

PRACTITIONER REFLECTIONS ON LEARNING FROM DEMONSTRATION PROJECTS

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Introduction

Conventional approaches to urban water management have emphasised supply security, public health protection and flood mitigation through the development of centralised systems in support of economic and population growth (Pahl-Wostl, 2007; Brown *et al.*, 2009a). However, such approaches are being recognised as unable to respond and adapt to the complex challenges of climate change and sustainability (Marsalek *et al.* 2001; Brandes and Kriwoken, 2006; Wong, 2006). Thus, transformational change is required within the urban water sector's socio-technical system to achieve more sustainable practices.

Progress towards more sustainable practices in Australia and beyond, has been slow and fragmented (not across the total water cycle), focusing predominantly on technological aspects of change. Furthermore, government-led reform initiatives for achieving sustainable urban water management have primarily focused on structural, regulatory and efficiency mechanisms to promote change. However, recent policy statements and initiatives are beginning to reflect more sustainable urban water management objectives (i.e. 'Our Water Our Future', Victoria). For example, it is a stated objective of the Australian Government's National Water Initiative to foster 'Innovation and Capacity Building to Create Water Sensitive Cities' (COAG, 2004, Clause 92: 20). While such policy statements and programs support the need for broad scale change in the urban water sector, how this will be implemented remains unclear. For example, despite calling for 'water sensitive cities', the Australian Government has not yet defined their vision for such a city, nor have they provided a transitions pathway. To address this deficit, recent academic research proposes that a water sensitive city would be underpinned by three fundamental 'pillars of practice' (Wong *et al.*, 2008):

- (i) **Cities as Catchments:** access to a diversity of water sources underpinned by a diversity of centralised and decentralised infrastructure;
- (ii) **Cities Providing Ecosystem Services:** provision of ecosystem services for the built and natural environment; and,
- (iii) **Cities Comprising Water Sensitive Communities:** socio-political capital for sustainability and water sensitive decision making and behaviours.

Also, drawing from historical, contemporary and futurist research, Brown and colleagues (2009a) suggest water sensitive cities would also reflect sustainability principles of inter-generational equity, social capital and resilience to climate change, among others, and would be serviced by adaptive, multi-functional infrastructure (Figure 1). However, achieving such radical changes in understanding and practice requires a system-wide overhaul of social and technical approaches. Yet, systemic institutional impediments constrain such advancement, including, among others, compartmentalised management, unclear roles and responsibilities, insufficient resources, and variable organisational commitment (Brown and Farrelly, 2009; Brown *et al.*, 2009b).

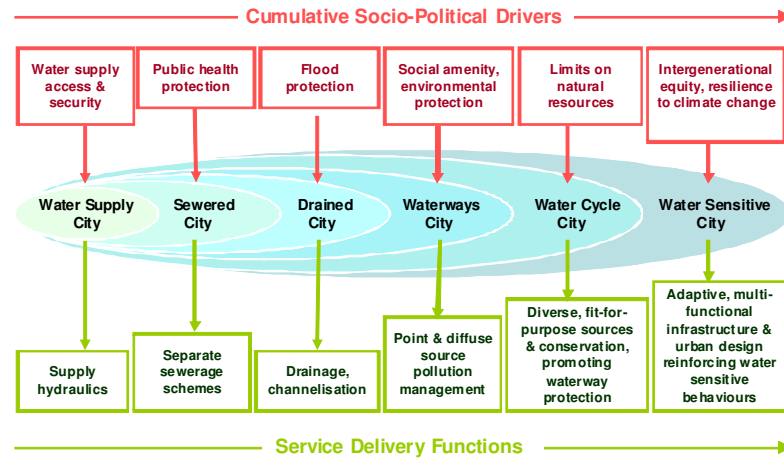


Figure 1: Urban water management transitions framework. **Source:** Brown *et al.* (2009a)

While it is possible to locate a city’s water management arrangements and practices on the continuum above (Figure 1), how we can proactively initiate and manage a transition to a future state, including a water sensitive city, is a matter of ongoing research (i.e. van de Kerkhof and Wieczorek, 2005; Brown and Clarke, 2007; Pahl-Wostl, 2007). For example, research tracing Melbourne’s transition from a ‘drained city’ to a ‘waterway city’, through the (partial) institutionalisation of water sensitive urban design, reveals several key enabling context factors that combined to facilitate Melbourne’s transition (Table 1).

