

Transition-Oriented Governance Processes for Enabling Sustainable Urban Water Management

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Notice 1

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Abstract

Cities continue to face increasing pressure on their water systems due to numerous global changes, escalating costs and various other risks and challenges. Recognising that the traditional approaches are no longer sustainable, scholars have asserted that fundamental change in managing urban water is required.

Sustainable urban water management is an ideological approach that strives to revolutionise the traditional processes of managing urban water. While the ideology is increasingly advocated, there are numerous barriers, primarily socio-institutional in nature, which prevent its implementation. There is growing scholarship highlighting that social learning, which builds relational capacity and configures decision-making, is very important in overcoming current barriers. Innovation in governance is viewed as a potentially important instrument for stimulating social learning. However, scholars have not yet fully grasped the effectiveness and dynamics of such innovation.

Employing a single-embedded case study, this thesis investigates a governance experiment aimed at advancing sustainable urban water management in the Cooks River catchment in Sydney, Australia. The experiment was a deliberate alternative to technocratic experimentation, and eight municipalities and a university were united for its execution. The research examines the experiment's emergence, effectiveness, design and implementation. A mixed-methods research approach explores these different perspectives and illuminates the relationship between design and learning outcomes.

Overall, the results revealed that governance experimentation has the ability to transform conventional socio-technical configurations. Outcomes of the experiment included changes in individual and collective understanding as well as changes in the biophysical system. The study demonstrated that the experiment facilitated the development of concurrent and embedded social learning situations, which together created an emergent network. The findings indicate that learning was highly dependent on the architecture of the experiment. The experiment facilitated formal and informal interaction among diverse actors at horizontal and vertical levels within, across and beyond organisations. This interaction was created through a range of interconnected interventions that were linked to a wider learning agenda and open to a large variety of actors.

In studying the emergence of the experiment, it was found that it had derived from an earlier, smaller initiative. In turn, the governance experiment itself instigated a new, larger innovative policy process in the catchment. The results displayed a pattern where these phases of governance experimentation successively contributed to system

change. This pattern showed that in an unsympathetic, conventional technical system and increasing scale of experimentation was necessary to gradually build up socio and/or political capital. This capital was pre-requisite to the next phase of experimentation and strategically capitalised by the key-actors.

Through an evolving process whereby theoretical ideas obtained from literature interacted with empirical insights from data, this PhD research characterised governance experimentation and developed a framework that outlines enabling starting conditions and features for designing and organising social learning situations. Furthermore, an assessment procedure for studying the dynamics of organisations engaged in governance experimentation was developed.

The findings of this research, which highlight the potential, design and dynamics of governance experimentation, provide theoretical insights and practical strategies for operationalising policy and governance reform agendas that embrace learning situations.

General Declaration

In accordance with Monash University Doctorate Regulation 17/ Doctor of Philosophy and Master of Philosophy (MPhil) regulations the following declarations are made:

I hereby declare that this thesis contains no material which has been accepted for the award of any other degree or diploma at any university or equivalent institution and that, to the best of my knowledge and belief, this thesis contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

This thesis includes two original publications published in peer reviewed journals, two accepted publications that are in press and one submitted, unpublished publication. The core theme of the thesis is sustainable urban water governance. The ideas, development and writing up of all the papers in the thesis were the principal responsibility of myself, the candidate, working within the School of Geography and Environmental Science under the supervision of Professor Rebekah Brown, Dr Megan Farrelly and Professor Tony Wong.

The inclusion of co-authors reflects the fact that the work came from active collaboration between researchers and acknowledges input into team-based research.

In the case of Chapters 2, 3, 4, 5 and 6 my contribution to the work involved the following:

Thesis chapter	Publication title	Publication status	Nature and extent of candidate's contribution
2	Realising sustainable urban water management: Can social theory help?	Published	Formulation of research problem and the context of the research in the wider literature; interpretation of literature and writing.
3	Enabling sustainable urban water management through governance experimentation.	In press	Formulation of research problem and the context of the research in the wider literature; data collection; data analysis, interpretation of results and writing.
4	Assessing organisational capacity for transition policy programs.	Submitted	Formulation of research problem and the context of the research in the wider literature; development of assessment framework; data collection; data analysis, interpretation of results and writing.

Thesis chapter	Publication title	Publication status	Nature and extent of candidate's contribution
5	A design framework for creating social learning situations.	In press	Formulation of research problem and the context of the research in the wider literature; data collection; data analysis, interpretation of results and writing.
6	Governance experimentation and factors of success in socio-technical transitions in the urban water sector	Published	Formulation of research problem and the context of the research in the wider literature; data collection; data analysis, interpretation of results and writing.

I have renumbered sections of submitted or published papers in order to generate a consistent presentation within the thesis.

Signed:

Date:

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List of Thesis Publications

Journals¹

Bos, J.J. and Brown, R.R., 2012. Governance experimentation and factors of success in socio-technical transitions in the urban water sector. *Technological Forecasting and Social Change*, 79 (7), 1340–1353.

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Bos, J.J., Brown, R.R., Farrelly, M.A., and De Haan, F.J., 2012. Governance experimentation: A descriptive analysis of translating sustainable urban water management in practice. In: Proceedings of the 7th International Conference on Water Sensitive Urban Design, 21 - 23 February 2012, Melbourne, Australia

Bos, J.J. and Brown, R.R., 2012. Reflections on research into the OurRiver-Cooks River Sustainability Initiative. In: Proceedings of the 2nd National Stormwater Conference, 15-19 October 2012, Melbourne, Australia

¹ All journal papers are included in this thesis (Chapter 2 – 6).

Chapter 1

Introduction

1.1 Research problem

Across the world, managing urban water is an increasing topic of concern. Growing urban populations, significant climate change and climate variability cause uncertainty in urban water supply and are associated with major system disturbances such as floods, droughts and deterioration of waterway health (Bates *et al.* 2008, Pahl-Wostl *et al.* 2011). At the same time, many developed nations are confronted with renewal of their water infrastructure, as existing infrastructure has come to the end of its life cycle (Vlachos and Braga 2001, Palaniappan *et al.* 2007). In addition, social values underlying urban water have expanded and now include ecosystem protection and improved social amenity (Pahl-Wostl 2008, Brown *et al.* 2009). Furthermore, traditional approaches for managing urban water rely on large, centralised infrastructure to shift potable water, wastewater and stormwater; within this compartmentalised system is little consideration of water and energy efficiency (Mouritz 1996, Daigger 2012).

While existing urban water systems have been reasonably successful in securing water supply, public health and flood protection, they appear to be less successful in responding to emerging uncertain and complex challenges (Maksimovic and Tejada-Guibert 2001, Rauch *et al.* 2005, Van der Brugge and Rotmans 2007, Wong and Brown 2009). Recognising that the traditional approaches are no longer sustainable and fulfilling changing societal needs, scholars have asserted that fundamental change in managing urban water is required (Mouritz 1996, Niemczynowicz 1999, Ashley *et al.* 2004, Brown *et al.* 2006, Harding 2006, Mitchell 2006, Speers 2007). Against this background, a new ideological approach has emerged that embraces the total water cycle and addresses the notion of sustainability within an urban water context.

Sustainable urban water management (SUWM) aims at protecting and conserving water resources and encourages ways of living which neither depletes resources nor degrades environmental quality (Wong and Eadie 2000). Therefore, SUWM attends to all facets of the total water cycle (water supply, wastewater and stormwater) with the objective that importing drinking water into cities and the discharge of wastewater and stormwater to urban waterways is minimised. Furthermore, the paradigm reflects the values of conservation (through fit-for-purpose usage), ecology, equity and resilience (Novotny 2009, Wong and Brown 2009, Pahl-Wostl *et al.* 2011). Hence, it considers the local context and flexible, inclusive and collaborative approaches for developing new practices. SUWM strives to develop access to a range of water sources through a diversity of centralized and decentralized infrastructures (Wong and Brown 2009).

Through flexibility and diversity in its approaches and solutions, SUWM is considered to provide adaptive capacity to deal with the uncertainties and complexities that are associated with contemporary and future urban water management practices (Vlachos and Braga 2001, Pahl-Wostl 2007, Aerts *et al.* 2008).

The ideology of SUWM is similar to Integrated Urban Water Management (IUWM) (Cowie and Borrett 2005) and Water Sensitive Urban Design (WSUD) (Lloyd *et al.* 2002, Wong 2006a). These ideologies all signify urban waters as the lifeline of cities and are at the centre of the movement towards more sustainable "green" cities (Brown *et al.* 2009, Novotny 2009).

The principles and practices surrounding SUWM have been advocated in Australia since the 1990s (Mouritz 1996, Newman and Kenworthy 1999, Wong 2001). Technical publications, design tools, industry-focused research, conferences, capacity building organisations and several policy instruments have emerged in support of SUWM elements (Mitchell 2006, Wong 2006a, Brown and Clarke 2007). At the same time, numerous innovative applications and demonstration projects have been implemented that trial a range of technologies (Mitchell 2006, Farrelly and Brown 2011). Various reviews indicate that although many lessons have been learned both in Australia and beyond, these technical experiments remain isolated and do not seem to be replicated (Harremoës 2002, Farrelly and Brown 2011). Commentators generally agree that the progress towards SUWM is too slow and that there is a long way to go before SUWM can be considered mainstream practice (Maksimovic and Tejada-Guibert 2001, Marsalek *et al.* 2001, Gardiner and Hardy 2005, Harding 2006, Farrelly and Brown 2011).

Translating the SUWM ideology in practice is hindered by numerous barriers. Although technical problems, cost and time-consuming project implementation have been identified as barriers, most impediments towards the adoption of SUWM are considered socio-institutional in nature (Blomquist *et al.* 2004, Brown *et al.* 2006, Mitchell 2006, Wong 2006b, Brown and Farrelly 2009, Ashley *et al.* 2010, Truffer *et al.* 2010). These impediments include: lack of long-term agreed visions, lack of political and public will, technical path-dependencies, uncoordinated and fragmented institutional frameworks, poor inter- and intra-organisational collaboration, institutional, professional and community capacity deficiencies, and limited community and other societal stakeholder engagement. These barriers are exacerbated by the fact that SUWM is being pursued in an environment that is traditionally dominated by "a technical engineering elite" that disregards involvement of external stakeholders (Brown 2005, p. 462). Furthermore, this traditional environment is characterised by the historic division between infrastructure and management (Farrelly and Brown 2011), preference for linear, scientific, risk-avoiding solutions (Ingram and

Schneider 1990, Giddens 1999), and the importance of economic efficiency, justified through outputs and measurement (Curtin 1999, Elzen and Wieczorek 2005).

To manage urban water in a more sustainable manner, both technical and non-technical changes are required (Mitchell 2005, Chocat *et al.* 2007, Pahl-Wostl 2007, Brown and Farrelly 2009). However, as indicated above, the existing structure, culture and rules to guide urban water practices are based on the stable, traditional, technocratic view of the urban water management problem (Brown 2005). This suggests that the current governance arrangements that underpin urban water management are not adequately equipped to facilitate change for managing urban water in a more sustainable manner. It is within this context that scholars argue for change in processes that shape the behaviour and decision-making of societal actors (Blomquist *et al.* 2004, Pahl-Wostl *et al.* 2008, Truffer *et al.* 2008, Loorbach 2010, Tortajada 2010).

1.2 Research focus

The attainment of the SUWM ideology is hampered by an incongruity between SUWM aspirations, existing technical infrastructure, institutional inertia and underpinning administrative and decision-making processes. The extent to which the SUWM ideology will be translated in practice, and have thus overcome these disparities, depends on the capacity of different societal actors to communicate, negotiate and reach collective decisions (Pahl-Wostl 2002). Building of such 'relational capacity' (Healey 1997, Pahl-Wostl *et al.* 2008) requires learning by which actors develop "new understanding of the kinds of role, relationship, practice and sense of purpose" necessary for managing water in a more sustainable manner (Collins and Ison 2009a, p. 354). Therefore, to enable socio-technical system change as desired in the urban water sector necessitates *innovation in governance* that allows the development of new understandings and building of new relational capacities (Healey 1997, Pahl-Wostl *et al.* 2008, Collins and Ison 2009a, Loorbach 2010).

While the need for social learning through experimentation is widely recognised for overcoming system lock-in and the restructuring of societal systems (Olsson *et al.* 2004, Folke *et al.* 2005, Geels 2006, Pahl-Wostl, Craps, *et al.* 2007, Van der Brugge and Rotmans 2007, Loorbach 2010), there has been little systematic investigation of experimental governance approaches in the water or wider natural resource sector (Garmendia and Stagl 2010, Rodela 2011, von Korff *et al.* 2012). Instead, the majority of literature examines innovation in technology in which learning "does not seem to go beyond developing technical expertise and practitioners' confidence in alternative technologies" (Farrelly and Brown 2011, p. 9). Commentators, however, argue that there is a knowledge gap pertaining to experimentation that challenges existing values,

principles and assumptions of societal actors (Van den Bosch and Taanman 2006, De Bruijne *et al.* 2010).

Innovative governance approaches are increasingly becoming popular policy instruments as there is growing recognition that sustainability problems cannot be solved by traditional means nor policy approaches that rely predominantly on technical solutions and market forces (Woodhill 2003, Dieleman 2007, Loorbach 2010, Shove 2010). Over recent years, a variety of concepts, models and theories have been developed that explain innovation in governance to increase the sustainability performance of societal systems, for instance collaborative governance (Healey 1997); network management (Klijn and Koppenjan 2000); sustainability transitions (Elzen *et al.* 2004, Loorbach 2010), and social learning (Keen *et al.* 2005, Ison and Watson 2007). Within these literatures, high expectations are placed on the potential of experimental governance approaches as a starting point for socio-technical system change.

However, despite the potential of alternative governance approaches to give meaning to sustainability ideas, the extent and type of actual influence of these approaches is unknown as results and outcomes have often not been empirically substantiated (Von Korff *et al.* 2012). In addition, published articles measuring results and learning outcomes that have derived from experimental governance approaches seldom set out to evaluate learning variables (Rodela *et al.* 2012). Furthermore, the relationship between outcomes and processes is underexplored, as very limited research methodically establishes the mechanisms, interventions or techniques that actually lead to outcomes (Muro and Jeffrey 2012, Rodela *et al.* 2012). Specific understanding of such mechanisms and techniques is important for understanding how innovative governance approaches could be best set up to contribute to socio-technical transitions. Ison and Watson (2007) provide some principles for doing so, however pragmatic literature on how to conduct and organise experiments that seek to change the behaviour of individuals in a socio-technical system is largely absent (Elzen and Wiczorek 2005, De Bruijne *et al.* 2010).

Overall, very little is understood about real-life experimental governance approaches (Huitema *et al.* 2009). Some studies that consider real-life experimentation for societal change have recently been undertaken (Van den Bosch 2010, Vreugdenhil 2010), however, neither of these investigations specifically focus on innovation in governance nor on how social learning can be generated. Furthermore, literature falls short in explicitly describing the dynamics by which governance experimentation unfolds and becomes a desired ongoing policy initiative in itself. In view of the above, understanding the influence of innovative governance approaches and factors that

contribute to the emergence and effectiveness of such approaches was the focus of this research.

Within this thesis, approaches that innovate with governance in order to transition to a sustainable future are referred to as governance experimentation. Despite the emphasis literature has placed on the value of governance experimentation, there is no specific definition of exactly what it is and what it entails. As a starting point for this thesis, the concept of governance experimentation denotes *processes and approaches that stimulate interaction, reflexivity and communication between a multitude of societal actors to enable social learning and reconfigure decision-making*.

1.3 Research design and methods

1.3.1 Aims and objectives

Based on the knowledge gaps identified, the overall aim of this research was to deepen and increase (empirical) understanding of transition-oriented governance approaches to enable transitions to more sustainable forms of urban water management. The underlying ambitions of this aim were: (i) to critically inform the urban water sector on how experimental governance processes could be used as instruments to further sustainable urban water management; and ii) to contribute to the practical applicability of theories developed in the field of sustainable transitions, focusing on transition management.

In order to achieve the aim, the following research objectives were established:

1. To identify the key features that characterise a governance experiment.
2. To examine if and how governance experimentation advances sustainable urban water management practices.
3. To identify mechanisms that strengthen the theory and practice of governance experimentation.
4. To map the emergence and translation of governance experimentation into an institutionalised process.

1.3.2 Research context

The research was conducted through an in-depth case study analysis of the first urban catchment governance experiment in Australia aimed at the sustainable management of urban water in the Cooks River catchment in Sydney. This governance experiment, which was named the OurRiver - Cooks River Sustainability Initiative (CRSI), employed a new model for administering regional-scale water planning and

management. CRSI had an agenda to innovate in governance to improve river health, conserve water resources and improve the sustainability performance of catchment stakeholders, in particular of municipalities and communities. The underlying rationale was that irrespective of the efforts of community groups and other stakeholders, increasing urban consolidation threatened to accelerate negative impacts on the already highly degraded Cooks River. The Initiative was created in an urban water environment affected by issues such as prolonged droughts, severe water shortages, occasional floods, degraded waterways and aging infrastructure (Brown 2005). CRSI was established on the recognition that previous planning processes compounded by complexities such as catchment size, population dynamics and conventional engineering principles had failed to adequately address the catchment and stormwater management issues for the river (Brown 2003).

The design of the CRSI was based on Marrickville City Council's award winning Urban Stormwater Integrated Management (USWIM) project, which in partnership with Monash University, developed and trialled a planning process that allowed consideration of all facets of a complex system such as the Cooks River. The Initiative was a partnership between eight municipalities and Monash University and ran between 2007 and 2011. CRSI received a grant of over two million dollars from the New South Wales State Government to realise its agenda. The initiative was politically endorsed and was signed off collectively by the mayors from the eight municipalities involved. No pre-defined outcomes of the governance experiment were formulated.

1.3.3 Research philosophy, strategy and position

This social research has adopted a pragmatic stance as its philosophical approach. Pragmatism is focused on addressing practical problems, such as those found in the urban water sector, in the 'real world'. It bypasses the debates between (post) positivism and constructivism and recognises that there are a variety of realities that are open to empirical investigations (Creswell and Plano Clark 2007, Morgan 2007, Feilzer 2010). Pragmatism enables the researcher to be open to a variety of research methods as it allows consideration of the methodological choices best suited to the purpose and nature of the research (Creswell 2009), instead of the methodological choices aligned with a certain paradigm (Johnson and Onwuegbuzie 2004).

The research strategy associated with the pragmatic paradigm is abduction (Morgan 2007). Through the process of inference, the abductive strategy develops theory that is grounded in emergent meanings of actors and enhanced by existing theoretical concepts (Blaikie 2007). The results obtained from employing an abductive strategy are considered to provide in-depth explanation of the phenomena under research (change in urban water management) and produce relevant results as they have been

developed from the 'bottom-up' (Glaser and Strauss 1967). Overall, results derived from research with a pragmatic stance are regarded as potentially 'transferable' (Morgan 2007, p.72), where some results may be bound by context, while others may be more generalised. This requires investigation of factors that enable or constrain transferability.

The principal position of the researcher within this research was the 'researcher as observer'; the secondary position of the researcher was the 'researcher as enabler' (Ison and Watson 2007, p.10 -11). These authors describe these positions as follows:

- *Observer* - The researcher observes a complex environmental management situation with an interest in understanding the factors at play.
- *Enabler* - The researcher enables the environmental policy-making process with an interest in identifying and helping to create conditions conducive to learning.

In the principal position, the researcher observed to reflect and understand the situation; this happened either through direct observations, questioning actors, and analysing of project documentation. In the secondary position, the researcher facilitated through the use of tools, skills and data, and the learning of others. The latter role primarily involved the co-facilitation of some project meetings.

1.3.4 The case study approach

A single-embedded case study approach (Yin 2009) was utilised to investigate a governance experiment and to determine its effectiveness in creating change for enabling sustainable urban water practice in the Cooks River catchment.

The case study approach was selected as an overall method as it enabled the researcher to examine a contemporary phenomenon (change in the urban water sector) within its real-life situation of the governance experiment. Case studies are especially relevant in situations where boundaries between phenomenon and context (practice of urban water management) are unclear (Yin 2009). The case study approach allows rich descriptions and multiple sources of empirical evidence from actors in their natural working environment (Myers 2008).

In particular, the *single-embedded* case study approach was selected as there are several units of analysis that are 'embedded' in the overall context (this will be discussed in more detail in Section 1.3). Single-embedded case studies have been criticised for their lack of general application as the data collected are particular to a specific situation at a certain time. However, single-embedded case studies are increasingly seen as generalisable to theoretical propositions (Scholz and Tietje 2002, Flyvbjerg 2006,

Silverman 2006, Yin 2009). Yin (2009) asserts that a single-embedded case study is appropriate when the investigated case is revelatory. The rationale for selecting CRSI as a single-embedded case study was found in that CRSI is a unique case. The rationale for this single case could not be satisfied by an analysis of multiple cases as this was the first and only case of this nature in Australia. Scholz and Tietje (2002) describe this form of case study as a groundbreaking case, as the governance experiment under research was a totally new approach towards urban water management and no knowledge was available that had been obtained by the means of a structured research approach. The motivation for investigating this single-embedded case study was both intrinsic and instrumental (Stake 2000). It was intrinsic in the sense that the governance experiment under study offered an exclusive insight into an innovative transition-oriented governance process. The case study was instrumental as the data on how this governance process helped the transition process was used to further develop theory.

Single-embedded case studies have also been critiqued for a lack of rigor connected with conducting this approach. This particular concern relates to the unit of analysis (Stake 1995, Yin 2009). As indicated above, an embedded case study embeds sub-units within one overall case. The problem is that a researcher could focus on either the sub-unit, without consideration of the overall case, or the other way around (Yin 2009). This researcher took great care in being systematic in collection and analysis of data and in the writing of the publications, to ensure this potential weakness was addressed. An explanation to guide the reader in the units being analysed in this research has been provided in the next section.

1.3.5 Research design

To deepen and increase understanding of transition-oriented governance approaches to enable transitions to SUWM, the research considered the emergence, design and implementation of CRSI and an overview is presented in Figure 1.1. The research involved eight local government organisations that were part of implementing this governance experiment. These organisations were, together with other catchment stakeholders, involved in the development of six sub-catchment water management plans.

Research into engagement of local government organisations in environmental initiatives has highlighted the importance of both qualitative and quantitative data for in depth understanding of such events (Pini 2009, Morison and Brown 2011). Multiple sources of evidence help to develop converging lines of inquiry (Yin 2009). Therefore, this research employed a mixed methods approach, and data were collected through a number of qualitative and quantitative research methods. Creswell (2009) describes the selected approach, which had a primary method (qualitative) that guides the project

and a secondary database (quantitative) that provides a supporting role, as the *concurrent embedded strategy* of mixed methods. Data collection methods included: oral histories, semi-structured interviews, group interviews, surveys, direct observations and document analysis.

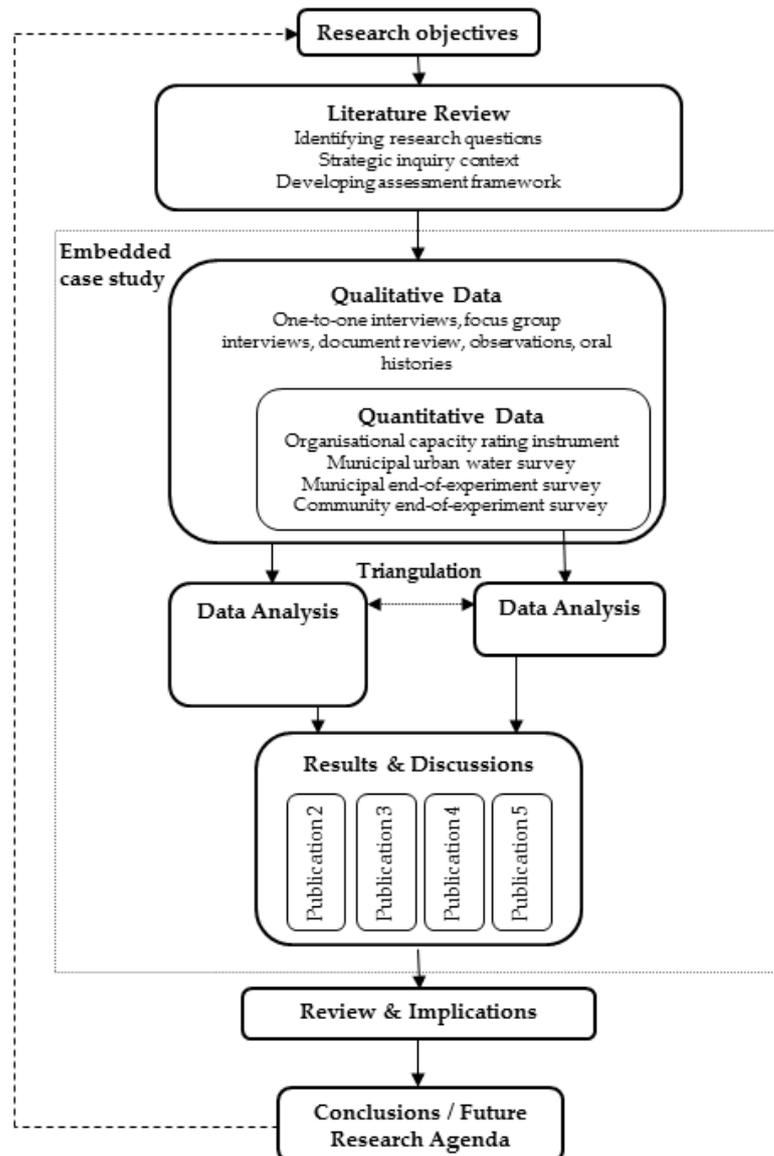


Figure 1.1 Research design

This doctoral dissertation uses the format of ‘thesis by publication’ and is organised with a series of journal papers. Each of the publications, except the literature-based paper (publication 1), provides an (in-depth) overview of the methods used, describes its sources of data, and explains how the data was collected, analysed and validated. Therefore, this section provides only a brief introduction to the research questions that guided this research. These research questions are linked to the research objectives. It should be noted that the researcher did not address these questions in a sequential fashion.

Research objective 1: To identify the key features that characterise a governance experiment.

The research question linked to this objective is: What are the features and characteristics of a governance experiment? Answering this question involved an evolving process whereby theoretical concepts / ideas and empirical results were integrated. This led to the characterisation of a governance experiment in section 7.1.

Research objective 2: To examine if and how governance experimentation advances sustainable urban water management practices.

The research questions linked to this objective are: (1) What effects does a governance experiment generate in practice? (2) How does a government experiment bring about these effects? (3) What factors foster and/or hamper governance experimentation? Data collection to answer these questions involved principally the collection of primary data through observations, one-to-one interviews, group interviews, and a survey, at different times during the research. Data was analysed, first, to ascertain the extent and type of influences that were produced by the governance experiment. Second, data was analysed to determine the relationship between different aspects of the governance experiment and their effects. Each of the results papers, albeit from different perspectives, reflects on one or more of these questions (see publications 2 – 5, Chapters 3 - 6).

Research objective 3: To identify mechanisms that strengthen the theory and practice of governance experimentation.

The research questions linked to this objective are: (1) What are the current gaps in theoretical, experimental governance approaches? (2) How can the design and implementation of a governance experiment be improved? In answering these questions, literature on transition management and social learning were critically assessed.

Organisational capacity literature was reviewed to develop a diagnostic procedure that guides leaders of a governance experiment to assess the capacity of participating

organisations. This procedure was tested and the resulting data was analysed to: i) inform research question 2.1, and ii) to inform the wider applicability of the procedure (see publication 3, Chapter 4).

A framework for designing and organising governance experimentation was inductively developed, based on the data generated from research question 2.1 – 2.3. (see publication 4, Chapter 5)

Research objective 4: To map the emergence and translation of governance experimentation into an institutionalised process.

The research questions linked to this objective are: (1) What are the mechanisms through which institutionalising of innovation in governance occurs? (2) What context factors contribute to the emergence and continuation of governance experimentation? Through a retrospective analysis (oral histories) and direct observation a pattern was revealed for how innovation in governance is contributing to socio-technical transitions. Based on analytical induction, enabling factors for such a process were established (see publication 5, Chapter 6).

For more detail on the data collection methods and a sample case report, see Appendix A - C. An overview of these appendices is presented in Table 1.1.

The CRSI governance experiment, which took place at the catchment level, has been the overall unit of analysis in this study (as presented in publications 2 - 5). Embedded units of analysis are: local government organisations, sub-catchments, core actors (these actors were considered the Initiatives' driving force as they were consistently involved throughout the Initiative and responsible for providing the overall direction), and non-core actors (these actors were involved but did not have a formal day-to-day responsibility). In addressing the fourth research objective (publication 6), CRSI became an embedded unit itself in a ten-year process of governance experimentation in the Cooks River catchment. This is because the process of governance experimentation involved three separate phases, of which CRSI was one.

Table 1.1 Summary of appendices

Appendix*	Description	Research participants	Primary function in thesis	Comments	
Appendix A – Guiding Interview Questions	A.1	Questions for initial and half-way one-to-one interviews	Range of catchment stakeholders, urban water specialists, and project team.	Informs publication 2 - 5	Focus of questioning depending organisational background, hierarchy, type of involvement in governance experiment, and timing of interview
	A.2	Questions for municipal focus-group discussions	Municipal staff	Informs publication 2 - 5	
	A.3	Questions for oral histories	Key-actors involved in emergence of governance experiment.	Informs publication 5	
	A.4	Questions for end-of-experiment interviews (focus group and one-to-one)	Municipal staff and project team	Informs publication 2 - 5	
Appendix B – Survey Questions	B.1	Rating Instrument - Questions relating to organisational capacity for SUWM	Municipal staff	Informs publication 3	Questions were the same for each municipal organisation.
	B.2	Managing Urban Water – Questions relating to current and future urban water practice	Municipal staff	Informs publication 3	Questions were the same for each municipal organisation.
	B.3	End-of-Experiment Survey – Assessing the experiment from a municipal perspective	Municipal staff	Informs publication 2 - 5	Some questions were tailored to each of the municipal organisations as individual actions differed.
	B.4	End-of-Experiment Survey – Assessing the experiment from a community perspective	Cooks River catchment community	Informs publication 4	
Appendix C	C	Case Report - Organisational capacity for Sustainable Urban Water Management (SUWM)	Informed by A1, A2, B1, and B2	Background to publication 3	

* Please note the term 'council' in the appendices refers to municipal organisations and local government organisations. These latter terms have been used interchangeably throughout this thesis.

