected, and duration; see Creswell & Miller, 2000), and documenting our unfolding analysis in memos. We describe the key steps of our analytic journey below.

First, we collated the data in an ATLAS.ti database, which enabled us to identify emerging patterns and themes by interrogating the data and performing early rounds of coding and theorizing (Locke, Feldman, & Golden-Biddle, 2015). We initially coded anything relating to developing a collective response (e.g., agreeing on the operational rules, establishing a cost-sharing system, deciding how data will be collated). As we did this, we noticed several obstacles to the process (e.g., identifying who should become a member, struggling to agree on which information input should be included). Further analysis indicated that these governance obstacles were recognized across the partnership as actors collectively struggled to agree on the best ways to coordinate and collaborate in responding to the grand challenge.

In order to better understand what actually happens when these obstacles emerge, we investigated the micro-level practices of developing a collective response to the grand challenge in the context of such governance obstacles. We thus identified the practices actors engaged in as they developed the collective response, including "insisting on the inclusion of information X," "debating the importance of water health issues portrayed in media outlets," and "increasing report card promotion efforts."

Iterating between the literature on organizational responses to governance obstacles (e.g., Dentoni et al., 2018; Dorado et al., 2022; Gillett et al., 2019; Hardy et al., 2006; Margerum et al., 2016) and our data led us to identify two clusters of practices that were particularly central to addressing governance obstacles: broadening and containing. *Broadening* practices involved seeking to expand the monitoring and reporting of waterway health (e.g., pushing for the identification of drivers of water health degradation; pushing for the inclusion of new monitoring and reporting mechanisms in the report card). *Containing* practices sought to restrict attempts to expand monitoring and reporting of waterway health. As broadening and containing practices were

often used to address governance obstacles and thus consequential to the partnership's process of responding to the grand challenge, we looked at how and why these practices unfolded.

Second, we sought to understand how these practices were linked to one another and how they evolved over time. Working across our data sources, we identified points where broadening and containing practices led to outcomes that affected subsequent periods. Using temporal bracketing (Langley, 1999), we traced these practices throughout interviewee recollections and fieldnotes and then examined and triangulated our documentary sources to ensure the robustness of our longitudinal analysis (e.g., Golden-Biddle & Locke, 2006; Jarzabkowski, 2008).

Based on this analysis, we found that *triggers* – in our case socio-environmental events increased the grand challenge's salience for stakeholders and participants (e.g., sudden and massive fish deaths) (Pradilla et al., 2022). These in turn triggered governance obstacles within WaterHealthOrg and broadening and containing practices aimed at addressing these obstacles. We noted that these practices unfolded simultaneously rather than sequentially: participants could seek to broaden the collective response even as they endeavored to contain it.

Third, temporally ordering the triggers, governance obstacles, and practices in visual maps (Langley, 1999) enabled us to identify the process of developing a collective response to a grand challenge. Specifically, this step helped us understand how triggers led to shifts in governance obstacles and how these (re)activated broadening and containing practices, thus leading to a new cycle of collective responding. Furthermore, our visual map enabled us to notice how, with each of these cycles, WaterHealthOrg members' ability to consolidate their collective response became increasingly disconnected from their ability to mitigate the grand challenge. We thus conceptualized the cycles of collective responding to the grand challenge as progressively disconnecting the response from the grand challenge.

Delving further into our case to understand the underlying dynamics informing this disconnect, we noticed that broadening and containing practices were strongly anchored in participants' desire to develop their collective response. Indeed, we identified efforts to avoid group paralysis and dissolution as a motivator in addressing governance obstacles. When examining this pattern across our data, we noted that the cumulative effect of each cycle locked actors into increasingly narrowing their remit which, in turn, consolidated their collective response. While this commitment generated positive feedback, allowing them to continue moving forward as a collective, it limited their actions to technical activities rooted in the increasingly narrowed remit of the collective response. These *governance traps* generated a structured and long-lasting multi-stakeholder response to the issue of degrading water health, but also inhibited its members ability to mitigate the grand challenge, as we now explain in the findings. We provide definitions and examples for each concept that emerged from our analysis in Table 5.

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FINDINGS

In this section, we show how, in narrowing their remit, WaterHealthOrg's members successfully overcame governance obstacles, generating positive feedback that encouraged them to further commit to the collective response. However, we show how cumulative cycles of commitment to the collective response led to an increasing disconnect with their ability to impact the grand challenge. We first detail the governance arrangement of WaterHealthOrg and then explain and illustrate the process dynamics of these cycles, which involve trigger, governance obstacle, practices, and outcomes. Finally, we reveal the cumulative and self-reinforcing nature of the governance traps that WaterHealthOrg members generated through these cycles (see Tables 6-8 for additional evidence).

WaterHealthOrg's Governance

WaterHealthOrg's partners annually sign a memorandum of understanding confirming their commitment to financially support the partnership and provide water quality data. The two most influential groups are mining industry partners (more than half the members) and local government (biggest financial contributor). To balance these groups, WaterHealthOrg has a co-chair arrangement, one from each of these partner groups: "I think a number of the mining companies saw it as a great idea to be able to work with all of the stakeholders, but others saw it as they had to be there just to protect their company. And that's why … it wasn't a bad move to have a dual chair" (Former science panel member, interview, 2018). Governance decisions are reached by consensus among partners; a process which is managed by the co-chairs (as per WaterHealthOrg's operating rules).

WaterHealthOrg is not legally incorporated but rather hosted by a local non-profit organization, which is a participating partner with legal accountability for the partnership's activities (WaterHealthOrg operating rules, 2012). This arrangement significantly lowers operational costs for WaterHealthOrg, while also allowing for synergies to be established between the non-profit and the multi-stakeholder initiative.

Science panel members have no participation rights, are independent from WaterHealthOrg, and report to partners but are not involved in formal decision-making. This separation offered important credibility: "Community trust is the greatest risk/asset… To build community trust over time, there needs to be clear separation between partners and the science" (Secretariat employee, fieldnote, 2018). Accordingly, while they can provide recommendations and ask questions to the science panel, partners cannot directly interfere with the way data are collated and grades produced.

WaterHealthOrg's day-to-day activities are managed by the secretariat, which acts as a mediator between science panel members and partners (WaterHealthOrg operating rules, 2012). Secretariat employees, especially the chief officer, relay demands between groups and try to find solutions to issues. In addition, the chief officer is in charge of recruiting new partners, promoting the report card, and seeking out new financial opportunities.

As a whole, therefore, the governance was designed with a series of checks and balances between partners, and with independent scientific analysis, in order to ensure no undue influence over the partnership's activities. We now look at how this governance arrangement was formed and evolved through cycles of collective responding to a grand challenge.

Cycle 1 (2008–2012): Developing a Collective Response by Narrowing the Remit

Trigger: Recurring large-scale water contamination events. In 2008, the discharge of billions of liters of contaminated water from a coal mine into the Great Barrier Reef region raised environmental and public health concerns. Environmental scientists and conservation groups reported "possible impacts of mine-affected water on the riverine biota" (Scientific Report, 2008). Despite these concerns and government commitment to create a partnership addressing degrading water health in the region, a second undisclosed discharge occurred in 2011. Communities expressed outrage that, once again, they had not been informed: "The Mayor, the council's water spokesman, and the community had all been kept in the dark about mines in the catchment recently breaching their discharge permits […] The community deserves to be told what's going on" (Local news report, 2012)

Organizations from the non-profit, mining, agriculture, government, academic, and consultancy sectors interpreted these incidents as a need to collectively respond to water health degradation in the region. Following previous recommendations made by scientists and natural

resource management non-profits, they began forming the WaterHealthOrg partnership described above, and establishing its governance.

Governance obstacles: Divergent views on managing reputational threats and open participation. Inspired by earlier responses to similar issues, participants agreed that WaterHealthOrg should center on creating a water health report card: "It was felt that it should be a data collection and review report card-generating association, not wanting to get into the finger pointing and blame game" (Science Panel member, interview). Despite agreeing on the use of a report card, a governance obstacle arose as participants struggled to agree how to approach the development of such a tool.

Government and mining companies' representatives were eager to get involved, as they sought to alleviate reputational threats: "there's no doubt that social license to operate was involved in some partners' big investment in WaterHealthOrg" (Secretariat Employee, Fieldnote, 2018). Others, such as conservation groups and some mining companies' representatives, disagreed with this approach, arguing that a focus on addressing reputational threats could result in the initiative being seen as a greenwashing exercise: "The mining industry was monitoring water health data and saying, 'Well, we're not causing any impact.' And yes, there'd be quite a suspicion on statements like that" (Former partner, Interview, 2018). Participants had to address this governance obstacle to move forward.