Table 1: Key enabling context factors for transitioning to a ‘waterway city’

1. Socio-Political Capital <i>Aligned community, media and political concerns</i>
2. Accountability <i>Formal responsibilities across water cycle, including land use planning</i>
3. Market Receptivity <i>A well articulated Business case for change</i>
4. Bridging Organisations <i>Facilitates Science (policy); Facilitates capacity building</i>
5. Champions <i>Vision; Multi-sectoral networks</i>
6. Reliable and Trusted Science <i>Academic Leadership; technology development</i>
7. Binding Targets <i>Measureable system targets; science, policy and development</i>
8. Strategic Funding Points <i>Dedicated external funds</i>
9. Demonstration Projects & Training <i>Experimentation; technology development; policy and institutional learning</i>

Source: Brown and Clarke (2007)

Other research also points to the need for establishing and supporting explicit learning mechanisms that promote policy and management changes to cope with the uncertainty and complexity associated with natural resource management issues (van de Kerkhof and Wieczorek, 2005; Folke, 2006; Gunderson *et al.*, 2006; Keen and Mahanty, 2006; Lauber and Brown, 2006; Blackmore, 2007; Ison and Watson, 2007; Pahl-Wostl *et al.*, 2007). Similarly, Fiorino (2001:331) proposes that “nations that will be most successful at coping with environmental problems in the future will be those that are able to develop and integrate their capacities for different kinds of policy learning.” Thus, to further advance the question of

how to promote and support a transition, this paper examines the potential of demonstration projects, one of the nine enabling context factors, to support a transition by revealing practitioner perceptions about such an approach. In this context, demonstration projects are considered an explicit learning instrument for the urban water sector.

Demonstration projects act as bounded experiments, where the application/implementation of new technology, infrastructure or science/policy/programs (innovations), is trialled. In the urban water sector, such experimentation has been used as a mechanism to test and promote new technologies and policy practices at a variety of scales, in order to ‘learn-by-doing’ (Mouritz, 2000). Due to the variety and successes of projects across Australia, and the potential lessons from their experiences, industry commentators have called for further implementation and documentation of such experiments (Mouritz, 2000; Kelly, 2004; Radcliffe, 2004; Mitchell, 2006; Brown and Clarke, 2007). Despite their potential, demonstration projects typically remain isolated and are ineffective at promoting replication, due to insufficient monitoring and evaluation, poor communication, few coordinative mechanisms and insufficient information exchange (Gardiner and Hardy, 2005; Mitchell, 2006; Roberts and Brown, 2007). Therefore, the aim of this paper is to investigate whether urban water practitioners consider demonstration projects are an important and effective learning mechanism to support a transition towards sustainable urban water management practices.

Research Approach

The concept of social learning has gained prominence in natural resource management literature and has been identified as a support mechanism for transitioning (Pahl-Wostl *et al.*, 2007; Blackmore, 2007). Social learning can be conceived of in a variety of ways: a conceptual framework; an operational principle; a policy instrument or governance mechanism; and, a process of systemic change (Ison and Watson, 2007:1). For the purposes of this research, social learning will be understood as encompassing all four elements, for example, as a conceptual framework, social learning has framed the overall research approach and the research explicitly investigates whether social learning is a significant operational principle (policy instrument) for inducing systemic change. Figure 2 presents the outcome of reviewing a variety of research detailing the attributes of social and policy learning. Well-designed social learning mechanisms can help promote a shift in the sophistication of learning, from technical to conceptual learning (Figure 2). In the absence of social learning mechanisms, this shift only occurs following a crisis or persistent policy failure (Fiorino, 2001). As depicted in Figure 2, social learning mechanisms and attributes, such as learning platforms (arenas) along with leadership, networks and facilitation, all work to help facilitate a shift in the level of learning, also recognising this process is iterative. Thus, social learning is also a process of communicating and diffusing knowledge. However, social learning is not meant to imply that technical learning is insignificant; in fact technical learning remains a fundamental basis for all learning. Rather, conceptual learning helps generate change by reconceptualising fundamental policy aims and objectives, (questioning the status quo) rather than only focusing on correcting policy instruments (technical learning).