1.4 Structure of thesis

This thesis encompasses eight chapters, of which five comprise scholarly publications. The next chapter (Chapter 2) comprises the first publication, which conducts a literature review that sets the context of this study. This is followed by the second publication, which is an initial exploration of the potential of governance experimentation for SUWM (Chapter 3). This chapter presents an initial description of CRSI and outlines its features and factors that helped or constrained the governance experiment implementation. The third publication (Chapter 4) concentrates on

organisations as actors in a governance experiment. It describes why understanding organisational context is important in purposive transition processes. It also develops and tests an analytical framework for assessing multi-organisational actor dynamics. Chapter 5, which presents the fourth paper, details how governance experimentation creates changes in catchment actor understanding that potentially influence socio-technical systems change. It identifies the type of changes in understanding and examines the relationship between such outcomes and the operational characteristics of a governance experiment. Based on these findings, a framework is presented for the creation of social learning situations. The last publication, Chapter 6, critically examines the efficacy of governance experimentation for socio-technical system change and how such processes are enabled, developed and sustained in conventional technocratic resource contexts, such as the urban water sector. Chapter 7 reviews the findings of this research and reflects on the achievement of the research objectives. In addition, Chapter 7 discusses the implications for theory and practice. The key outcomes of this doctoral research are discussed in Chapter 8, which also includes a future research agenda.

Each of the chapters that contain a publication has a short introductory section and a declaration outlining the extent of the contribution to the paper. Table 1.2 highlights the link between the research objectives, its underlying questions and each of the publications and chapters.

Table 1.2 Relationships between chapters, publications and research objectives.

<p>Chapters</p> <p>Publications</p>	<p>Chapter 2: Setting the strategic inquiry context</p> <p>Publication 1: Realising sustainable urban water management: Can social theory help?</p>	<p>Chapter 3: Exploring the potential of governance experimentation for SUWM</p> <p>Publication 2: Enabling sustainable urban water management through governance experimentation.</p>	<p>Chapter 4: An approach for assessing organisations engaged in transition processes.</p> <p>Publication 3: Assessing organisational capacity for transition policy programs.</p>	<p>Chapter 5: Developing a framework for design and organisation of governance experimentation</p> <p>Publication 4: A design framework for creating social learning situations.</p>	<p>Chapter 6: Enabling effective governance experimentation</p> <p>Publication 5: Governance experimentation and factors of success in socio-technical transitions in the urban water sector.</p>
<p>Research objectives</p>					
<p>1. To identify the key features that characterise a governance experiment.</p>	<p>1.1 Theoretical characterisation of innovation in governance.</p>	<p>1.1 Brief characterisation of a governance experiment.</p>		<p>1.1 In-depth characterisation of a governance experiment.</p>	<p>1.1 Brief characterisation of a governance experiment.</p>
<p>2. To examine if, and how, governance experimentation advances sustainable urban water management practices</p>		<p>2.1 Exploration of the effects generated by governance experiment.</p> <p>2.3 Factors that foster and/or hamper governance experimentation identified.</p>		<p>2.1 In-depth investigation in learning effects generated by single governance experiment</p> <p>2.2 In-depth exploration of how design of single governance experiment generates learning effects.</p>	<p>2.1 In-depth investigation of effects of on-going processes of governance experimentation.</p>
<p>3. To identify mechanisms that strengthen the theory and practice of governance experimentation.</p>	<p>3.1 Introduces theoretical notions for governance experimentation</p>		<p>3.1 Identifies gap of ignoring organisational context in transitions management</p> <p>3.2 Develops diagnostic tool for assessing multi-organisational capacity.</p>	<p>3.1 Identifies absence of pragmatic scientific literature on designing and organising governance experimentation aimed at social learning.</p> <p>3.2 Develops framework for creating social learning situation.</p>	
<p>4. To map the emergence and translation of governance experimentation into an institutionalised process.</p>					<p>4.1 Identifies mechanisms through which institutionalisation occurs.</p> <p>4.2 Identifies enabling context factors for the emergence of governance experimentation.</p>

Chapter 2

Setting the Strategic Inquiry Context

2.1 Introduction

Translation of the SUWM ideology to practice requires a radical change in the current socio-technical system of managing urban water. Innovation is regarded of high importance in bringing about such system change (Nelson and Winter 1977, Freeman 1987, Lundvall 1992, Rip and Kemp 1998, Geels 2002). The proposition of the publication presented in this Chapter is that the field of SUWM has limited understanding of the manner by which innovation potentially contributes to widespread system change. The paper argues that social theory and research provide resources for understanding and responding to challenges associated with transitioning to more sustainable futures. Therefore, this literature-based publication introduces the theoretical notions of the multi-level perspective (Geels 2002, 2005), reflexive governance approaches, in particular transition management (Voß and Kemp 2006, Hendriks and Grin 2007, Loorbach 2010), and idea translations (Czarniawska and Joerges 1996, Béland 2009), to provide a preliminary framework for understanding and guiding change. The publication, published in *Water Science and Technology*, theoretically positions this PhD research and provides the overall scope of this study.

2.2 Declaration by candidate for publication 1 (Chapter 2)

In the case of Publication 1, the nature and extent of my contribution to the work was the following:

Nature of contribution	Extent of contribution (%)
Formulation of research problem and the context of the research in the wider literature; interpretation of literature and writing.	90%

The following co-authors contributed to the work. Co-authors who are students at Monash University must also indicate the extent of their contribution in percentage terms:

Name	Nature of contribution	Extent of contribution (%) for student co-authors only
Rebekah R. Brown	Formulation of research problem and revision of writing.	N/A

Candidate's Signature		Date
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Declaration by co-authors

The undersigned hereby certify that:

1. the above declaration correctly reflects the nature and extent of the candidate's contribution to this work, and the nature of the contribution of each of the co-authors.
2. they meet the criteria for authorship in that they have participated in the conception, execution, or interpretation, of at least that part of the publication in their field of expertise;
3. they take public responsibility for their part of the publication, except for the responsible author who accepts overall responsibility for the publication;
4. there are no other authors of the publication according to these criteria;

- 5. potential conflicts of interest have been disclosed to (a) granting bodies, (b) the editor or publisher of journals or other publications, and (c) the head of the responsible academic unit; and
- 6. the original data are stored at the following location(s) and will be held for at least five years from the date indicated below:

Location(s)	School of Geography & Environmental Science, Monash University	
Signature 1		Date

2.3 Publication 1 – Realising sustainable urban water management: Can social theory help?

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Abstract

It has been acknowledged, in Australia and beyond, that existing urban water systems and management lead to unsustainable outcomes. Therefore, our current socio-technical systems, consisting of institutions, structures, and rules, which guide traditional urban water practices need to change. If a change towards sustainable urban water management practices (SUWM) is to occur, a transformation of our established social-technical configuration that shapes the behaviour and decision-making of actors is needed. While some constructive innovations that support this transformation have occurred, most of innovations remain of a technical nature. These innovative projects do not manage to achieve the widespread social and institutional change needed for further diffusion and up-take of sustainable urban water management practices. Social theory, and its research, is increasingly being recognised as important in responding to the challenges associated with evolving to a more sustainable form of urban water management. This paper integrates three areas of social theories around change in order to provide a conceptual framework that can assist with socio-technical system change. This framework can be utilised by urban water practitioners in the design of interventions to stimulate transitions towards sustainable urban water management.

Keywords: Multi-level perspective, reflexive governance approaches, sustainable urban water management, social theory, translation theory.

2.3.1 Introduction

The way our society is structured to manage its water can be considered unsustainable in the future; there are limited resources, increased demands, infrastructures and economic feasibility are under pressure, and unpredictable exogenous events such as climate change are putting more pressure on our already stressed systems. The urban water management problems that our society faces are extremely complex, highly uncertain, and affected by multiple actors with different perspectives and values (Marsalek *et al.* 2001). Scholars refer to these problems as “wicked” (Rittel and Webber 1973). The essence of wicked problems is that ambiguity about facts

is high and consensus on desirable solutions is lacking. Addressing wicked problems requires holistic assessment of the problem, including the interconnections between the problem and their underlying factors. The extent to which these problems are addressed will depend on the capacity of different actors to communicate, negotiate and attain collective decisions (Woodhill 2003). Scholars acknowledge that wicked problems cannot be solved by traditional means nor policy approaches that rely predominantly on technical solutions and market forces.

In Australia and internationally, there is growing recognition that the traditional

management of urban water, which facilitates the wastage of a valuable resource, contributes to the degradation of water resource environments and does not reflect contemporary aspirations of ecologically sustainable development, is no longer appropriate and needs to change (Brown *et al.* 2006). Although there is no consensus on what sustainability exactly is, sustainable development is commonly considered as a desirable direction, leading to a decreased environmental burden, and less use and fairer distribution of resources. At present, most of existing institutions, structures, and rules to guide current urban water practices are based on the stable, traditional view of the urban water management problem. The fact that these current approaches are incapable of solving wicked urban water management problems is evident by the numerous water problems nations such as Australia currently faces. Substantial efforts have been undertaken in Australia to provide a sustainable direction to urban water management through policy. Notwithstanding this effort, no systemic change in terms of on-ground urban water practice has occurred. Whilst local-scale innovation, often through demonstration projects, is evident they remain isolated and are yet to become mainstream urban water management. Farrelly and Brown (2011), based on the perceptions of more than 150 urban water practitioners across Australia, raise a number of issues why this is so. These issues, which hinder diffusion of sustainable innovation, typically relate to: formal rules and regulation, consistent policy direction, pricing signals, organisational culture, intra/interorganisational collaboration, commitment, political support, shift in values and thinking, and risk sharing.

Our current socio-technical systems are typically not adequately equipped to handle the water challenges ahead, and structural change of the current systems is needed. Scholars stress that transformation of existing socio-technical systems are long-term and complex processes, as current configurations

are stable, locked-in and typically resist fundamental change (Loorbach and Rotmans 2010). While technical difficulties, such as technical problems and perceived costs, may hinder a transition into a sustainable direction (Mitchell 2006), most impediments in the water sector are considered of social and institutional nature (Brown and Farrelly 2009, Farrelly and Brown 2011). Most of the identified barriers are firmly embedded within the existing configuration of infrastructure, rules, norms, and values. This institutionalized environment is described by Rip and Kemp (1998) as a socio-technical regime. It is argued that in order to enable the traditional socio-technical regime to facilitate up-take of sustainable practices, significant social change, as opposed to technical change, is needed (Brown and Farrelly 2009). This means that in order to manage urban water in a more sustainable manner, besides technical, non-technical changes are needed that demand the inclusion of a multitude of stakeholders, and requires cooperation and shared solutions from these stakeholders. This implies the necessity of change well beyond policy alterations. It is surprising that presently the main approach towards innovative experiments aimed at improving the management of urban water services focus on the implementation of 'technical hardware' innovations to increase water use efficiency, improvement of water quality and treatment, alternative supplies and water recycling. Although the result of these experiments often show satisfaction on technical advancements (Mitchell 2006), most of the projects do not manage to achieve the social and institutional change needed for further diffusion and up-take of SUWM practices (Brown and Farrelly 2009).

If the SUWM concept is to reform current urban water management practices and is to contribute to a socio-technical system change, it needs to be translated and adopted into local practices. Depending how the concept is translated in practice, urban water management may take different directions. Currently the main mechanism for translating

the SUWM concept seems to be through demonstration projects aimed at revealing new technical and infrastructure often at the expense of social and institutional insights. In this context, it is the proposition of this paper that the field of SUWM currently lacks an in-depth understanding of how innovations can contribute to widespread change of the current urban water management regime. Social theorists such as Smith (2007) argue that diffusion of sustainable practices requires some compatibility between the niche, the micro level place in which innovative urban water management practices develop, and the socio-technical regime in which traditional practices take place. Understanding translations can help the ideas and experiments guiding the sustainable urban water niche and the current urban water management configuration to come into some kind of correspondence for them to co-evolve and adapt. Brown and Keath (2008) state that social research and theory is a relatively under-utilised and increasingly important resource for understanding and responding to the challenges associated with evolving to a more sustainable society. In line with this argument, this paper aims to provide insight into three areas of social research, which when integrated, can be utilised by urban water researchers and practitioners in designing interventions aimed at transitioning towards SUWM.

2.3.2 *Social theory*

Social theories and research that provide insight to socio-technical change processes can be drawn from a wide body of specialist fields such as: policy design, organizational science, innovation studies, socio-technical system innovation, urban planning, institutional analysis and environmental governance. Based on assessment of the literature, this paper proposes that the integration of the three following fields of scholarship offers a potentially valuable insight into the strategies that could be used to improve the design of innovative interventions aimed at mainstreaming SUWM.

These three 3 areas of social research are:

- The *multi-level perspective*, which provides an analytical framework for understanding long-term socio technical systems and transitions.
- *Reflexive governance approaches*, which, if adopted, could help to prevent negative social consequences that are associated with technologies. These approaches require the adoption of holistic views on novel technologies by allowing for a variety of social aspects and the different actor perspectives to be taken into account.
- *Translation theory*, which helps us to understand how ideas, objects and practices may be translated and, by doing so, are transformed in new settings.

The following subsections provide a short review of these three concepts. The discussion session integrates these concepts and explains the relevance of these concepts to developing urban water management into a more sustainable direction.

The Multi-Level-Perspective

Dutch scholars have developed a multi-level perspective in order to understand long-term socio-technical systems and transitions (Kemp *et al.* 1998, Geels 2002). It has evolved from the integration of new institutionalism, innovation studies and the sociology of technology. The multi-level perspective distinguishes three analytical levels: the niche, regime and landscape. The central concept forms the meso-level and is described as the regime. A regime can be seen as the dominant structure, culture and practices with power and vested interest in a social-technical system. In other words, patterns of institutions, rules and norms, and artefacts assembled and maintained to perform economic and social activities (Berkhout *et al.* 2004). It is argued that this level needs to transform into another if transitions towards sustainable technologies are to occur as it accounts for the stability of existing large scale systems (Schot and Geels 2008).

The macro-level is formed by the socio-technical landscape, which presents the macro-economy, the political, social and cultural context, the demographics and physical environment. The relatively autonomous and often slow developments at the macro-level cannot be shaped by individual actors. Niches form the micro level and are seen as a place in which novel practices and associated culture and structures emerge and develop through a small network of dedicated actors.

The multi-level perspective views transitions as interactive processes of change at the micro-level of niches and the meso-level of socio-technical regimes, which are both embedded in the broader developments at the macro-level of the socio-technical landscape (Figure 2.1). The idea is that a) niche innovations build up internal momentum, b) changes at the landscape level create pressure on the regime, and c) destabilisation of the regime creates windows of opportunity for niche innovations (Geels 2002). Although critiqued, primarily on the lack of distinctiveness of the boundaries between the levels (Berkhout *et al.* 2004), the multi-level perspective is advocated by sustainability scholars as a promising and useful framework for analysing and advancing sustainable development. A principal insight from the multi-level perspective into transitions is that direction and outcome of technological change are not the result of dynamics at any specific level, but only take place when dynamics at all levels link up and strengthen each other.

The strategic creation of green, innovative niches is recognised as a potential source for influencing change towards a 'transition' to sustainable development (Kemp *et al.* 1998). The intention is to create lessons from these niches and to use them to help diffuse sustainable values and practices at the traditional regime level more widely. However, the narrow learning that does currently arise from niche experiments seems to be strengthening the niche itself and is not

geared towards investigating the interfaces between niches and the incumbent regimes (Smith 2007). Novelty in niches can only spread more widely if they connect with ongoing processes at regime level (Schot and Geels 2008). The key idea is that change takes place through processes of co-evolution and mutual adaptation with and between the different layers. This means that niche innovations might not necessary result in a regime substitution, but that changes in behaviour, practices and routines of regime actors may contribute to adoption of innovations within the existing regime (Smith 2007, Schot and Geels 2008). It may also contribute to a niche-regime constellation, which "represents a niche that has grown powerful enough to gain a number of new characteristics, the most important of which is the ability to attack sometimes effectively and incumbent regime" (Rotmans and Loorbach 2010 p. 136).

In Australia, a number of niches that privilege the values of environmental protection and intergenerational equity at the micro-level are being developed and established at present (Mitchell 2006, Brown and Keath 2008). Despite macro-level pressures such as climate change, climatic variability, and waterway health degradation, the uptake of these niches in the existing regime seems marginal as there is a very limited shift towards widespread sustainable governance and practices.

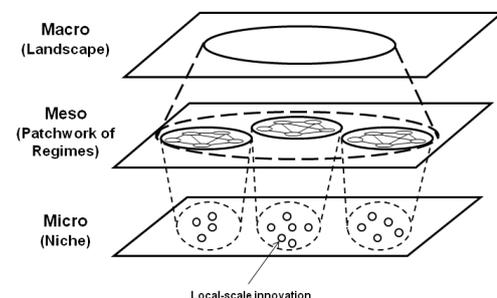


Figure 2.1 The multi-level perspective
Source: Geels (2005)

Instead, the actual response to these macro pressures at the meso-level are to prioritise solutions that support the deep-rooted conventional values around public health protection, supply security and economic efficiency (Brown and Keath 2008). The dynamics and values at the different conceptual levels are presently not aligned and niche developments have not yet been able to diffuse broadly.

Another issue the multi-level perspective reveals, which is of relevance to the Australian water sector, is the importance of learning as a source of influencing the regime. While lessons may be learned from individual niche innovations, Farrelly and Brown (2011) state that learning is often not an explicit mandate of innovative projects. In addition, these authors assert that actors in the sector may “recognise the importance of learning, but that they ultimately remain unable to learn from their cumulative experiences due to lack of explicit investment in facilitating appropriate social learning mechanisms” (p. 730). The lack of cumulative learning influences the extent to which lessons can be learned from niches; in turn this influences the extent to which a socio-technical regime can be influenced by innovative practice.

The multi-level perspective is highly relevant for this study as it emphasises the importance of radical novelties which develop in niches, outside the existing socio-technological regime as potential drivers for regime change towards sustainability. Although this is not yet happening in Australia, the multi-level perspective provides a useful framework for investigating how to influence change of a socio-technical regime through the concept of niches.

Reflexive governance approaches

Beyond the call for system innovation to achieve more sustainable management of our resources, there is a call for reflexive governance for our pathways to sustainable development (Voß and Kemp 2006). Reflexive governance argues that not only the arrangements of socio-technical systems

should be considered, but also how these socio-technical systems should be governed (Hendriks and Grin 2007). This consideration could potentially help to prevent negative social consequences associated with technologies as it requires the adoption of holistic views on novel technologies by allowing for a variety of social and actor perspectives to be taken into account. Therefore, reflexive governance carries the notion that systems of governance should not only encourage societal dialogue, but also transform attitudes and beliefs in ways that actively facilitate sustainable development.

Reflexive governance has been developed in response to wicked problems with the idea that a reflexive understanding of governance will guide governing processes to be open for interactions and feedback that reflect their embedding in the social, technical, and physical context (Voß and Kemp 2006). Given the fact that moving towards SUWM addresses an extremely complex, highly uncertain, multiple actor problem and as it aims to transform existing systems of production and consumption, reflexive governance is a highly relevant concept. Overall the relationship between governance processes and socio-technical system change has received little systematic attention in practice.

Transition management, which has been identified as a form of reflexive governance by its proponents, provides further useful analytical insight into the creation of niches and experiments for (technical) innovation, and aims to contribute to socio-technical change for sustainable development. The following section briefly describes transition management.

Transition Management

Transition Management (TM) is an approach for governing transitions towards sustainable development in general. It can be explained as a searching and learning process in which a diversity of actors who ‘think outside the box’ participate and cooperate (Loorbach 2010). TM uses the concept of sustainable development as a normative

frame to develop a future orientation. The starting point of the approach, however, is not a solution but is explorative and design oriented in nature (Rotmans and Loorbach 2010). This means that while the approach enables a focus on a sustainable future, it allows the discovery of multiple pathways and a diversity of solutions to get towards this sustainable future. Transition management seeks to connect process and content by allowing a diversity of participants to structure the problem, develop the long term vision, and devise experiments. Within transition management a space for actors who 'think outside the box' is created in a transition arena (which can be described as a platform for active involvement), new partnerships are formed around these arenas, activities are steered in a shared and desired direction, and a social movement is created which places pressure on conventional policy and practice (Rotmans and Loorbach 2010).

The starting point in TM is generally a societal problem, and a typical cycle of learning and action consisting of a number of stages (Loorbach 2010):

- i) Establishing and developing a transition arena (organization of a multi-actor network) for a specific transition theme, which includes problem definition; identification of stakeholders; establishment of preconditions for operation of the arena; definition of transition themes.
- ii) The development of a long-term vision for sustainable development and a common transition agenda;
- iii) Exploration of transition pathways (scenarios) through the initiation and execution of transition experiments and joint actions; and
- iv) Monitoring, learning and evaluation of the transition process, which should result in the adjustment of the agenda and visions as preparation for the next transition round.

Transition management has been criticised in regard to the appropriateness and the

prospect of steering the management of social systems (Shove and Walker 2007) and in relation to the lack or limited notice of power dynamics (Voß *et al.* 2009). Despite this critical commentary on the approach, transition management has been recognised as a potentially powerful avenue for influencing long term policy design and practice. The concept of TM offers a useful integrated model for dealing with complex societal problems such as urban water management. The approach actively aims to influence the social-technical regime using niche experiences and alternative visions to influence the cognitive frame of regime actors.

Translation theory

Scholars within different scientific domains emphasise the principal role of ideas (such as the SUWM idea) in institutional change process. Ideas provide meaning through which actors make sense of their environment (Béland 2009). They can serve as discursive frames which help advocating actors convince others that the existing situation is fundamentally flawed and that transformation is necessary to solve the problems (Cox 2001). Ideas can take the form of ideologies or paradigms that serve as intellectual maps guiding actors who often face complex and uncertain situations (Béland 2009, p. 148).

The concept of translations, which draws largely from the field of organisation science and policy translation, potentially helps to explain how ideas (and practices) may be translated and, by doing so, are transformed in new settings. Translation implies movement and transformation with emphasis on actors being involved in a continuous translation process through which society is constantly created and re-created (Czarniawska and Joerges 1996). When adapted to local settings, ideas and practices have to be translated to be filled with

meaning in order to be adopted and pursued locally (Czarniawska and Joerges 1996). The translation process takes into account the interpretation and adaptation of ideas and practices in a new setting as well as an understanding of how to act in order to achieve these ideas and goals. Smith (2007) argues that for sustainable development, the alignment of multiple actors and objects into systems that constitute a socio-technical practice will require many mutual and multiple translations between actors. This implies interplay between the sender and the creator of the idea, which might also result in an adjustment of the original message. Therefore, translations can be seen as; *the process whereby an idea, is transferred and reinterpreted in a new setting through the interplay between creating and receiving actors.*

It cannot be assumed that translations based on an original concept will spread throughout the system and influence traditional practices. Research on how concepts are taken up in practice finds disparity “between talk and action, between formal plans and practice, between activities and accounts, between managers and operations and between different groups of actors” (Sundewall and Sahlin-Andersson 2006, p. 279). The translation process is described by Czarniawska and Joerges (1996) as follows: ideas are dis-embedded from a given context, objectified in terms of models and ideas in order to become travelling ideas, and accordingly translated into action when travelling through new contexts where they might be implemented in concurrence with existing practices. Those new practices are then re-embedded and become standard practice. Johnson and Hagstrom (2005) critique the staged approach of this concept as they see these stages happening concurrently and as a continuous process. They argue that translation processes should be seen as open-ended process. However, it should be noted that uniformity, traditionalism and social control can shape the translation processes (Sahlin-Andersson 1996). Therefore, translations take place in a context that

hampers forms of translation. In addition, social power relationships, whether due to knowledge, status, contacts, or institutional background affect actors in translation processes (Johnson and Hagstrom 2005). Windell (2006, p. 41) argues that the concept of translation conceptualizes the circulation and construction of ideas as processes in which ideas are materialized and given meaning, and are likely being presented in accordance with the existing institutional context. This implies translation processes may be rough as they can take place in an environment of confrontation and disputes.

Translation of ideas is strongly influenced by the perspective, character and culture of the translator. In the act of translation, translators edit ideas as they rename, customize, reinterpret, drop or add parts, or even reinvent ideas as they travel (Sahlin-Andersson 1996), depending on the use translators see for the idea. Sahlin and Wedlin (2008 p. 223) further assert that translation processes are restricted and directed by informal, unwritten editing rules which derive from social control, conformism and traditional values. Innovative projects can be seen as translators of the SUWM concept. This notion is of great importance to the urban water sector as many ‘translators’ of the SUWM concept are likely to apply editing rules that are associated with the conventional, technical oriented regime.

Translation lessons from innovation theory stress that it is important to know what processes of translations are necessary for an innovation to be perceived as a new self-evident and logical reality by the actors when considering a solution to a certain problem (Dieleman 2007). There is a call for social experiments to help translation processes between different actors. This means that the experiments are carriers of ideas, which act as translators in translating the idea. Scholars in the field of institutional theory argue that it is the “process of translation that should become our concern, rather than the properties of ideas” (Czarniawska and Joerges 1996 P. 25). Smith (2007) identified three areas of socio-

technical translations namely; translation of sustainability problems, translations that adapt lessons, and translation that alter contexts.

2.3.3 Discussion

Collectively, these three areas of thinking provide a potentially powerful framework for understanding wicked problems, such as urban water management, and in presenting new rationality for addressing these problems in a range of ways where technical interventions are just one type of strategy. The shortcomings inherent in each concept are significantly addressed when considered integrated, as they can jointly provide a strategy for the SUWM niche and its actors to achieve change beyond ad-hoc innovative practices.

The multi-level perspective provides a useful framework for investigating how to influence change of a socio-technical regime through the concept of niches. The strategic creation of a niche is recognised as a potential source for influencing change towards a 'transition' to SUWM. The intention is to create lessons from these niches and to use them to help diffuse sustainable values and practices at the traditional urban water management regime level more widely. Smith (2007) argues that diffusion of sustainable practices requires some compatibility between the niche, in which the innovative urban water management practices take place, and the socio-technical regime in which traditional practices take place. However, there is ample evidence that there is insufficient consideration in the multi-level perspective to the processes by which niches and regimes interact and are interdependent (Smith 2007). Translations can help the ideas and experiments guiding the SUWM niche and the current urban water management regime to come into some kind of correspondence for them to co-evolve and adapt. The translation of an idea will get lost (or are likely to be ineffective) if a creator (niche) and receiver (regime) have limited ability to understand each other. There needs to be interplay

between creating and receiving actors for an idea to be transferred and reinterpreted in the new setting. The process of achieving SUWM is far from linear, as it addresses multiple, unclear factors and varying interests and understandings of actors affect its outcome. This means that socio-technical systems change can be presented as a chain of ongoing translations affected by multiple factors.

If the SUWM approach is to become embedded at the socio-technical regime, it appears important that those actors involved in urban water management share the ideas that constitute the SUWM idea. In order to understand the extent to which the SUWM idea has been locally adopted, the adoption of the idea as an active process of translation, wherein policies, practices, activities, and norms are formed and reformed as the idea is adopted should be analysed (Sundewall and Sahlin-Andersson 2006). As the ideas related to sustainable development are not subject to straightforward interpretations, translation of these ideas by the different actors is necessary.

TM as a type of reflexive governance has the potential to facilitate these ongoing translations as it contains elements that are of great importance to support effective niche-regime interaction. TM provides a governance instrument that addresses wicked problems, such as urban water management, as it is geared to the inclusion of a multitude of stakeholders, and requires cooperation and shared solutions from these stakeholders. Legitimate transparent and inclusive decision-making processes are a necessity for enabling and sustaining effective sustainable urban water management (Westley *et al.* 2011).

2.3.4 Conclusion

The proposition of this paper is that socio-technical system change towards SUWM is achievable. However, it is argued that in order to enable the traditional socio-technical regime to facilitate up-take of sustainable practices, significant social and institutional change, in addition to technical change, is needed. This paper demonstrates that a

hybrid of relevant social theories provides an informed framework for guiding social-technical system change. The suggested hybrid approach is an alternative for addressing wicked problems as it is not reliant on traditional policy approaches that rely predominantly on technical solutions and market forces. Employing this framework in order to create socio-technical change will

require significant normative and cognitive change from urban water professionals in designing new practices to facilitate SUWM as they greatly differ from conservative approaches.

References have been moved to a consolidated reference list at the end of the thesis.

Chapter 3

Exploring the Potential of Governance Experimentation for Sustainable Urban Water Management

3.1 Introduction

The previous Chapter revealed that reflexive governance approaches have the potential to facilitate the multiple and ongoing translations necessary for socio-technical system change. This Chapter explores governance experimentation, which values the contribution of a variety of actors operating within a socio-technical system, as a potential instrument for facilitating such system change.

The publication presented in this Chapter introduces the CRSI case study as a governance experiment. Drawing on qualitative insights from municipal actors and following Reed (2010) the paper then explores the scope of this type of social interaction in experimentation particularly in regard to generating changes in understanding and practice. This publication is forthcoming in *Water Science and Technology*.