Practices: Broadening and containing membership and knowledge base. Participants had lengthy discussions on how to design the report card. Conservation groups, NGOs, scientists, and some mining representatives, for instance, sought to *broaden* the report card to include management actions to mitigate waterway health degradation: "Reporting on water quality parameter is one thing but… how do we go about identifying the land management issues and how

do we address them? We certainly pushed for this" (Conservation group employee, Interview, 2018). However, fearing that these conversations could stall the partnership's progress, other participants, such as government and mining representatives sought to *contain* these requests: "Some things had to be parked, 'Hey, this isn't the forum to talk about those things. … Let's not hijack the agenda, because we've got a good product here [the emerging report card parameters]'" (Partner, Interview, 2018).

Accordingly, attempts made to broaden monitoring by land users were actively rebutted by multiple members, especially mining representatives, stating that it was very costly and not legally required: "The problem was that there was very little data in these ecology fields... the science panel and [WaterHealthOrg's executive officer] pushed in that direction, but there was no inclination from the member organizations and no economic driver" (Former co-chair, Interview, 2018). They argued that the group's focus should primarily be on developing and launching the report card. While this allowed them to agree on action, it also served to *contain* attempts to broaden the remit:

> It was noted that the Department's request to include additional monitoring was contrary to an agreement by [WaterHealthOrg] to prioritize the development of the first report card. … reporting and communications components should not be reduced … because it was most important that the report card be completed and communicated to the public" (Partners Meeting Minutes, 2012)

Simultaneously, to avoid the impression of bias, mining representatives sought to *broaden* the collective response by ensuring membership diversity: "All resource users need to be included in the partnership … a perceived domination of the partnership by any sector, could undermine the credibility of partnership information" (WaterHealthOrg Formation Review, 2013). While several participants agreed with this approach, they also sought to *contain* membership to avoid reaching a standstill, which they had previously experienced in open forums: "Anyone who wanted to, could come to the table… it was just a free-for-all… the meetings quite often ended up in a debacle"

(Partner, Interview, 2018). Participants, especially the land users, city councils and government representatives, also wanted to ensure a durable response. They therefore debated WaterHealthOrg's funding strategy, eventually agreeing that all partners had to provide specific data or financial resources to support the report card: "We had to do it. If they had no skin in the game, we probably would not have been sustainable in the long-term" (Secretariat employee, Interview, 2018). The minimum annual membership fee was $10,000 and organizations were solicited by the Secretariat for inclusion if they could also provide water quality data.

Outcome for WaterHealthOrg: Developing a collective response. As a result of the interplay between broadening to ensure a wide perspective on the grand challenge and an impactful response and containing to ensure members could get to action, the group succeeded in collectively producing its first report card, based on an impressive amount of data provided by members, "More than 340,000 sample results taken from hundreds of sites" (Report Card, 2010). This bolstered WaterHealthOrg's credibility, consolidated membership, and facilitated a successful public launch: "Major achievements … include 40 media articles published, exceeding the target of 10; over 2,000 visits to website, exceeding the target of 1,000; and significant brand and report card exposure" (WaterHealthOrg Activity Report, 2012).

Outcome for the grand challenge: Narrowing the remit by containing membership and knowledge base. Although containing monitoring activities and membership generated positive outcomes such as access to data and financing, it also excluded community stakeholders with relevant knowledge who could not afford to be represented. For example, most smaller landholders were left out, despite having significant influence on water health: "There's no accountability on [WaterHealthOrg's] recommendations. 5% or less of landholding is by mines. So, where are the 95% of other people?" (Former partner, Interview, 2018).

Furthermore, as the focus was on producing report cards based on data provided by partners, efforts to amass knowledge relating to environmental values, historical and cultural traditions, and biodiversity conservation, for example, were curtailed in favor of more technical indicators: "The way we select, collect, analyze, and publish data will always be shaped by partners involved. It's a natural and holistic process" (Secretariat employee, Interview, 2018). Those excluded were more critical:

> We've probably stood on every little square inch of the region … But again, we don't see much evidence that our scientific knowledge was properly utilized in decision making… So, we've been less involved in those [report card production] processes because it's technical data collection. It's technical report card production … it became a—not a closed shop—but a less iterative process (Conservation employee, Interview, 2018).

In sum, as they began to develop a collective response to the grand challenge of degrading water health, members experienced governance obstacles. Specifically, they disagreed about whether to address reputational threats and how open participation should be. Prospective members addressed these obstacles by engaging in broadening practices to ensure there was sufficient diversity in membership to adequately represent water health and avoid claims of greenwashing. Broadening was also used to inform management decisions on water health. Members used containing practices to restrict participation to those who could support action. This approach generated positive feedback, as WaterHealthOrg was able to develop and strengthen a collective response to the grand challenge – a report card for monitoring water quality grounded in data. Yet, these practices also led to the inclusion of specific viewpoints at the expense of others, filtering the way information was processed by the partnership. Thus, while this interplay of practices overcame governance obstacles, preventing potential stalemates, it also narrowed WaterHealthOrg's remit by reducing members' ability to share, exchange and combine wider knowledge about the grand challenge. In doing so, it created a precedent for addressing future governance obstacles.

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Cycle 2 (2013–2016): Protecting a Collective Response by Further Narrowing the Remit

Trigger: Large-scale flooding causes several water contamination incidents. In the wake of a tropical cyclone in 2013, the government allowed "30 mines [to] pump billions of liters of mine water into rivers and streams;" an additional "nine mines [were] accused of breaching environmental conditions" by dumping water into the basin without consent (Local newspaper, 2013). Simultaneously, an abandoned gold mine overflowed, polluting a neighboring river with acid and waste from toxic metals. Tap water turned brown and communities witnessed a massive fish kill due to increased levels of organic matter in a large river. These overlapping incidents spurred widespread drinking water concerns in cyclone-affected towns: "Despite assurances that the water is safe to drink, locals are uneasy about what they are hearing about wastewater coming down the river […] They've been buying a lot of bottled water" (National Radio, 2013).

These issues rapidly escalated concerns over water health in the region. Having successfully developed their report card, but not in a way that could directly address these concerns, WaterHealthOrg members feared these events could compromise the credibility of their collective response.

Governance obstacles: Divergent views on addressing specific community concerns. A governance obstacle arose as members debated whether they should adjust their remit by amending the report card to directly address these concerns or not. Some members, including mining, city council, government and science panel members, pushed for the report card to be tailored to community interests, as they feared not doing so could lead to criticisms: "There are several community concerns relative to waterway health in the [basin], which are not addressed in our current reporting or communications … our silence on some of these topics may be interpreted

incorrectly" (Partners Meeting Minutes, 2013). Other members, including other mining partners and some science panel members, were against this adjustment of the remit, preferring instead to let the data speak for itself and developing management responses accordingly: "The data will tell what the data tells and then you manage [community concerns over waterway health] according to that" (Co-chair, Interview, 2018).

Practices: Broadening and containing the monitoring and reporting of water health. Seeking to address this obstacle and protect their collective response, mining, city council and government representatives proposed to *broaden* the report card to include key indicators of concern to targeted external stakeholders. For example, city council representatives, under increased pressure from constituents to assess drinking water quality, pushed for the report card to include reporting on drinking water.

> [There] was a definite pull from local councils to focus more on [drinking water reporting]. And that was so that they could provide a report to their ratepayers and say, … "We're also now looking at drinking water to give you certainty that the water that's being provided is of suitable quality." (Former co-chair, Interview, 2018).

Most members agreed that indicators addressing the impact of drastic environmental events on waterway health could be incorporated. However, some, especially science panel members and secretariat employees, sought to *contain* these types of requests in favor of maintaining momentum:

> The 2010/11 report card received positive media coverage because it was the first of its kind. If the report cards continue to be years behind, the media may not continue to report on the partnership in a positive light … There is consensus that the partnership should reduce the lag between monitoring and reporting. (Partners Meeting Working Papers, 2014).

Nonetheless, WaterHealthOrg, science panel members also simultaneously attempted to *broaden* monitoring to address data patchiness, which undermined WaterHealthOrg's ability to produce meaningful management responses to water health issues: "We really spelled out: 'This is the data

we have. This is the data we'd like to have … what we do get is very patchy'" (Science Panel member, Interview, 2018).

In response to these efforts to both broaden and contain monitoring, partners and secretariat employees decided to undergo a prioritizing exercise: the secretariat produced a list of "critical", "high" and "medium" priority items. The critical items were automatically funded while funding of other items had to be negotiated: "Cost effectiveness will be taken into account by WaterHealthOrg when considering recommendations [for additional monitoring] ... if prioritized by WaterHealthOrg's Management Committee" (Partners Meeting Minutes, 2015). This prioritization process *contained* monitoring efforts by narrowing WaterHealthOrg's focus to activities that were perceived as cost effective.