It is important to also recognise that learning processes are highly situated and contextual, influenced by the location, experiences from which they arrive, and the cultures in which they are associated (Keen and Mahanty, 2006). Similarly, Ison and Watson (2007) identify that changes in practice and understanding (learning) are influenced by contextual factors including history, stakeholding, facilitation, institutions/policies and ecological constraints.

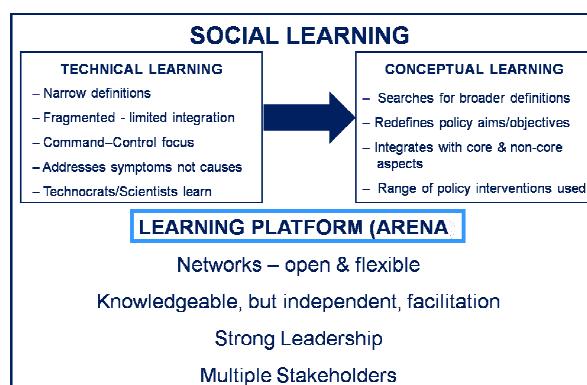


Figure 2: Concepts embedded within social and policy learning
Adapted from Glasbergen (1996); Fiorino (2001); Lauber and Brown (2006)

Drawing on the description of social learning above, the research attempts to reveal whether practitioners conceive of demonstration projects as a ‘learning platform’ to help promote transformational change. Using a qualitative, comparative, case study approach, semi-structured interviews were conducted with over 150 urban water practitioners in Brisbane (n= 43), Melbourne (n= 47) and Perth (n= 65), all of whom had a variety of experience with, or exposure to, demonstration projects. For example, interviewees included representatives from local government, state government, research organisations and the private sector, who work primarily in policy, planning, engineering, design/construction, land development and implementation. Interviewees were asked to comment on: their perceptions regarding the role of a demonstration project; the key lessons derived from their experience and/or exposure to demonstration projects; reflect on how this learning was facilitated; and finally, how in their opinion, could the sector support broader dissemination of key lessons to encourage replication of the demonstration project.

To complement the interview data, twelve in-depth case studies were also undertaken to further explore the drivers and the processes/challenges of designing, creating and implementing a demonstration project (Table 2).

Table 2: Selected case studies

Brisbane/SEQ	Melbourne	Perth
Rocks Riverside Park (natural parkland, redesign)	60L Building (commercial building, retrofit)	Kwinana Recycling Plant (industrial zone; recycling)
Payne Road, The Gap (small-scale residential)	Lynbrook Estate Development (greenfield; stormwater)	Brighton Estate “The Green” (greenfield; third-pipe)
Coomera Waters Subdivision (greenfield)	Aurora Estate Development (greenfield; multiple aspects)	Wungong Urban Water Project (total water cycle management)
Rochedale Development (greenfield)	Inkerman Oasis (D’Lux) (multi-storey, residential)	Liege Street Wetland (stormwater)

This paper represents one component of a larger social science research project and complements a broader research program aimed at facilitating the transition towards water sensitive cities (www.urbanwatergovernance.com). A companion conference paper provides further details on the specific research project and examines practitioner perceptions of why there is limited replication of demonstration projects (Farrelly *et al.*, 2009). Next, the key findings are highlighted and discussed in relation to whether or not demonstration projects can act as a social learning mechanism for supporting a transition to water sensitive cities.

Results

Overall, interviewees had a wide range of experience and exposure to demonstration projects. While the majority had direct, ‘on-ground’ experience with specific projects, others had policy/planning experience with innovative new programs/projects, while a small number only had limited exposure. Such projects ranged from the small to large scale, located in residential, industrial and parkland areas; as well as ‘non-technical’ projects, such as trial policy programs and multi-agency alliances.