3.2 Declaration by candidate for publication 2 (Chapter 3)

In the case of publication 2, the nature and extent of my contribution to the work was the following:

Nature of contribution	Extent of contribution (%)
Formulation of research problem and the context of the research in the wider literature; data collection; data analysis, interpretation of results and writing	90%

The following co-authors contributed to the work. Co-authors who are students at Monash University must also indicate the extent of their contribution in percentage terms:

Name	Nature of contribution	Extent of contribution (%) for student co-authors only
Rebekah R. Brown	Formulation of research problem and research design	N/A
Megan A. Farrelly	Interpretation of results and revision of writing	N/A
Fjalar J. de Haan	Interpretation of results and revision of writing	N/A

Candidate's Signature		Date
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Declaration by co-authors

The undersigned hereby certify that:

1. the above declaration correctly reflects the nature and extent of the candidate's contribution to this work, and the nature of the contribution of each of the co-authors.
2. they meet the criteria for authorship in that they have participated in the conception, execution, or interpretation, of at least that part of the publication in their field of expertise;

3. they take public responsibility for their part of the publication, except for the responsible author who accepts overall responsibility for the publication;
4. there are no other authors of the publication according to these criteria;
5. potential conflicts of interest have been disclosed to (a) granting bodies, (b) the editor or publisher of journals or other publications, and (c) the head of the responsible academic unit; and
6. the original data are stored at the following location(s) and will be held for at least five years from the date indicated below:

Location(s)	School of Geography & Environmental Science, Monash University	
Signature 1		Date
Signature 2		Date
Signature 3		Date

3.3 Publication 2 – Enabling sustainable urban water management through governance experimentation.

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Abstract

A shift towards sustainable urban water management is widely advocated but poorly understood. There is a growing body of literature claiming that social learning is of high importance in restructuring conventional systems. In particular, governance experimentation, which explicitly aims for social learning, has been suggested as an approach for enabling the translation of sustainability ideas into practice. This type of experimentation requires a very different dynamic within societal relations and necessitates a changed role for professionals engaged in such a process. This empirically-focused paper investigates a contemporary governance experiment, the Cooks River Sustainability Initiative, and determines its outcome in terms of enabling social learning for attaining sustainable water practice in an urban catchment. Drawing on the qualitative insights of the actors directly involved in this novel process, this paper provides evidence of changes in individual and collective understanding generated through diverse forms of social interaction. Furthermore, the research reveals perceived key-factors that foster and/or hamper the execution of this new form of experimentation, including project complexity, resource intensity and leadership. Overall, this paper highlights that while implementation of governance experimentation in a conventional setting can be highly challenging, it can also be highly rewarding in terms of learning.

Keywords: Cooks River Sustainability Initiative, Governance experimentation; Project design, Social learning.

3.3.1 Introduction

Across the world, managing urban water is an increasing topic of concern. Growing urban populations, significant climate change and climate variability cause uncertainty in urban water supply and are associated with major system disturbances such as floods, droughts and deterioration of waterway health (Bates *et al.* 2008, Pahl-Wostl *et al.* 2011). At the same time, many developed nations are confronted with renewal of infrastructure challenges, expanded social values, and increased demands for improved social

amenity in urban areas (Palaniappan *et al.* 2007, Pahl-Wostl 2008). While existing large-scale, centralized urban water systems have been reasonably successful in securing water supply, public health and flood protection, they appear to be less successful in responding to the emerging uncertain and complex challenges (Maksimovic and Tejada-Guibert 2001).

Faced with rigid and compartmentalised views of managing urban water systems, scholars with concerns for urban sustainability have called for alternative approaches that embrace the total water cycle (Newman and Kenworthy 1999). In response, the paradigm of sustainable urban water management (SUWM) has been developed and promoted as an alternative ideological and technical approach to conventional urban water management (Brown 2008a). SUWM is aimed at protecting and conserving water resources and encourages ways of living that neither depletes resources nor degrades environmental quality (Wong and Eadie 2000). Therefore, SUWM attends to all facets of the total water cycle, reflects the values of conservation, ecology, equity and resilience, and recognises that urban water management is affected by multiple actors with different perspectives and interests. The ideology of SUWM is analogous to Integrated Urban Water Management (IUWM) (Maksimovic and Tejada-Guibert 2001) and Water Sensitive Urban Design (WSUD) (Wong 2006b).

While technology development is acknowledged to be of great importance to enable a transition to SUWM, there is a growing body of literature that suggests that societal search and learning processes are even of greater significance to support such a transition (Brown 2008a). It is argued that these so-called social learning processes overcome current system lock-in i.e. technical path dependency and enable transformation of existing social-technical systems through the development of new relational capacities among actors. Building new capacities necessitates experimental, multi-scale, polycentric governance approaches that facilitate and value the contribution of a variety of actors operating within a social-technical system (Pahl-Wostl *et al.* 2008). Such approaches are considered more flexible, adaptive and appropriate in addressing urban water management problems than current mono-centric governance approaches. As the pathways to a sustainable future are uncertain, experimentation is regarded of crucial

importance for learning (Van der Brugge and Rotmans 2007). Governance experimentation, which aims to alter the configuration of decision-making, allows for a diversity of actors to learn through social interaction (Bos and Brown 2012). By doing so, it enhances innovation networks and offers the potential of exploring and developing alternative solutions to existing problems. The approach, which is not specific in regard to its outcomes at the start, is very different from conventional urban water practice, which is operating in a hierarchical, market-based governance paradigm and is considered to be risk averse (Farrelly and Brown 2011).

While governance experimentation is recognised as an essential vehicle for social learning, there is limited scientific understanding of how and to what extent social interaction actually generates social learning (Reed *et al.* 2010). Collins and Ison (2009a) state that participation of actors in itself is not adequate to bring about social learning and argue that social interaction should follow a learning agenda rather than a participatory agenda. Such an agenda should support actors to appreciate different stakeholder perspectives and help them to recognise their interdependencies. As well as bringing the 'right' actors together, SLIM (2004a) contends that governance experimentation aimed at social learning needs to pay attention to the history of a (problem) situation, its context (social, ecological and policy), the processes by which actors engage, and the facilitation of these processes. Social learning is an emergent body of scholarship, and although it is widely used and advocated, it also highly contested (Armitage 2005, Reed *et al.* 2010, Rodela 2011). Within this paper, social learning is understood as change that has taken place among and beyond individual actors through social interaction (Reed *et al.* 2010).

At present, little is known about actors' personal experiences of being involved in a governance experiment and there is little understanding of the significance of what actors have learned through participating in

such collaborative endeavour (Hoverman *et al.* 2011). Understanding actors' perspectives offers insight into specific mechanisms through which social learning is supported and will help the design and implementation of future governance experiments. Therefore, drawing on empirical, qualitative insights from actors directly involved in a unique governance approach to water planning in an urban catchment, this paper demonstrates changes in understanding (including social learning) that occurred as result of participation in the governance experiment and identifies key factors that fostered and/or hampered the creation of a social learning situation. The paper reports on the OurRiver - Cooks River Sustainability Initiative (CRSI in Sydney, Australia. The outcomes of this successful, contemporary governance experiment resulted in social learning about the problems of managing urban water and the potential solutions. These changes have gone beyond individual actors and have become situated within wider societal units such as local municipalities. Moreover, these changes have led to a modification of catchment governance structure. These changes were facilitated through a range of formal and informal interactions and processes within a social network within the urban catchment.

This paper describes the structure of the governance experiment and outlines its differences compared to existing practice. Following Reed *et al.*'s (2010) consideration of changes in understanding, the paper then provides qualitative evidence of social learning outcomes that can be attributed to the process of governance experimentation and demonstrate a significant shift away from the outcomes of a typical technocratic approach. This is followed by an outline of five key variables that appear to be instrumental to the success or otherwise of governance experiments. While these five variables are preliminary at this stage, they set the scope for further research aimed to design governance experimentation. In addition, they are useful for urban water practitioners

involved in the design of governance experiments. Furthermore, the case reveals the significant promise for enabling catchment wide practice of on-ground implementation of sustainable water management infrastructure.

3.3.2 Context

The Cooks River catchment

The Cooks River flows from south-western Sydney into Botany Bay through a heavily urbanised and industrialised catchment. Water management in the Cooks River catchment involves multiple organisations, including 13 local municipalities. Despite decades of conventional urban water management planning, this catchment has not yielded results in terms of a healthy and sustainable water environment and still has one of the most degraded water ways in the nation (Tovey 2010) The catchment's highly fragmented institutional framework has significantly contributed to the failure of various policy attempts to improve river health (Brown 2005). On-going traditional water practices and limited State Government directive for improving river health, led to key-local champions in the catchment advocating and winning a grant to trial and implement a process of governance experimentation in the catchment, which led to the Cooks River Sustainability Initiative. For more detail on the background of this government experiment, see Bos and Brown (2012).

The OurRiver - Cooks River Sustainability Initiative

In 2007, the NSW Environment Trust's Urban Sustainability Program awarded funding to a project which aimed to improve the health of the Cooks River and conserve water in the catchment. This project, the OurRiver - Cooks River Sustainability Initiative (CRSI), strived not only to develop the capacity of municipal organisations and their communities but also to improve

collaboration within and between municipal organisations. The grant was provided to trial a multi-disciplinary, participatory approach to collaboratively develop local, appropriate water management plans for six different sub-catchments in the Cooks River catchment. This collaborative governance approach was an intentional structure for deliberation and learning at local level between municipal professionals, community members and other stakeholders such as State Government organisations or environmental community groups. CRSI was a grant funded partnership between eight municipalities and Monash University. Deliberate and facilitated interaction between project partners would provide a structure for intra-organisational learning at the catchment level. Increased understanding of actor perspectives and actor interdependencies in addressing urban water management was part of the initiative's underlying agenda.

Although the project had overall stated directions for improving urban water management through collaboration, there were no defined expectations of the initiative's outcomes with regard to specific sub-catchment solutions and enhanced catchment governance arrangements. This meant that specific options or solutions for addressing local problems would derive from multi-stakeholder learning and searching and were not locked-in at the start.

The initiative's success would be highly reliant on processes facilitating effective communication and (social) learning among a wide variety of catchment stakeholders. Therefore, networks and interaction were to

be developed between stakeholders at:

- i) sub-catchment level, e.g. residents, businesses, community groups, state agencies and municipal staff;
- ii) municipal level, across different departments and hierarchical levels;
- iii) regional level, between staff, executives and politicians of different municipal organisations; and
- iv) project level, e.g. all earlier mentioned stakeholders, the project team, and a University

The project's structure (Figure 3.1) was designed to help facilitate interaction and differed from most experimental projects aimed at improving urban water management. The project had a dedicated project team consisting of one project manager and four project officers. This project team was assisted in carrying out the day-to-day project responsibilities by a steering committee, consisting of municipal members of staff from each participating municipality. An executive 'champions' group, consisting of senior and executive members across each municipality, was specifically established to promote the project and to provide high-level support within each of the municipalities. A cross-municipal technical working group, including landscape architects and engineers, was developed to exchange technical ideas and information during the course of the project. These groups formed part of the overall project structure throughout the project. A cross-municipal committee assisted early on in the project with branding the initiative, development of engagement strategies and feedback on educational materials.

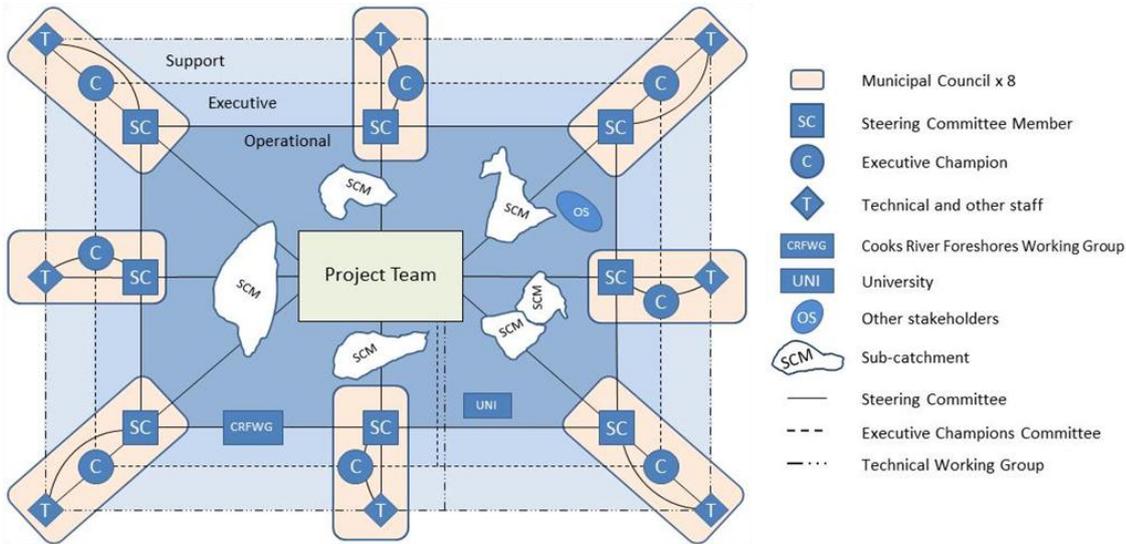


Figure 3.1 Structure of Cooks River Sustainability Initiative

CRSI was very different from conventional urban water planning within the Cooks River catchment. When considering characteristics in terms of scale, expertise and role of the public a number of differences between the approaches can be established. For example, plans designed for whole river catchments within conventional forms of planning are unlikely to allow for local conditions. This can lead to inappropriate solutions at the local scale (Brown 2005). Within CRSI plans were developed at sub-catchment level to ensure practical and applied solutions to the local physical, social, economic and organisational context. In terms of expertise, CRSI offered a far more inter-disciplinary approach to urban water management to ensure an integrated approach to urban water management. Traditionally, components of the water cycle are compartmentalised and primarily dealt with in narrow focused disciplines (Newman and Kenworthy 1999). Compared to conventional practice where water is managed by government on behalf of the communities, CRSI recognised the community as an active stakeholder. Collaboration with the local community was sought to plan and tailor solutions, and to build support and ownership of alternative infrastructure projects.

Figure 3.2 provides a brief chronology of the major stages, activities and important events of the CRSI project. It should be noted that, although activities were undertaken roughly at the same time in each of the sub-catchments, they did not exactly synchronise in terms of timing. Therefore, the dates reflected in the timeline (Figure 3.2 should be regarded as indicative).

3.3.3 Methods

This research employs a single embedded case study approach (Yin 2009) to analyse the experimental governance process in which eight municipalities across the Cooks River catchment took part. This specific case study was selected as it offers an important in-depth empirical research opportunity of the first Australian urban water governance experiment engaging local-to-regional level urban stakeholders. It was undertaken in a highly urbanised and industrialised water management context where nearly all efforts of achieving sustainability are aimed at creating optimised solutions and technical learning instead of addressing wider social learning.

The qualitative research methods used a synthesis of multiple data sources, including:

i) document analysis of OurRiver project records; ii) 17 semi-structured interviews with local municipal staff, and OurRiver project staff; iii) 12 focus-group discussions with municipal project actors totalling over 80 participants; and process observations throughout the project. Interviews and focus group discussions to obtain detailed and contextualised information about the governance experiment and its social learning outcomes were undertaken half-way through and near the end of the project. Deeper understanding of the context in which the experiment took place was sought through the analysis of policy, organisation and media documentation and existing scientific literature. Interview transcriptions and field memoranda were coded using QSR Nvivo 9. The data were analysed using a grounded theory approach (Blaikie 2000). Systematic reduction of data was performed through coding the data into grouped themes. Codes and themes in regard to changes in understanding and factors hampering or fostering the governance experiment derived from analytical induction on the basis of patterns that emerged from the data (Creswell 2007). The principle position of the primary

researcher was the ‘researcher as an observer’; the secondary position was the ‘researcher as an enabler’ (Ison and Watson 2007).

3.3.4 Results

This result section, firstly, demonstrates that CRSI generated social learning and describes what actors have learned through participating in the experiment. Secondly, this section outlines key factors that fostered and/or hampered the creation of a social learning situation.

Evidence of social learning

The governance experiment demonstrates widespread learning throughout the catchment in the context of existing goals for urban water management as well as in the broader framework of the sustainable urban water management ideology. Reed et al. (2010) argue that learning can only be considered social learning when change in understanding in individuals and wider social units is actually demonstrated in practice and has come about through social interaction. The following discussion is structured around these three pillars of social learning.

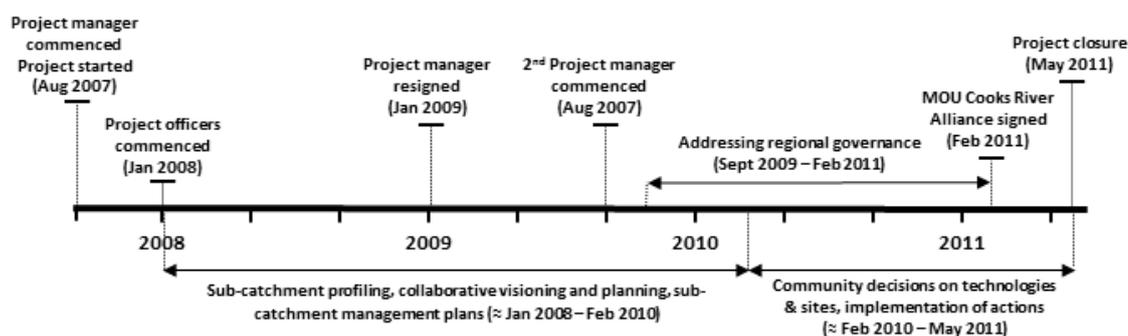


Figure 3.2 Timeline for the Cooks River Sustainability Initiative

Change in individual understanding.

Interviewees identified multiple areas in which change in individual understanding through engagement in social processes was evident. These areas of learning relate to project topic (urban water management) and to project processes themselves. Interviewees frequently mentioned increased appreciation and comprehension of the integrated and complex nature of managing urban water. This change in understanding enabled some actors to provide critical input into municipal strategic documents in support of sustainable water practice. For others, participation in this project also introduced the consideration and implementation of water sensitive urban design in areas outside the project:

Our engineers are far more aware of water sensitive urban design issues...I've seen in their projects that they're cognizant ... and are starting to introduce those sorts of provisions into the work they do. (Municipal representative 8.4.1.)

Actors engaged in the collaborative planning and/or multi-disciplinary activities identified extensive learning related to the value of diverse stakeholder participation. For some municipalities participation in the CRSI governance experiment was the first time where different professions from different organisational departments jointly reflected on urban water practice within that municipality. Overall, the interviewees revealed a better understanding of the necessity for a multi-disciplinary approach in realising sustainable water management. Some actors were able to directly translate this new insight into practice and actively pursued engagement with other professionals:

[What] I have begun to appreciate and learn from the CRSI is the importance of knowledge held locally within different units because of the operations that they perform... So just, you know, getting that appreciation has helped me because I very consciously try and go and talk to different

groups, different units, with a view to hear out their experiences and invite their knowledge input into the strategy I'm developing. (Municipal representative 6.4.1.)

During the course of the project diverse disciplines started increasingly interacting with each other without being prompted to do so:

[T]he emails that go around about the design, the detailed design and everything seem to be quite far reaching in terms of how many staff they're sending them out to and I've been really impressed with that and the landscape architect and the engineer have been working quite closely together. Even before I initially held a design meeting, they'd already met to discuss a few things, which I thought was really impressive. (Municipal representative 8.4.2.)

Engagement with the wider community has been highly satisfactory for most interviewees who were at the core of the initiative. A number of initially highly sceptical actors started to appreciate the role the community potentially plays in urban water management and in particular, in the management of decentralised options:

I didn't want this community consultation...but [then] I was convinced that it's important, I'd become like a complete... I was completely convinced community consultation is important, but the next thing for me to be was how will I do it..? And that's when I started searching for tools. (Municipal representative 6.4.2)

One of the eight municipalities redirected committed funds, originally intended for implementation of project actions, to further engage the community in developing decentralised water plans.

Change in wider social units.

Social learning within wider social units is evident in the establishment of a new and formalised, political catchment-wide association named the Cooks River Alliance. This association reflects principles underlying the original governance experiment, including implementation of water sensitive urban design. Actors participating in the governance experiment continued dialogue on reframed catchment perspectives within their organisation. As a result, all eight participating municipalities have endorsed the new catchment association and committed funding to this alliance. These funding contributions collectively increased the budget allocated to organised sustainable practice in the Cooks River catchment three-fold.

Change through social interaction

A range of formal, deliberative stakeholder platforms and collaborative processes were established as part of the project design to facilitate interaction and develop effective networks. However, many opportunities for multi-disciplinary stakeholder interaction and cooperation derived independently from actions and processes associated with preparing collaborative sessions and, even more obviously, through the stakeholders developing the outcomes of these collaborative planning sessions. This resulted, amongst other things, in the design and

construction of ten site-specific water sensitive technologies that treat runoff from \approx 5.5 hectares (\approx 31,000 KL/year) and save \approx 10,000KL/year (OurRiver 2011).

Table 3.1 provides an overview of the formal platforms and processes that were designed to facilitate stakeholder interaction. The table also outlines the specific project activities that highly supported informal stakeholder interaction in CRSI. Although the formal structures and processes served important purposes, they did not automatically draw in staff from various disciplines that were traditionally involved with water management. For some of these actors, the more tangible ways of getting involved with further developing specific on-ground actions were important as they then began to see how this project approach related to their area of work and/or the role of the municipality urban water management. Actors who enrolled late and/or did not take part in the whole collaborative planning process were, nevertheless, still able to fully engage and learn from its processes:

The award has given staff a big boost which was so obvious from the two engineers [design and construction] feeling visibly proud of holding it in their hands...the managers are all talking about the award and most importantly about the integrated cross-divisional effort that has led to the recognition. (Municipal representative 8.5.1)

Table 3.1 Main platforms and process to facilitate stakeholder interaction in CRSI

Formal	Informal
<p>Platforms for collaborative planning such as community visioning sessions, planning forums, water wise tours construction planning days, rain garden planting days, and community barbeques.</p> <p>The project structure established different cross-municipal platforms. It also necessitated internal communication as municipal project leaders were environmental professionals instead of engineering professionals.</p> <p>Presentations, meetings and presence at municipalities, forums and festivals.</p>	<p>Sub-catchment profiling: this process included research on the sub-catchments social make up, its physical and organisational characteristics. Supported interaction through: e.g. workshops, focus-group discussions, walks through the catchment.</p> <p>Design and implementation of sub-catchment management plans. Supported interaction by engaging e.g. variety of staff in working out “real life example” based on collaborative planning, staff encouraging each other to engage in training sessions and discussion content.</p>

3.3.5 Factors fostering or hampering the implementation of a social learning situation

Professionals have highlighted the important role of governance experimentation in bringing about changes. While this form of experimentation may have yielded significant results in terms of creating a social learning situation, it has also been a challenging process to execute. Five overarching themes arose from the analysis in relation to factors fostering or hampering the social learning situation through governance experimentation within the Cooks River catchment: governance configuration, resource intensity, leadership, openness, and financial resources. Some of these factors have been both a fostering and a hampering factor during some stage of the project.

Governance configuration

While complex and difficult to grasp for some actors, the governance configuration was perceived as most central to the success of this initiative. It enabled the bringing together of actors who have different world views and knowledge systems within organisations and among organisations (and other stakeholders). For instance, steering committee members who were not from a background traditionally involved in urban water management were able to bring out learning dynamics at municipal level. Their different background provided a natural need for interaction between various disciplines.

The platforms that were developed (i.e. steering committee, executive champion and technical working group) provided opportunity for on-going cross-municipal sharing across diverse hierarchical levels. Even though active learning opportunities between municipalities could have been enhanced, the structure helped to widely display and debate water issues and the accumulated project effects within the catchment. This, in turn, provided impetus for the reform of regional governance arrangements.

The project team was considered most vital in supporting municipalities to execute the project:

The reason why the CRSI has been successful is there is a supportive structure with the provision of project staff (Municipal representative 7.4.1.)

The municipal interviewees revealed that the project team members played an important role as dedicated and persistent individuals who created project momentum through on-going practical and emotional support, and by keeping municipal actors accountable to the project goal.

Resource intensity

As identified above, key issues for executing the governance experiment were the relationship and the communication

between project team and the steering committee members. Although the project team carried out the greater part of the project work, there was a high reliance on steering committee members to provide and channel information, and facilitate internal municipal processes. Cooperation between these actors was severely hampered initially due to inaccessibility of the steering committee members. The majority of municipal interviewees revealed that there had not been prior understanding of the time commitment and workload involved in the implementation of this project. This project was competing with many other priorities within the municipality. It was assumed that the assigned project team would primarily be running the project and did not need too much municipal input:

I think, we thought oh, there's going to be a five project staff. Yes, we'll be involved; and there will be stuff to do... It was certainly an unexpected challenge. (Municipal representative 1.4.1)

Gaps in shared expectations, related to the resource intensiveness of the project, occasionally delayed the project, and this was identified as a source of frustration within the municipality and between the steering committee members and the project team:

You've asked a steerer to do something.., so you think, oh that's taken care of and then a week or so later or two weeks later you find out no, it's not taken care of because they haven't read the email or something and you just think: oh, why does it have to be so difficult? (Project team member 1.3.1)

Municipal interviewees disclosed in the latter round of interviews that, while CRSI had been very resource intensive, this intensiveness had also facilitated extensive individual learning and relationship building.

Leadership

The second project manager was considered instrumental in facilitating the project's processes and its overall coordination. Her personal qualities, her capacity to communicate with diverse stakeholder groups and her ability to instil confidence were seen as very important:

She's just a great communicator and a really switched-on strategic thinker and has that personality to be able to deliver... or get people to come up with outcomes...by her facilitation skills (Municipal representative 5.2.1)

Absence of leadership halfway through the project, as a result of the early departure of the initial project manager, caused a temporary lack of direction and stagnation of the project. A traditional technocratic approach came to power during this leadership vacuum. Although this was seen as constructive in motivating project staff during this time of lack of leadership, it temporarily diminished the project's social and engagement focus. The loss of project momentum, in particular, affected stakeholder engagement at the community and the executive champions' level.

Openness

The novel sub-catchment plan development was undertaken in six sub-catchments with varying social and physical characteristics across eight culturally diverse municipalities. To develop context based plans that would be meaningful to municipalities required openness to individual municipal needs. Each municipality's differing policies, procedures, approval processes and previous experiences impacted on how and when project activities were undertaken. In some cases, this meant that project processes such as physical

profiling and community engagement were integrated into existing municipal planned processes. The adaptability of the project approach and the willingness of the project team to accommodate these individual differences ensured continuing partner engagement. Municipal interviewees identified that there was sufficient scope to influence project processes and decisions, resulting in a true partnership and high levels of project ownership:

[W]hereas [in] CRSI... we have a lot of say and a lot of opportunity to feed back into the processes and be involved (Municipal representative 1.4.1.)

Financial resources

The availability of a realistic, available budget was identified as a fostering factor for the completion of the full process of experimentation, not only for developing alternative frames and understanding but also to put planning or other learning outcomes into action. As indicated earlier, activities around actions provided an incentive for some actors to become fully engaged. The project provided some municipalities for the first time with an opportunity for developing and constructing on-ground actions. Funding also allowed a specialist consultant to mentor municipal staff during these processes. Development and implementation of on-ground works required on-going community engagement and multidisciplinary engagement and have reduced perceived barriers to alternative urban water solutions:

"... [the] raingarden has been really positive for our organisation...so you suggest to do similar sort of work elsewhere...and there is not that resistance anymore" (Municipal representative 2.2.1)

3.3.6 Discussion

This paper examines a case of social learning aimed at enabling a shift towards sustainable urban water management through

governance experimentation. It demonstrates that the governance experiment was designed, structured and resourced in such a manner that social learning was facilitated and enabled from the local through to the regional level. This process of engaging a wide range of stakeholders and a variety of disciplines simultaneously across the catchment has built momentum that resulted in changed structures within the catchment. Social learning was derived from formal platforms and, perhaps more importantly, from informal, spontaneous processes associated with undertaking project activities. This suggests that the side-effects of undertaking formal activities were just as important for achieving the initiative's objectives as the actual activities themselves. Therefore, experimentation aimed at wide social learning may necessitate a diversity of processes that allow social interaction at different levels. This implies that processes to stimulate social interaction go beyond the design of participatory workshops, which seem to be often advocated as the single main mechanism for social learning (Muro and Jeffrey 2008, Garmendia and Stagl 2010).

Physical outcomes within the governance experiment were not pre-determined and project processes severely diverged from mainstream and conventional practice and learning. This put different demands on all participants. As a consequence, certain actors were at times unwilling to participate, while others experienced practical obstacles to fully engage in the project. Nevertheless, the majority of participating actors were highly satisfied with the outcomes and processes by the final stages of the governance experiment. The case-study supports the contention that ongoing, continued engagement between actors over a long period of time is necessary to build trust, consolidate relationships and develop highly functioning manners of communication (SLIM 2004b, Mostert *et al.* 2007). It also took a considerable amount of time for all participating actors (including the project team) to fully understand the initiative, which differed significantly from traditional

urban water practice. Although social learning processes in controversial settings are time consuming, costly and require external facilitation, this empirical research suggests that governance experimentation can indeed act as one of the vehicles to bring about change (Von Korff *et al.* 2012) and, by doing so, support transitions to sustainable urban water management.

As illustrated in this case study, the learning agenda provided an important starting condition for the design of the governance experiment. Through its design, the project did not only help to provide opportunities for stakeholders to explore and appreciate various actor perspectives that exist, it also gave insight into the systemic nature of each of the sub-catchment situations (in its social, historical and biophysical / ecological context). In addition, it highlighted interdependencies between different actors at an individual, organisational and societal level. Ongoing facilitation, which was firmly embedded in the project structure, provided continuous support and guidance to these learning processes.

3.3.7 Conclusion

Widespread adoption of sustainable urban water management requires a socio-technical transition in the urban water sector. Social learning fostered through governance experimentation is regarded as very important in enabling such a transition.

Extensive empirical evidence of how and to what extent social learning can occur through governance experimentation is absent in the literature. The examination of CRSI highlights the challenging operational environment of undertaking governance experimentation. It, however, also demonstrates that governance experimentation can be highly rewarding in terms of social learning outcomes, not only at the individual but also at the wider institutional level. CRSI represented an open approach of governance that went beyond involvement in organised participatory approaches. This study confirmed the importance of unorganised, informal interactions to create social learning. The case-study demonstrates that careful design of project processes and structures can draw in a wide range of actors and support them in formal and informal learning endeavours.

