

Towards improved urban water governance in Adelaide, Australia

J. Rijke^{1,2,3*}, M. Farrelly¹, P. Morison¹, R. Brown¹ and C. Zevenbergen^{2,3}

¹*Centre for Water Sensitive Cities, Monash University, VIC 3800, Australia*

²*Flood Resilience Group, UNESCO-IHE, PO Box 3015, 2601 DA, Delft, The Netherlands*

³*Delft University of Technology, PO Box 5048, 2628 CN Delft, The Netherlands*

**Corresponding author, e-mail j.rijke@unesco-ihe.org*

ABSTRACT

This paper explores how to improve the effectiveness and ‘fit’ of new urban water governance strategies targeted at facilitating more sustainable urban water management. The study involved a governance analysis across the city of Adelaide, Australia, using detailed interviews with senior staff across all key stakeholder groups and policy and media documentary analysis. This analysis is highly relevant as Adelaide has been subject to significant water supply stress the last decade and currently implementing, with varying degrees of success a number of governance reforms. The meta-assessment across four major governance strategies reveals important insights about how to improve the fit of these strategies in relation to their intended purpose. The major insights include: 1) the value of the interplay between providing space for opportunistic behaviour while at the same developing and implementing strategic planning; 2) the importance of a balance that shifts between centralised steering and localised processes to improve the context relevance of outcomes; and, 3) governments to value, stimulate and support the necessary transaction costs of informal professional networks to ensure advocacy, learning and replication of more sustainable practices. These insights provide an important first step in operationalising the concept of adaptive governance for the urban water sector.

KEYWORDS

Adaptive governance, Adelaide, institutions, urban water management, water scarcity.

INTRODUCTION

Numerous urban water industry commentators are calling for a shift in urban water management in Australia, away from the traditional, highly centralised ‘big pipes-in big pipes-out’ approach, towards more sustainable urban water management which incorporates multiple water supply sources at various scales (e.g. Newman, 2001; Bates et al., 2008). Achieving a ‘water sensitive city’ is a long-term goal (Brown et al., 2009), but at present, there remain a number of significant institutional barriers to facilitating this paradigm shift in planning, design, operation and management of urban water systems (e.g. Maksimovic and Tejada-Guilbert, 2001). For example, a large number of alternative technologies are currently available, yet their mainstream implementation remains slow, hindered by numerous impediments related to governance processes (Pahl-Wostl, 2007). As an example, practitioners with tacit knowledge of traditional operations are typically not engaged in discussions about future pathways and while practitioners are open to adopting new technologies, they are often limited by their skills and knowledge and the formal regulatory system (Brown and Farrelly, 2009).

Understanding how the contemporary urban water network operates is important for revealing opportunities to apply new strategies in support of sustainable urban water governance (Adger et al., 2005). Urban water networks consist of interactions between many different bio-physical components, infrastructure systems and multiple stakeholders (individuals and organisations), often resulting in high levels of operational complexity and uncertainty regarding short, medium and long-term outcomes (Adger et al., 2005). Adaptive governance mechanisms are advocated as a process for addressing these challenges (Adger et al., 2005). Adaptive governance relies on continuous monitoring, evaluation and adjustment of institutional arrangements to anticipate and respond to changing conditions. Hence, on-going learning is a critical component of adaptive governance (Folke et al., 2005). Learning processes are stimulated by networks which facilitate interaction among individuals, organisations, agencies and institutions at multiple organisational levels to draw upon different experiences and knowledge sets (Olsson et al., 2006). As a result of this interaction, adaptive governance systems often self-organise (Folke, 2003); however, leadership may also serve as a catalyst for adaptive processes by strategically bringing people, resources and knowledge together (Uhl-Bien et al., 2007).

This paper explores how to improve the effectiveness and ‘fit’ of new urban water governance strategies targeted at facilitating a water sensitive city. The main objectives of this paper are to identify existing and planned urban water governance strategies in relation to urban water management; to map the historical and contemporary context of urban water governance in Adelaide; and to assess whether the (anticipated) outcomes match the intended purposes of proposed and applied governance strategies.