Perceived Roles of Demonstration Projects

Table 3 outlines the variety of perceived roles practitioners consider demonstration projects play in the urban water sector. In all three cities, demonstration projects were identified as a method for challenging conventional practice by ‘pushing the boundaries’, not just in terms of technology, but also by challenging the standardised processes that support traditional systems (the status quo) (Table 3). Thus, while demonstration projects are considered critical for building sectoral confidence in the feasibility, performance and effectiveness of new technologies through empirical data (i.e. technical and financial), they also reveal crucial ‘invisible processes’, which relate to the enabling and/or constraining policy, rules and regulations that influence successful implementation of a new technology or practice (Table 3). Importantly, demonstration projects were also identified as providing an element of ‘tangibility’. Rather than attempting to visualise the application of a new technology remotely, visiting a site and witnessing how a new technology fits within the landscape is a potent tool in helping allay many concerns held by professionals. Furthermore, respondents identified the valuable role demonstration projects play in raising awareness about a technology or practice, not only within the sector, but also amongst the broader community. In addition, Melbourne and Perth respondents suggested demonstration projects can also act as a coordinative mechanism, fostering intra- and inter-organisational collaboration amongst multiple stakeholders.

Table 3: Practitioner perceptions of the role of demonstration projects

Key Themes^a	Melbourne	Perth	Brisbane
Pushing Boundaries	✓	✓	✓
Technical Learning	✓	✓	✓
Process Learning	✓	✓	✓
Tangibility	✓	✓	✓
Building Awareness	✓	✓	✓
Collaboration	✓	✓	
Building Confidence	✓	✓	
Institutional Leadership	✓		

^a These categories represent the majority of respondents from within each city

What and How did Practitioners Learn?

While interviewees reflected briefly on the technological and scientific outcomes of the projects they were involved in, the majority of participants quickly shifted to describing lessons they learnt regarding the *process* of undertaking demonstration projects. For example, participants highlighted the importance of communication, including valuing transparency, communicating effectively within and across organisations and disciplines, communicating the purpose and results of a project, and ensuring a common understanding amongst all stakeholders. Persistent, committed individuals (champions) were also considered necessary to maintaining project momentum. Similarly, the ongoing commitment of the organisation leading the project was considered vital to its success (Table 4).

The majority of answers were framed in the context of perceived failures or difficulties encountered in a participant’s previous experience. For example, recognising the importance of early and ongoing stakeholder engagement and collaboration in all three cities was related to prior examples, where a failure to engage all stakeholders resulted in negative implications for projects. In the case of the Inkerman Oasis project in Melbourne, failure to engage the local water utility early in the project resulted in the need for substantial changes in the physical infrastructure systems and contributed towards long delays in the project.

Table 4: Lessons practitioners derived from experience/exposure to demonstration projects

Key Themes^a	Melbourne	Perth	Brisbane
Importance of Stakeholder Engagement & Collaboration	✓	✓	✓
Importance of Communication	✓	✓	
Importance of Stakeholder/Organisational Commitment	✓	✓	
Importance of champions	✓	✓	
Importance of Monitoring & Evaluation	✓		✓
Importance of Funding & Resources		✓	✓
Asset Management Issues		✓	
Political Influence			✓

^a These categories represent the majority of respondents from within each city

A number of Melbourne and Brisbane respondents placed considerable emphasis on the importance of monitoring and evaluation as a crucial element of any experiment (Table 4). Participants highlighted that although resources are aimed towards developing and constructing demonstration projects, little value is placed on monitoring and evaluation (during and post ‘end’ of trial). Similarly, participants also indicated that while monitoring and data collection may occur, there was often little to no emphasis placed on evaluating the outcomes from such data.

When asked to reflect on *how* their learning had been facilitated, the overwhelming response was through direct experience. ‘Learning-by-doing’ was apparent not only in operational and technical contexts, but also through planning, strategy and policy development. The role of both formal and informal networks was also emphasised in all three cities; however, the responses closely reflected the respective cities’ context. For example, Perth interviewees relied largely on their personal networks of colleagues and their membership on various committees, whereas Brisbane respondents highlighted the important formal networks created by the Healthy Waterways partnerships and associated capacity building programs such as ‘Water by Design’. Melbourne respondents, on the other hand, emphasised the importance of industry and professional associations as a source of knowledge and learning, but also emphasised the important role of organised site visits as another mechanism supporting learning and understanding about new practices.