Outcome for WaterHealthOrg: Protecting the collective response. To keep the momentum, members thus tabled recommendations that risked progress: "Both the science panel and [WaterHealthOrg] as a whole support a continuous improvement philosophy for the future direction of WaterHealthOrg's monitoring and assessment program" (Partners Meeting Working Papers, 2014). As such, participants set aside discussion about whether the report card informed management responses to the grand challenge: "What is done in terms of interventions after the publication of the report card is not something the partnership is concerned with" (Secretariat employee, Interview, 2018). While this protected WaterHealthOrg's collective response, it also narrowed the remit even further. The report card only included requests for additional monitoring and reporting if these directly addressed criticisms from external stakeholders and were cost effective.

Outcome for the grand challenge: Narrowing the remit by containing water health monitoring and reporting. Such a focus, however, curtailed efforts to reflect on various longer-

term and more complex monitoring approaches that could fundamentally inform and improve water management in the region. WaterHealthOrg now firmly favored reporting activities that bolstered existing report card efforts, such as "publications and promotional materials development [e.g., designing a mascot, building a community water sample toolkit], media promotion [e.g., participating in radio interviews and writing press releases], report card launches, and community engagement events [e.g., attending festivals and organizing fishing tournaments]" (Partnership Communication Review and Plan, 2014). These actions were shaped by governance decisions made in Cycle 1, which created a report card built only by stakeholders who could provide specific data and fund activities. This determined how future triggers could be interpreted and governance obstacles addressed. Thus, the governance approach limited members' ability to change the collective response, despite a growing disconnect between report card and water health improvement: "There's only so long that it's relevant to be reporting on [the basin's] conditions but not commenting on how to improve it" (Science panel Meeting Minutes, 2016).

In sum, as the grand challenge of deteriorating water health triggered new governance obstacles for the partnership, members engaged in broadening and containing practices. These practices were positive in enabling them to consider a range of indicators, whilst narrowing their remit by limiting actions to those that would maintain progress and protect the collective response. This was grounded in their existing governance approach, which invited deliberation but also circumscribed members' activities. As such, even though WaterHealthOrg's response was broadened, such broadening unfolded in the realm of an increasingly narrow remit. By focusing on fulfilling their remit through report card activities that were in line with WaterHealthOrg's governance, members set aside activities which might have enabled them to improve water health,

but were difficult to agree on. Thus, their repeated success in arriving at a collective response significantly impeded their ability to mitigate the grand challenge.

-----INSERT TABLE 7 ABOUT HERE-----

Cycle 3 (2016 – 2018): Leveraging a Collective Response by Further Narrowing the Remit

Trigger: Coral bleaching linked to degrading water health, increased scrutiny, and regulatory debate. The issue of degrading water health came into greater focus as extensive coral bleaching, coral mortality, and habitat loss on the Great Barrier Reef made world news. With evidence suggesting that more than 90% of corals had bleached, and early reports advancing that 50% of sampled corals were dead, the UN World Heritage Committee considered changing the reef's status to "endangered," with important economic repercussions for the region (BBC News, 2016). Government regulators were under increasing pressure to demonstrate effective mitigation of the marine park's deterioration.

Although climate change was recognized as the principal cause of these coral bleaching events, earlier scientific reports also emphasized that "good quality water is essential for the proper functioning of the Reef's ecological systems" (Reichelt, 2010, p. i). Accordingly, water scientists, conservation groups, regional government auditors, and local citizens began to scrutinize water health programs in the region and noticed significant discrepancies between regional report cards: "public reporting on pollution levels through modelling was lacking transparency at best, and misleading at worst" (Regional Government Auditor, 2017).

Members feared their collective response was insufficient to counteract regulatory responses from regional government. Responding to anticipation of regulation, they considered leveraging their report card to instigate "voluntary participation in an integrated monitoring program [as an alternative to regulation]" (Partners Meeting Minutes, 2017).

Governance obstacle: Divergent views on endorsing voluntary self-regulation. Members were confronted with a governance obstacle over whether WaterHealthOrg should adjust its monitoring and reporting of water health to feed into voluntary self-regulation. Science panel members and several mining partners argued that this was directly in line with the Partnership's remit. First, it would reinforce the report card's robustness as it would enable a more complete understanding of water health:

> We can monitor water quality all we like, but all we'll really understand is what water quality is doing that day. That's probably the biggest weakness [of the report card] to me. If this [voluntary self-regulation] goes through, then that's a major positive because we'll be able to account for cumulative and long-term impacts better through more targeted monitoring (Science panel member, Interview, 2018).

Second, it would enable mining industry partners to demonstrate pro-activeness: "[Voluntary self-regulation] is about the [mining] industry acting proactively to be [water] stewards … There will be more [water health degradation] events; we need to be prepared" (Partners Meeting, Fieldnotes, 2018). Others, however, were critical of this approach, at the same meeting being reluctant to endorse voluntary self-regulation: "I also have an issue with [voluntary self-regulation] because not all members have skin in the game" (Government Representative during a partners Meeting, Fieldnote, 2018). A governance obstacle emerged as participants debated whether to engage in the additional monitoring required by voluntary self-regulation.

> [Partner 1, mining lobbyist]: Are the companies comfortable with the new monitoring [attached to voluntary self-regulation]?
>
> [Partner 2, mining]: I'm more than happy to …
>
> [Partner 3, mining]: … We're not interested in reporting to this
>
> [Partner 4, consultant]: It's important for the dialogue to understand the pushback for [voluntary self-regulation] by some Partners (Partners Meeting, Fieldnotes, 2018)

In short, while some partners were willing to approve self-regulation, others immediately pushed back, generating a governance obstacle.

Practices: Broadening and containing water health monitoring and reporting . To address this obstacle, science panel members sought to *broaden* monitoring and reporting mechanisms in ways that enhanced report card robustness and would support voluntary self-regulation. For instance, during the Partnership's 2016-17 report card launch, with 40 stakeholders present from local mining and agriculture companies, government regulators, scientists, including most WaterHealthOrg members, one Science Panel member proposed incorporating fish indicators. She argued that this addition would capture the long-term impact on the basin, thereby improving the report card's robustness. "A fish stays longer in the catchment compared to a chemical, which will eventually get flushed out… the fish indicators were specifically chosen because they are cheap and fast to collect; they would be valuable indicators to include in [the voluntary self-regulation]", she explained (Report Card Launch, Fieldnote, 2018). This broadening effort was therefore connected to the governance obstacle around voluntary self-regulation and also shaped by the collective response in Cycle 2, where the group decided to prioritize cost-effectiveness.

Not all members agreed with this approach; some mining and city council representatives, along with secretariat employees, sought to *contain* efforts to broaden the report card, highlighting the resource cost and infeasibility of gathering additional data. For example, a secretariat employee explained to science panel members seeking to incorporate pesticide indicators as part of voluntary self-regulation that these could only be included if "some indicator scaling" was done, i.e., some existing indicators were removed (Partners Meeting, Fieldnote, 2018).

Science panel members recognized broadening as adding value for partners and sought to circumvent containing attempts by using third-party funding that would allow them to conduct research on indicators to *broaden* the report card at little or no cost:

> While many of the [monitoring] items discussed are important, beneficial, and in some cases critical, partner funding will not cover many of these items. Science panel members were well aware of this funding issue and spent time considering opportunities potentially available through research grants and universities. (Partners Meeting Working Papers, 2017)

Some more critical mining company partners did not want to provide additional data without a formal regulatory requirement, thereby *containing* the collective response:

> [Science Panel member]: What's really annoying for me is I happen to know one company has a bucket load of [ecology] data and then it's not available for some reason that I don't understand.
>
> [Former co-chair]: It's because the companies are not ready to give more than what is required for them to avoid being regulated. (Report Card Launch, Fieldnote, 2018)

Outcome for WaterHealthOrg: Leveraging collective response. By the end of Cycle 3, members were still debating whether to endorse voluntary self-regulation. However, broadening and containing practices enabled members to address, at least partially, the governance obstacle by incorporating some of the cheaper and easier to collect indicators in the report card. Regardless of whether they supported voluntary self-regulation, members felt like they were progressing: "You get going with what you have and then improve it year after year" (Secretariat employee, Field Note, 2018). They were proud of their expertise and leadership in report card production: "WaterHealthOrg is a leader in report card production. Our report card offers a snapshot of the waterway health. But there's more to the story. It's 637,131 samples over 250 sites in the region. The contribution provided by the Partners, if it were to be calculated as an overall cost, would come up to 3.5 million dollars" (Science panel member, Fieldnote, 2018).