METHODOLOGY

This research adopts a qualitative case study approach to explore the historical and contemporary urban water governance strategies. As such, desktop research (i.e. examining current policy and regulatory government documentation) alongside semi-structured interviews with 31 key urban water network practitioners, were undertaken. The interviewees selected represented a range of different disciplines and organizations, which included key decision makers and individuals in senior advisory roles. For example, interviewees had a variety of backgrounds including policy, planning, regulation, project management, lobbying, consultancy, business development, politics and research. Furthermore, interviewees represented local and state government agencies, water authorities, utilities and the environment and development sectors. Each interview covered a range of topics including, among others, the interviewee’s background and current position; his/her perspective on current urban water governance and desired urban water futures; perceived drivers and barriers to change; and leadership and advocacy within the urban water network. Once collated, all the interviews were analyzed to assess the current state of urban water governance, and to identify pathways forward leading towards a ‘water sensitive city’. In addition, to ensure the reliability and validity of the research findings, workshops have been organized with interviewees to a) test the legitimacy of the findings and b) provide an opportunity for reflective learning.

URBAN WATER GOVERNANCE IN ADELAIDE

Adelaide is a coastal city (population 1.2 million as of 2009) which stretches approximately 20km from East to West and extends over more than 100km in a Northern and Southern direction. Adelaide is the driest capital city of Australia and is located downstream of the

River Murray. Adelaide's water supply follows the traditional 'big-pipes-in and big-pipes-out' approach but remains unique in an Australian context for it has a large reliance on the Murray-Darling River Basin. Therefore, the city is reliant upon water supplies which are i) predominantly generated outside its physical domain and ii) are subject to the political discretions of the New South Wales, Victoria and Queensland state governments, and the intergovernmental arrangements of the Murray Darling Basin Commission. Over the last decade, Adelaide has been subject to severe water scarcity (Daniels, 2010) that has had forced the South Australian government to rethink the way it manages its water resources.

Adelaide's urban water infrastructure and practices are managed via a mix of formal and informal organisations. For example, i) Natural Resource Management (NRM) Boards are responsible for water allocation, ii) SA Water which is responsible for delivering drinking water supplies and managing sewerage treatment and disposal, iii) local governments are responsible for stormwater management. Regulation of the system is also distributed amongst a number of organisations including the recently formed Department for Water, which also has the major role of developing and coordinating a new, holistic urban water policy, the Environmental Protection Authority and the Department of Health. Other organisations involved in urban water management include, among others, the industry's professional associations such as the Stormwater Industry Association and the Institute for Public Works Engineering Australia.

At the time of conducting interviews (August 2010), the public, policy makers and practice were predominantly focused upon responding to the recent water scarcity crisis, where at its peak (2006), Adelaide faced the reality of insufficient water supplies. Considering the exogenous pressures faced by the South Australian Government, numerous talks were held between decision makers and leading industry experts resulting in the announcement of a new large-scale desalination plant, improved interconnections between north-south supplies, lowering pump intake levels along the River Murray and constructing new wastewater recycling schemes (currently, 30% of Adelaide's wastewater is recycled and predominantly used for irrigation (Office for Water Security, 2010)). Thus the emphasis in responding to water scarcity was to 'plug-in' to the existing 'big pipes in- big pipes out' approach through highly centralized, large-scale technologies such as desalination and improving the efficiency of existing systems. This was reinforced at the national scale, where a key objective in the blueprint for urban water reform, prepared by the National Water Initiative, calls for "*reliable, healthy, safe and sustainable*" urban water supplies (NWC, 2009). Many interviewees attributed these large-scale responses to the heightened political concern over the growing public uneasiness regarding water scarcity, promoted by the dominant media coverage of the drought. This led to growing public debate about urban water management as one interviewee suggested "in 2001 there were probably 30 to 40 people in South Australia who could be classed as water experts, but with the drought, we now have 1.5 million experts...".