Acknowledgements

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References have been moved to a consolidated reference list at the end of the thesis.

Chapter 4

An Approach for Assessing Organisations Engaged in Transition Processes.

4.1 Introduction

This Chapter concentrates on organisational actors participating in a governance experiment. It develops processes and tools to assess multi-actor capacity in purposeful transition programs. Importantly, the Chapter also shows the diversity in actor capacity, and therefore it is likely that responses and outcomes of governance experiments at the organisational level are diverse as well.

Yet, independent of the pre-existing organisational capacity prior to the experiment, the study reveals the critical role of governance experiments in the development of relational capacities across the horizontal and vertical structures of the multi-actor system. Horizontal cooperation, for instance between local government organisations and other societal actors, is increasingly recognised as becoming as important as vertical cooperation with other tiers of government to develop sustainable practices (Ryan and Klug 2005, Morison and Brown 2010). Therefore, purposive transition-oriented governance processes need to be designed to develop such relational capacity. The development of relational capacity is further explored in Chapter 5.

The publication presented in this Chapter does not report on all data collected, given the significant volume of data generated during the data collection process. Prior to the actual organisational capacity assessment, a preliminary organisation wide survey was undertaken to gain a sense of the priority placed on the broader agenda of sustainability and where water sits within these organisational priorities. It is beyond the scope of this publication to report on all these preliminary findings. An example of the organisational wide survey results is however presented in Appendix C, the organisational capacity case report.

The publication has been submitted to *Technological Forecasting and Social Change*.

4.2 Declaration by candidate for publication 3 (Chapter 4)

In the case of publication 3, the nature and extent of my contribution to the work was the following:

Nature of contribution	Extent of contribution (%)
Formulation of research problem and the context of the research in the wider literature; development of assessment framework; data collection; data analysis, interpretation of results and writing	90%

The following co-authors contributed to the work. Co-authors who are students at Monash University must also indicate the extent of their contribution in percentage terms:

Name	Nature of contribution	Extent of contribution (%) for student co-authors only
Rebekah R. Brown	Formulation of research problem, interpretation of results and revision of writing.	N/A

Candidate's Signature		Date
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Declaration by co-authors

The undersigned hereby certify that:

1. the above declaration correctly reflects the nature and extent of the candidate's contribution to this work, and the nature of the contribution of each of the co-authors.
2. they meet the criteria for authorship in that they have participated in the conception, execution, or interpretation, of at least that part of the publication in their field of expertise;
3. they take public responsibility for their part of the publication, except for the responsible author who accepts overall responsibility for the publication;
4. there are no other authors of the publication according to these criteria;

5. potential conflicts of interest have been disclosed to (a) granting bodies, (b) the editor or publisher of journals or other publications, and (c) the head of the responsible academic unit; and
6. the original data are stored at the following location(s) and will be held for at least five years from the date indicated below:

Location(s)

School of Geography & Environmental Science, Monash University
--

Signature 1

	Date
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4.3 Publication 3 – Assessing organisational capacity for transition policy programs.

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Publication submitted to Technological Forecasting & Social Change

Abstract

Socio-technical system change demands engagement of and interaction between different types of social actors. Within the sustainability transitions scholarship there is limited understanding of the dynamics and capacity of these social actors in transition processes. In particular, little is known about the organisation as a social actor that can exert influence on transition policy programs. In addition, no analytical tools exist in the sustainability transitions literature to map organisational dynamics that affect transition processes. This paper presents a multi-actor assessment procedure for studying the dynamics of organisations engaged in purposive transition programs. Application of this procedure, which fundamentally provides insight into the capacity of organisations to pursue a specific sustainability goal, reveals the importance of systemic multi-actor assessment processes; demonstrates the utility of such procedures; and outlines important insights for the design of purposive transition programs. By presenting the multi-actor assessment procedure, this paper provides pragmatic guideposts for the design of future transition policy programs.

Keywords: Multi-organisational assessment procedure, organisational capacity, purposive transition programs, sustainable urban water management.

4.3.1 Introduction

Addressing sustainability challenges through social-technical system change requires “the coordination and steering of many actors and resources” (Smith *et al.* 2005, p. 1492). Since the late 1990’s, a number of theoretical approaches in the field of sustainability transitions have developed to purposefully govern and support such processes. In particular, transition management is recognised as a potentially influential governance approach to generate long-term socio-technical system change (Meadowcroft 2005, Voß *et al.* 2009, Shove and Walker 2010, Gössling *et al.* 2012). The underlying idea of transition management is that through strategic interplay between

various actors, changes in (sub) systems are created (Loorbach 2010, Frantzeskaki *et al.* 2012).

While transition management and the wider field of sustainability transitions highlight the role of actors in purposive socio-technical change processes, little is known about the specific features and dynamics of these actors in this processes (Farla *et al.* 2012, Holtz 2012, Markard *et al.* 2012). Recently attempts have been made to investigate actor orientations in transition processes (eg. Budde *et al.* 2012, Konrad *et al.* 2012). Based on these enquiries, Farla *et al.* (2012) emphasize that sustainable transition efforts require engagement and interaction between similar

and different types of actors. While this observation is evident “given the systemic nature of socio-technical transitions” (Farla *et al.* 2012, p. 995), transitions scholarship, including transition management, does not provide in-depth insight into and guidance for such multi-type actors interaction.

Implementing transition management requires the translation of visions and associated transition images from individual actors (frontrunners) into organisations through transition agenda’s and experiments. Taylor *et al.* (2011) state that behaviours and strategies adopted by an individual actor, such as a frontrunner, is highly dependent on his/her organisational culture, commitment and capacity. Existing transition management literature focuses on frontrunner characteristics and outlines how such an individual actor ought to operate (Loorbach 2010). However, this literature appears to overlook the organisational context which shapes the actions in which such an individual actor operates. This oversight is exacerbated by the fact that there are limited examples and tools to understand and/or assess organisational systems and transition contexts in the transitions literature (Ferguson, Brown, *et al.* 2012).

Against this background, this paper proposes and demonstrates a multi-organisational capacity assessment procedure to assess the organisational dynamics of organisations engaged in purposive transition policy programs. This approach, which maps multiple organisational capacities, informs purposeful sustainability transition efforts. The paper builds on the literature to develop an analytical tool for studying organisational capacity to implement a specific sustainability practice. A rating instrument is then developed to guide data collection to populate the tool. Subsequently, the tool is tested pre- and post on a self-organised, purposive transition process in the urban

water sector in Sydney Australia. Thereafter, the value and role of the analytical approach to support sustainability transitions is discussed.

For the purpose of this paper, the tool has been developed and applied to a system of local government organisations. In transitioning to a sustainable urban water future, Australian local government organisations are of critical importance as they potentially play a large role in conserving potable water, addressing waterway-health and re-using stormwater. State government led policy change programs aimed at improving urban water management often target similar types or groups of organisations (such as land developers, municipal governments and/or civic institutions (see Brown and Ryan 2000, England 2008, Morison and Brown 2011) and assume similar levels of organisational capacity between the same type of actors. Research in Australia however has established that there is a high variability of organisational capacity between local government organisations in terms of ability to: i) address more sustainable forms of urban water management, and ii) respond to policy change programs (Brown 2008a, Morison and Brown 2010). Notwithstanding the broader supply chain and variety of other organisations needed to be involved in societal change, local government organisations are an appropriate focus for assessing multi-actor capacity as they are the main service providers for realising sustainability actions (particularly in situations that involve public infrastructure) and interact with a multitude of other organisations. The procedure described in this paper was specifically developed to assess organisational capacity in terms of sustainable urban water management, a recent ideological paradigm in the urban water sector (Wong and Brown 2009).

4.3.2 *Developing an analytical framework for assessing organisational capacity*

Organisations as social actors

Katz and Kahn (1966, p. 16) define organisations as “social systems that consist of patterned activities performed by individuals”. These activities are shaped by formalised arrangements of rules, procedures and decision-making. In more recent times organisations are also seen as ‘bundles of capabilities’, which highlights aspects of competencies, culture, agility and work practices to pursue common outcomes (Black and Ulrich 1999). Therefore, an organisation can be conceptualised as an entity with a capacity to act. In this manner, organisations can “exert influence on individuals, shape communities, and transform their environments” (King *et al.* 2010, p. 292).

Organisations as social actors have intentions underpinning their actions and exist because society, or actors in society, attribute status to them (King *et al.* 2010). As social actors they are able to interact with both individual actors and other organisations (Geser 1992). King *et al.* (2010) assert that organisations are more than the combined behaviours of individual actors as they enable realisation of deliberate common objectives in such way that is unachievable by any individual actors.

Organisational capacity

To tackle the world’s sustainability challenges, organisations need to be developed and sustained not only as a single entity but also as a network (Hoberecht *et al.* 2011). Through interaction in new or strengthened networks, socio-technical change can be generated (Loorbach 2010). However, networks can be difficult to establish and/or sustain (Bell and Park 2006). Hampering factors to cooperation include differing organisational perspectives, language and procedures (O’Toole 2003). Even when there is willingness to engage in pursuing a collective sustainability agenda,

organisations have difficulties to sufficiently do so as they experience deficiencies in their capabilities (Bell and Park 2006, Hoberecht *et al.* 2011). To support and build competences for system change, organisations not only need to develop inter-organisational capacities to create cultures of cooperation, they also need to develop intra-organisational capacity to create organisational commitment and support to enact alternative policy goals and practice (Hill and Hupe 2003, Barman and MacIndoe 2012).

The concept of organisational capacity has been defined by Morison (2009, p. 65 based on Honadle (1981)) as an organisation’s “ability to anticipate and influence change, make informed and intelligent policy decisions, attract, absorb, and manage resources, and evaluate current activities to guide future action”. Brown (2008a) states that assessing organisational capacity helps to identify the stage of development of an organisation in relationship to pursuing a societal sustainability goal. Therefore, in line with Barman and MacIndoe (2012), our definition of organisational capacity refers to the implementation of innovative ideologies and practice and does not denote the ability of an organisation to execute routine practice.

In the field of public administration, it is widely recognised that understanding organisational maturity of individual organisations is an important aspect of effective execution of inter-organisational change programs and developing inter-organisational networks (Christensen and Gazley 2008, McGuire and Silvia 2010). Establishing inter-organisational networks is of particular significance in addressing sustainability challenges in “interconnected social, ecological and infrastructural systems that are often governed by overlapping and intersecting electoral boundaries” (Morison and Brown 2010, p. 198), such as river catchments. Such systems demand the involvement of a diversity of public, private and non-government sector organisations. While coordination between all these type of organisations is required, extensive

cooperation is especially needed between local government organisations; as this is the level where many sustainability challenges manifest itself (Hoppe and Coenen 2011). As indicated in the introduction, local government organisations are the focus of this study.

Assessing organisational capacity

While pre-existing organisational capacity of organisations involved in purposeful change programs is considered important, there is limited empirical attention for this consideration within the existing public administration and organisational studies literature (Morison and Brown 2010). Further, only few conceptual frameworks have been developed which could support the systematical examination of organisational characteristics in relation to a sustainable practice or paradigm.

Based on research into local government organisational dynamics for urban stormwater quality improvement in Sydney, Australia, Brown (Brown 2003, 2008a) developed a typology of organisational development that reflects varying levels of relative organisational capacity for executing sustainable practices. Within this model it is proposed that there are five transitional phases in regard to transitioning to a new practice. These phases span from a very basic level of capacity (Project) to a very high level of capacity (Integrated) for undertaking a certain sustainability practice. The conceptual model provides a framework to broadly indicate where a local government organisation is positioned along the continuum of desired sustainable practices. Drawing on the field of sustainable urban water management, Table 4.1 presents the main features of Brown's (2008a) framework. The table highlights a number of indicative variables for each organisational development phase.

While Brown's framework provides the 'architecture of the organisational transition'

in terms of the capacity pathway for institutionalising a sectoral practice transition, it does not provide an accompanying diagnostic tool to allow the assessment of a wide range of organisational variables.

Literature on the non-for profit sector provides some pragmatic, analytical tools and insights that could assist with the investigation into organisational dynamics (Krishnaveni and Sripirabaa 2008, see Brown 2012). Of particular use in furthering Brown's typology, is a capacity assessment grid developed by McKinsey & Company (McKinsey & Company 2001). This tool provides a practical and elaborate basis for evaluation of a range of organisational dynamics. Although the grid is developed for measuring capacity in non-profit organisations, it is considered of relevance to evaluating organisational dynamics in local government organisations as opposed to private sector ones, as it provides flexibility for adaptation and inclusion of issues relevant to such organisations, i.e. political related matters. The framework consists of seven elements of intra-organisational capacity (McKinsey & Company 2001, p. 33-34): aspirations, strategy, organisational skills, human resources, systems and infrastructure, organisational structure and culture. Again drawing on the field of sustainable urban water management, Table 4.2 explains these seven capacity variables and outlines the dimensions of assessment for each organisational capacity variable. While the variables in this table are based on McKinsey & Company's (2001), the dimensions have been adapted to suite urban water management in the local government sector.

As part of this framework, McKinsey and Company (2001) also developed a rating tool to measure capacity in each of the capacity variable. While their framework provides clear guidance on how to undertake an organisational diagnosis, it does not help to understand what this capacity means in comparison to other organisations.

Table 4.1 Typology of organisational development phases for sustainable urban water management

Project (Very basic level of capacity)	Outsider (Basic level of capacity)	Growth (Moderate level of capacity)	Insider (High level of capacity)	Integrated (Very high level of capacity)
<ul style="list-style-type: none"> • SUWM not an organisational priority • Basic compliance with state mandates (policy and community engagement) • Commitment deficit (ideological and capacity related) • No dedicated staff hours for SUWM activities; ad hoc activities are with individual technical officer • An isolated, externally-funded SUWM project may exist • Any SUWM activity externally driven; not related to core business • Very limited inter-departmental relations 	<ul style="list-style-type: none"> • Some organisational unit or department related to environment is defined • Still low priority for SUWM • SUWM activity dealt with by individual, likely to be environmental or technical officer. • Internal conflict between departments; especially between environmental officer(s) and other departments in organisation • Reliance on successful grants • No agreements and funding for operations and maintenance of on-ground works • External stakeholder engagement for legitimacy • Poor inter-organisational relationships 	<ul style="list-style-type: none"> • Growing commitment for SUWM at political, managerial and community level. • SUWM driven by consistent formal/informal network • Dedicated staff hours dedicated to SUWM activities • Still highly dependent on external skills • Some internal conflict regarding roles and responsibilities persists • Proficient in obtaining external grants for projects • Increasing internal funding for SUWM • Champions with moderate influence are becoming apparent • Extended stakeholder network established, but tensions between the organisations • Increasingly extended community consultation 	<ul style="list-style-type: none"> • Stronger inter-agency relationships, but collaboration is limited to some units. • Emerging industry leader • Good knowledge and skills on SUWM across departments • Stronger departmental relations particularly between engineering, planning and environment • Collaboration with research and non-governmental organisations. • Development Control Plans for SUWM developed • Operation and maintenance (O&M) staff involved in design 	<ul style="list-style-type: none"> • Commitment to SUWM policy at all levels within the organisation • Sustainable policies translated into work plan and built in performance assessments • Dedicated and effective interdepartmental committees • Dedicated funding for SUWM projects, including their O&M • Organisational culture values cooperation, research, community participation and principles of sustainability • Systems to measure SUWM performance and manage knowledge well developed, reported upon and used. • Intergovernmental leadership role; organisation has high ability to influence • Strong community governance

Adapted from Brown (2008a), Morison (2009) and Taylor (2009).

An analytical tool and grading framework for assessing organisational capacity

The variables as outlined by McKinsey and Company's (2001) provide a powerful framework for assessing multi-actor municipal capacity. Hence, these diagnostic variables have been brought together with Brown's (2008a) framework, and thereby extends this framework so that it can be operationalised.

Brown's framework (2008a) was selected over others as it was specifically developed for assessing local government organisations. This in contrast to, for instance, the framework developed by Dunphy et al. (2003) that focused on measuring organisational capacity in the private sector. Typologies similar to Brown's (2008a) have been created by Margerum (2001) after examination of

collaborative catchment management strategies in the United States and Australia, and by Agranoff and McGuire (2003) who reviewed an intergovernmental economic development program. None of these frameworks, however, is as operationalisable as Brown's.

The combined insights Brown's (2008a) typology and McKinsey & Company's (2001) framework resulted in an analytical tool that formed the backbone of the empirical investigation. This tool integrates the transitional phases of organisational development with the capacity variables of intra-organisational capacity. To organise and communicate data and information in a clear manner, an 'organisational capacity circle' that represents this integration has been developed (see Figure 4.1).

Table 4.2 Variables and dimensions for assessment of sustainable urban water management (SUWM)

<i>Variable</i>	<i>Description</i>	<i>Dimensions of assessment</i>
Aspirations	Vision, goals and commitment , which collectively expresses the organisations common sense of purpose in regard to SUWM	1. SUWM aspirations articulated 2. Elected member commitment to SUWM 3. Executive commitment to SUWM 4. Internal political priority by management and staff for SUWM
Strategy	An integrated set of programs, activities and funding aimed at accomplishing the organisations overarching SUWM aspirations.	5. Policies and strategies for achieving SUWM 6. Funding for pursuing SUWM 7. Local implementation goals and performance targets for SUWM
Organisational capabilities	The collective set of processes through which the organisation develops, implements, and measures SUWM activities	8. Day-to-day operations for SUWM, including measurement of SUWM performance 9. Stakeholder engagement, including communities involved in planning, execution and management of SUWM 10. Development and nurturing of inter-organisational relationships
Human Resources	The combined set of knowledge, skills, experiences and availability of staff within the organisation to make SUWM happen.	11. Staff responsibilities & leadership for SUWM 12. Overall expertise and depth of knowledge 13. External dependence on knowledge
Systems and infrastructure	The formal and informal processes, systems and assets that make SUWM work within organisation.	14. Planning & Development controls for SUWM 15. SUWM (non) structural measures 16. Operation and maintenance of SUWM infrastructure 17. Knowledge management regarding SUWM
Organisational structure	Inter-functional coordination that shapes the organisation’s structure to enable SUWM.	18. Inter-departmental SUWM coordination
Culture	The “connective tissue that binds together the organisation” to work towards a more sustainable practice of managing urban water.	19. SUWM as shared values and beliefs

Adapted from Bolton et al. (2007), Brown (2008a), DECC, (2007), Mc Kinsey and Company (2001) and Taylor (2009)

This circle shows the phases of development of an organisation in regard to a societal sustainability goal and the numbers indicate the dimensions for assessment in each of the organisational capacity variables. By shading the level of capacity in each of the dimensions, a picture derives of where an organisation stands in terms of achieving a

sustainability goal. Shading that stays close to the centre indicates a low capacity in that area. If shading is full to the outer edge of the circles wedges, our hypothesis is that sustainability practice is mainstreamed in that area of the organisation. The circle shows some similarities in presentation with the adaptive capacity wheel developed by Gupta

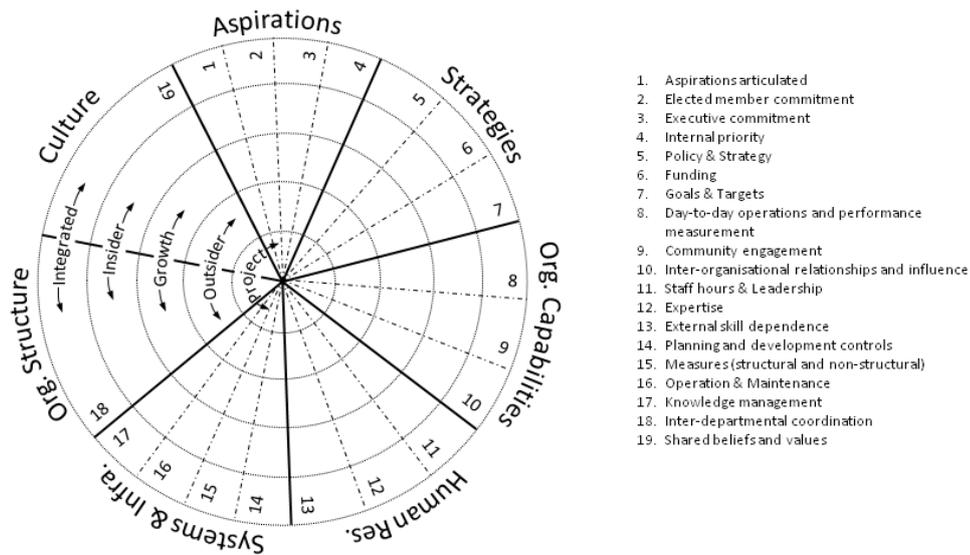


Figure 4.1 The organisational capacity circle

et al. (2010). However, this cycle focuses on individual organisations instead of institutions. The tool, similar to the one as outlined by Gupta et al. (2010), should be regarded as an ‘analytical structuring tool’ that offers insight into organisational capacity, and by doing so provides an in-depth overview of organisational context in which sustainable transition efforts take place.

Accompanying the analytic tool for capacity assessment is an instrument that helps to populate the tool. This rating instrument consists of 30 questions in relation to the seven organisational dynamic variables of McKinsey and Company (2001) and organisational development phases as outlined by Brown (2008a). See Table 4.3 for an example of this data collection tool. The instrument should be seen as a grading framework for organisational dynamics instead of a precise measure of organisational capacity.

4.3.3 Application of the organisational capacity framework

To demonstrate the applicability of the tool in purposive transition processes, the tool was utilised to assess organisational capacity in local government organisations engaged in

such a process for sustainable urban water management in the Cooks River catchment, Sydney, Australia. This section, firstly, provides the background and context in which the tool was used. Secondly, an outline of the research methods to assess capacity within the organisations is presented. The subsequent sections present the results of the assessment.

Background and context

In Australia, local government developed approximately between 1850 and 1925 (Dollery *et al.* 2006). Often characterised by its general responsibility for ‘roads, rates and rubbish’, local government has traditionally been set up to deliver a limited range of functions that concentrate on ‘services to property’ (Dollery *et al.* 2008). Throughout its history, engineers and capital work programs have been the dominant forces in driving service priorities in local government.

While local urban drainage has historically been a responsibility for local government, it received little priority and was considered a minor practice as part of important road developments (Brown 2005).

Table 4.3 Rating instrument: sample statements

	Phases	Project	Outsider	Growth	Insider	Integrated
Organisational situation in terms of:						
... SUWM aspirations?		No shared understanding of what the organisation aspires to become with regard to SUWM.	Little shared understanding of what the organisation aspires to become with regard to SUWM	Somewhat clear or specific understanding of what organisation aspires to become or achieve in regard to SUWM, held by only a few; Sustainability aspirations are documented in strategic and corporate documents.	Clear or specific understanding of what the organisation aspires to become or achieve in regard to SUWM, held more widely throughout the organisation; SUWM aspirations are clearly articulated in strategic and corporate documents.	Clear, specific and compelling understanding of what the organisation aspires to become or achieve, broadly held throughout the organisation; SUWM aspirations are clearly articulated in strategic and corporate documents and are integrated across a range of operational areas.
... elected member commitment to SUWM?		No elected member commitment or priority to SUWM issues within municipality.	Broad elected member commitment to environment and sustainability but these are not translated into practice	Elected members are collectively concerned about environmental reputation; Minority of elected members interested in SUWM issues; A forum for community, municipal staff and elected members to tackle environment /sustainability matters is established.	Elected members are interested in a range of SUWM issues; The environment is on the elected members' agenda and some broader interest in SUWM starts to appear; Elected members occasionally attend environment events; Elected members ask staff to report on SUWM issues.	Collective commitment to SUWM across elected members; Elected members actively participate with community and municipal staff in an environment/SUWM committee; Elected members regularly attend environmental events; Elected members request staff reports on SUWM and environmental issues.
... policy for SUWM?		SUWM activities driven by regulatory compliance from State Government	An internal policy/strategy for sustainability or the environment – which includes reference to 'water as a resource' is developed but there is no relationship to the municipal management plan.	Broad SUWM policy/strategy exists (or SUWM is clearly part of the overall strategy) and is increasingly used in organisational decision-making as it is linked to the management plan.	Specific SUWM policies/strategies are often used to direct actions and set priorities; Policies/strategies have been translated in cross sectional responsibilities, which are spelled out in management plan.	Specific SUWM policies/strategies consistently used to direct actions and set priorities. Initiatives set out in the management plan, are adopted and reflected in the work plans.
... funding for SUWM?		SUWM related activities are highly dependent on scattered grants-in-aid; No dedicated internal resources for SUWM.	SUWM related activities highly dependent on external grants; Environmental team is actively trying to secure funding through writing grant applications; Very limited or no dedicated internal resources for SUWM	SUWM related activities funded through some dedicated internal resources which are reflected in the municipal budget; Environmental team is often successful in obtaining project based external grants.	Dedicated internal resource allocation (reflected in municipal budget) for funding of ongoing SUWM activities on top of external dedicated funds; Budget roughly distributed according to priority as outlined in a SUWM plan.	Dedicated internal resources; Allocation for ongoing SUWM activities on top of external dedicated funds; Budget distributed according to priority as outlined in plan; Benchmarking of SUWM funding is being undertaken with neighbouring or a grouping of municipalities.

Adapted from Bolton et al. (2007), Brown (2008a), DECC, (2007), Mc Kinsey and Company (2001) and Taylor (2009)

The low importance placed on stormwater management combined with the rapid urban land development, and hence rapidly constructed drainage networks and the inadequate maintenance practices, resulted in major flooding problems (Brown 2005). Therefore, until the 1980's, stormwater was primarily associated with as a flooding nuisance (Wong and Eadie 2000). At that time, there was very little acknowledgement of its ecological and social significance.

Since the 1990's, environmental management and sustainability have become a growing focus within local government, and recently gaining importance due to changing community values and global movements (Brown 2005). As a result, the role of water in society is changing. For example, stormwater is increasingly seen as a resource, waterway amenity has become a social value, and potable water is to be conserved. In addition, a strong link between the quality of stormwater and the health of waterway has been established.

These new developments make water a vexed question in local government organisations as road engineers are not water specialists and water is no longer a single engineering problem. Neither is it a sole conservation or water quality problem. Stormwater servicing no longer sits neatly in a single department (ie. roads section in engineering department), but has become distributed over a variety of departments and professions (see also Cettner *et al.* 2012). Based on research into 38 local government organisations in Victoria, Australia, Morison (Morison 2009) states that environmental officers (typically in planning or environmental departments) are generally inclined towards more sustainable forms of urban water management as they are aware of current problems and potential solutions, and

are prepared to apply various policy instruments. However, "implementation occurs in the domain of the engineers and statutory planners via capital projects and the regulation of private development" (Morison 2009, p. 236).

Urban water can only be managed in a sustainable manner by achieving horizontal integration and cooperation across different functional departments and related professions. This, however, presents an enormous challenge to organisations that traditionally operate in a 'silo' structure such as local government, where the structuring of these organisations are designed to optimise intra-departmental performance targets as opposed to cross-departmental interactions (Rauch *et al.* 2005, Brown 2008a). Figure 4.2 provides an overview of a typical organisational structure of an urban local government organisation in New South Wales, Australia.

Against this background, The New South Wales Government (Australia) dedicated \$ 2 million (AUD) to a three-year governance experiment to encourage and support sustainable urban water management (SUWM) in the Cooks River catchment in Sydney. This initiative, the OurRiver - Cooks River Sustainability Initiative (CRSI), was a partnership between eight local municipalities in the Cooks River catchment and a university, to enhance new understandings of the urban water system among a wide range of actors in the Cooks River catchment and to build capacity and collaboration for SUWM, not only among but also within organisations. The initiative ran between 2007 and 2011 and further details of the initiative are described in Bos and Brown (2012). This initiative was a governance experiment and is considered similar to a transition program and analysed as such.

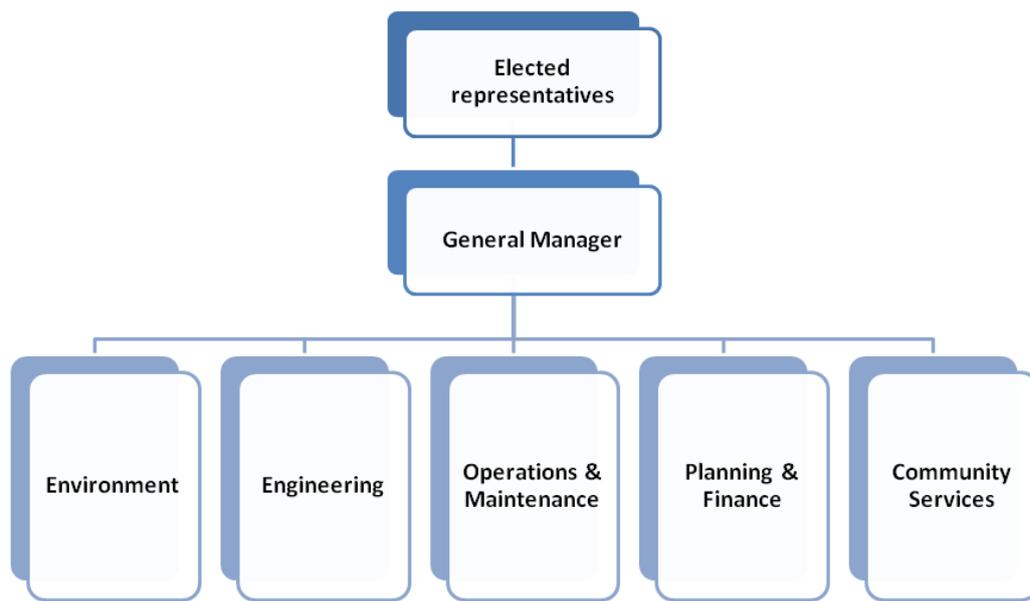


Figure 4.2 Typical organisational structure for local government organisation in New South Wales, Australia

Research design

The underlying research questions that involved application of the analytical tool were: (i) what are the existing organisational characteristics in terms of supporting sustainable urban water management within the local government organisations and the Cooks River; (ii) how do these organisations compare in terms of organisational capacity; and (iii) which areas of organisational capacity have benefited from participating in the OurRiver – Cooks River Sustainability Initiative. The research involved multiple local government organisations (municipalities) implementing a single policy event, namely the CRSI (Hill and Hupe 2002). A multiple-case study method (Yin 2009) was employed to explore the research questions. Six municipalities participated in this research.