Outcome for the grand challenge: Narrowing the remit by containing water-health monitoring and reporting. The report card was seen as a success. However, WaterHealthOrg partners were also aware that their efforts were not really addressing the grand challenge: "We're not delivering on the ground. We're filling a knowledge gap that's tangible in a sense, but has it

impacted riverways and changed anything? I don't think so" (Secretariat employee, interview, 2018). Activities that reached beyond report card production and promotion, even if directly linked to addressing waterway health degradation, were set aside. As a result, the relationship between the report card response and the grand challenge was now somewhat back to front – the collective response was no longer focused on mitigating the grand challenge but on mitigating reputational threats to the report card. For example, members sought to position their report card in the Great Barrier Reef's health narrative as a means to bolster its media coverage instead of reflecting on how it could actually mitigate water health degradation effects upon the Reef:

> [Partner 1]: I'm disappointed we didn't get TV at the report card launch.
>
> [Partner 2]: What are the news organizations needing?
>
> [Partner 3]: They are looking for novelty. Maybe we should anchor the report card in the "maintaining the health of Great Barrier Reef" narrative? … That could be more newsworthy" (Science Panel member, Fieldnote, 2018).

In sum, as the contamination of waterways became increasingly visible, bringing to light several deeply embedded issues related to water health, the group was confronted with further governance obstacles. Informed by the narrowed remit set in Cycles 1 and 2, and the positive feedback generated, members successfully worked through these obstacles, leveraging their collective response to address regulatory and legitimacy threats. Yet by doing so, members ability to explore other means to address the grand challenge became increasingly constrained. Indeed, Cycles 1, 2, and 3 show how broadening and containing practices had consequences in the form of cumulative and self-reinforcing dynamics trapping members in (re)producing a set of highly technical and repetitive activities now firmly anchored in their narrow remit. This severely limited their ability to critically reflect on the grand challenge and the adequacy of their own response. We further explain and evidence these cumulative implications below.

-----INSERT TABLE 8 ABOUT HERE-----

Cumulative Implications: Governance Traps leading to a Disconnect between the Collective Response and the Grand Challenge

The process dynamics of overcoming governance obstacles by narrowing the remit in each cycle form a cumulative and self-reinforcing pattern which trapped members into increasingly consolidating their collective response at the expense of mitigating the grand challenge. Specifically, narrowing the remit in Cycle 1 allowed WaterHealthOrg to experience positive feedback as it secured the data and financial resources required to produce and launch its first report card. However, it also meant that stakeholders who could not afford to be represented could not share their knowledge or expertise on the grand challenge, making it hard for WaterHealthOrg to amass knowledge beyond report card production.

These actions to overcome governance obstacles laid the groundwork for Cycle 2. For instance, members selected in Cycle 1 interpreted subsequent socioenvironmental events as posing a reputational threat to their collective response. Additionally, as members previously managed to address governance obstacles and move forward by narrowing their remit, they applied the same strategy in Cycle 2. While this focus generated positive feedback, allowing members to move forward, it also further narrowed monitoring and reporting and constrained deeper investigations into other ways in which these activities could inform and improve water management in the region, moving WaterHealthOrg even further away from actionability.

The cumulative effects of cycles one and two compounded in Cycle 3. First, members were quick to perceive socioenvironmental events relating to water health degradation as a reputational threat; an interpretation which can be traced back to former cycles, which predominantly directed members to focus on the threats posed to their collective response (i.e., the report card), as opposed

to the problem of degrading water health and whether or how the report card could be acted on to contribute to its mitigation.

Second, the focus on resolving governance obstacles through broadening and containing practices in Cycles 1 and 2, which largely revolved around making incremental amendments to the monitoring and reporting activities, meant that, when faced with new governance obstacles in Cycle 3, WaterHealthOrg members had a well-established response pattern that generated positive feedback: governance obstacles were addressed through alterations to the monitoring and reporting activities; anything else was perceived as irrelevant. This response pattern gradually narrowed WaterHealthOrg's remit as participants increasingly focused on adjusting how their report card represented water health over whether that representation produced actionable outcomes.

Third, with its remit narrowed in cycles 1 and 2, WaterHealthOrg was now firmly entrenched in a set of highly technical activities that severely restricted its focus and limited members' collective response to identifying additional indicators for the report card that would alter its representation of water health: "Until we have consistent monitoring of all the indicators across the basin and through time, that's going to be a gap in really understanding water quality or waterway health" (Science panel member, Interview, 2018). While members were increasingly aware of a disconnect between their response and the grand challenge, they were trapped into repeating the same action cycles. They struggled to alter the collective response in a meaningful way: "I'm writing papers on stuff we've been talking about since last year... the group is focusing on trivial questions, and they go on and on… The risk profile is low and it's stifling innovation" (Secretariat employee, fieldnote, 2018). As a consultant noted: "[WaterHealthOrg members] would recognize that there's more work the partnership could do that it wasn't doing, but it never quite seemed to get there" (Consultant, Interview, 2018). The culmination of each governance trap

led WaterHealthOrg members to experience a progressive disconnect between their increasingly consolidated collective response and their diminishing ability to mitigate the grand challenge. As a result, WaterHealthOrg's ability to mitigate the grand challenge became a growing impossibility.

DISCUSSION

Our aim was to answer the theoretically informed research questions: *How are multi-stakeholder governance obstacles addressed in practice? With what implications on the collectives' ability to respond to grand challenges?* Drawing on our findings, we developed a conceptual model on the management and implications of collective responses to grand challenges by unpacking the process of addressing multi-stakeholder governance obstacles in practice and the implications this generates for collective responses to these wicked problems. Our model shows that, as participants increasingly consolidate their collective response to a grand challenge (Figure 1, 1), their ability to mitigate the grand challenge actually decreases (Figure 1, 2), generating a disconnect between the collective response and the grand challenge (Figure 1, 3). We now explain how collective response dynamics – created by the interplay of socio-environmental triggers, governance obstacles, and practices aimed at addressing these obstacles – increasingly emerge this disconnect.

-----INSERT FIGURE 1 ABOUT HERE-----

Our model unpacks the dynamic and cumulative ways in which obstacles arising from multi-stakeholder governance are negotiated in practice. A shift in the manifestation of the grand challenge triggers (Figure 1, A_1-A_n) its saliency for stakeholders (Pradilla et al., 2022), who are then exposed to governance obstacles (Dorado et al., 2022; Gillett et al., 2019; Hardy et al., 2006; Margerum et al., 2016), as they endeavor to respond to the salient aspects of the grand challenge. This first part of our process model highlights that governance obstacles are fluid (Dentoni et al.,

2018), arising from participants' clashing (re)interpretations of the grand challenge (Ferraro et al., 2015) in light of its shifting manifestation (Pradilla et al., 2022) and different views on how they should respond (van Wijk et al., 2020; Voegtlin et al., 2022). Water contamination from industrial activities, fish kills, coral bleaching, and debates on the need for additional regulation are some of the events we identified in our study as triggers of governance obstacles for WaterHealthOrg.

Actors engage in practices – broadening and containing in our case – to address governance obstacles (Figure 1, B_1-B_n) that might otherwise lead to group paralysis or dissolution, and these practices shape the collective response. Broadening involves participants seeking to stretch the scope of the collective response by including new activities that incorporate participants' (shifting) interpretations of what a grand challenge entails and how it should be addressed (Berkowitz & Grothe-Hammer, 2022; Easter et al., 2022; Howard-Grenville & Spengler, 2022; Seidl & Werle, 2018). Containing practices counteract the broadening practices by seeking to limit the scope of the collective response. For instance, containing proposals for additional activities enables participants to keep sharp focus on the agreed activities. In our case, the interplay between broadening and containing practices enabled participants to overcome the governance obstacles of each cycle sufficiently to enact a collective response and move forward. This second part of our model highlights the centrality of addressing governance obstacles in multi-stakeholder participants' efforts to tackle grand challenges (Dentoni et al., 2018; Dorado et al., 2022; Voegtlin et al., 2022).

With each cycle of trigger, governance obstacles, and practices, the group becomes increasingly skilled in enacting its collective response to the grand challenge (Figure 1, C_1-C_n). In our case, the dynamics of addressing governance obstacles increasingly narrowed the remit, generated positive feedback (Dobusch & Schüßler, 2013), allowing WaterHealthOrg to continue

as a committed and relatively cohesive group, developing, protecting, and leveraging their response. Yet, these cycles also lock participants into particular response paths (Sydow et al., 2009), gradually decreasing their ability to mitigate the grand challenge (Figure 1, 2). In the case of WaterHealthOrg, despite the collective response becoming increasingly complex (e.g., the number of samples collected and the types of indicators included increased every year), it also became simpler in some ways, as participants zeroed in on activities aligned with their increasingly narrowed remit (Miller, 1993). In short, one facet of WaterHealthOrg's remit (creating a representation of the grand challenge) overpowered the other (acting on the grand challenge). This third part of our model shows the self-reinforcing mechanism resulting from efforts to tame governance obstacles (Dobusch & Schüßler, 2013).

