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Configuring transformative governance to enhance resilient urban water systems

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ABSTRACT

Governance reforms are required to establish adaptive and resilient urban water resource management that takes into account complexity, uncertainty and immediate and long term change. This paper details the outcomes of a qualitative, social science research project, drawing on insights from Australian urban water practitioners ($n = 90$) across three Australian cities to explore the effectiveness of governance reforms in the contemporary urban water context. The perceived effectiveness of current urban water governance strategies were assessed through the first application of a fit-for-purpose governance framework, which helps to assess whether the (anticipated) outcomes match the intended purposes of proposed and applied governance strategies. The research provides important insights regarding the need for a mix of centralised and decentralised, and formal and informal, governance approaches to support effective governance of water infrastructure during different stages of adapting to drought and transitioning to a water sensitive city that is resilient to immediate and gradual change. The research insights suggest that decentralised and informal governance approaches are particularly effective in early stages of transformation processes (i.e. adaptation and transition processes), whilst formal and centralised approaches become more effective during later stages of transformation. As such, we have identified a pattern of effective governance configurations during consecutive stages of transformation processes that could provide policy makers guidance in overcoming urban water governance challenges.

1. Introduction

In many places, water scarcity and uncertainty are forcing a re-think about the way governments manage their water resource management systems. As a result, approaches such as Integrated Water Resources Management (e.g. Biswas, 2004), Sustainable Water Resource Management (e.g. Loucks, 2000) and Water Sensitive Urban Design (WSUD; e.g. Wong and Brown, 2009) have (re-)gained prominence over the last decades to deliver water resource management systems that are adaptive to change and resilient to extremes. Collectively, these approaches are comprehensive systems approaches that involve multiple disciplines and stakeholder groups. Research related to these approaches has demonstrated that urban water reforms should result in resilient water resource management that explicitly takes into account complexity, uncertainty and immediate and long term change (Folke et al., 2005). Resilience provides capacity: (i) to absorb shocks while maintaining function (Holling, 1973); (ii) for renewal and reorganisation following disturbance (Gunderson and Holling, 2002); and (iii) for adaptation and learning (Folke, 2006;

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Gunderson, 1999; Olsson et al., 2006). Despite the availability of technologies and knowledge required to develop resilient water resource management systems, practical implementation remains slow (Harding, 2006; Mitchell, 2006). Developing resilient water resource management systems is more a governance issue than a technological issue as ''*adaptation to climate change is limited by the values, perceptions, processes and power structures within society*'' (Adger et al., 2009, p. 349).

Meanwhile, there is insufficient prescription for transformative governance approaches that enhance resilient water systems (e.g. Loorbach, 2010; Rijke et al., 2012). The purpose of prescription for transformative governance is twofold: (1) to enable adaptive capacity for establishing resilience (i.e. to enable adaptation); and (2) to transform existing systems into more resilient systems (i.e. to enable transitions). Creating effective prescription is complicated by the recognition that there are no blueprint solutions for good governance that operate successfully in all conditions and across all scales (Ostrom et al., 2007; Pahl-Wostl et al., 2010). 'Solutions' that have been widely implemented in the past, such as the privatisation of public services or decentralised management of natural resources, have a track record of repeated failure related to unanticipated outcomes (Acheson, 2006). However, several recent contributions have been useful for developing prescriptions for effective governance through guiding principles (e.g. Huntjens et al., 2012; Ostrom and Cox, 2010) and attributes of transformative governance (e.g. Farrelly et al., 2012; Loorbach, 2010; Pahl-Wostl et al., 2010; van de Meene et al., 2011). Whilst all these efforts provide general guidance for policy and decision makers to governance arrangements that enhance resilience, most of them fail to provide specific guidance for governance related to changing circumstances during transformation processes, with some recent exceptions (i.e. Adger et al., 2011; Herrfahrdt-Pähle and Pahl-Wostl, 2012; Olsson et al., 2006). Therefore, this article focuses on providing guidance for aligning effective governance strategies during different stages of transformation processes.

Urban water governance in three Australian cities is being drawn upon as Australian cities are facing highly variable and extreme climate conditions. Over the last decade, long-lasting drought interrupted by short periods of extreme rainfall have placed the traditional, large-scale water infrastructure under pressure regarding the security of water supplies and protecting cities from flooding. In response to such pressures, the concept of a water sensitive city (WSC) has emerged concurrently from the technical and social science fields (Brown et al., 2009). A WSC is the outcome of WSUD processes, and is considered to be adaptive and resilient to broadscale change (i.e. demographic change, climate change and extreme weather conditions) and values water, promotes conservation and aims to improve liveability (Wong and Brown, 2009). Such a city would achieve this through planning for diverse and flexible water sources (e.g. dams, desalination, water grids and stormwater harvesting), incorporating WSUD for drought and flood mitigation, environmental protection and low carbon urban water services in the planning system, and enabling social and institutional capacity for sustainable water management (see also Wong and Brown, 2009).

Although technologies that make WSCs possible have been successfully demonstrated on a number of occasions (Farrelly and Brown, 2011), there remain significant institutional barriers to facilitating this paradigm shift in planning, design, operation and management of urban water systems including: a lack of understanding about urban water cycles; different interpretations of WSUD; WSUD values are not firmly embedded in the water and development sectors; limited skills and competencies to apply WSUD; a fragmented urban water space; a limiting regulatory environment for technological innovation; and, ineffective leadership (see also Brown and Farrelly, 2009; Pahl-Wostl, 2007). Because of these challenges, there are no examples of a city which has fully transformed into a WSC. Therefore it should be noted that empirical evidence that a WSC is indeed adaptive to change and resilient to extremes is not available. However, the terminology of WSCs and WSUD is being used in Australia to assist cities in adapting to a persistent drought (2001–2009) and climate change. For example, the terminology has been adopted as a policy objective in the National Water Initiative (National Water Commission, 2011) and in the South Australian Government's *Water for Good* strategy (Office for Water Security, 2010). Hence, the overall objective of this paper is to identify the patterns of governance configurations that are likely to be most effective as a system transforms to a WSC that is posited to be more adaptive to change.

2. Social–ecological and socio-technical perspectives on governance

Over the last decades, several efforts have been made to better align the physical domain with the concept of governance. From a social–ecological perspective, in which social systems continuously interact with ecosystems, the concept of resilience emerged in the 1970s, introducing the notions of dynamic equilibria and multi-stable states (Holling, 1973). Building on the social–ecological perspective and the concept of resilience, adaptive governance emerged as a way of governing by anticipating long-term change (i.e. climate change, population growth), responding to immediate shock events (i.e. drought, flooding) and recovering from such events (see also Folke et al., 2005). Since the late 1990s, a socio-technical perspective has emerged from technology and innovation studies. It examines how societal systems – including culture, politics, institutions and economics – and technical systems co-evolve over time. It focuses upon transitions, which are long-term non-linear processes (25–50 years) that result in structural changes in the way a society or a subsystem of society (e.g. water management, energy supply) operate (Rotmans et al., 2001). Governance to establish transitions, often referred to as transition management, aims at influencing interactions between the dominant 'regime' (meso level) with its societal 'landscape' (macro level) and 'niches' (micro level) where innovation occurs, so that these innovations become mainstream (Berkhout et al., 2004; Geels, 2002; Rip and Kemp, 1998).

Social–ecological systems and socio-technical systems are considered to behave as complex adaptive systems; they change as a result from self-organisation and external pressure (de Haan, 2006; Scheffer, 2009). Therefore, unsurprisingly, adaptive governance and transition governance share