More recently, however, the new leading urban water policy organization in South Australia, the Department for Water, has a stated aim of creating 'water sensitive cities' by 2020 (Office for Water Security, 2010). To be a 'water sensitive city' requires, among other elements, multiple water supply sources and diverse, multifunctional infrastructure (see e.g. Wong and Brown, 2009). To support this agenda, South Australia has been fortunate to secure \$200 million from the Federal Government to implement proposals for stormwater harvesting schemes, which are more decentralized, require local government involvement and may provide external benefits such as improving waterway health and reducing stormwater pollution in the marine environment. Furthermore, the Department for Water has identified a

long list of actions, published in the *Water for Good* strategy (2010) to help shift towards sustaining long term water security. For example, a) reform the urban water legislation to support the efficient and effective delivery of water and wastewater services; b) pursue water pricing that reflects the true value of water, and c) develop an holistic urban water strategy linking all existing strategies together to achieve the high level objectives in *Water for Good*. As a result, a stormwater strategy is being developed linking all current and future stormwater initiatives to ensure greater cohesion whilst ensuring consistency with adjacent disciplines such as urban planning, public health and natural resource management. Interviewees see the Department acting as a program manager for creating more integrative urban water management; therefore, the organisation is currently focusing on building relationships with other key stakeholders, such as SA Water and various local governments. Also, the DfW is currently rethinking the roles and responsibilities of some of the other government agencies involved in urban water management, such as the Stormwater Management Authority and the NRM Boards. At the time of interviewing, the Department for Water had a lot of political momentum and the majority of network actors accepted and supported the leading position of the new Department.

The shift towards recognizing stormwater as a resource, not a waste product, is an important step in diversifying the water supply base. The broad public opinion supports the notion that stormwater is a valuable resource, opening the window for considering stormwater as a commodity. Indeed, the local government, City of Salisbury, has established an active business in harvesting, storing and recovering stormwater from groundwater aquifers for distribution. It is expected that the new Federally funded stormwater harvesting projects will also build further momentum towards mainstreaming stormwater as an alternative water supply source. However, there remain a number of concerns surrounding these projects, including the limited knowledge surrounding the hydrogeology of the project areas.

Adelaide's urban water governance is currently structured to support improvements in the efficacy of the traditional system; however, the interview data reveal several key governance strategies that are being applied or planned to adapt to the described changes in the water system (see Table 1).

Table 1: Four key urban water governance strategies in Adelaide

1. Centralization of urban water policy making efforts	
Intended purposes	- Coordinate the fragmented urban water policy space to establish holistic urban water management, make strategic decisions to establish a water sensitive city and create synergies between different projects, such as the \$200 million Commonwealth investment for stormwater projects.
Outcomes & expectations	- Improved decisiveness resulting in a policy decision about the water resources that will be used to ensure water supply to 2050. - Synergy between different stormwater harvesting projects: improved data management, learning and decision making. - Process of mandating WSUD was slowed down, because of outsiders' unrealistic expectations of the legislative power of DfW with regards to urban planning.
2. Establishment of urban water markets	
Intended purposes	- To create economic efficiency of available water resources to "get the best bang for each buck" by allocating water resources to uses that deliver the biggest economic output. - Avoid difficult political decisions of putting water restrictions in place and increasing the price of water.
Outcomes & expectations	- In general, the interview data indicate that the implications of urban water markets on urban water governance remain uncertain at this point. - Decentralization of pricing and operation of urban water assets. But not to the extent that a 'free' market will be established. Therefore, it can be expected that policy making will predominantly remain a centralized activity. - Because no reduction of water scarcity is expected, this strategy needs to be complemented by augmentation of supply or demand management.
3. Large scale investment in stormwater harvesting and reuse schemes	

Intended purposes	-	To augment Adelaide's portfolio of water resources to make it less reliant on the River Murray, respond to the drought and anticipate to population growth and climate change.
Outcomes & expectations	-	The success of the approved projects is in some cases "a bit of a gamble", because of inadequate knowledge about the hydrogeology.
	-	Through central program management of stormwater projects, a platform is provided for joint learning amongst different stakeholders.
	-	Legislative issues need to be resolved to avoid future conflict between different harvesters of stormwater, and between different users of groundwater aquifers.
4. Mandating Water Sensitive Urban Design		
Intended purposes	-	To make the WSUD principles the new bottom-line for all new residential, commercial and industrial developments.
Outcomes & expectations	-	Capacity building and training programs are needed to support practitioners to implement the mandated principles.
	-	There is disagreement amongst State government agencies about how the mandate should be put in place.