Our framework explains *why* collective responses to grand challenges can become path dependent (Sydow et al., 2009, 2020). We identify governance traps arising from and reinforced by the positive feedback described above as the key mechanism underpinning the progressive disconnect between a collective response and the grand challenge it was intended to mitigate (Figure 1, 3). Contrary to other accounts where participants confronted with governance obstacles grafted their viewpoints to the collective goal, thus expanding their remit (Grodal & O'Mahony, 2017), our participants' practices led them to increasingly narrow their remit, initially by restricting membership and later by focusing only on particular types of data and water health activities. This generated a cumulative dynamic of governance traps (Figure 1, D_1-D_n), as members struggled to: (a) generate knowledge around the grand challenge beyond that which aligned with the viewpoints held by selected members (governance trap of first Cycle); (b) develop activities beyond those that protected the collective response from reputational backlash (governance trap of second Cycle); and (c) deviate from a set of highly repetitive activities that were aligned with an increasingly rigid

validation and strengthening of the existing approach to generating a collective response (governance trap of third Cycle). This last part of our model clearly unpacks why path dependence emerges in a multi-stakeholder context in which participants seek to collectively tackle a grand challenge. In sum, our model explains how a collective response to a grand challenge can lose traction and become path dependent (Sydow et al., 2009, 2020), precisely because the group develops a cumulative ability to address governance obstacles.

CONTRIBUTIONS

One of the biggest puzzles in research on grand challenges is why, despite tremendous investment and strong multi-stakeholder commitment, these collective responses continue to fail, (Grodal & O'Mahony, 2017; Van Wijk, Van Wijk, Drost, & Stam, 2020; Wright & Nyberg, 2017). Our conceptual process model offers some explanation by showing how working through governance obstacles can lead to a progressive disconnect between collective response and grand challenge. Specifically, by increasing their ability to respond collectively, actors may simultaneously decrease their ability to mitigate the grand challenge.

Our findings extend the literature in two key areas. First, we provide deeper insights into why multi-stakeholder governance obstacles (Dentoni et al., 2018; Provan & Kenis, 2008) can result in unintended consequences in responding to grand challenges (e.g., Feront & Bertels, 2021; Grodal & O'Mahony, 2017; Khan et al., 2007; Porter et al., 2020; van Wijk et al., 2020) by revealing governance traps as an important liability in this process. Second, we theorize our findings of the cumulative, self-reinforcing nature of these governance traps by linking them to path dependence theory (Sydow et al., 2009, 2020). We reveal how and why exogenous triggers, which could break a response path (Stache & Sydow, 2022), can actually reinforce it.

Governance Traps as an Explanation for the Unintended Consequences of Collective Responses to Grand Challenges

Our model contributes to knowledge on why multi-stakeholder initiatives (Dentoni et al., 2018; Dorado et al., 2022; Provan & Kenis, 2008; Voegtlin et al., 2022) to tackle grand challenges are often prone to unintended consequences. Management literature on grand challenges increasingly demonstrates the limitations of multi-stakeholder governance (Dentoni et al., 2018; Gray et al., 2022; Grodal & O'Mahony, 2017; Provan & Kenis, 2008). There are indications that unintended consequences experienced by multi-stakeholder groups tackling grand challenges may actually arise from such governance (e.g., Fan & Zietsma, 2017; Grodal & O'Mahony, 2017; van Wijk et al., 2020). Our findings extend these earlier studies, by revealing important liabilities in the process of overcoming multi-stakeholder governance obstacles, not previously identified in the literature, and which further explain why unintended consequences are so prevalent in these settings (Gray et al., 2022; Huxham & Vangen, 2000).

We introduce the notion of *governance trap*; a phenomenon whereby participants of a multi-stakeholder governance approach become locked into increasingly consolidating their collective response at the expense of developing their ability to address the grand challenge. Others have attributed unintended consequences arising from multi-stakeholder initiatives to participants' inability to collaborate (Zuzul, 2019), ambiguous interpretations of the problem (Feront & Bertels, 2021), excessive diversity of perspectives (Porter et al, 202), and group dissolution (Kallis et al, 2009). Yet our study shows that the ability to overcome these obstacles through a consolidated collective response can also generate unintended consequences. Specifically, the positive feedback between their ability to arrive at a collective response and the increasingly narrow remit of our multi-stakeholder group (Figure 1, C_1-C_n) constituted a self-reinforcing process of lock-in

dynamics (Stache & Sydow, 2022) that generated governance traps. The culmination of these traps led to the unintended consequence of the group becoming more focused on consolidating their collective response than on mitigating the grand challenge; in our case focusing more upon their report card, rather than on improving water health in the region.

Our findings and conceptual model explain the process by which governance traps arise from participants' efforts to avoid group paralysis or dissolution (Dentoni et al., 2018; Dorado et al., 2022; Voegtlin et al., 2022) and illustrate the broadening and containing practices involved in addressing governance obstacles and enabling the collective response. While addressing governance obstacles is necessary to continue responding to grand challenges collectively (Dentoni et al., 2018), we show that concentrating on continuously consolidating the collective response may yield positive feedback that locks a group into a specific response path that limits their ability to impact the grand challenge.

Our identification of governance traps and the cumulative lock-in dynamics they generate further explains why groups skilled at incorporating actors' multiple interests in responding to a grand challenge (Grodal and O'Mahony (2017) may actually be more prone to lock-in effects. This finding provides important insights into the puzzle of why multi-stakeholder initiatives often lead to unintended consequences. Specifically, we reveal how the ability to collectively address multi-stakeholder governance obstacles can both strengthen participants' commitments to a collective response and limit their ability to address the grand challenge. Our process model thus helps explain why well-funded and celebrated initiatives often fail to impact the issues they seek to address. It is critical to understand the risk governance traps pose to the success of multi-stakeholder initiatives in mitigating grand challenges, putting into perspective the potential cost of

an increasing reliance on multi-stakeholder governance arrangements for addressing persistent and 'wicked' grand challenges (Huxham & Vangen, 2000; Kallis et al., 2009).

Connecting Governance Traps to Path Dependence

We extend existing research into grand challenges (Brammer et al., 2019; Ferraro et al., 2015; Gümüsay, Marti, Trittin-Ulbrich, & Wickert, 2022; Howard-Grenville & Spengler, 2022) by theorizing this relationship between overcoming multi-stakeholder governance obstacles and their unintended consequences as a path dependent process whereby multiple cycles of increasing commitment to a collective response result in governance traps (Schreyögg & Sydow, 2011; Sydow et al., 2009, 2020). In doing so, we also contribute deeper insights into path dependent processes as they play out between organizational actors (Kremser & Sydow, 2022). Scholars argue that path dependence tends to arise from self-reinforcing forces that constrict choice inside organizations (Dobusch & Schüßler, 2013; Sydow et al., 2020), necessitating external triggers to broaden choices (Stache & Sydow, 2022). We show that these self-reinforcing constraints are also pervasive in interorganizational settings and that the cumulative effects of governance traps that enable alignment across multiple stakeholders can constitute an inability to change (Kim, Oh, & Swaminathan, 2006), even when confronted with external shocks.

Indeed, while scholars suggest that breaking a path dependent response should involve some form of external shock (Stache & Sydow, 2022; Sydow et al., 2020), our findings suggest this may not be enough, or at least, that not all external shocks can produce such change. Indeed, we observe the opposite pattern. Multiple external triggers, each interpreted by the group as a governance obstacle needing to be tamed, actually reinforced rather than broke their collective response. Thus, recurring opportunities to adjust the response in light of the increasingly dramatic problems posed by the grand challenge (Wright & Nyberg, 2017) were not only ignored, but

actually led to a doubling down on the response. In our case, as water health degradation events triggered governance obstacles for our participants, they became trapped in continuously, and rather successfully, tame these obstacles. We thus advance that external shocks do not always constitute an opportunity for path breaking (Stache & Sydow, 2022). Rather, when faced with the complexities of a shifting grand challenge such as water health degradation, external shocks may even serve to reinforce a response path, as actors focus upon the more tractable issue of overcoming their governance obstacles over the less tractable issue of the worsening challenge.