Diffusion of Knowledge

All three cities emphasised the closely related themes of effective communication and information sharing, capacity building and bridging organisations as primary mechanisms for diffusing information. However, the different contextual experiences of each city again distinguished participants’ responses. For example, in Perth participants were calling for the establishment of an effective capacity building program and bridging organisation, highlighting that the existing New WATERways program was still ‘finding its feet’. On the other hand, Melbourne and Brisbane respondents reflected on their positive experiences with Clearwater and Healthy Waterways respectively, highlighting their instrumental role in facilitating learning and information exchange and the need to build on this success.

Respondents in these two cities also suggested that, in addition to these programs, there were opportunities for other relevant organisations, such as universities, to play a role in bridging the gaps between organisations.

Table 5: Mechanisms identified by practitioners to support diffusion of learning.

Key Themes ^a	Melbourne	Perth	Brisbane
Effective communication and information sharing	✓	✓	✓
Capacity Building	✓	✓	✓
Bridging Organisations	✓	✓	✓
Traditional Forms of Learning		✓	✓
Time and space	✓		
Site visits		✓	
Engage with research			✓
^a These categories represent the majority of respondents from within each city			

Traditional mediums such as conference papers, seminars and relevant websites were also mentioned in Perth and Brisbane as important tools in the diffusion of information. Perth participants called for greater opportunities for site visits within the region, interstate and internationally. Brisbane respondents placed a particular emphasis on the need for ongoing engagement with research, reflecting the anticipation surrounding the outcomes of the Urban Water Security Research Alliance in Brisbane. Respondents in Melbourne pointed to a need for valuing learning within the workplace, where organisations are willing to provide the time and space to experiment and learn. However, this theme also emerged in Perth and Brisbane, albeit less frequently.

Discussion

Water sensitive cities will ultimately be a more complex and uncertain environment. Thus to successfully respond to this inherent uncertainty, learning processes need to be supported by the governance frameworks that shape society's responses to environmental issues (Keen and Mahanty, 2006; Pahl-Wostl *et al.* 2007). Gunderson *et al.* (2006) described the fundamental role of 'discourse arenas' is to provide opportunity for collaboration, and the generation and testing of new ideas. The research broadly reveals urban water practitioners consider the fundamental roles of demonstration projects relate to learning mechanisms and that such an approach can facilitate collaboration. For example, projects can assist in removing some of the traditional inter-organisational constraints faced by providing common, neutral ground for multiple actors to openly debate the potential of new technologies or practices. Whether the role of a project is about discovering the feasibility, function or cost of a technology, or to facilitate collaboration or push current boundaries, these attributes all reflect some form of learning. Thus, practitioners identified demonstration projects act as 'learning arenas' (Figure 2) within the urban water sector. However, the question remains, how effectively is this learning instrument used and what else is required for successful learning outcomes?

Interviews with urban water practitioners revealed they are motivated to learn about new practices and processes to support sustainable urban water management, and are taking on the direct responsibility of learning, facilitated by their experiences and/or formal and informal networks. However, without effective facilitation and support, and an appropriate organisational culture supporting learning, there is likely to be high transaction costs, potentially rendering these approaches ineffective. Even though the existence of networks would suggest social learning mechanisms are being utilised, the effectiveness of such as approaches remains limited, constrained by poor coordination and facilitation across the

sector. Clearly the sector lacks the necessary procedural support and organisational culture for enabling reflexive learning. This is further reinforced by practitioner calls for the strengthening of capacity building programs, more effective communication (within and among organisations) and the necessary time and space for learning.

Whilst demonstration projects can be conceived as ‘learning arenas’ (Figure 2) to help make the shift from technical to conceptual learning, the majority of learning remains locked-in at the technical level. For example, learning within the sector appears to occur at the on-ground innovation site (micro-scale), where scientists, technicians and government bureaucrats are learning (technical learning, Figure 2) about how objectives can be accomplished and are gathering operational data/lessons. While the act of engaging in a demonstration project that ‘challenges the status quo’ could be considered conceptual learning, the limited replication of such projects throughout the sector suggests fundamental policy aims are not being reconsidered (e.g. policy-practice disconnect); yet, this is a fundamental requirement for achieving conceptual learning. Further compounding this issue is the limited monitoring and evaluation of such projects. Without an understanding of the implications of project outcomes (positive and negative), both in the short and long term, there remain limited opportunities for promoting replication or preventing duplication (of failed experiments). Mitchell (2006) provides a similar critique following her extensive review of key demonstration projects in the urban water sector. Ultimately, while technical learning is a critical component of the policy learning process, it is an insufficient base for policy-making which requires the explicit reconsideration of current policy aims and objectives (Fiorino, 2002; Lauber and Brown, 2006).

