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Research paper

A strategic program for transitioning to a Water Sensitive City

Briony C. Ferguson[a,*], Niki Frantzeskaki[b], Rebekah R. Brown[a]

[a] Monash Water for Liveability, Cooperative Research Centre for Water Sensitive Cities, School of Geography and Environmental Science, Monash University, Building 11, Wellington Road, Clayton, Victoria 3800, Australia
[b] DRIFT – Dutch Research Institute For Transitions, Erasmus University Rotterdam, Netherlands

HIGHLIGHTS

- Long-term planning for transitions in urban water systems presents many challenges.
- Literature on strategic management offers insights for addressing these challenges.
- Normative scenarios for transitioning to a water sensitive city also give insights.
- These inform a scope, logic & design base of an operational strategic program.
- Application of program to local contexts gives guidance for enabling transitions.

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ABSTRACT

In the context of climate change, resource limitations and other drivers, there is growing international acceptance that conventional technocratic approaches to planning urban water systems are inadequate to deliver the services society requires. Instead, scholars and practitioners are calling for a shift to an adaptive approach that increases a system's sustainability and resilience. This shift is significant, requiring transitions in the way urban water systems are planned, designed and managed. However, there is limited understanding of how strategic initiatives can be deliberately managed and coordinated to reform mainstream policy and practice. This paper aims to develop a strategic program for this purpose. It draws on strategy literature to develop a scope and logic for a general program that can address challenges for long-term urban infrastructure management related to path-dependencies, the direction of transformative change, system complexity and future uncertainty. The content of a normative transition scenario, developed in participatory workshops by water practitioners in Melbourne, is then presented, focusing on the transition to a "water sensitive city". The scenario comprises a problem definition, vision and strategies, which provide lessons for contextualizing the strategic program for the specific purpose of enabling transformative change in urban water systems. These lessons are synthesized in strategy goals and planning processes that form the design base of a strategic program. With tailoring for local contexts, the strategic program can provide operational guidance for planners, designers and decision-makers in strategically planning and managing initiatives to facilitate sustainability transitions in urban water systems.

1. Introduction

Urban water systems exist to meet a broad range of societal needs. The most obvious and long-standing are for water resources, sanitation and flood protection, which are typically served by centralized water supply, sewerage and drainage infrastructure. Strategic management of these infrastructure types is traditionally characterized by an engineering 'command-and-control' approach, which aims to reduce uncertainties through emphasizing technical solutions, ignores radical alternatives and bases decisions on rational cost-benefit assessments that consider a narrow set of values (e.g. Dominguez, Truffer, & Gujer, 2011; Pahl-Wostl, 2007; Truffer, Störmer, Maurer, & Ruef, 2010). Strategic planning from this perspective adopts a paradigm of linear change, in which key variables such as rainfall patterns, resource availability and community values are assumed to be predictable (Brown, 2008; Dominguez, Worch, Markard, Truffer, & Gujer, 2009; Pahl-Wostl, 2007).

Until recently, this engineering approach served the urban water needs of society relatively well. However, tensions are now experienced in cities globally, as socio-political drivers and broader

* Corresponding author. Tel.: +61 3 9905 2581; fax: +61 3 9905 2948.
E-mail addresses: briony.ferguson@monash.edu (B.C. Ferguson), frantzeskaki@fsw.eur.nl (N. Frantzeskaki), rebekah.brown@monash.edu (R.R. Brown).

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contextual factors, such as climate change, resource limitations and the prioritization of urban amenity and ecological health, challenge the ability for traditional systems to deliver adequate levels of water service. These challenges arise as urban water systems are becoming recognized as social-ecological systems that encompass complex dynamic processes of change, high levels of uncertainty and a limited ability to control variables. Attempting to steer a complex system with control measures, as well as apply linear solutions to its problems, will be ineffective in securing the delivery of desired outcomes (Brown, 2008).

To summarize, complexity, variability and uncertainty will characterize urban water futures and conventional water planning is inadequate to deliver solutions that will cope with this context (van der Brugge & Rotmans, 2007; Wong & Brown, 2009). There is now growing international acceptance that strategic planning of urban systems needs to increase the resilience of infrastructure, ecosystems, community and the economy by adopting an adaptive paradigm that embraces uncertainty and complexity and provides adaptive capacity through flexibility, diversity and redundancy in its solutions (Ahern, 2011; Brown, 2012; Dominguez et al., 2009; Lessard, 1998; Wollenberg, Edmunds, & Buck, 2000).