Our theoretical connecting of governance traps to concepts of path dependence (Schreyögg & Sydow, 2011; Sydow et al., 2009, 2020), explains how responding to external shocks by consolidating collective responses can reinforce rather than disrupt a lock-in pattern. In doing so, we provide additional insights on how and why actors adopting a multi-stakeholder governance approach to addressing grand challenges can experience means-ends decoupling (Wijen, 2014). In our case, WaterHealthOrg sought to overcome governance obstacles by reinforcing their commitment to their report card (the means), which inhibited their collective ability to mitigate the grand challenge (the ends), and eventually became their sole focus. Indeed, as our findings show, our participants gradually positioned the report card as part of the narrative of water health as opposed to a tool that could improve water health. Attention to these lock in dynamics, and the way they are negotiated in practice, can take us closer to understanding persistent collective failure to address some of the most pressing issues of our time (Howard-Grenville & Spengler, 2022; Howard-Grenville, 2021; Huxham & Vangen, 2000).

BOUNDARY CONDITIONS & CONCLUSIONS

We have examined a collective response to a particular grand challenge—the problem of degrading water health in the Australian Great Barrier Reef. Our setting presents some boundary

conditions that guide where our model might be most applicable and suggests grounds for future research. The cyclical process we identified generated a cumulative path dependent pattern that is likely to occur elsewhere. In particular, our model speaks to situations in which organizational actors are required to make sense of and formulate solutions to issues that are ill-defined or escalating, while also navigating governance obstacles that risk stalling collective initiatives (Dentoni et al., 2018; Dorado et al., 2022; Voegtlin et al., 2022). For instance, we may see the disconnect we document in collective responses to the COVID-19 pandemic (Howard-Grenville, 2021), catastrophic failures such as the Fukushima nuclear disaster (Willacy, 2013) or the Chilean mining collapse (Rashid, Edmondson, & Leonard, 2013), and field-configuring events aimed at addressing long-lasting and systemic issues such as the Conference of Parties (Schüssler, Rüling, & Wittneben, 2014). We propose that future research examine how overcoming governance obstacles in such settings might also result in disconnects from the very issues multi-stakeholder initiatives are established to address.

The initial cycle in our study was important to the path pursued because it shaped the types of participants included and knowledge sought, suggesting grounds for future research into longer-term implications of the process of selecting participants for multi-stakeholder initiatives (Seidl and Werle, 2018). In particular, such studies could examine different viewpoints and the underpinning power dynamics involved in including or excluding particular participants (Gray et al, 2022). For example, in our case, the exclusion of conservation groups and the resource dependence of WaterHealthOrg on partners for funding and data input clearly shaped the process. By contrast, actors with a wider remit, different sources of funding, or a more general understanding of the challenge they seek to address may engage in more open or innovative approaches (Ferraro et al., 2015).

Additionally, actors in our study joined together in a multi-stakeholder initiative, WaterHealthOrg, that focused on progressing its collective response. Other, more loosely affiliated actors, such as those involved in social movements (Reinecke & Ansari, 2016), international convening events (Schüssler et al., 2014), communities (Berrone, Gelabert, Massa-Saluzzo, & Rousseau, 2016), online platforms (Tello-Rozas, Pozzebon, & Mailhot, 2015), or initiatives with a different membership composition (Olsen, Sofka, & Grimpe, 2016; Seidl & Werle, 2018), might generate dynamics that are less attentive to generating a collective response or ensuring a sense of progress. Future research could examine whether such collectives may be more or less disposed to the self-reinforcing dynamics that can shape response pathways (Schreyögg & Sydow, 2011; Stache & Sydow, 2022).

Furthermore, participants in our study worked through governance obstacles in specific ways that led to an increasingly pronounced disconnect between their response and the grand challenge they sought to mitigate. Their response, and governance, revolved around a tool: the report card. Research on collective tool making processes (Burke & Wolf, 2021) has shown how tools can derail collaborative efforts to address complex and cross cutting issues (Zuzul, 2019). Specifically, the use of commensuration (Espeland & Stevens, 1998), and information more broadly (Feldman & March, 1981; Langley, 1995), is known to create questionable outcomes. For instance, the measures may become the target (Espeland & Sauder, 2007) or focus falls only on what can be measured, regardless of importance (Esposito & Stark, 2019; Howard-Grenville & Spengler, 2022). Despite the shortcomings of commensuration strategies in tackling grand challenges (Ferraro et al., 2015), our study shows the overwhelming tendency to rely on tools and metrics as a means of tackling these wicked problems (Burke & Wolf, 2021; Espeland & Stevens, 1998). Future research should therefore pay attention to whether commensuration strategies,

collective tools, and information more broadly enable or hinder collaborative governance processes and overall progress on grand challenges.

Lastly, the traps in our study indicate that different practices for addressing governance obstacles might enhance actors' ability to mitigate the grand challenge. For instance, we expect that practices such as exchanging knowledge on grand challenges with external stakeholders, developing and encouraging activities that deviate from the established response path (Stache & Sydow, 2022), and critically examining the collective ability to adapt a response to the evolving challenge (van Wijk et al., 2020) could help avoid the governance traps we identified. However, each of these practices comes with important trade-offs that need to be carefully examined and understood (Henry et al., 2022; Voegtlin et al., 2022). For instance, balancing the need for participants to remain critically reflexive about the adequacy of their response for mitigating the grand challenge and the need to secure long-lasting endorsement from key stakeholders is an important governance obstacle participants need to consider (Grodal & O'Mahony, 2017). We thus encourage researchers to attend to the dynamics used to develop collective responses, the trade-offs they require and their implications over time.

In conclusion, this study enriches understanding of dynamics that contribute to the failure of collective efforts aimed at tackling grand challenges (Grodal & O'Mahony, 2017; Van Wijk, Van Wijk, Drost, & Stam, 2020; Wright & Nyberg, 2017). Our model provides processual insights into the traps experienced by participants as they seek to address multi-stakeholder governance obstacles (Dentoni et al., 2018; Dorado et al., 2022; Voegtlin et al., 2022). We therefore join other scholars (Grodal & O'Mahony, 2017; Henry et al., 2020; Porter et al., 2020; Schüssler et al., 2014) in nuancing the value of collectivity when tackling grand challenges by providing a detailed account of the potential downsides of collective responses arising from multi-stakeholder

initiatives. Understanding these dynamics is important, as such knowledge can guide policymakers, communities affected by grand challenges, and organizational theorists as they develop or investigate interventions aimed at mitigating such challenges.

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TABLE 1

Multi-stakeholder governance obstacles

Key obstacles		Source
Interpretive	Struggles to grasp the extent of the grand challenge	(Howard-Grenville & Spengler, 2022)
	Misaligned temporal structures (time rhythms, paces, and time horizon)	(Hilbolling et al., 2022: 136)
	Misaligned assumptions, and values	(Berkowitz & Grothe-Hammer, 2022; Easter et al., 2022; Fan & Zietsma, 2017; Le Ber & Branzei, 2010)
	Clashing interpretation over the ways in which progress should be assessed/ measured	(Huault & Rainelli-Weiss, 2011; Khan et al., 2007; Levin & Espeland, 2002)
Structural	Lack of participant diversity affecting legitimacy	(De Bakker et al., 2019; Olsen et al., 2016)
	Too much participant diversity undermining response efficiency	(Henry et al., 2022)
	Struggles to adjust strategic tools and organizational processes to shifting manifestations of the grand challenge	(Burke & Wolf, 2021; Pradilla et al., 2022; van Wijk et al., 2020)
	Financial fragility jeopardizing ability to remain reflexive	(van Wijk et al., 2020)
Relational	Historical feuds between participants, making trust-building and collaborating difficult	(Sloan & Oliver, 2013; Vangen & Huxham, 2003)
	Participants' emotional attachement and loyalty to their organization hampering commitment to collective actions	(Easter et al., 2022; Fan & Zietsma, 2017; Hardy et al., 2006)
	Rivalry between participants misaligned with collective goals	(Hahn & Pinkse, 2014)
	Power asymmetries making collaboration difficult	(Gray et al., 2022)
	Uneven ability to participate due to resource or capability constraints making collaboration difficult	(Banerjee, 2008; De Bakker et al., 2019)