DISCUSSION

Strategic planning and stimulating innovation

Adaptive governance systems have the capacity to anticipate immediate and long-term change (e.g. Folke et al., 2005). Strategic planning, such as the *Water for Good* strategy and the *30-year Plan for Greater Adelaide*, predominantly focus on long-term objectives and incorporate short and medium-term pathways to achieve these objectives. A review of the *Water for Good* and the *30-year Plan for Greater Adelaide* shows that strategic planning in Adelaide is mainly focused on addressing the pressing issue of dealing with water scarcity. Also, the analysis revealed that there is a disconnect between water management and land use planning. However, the adaptive governance literature states that governance of complex changing systems, such as the urban water system, needs to take into account multiple issues within multiple disciplines (i.e. transport, energy, spatial planning, city design) to effectively establish water sensitive cities (Brown et al., 2009). In *Water for Good* a first step towards holistic water management is being made. However, this strategy only incorporates issues around water supply and primarily investigates different sources of water, such as drinking water from the River Murray, catchments, desalination, groundwater and stormwater. The next step would be to link water supply with, amongst others, flood risk management, urban drainage and sanitation, so that governance responses to current drivers of drought, climate change and population growth, do not overlook old issues, such as public health, flood risk management and environmental management.

Whilst strategic planning can be a basis to anticipate to change and establish redundancy to safeguard original objectives of urban water management, it can only build in flexibility through regular review of applied strategies. It could also provide preparations for anticipated crises such as flood emergency plans or drought relief strategies. However, it is impossible to plan for unanticipated developments such as invention of a new technology. For example, the invention and development of Aquifer Storage and Recovery technology in the City of Salisbury shows that opportunistic behaviour enables innovation by bringing together sources of knowledge, pursuit of a vision for the future and breaking through dominant practice. Although the work of the City of Salisbury on Aquifer Storage and Recovery is globally recognised, it is also challenging the legislative framework for urban water management in South Australia. Opportunistic behaviour may not necessarily lead to the 'common good'; Salisbury's endeavours to distribute stormwater to industrial and residential users and neighbouring councils are, for example, leading to concerns about public health in relation to the potability of stormwater. To overcome the limitations of strategic planning and

opportunistic behaviour and to provide all aspects of adaptive governance, opportunities for opportunistic behaviour need to be provided whilst applying strategic planning.

Create and maintain a balance that shifts between centralized steering, facilitation and data management and decentralized collaborative processes

Recently, centralization of urban water governance has in Adelaide effectively resulted in key decisions such as the development of a portfolio of water resources and a mandate for WSUD in the *Water for Good* strategy. According to several interviewees, these decisions would not have occurred without such a directive approach. This shows that a centralized governance approach can establish a breakthrough in the status quo. Also, centralization allows the Department for Water to take up the role of programme manager to create synergies between different stormwater harvesting and reuse projects, for example in terms of cost-efficiency, time, or process management, which may have been left unexploited when they would be managed by several different organizations. To achieve this, the programme manager has an important role in the central collection, validation, storage and accessibility of relevant data.