The six case-studies within this research share the same administrative, technological and regulatory structure in which they operate, they however differ in size, and local socio-political and economical contexts. Out of the six municipalities, only one municipality had previously engaged in

trialling an alternative water planning approach.

The research was conducted over two phases, employing a number of data collection methods (see Table 4.4). Phase 1 consisted of in-depth assessment of each of the organisational dynamics in regard to SUWM. The assessment aimed to capture insights of a broad spectrum of individuals and groups functioning in the municipal environment. Therefore, multiple methods (for details see Table 4.4) were employed to ensure wide participation of organisational stakeholders across hierarchical levels and disciplines.

Preliminary research consisted of testing and validation of the rating instrument (See Table 4.3 for example). This was done through a review panel session with leading water sector representatives from local and state government organisations, academic institutions, consultancy firms and the water utility. The rating instrument was self-administered and employed as part of a focus-group interview.

Table 4.4 Data collection methods

Data Collection Method	Phase 1 – Pre-Transition Program	Phase 2 – Post Transition Program
Self-evaluation rating tool (Table 3)	N = 43 (Municipal-water decision-makers across departments and hierarchical levels)	
Interviews	Inside organisation N = 14 (Executive and environmental officer level staff) Outside organisation N = 4 (Sector specialists)	Inside organisation N = 12 (Executive and environmental officer level staff)
Focus-group interviews	Total six (One in each municipality with decision-makers in water management across organisation)	Total three (One with senior executives, one with municipal officers, one with the project team)
Organisation - urban water management survey	N = 86 (Staff across organisation with responsibilities in urban water)	
Organisation - OurRiver-Cooks River Sustainability Initiative post program survey		N = 61 (Staff across organisations that had participated in initiative)
Field-based observations	During visits, meetings, etc.	During visits, meetings, etc.
Documentation – Secondary data	Review of municipal strategies, policies, plans and reports	Review of documentation that emerged from the OurRiver-Cooks River Sustainability Initiative and municipal reports.

Before the interview started, all participants were asked to answer the 40 questions that make up the rating tool.

Quantitative data was descriptively analysed and all interviews were transcribed and analysed using NVIVO 9.

The researchers interpreted and triangulated (Yin 2009) the data derived from the multiple sources and scored each organisation along the organisational development continuum (see Table 4.1).

Phase 2 examined the organisational

response to participating in the governance experiment. Also multiple sources of data informed this phase of the research (Table 4.4), which was primarily about obtaining information about change in organisational dynamics over the past three years. A similar process of data analysis was followed as outlined in phase 1.

To be able to differentiate the organisational dynamics between the six municipalities, a reporting code has been used in the results section as outlined in Table 4.5.

Table 4.5 Reporting codes

Code	Organisation
M1	Municipal organisation 1
M2	Municipal organisation 2
M3	Municipal organisation 3
M4	Municipal organisation 4
M5	Municipal organisation 5
M6	Municipal organisation 6

4.3.4 Characterising organisational dynamics: results from Phase 1

As depicted in Figure 4.3, the results of the organisational capacity assessment reflect varying level of overall municipal capacity for SUWM among the municipalities in the Cooks River catchment. The data reveals that SUWM is an entirely new notion for one municipality [M1] (being in the project phase), whereas the remaining organisations have started to internalise and apply the concept (from outsider to integrated phase).

The organisational dynamics of each municipality are further detailed in Figure 4.4. The light shaded area in each of the organisational capacity cycles indicates the relative capacity of a municipality

The following sub-sections outline the organisational dynamics across the six case-studies per dynamic variables.

Aspirations & Strategy

Aspirations in regard to various aspects of SUWM were articulated in a comprehensive long-term vision in the highest-capacity case [M6]. While all municipal staff in this organisation was broadly aware of municipal’s sustainability aspirations, a high level of commitment to them was found across the elected officials, several senior executives and a driven group of individuals. The SUWM aspirations were translated in provisions for SUWM in the Corporate Plan, the Environmental Management Plan and other important municipal documents. A clear synergy regarding SUWM aspects existed between these documents and they were used for municipal decision-making. Although

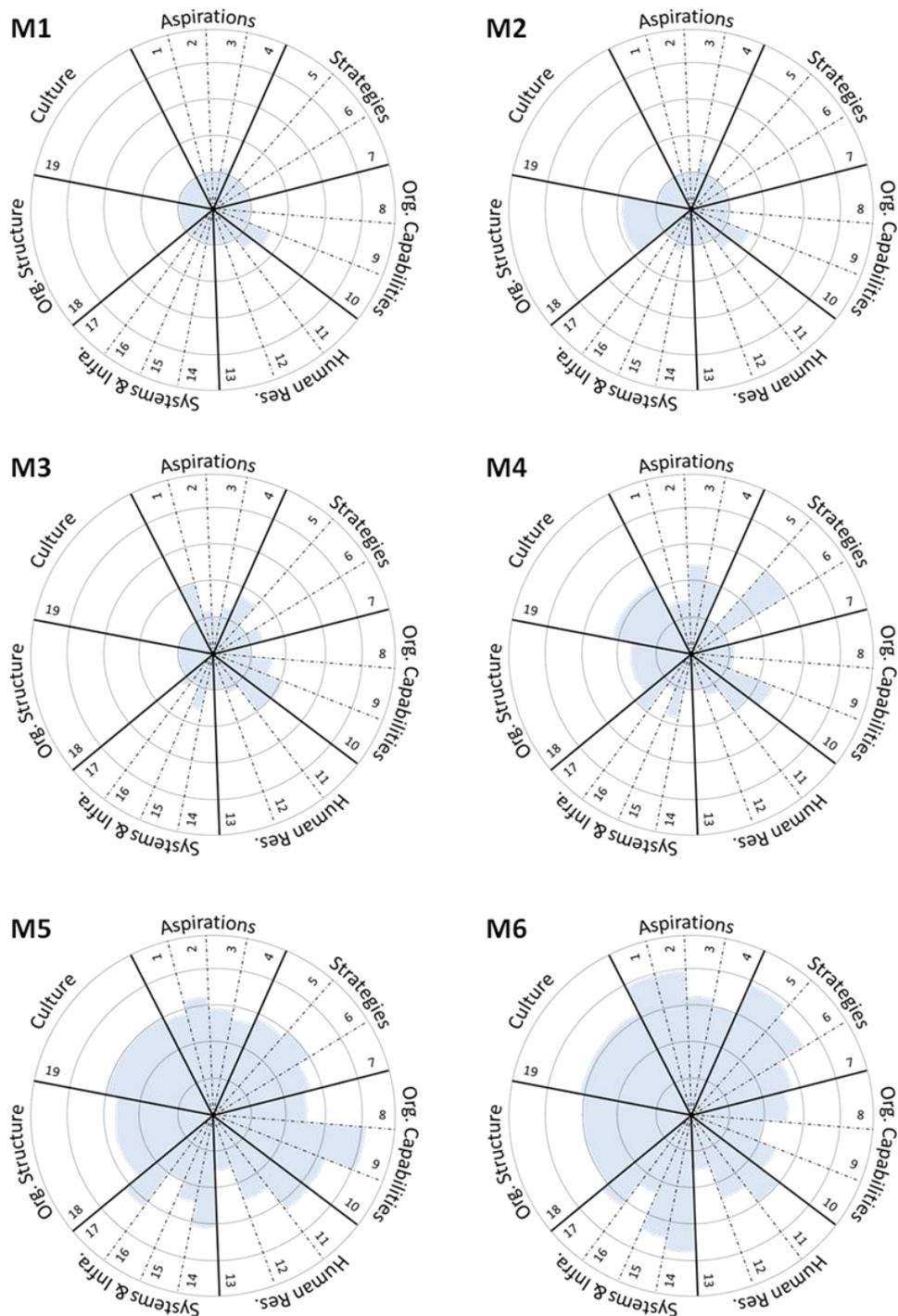
existing documentation provided certain direction, no specific policy or strategy was developed. The second highest capacity case [M5] had also articulated ambitions for SUWM which recognised the importance of water sensitive infrastructure and extensive community involvement. These aspirations, however, were scattered throughout a number of policies, plans and other documents and the organisation lacked a coherent strategy. Also in this case, a consistent network of driven individuals with moderate influence in the organisation carried these aspirations. They were actively supported in their efforts by a number of elected officials and senior executives. This was for instance demonstrated by elected officials actively participating in community and other events related to SUWM.

In contrast to these higher-capacity cases, organisational aspirations for SUWM, while variable, were markedly lower for the other cases. For cases [M1, M2 & M4] aspirations for SUWM were minimal and involved some broad, loose statements in relation to water conservation and/or water quality improvement. Whereas case [M3] had these statements further developed in a newly developed overall ten-year strategic plan. During the time of this assessment, case [M2] was in the development of an integrated water management plan. At that stage, this plan had very limited consideration of SUWM in its approach to urban water management.

Internal organisational priority for SUWM by the low-to-moderate capacity organisations was driven by either an individual [M1& M2] or a loose, small, informal network of like-minded people [M3 & M4].



Figure 4.3 Organisational development phases of organisations involved in Cooks River Sustainability Initiative



- | | | |
|------------------------------|--|--|
| 1. Aspirations articulated | 8. Day-to-day operations and performance measurement | 14. Planning and development controls |
| 2. Elected member commitment | 9. Community engagement | 15. Measures: (non) structural and non-structural) |
| 3. Executive commitment | 10. Inter-organisational rel. and inf. | 16. Operation & Maintenance |
| 4. Internal priority | 11. Staff hours & Leadership | 17. Knowledge management |
| 5. Policy & Strategy | 12. Expertise | 18. Inter-departmental coordination |
| 6. Funding | 13. External skill dependence | 19. Shared beliefs and values |
| 7. Goals & Targets | | |

Figure 4.4 Pre-existing organisational capacity

Whilst each of these cases have an organisation unit or department related to the environment, overall low political and senior executive interest and/or commitment to environmental sustainability was identified. Some vision for environmental sustainability was, however, detected among a few senior executives in case [M4]. This had translated in stable support for some SUWM related activities such as implementation of water sensitive infrastructure at town centres.

Overall, the majority of performance targets for SUWM related to water quantity. Within the low-to-moderate capacity cases (M1, M2 & M4) these targets had merely derived from regulatory obligations, whereas the other cases had intentionally supplemented these targets. Performance targets for water recycling only existed in the highest capacity case [M6]. Broad targets for water quality were only found in cases [M3 and M5]. In all cases that had established performance targets beyond regulatory obligation it was noted that these targets were not commonly known. In addition, they provided no [M3] to very limited guidance [M5 & M6] to daily practice.

In cases [M1, M2 & M3] where SUWM was not a political and executive priority, very low internal resources were devoted to SUWM practice. While cases [M4, M5 & M6] all experienced some sort of limitations with internal budget for SUWM, each had capital funding, derived from a dedicated stormwater levy, committed to furthering SUWM related infrastructure. Municipal officers [M1, M2 & M3] believed that SUWM would only significantly develop through continuing external grant funding and/or change in elected officials and senior staff.

Organisational Capabilities

The two lower capacity cases [M1 & M2] ran SUWM operations mostly unintentionally. These municipalities regarded the practice of SUWM as one-off projects. In contrast, the higher-capacity cases [M5 and M6] were much more intentional about their processes. Nevertheless, the earlier identified lack of

widely known and adopted targets, were impeding on day-to-day operations and performance measurement. Performance progress [M5] was partially measured and tracked against broad municipal targets. However, detailed measurement and tracking of performance of SUWM infrastructure was done to a very limited extent. It was assumed [M6] that infrastructure performed well, but what, for instance, the amount of re-use was from certain stormwater harvesting schemes in comparison to the potable use was not known. A similar situation was found for case [M4] where municipal depot services were continuously provided with rainwater tanks but no-one knew the actual amount of water conserved. It was also observed that none of the cases could actually identify what the result of their overall projects was in terms of reduced water pollution and reduced flooding. There were no metrics or systems in place in order to make measurement for these aspects of SUWM happening. Most evaluations were based on anecdotal evidence.

One of the higher capacity cases [M5] had an extensive, well-established and actively facilitated local stakeholder network concerned with SUWM. This network was consulted for purposes beyond obtaining internal legitimacy and advocacy for more resources for SUWM. This growing external stakeholder network, managed by some individuals, had as purpose to influence and/or inform SUWM decision-making included local residents, business and other catchment municipalities. Meaningful relationships were also built between municipal officers and research groups. In the vertical direction this municipality was reasonably successful in attracting involvement from some State Government officials in SUWM planning processes. There was, however, frustration experienced in commitment and genuine (regulatory) support to SUWM practices. This sentiment was shared by case [M6] where officers described poor relationships and lack of support by State Agencies to further SUWM. The latter case had some external engagement

with State Governments, other municipalities and community groups, though they were not comprehensively developed for SUWM. Active collaboration with external stakeholder for most of the cases [M1, M2, M3, M4 & M6] consisted mostly through engagement in grant funded projects and participation in catchment working groups. The municipal organisations have different objectives for engaging in collaborative grant funded projects. They range from enhancing municipal reputation [M1 & M2] to building external political capital to achieve (increased) internal legitimacy [M3 & M4]. Officers [M6] stated the importance of the individual and collective learning potential that derives from participating in collaborative undertakings.

Officers [M3, M5, & M 6] strived to inform and influence the local community on water related sustainability issues within their Local Government Area through the media. New initiatives or water sensitive infrastructures were being actively advocated and press releases regularly prepared. The other cases had not been actively seeking or unable to gauge the interest of the local media for regular SUWM updates. All cases, except [M5], had limited experience in meaningful engaging of the community about water management. There was a perceived risk of creating expectations that could not be fulfilled by the municipal organisations. While some individuals have willingness to develop a two-way process of engagement, most actual community engagement in relation to water was restricted to the provision of information which assists in understanding services, problems, alternatives and solutions. High active community participation in running general environmental initiatives was found in case [M3]. The two lowest capacity cases [M1, M2] merely complied with state mandates in relation to informing the community in regard to environmental sustainability and water issues.

Human Resources

SUWM was primarily driven by officers that are located in the environmental department. Each of the cases had someone actively trying to champion SUWM in order for the practice to gain broader priority within the municipality. Champions in the higher-capacity cases [M5 & M6] played a more networking and knowledge brokering role. They appeared to have higher corporate influence in comparison to the other cases. However, officers in each of the cases identified the need for active, senior champions to make SUWM happen in practice.

Staff positions related to SUWM were created and filled in the higher-capacity cases [M5 & M6]. While SUWM related activities were starting to be horizontally shared across multiple sections, these activities were not part of the formal portfolio of a range of people across the municipality. Responsibilities for SUWM related activities in the lower capacity cases [M1 & M2] were ad-hoc, while in the low-to-moderate capacity cases [M3 & M4] environmental officers were eligible to dedicate a number of hours to SUWM. These activities competed with numerous other environmental issues that the environmental officers needed to attend to. Interest in water sensitive infrastructure from some individuals in the engineering and/or park department started to emerge in cases [M3 & M4].

In general, SUWM was seen as a relative new area of operation. Comprehensive understanding, capacity and expertise in this field were considered lacking, also in the higher-capacity cases [M5 & M6] with the exception of some specific staff. While the higher-capacity cases were developing their in-house expertise for SUWM, all cases recognised that their municipalities were highly dependent on consultants, especially for design, construction, and supervision of

the construction of SUWM related infrastructure.

Depending on their disposition towards SUWM, staff had increasingly the ability to question external providers. Case [M5] was in the process of developing strategies so that over time a relationship with a group of consultant could be built and skills could be transferred. Officers [M5] cautioned that not all external consultants, even good ones, have developed full SUWM knowledge.

Skill development through training took overall place on individual request external of the organisation. It did not seem to be widely known what SUWM training opportunities were available to officers [M1 - M4] and whether the municipality would be willing to support these.

Systems & Infrastructure

Very limited provisions in support for SUWM were found in the municipal planning and development documentation such as the Local Environmental Plan (LEP) and the Development Control Plans (DCP) of each of the low-to-moderate capacity cases [M1 - M4]. Within the DCPs there was no provision in regard to stormwater quality, waterway health, demand/ end use management, and other SUWM related measures/activities. The provisions with the DCPs of case [M5 & M6] are more supportive, in particularly DCPs that outline planning controls for water, stormwater and water sensitive infrastructure [M6].

Cases [M5, M6 and to a lesser extent M4] were pro-active in trialling a range water sensitive technologies on the ground. These included stormwater harvesting and water recycling systems, permeable paving projects, raingardens and swales. Within the two highest capacity organisations [M5 & M6], officers claimed that water sensitive infrastructure was considered a standard element of capital works. Some staff [M4] argued that the water sensitive initiatives so far had been superficial and had primarily aimed at political satisfaction instead of environmental benefit. The remaining cases

[M1 - M3] had some water sensitive infrastructure implemented which were primarily developed through grant funded projects. Some short term funding provisions for operation and maintenance (O&M) of the implemented technology are generally being made. Continuous measures for undertaking O&M only existed to a very limited extent in all cases. Most O&M of more traditional and technological water sensitive infrastructure is often contracted out, but not monitored by the municipalities. In most cases, except case [M6], O&M was viewed as an add-on requirement that is competing for a portion of an already stretched and limited resource. Overall, it seemed that O&M staff was very limited involved in design of water sensitive infrastructure and that on-going operation costs were not taken into account technologies were planned and constructed.

Non-structural measures that aimed to increase the up-take of SUWM within the community include the promotion of water saving rainwater tanks incentive schemes [M5], school grants [M4], sustainability workshops [M4, M5 & M6] and sustainability resource centres [M5 & M6]. Several cases also actively supported water saving incentives schemes provided by Sydney Water, the water corporation [M3 & M6].

Information systems (IT) such as geographic information systems (GIS) were generally reasonably well developed for stormwater related infrastructure. IT systems, such as MUSIC modelling for developing water sensitive infrastructure, were available but not widely used in cases [M4, M5 & M6]. The lower capacity cases [M1 - M3] did not have access or make use of this tool.

None of the cases had a functioning knowledge system for the creation, capture, storage and dissemination of SUWM information. Knowledge related to different aspects of SUWM was mainly held by individual in each of the organisations.

Organisational Structure

The practice of SUWM was not considered a legitimate area of corporate activity, beyond

the environmental department, in the lower-capacity cases [M1, M2 & M3]. This had direct consequences for either the willingness or corporate necessity to cooperate. A formal inter-departmental group for SUWM was established in case [M5]. It was believed that this working group is a mechanism that potentially can further the municipality by structuring SUWM activities, rather than doing them ad-hoc. The group has been very successful in helping different disciplines to better understand each other's languages. Intensified communication has especially helped to develop a closer relationship between different departments such as the Engineering and Environment department. While a certain level of commitment to this group was identified among all its members' it was not exactly clear to everyone what their role in the group was. It became evident that some internal conflict regarding agenda, roles, and responsibilities persisted in this organisation.

Internal conflicts in regard to SUWM were evident between environmental officers and other departments in cases [M1, M3 & M4] as well. Within these cases, departments were functioning as silos which led to very limited communication and exchange of information. These issues were also present in case [M6] and SUWM activities are not fully coordinated. However a willingness to cooperate between different municipal groups was identified. In case [M1], different officers/departments with roles and responsibilities had never reflected on their inter-dependencies in regard to urban water management and no substantial inter-departmental relationships in regard to SUWM existed. Staff [M2] claimed that while information could be better shared internally, coordination within their organisation was not an issue due to its small size. Overall, municipal staff was of the opinion that collaboration in inter-departmental groups was very important for furthering environmental sustainability practices.

Culture

Shared beliefs and values for SUWM were significantly broader in the cases [M4, M5 & M6] that had a more positive disposition to environmental sustainability. These SUWM beliefs/values, however, were not yet widespread across the whole of staff within these municipal organisations. Genuine sharing of these beliefs/values was limited to a relatively small network in each of these cases. Even in the highest capacity organisation [M6], SUWM was not yet an overall cultural practice and was seen as strongly competing with other environmental issues that are more directly seen as impacting climate change, such as energy.

Environmental sustainability, and inevitably SUWM, was a very recent concept for the lowest capacity case [M1] and was primarily addressed for reputation purposes. In this and cases [M2 & M3], an attitude of scepticism toward environmental sustainability and its practice was observed among senior and other managerial staff. In these cases, SUWM was generally not regarded as a municipal responsibility but seen as a cost shifting practice from State Government. In addition, limited benefits were identified from a SUWM approach. For instance, stormwater was not valued as an asset among water staff, costs were emphasised and environmental benefits not appreciated. There was also a high risk adversity towards SUWM among senior and water staff. SUWM was considered a liability for the municipality as well as for the community. These views were at times also observed in individuals in the cases that had moved up the organisational development typology.

While the desire to satisfy community aspirations in regard to environmental sustainability and SUWM was revealed among the higher capacity cases, little pressure from the community for such practices was identified among senior staff in

cases [M1 & M2]. In these, and other cases that had not fully entered the Growth phase, sustainability initiatives were perceived to cause high pressure on already stretched workloads, plans, budgets and staff. Openness to organisational learning, improvement and collaboration were more widespread in the higher capacity cases [M5 & M6]. This, however, does not imply that these cases had a culture of sharing knowledge and information.

4.3.5 Organisational areas that benefitted from participation in the Cooks River Sustainability Initiative: results from Phase 2

Figure 4.5 shows the main municipal organisational benefits derived from partaking in the Cooks River Sustainability Initiative. The light shaded area indicated the pre-existing capacity of each municipality as depicted in Figure 4.4, the dark shaded area shows the area of impact of the initiative. As depicted in the Figure 4.5, the initiative has impacted different areas of capacity in different organisations.

The analysis revealed that intra-organisational coordination was positively influenced in all cases. Professionals from a range of disciplinary backgrounds across each of the cases reported increased understanding of how different departments hold complementary information that is important to manage urban water in a more sustainable manner. This has generally helped internal communication and awareness of the need to consult with each other. For instance, in cases [M1 & M4] strong relationships have been built between staff of the parks and the environmental departments. This has led to common acceptance of new proposals for implementation of water sensitive infrastructure in early stages of project execution.

While inter-departmental communication in case [M3] was always regarded as “relatively easy” in regard to sustainability matters, contact was generally initiated by the environmental department.

The initiative has brought about a two-way communication (instead of one way) in which the engineering department is more readily approaching the environmental department for ideas and support. Cases [M5 & M6] reported increased and/or improved cooperation with more than one department.

Examination of the initiative also showed commonality in regard to development of expertise. All cases indicated that staff capacity was built among individuals in the organisations. Technical skills and capabilities in the context of sustainable urban water management infrastructure were enhanced across all cases. Officers [M2, M3 & M6] developed understanding, confidence and/or skills for engaging the residential community in planning for water services. This led, in case [M6] to an immediate change in an already planned approach for the development of a municipal water strategy. An adjusted version of the initiative’s collaborative planning was utilised to formulate this plan that aimed for improved water use efficiency, reduced stormwater pollution discharge and increased uptake of recycled water. Specifics of other spheres of capacity development differed among the cases. For instance, learning in regard to the initiatives project management provided expertise that was employed in the management of other large, multi-organisational sustainability focused projects [M2]. Officers (M5), who were instrumental in process trialled in this initiative, gained increased comprehension of processes of influence and persuasion. These insights were translated to influence internal organisational change processes that were aimed at developing sustainable water futures.

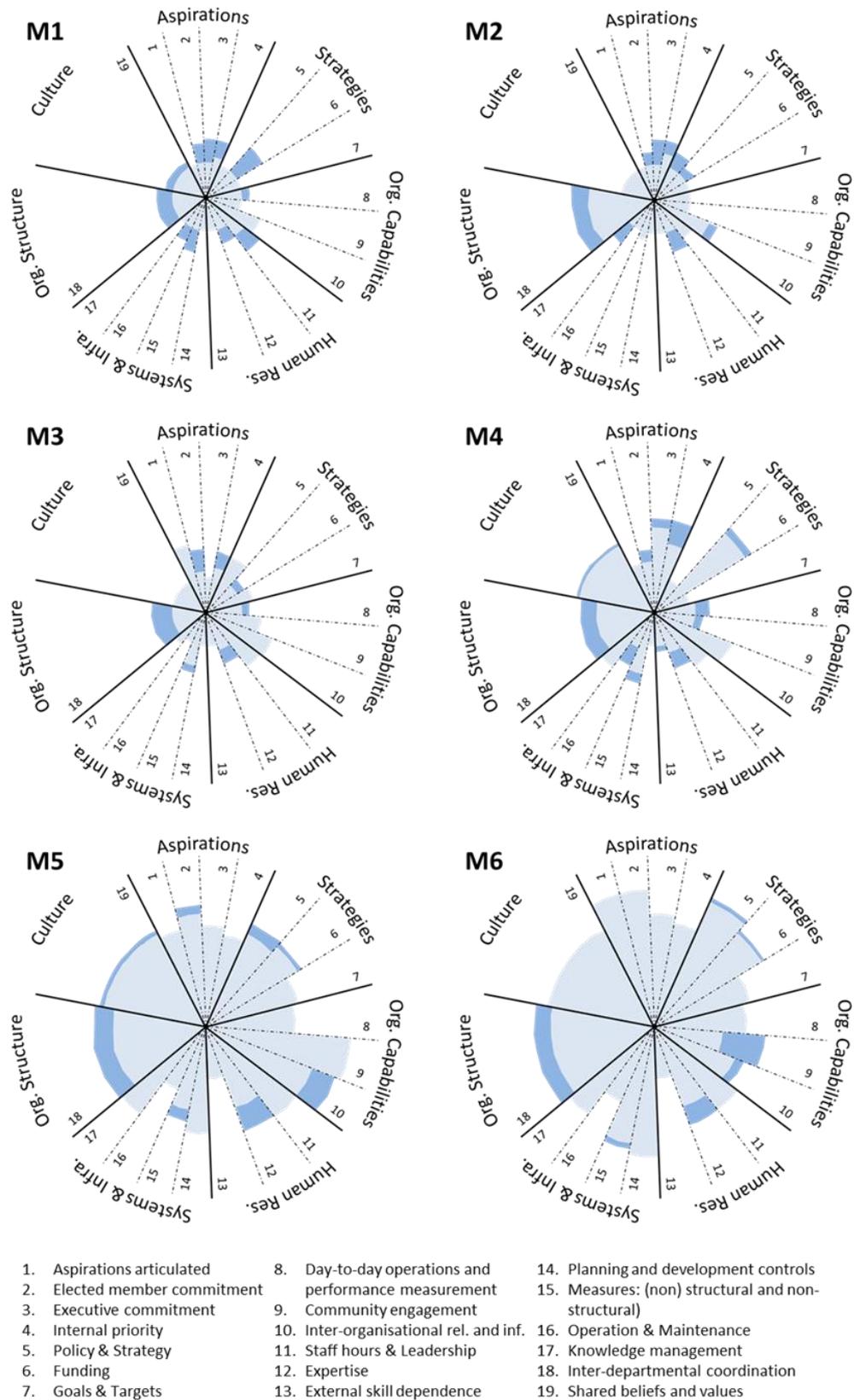


Figure 4.5 Main areas of organisational development

All cases obtained external funding through participating in the initiative for the implementation of: i) on-ground infrastructural works which were co-funded by the municipal organisations [M1, M3, M4 & M5]; ii) non-technical measures, such as education and training [M2]; and, iii) development of strategies in regard to street tree planting and residential community involvement in the water management strategy [M6]. Funding from the initiative for implementation of water sensitive infrastructure has served as a catalyst for increased internal capital works funding towards such infrastructure, in case [M2]. This organisation has now committed a substantial budget for the implementation of a number of water sensitive projects. In addition, this case is in the process of considering a stormwater levy that allocates funding to water sensitive infrastructure.

Overall, the level of benefit in relation to aspirations and commitment is significantly higher among the low-to-moderate capacity cases [M1 – M4] than the initial higher-capacity cases [M5 & M6]. This has resulted in a built or strengthened agenda for sustainable urban water practices. Through the initiative and the establishment of the Cooks River Alliance, the profile of sustainable urban water management was raised, especially among elected officials [M1-M4]. Executive support for involvement in sustainable water initiatives is raised in case [M1, M2 & M4]. This is, for instance, demonstrated by general managers and other seniors that have actively supported and used high-level relationships to endorse a variety of water sensitive infrastructure [M2 & M4].

Increased staff understanding created a seed for trialling new technology and increased willingness and commitment to experiment with water sensitive infrastructure [M1-M4]. This has resulted in a variety of organisational responses. For case [M2] this created readiness to implement different technologies, depending on availability of external funds. Case [M3] is in a similar situation but internalised the

outcomes. This case has translated some of the sub-catchment plans, developed within the initiative, into actual work plans. Even though this case has some internal matching funding available, external funding is required, and actively being sought, to enable implementation of these plans. A higher level of priority for sustainable urban water management is evidenced in cases by actual implementation of water sensitive technologies [M1 & M4]. While officers [M1] have started to engage with such infrastructure and aspirations for sustainable water management are becoming more shared, the organisation is still fully dependent on external capacity for its implementation. However, the initiative has generated a narrative in regard to sustainable water practices that was not there before. For case [M4], the initiative helped to increase priority for water sensitive infrastructure at a larger scale and beyond implementation of such infrastructure at town centres only. It much more normalised major new technology within its organisation. While internal funding for implementation of new infrastructure is not available in case [M2], the organisation has much become more willing to fund and become part of cross-municipal initiatives. Expanded environmental programs within the organisation have been a positive consequence of this increased commitment.