TABLE 2

Unintended consequences of multi-stakeholder governance on grand challenges

Grand challenge	Goal	Unintended consequences	Source
Sustainable water management	Find cooperative solutions to water sustainability issues	"The same recursive cycles among emotional facilitators, agentic mechanisms, and logic construction that aided the building of new logic also led to its weakening when those cycles turned negative".	(Fan & Zietsma, 2017: 2322)
Address hunger, poverty, and climate change through nanotechnology	Creating molecular manufacturing in the nanotechnology field	"The very strategies employed to successfully mobilize diverse participants to support the grand challenge actually helped displace it with less ambitious goals".	(Grodal & O'Mahony, 2017: 1801)
Environmental and social sustainability	Responsible investment in South Africa	"Frame ambiguity drew in a broader range of field actors but ultimately stalled the institutionalization of new meanings and practices in the investment field"	(Feront & Bertels, 2021: 1)
Sustainable water management	Restoration and management of the Bay-Delta	"CALFED was praised as ''a leading-edge experiment'' in collaborative planning, a new model of environmental regulation, and an exemplar of adaptive management. Yet a general discontentment with the program's management, coupled with its failure to achieve in the short-term its stated goals, led to its eventual dissolution"	(Kallis et al., 2009)
Improve cities' operational efficiency, environmental sustainability, or quality of life	Building the world's first smart cities	"The very projects that are so often the drivers of systemic change and innovation— the development of boundary objects that occasion the transformation of abstraction into materiality – can be deadly to collaboration".	(Zuzul, 2019: 740)
Water pollution	Develop innovations for the sustainable use of oceans within the maritime industry	The response "attract(ed) a diverse stakeholder network to generate novel ideas and develop these into sustainable solutions. Yet ... the momentum and novelty generated was at risk of getting lost as the actors and their roles changed frequently throughout the process"	(Porter et al., 2020: 1)
Eradicate global poverty	Making the dairy value chain in Ethiopia more inclusive	While the initiative stimulated the "development of indigenous knowledge and practices", these were "misaligned with local norms, values, and power disparities, creating negative feedback" that led to cascading failures.	(van Wijk et al., 2020: 1410)
Child labor	Eradicate child labor from the soccer industry	Eradicating child labor in the Sialkot's soccer ball manufacturing companies led to the "loss of income, disruption to family life and the negative effects upon women, in particular", which exacerbated poverty and children's wellbeing	(Khan et al., 2007: 1070)

TABLE 3

WaterHealthOrg members role, and main tasks

			Main Task				
Member	Role	Partnership members	Contribute financially	Make governance decisions	Approve report card	Grade data	Provide data
Partners	- Provide strategic oversight - Set membership fees - Approve annual project and communication plans, and budget - Monitor and review risks and performance - Approve public release of Partnership reports - Approve the science panel membership - Receive advice from the Science Panel	Mining companies	✓	✓	✓		✓
		Agriculture companies	✓	✓	✓		
		Regional government	✓	✓	✓		✓
		Local council	✓	✓	✓		
		Consultants	✓	✓	✓		
Science Panel	- Provide scientific review - Provide advice on quality assurance relevant to the activities of the Partnership	Academic and independent (water scientists)			(✓)*	✓	
Hosting organization	- Manage WaterHealthOrg's project plan & budget - Provide progress reports to the partners - Employ Secretariat staff	Natural resource management non-profit	✓	✓	✓		
Secretariat	- Facilitate communication between members - Ensure the delivery and promotion of the project - Recruit new Partners	Partnership employees		(✓)	(✓)	(✓)	

* (✓) = Member can advise and influence the task, but is not a decision-making member

TABLE 4

Data sources

Type	Amount
Observations (conducted in 2017-18)	**Total: 502 hours**
Informal observations	320 hours
Formal observations	60 hours
Special events	122 hours
Interviews (conducted in 2018)	**Total: 30 interviews***
Science panel members	7 interviews
Co-chairs (industry)	2 interviews
Co-chairs (government)	2 interviews
Partners	11 interviews
Government regulator	1 interview
Staff	4 interviews
External stakeholders	2 interviews
WaterHealthOrg consultant	1 interview
Documents	**Total: 495 documents**
Scientific studies	25 documents
Meeting minutes	46 documents
Internal meeting working papers and Memos	213 documents
Report cards	30 documents
Media reports	45 documents
Strategy documents	16 documents
Other relevant documents (e.g., drafts, memos)	59 documents
Social media	61 documents

TABLE 5

Coding Table

Concept	Definition	Example
Triggers	Socio-environmental events increasing the grand challenge's salience for stakeholders and participants of multi-stakeholder initiatives	Flash flood leading to water contamination for local residents who pressure their government to act.
Governance obstacles	Interpretive, structural, and relational "challenges of coordination, collaboration, and participatory action" (Dorado et al., 2022: 9).	Participants disagreeing on which types of stakeholders should be included as members in the multi-stakeholder initiative and on what basis.
Broadening practices	Practices aimed at stretching the scope of the collective response by including new activities that incorporate participants' (shifting) interpretations of what a grand challenge entails and how it should be addressed	Making several formal and informal requests for the inclusion of more indicators into the report card that can widen the way it can be used.
Containing practices	Practices aimed at counteracting broadening practices by seeking to limit the scope of the collective response	Rebutting requests for monitoring going beyond Environment Agency-required indicators during Partners meetings
Governance traps	Traps arising from the positive feedback generated when governance obstacles are addressed by narrowing a multi-stakeholder initiative's remit. Over time, this positive feedback hinders collective action toward the mitigation of a grand challenge.	Excluding reporting activities that might improve the management of water health in order to protect the group's ability to get to a collective response, which in turn reinforces their exclusion of potential new reporting activities in subsequent cycles.

TABLE 6

Illustrative evidence Cycle 1 (2008-2012)

Construct	Description	Illustrative evidence
Trigger	Recurring large-scale water contamination events	The reason the partnership essentially came about was an outworking from challenges that we had […] in 2008 and then again in 2011 where there was conflict running between the resource sector and other parts of other sectors around water quality issues and who was to blame for those or who was contributing to them. (Regional Government Representative, Interview, 2018)
Governance obstacle	Governance obstacles over whether WaterHealthOrg should address reputational threats and how open participation should be	The reason the partnership essentially came about was an outworking from challenges that we had … in 2008 and then again in 2011 where there was conflict running between the resource sector and other parts of other sectors around water quality issues and who was to blame for those or who was contributing to them. (Regional Government Representative, Interview, 2018) I think early on the focus was on getting a deliverable. Of course, with a partnership you've got people putting in money and that's on the provision of various things being met. (Partnership co-chair, Interview, 2018)
Broadening	Pushing for indicators that can allow for management responses to be developed	The science panel supports the development of a suite of conceptual diagrams to describe the current understanding of causal processes linking threats/hazards/stressors to the condition of the assets, and possible interventions to manage those threats (Science panel Meeting Working Papers, 2010).
	Pushing for all point-source polluters to become members	The importance of ensuring adequate representation of the grazing, grains, and irrigation industries on [WaterHealthOrg] (Science panel Meeting Minutes, 2010)
Containing	Rebutting requests for monitoring going beyond EA-required indicators	There were a few [indicators], particularly metals and things of interest to the science panel, but unfortunately the limitations on the data availability prevented us from really being able to report on those. (Secretariat employee, Interview, 2018)
	Rejecting members who could not pay or provide data	There was some negativity from conservation groups in that they expected to have a seat at the table, but you couldn't have a seat at the table unless you [were] actually going to pay a membership (Partner, Interview, 2018)
Outcome for the partnership	Collective response is achieved allowing WaterHealthOrg to move forward	WaterHealthOrg was well presented in media, and the report generally received positive media coverage (Communication Review and Plan, Partners Meeting Minutes, 2012)
Outcome for the grand challenge	Collective response narrows membership and knowledge base	We captured the community values, but we did not do a great deal with it (Secretariat employee, Fieldnotes, 2018) We've been less involved in those [report card production] processes because it's technical data collection. It's technical report card production … it became a—not a closed shop—but a less iterative process (Conservation group employee, Interview, 2018). The detail in biological and ecological monitoring was not something that the [Partners] took on" (Science panel member, Interview, 2018)

TABLE 7

Illustrative evidence Cycle 2 (2013-2016)