However, the stimulus of multi-million investment in stormwater harvesting and reuse infrastructure has resulted in the submission *and* approval of several proposals that are by intimates being classed as “a bit of a gamble”, because of inadequate knowledge about hydrogeology (see Table 1). This shows that multiple sources of knowledge and perspectives need to be taken into account in order to understand the complexity of urban water governance and develop appropriate and legitimate measures. According to our findings, this requires collaboration between the domains of policy, practice and research, various disciplines such as water management, spatial planning, ecology and economics, and different organizational levels. The research data show that a lack of broad understanding about WSUD technologies and their implications and lack of appropriate skills are causing resistance amongst practitioners to implement these technologies. In particular, the data show that research programs, such as *Cities as Water Supply Catchments*, and innovative projects, such as the development of the *Lochiel Park* residential estate and the *Waterproofing* projects, provide a platform for collaborative learning and collaborative decision making by which these types of concerns can be taken away.

However, research has shown that panaceas, universal solutions, to all environmental resource management problems often result in undesirable outcomes (Acheson, 2006). In this light, we argue that centralized governance approaches need to be combined with decentralized approaches to establish an adaptive governance system that has the flexibility to anticipate to change and that incorporates redundancy to reflect on established governance mechanisms and practice. The emphasis of either centralized or decentralized approaches needs to be decided upon depending on the conditions. Centralized governance approaches are typically effective for coordination of activities (Bodin et al, 2006). Therefore, they tend to be more effective for responding to crisis situations and safeguarding against tragedies of the commons. However, decentralized approaches with interaction on multiple governance levels have proven to be more effective in developing competences and skills and taking away issues of distrust, legitimacy and inequity (Davidson-Hunt, 2006). Therefore, they are more suitable in creating an understanding of the complexity of problems and developing and weighing potential solutions.

Facilitate and strengthen informal professional networks of individuals

Based on the research data, it can be concluded that the urban water governance network in Adelaide is fragmented; a disconnect was identified between different levels of government, and between water management and land use planning. Although formal network

relationships are not always strong, informal networks of individuals from different disciplines within different organisations were identified. The data show that these informal networks are often providing the starting point and a consistent driver from which understanding about problems and alternative solutions is being developed, alternatives are being advocated amongst different organizational levels, resources are being collected and momentum is being built for policy change. These networks operate on a trust basis, are building on shared interests, contain a high degree of tacit knowledge and have changing intensity of interactions. The research data show that interaction between individuals in the networks is sometimes limited to infrequent email communications to keep each other updated about experiences and new technologies or innovative processes. In other times, such networks can be mobilized very quickly to influence decision makers in different organizations. Because informal networks are not being scrutinized by bureaucratic procedures, they are more adaptive than formal institutions. Hence, they are critical to adaptive governance and need to be facilitated and strengthened where possible.

However, there are limitations to strengthening informal networks. Research has shown that individuals have limited capacity to maintain the contacts in their network whilst doing their day-to-day activities (Bodin and Crona, 2009). Furthermore, it is likely that informal networks will become constrained by interfering with them, because when they become more formalize they lose their informal character that is crucial for developing trust and sharing, sometimes sensitive, information. One way of stimulating informal networks could be through stimulating professional associations. The findings show that the informal water networks in Adelaide thankfully use associations, such as the Stormwater Industry Association, the Institute for Public Works Engineering Australia and the Water Industry Alliance, as a platform to meet, exchange perspectives and share experiences. The data show that research projects and demonstration projects are other venues from which informal networks emerged and gathered.

CONCLUSION

This paper explores how to improve the effectiveness and 'fit' of new urban water governance strategies targeted at facilitating a water sensitive city. This paper is the result of a literature study to adaptive governance of urban water systems, a desktop-study of policy documents and reports and an analysis of 31 semi-structured qualitative interviews with key decision makers and people in senior advisory roles in the urban water sector. The historical and contemporary context of urban water governance in Adelaide was mapped, existing and planned urban water governance strategies in relation to stormwater management were identified, and their outcomes were evaluated. The major insights include: 1) the value of the interplay between providing space for opportunistic behaviour while at the same developing and implementing strategic planning; 2) the importance of a balance that shifts between centralised steering and localised processes to improve the context relevance of outcomes; and, 3) governments to value, stimulate and support the necessary transaction costs of informal professional networks to ensure advocacy, learning and replication of more sustainable practices. These insights provide an important first step in operationalising the concept of adaptive governance for the urban water sector.

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