Cases [M5 & M6] had a higher external focus on engagement of external [catchment] stakeholder other than municipal organisations. These higher capacity cases indicated a considerable greater benefit in terms of actor engagement and/or development of external relationships than the other cases [M1 – M4]. Residential community engagement was [M5] and became [M6] highly valued and seen as a constructive process to develop solutions appropriate to a local situation. In addition, research processes that provide independent new knowledge were seen as important to develop sustainable practice within the organisation and beyond. Both cases actively

participate in sector-wide research initiatives. Outcomes derived from research undertaken in the initiative were used in municipal specific water policy documents [M5]. Officers in this case regarded engagement with external organisations as a highly useful motivator in persevering to overcome internal obstacles and barriers to engage with other relevant catchment stakeholders. Although external research has not been indicated of high importance to case [M2], research tools and data derived from the initiative were included in a water management plan the organisation developed.

Two cases [M1 & M4] were directly positive affected in the area of operation and maintenance (O&M) of water sensitive infrastructure. Since being involved in the initiative, O&M staff [M4] have been involved at early stages of planning/design in developing new water sensitive infrastructure and maintenance is regarded much less of an issue. In case [M1], O&M of water sensitive infrastructure has become part of certain job descriptions. Only case [M5] to have become less independent on external providers for the design and implementation of water sensitive infrastructure.

A noticeable shift in shared values and beliefs was reported in cases [M1, M4 & M5]. Through participation in the initiative staff of case [M5] saw that their reputation as a leader in the field was raised. This, in turn, helped a wide range of staff of this municipality to take pride and more actively support an organisational-wide approach to sustainable water practice.

4.3.6 Value and role of organisational capacity assessment for sustainability transition studies.

Importance of systemic multi-actor assessment procedure.

Our research of six relatively co-located organisations in the same macro socio-political and bio-physical context revealed very different capacities for SUWM. Such diversity in organisational ability is likely for

a range of contemporary sectoral sustainability issues, such as waste, energy and mobility. In-depth understanding of organisations involved in transition policy processes at the onset of such a process, helps to appreciate where these organisational actors are in terms of the vision pursued. Transitions literature assumes a high degree of unity among organisations when talking about socio-technical systems. However, our study shows that organisations, within a 'systems of organisations', involved in a policy change program are not uniform in their capacity to implement such alternative visions. Furthermore, the differing levels of normative commitment to sustainability at the outset of an initiative affect the implementation, the outcome of the initiative, and presumably the ongoing development practices into the future.

Application of the multi-actor assessment procedure revealed that all municipal organisations have improved their intra-organisational capacity for SUWM and four organisations have moved along the continuum to a subsequent organisational development phase (see Figure 4.3). Organisation M1 has moved from the Project to Outsider phase, M2 also jumped fully into the Outside phase, M3 remained in the Outsider phase, M4 has progressed to the Growth phase, while M5 stayed in the Growth phase. Lastly, M6 has now fully entered the Insider phase. In the absence of a systemic analysis, there is a risk that organisations M1-M3 may have been considered failures in the transition program as their changes in capacity were internal to the organisation (and difficult to observe from a central policy viewpoint in the short-term), in comparison to organisations M5 and M6 generated collaboration with external actors (beyond the project partners) elevating the profile of their activities. Further, the highest capacity organisation [M6] would most likely to be perceived to having benefited the most from participating in CRSI as this organisation had the most immediate and visible outcomes of the initiative. Only

after in-depth assessment had it become clear that the lowest capacity organisations [M1 – M3] had critically progressed in a number of areas that are less instantly apparent to the outside world. This finding stresses the importance of systematic investigations to capture improvements and the necessity of feedback loops in change processes. Furthermore, the obtained insight that organisations first need to build their internal agenda's before they can effectively collaborate with other organisations, confirms the pathways according to Brown (2008a) and Margarum (2001) to institutionalising new practices.

Utility of the multi-organisational capacity assessment procedure

The 'organisational capacity circle' as an analytical tool with its associated rating framework has proved to provide a useful tool for assessment of organisational dynamics of organisations engaged in purposive transition policy programs. Application of the procedure demonstrated its utility at the individual and multiple organisational levels and helped to reveal these organisations in their comparative context. The procedure has the potential to provide quality information at different scales of a transition agenda: at the design of the policy approach level, at the inter- and intra-organisational level, and at the frontrunner level.

Transition policy programs should allow for organisations to develop into a sustainable direction from where they are in terms of commitment and further capacity as a program design principle. In line with Morison and Brown (2010), transition policy processes therefore cannot be developed as a one size fits all but instead should be tailored to fit differing organisational contexts. This requires sensitivity and flexibility to the varying dynamics of organisations. Therefore, transition managers and/or frontrunners should at early stages of program development assess where different actors sit in terms of capacity for pursuing certain

sustainability goals. At the moment, understanding of organisational context is likely to rely on key people's opinion, instead of in-depth, systematic assessment process. Knowledge derived from a systematic assessment provides insight into organisational capacity needs and assists with the development of a higher-order strategic plan that fits the organisations receptivity to implement a transition agenda.

Detailed understanding of an organisation does not only provide a benchmark to what organisational capacities to invest in, it also provides a good starting point to measure changes in capacity over time. Hill and Hupe (2003) contend that understanding organisational context provides a valuable point of reference for how a policy event affects its context. Knowing the base line helps to evaluate impact of transition policy programs in a 'system of organisations'. For example, comparative analysis of the organisations in our study revealed that CRSI was successful in developing inter-departmental collaboration across all organisations, and that therefore a major ambition of the CRSI program was achieved.

Loorbach (2007, 2010) emphasises the importance of monitoring and evaluation as a reflexive activity in transition management. Literature on sustainable transitions, however, does not offer tools to measure changes in a socio-technical system as a result of transition management processes. Application of the organisational capacity assessment framework allows continuous assessment of a transition policy program throughout its implementation and at its end. Outcomes of such monitoring and evaluation may subsequently shape the program, inform future course(s) of action within that particular transition context and/or inform the design of other transition programs. In this manner, this capacity assessment tool contributes to the provision of "infrastructure for strategic intelligence" that helps to stimulate and develop socio-technical system change (Wieczorek *et al.* 2010).

In more pragmatic terms, outcomes of the procedure could create competition-by-comparison as organisations potentially develop healthy aspirations to do better than their contemporaries. Nevertheless, undertaking such assessment may also create adversity as organisations may not want to be exposed. If the public got hold of quick and dirty assessment perceptions, unfair opinions may be presented. Two municipal organisations within the CRSI project requested confidentially agreements between the researchers and the organisation to ensure that the obtained insights were not disseminated beyond the agreed boundaries.

Another purpose of understanding organisational context is that it potentially supports frontrunners, transition managers and other actors involved in executing transition policy programs. This is especially important in multi-organisational initiatives as “work across organisations is often cross-cultural work as each may have very different cultures, values, governance structures, and practices” (Hoberecht *et al.* 2011, p. 25). Within CRSI it was found that leading actors in the lower capacity municipal organisations generally needed to invest considerably more time and effort in getting municipal staff together and involved in the initiative, than leading actors in the higher performing organisations. Therefore, frontrunners and/or transition managers in high-capacity organisations need to pursue different strategies to those frontrunners in lower capacity organisations. Knowing organisational contexts and development/capacity building needs and trajectories help to prepare these actors for what role and style of behaviour to adopt in leading a transition initiative (Taylor *et al.* 2011). Understanding the dynamic of organisations also helps to identify and provide the right type and level of support frontrunners or other organisational leaders need to carry out their responsibilities in implementing a transitional change

program. In the case of CRSI, project leaders in lower capacity organisations required much more hands on support than project leaders in higher capacity organisations from the project team. The project leaders within the higher capacity organisations used the project team much more for reflective purposes.

The ‘assessors’ in this study were ‘outsiders’ to the local government organisations and the CRSI project team. Participants commented that it had taken the involvement of an outsider to get staff together and reflect on the topic of urban water management. The focus-group discussion had been the first time for four of the six case study organisations where there was joint reflection and organisational assessment on the topic of urban water management. In this manner, application of the procedure created a social learning situation within organisations as it brought a diversity of intra-organisational actors together who extensively shared perspectives on roles, relationships, practices and purposes. Trust and access to a wide range of individuals were essential for the researchers to obtain an in-depth view of the organisation. Becoming trusted outsiders over time meant, however, that people started to initiate conversations, share opinions and confided in the research about project and organisational matters.

In the case of CRSI, actual application of the capacity assessment framework became a tool for engaging the broader organisation in the initiative. Frontrunners and/or transition managers engaged in transition policy processes could intentionally design data collection processes in such a manner that they help to generate organisational buy-in into the transition processes.

The multi-actor assessment procedure is expected to be of use for other organisational types involved in a purposive transition process. However, its general application will need to be verified in subsequent research.

Insights for the design of purposive transition programs

Application of the multi-actor assessment procedure brought some important conceptual insights into the design of purposive transition programs. The study revealed the critical importance of horizontal and vertical intra-organisational collaboration for all organisational types in this research. Independent of where the organisation sat on the continuum, lack of integration across the organisation was identified as preventing them from further progressing to their sustainability goals. Within and beyond transitions literature, new forms of (collaborative) governance are widely advocated to achieve sustainable development (Emerson *et al.* 2011, Lawhon 2012, Smith and Wiek 2012). There is, however, much greater emphasis on and guidance for the development of multi-partner governance than for the development of intra-organisational governance. This latter form of governance, in which internal relational capacity is built (Healey 1997, Pahl-Wostl *et al.* 2008), is found of high importance in furthering sustainable development (see also Morison (2009) and Van de Meene *et al.* (2010)). Therefore, in cases there were no resources for undertaking such a multi-actor assessment process, transition programs should be designed to incorporate the development of relational capacity within and across organisations. Ideally, the design and implementation of transition programs need to be nuanced enough to address differences in organisational capacity. Otherwise, it is likely that policy/program design will undermine policy intent (Morison and Brown 2010).

4.3.7 Conclusion

This paper has developed a multi-actor procedure to assess organisational dynamics to obtain support and build organisational competences for system change. Based on

application of the procedure, the study revealed the importance of systemic multi-actor assessment processes, demonstrated the utility of such a procedure and outlined important insights for the design of purposive transition programs. Overall, the paper has demonstrated the need for transition policy programs to identify and investigate organisational contexts and take into account pre-existing organisational capacity when designing and executing transition programs.

The study exposed the key purposes of application of the assessment framework, as understanding organisational capacity: 1) helps to develop strategies to fit transition agenda and are of relevance to the participating organisations; 2) provides a benchmark for monitoring and evaluation of transition management processes; 3) supports frontrunner and/or transition managers in their endeavours during planning and implementation of transition policy programs; and 4) provides conceptual insights into transition dynamics in a system of organisations. Lastly, application of the tool itself provides a valuable manner for engagement of the broader organisation in transition processes.

These insights and the presented tentative, analytic capacity assessment framework provide pragmatic guideposts for the design of future transition policy programs.

Acknowledgements

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References have been moved to a consolidated reference list at the end of the thesis.

Chapter 5

Developing a Framework for Design and Organisation of Governance Experimentation

5.1 Introduction

Chapter 3 (publication 2) revealed the potential impact of governance experimentation for creating socio-technical system change and identified five preliminary variables that appeared to be of importance in the design of transition-oriented governance processes. These findings set the scope for further investigation into (social) learning, the design of governance experimentation and the relationship between these.

Based on quantitative and qualitative evidence, this Chapter (publication 4) offers a systematic, in-depth exploration of the extent and type of learning that occurred as a result of CRSI. Furthermore, it provides the architecture and practical principles for creating and/or facilitating a social-learning situation.

The publication presented in this Chapter is forthcoming in *Global Environmental Change*.

5.2 Declaration by candidate for publication 4 (Chapter 5)

In the case of publication 4, the nature and extent of my contribution to the work was the following:

Nature of contribution	Extent of contribution (%)
Formulation of research problem and the context of the research in the wider literature; development of assessment framework; data collection; data analysis, interpretation of results and writing.	90%

The following co-authors contributed to the work. Co-authors who are students at Monash University must also indicate the extent of their contribution in percentage terms:

Name	Nature of contribution	Extent of contribution (%) for student co-authors only
Rebekah R. Brown	Formulation of research problem, interpretation of results and revision of writing.	N/A
Megan A. Farrelly	Formulation of research problem, interpretation of results and revision of writing.	N/A

Candidate's Signature		Date
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Declaration by co-authors

The undersigned hereby certify that:

1. the above declaration correctly reflects the nature and extent of the candidate's contribution to this work, and the nature of the contribution of each of the co-authors.
2. they meet the criteria for authorship in that they have participated in the conception, execution, or interpretation, of at least that part of the publication in their field of expertise;

3. they take public responsibility for their part of the publication, except for the responsible author who accepts overall responsibility for the publication;
4. there are no other authors of the publication according to these criteria;
5. potential conflicts of interest have been disclosed to (a) granting bodies, (b) the editor or publisher of journals or other publications, and (c) the head of the responsible academic unit; and
6. the original data are stored at the following location(s) and will be held for at least five years from the date indicated below:

Location(s)	School of Geography & Environmental Science, Monash University	
Signature 1		Date
Signature 2		Date

5.3 Publication 4 – A design framework for creating social learning situations.

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Abstract

Learning nurtured through experimentation is very important for enabling sustainability transitions. Over the last decade, different strands of research have investigated social learning and its associated processes to better understand learning efforts aimed at socio-technical system change. While some necessary process considerations to enable social learning have been established, actual design and organisation of experiments that aim to create a social learning situation remain largely unexplored. Against this background, this paper presents an empirical, mixed-method study that investigated a governance experiment within the Australian urban water sector. This experiment enabled widespread learning, resulting in socio-technical system change. The research reveals that social learning in particular is more complex in reality than in theory and that not all system stakeholders need to learn the same to achieve system change. Further, this paper develops a framework that outlines enabling starting conditions and features for designing and organising social learning situations. The framework comprises focus projects, multi-organisational peer groups, distributed facilitation, adaptability and flexibility, time and science/research. The key findings provide practical strategies for designing and operationalising policy and governance reform agendas that embrace learning situations.

Keywords: Governance experimentation; sustainability transitions, social learning, transition management; design features; urban water planning

5.3.1 Introduction

An increasing amount of literature has emerged that investigates sustainability transitions within socio-technical systems such as the water or energy sector (e.g. Rip and Kemp 1998, Geels 2002). This literature emphasises the strong inter-relationship between social structures (cultural, institutional and economic) and the technology developed by these social structures (Geels 2004). Hence, co-evolutionary development of (emerging) technology and social structures is required for radical transitions of established socio-technical systems. Building on insights of socio-technical transition theory and complexity theory, transition management has been developed as a strategic policy approach for governing transition processes

in such a manner that they influence socio-technical transitions in sustainable directions (Kemp and Loorbach 2006, Loorbach 2010). Facilitating long-term reflection on the socio-technical system, transition management “takes into account the limits to predictability and control due to the uncertainty and dynamics of complex systems”, such as an urban water management system (Voß and Bornemann 2011, p. 8). While transition management is not without its criticisms (Hendriks and Grin 2007, Shove and Walker 2007, Voß *et al.* 2009), it is acknowledged as a potential powerful avenue to influence long-term policy design (Meadowcroft 2005, Voß *et al.* 2009, Shove and Walker 2010).

The starting point of transition management is “not a solution but explorative

and design-oriented”, with societal actors inducing specific system change (Rotmans and Loorbach 2010, p. 140). Learning, and in particular social learning, nurtured through the process of experimentation, is considered very important in overcoming stable and difficult-to-change socio-technical systems (Raven *et al.* 2007, Van der Brugge and Rotmans 2007). Therefore, learning-by-doing and doing-by-learning through (governance) experimentation is a key concept within transition management (Loorbach 2010).

Over the last decade, transition management scholars have investigated learning and its associated processes to better understand and frame learning efforts. For example, Van de Kerkhof and Wiczorek (2005) considered how learning should be methodologically organised in the initial stages of a transition management process, whereas other scholars explored what learning dynamics should be pursued during experimentation to support a transition (Van den Bosch and Taanman 2006, Van den Bosch 2010). To date, however, transition management scholarship fails to describe specific design and organisational characteristics of experimentation aimed at maximising widespread learning. This is particularly problematic at the operational level, where the only requirement for creating a social learning situation through experimentation seems to be the involvement of all relevant societal stakeholders (see Van den Bosch 2010).

Broader scholarship on social learning provides some insight into the design of experimental learning processes. For instance, Ison and Watson (2007) developed a design heuristic for social learning consisting of a suite of activities that are minimal necessary to create the conditions for social learning. While learning-system design considerations may be important factors for creating a learning situation as desired in transition management experimentation, such factors do not provide insight into how to organise a learning situation that involves a messy problem, multiple agencies and a multitude of

disciplines. There have been recent studies on experimentation and (social) learning in the scholarship on policy innovation and environmental governance (e.g. Hoffmann 2011, Bulkeley and Castán Broto 2012, Castán Broto 2012). However, their focus is primarily on the contextual role and characteristics of experiments rather than on pragmatic and operational characteristics, i.e. how to undertake a governance experiment.

Within the field of sustainability transitions and beyond, there is an absence of pragmatic scientific literature on designing and organising experimentation to generate widespread social learning. In addition, there is limited empirical evidence and scholarly understanding to what degree and in which manner experimentation generates change in understanding that contributes to socio-technical system change. Indeed, following their examination of empirical studies of social learning and natural resources, Rodela *et al.* (2012, p. 21) argue “that a great number of publications report on research that is seldom meant to evaluate individual variables e.g. learning, or to test what techniques, or interventions can best lead to social learning”. Furthermore, Markard *et al.* (2012) noted that beyond the great necessity of providing further empirical insight and understanding of transition processes, bridges should be built between transition literature and other established strands of research to advance current transition approaches.

Against this background, this paper seeks to empirically and systematically: (i) assess if and how experimentation generates changes in understanding that potentially influence socio-technical system change, (ii) identify the types of these changes in understanding, and (iii) examine the relationship between the social learning outcomes and the operational characteristics (design/organisation/structure) of experimentation. Important issues affecting social learning itself, such as power, trust and cultural context, are not explicitly explored in this paper. Instead, the paper focuses on operational features of social learning by providing practical, operational principles to

guide governance experiments, thereby supporting scientists, policy makers, and professionals in the design and organisation of experimentation intended to generate widespread learning. The aims of this paper are achieved through a structured case-analysis of a governance experiment in the context of a self-organised, emergent transition management process in the urban water sector in Australia. This unique and successful governance experiment has been a deliberate alternative to conventional, technocratic experimentation to enable more sustainable forms of urban water management.

This mixed-method research paper is organised as follows. Section 2 draws on transition management, learning and participation scholarship to provide a conceptual background for the investigation. We then outline our research approach in Section 3. Although the results and discussion are combined, they are presented over two sections (Sections 4 and 5). Section 4 outlines the evidence of learning outcomes as a result of the governance experiment, while Section 5 focuses on the ingredients that enable and foster a social learning situation that produces such changes in understanding. Section 6 proposes a framework that features aspects of design and organisation that may contribute to effective governance experimentation. Lastly, the conclusion highlights obtained insights and their implications.

5.3.2 Conceptual background and considerations

Learning framed in transition management experimentation is understood as the “processes of obtaining and developing new knowledge, competence or norms and values”, by individuals, organisations and regimes, within a normative stance (Van den Bosch 2010, p. 232). In this context, three types of learning processes are distinguished. Broad learning relates to understanding the systemic nature of a societal issue, whereas reflexive learning is associated with questioning

existing ways of doing, thinking and organising a societal practice and letting go of existing convictions. Finally, social learning refers to the process by which societal actors interact and develop alternative perspectives on a societal issue.

The broad learning process is mostly aimed at cognitive development (Webler *et al.* 1995) and can be characterised as actors acquiring three types of knowledge (Kaiser and Fuhrer 2003, Garmendia and Stagl 2010): (i) declarative knowledge, which provides insight into an existing problem situation; (ii) procedural knowledge, which refers to a range of (behavioural) options, processes and actions through which a particular sustainability goal can be achieved; and, (iii) effectiveness knowledge, in which comparative effectiveness of the different behaviours, processes and actions to achieve a particular sustainability outcome is assessed. This cognitive development occurs within the framework of pre-existing values, assumptions and principles, commonly known as single-loop learning (Argyris and Schön 1978, 1996). These existing underlying values, assumptions and principles have become the subject of learning within the latter two learning processes (reflexive and social). Thus, these forms of learning aim to change an existing ‘frame of reference’ (Schön and Rein 1995) and are commonly known as double-loop learning processes (Argyris and Schön 1978, 1996). Van Mierlo *et al.* (2010) stress that change in socio-technical systems is dependent on double-loop learning among a range of interdependent actors. Literature on adaptive capacity and environmental governance (Armitage *et al.* 2008, Pahl-Wostl 2009, Diduck 2010) emphasise the perspective of triple-loop learning, in which assumptions and protocols of governance have become the subject of learning. Such learning is thought to foster change in institutional context and governing conditions. Pahl-Wostl (2009) argues that an effective change in ‘frame of reference’ often requires double-loop learning to be complemented by triple-loop learning.

This because the prevailing frame of reference is often strongly affected by institutional and governance aspects.

The definition of social learning within the context of transition management experimentation emphasises social learning as a collective process enabling change in a situation, as opposed to social learning as an outcome or 'emergent property' of a process to change a situation (SLIM 2004a). The underlying idea of 'social learning as a process' is that actors develop shared meanings, values and understandings through interaction, which provides the basis for joint future action (Pahl-Wostl, Sendzimir, *et al.* 2007, Muro and Jeffrey 2008). As such, social learning develops and/or strengthens relational capacities between social actors and their socio-technical systems (Pahl-Wostl, Tàbara, *et al.* 2008). Changed relational capacities are thought to transform prevailing socio-technical systems and, by doing so, overcoming system lock in (i.e. institutional and/or technical path dependency).

Reed *et al.* (2010) contend that the view of 'social learning as a process' is mistaken with approaches needed to facilitate social learning. On the premise that social learning through such mechanisms is rarely demonstrated, they assert that social learning cannot be defined as a process. Indeed, social learning as a methodical process or 'governance mechanism' (Ison and Watson 2007) could be understood as linear, predictable and deterministic in terms of cause-effect dynamics (Rodela 2011), showing similar characteristics of traditional 'unsustainable' governance paradigms (Farrelly and Brown 2011). However, experimentation which explores potential transition pathways through searching and learning as advocated in transition management, intends to facilitate social learning that could be understood as an emergent process of learning (Rodela 2011). This author states that emergent processes of learning are inclusive of failure and subject to unpredictability. Following this, social learning can be viewed as an adaptable and flexible learning mechanism. Such learning

potentially facilitates "new understanding of the kinds of role, relationship, practice and sense of purpose" required for socio-technical system change towards more adaptive systems (Collins and Ison 2009a, p. 354).

Developing new understandings and building relational capacities requires experimental, multi-scale, governance approaches that appreciate and facilitate the input of a diversity of actors functioning in a social-technical system (Pahl-Wostl 2008, Garmendia and Stagl 2010). Open styles of governance arrangements allow societal actors to engage, interact, negotiate and collaborate and may thus influence and stimulate learning and in turn decision-making processes. Despite the importance and necessity of actor participation in social learning processes, participation as a goal in itself is not sufficient to generate social learning that enables socio-technical system change (Collins and Ison 2009a). Therefore, Collins and Ison (2009b) argue that governance experimentation should purposefully pursue a learning agenda instead of an agenda merely aimed at participation. These authors contend that such an agenda should focus on helping actors to appreciate the various mental models that exist, the system nature of the situation (in its social and biophysical context) and the interdependence of actors. Within transition management, the idea of a learning agenda has been translated in the formulation of explicit learning goals connected to the transition goal (Kemp and Van den Bosch 2006). Hoffmann (2011, p.18) argues that governance experimentation should have a "conscious intention to create/shape/alter behaviour by setting up rules (broadly conceived as principles, norms, standards and practices) for a community of implementers to follow". While this author does not explicitly mention a social learning agenda, it is implied in his definition of a governance experiment because behaviour change fundamentally builds on social learning.

As social learning processes are highly dependent on contextual circumstances,

influenced by location, historical experiences and associated cultures (Keen and Mahanty 2006, Ison and Watson 2007), governance experimentation should be designed not only to facilitate stakeholder interaction but also to appreciate its local context (Brown 2008b). Furthermore, steering mechanisms like leadership and/or facilitation have been recognised as important ingredients for bringing about social learning (Ison and Watson 2007, Mostert *et al.* 2007). Hence, governance experimentation should be structured in such a manner that it guides and supports learning processes among the variety of interdependent actors.

This paper argues that governance experimentation is more than the sum of its parts and that the actual interplay between the different components (i.e. agenda, process design, structure, actor engagement and context) may create a unique social learning situation. However, there remains limited empirical evidence and understanding regarding how these different elements generate widespread learning. Muro and Jeffrey (2012) identified that most social learning studies focus primarily on the dimensions of stakeholder engagement and its outcome, without exploring the relationship between participation processes and their specific outcomes. They further highlight how few studies have empirically investigated and demonstrated “how context, method, process design” stimulate social learning processes (p. 3). What appears absent from the debate on social learning is how governance experimentation should be organised to promote extensive social learning. Most systematic research within the field of social learning focuses on a single mechanism for social learning, namely participatory forums such as workshops, working groups, etc. (e.g. Garmendia and Stagl 2010, Muro and Jeffrey 2012). Therefore, this study systematically analyses the (learning) outcomes of a governance experiment aimed at social learning that has gone beyond creating stakeholder interaction through participatory forums, and examines

how its design, organisational and structural features have contributed to this process.

5.3.3 *Research approach*

In exploring how governance experimentation can foster changes in understanding that potentially influence socio-technical system change, the research agenda aimed at: (i) establishing the type and quality of learning outcomes (changes in understanding) that can occur as a result of a governance experiment, and (ii) exploring the relationship between learning and design of a governance experiment in order to inform the design and organisation of future initiatives that aim to create a social learning situation. This agenda is explored through a case of successful governance experiment (as demonstrated in the next sections) in the urban water sector in the Cooks River catchment in Sydney, Australia. The Cooks River is severely degraded, flowing through catchments that are highly industrialised and urbanised. Urban water management for the Cooks River catchment involves many organisations. Brown (2005) states that there have been a number of policy initiatives to improve the management of urban water in the catchment; these however have all failed due to institutional fragmentation. In 2007, the State Government of New South Wales allocated AUD\$2,000,000 to invest in an alternative, experimental governance approach to transform current water planning and overall catchment governance.

The governance experiment

The OurRiver – Cooks River Sustainability Initiative was instigated to bring together catchment stakeholders, including local and state government organisations, community groups and residents, to address waterway health, preserve water and enhance the capacity of eight local municipalities and their communities. It also aimed to develop and improve coordination and cooperation within and between municipalities. To achieve these aspirations, a multi-disciplinary, multi-stakeholder approach to develop local,

context-specific, adaptable plans for six sub-catchments within the Cooks River catchment was applied. The approach, which ran from 2007 to 2011, explicitly aimed to encourage municipal staff and catchment stakeholders to explore and recognise their perspectives and interdependencies in managing urban water and to determine how their roles and functions could be shared and complement each other. This learning agenda was supported through an intricate project structure (see Figure 5.1), which facilitated a series of collaborative and non-collaborative processes and activities (see Table 5.1). The organisation and structure of the Initiative was designed to purposefully stimulate interaction among and between different stakeholder groups at the local and catchment level, and, by doing so, enable implementation of the initiative's underlying agenda. Figure 5.1 shows the six sub-catchments, where the majority of activities and processes (Table 5.1) were centred. Each

of these sub-catchment projects was linked to one or more municipal organisation.

The sub-catchment processes and activities drew in a wide variety and large number of catchment stakeholders Table 5.1. The Initiative was governed by a project team comprising a project manager and four project officers. This project team provided continuous support and guidance to the Initiative's (learning) processes and activities. A diverse, cross-municipal interlinked set of committees was established to maximise sharing of knowledge, perspectives and newly obtained experiences. This structure helped to foster debate on water management and showed the accumulated influences of the project within the catchment. The Initiative's cross-municipal committees consisted of municipal staff representing each participating municipality. Each of these committees had their own specific focus (see Table 5.2).

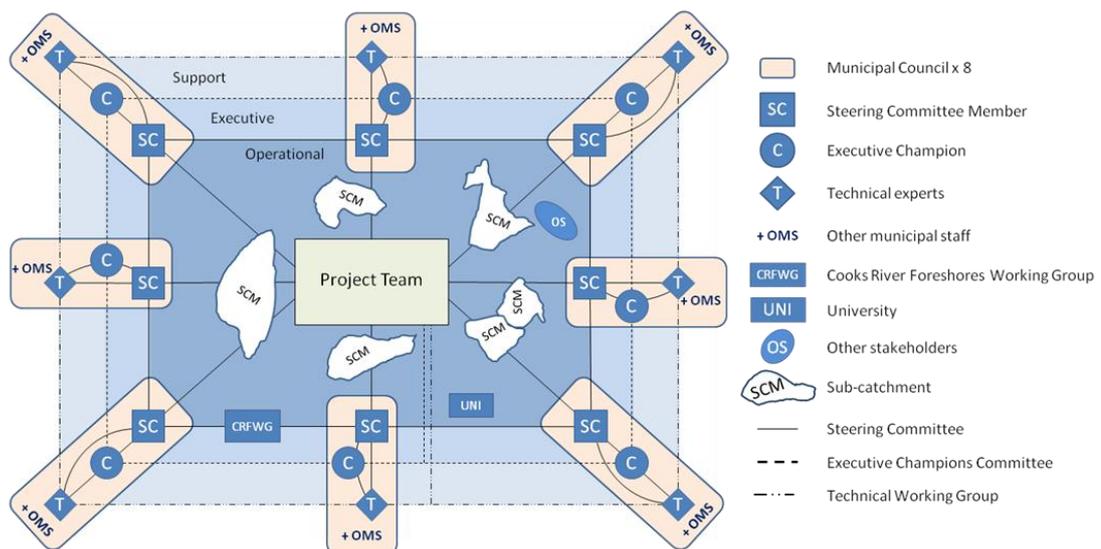


Figure 5.1 Structure and organisation of governance experiment

Adapted from Bos et al. (2012)

Table 5.1 Cooks River Sustainability Initiative: its processes and activities

Project processes and activities	Brief details	Participants/audience
<i>Sub-catchment context mapping (workshops, interviews and surveys)</i>	Determining social, physical, and organisational characteristics as well as policies influencing decision-making through surveys, focus-group discussions, walks through the sub-catchments, interviews and desk-top studies.	Over 1100 municipal staff across hierarchical levels and disciplines, about 2465 residents and 200 businesses participated.
<i>Sub-catchment visioning, planning, implementation activities</i>	In early project phases, this included community visioning and planning sessions with a diverse range of sub-catchment stakeholders. In later phases, this included: (i) sessions to plan construction , (ii) rain garden planting days, and (iii) community barbeques	Over 600 residents, elected officials, Mayors, community groups, local and state government officers, large landowners and technical experts participated.
<i>Development of project documentation</i>	For each sub-catchment, this entailed the development of documents such as sub-catchment information booklets (context maps), sub-catchment management plans, and organisational capacity reports.	Documentation based on outcomes from above-mentioned activities was developed by project team, steering committee members, and researcher (only organisational capacity reports) for sub-catchment participants and/or individual municipalities.
<i>Formal training and educational activities</i>	Attending water-sensitive training events or water-wise community tours. Also mentoring of municipal staff by consultants took place during design and implementation.	37 municipal officers (formal training) and 60 residents
<i>Catchment governance</i>	Addressing urban water management governance arrangements at catchment level.	Steering committee members, municipal executives, elected officials, mayors
<i>Communication activities</i>	Presentations, meetings, informal sustainable water management workshops, presence at forums and festivals, and newsletter.	Hundreds of municipal staff across, residents, regional environmental groups, urban water practitioners, scientists and other interested parties. Over 750 households and businesses were signed up to a bi-monthly newsletter.