Construct	Description	Illustrative evidence
Trigger	Large-scale flooding causes several water contamination incidents	A resident ... has reported seeing hundreds of dead fish in the river. [Other resident] says she is concerned about the water quality because her cattle drink it and her family showers in it. She says she has spoken to the Rockhampton council about her concerns. (Local news, 2013)
Governance obstacle	Governance obstacle over whether and how to address specific community concerns	There was a need for solid science to support decision making in the region instead of quick fixes that look flamboyant from the outside but do not make any sense at ground level (Science panel member, Interview 2018)
		There are some community issues that are not dealt with in the report card. It is suggested that the partnership considers the preparation of material to inform the community (Partners Meeting Minutes, 2013).
Broadening	Urging partnership to allocate resources to address data patchiness	There is a need to place a high priority on collecting data for Ecology/Biology indicators ... The Science Panel strongly agreed ... it was decided that a small working group would put together a brief discussion paper on this issue ... [for the Partnership's consideration]. (Science Panel Meeting Minutes, 2014)
	Pressuring members to allocate resources to report on themes of concern to specific stakeholders	There were definitely differing views, and some vigorous conversations and quite strong opinions expressed by people trying to identify effectively where they could get the biggest bang for their buck (Partner, Interview, 2018)
Containing	Prioritizing requests based on cost-benefit	In 2013–14, priority project funds were directed towards catching up in our annual reporting, preparing drinking water reporting products and with potential to fund a project to improve monitoring efficiency (Partners and science panel Meeting Minutes, 2014).
	Belaying requests by arguing WaterHealthOrg should first focus on maintaining report card momentum	It was noted that the Department's request to include additional monitoring was contrary to an agreement by [WaterHealthOrg] to prioritize the development of the first report card. … reporting and communications components should not be reduced … because it was most important that the report card be completed and communicated to the public (Partners Meeting Minutes, 2012)
Outcome for the partnership	Collective response is protected against criticisms allowing WaterHealthOrg to move forward	We [WaterHealthOrg members] will continue to deliver value to partners by embracing a client focused approach – Developing and tailoring specific reporting products relevant to the sectors represented in our membership (WaterHealthOrg strategic planning draft, 2016)
Outcome for the grand challenge	Collective response narrows water-health activities	There is the risk of queries in regard to mine releases and their use of, or impact on water. Queries in regard to dead trees, the effects of floods and other topical issues may also be directed to [WaterHealthOrg's report card website] … [WaterHealthOrg] has provided in principal support for a community fact sheet series … on topical or perceived issues. Messages would be drawn from these to allow the partnership to have a presence in the media around these issues (Partner Meeting Working Papers, 2014)

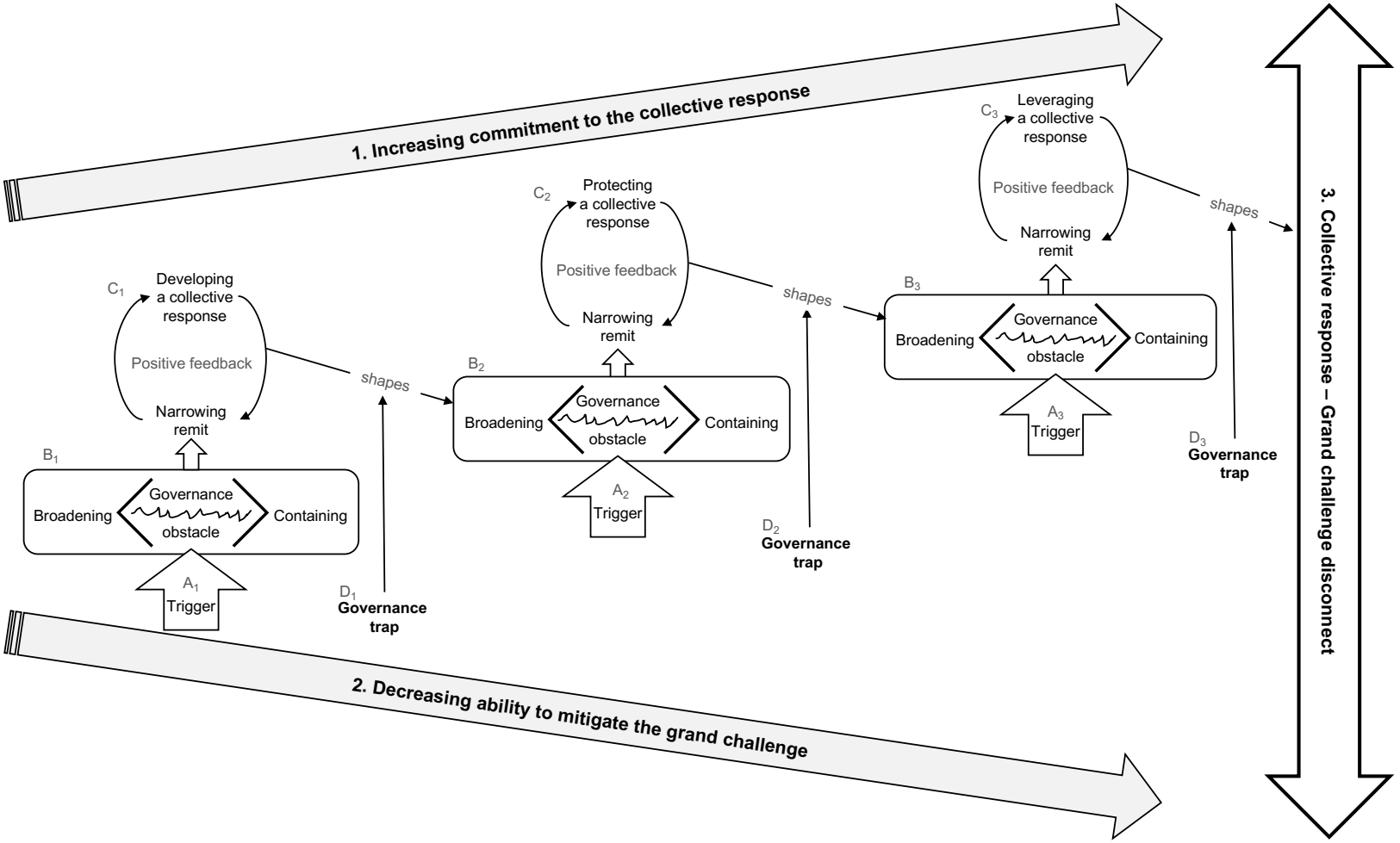
TABLE 8

Illustrative evidence Cycle 3 (2016-2018)

Construct	Description	Illustrative evidence
Trigger	Coral bleaching linked to degrading water health	The back-to-back bleaching hit more than two-thirds of the Great Barrier Reef and may threaten its UNESCO World Heritage listing... Water quality can affect a reef's health and resilience to stress. (Local News, 2016)
Governance obstacle	Governance obstacle over whether to endorse voluntary self-regulation	[Secretariat employee]: [Voluntary self-regulation] is the lower hanging fruit. [Researcher]: are the Partners endorsing it? [Secretariat employee]: look they're struggling on agreeing and getting beyond just talk (Secretariat employee, Fieldnote, 2018).
Broadening	Using third-party funding to research additional indicators that could be included	The discussion revolves around who is going to do the Ph work and [science panel member] suggests using an intern for that as well and asks [Secretariat employee] to write a brief about the project (Science panel meeting, Fieldnote, 2018)
	Making the case for additional indicators during strategic events	The science panel recommended adding wetlands. Wetland data … could be drawn across into the report card from Basin sites. [Science panel member] noted that habitat assessments are both very quick to score and if [voluntary self-regulation] were developed, would only add another 10 minutes per site" (Science panel Meeting Minutes, 2017)
Containing	Trading-off requests for additional monitoring based on cost-benefit analysis	There was a suggestion that 14 activity fronts are too many. Need to reduce. … There was a query if any of the goals and activities can be removed (Partners Meeting Minutes, 2017)
		Most of [WaterHealthOrg] budget is directed to expenditure on annual report card production and promotion. Activities have been prioritized and rationalized according to the budget (Partners Meeting Paper, 2018)
	Not providing data on proposed new indicators	[Looking at the report card, the researcher noticed that the grades were represented by a fish icon. Several of the fish's "head" were grey colored. She asked a member why this was the case]. [Secretariat employee]: Because we don't have good data on ecological factors and these heads will probably stay grey way after I'm gone (Report card launch, Fieldnote, 2018).
	Reinforcing WaterHealthOrg's leadership as a report card producer	The management committee members see the collaboration [with other report card initiative] as inevitable and an opportunity to take the lead. (Partners Meeting Minutes, 2016)
Outcome for the partnership	Collective response is leveraged to hone leadership allowing WaterHealthOrg to move forward	The [National] workshop gained great publicity for the partnership … and was felt to be a good investment. … The partnership is performing very well in report card production at the Australian level (Partners Meeting Minutes, 2017)
Outcome for the grand challenge	Collective response further narrows water-health activities	[Researcher]: How did the community receive the report cards? [Partner]: I don't know. I really don't know. … By the time it gets to the report card [release], I've done my job. (Partner, Interview, 2018)
		Where are the tangible outcomes? Trust and relationships are good, but then does that enable something? What [the Partners] think it's there to do might actually not be what it ends up doing (Secretariat employee, Interview, 2018)

FIGURE 1

Process model on the management of governance obstacles and its consequentiality for collective responses to grand challenges



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