The "water sensitive city" is a conceptual representation of this alternative paradigm for urban water systems, building on sustainable urban water planning and management practices and prioritizing liveability, sustainability and resilience in the design of its institutions and infrastructure. Wong and Brown (2009) describe three pillars of a water sensitive city: cities as water supply catchments, cities providing ecosystem services and cities comprising water sensitive communities. Compared with conventional approaches, its innovative aspirations include: (a) harmony between water planning and urban planning; (b) adaptive and multi-functional infrastructure; and (c) productive and ongoing collaborations between science, policy, practice and community (Brown, Keath, & Wong, 2009; Wong & Brown, 2009). There is not yet an example of a water sensitive city in the world, nor is there an accepted set of attributes and indicators for defining one. However, the concept is starting to be adopted broadly, with growing international interest by communities, governments, planning sectors, water sectors and academia (e.g. Brown, 2012; COAG, 2004; Cooperative Research Centre for Water Sensitive Cities, n.d.; Howe & Mitchell, 2012; ICLEI, 2012; Ison, Collins, Bos, & Iaquinto, 2009; Jefferies & Duffy, 2011; Victorian Government, n.d.).

The shift from an engineering approach to a water sensitive approach is significant, requiring transformative change in how urban water systems are planned, designed, built and managed. However, there is limited academic and practical understanding of how strategic planning and management can be purposefully undertaken to facilitate the long-term transition required (Dominguez et al., 2011; Ferguson, Brown, & Deletic, 2013; Monstadt, 2009).

To address this critical gap, this paper aims to develop a strategic program for coordinating action to enable a conventional water system's transition to a water sensitive city. First, the paper draws on conceptual insights from literature on strategic planning, strategic management, transition management and adaptive management to develop a scope and logic for such a program. Second, the paper presents a normative transition scenario (comprising a problem definition, vision and strategies) developed for Melbourne's water system. The scenario was produced with the tacit and co-developed knowledge of water practitioners elicited during workshops based on the transition arena methodology used in transition management (Frantzeskaki, Loorbach, & Meadowcroft, 2012; Loorbach & Rotmans, 2010; Nevens et al., 2013). Third, the content of the transition scenario is analyzed to identify lessons for informing the design base of a strategic program that has the specific purpose of enabling transformative change in urban water systems.

2. Developing a program scope and logic

Scholarship addressing urban infrastructure management identifies system characteristics that present key challenges requiring attention in long-term planning. These challenges pose four questions that frame the scope of a strategic program for enabling transformative change. (1) Large urban infrastructure systems are typically locked into existing practices through institutional inertia and persistent socio-technical regimes (Berkhout, 2002; Dominguez et al., 2009; Smith, Stirling, & Berkhout, 2005; Störmer et al., 2009): *How can socio-technical path dependencies be overcome through strategic planning and management?* (2) Long-term planning and short-term decision-making for urban infrastructure systems are influenced by normative goals and policy agendas of actors with diverse interests, responsibilities and perspectives (Albrechts, Healey, & Kunzmann, 2003; Albrechts, 2004; Störmer et al., 2009; Voβ, Smith, & Grin, 2009): *How can strategic planning and management guide the direction of transformative change in a 'desirable' direction?* (3) Urban infrastructure systems are inherently complex, comprising multiple objectives and interlinked technological, ecological, spatial, social, institutional, economic and political dimensions (Dominguez et al., 2009; Monstadt, 2009): *How can strategic planning and management accommodate system complexity?* (4) Planning and decision-making for long-term transformative change brings a high degree of uncertainty in the context conditions faced by urban infrastructure systems (Albrechts, 2004; Dominguez et al., 2011; Störmer et al., 2009; Voβ et al., 2009): *How can strategic planning and management cope with uncertainty?*

Literature on transition management and adaptive management offer insight into the types of strategic initiatives that can respond to this scope. For example, *visioning* (e.g. Loorbach & Rotmans, 2010; Voβ et al., 2009), *experimentation* (e.g. Farrelly & Brown, 2011; Huitema et al., 2009); *innovation* (e.g. Westley et al., 2011); *social learning* (e.g. Bos, Brown, & Farrelly, 2013; Pahl-Wostl et al., 2007); *shadow networks* (e.g. Olsson et al., 2006); *leadership* (e.g. Huitema & Meijerink, 2010; Olsson et al., 2006); and *bridging organizations* (e.g. Berkes, 2009; Folke, Hahn, Olsson, & Norberg, 2005).

Accordingly, a vast range of strategy goals and planning processes needs to be incorporated into a strategic program for enabling transformative change. Transition management is a metagovernance approach for coordinating these types of initiatives. It uses a range of instruments and methods to bring frontrunners together to compete with dominant actors and practices during the early phase of a transition, when the aim is to stimulate new innovations. However, there is a lack of theory or empirical evidence for developing operational programs to influence later phases of a transition by engaging with regime actors and their practices within mainstream strategic management of urban infrastructure systems (Loorbach & Rotmans, 2010).

Literature on strategic planning and management is therefore drawn upon to develop the logic of a strategic program that can (a) meet the scope of four questions developed above and, (b) accommodate the diversity of organizational actors that have different degrees of power, influence and responsibility in the mainstream management of an urban infrastructure system. This logic would need to make the interactions and dependencies of strategic initiatives explicit so that coordinated and aligned action across multiple organizations deliver on shared objectives.

Scholarship on strategic planning for corporate and public organizations offers valuable insights (Albrechts, 2004; Bryson, 1988), notwithstanding key differences in planning for single