Adapted from Bos and Brown (2012)

The governance experiment was politically endorsed by the mayors of each of the participating municipalities, which provided status and high-level organisational support for the Initiative, particularly during the start-up phase. Grant funding had supported development and execution of the Initiative. Supplementary funding for implementation of identified actions was provided by the participating municipalities and state government.

This governance experiment substantially differs from conventional urban water practices, which can be considered as “large-scale, centralised and mechanised systems operating within a management regime of expansion and efficiency, facilitated by technical, professional elites, who in turn operate in a rigid regulatory framework” (Farrelly and Brown 2011, p. 721). Table 5.3 outlines attributes of the Cooks River

Sustainability Initiative in comparison to attributes of traditional urban water management in the Cooks River catchment and in the wider Australian water sector. While the Initiative had stated ambitions for enhancing urban water management, expectations and outcomes in regard to solutions and improved catchment governance arrangements were not defined.

The Initiative produced tangible outcomes including: six sub-catchment community visions and water management plans endorsed by eight municipalities, ten site-specific water-sensitive infrastructures that treat and harvest stormwater runoff, and the establishment of the Cooks River Alliance, a new model for regional governance.

This large multi-organisational initiative evolved from a much smaller initiative that had taken place in one of the participating municipalities. Key actors from this initiative were instrumental in the advocacy, design

and implementation of the Cooks River Sustainability Initiative. Therefore, the prior experience and learning of these key-actors, who would be considered front-runners from a transition studies perspective (Loorbach 2010), was highly influential to framing the initial vision and agenda for the Cooks River experiment. While the overall attention to sub-catchment management, such as context mapping, envisioning and planning, was broadly similar in intent across both initiatives (albeit on very different scales and open to adjustment to suit the local context in each of the sub-catchments), the subsequent governance initiative innovated and trialled new processes for inter-organisational learning and collaboration. Each of the two initiatives demonstrated strategic, tactical and reflexive activities as outlined by Loorbach (2010), and the governance experiment described in this

Table 5.2 Cross-municipal groups within the Cooks River Sustainability Initiative

Type of group	Members	Purpose	Specifics
<i>Steering committee</i>	Environmental staff	Directing the experiment and the project team through negotiating major decisions. Assisting project team in everyday tasks. Acting as conduit for providing and channelling of information.	Each of steering committee members was connected with an executive champion from their organisation throughout Initiative.
<i>Executive champions committee</i>	Senior and executive staff (representing each municipality)	Promoting of Initiative within organisation. Providing top-level support for decision-making.	Exact role was not completely clear at start; continuously involvement of this group became essential in addressing regional governance issues in catchment.
<i>Technical working group</i>	Engineers and landscape architects (of each municipality)	Exchange of technical information, ideas and knowledge.	Forum became most functional and stable when actual design of technical options took place.
<i>Communications working group</i>	Communications staff	Branding of the Initiative Providing support in design of community engagement processes.	Group was only active in the beginning of the Initiative.

Table 5.3 Innovative differences between the Cooks River Sustainability Initiative and traditional urban water management practices

Attributes	OurRiver – Cooks River Sustainability Initiative	Traditional urban water management
<i>Scale</i>	Plan development at <i>sub-catchment scale</i> to ensure appropriate solutions to the local (physical, social, economic and organisational) context.	Plans designed for entire river catchments without taking into account local circumstances (Brown 2005).
<i>Expertise</i>	Facilitating integrated approach to urban water management through <i>multi-disciplinary</i> cooperation to address multiple water issues and purposes (e.g. stormwater quality, amenity, flooding, water re-use).	Components of the water cycle are compartmentalised and managed by narrow-focused disciplines (Newman and Kenworthy 1999). In addition, engineers focus on stormwater drainage issues; environmental officers are responsible for waterway health (Morison and Brown 2011).
<i>Role of community</i>	<i>Collaborating with local communities</i> to tailor solutions and build support and ownership of alternative construction projects.	Government manages water on behalf of communities. Communities informed after decisions have been taken (Keath and Brown 2008).
<i>Governance focus</i>	Bottom-up addressing of <i>regional governance</i> issues to ensure long-term, coordinated management and resources to implement sustainable urban water management practices.	Municipalities focused on water management within individual administrative boundaries. Cooperation between municipalities is primarily implemented through top-down measures by higher-level bodies (Brown 2005).

Adapted from Bos and Brown (2012)

paper could be identified as the second phase in a multi-phase transition management process. Details related to the emergence of each of the phases have been described by Bos and Brown (2012).

Methods

Following Yin (2009), a single-embedded case-study approach was adopted for this exploratory research. The Cooks River Sustainability Initiative as a case-study for this research was selected for three reasons. Firstly, it provides a valuable opportunity for undertaking empirical research as this project is a rare example of governance experimentation in the Australian urban water sector aimed at widespread learning and involving a wide variety of local-to-regional level stakeholders. This is significant as the experiment was undertaken in an environment where most sustainability efforts focus at optimising solutions and training of predominantly technical professionals. As

such, it can be considered a distinctive case, contrasting with the norm of conventional practice (Scholz and Tietje 2002, Denscombe 2007). Secondly, research involving various urban stakeholders contributes significantly to the field of environmental sustainability as previous investigations involving multiple stakeholders and learning at the local level in Australia are predominantly focused on rural and/or regional catchments (see Eversole and Martin 2005, Benson *et al.* 2012). Finally, systematic investigation into the design of wide stakeholder participation for water management is considered an emerging field (Von Korff *et al.* 2012).

The first two authors of this paper have been closely involved in the case-study. The primary position of the first author within this research was the 'researcher as observer' to understand the governance experiment, its processes and dynamics. As a secondary position, the researcher was an enabler, whereby the researcher helped to establish

circumstances that support learning (Ison and Watson 2007). The first role of the researcher involved observing the process for 3.5 years, taking field notes, conducting interviews and surveys, and interacting with participants; the second role involved co-facilitation of some steering committee and executive champions meetings, and the provision of organisational capacity reports. The second author has been engaged as an enabler through the provision of expert advice to the project manager, steering committee and executive champions during different stages of the Initiative. Neither researcher actively engaged in the sub-catchment processes. The Initiative was not designed as an action research project, which implies application of scientific knowledge and the use of this knowledge by practitioners, whereby the researchers had a specific role of facilitator throughout the governance experiment (Greenwood and Levin 2007). In addition, the researchers have not purposefully acted as co-constructors of knowledge with other stakeholders (Ison and Watson 2007).

To obtain valuable insights, cover a wide range of actor perspectives and validate findings in establishing what has been learned through the governance experiment and what project design features influenced the generation of learning outcomes, this case-study research necessitated a mixed qualitative and quantitative methods approach (Creswell and Plano Clark 2007). Following Creswell's (2009) concurrent embedded strategy of mixed method research, qualitative data principally guided the

research project and quantitative data provided a supporting role. By providing more than one perspective, this mixed method approach offers a more complete and in-depth explanation of phenomena related to learning through governance experimentation (Denscombe 2007). Accordingly, qualitative data methods including (group) interviews, observations, and documentary analysis were combined with a structured quantitative survey instrument to better understand the investigated phenomena and substantiate the research findings. Yin (2009) requires the use of multiple sources of evidence and of data to overcome potential issues with self-reported data.

The qualitative phase of the research included in-depth, semi-structured interviews and focus-group interviews (Table 5.4). This phase aimed to generate in-depth insight into the governance experiment, its context, dynamics and learning outcomes. Interview transcripts and field notes were analysed using QSR Nvivo 9. Data were coded under the overarching themes of (i) changes in understanding and relationships as result of governance experiment, through interplay between its (ii) actors, (iii) processes, and (iv) structures. Although these codes were inductively devised from the interview data, they closely coincide with Van der Brugge's (2009) conceptualisation of understanding urban water governance, which is based on insights from complex adaptive systems theory (e.g. Kauffman 1995, Holland 1996) and Giddens' (1984) 'duality of structure'.

Table 5.4 Research approach and methods

Qualitative phase		
Method	When	Research participants / documents
<i>Interviews</i>		
<ul style="list-style-type: none"> • 17 in-depth, semi-structured one-to-one interviews • 12 focus-group interviews (totalling over 80 participants) 	August - October 2009 (Half-way through initiative) October 2010–April 2011 (Nearer the end of the initiative)	Municipal professionals, CRSI project staff, and Cooks River catchment representatives. Interviewees represented diverse (professional) backgrounds and included individuals in executive, senior, middle-management and officer positions.
<i>Process observations</i>		
<ul style="list-style-type: none"> • Observing variety of meetings with highly diverse objectives • E-mail correspondence 	Throughout initiative (February 2008 – May 2011)	Residents, Councillors, community representatives, state government representatives, municipal executives and other municipal representatives.
<i>Document analysis</i> (secondary data)	Throughout initiative (February 2008 – May 2011)	Sector strategies and policies, municipal documents, project documents, meeting minutes.
Quantitative phase		
Method	When	Survey questions related to
Survey of municipal professionals ($N = 41$)	March / April 2011 (End of initiative)	(i) changes in individual understanding, experience, behaviour and likelihood to pursue certain practice as a result of the Initiative; and (ii) facets of the governance experiment that contributed to these changes in understanding
Survey of residential community ($N = 55$)	March 2011 (End of initiative)	(i) changes in individual understanding and actions undertaken as a result of the Initiative; and (ii) perceptions of collaborative processes undertaken as part of the governance experiment.

The quantitative phase involved a survey of municipal professionals, conducted at the end of the Initiative (Table 5.4). This phase aimed to reveal whether learning occurred. The questionnaire was predominantly structured with five-point Likert-based categories. The survey was first piloted by five persons, of whom three were independent of the research. Forty-one respondents voluntarily replied to the survey, which was distributed in each municipality by an e-mail link to all who had been involved with the Initiative. Table 5.5 presents the professional training and/or education that the respondents draw on for their day-to-day work. The table also indicates whether the respondent was a core or non-core actor in the Initiative. Core actors were considered the Initiative's driving force as they were

consistently involved throughout the Initiative and responsible for providing the overall direction. Participants who were involved in one or more particular events, activities or processes but did not have a formal day-to-day responsibility were analysed as non-core actors.

The survey responses were statistically analysed using IBM SPSS 19.0. Given the small sample size and skewness of results, non-parametrical tests were conducted. Fisher's Exact Probability Test of association was applied to compare (i) who learned (dependent on level of involvement and professional background) and what was learned through participating in the governance experiment; and (ii) what was learned and the design elements that made up the governance experiment. In order to fit

assumptions of this test (Pallant 2011), ordinal 5-point Likert scale responses were collapsed into two categories. The quantitative phase was also broadly informed by a community survey. This survey mostly reflected on community experience in regard to collaborative planning engagement. Data were collected by use of Likert-scale responses and were analysed descriptively. The analysis and interpretation of the data involved contrasting and comparing the data through triangulation, as suggested by Yin (2009).

5.3.4 *Changes in understanding and practice*

The research reported in this paper aimed to gain insight into whether and how governance experimentation creates social learning situations. The results showed governance experimentation in the Cooks River catchment fostered changes in understanding at the individual, as well as at the collective, level.

Single-loop learning

Single-loop learning, as a result of involvement in the governance experiment, is demonstrated by a change in cognitive understanding among a wide range of individual stakeholders. Table 5.6 shows the changes in cognitive understanding, differentiated by form of cognitive knowledge (declarative, procedural and effectiveness) among municipal respondents, and outlines significant differences between the two response groups. Regarding declarative knowledge, a great majority of respondents reported having developed an increased understanding of (sustainable) urban water management (88%) and an increased recognition of the different goals pursued by various disciplines and stakeholders in urban water management (78%) (Table 5.6). Interviewees reinforced these findings and highlighted their altered perspectives about the complex and integrated nature of managing urban water. They particularly commented on how participating in the Initiative helped them, and others, to see interconnections among the multitude of actors, professions and/or departments

Table 5.5 Respondents' educational background and level of involvement in the Cooks River Sustainability Initiative

	Planning	Strategy/policy	Engineering	Construction	Environmental science and natural resources management	Education	Business/economics	Urban design/architecture/landscape architecture	Other	Total
Non-core actor	2	0	13	1	4	0	0	3	2	25
Core actor	1	1	2	0	10	1	1	0	0	16
Total	3	1	15	1	14	1	1	3	2	41

Table 5.6 Changes in different forms of cognitive knowledge/understanding as a result of involvement in the Cooks River Sustainability Initiative

Forms of cognitive knowledge	Response to question				<i>p</i> ^c
	Agree ^b		Not Agree ^b		
	<i>n</i>	%	<i>n</i>	%	
Declarative knowledge					
(a) Increased overall understanding of sustainable urban water management					
Non-core actors ^a	23	92	2	8	0.36
Core actors ^a	13	81	3	19	
All	36	88	5	12	
(b) Increased understanding of different stakeholder goals in urban water management					
Non-core actors	21	84	4	16	0.28
Core actors	11	69	5	31	
All	32	78	9	22	
Procedural knowledge					
(a) Increased experience in community engagement					
Non-core actors	7	28	18	72	0.02*
Core actors	11	69	5	31	
All	18	44	23	56	
(b) Increased experience in application of water-sensitive technologies					
Non-core actors	19	76	6	24	0.49
Core actors	10	62	6	38	
All	29	71	12	29	
Effectiveness knowledge					
(a) Likely to engage community in future developments					
Non-core actors	12	48	13	52	0.75
Core actors	9	56	7	44	
All	21	51	20	49	
(b) Likely to pursue water sensitive technologies in future developments					
Non-core actors	16	64	9	36	0.51
Core actors	12	75	4	25	
All	28	68	13	32	
(c) Likely to consider contextual dimensions in future decision-making					
Non-core actors	13	52	12	48	0.75
Core actors	7	44	9	56	
All	20	49	21	51	

Notes: Reported are numbers and (row) percentages of the various answering categories.

^a Denotes the respondents' level of involvement in the project.

^b Agree covers "agree" and "strongly agree" and the Not Agree covers "neutral", "disagree" and the "strongly disagree" answering options respectively in the five point Likert scale.

^c *p*-Values; Fisher's exact probability test.

* Significant at the 0.05 level.

involved in managing water, especially in attempting to manage the urban water cycle in a more holistic manner. In addition, 75% of the community respondents reported that their overall understanding of sustainable urban water management had increased as a result of participation in the governance experiment. These newly obtained declarative understandings provided actors with insight into the state and nature of the urban water problem. Based on all data, highly diverse acquired procedural knowledge on how to achieve sustainable urban water management was found among different actors. Acquired procedural knowledge included changes in understanding of processes of stakeholder involvement, technological options and functionality of systems and infrastructure. For example, certain traffic engineers revealed that they had never realised there were opportunities to design kerbsides and roundabouts that included vegetation that could improve water treatment.

Effectiveness knowledge was obtained through application of and involvement in alternative processes and action. For instance, 70% of municipal respondents were not only exposed to different technological options but also gained hands-on experience in the development and implementation of green, water sensitive technologies. For a number of municipalities, this initiative was the first ever opportunity to design (five municipalities) and construct (three municipalities) water sensitive technologies in-house. In some municipalities, this led to further consideration of water sensitive technologies beyond this Initiative. Nearly 70% of municipal respondents reported that they are likely to pursue water sensitive (green) infrastructure in the future.

While about half of the municipal survey respondents reported that they are likely to consider community engagement in the future, the majority of interviewees who had been involved in the collaborative planning

processes identified changes in understanding of the knowledge, role and function that community members have. Initially sceptical respondents who participated in this collaborative process stated that they began to comprehend the role residents play in urban water management, and, particularly in managing decentralised options. The Initiative also helped to overcome fears among municipal representatives about facing community members, as these actors perceive the community to be highly critical of any municipal activity. Indeed, one municipality used funds, originally allocated for implementing project actions, to engage the residential community in the development of municipal water plans.

Overall, there was no clear trend between the different response groups regarding who was more positive about the changes in cognitive understanding. There was only one significant association regarding actor involvement and increased experience with community engagement ($p < 0.05$, $\phi = .40$, $n = 41$). Nearly 70% of core actors compared to 28% of non-core actors answered in the affirmative. Several core actors stated that they did not acquire changes in cognitive knowledge and understanding as a result of their involvement in the governance experiment. These actors, who are seen as frontrunners in the urban water sector and were part of the design of this initiative, indicated that they already had a high level of understanding in all areas of the initiative.

Double-loop learning

Double-loop learning is demonstrated by a number of actors who have changed their mindset in the sense that including other frames-of-reference became integrated in their thinking and practice. This has resulted in a range of new forms of action in relation to alternative technologies and community engagement, among others (see Table 5.7(a and b)).

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Table 5.7 New forms of action undertaken as result of participation in governance experiment

New form of action	Illustrative quotes
a) Pursuing water sensitive technologies	<i>"Just the other day one of the biodiversity officers called us up and said 'oh, you know, there's this new development, can you help with suggestions for what they could do for implementing Water Sensitive Urban Design on this ... and now, you know, I've got another one that they've sent through and so I think that that's actually been a big breakthrough here'".</i>
b) Pursuing community engagement	<i>"I have never ever done community engagement [before] because I've been an engineer and scientist. Plus I always felt I don't know whether I can do it ... but I feel confident that I can facilitate a group and also get a good facilitator... I've been reading a lot; I found a lot of resources on different tools for engagement and understanding how that tool could fit in different [situations]".</i>
c) Pursuing interconnecting organisational perspectives	<i>"So we got both the groups together and City Projects have never met the Parks people, Parks people rarely talk to the Stormwater people and we were all in the same room... So what I was doing I put all the Parks names and asked them 'start off with what parks you think would need ... and when they identified the parks I would ask the Stormwater people, 'so what do you think, where in the catchment is this park sitting?' And 'oh that sits right on top of the catchment so you can't do much there' or something".</i>
d) Pursuing intra-organisational collaboration	<i>"With a couple of our parks staff that I didn't really have much to do with before ... and now we have built a strong relationship between parks and environment. We now cooperatively engage in new projects. We tell each other what's happening, we give each other advice; they think to come to us to ask questions when they're not sure as opposed to just going off and doing whatever they think".</i>

The Initiative has also produced high levels of, what Muro and Jeffrey (2012) term relational change, as individual and organisational actors strengthened and/or developed relationships and common views to improve urban water management. For example, interviewees revealed that new insights and understandings of how different professions hold diverse, complementary knowledge that is potentially important for advancing urban water management led to the desire, among most municipal actors, to increase intra-organisational collaboration. Indeed, as a result of the governance experiment, 81% of the municipal respondents stated that they are now more likely to communicate with other departments within the municipality about urban water management than at the start of the Initiative (Table 5.8a). This is evidenced by various examples whereby actors have directly translated these new insights and actively sought engagement with other municipal professionals in support of sustainable action (see Table 5.8c and d). The survey results indicate that the likelihood of pursuing internal municipal communication as a result

of participating in the Initiative was significantly higher among the non-core response group (who had primarily been involved in the sub-catchment projects) than among the core respondents ($p < 0.05$, $\phi = -.36$, $N = 41$).

While municipal staff began to recognise their mutual, intra-organisational interdependencies, catchment-wide interdependencies seemed to be more narrowly explored and understood, particularly among the non-core actors. Although not statistically significant, a noteworthy observation here is that core actors reported a higher level of likelihood to increase coordination with other catchment municipalities than the non-core actors did (Table 5.8b). Core group interviewees also highlighted that, through their close involvement in on-going formal cross-municipal processes throughout the governance experiment, they directly experienced the potential of catchment collaboration in furthering sustainable urban water management in the catchment. A number of the core group actors, however,

reported that they already put a lot of effort into developing cross-departmental and cross-municipal relationships and that this initiative did not change their efforts.

Triple-loop learning

Triple-loop learning among participating municipal organisations is demonstrated through a bottom-up change in governance structure of the Cooks River catchment. As a result of the governance experiment, in which catchment governance arrangements were reviewed, a new, formalised, catchment-wide association has been developed. This new structure, the Cooks River Alliance, is a regional coordinating body and a technical resource that supports its participating municipalities in improving waterway health and achieving sustainable urban water management in the catchment. It operates in an environment where current external rules provide very limited direction for the (cooperative) development and implementation of sustainable urban water

management. The Alliance, which has voluntary membership, functions at the political and staff (consisting of municipal and agency representatives) level and, for the first time, provides high-level support within municipalities for sustainable urban water management. This new governance structure raises the profile and urgency to address complex water problems that exist across multiple organisational boundaries in the Cooks River catchment, and is intended to make more efficient use of municipalities' limited resources. The Alliance represents a significant change in terms of mobilising municipal resources and power dedicated to sustainable urban water management approaches. This new association is endorsed by all municipalities participating in the Initiative. Each municipality has committed funding to the Alliance. It is premature to determine whether changes brought about through learning are of a temporary or transformative nature (Argyris 1999).

Table 5.8 Indicators of relational change as a result of the governance experiment by level of actor involvement

	Response to question				<i>p</i> ^c
	Agree ^b		Not Agree ^b		
	<i>n</i>	%	<i>n</i>	%	
Relational change					
(a) Likely to increase communication with other organisational departments					
Non-core actors ^a	23	92	2	8	0.04*
Core actors ^a	10	62	6	38	
All	33	81	8	20	
(b) Likely to increase coordination with other catchment municipalities					
Non-core actors	9	36	16	64	0.12
Core actors	10	62	6	38	
All	19	46	22	54	

Notes: Reported are numbers and (row) percentages of the various answering categories.

^a Denotes the respondents' level of involvement in the project.

^b Agree covers "agree" and "strongly agree" and the Not Agree covers "neutral", "disagree" and the "strongly disagree" answering options respectively in the five point Likert scale.

^c *p*-Values; Fisher's exact probability test.

* Significant at the 0.05 level.

Social learning

Social learning provided the opportunities and levers to promote the shifts in ways of doing, thinking and organising within the Cooks River catchment. This revealed a more nuanced perspective of learning, demonstrating that such learning does not need to be the same type for all actors.

Social learning was simultaneously stimulated at three different levels within the socio-technical system of the catchment (see Figure 5.2). This mobilised an emergent network of municipal practitioners, catchment decision-makers and communities around the ideology of sustainable urban water management. It should be noted that individual learning was encapsulated in each of the three levels.

At the sub-catchment level, residents, community representatives, state government representatives, elected officials and other municipal representatives developed new perspectives on the current situation and future of water management within the catchment. These new perspectives informed collective envisioning, planning and action in the catchment. While the results in this paper show that some municipal actors did not regard these collaborative processes as core to

the project and beneficial in bringing about changes in understanding (which could be considered failure in terms of social learning), it appeared that social learning within the wider residential community through their participation built and attracted publics. These publics, which can be seen as residential “groups surrounding common issue interests” (May 1991, p. 190), are considered critical in increasing political commitment to collective action for addressing environmental issues, such as sustainable urban water management. In this case, creating and maintaining publics helped to secure attention and on-going support for sustainable urban water management by elected officials beyond the start of the Initiative.

At the municipal level, actors from diverse disciplinary backgrounds refined their perspectives of how different professional and/or disciplinary roles and functions contribute to developing more sustainable, on-ground forms of urban water management. Building such relational capacity (Pahl-Wostl 2009) between professionals is important for furthering socio-technical system change as professional silos within organisations inhibit the development of innovative

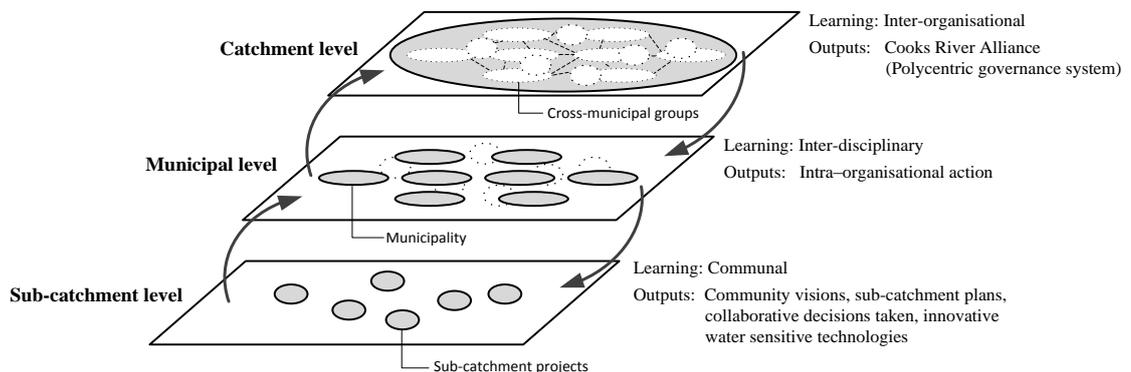


Figure 5.2 Levels of learning

solutions in the urban water industry (Rauch *et al.* 2005, Brown 2008a).

At the catchment level, actors from various organisations and across various hierarchical levels increased their understanding and knowledge of the context, complexities and interdependencies involved in developing sustainable urban water management at a catchment level. This resulted in a process of learning in which: (i) a shared meaning for urban water management in terms of purpose and stakeholder involvement in the catchment was negotiated ; (ii) ways to create changes in network practice were defined (for instance, the newly developed governance structure), and commitment created in each of the municipalities to support these changes. Knight and Pye (2005) refer to this type of social learning as network learning because change in network-level properties among a range of organisations has occurred.

Narrative in support of sustainable urban water management, which recognised the importance of integration and mutual dependence among a diversity of actors and factors, developed at the sub-catchment, municipal and catchment level during the Initiative. This resulted in new or strengthened networks and collective action at different levels of the socio-technical system within the catchment. It was, however, the interplay between social learning (and its manifestations) at these three levels that concurrently created momentum for a bottom-up structural change in the catchment network.

If social learning didn't happen concurrently across three levels, it is unlikely it would have resulted in changed urban water practice at the catchment level. The results, for example, indicate that social learning among non-core municipal staff was restricted to the local implementation and organisational level. Although individual learning among these actors diffused more widely within and across the municipal organisations, these actors did not necessarily see or consider the benefits of such a

collaborative approach at higher levels of the catchment system to further sustainable urban water management. On the contrary, municipal actors involved in the catchment-level governance processes witnessed how learning and growing networks at the local implementation and organisation level supported development of sustainable urban water management. These actors came to understand how more could be gained in furthering sustainable urban water management if such collective processes occurred at the broader catchment level in support of addressing urban water management and, in particular, in Cooks River health. This recognition motivated actors to fully engage in and support wider catchment governance deliberations. Supportive and interconnected social learning processes at different scales developed a refined and widely shared vision for sustainable urban water management. This vision is now embedded, not only in a new governance structure but also in wider cognitive and normative dimensions across the catchment.

The case reveals a need for a broader understanding of social learning. Experimental processes need to: (i) define whether all participating actors need to learn about the same level of a socio-technical system, and (ii) critically assesses the learning needs of different actors at different system levels to empower these actors to act as change agents. This does not suggest that broad system learning should not take place among a wide range of societal actors; rather it acknowledges that one size of learning does not fit all. The results also suggest that enabling diverse learning outcomes at different levels requires different types of social learning. Rather than relying on a single mechanism for social learning, the governance experiment offered multiple processes and approaches to learn about the relationship between social and technical systems, which were firmly embedded in an enabling project structure.

5.3.5 Design features for creating a social learning situation

The findings indicate that the depth and breadth of learning was highly dependent on the architecture of the governance experiment. The intricate design of the experiment created a range of situations for learning-by-doing and doing-by-learning, as advocated in transition management (Loorbach 2010). Through a strategic combination of project structure and various process approaches, a dynamic was created, which enabled simultaneous multi-level learning and action. The experiment was designed so that project

networks were open to a range of individuals beyond actors who were directly concerned with on-going project decision-making. Resulting learning experiences were purposefully coordinated and shared from the local to the regional level.

To understand what facets (processes, activities, project material) of the Initiative's design and structure have principally contributed to bringing about changes in individual understanding, municipal staff were asked to identify whether a particular facet contributed to increasing their knowledge and understanding of sustainable urban water management (see Table 5.9).

Table 5.9 Importance of the Cooks River Sustainability Initiative design facets (processes, activities, project material) in bringing about changes in understanding.