Communication between the on-ground innovations (micro-level) and the various organisational networks involved in policy decision-making (macro-level) has occurred in an ad hoc manner, for example, on-ground innovations may be funded by the macro-level, yet such projects are not afforded the necessary resources (human and financial) to promote (diffuse) the new knowledge or follow-up on experiences. This limits the ability of new knowledge to effectively influence the broader institutional context. While the short-comings of current policies and governance issues in relation to demonstration projects have long been evident (see, for example, Mitchell, 2006; Gardiner and Hardy, 2005), the flexibility and availability of appropriate mechanisms to translate such lessons into behavioural and structural changes across the regime (macro-level) remain largely absent (Fiorino, 2001). Hence, although government bodies recognise demonstration projects operate as a ‘learning arena’, they are yet to value, prioritise or invest in learning as a *process* by which information not only needs to be gathered, but also communicated/disseminated and assimilated with current knowledge, to provide opportunities for reflection about the current context and how this new knowledge can be (re)applied in new ways.

It should be noted, there are currently support mechanisms for promoting demonstration projects in Australia. For example, there are a number of government-led initiatives which provide base funding support for the design and implementation of demonstration projects (i.e. Smart Water Fund, Victoria) and many projects could not have been implemented without some form of government/regime support. There are also examples of the private sector initiating such projects (i.e. 60L Building). However, while dedicated funding for these endeavours is important, it is also critical that funds are directed towards complementary and reinforcing strategic capacity building and training programs, to support widespread diffusion of new knowledge. As Brown and Clarke (2007) have suggested, the success of the Lynbrook Estate stormwater treatment train demonstration was largely due to

the knowledge diffusion campaign led by industry champions further facilitated by the capacity building program Clearwater. The authors also indicated that demonstration projects alone are not sufficient for transitioning; other key variables are necessary including the important role of committed industry leaders/champions.

Social learning as a policy framework, a policy instrument (learning arenas), and an operational principle (supporting dedicated learning programs), collectively could contribute towards building the appropriate momentum for achieving conceptual change, thus introducing new technologies and practices to reinforce sustainable urban water management practices. However, efforts need to be directed towards building an appropriate culture within and across organisations where learning is provided the appropriate time and space (value), further facilitating reflexivity and adaptability required of practitioners operating in water sensitive cities.

Concluding remarks

To achieve water sensitive cities, the Australian urban water sector must provide explicit support for and encourage the ability of practitioners to learn. This research paper has discussed Australian urban water practitioners' reflections on the role and capacity of demonstration projects to act as a learning instrument to assist in transitioning towards water sensitive cities. Overall, the research suggests that practitioners support demonstration projects as a 'learning arena', but there remains a critical need to introduce appropriate social learning mechanisms to influence policy re/formulation; however, this introduces a dilemma. There are a number of existing mechanisms that promote learning within the urban water sector, however, such approaches traditionally focus on and occur within disciplinary areas and organisational silos. Yet, what is required is the creation of a socio-technical space for interdisciplinary learning; carefully constructed and well-crafted demonstration projects (experiments), if appropriately facilitated, can act as a key platform to provide learning opportunities. Present government funding initiatives support the creation of demonstration projects in Australia, yet there appears to be insufficient attention directed towards developing the appropriate procedural frameworks to effectively leverage the lessons from such projects to help advance towards more sustainable urban water management practices. This is further confounded by the urban water sector's current conservative, risk averse culture (see Farrelly *et al.*, 2009), resulting in the perception that the sector lacks an institutional culture supportive of reflexive learning. However, there appears to be an existing capacity within the sector to engage in social learning, as demonstrated by the use of formal and informal networks, support for capacity building programs and interest in bridging organisations. These opportunities may provide an indication of the necessary leverage points to facilitate broader learning opportunities in the Australian urban water sector.

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