Design facets	Response to question (importance for creating changes in understanding)				<i>p</i> ^c
	Yes ^b		No ^b		
	<i>n</i>	%	<i>n</i>	%	
(a) Working together with staff from other departments through sub-catchment processes and activities					
Non-core actors ^a	18	72	7	28	1.000
Core actors ^a	12	75	4	25	
All	30	73	11	27	
(b) Working together with project team					
Non-core actors	11	44	14	26	0.008**
Core actors	14	88	2	13	
All	25	61	16	39	
(c) Project documents such as sub-catchment context map					
Non-core actors	9	36	16	64	0.009**
Core actors	13	81	3	19	
All	22	54	19	46	
(d) Participating in cross-municipal project support groups					
Non-core actors	7	28	18	72	0.000**
Core actors	15	94	1	6	
All	22	53	19	46	
(e) Participating in design and/or delivery of (on-ground) action					
Non-core actors	13	52	12	48	
Core actors	8	50	8	50	1.000
All	21	51	20	49	
(f) Attending presentations by team and/or experts					
Non-core actors	7	28	18	72	0.005**
Core actors	12	75	4	25	
All	19	46	22	54	
(g) Participating in training and/or workshops					
Non-core actors	6	24	19	76	0.02*
Core actors	10	63	6	38	
All	16	39	25	61	
(h) Participating in focus-group discussions in regard to how water is management by the municipality					
Non-core actors	3	12	22	88	0.000**
Core actors	11	69	5	31	
All	14	34	27	66	
(i) Undertaking community engagement at or before decision making stages					
Non-core actors	2	8	23	92	0.007**
Core actors	8	50	8	50	
All	10	24	31	76	
(j) Establishing community visions					
Non-core actors	2	8	23	92	0.017*
Core actors	7	44	9	56	
All	9	22	32	78	

Notes: Reported are numbers and (row) percentages of the various answering categories.

^a Denotes the respondents' level of involvement in the project.

^b Yes = selected option, No = not selected option.

^c *p*-Values; Fisher's exact probability test.

* Significant at the 0.05 level.

** Significant at the 0.01 level.

The majority of respondents assessed intra-organisational collaboration through sub-catchment processes and activities as an important facet for generating changes in understanding (73%), with responses nearly equally divided between the two response groups. Although fewer respondents identified participating in the design and/or delivery of (on-ground) action as an important design facet from which they learned, both groups responded equally regarding its importance ($\approx 50\%$). The overwhelming majority of core actors (94%) considered that participating in the cross-municipal project support groups had contributed to bringing about changes in understanding. Nearly 30% of non-core respondents answered positively to this facet, which represents 100% of respondents who participated in a cross-municipal group. Most core-actors also valued collaboration with the Initiative's project team (88%), project material such as the sub-catchment context map (81%), presentations by the Initiative's team and/or high-level sector experts (75%) and being involved in municipal focus-group discussions (69%) of relevance in bringing about changes in understanding (Table 5.9). The process of establishing a community vision was least valued for individual learning among all respondents.

Core actor respondents were more likely to have selected a certain design facet for bringing about change in understanding than actors who were more intermittently involved. In eight out of ten cases, this difference was statistically significant, indicating that a high association is found between level of actor involvement and valuing the facet in terms of bringing about learning. During the half-way interviews, many core actors reported a very high level of complexity in executing the different facets of the governance experiment. The Initiative was much more resource-intensive than expected. For instance, getting people involved at the municipal level was not easy and required great time and energy from steering committee members. These respondents identified that, over the first 2

years, they experienced high transaction costs while limited results were seen. However, near the end of the Initiative, when (learning) outcomes became clear and visible, the core actors demonstrated high awareness of how the different project design elements interlinked and contributed to the development of their knowledge and understanding of sustainable urban water management.

5.3.6 *Framework for governance experimentation.*

Transition management provides a governance framework aimed at widespread learning. It does not, however, explain how such an experiment should be designed to maximise social learning. Whilst the CSRI has addressed and integrated, in a sophisticated way, the design considerations as outlined by Ison and Watson (2007), the Initiative has demonstrated that running participatory workshops is just one of many instruments to foster social learning, leading to collective action. The case study suggests that governance experimentation aimed at learning for socio-technical system change not only requires careful design of its (collaborative) processes and activities to stimulate learning but also needs careful consideration of how interventions are structured and organised in terms of participating actors. Based on our results, the following discussion highlights a suite of proposed design /organisation features, which, when embedded in enabling starting conditions, may contribute to effective governance experimentation. Table 5.10 outlines the key elements of this framework, which stimulate formal and informal interaction.

Starting conditions

Enabling starting conditions guide the design and structure of an initiative and facilitate its legitimacy and execution. An essential starting condition for developing a governance experiment is the existence of a *shared learning agenda* among key participating

stakeholders, which establishes the broad values and assumptions that underpin the design and structure of an initiative. Assumptions underlying a governance experiment should include appreciation of multiple perspectives, problem framings and contextual circumstances, availability of a wide range of policy options to address a problem and acknowledgement of the potential for failure. Such an agenda serves to provide meaning to efforts and helps to convey that meaning to actors participating in an experiment (Martin 2007).

A learning agenda creates a clearer understanding of the operational environment needed within a governance experiment and potentially stimulates a culture that values learning (Martin 2007). Legitimacy to pursue an alternative learning agenda should be created among influential (political) stakeholders to provide credence and significance to such an agenda. Legitimacy creates initial trust, willingness and/or justification among high-level actors to participate in or contribute to an uncertain and innovative process. While *legitimacy* should be maintained throughout governance experimentation, initial legitimacy is key in creating momentum to embark on alternative policy processes (Lehtonen and Martinsuo 2008). In regard to the Initiative, initial legitimacy was achieved through advocacy from front-runners, the opportunity of winning AUD\$2,000,000 and the reputation of the earlier governance experiment (Bos and Brown 2012). Furthermore, realistic, committed *financial resources* are required, not only to support the (participatory) development and execution of innovative ideas and processes but also to shelter them from conventional and prevailing practices in unsympathetic regimes. Dedicated funding (such as grants and subsidies) contributes towards generating 'protected spaces' where

risks with new innovations can be taken (Kemp *et al.* 1998, Farrelly and Brown 2011). Smith and Raven (2012) contend that such space not only shields an innovation but also helps to nurture and empower it.

Features of design and organisation.

Building on the enabling conditions, the design and structure of governance experimentation need to allow for formal and informal interactions among core and non-core stakeholders at horizontal and vertical levels within, across and beyond organisations. This requires a range of interconnected interventions, each connected to the wider learning agenda.

Focus projects are critical in understanding the systemic nature of the problem at the local level and for developing alternative solutions at this level (defined in Table 5.10). These projects potentially draw in a wide variety of stakeholders and stimulate social interaction, not only between different societal actors but also between different disciplines within an organisation. Stakeholder interaction in a focus project should, on the one hand, be organised to ensure all relevant stakeholders are provided opportunities to participate so knowledge at local system level can be co-created through a wide range of perspectives. On the other hand, such projects should allow for many informal opportunities where actors can join learning processes. Within the Initiative, professionals who were traditionally involved in urban water management were not necessarily drawn to or willing to participate in the innovative formal processes. However, the practical ways by which these professionals could get involved, using outcomes of formal processes, provided an entrance into a learning environment. These projects are a focal point for professionals to develop and exercise expertise.

Table 5.10 Framework for governance experimentation: design and organisation aspects.

	Dimension	Definition	Example of this dimension in the Cooks River Sustainability Initiative (2007–2011)
Starting conditions	Shared learning agenda	A learning agenda aims to: provide meaning to efforts outline underlying assumptions guide operational environment of experiment	The Initiative’s learning agenda focused on exploring perspectives and mutual inter-dependencies between municipal staff (themselves) and other catchment stakeholders. It also aimed to develop local context-appropriate solutions.
	Legitimacy	(Political) support to endorse and legitimise alternative and experimental policy processes	Political endorsement by the mayors of each of the participating municipalities.
	Resources	Dedicated financial resources to protect, develop, implement and complete innovative policy processes and technologies.	Availability of grant funding for proposal development and execution of Initiative with subsequent co-investment by participating municipalities.
Features of Design & Organisation	Focus projects	Local projects that draw in a wide variety of disciplines/stakeholders and generate understanding of systemic nature of problem situation in its local, contextual circumstances and develop alternative solutions and publics through social interaction.	Sub-catchment planning projects
	Multi-organisational peer groups (Executives, focus project leaders and experts)	Multi-organisational peer groups serve as multi-functional learning platforms through on-going exchange of diverse organisational, professional and/or technical perspectives and sharing of (learning) experiences derived from undertaking the focus projects.	Steering committee, executive champions committee, technical experts committee
	Distributed facilitation	Distributed facilitation recognises distributed roles and responsibilities to facilitate, guide and support (learning) processes and activities across a variety of actors at and between different levels.	Project manager, project team, steering committee members, university partners
	Science/Research	Partnerships with research institutions/researchers provide on-going experimental guidance and feedback.	Initiative was subject to on-going monitoring research while specific scientific input and expert advice was sought in early project development and at various stages of Initiative.
	Adaptability and flexibility	Room for adaptation of processes and activities to suit local context without losing objective of learning agenda.	The development of specific sub-catchment plans in six-sub catchments with differing context features across eight culturally diverse municipalities required adaptability and flexibility of processes and facilitating actors.
	Time	Time to develop learning processes, buy-in and/or mutual trust	It took considerable amount of time for actors to build trust and to understand and appreciate the complexity of the Initiative.

According to our results, informal interaction was significant in generating changes in understanding. The practice-oriented nature of focus projects provides significant opportunity for learning-by-doing. If projects are well facilitated, they stimulate on-going reflection on the problem issue, its wider context and its interdependencies. An open network, with opportunities for actors to join a process in a later stage, provides a less threatening way for engagement of actors, who based on their professional background, tend to view organised collaboration as undesirable (Schein 1996). Such actors are less likely to voluntarily engage in collaborative processes, unless they can relate to and see the value of such a process. Practice-oriented focus projects provide a range of activities that different stakeholders can associate with and see the relevance of as they perceive the intervention within their scope of influence.

While it is hoped that focus projects have good outcomes in terms of natural resources management and technology, this is not their primary purpose. They are designed to serve primarily as a lever: (i) to build pressure within organisations to pursue more sustainable forms of resources management through increased understanding of the problem issue and development of organisational capacity around the issue, and (ii) to develop political capital and commitment to sustainable practice through building publics. Developing or attracting publics, as occurred within the Initiative, is critical in developing and implementing governance experimentation aimed at socio-technical change (see Morison and Brown 2011). Therefore, publics should be actively developed and encouraged to participate in policy implementation, particularly in areas of the socio-technical system with limited dedication and commitment to more sustainable forms of urban water management. By doing so, supportive policy images are created that are pertinent to publics and may consequently influence socio-political processes.

Focus projects can potentially help to generate small wins in relation to developing sustainable practice. Kouzes and Posner (2008) argue that these small steps are necessary to realise a big-picture vision. In addition, it enhances actor motivation as successful focus projects demonstrate that change through learning is possible.

Multi-organisational initiatives focused on generating widespread social learning should consider developing and implementing a range of comparable focus projects within each participating organisation and across participating organisations. Such projects provide a common sense of purpose and continuity to multi-organisational initiatives. In addition, cumulative learning and action experiences derived from concurrent focus projects have the potential to create momentum and impetus for socio-technical change (Bos and Brown 2012). A prerequisite for this to happen, however, is the deliberate, regular sharing of learning experiences within and between organisations.

Therefore, the creation of *multi-organisational peer groups* for executives, focus project leaders and experts is another important design feature of governance experimentation. These groups serve as multi-functional learning platforms through on-going exchange of diverse organisational, professional and/or technical perspectives and sharing of experiences derived from undertaking the focus projects. These groups can develop into networks, which potentially connect communities of practice and institutionalise learning (Pelling *et al.* 2008). These authors state that in this manner, they serve as shadow systems which can enhance innovative environmental practice. In addition, multi-organisational peer groups, where leaders at executive and project level work in tandem, can be highly effective in addressing complex challenges, particularly during project endorsement phases. For example, Taylor *et al.* (2011) suggest collaboration between executive and project leaders supports the building of advocacy coalitions, selling of ideas and initiatives to

high-level decision makers, and strategically utilising windows of opportunities. The underlying idea is that project leaders, who may have a relatively low level of position power, draw on the position power, strategic networks and relational knowledge of the executive leader (Taylor *et al.* 2011). This was important in the Initiative, where executives and steering committee members collaborated to gather municipal support for the endorsement of the sub-catchment management plans, which were developed in the collaborative planning process. These actors also worked in tandem to gain political and managerial support for municipal endorsement of the change in governance structure within the Cooks River catchment. Proehl (2001, p. 291) suggests that building coalitions for change should be a deliberate effort, “rather than hoping that momentum will build”. Therefore, the manner and frequency by which multi-organisational peer groups meet should be firmly embedded in the design of an initiative.

Robust facilitation is needed to support, guide and purposefully coordinate learning experiences at and between focus projects, organisations and wider society. The necessity for facilitation to generate social learning is consistent with the broader social learning literature (e.g. Mostert *et al.* 2007). However, governance experimentation aimed at widespread social learning recognises *distributed roles and responsibilities for facilitation* across a variety of actors. This means that facilitation is not the preserve of a designated individual/organisation. Distributed roles and responsibilities for facilitation do not suggest that formal leadership and/or facilitation functions are removed or unnecessary (Harris 2008). A governance experiment necessitates overarching facilitation (by one or more facilitators) that is specifically designed to coordinate learning processes and organise feedback loops between different processes, activities, focus projects and the wider vision/agenda at and among different levels of a socio-technical system. In addition, a

dedicated engine, in the form of a project team, can support and facilitate project momentum through provision of on-going emotional and practical support. They also kept stakeholders focused on and accountable for the aim of the experiment in this study. Distributed roles and responsibilities for facilitation recognise that facilitation is shared and realised within the broader network of partners involved in creating a learning situation to obtain better learning outcomes. For instance, organisational focus project leaders are not only instrumental in providing and channelling information but they also play a large role in facilitating organisational and focus project processes. These actors are responsible for day-to-day running of a governance experiment within an individual organisation. They are likely to possess informal means of influence and connection that may affect outcomes of the governance experiment, instead of formal power to make change happen. Ideally, these focus project leaders are geared towards the development of policy and processes and require the help of other disciplines, such as engineering, to carry out the focus projects. This provides a natural requirement for interaction between a diversity of disciplines and an informal experience of learning-by-doing together. Such distributed facilitation requires clarity on roles and responsibilities between the different facilitators to manage expectations and the ability to facilitate different processes at different levels. Drawing on the Initiative, facilitation can be supported through *partnerships with researchers*, as these actors potentially provide independent experimental guidance, increased rigour and credibility, continuous feedback and access to a wide range of expertise. Additionally, partnerships can bring together industry executives and key academics in a given sector.

Interplay between focus projects, multi-organisational peer groups and appropriate facilitation allows diffusion of widespread learning processes. Focus projects provide a forum for problem-based learning, in an

actual catchment with genuine data. To enable problem-based learning, good understanding and awareness of the systemic nature and context (including the history) of a problem issue should be developed. Although the literature stresses this (e.g. Keen and Mahanty 2006, Ison and Watson 2007), it is not specific about the extent to which a system and its context should be shared and understood by actors participating in an initiative. Understanding the problem in its context differs, depending on what level of the system the initiative is operating in. For example, within the Initiative, addressing the problem issue at local level was guided by different details regarding the system than addressing the problem issue at catchment level. Thus, governance experimentation should be designed in such a manner that systemic problem and context frames develop at different levels of a socio-technical system. While the systemic interconnections should be understood, detailed systemic pictures should also be developed in manageable portions to which stakeholders can relate, and, in turn, be potentially empowered to act.

Governance experimentation that is not outcome-driven and made up of many concurrent processes and activities in a variety of contexts requires great tolerance of uncertainty and necessitates a large degree of *adaptability and flexibility* among all stakeholders. The manner in which such an initiative is framed and executed requires an attitude of true experimentation, in which fallibility is implicitly acknowledged. The disposition of governance experimentation substantially differs from traditional project delivery (i.e. on time, within budget and meeting pre-identified key-performance indicators). Creating a culture that fosters adaptation requires strong leadership, openness and, specifically, *time* to develop trust among partners and in the process itself.

Transition management as a policy approach for facilitating sustainability transitions emphasises the importance of involving all relevant stakeholders at the operational level. The proposed framework

provides practical guidelines for how relevant stakeholders and learning processes can be organised. For instance, exploration of the role of focus projects provides insight on how transition experiments could be designed to enable and maximise local-level learning and how such experiments could be used to leverage broader social learning. The suggested multi-organisation peer groups provide paths for extensive sharing of learning derived from transition experiments, whereas distributed facilitation clarifies the necessity for, and roles of, a diversity of leading actors beyond a transition manager. While the framework for governance experimentation is important for transition management, it further informs wider literature and practice around policy aimed at creating social learning situations, as the framework presented in this paper goes beyond existing learning design dimensions.

5.3.7 Conclusion

Learning is increasingly identified as fundamental to achieving sustainability transitions, and experimentation is regarded as a highly important means of creating situations in which learning can occur. Through an empirical case study of governance experimentation aimed at enabling widespread learning, the study revealed how catchment actors develop changes in understanding and relationships. Moreover, the case study provided important insight into how a diversity of learning experiences can be generated, coordinated and shared at and across different system levels. These findings further explicate the importance of well-designed and organised governance experimentation, for this allows the development of concurrent and embedded social learning situations, which together have the potential to create momentum for socio-technical system change. The case study has shown that, in the design of the formal, the informal interaction came alive. Based on these findings, we proposed a framework of key aspects related to the design and organisation of governance

experimentation aimed at enabling a widespread social learning situation. This framework identifies key starting conditions required to create an enabling context for an initiative, and which facilitates its legitimacy and execution, then proposes six key features of design and organisation: focus projects, multi-organisational peer groups, distributed facilitation, adaptability and flexibility, time and science/research. Each feature plays a significant role in generating, coordinating and sharing learning in a complex system. Furthermore, the research evidence suggests that the type and degree of social learning do not need to be the same for all societal actors to achieve system change; thus, the framework suggests a range of processes that cater for the involvement of a diversity of actors in terms of background, influence, time availability, interest and learning needs.

Our study focussed on a diagnostic assessment of causality, which has led to a

structural analysis and discussion. While a detailed analysis of the role of agency in this case study including power dynamics, leadership and cultural context in and between organisations is beyond the scope of this paper, this would undoubtedly reveal further insights about the constraining or enabling factors of social learning. Despite this limitation, our framework contributes to the design and operation of practical transitions management processes in practice. Furthermore, the framework has significant utility in broader policy and governance reform agendas, which embrace the need for and importance of supporting social learning situations.

References have been moved to a consolidated reference list at the end of the thesis.

Chapter 6

Enabling Effective Governance Experimentation

6.1 Introduction

This Chapter examines the CRSI governance experiment in a broader context. Assessing the Initiative within its overall setting, it was discovered that it had not emerged from a previous initiative beforehand that provided foundational thinking and resources that helped to get the experiment off the ground.

The publication presented in this Chapter is published in *Technological Forecasting and Social Change* and identifies factors that help to enable and undertake transition-oriented governance processes in a conventional, technocratic resource context.

6.2 Declaration by candidate for publication 5 (Chapter 6)

In the case of publication 5, the nature and extent of my contribution to the work was the following:

Nature of contribution	Extent of contribution (%)
Formulation of research problem and the context of the research in the wider literature; data collection; data analysis, interpretation of results and writing.	90%

The following co-authors contributed to the work. Co-authors who are students at Monash University must also indicate the extent of their contribution in percentage terms:

Name	Nature of contribution	Extent of contribution (%) for student co-authors only
Rebekah R. Brown	Formulation of research problem, interpretation of results and revision of writing.	N/A

Candidate's Signature		Date
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Declaration by co-authors

1. The undersigned hereby certify that:
2. the above declaration correctly reflects the nature and extent of the candidate's contribution to this work, and the nature of the contribution of each of the co-authors.
3. they meet the criteria for authorship in that they have participated in the conception, execution, or interpretation, of at least that part of the publication in their field of expertise;
4. they take public responsibility for their part of the publication, except for the responsible author who accepts overall responsibility for the publication;
5. there are no other authors of the publication according to these criteria;

6. potential conflicts of interest have been disclosed to (a) granting bodies, (b) the editor or publisher of journals or other publications, and (c) the head of the responsible academic unit; and
7. the original data are stored at the following location(s) and will be held for at least five years from the date indicated below:

Location(s)	School of Geography & Environmental Science, Monash University	
Signature 1		Date

6.3 Publication 5 – Governance experimentation and factors of success in socio-technical transitions in the urban water sector.

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Abstract

The necessity of a shift towards more sustainable urban water management practice is widely acknowledged and advocated. Experimentation that enables social learning is regarded of high importance for realising such a change. For instance, literature on Transition Management suggests that governance, as opposed to purely technical, experimentation is considered a critical factor in achieving a socio-technical transition. When analysing the water sector it becomes clear that modern urban water systems have almost exclusively focused upon technological experimentation with little attention directed towards the importance of governance experimentation for social learning. Empirically little is known neither on how governance experimentation actually unfolds nor about its effectiveness for socio-technical transitions. This research paper presents a critical analysis of a unique process of governance experimentation within the Australian urban water sector which generated sufficient social-political capital to change an established water governance framework. Conclusions of this research reveal some theoretically conjectured processes, like deepening, broadening and scaling-up, are found in this contemporary, real-life example. Furthermore, factors which influenced the success of this governance experimentation process are revealed and the role of various forms of learning therein is described.

Keywords: Governance Experimentation; Transition Management; Transition Experiments; Learning; Critical Factors; Urban Water

6.3.1 Introduction

There is widespread agreement that the way our society is structured to manage its environmental resources is unsustainable. There are limited resources, increasing demands, infrastructure and economic feasibility are under pressure, and unpredictable events such as climate change are putting more demands on our already stressed systems. The environmental resource problems our society faces are considered to be of a persistent nature as they are extremely complex, highly uncertain, long-term, and

affected by multiple actors with different perspectives and values (Dirven *et al.* 2002). An example of such a problem is managing urban water with numerous potential supply sources, diffuse pollution sources, multiple administrative boundaries and numerous stakeholders, including different levels of government. Persistent problems are connected to system failures that are apparent in current socio-technical systems (Rotmans and Loorbach 2009). System failures are entrapped in socio-technical systems through

institutional arrangements, technological infrastructure, existing networks, and path dependency (Walker 2000, Raven *et al.* 2007). These different elements typically co-evolve to strengthen each other to develop a system that is stable and thus difficult to transform (Arthur 1989, Berkhout 2002). Commentators argue that fundamental change to the current production and consumption systems is needed to increase environmental performance and resolve unsustainable problems challenging society (Beck 1994, Konrad *et al.* 2008, Loorbach 2010). This requires structural change of our established socio-technical setting which shape the behaviour and decision-making of actors (Raven *et al.* 2007).

Although it is not conclusively understood how fundamental change in environmental resources management is created, there is an increasing scholarship focusing on complex system-based approaches. In particular, the theoretical fields of Social-Technical Transitions (Rip and Kemp 1998, Geels 2004), Social-Ecological Systems (Gunderson *et al.* 1995) and Transition Management (Rotmans 2003, Loorbach 2010) provide insight into the governance processes that might steer fundamental change in complex systems. These bodies of literature highlight that social learning fostered through experimentation is, among other factors, of high importance in overcoming system lock-in and enabling restructuring of current social-technical systems (Olsson *et al.* 2004, Folke *et al.* 2005, Geels 2006, Pahl-Wostl 2006, Van der Brugge and Rotmans 2007). Social learning potentially contributes to change in norms, values, goals, operational procedures and actors that govern decision-making processes and actions needed to translate sustainability ideas into practice (Pahl-Wostl 2009). Experimentation is regarded as an important instrument to support transitions towards sustainability as it provides a venue for such learning (Loorbach 2010).

Wide-scale experimentation intended to advance sustainable resource management is taking place around the globe. However,

when taking a view of the water sector, it becomes clear that modern society is much better with experimentation that is geared towards technical innovation than experimentation that enables wider learning (Mitchell 2006, Farrelly and Brown 2011). While technological experimentation is critical for sustainable development, the learning derived from these experiments “does not seem to go beyond developing technical expertise and practitioners’ confidence in alternative technologies” (Farrelly and Brown 2011: 9). This is indicative of learning within closed networks, where project networks mainly consist of those directly involved with project decision-making (Hegger *et al.* 2007). However, social learning processes aimed at system change are thought to require open and flexible (informal) networks (Gunderson *et al.* 2006, Pahl-Wostl 2009). Learning in closed networks may potentially result in technological and policy-instrument improvements. However, it is highly unlikely that it leads to questioning or changing the current problem framing, the policy objectives and the way these objectives are being achieved. Neither does it lead to a fundamental change of the context and factors in which decision-making takes place (Pahl-Wostl 2009). Therefore, dealing with persistent societal problems requires experimentation that explicitly aims to encourage informal societal networks to emerge or be strengthened. This could be achieved through multi-stakeholder collaboration in which actors share and challenge their knowledge and perspectives (Beers *et al.* 2010). This innovation or experimentation in governance approach, which focuses on processes, requires a very different dynamic within societal relations than technical experimentation, as it involves much more interaction and reflexivity (Woodhill 2010). It is widely understood to enhance social learning and innovation networks (De Bruijne *et al.* 2010, Loorbach 2010). Thus, offering the potential of exploring alternative solution methods to persistent problems (Van Buuren and Loorbach 2009).

The disproportionate focus on technical experimentation may be due to a number of factors. The historic division between infrastructure and management, preference for linear, scientific, risk avoiding solutions (Ingram and Schneider 1990, Giddens 1999), and the importance of economic efficiency, justified through measurement (Elzen and Wiczorek 2005), have been referenced as reasons for a technocratic focus on experimentation. Innovation and experimentation with governance approaches, can be referred to as governance experimentation, which draw on the scholarships of collaborative planning (Healey 1997), participation and social learning (Keen *et al.* 2005) and aim to alter the configuration of decision-making, which raises issues of accountability and legitimacy (Moore and Hartley 2010). As such, governance experimentation challenges existing public administration procedures, as it is less specific in regard to its outcomes. Despite these complexities, deliberate and serendipitous forms of governance experimentation have emerged in technocratic, adverse contexts.

While there is a variety of concepts, models and theories that explain governance processes in which societal stakeholders are involved (Healey 1997, Klijn and Koppenjan 2000, Loorbach 2010) very little is understood in regard to real-life experimental governance processes (Vreugdenhil *et al.* 2010, Farrelly and Brown 2011). In particular, literature falls short in explicitly describing the dynamics by which governance experimentation actually unfolds and the specifics by which such processes contribute to change for sustainable development. For instance, literature on Transition Management suggests that governance experimentation is a critical factor in achieving a socio-technical transition such as necessitated in the urban water sector. However, this field lacks in-depth empirical case-studies to verify their assertions. In addition, much of the scholarship on advancement of sustainable practices focuses on identification of barriers towards

implementation of these practices (Van Bueren and De Jong 2007, Brown and Farrelly 2009). The empirical identification of enabling factors for advancing sustainable practices, with some exceptions such as Farrelly and Brown (2011) and Vreugdenhil *et al.* (2010), appears to be of less importance in academic literature.

Against this background, this paper seeks to critically examine how effective governance experimentation is for socio-technical system change and how such processes are enabled, developed and sustained in conventional technocratic resource management contexts. This is explored through a structured case analysis of a 10-year dedicated process of local to regional governance experimentation in the urban water sector, driven by a small group of actors. This paper presents an overview of an experimental governance process within the Cooks River catchment in Sydney, Australia. In particular, the different developmental phases and their outcomes are outlined. This is followed by an analytical discussion regarding the process mechanisms and aspects that triggered the emergence and continuation of the process of governance experimentation. Finally, a commentary is provided on how this research complements and extends current international scholarship on socio-technical transitions and, in particular, Transition Management as governance experimentation is central to this scholarship. This paper highlights the ability of governance experimentation to transform existing, conventional socio-technical settings, provides empirical support for the dynamics presented in Transition Management literature and identifies some critical success factors which could be of guidance in future experiments aimed at sustainable resources management.

6.3.2 Research approach

The case study and its context

The development and implementation of a novel multi-disciplinary, participative approach to urban water planning in the

Cooks River Catchment have resulted in a significant adaption of the governance arrangements within this catchment. This successful, bottom-up experimental governance approach, which took place over a 10-year period (2002-2011), has been unique in uniting municipalities in active support for sustainable water practices at a political level. The initiative started initially as a small-scale single niche experiment, the experiment replicated in other areas and its underlying values and practices are now in being institutionalised through new governance rules and structures within the current social-technical setting of the catchment. This first Australian urban water governance experiment at the local-to-regional level offers an important empirical research opportunity as it has emerged and is established in a highly urbanised and industrialised water management context where abundant experimentation is taking place, but where near all efforts are aimed at creating optimised solutions and technical learning (Farrelly and Brown 2011). While key-actors involved in this process specifically intended to develop an experiment for governance, no specific approach such as Transition Management was used to guide the process of experimentation in practice.

The Cooks River flows from south-western Sydney into Botany Bay through some of the most heavily urbanised and industrialised areas in Australia. Its catchment is a densely populated area of over 500,000 residents occupying approximately 100 km². Over the past 200 years the Cooks River has experienced a turbulent history as it has been “dammed, diverted, dredged, dumped and thoroughly degraded” (Renwick *et al.* 2008: 1). It has a reputation as one of the most polluted rivers in Australia [36]. Sydney’s stormwater drainage contributes largely to the degradation of the Cooks River through the transportation and disposal of polluted urban stormwater into the river (Brown *et al.* 2006). The institutional framework governing urban water management within the catchment is highly fragmented. A large number of

organisations, including 13 local municipalities, administer the development and management of water resources, the provision of water services and related infrastructure, the care of public land and the natural environment. A state government owned corporation is primarily responsible for water supply, wastewater services and trunk drainage, while the Catchment Authority is responsible for catchment management and bulk water supply. Local municipalities are responsible for the stormwater drainage network. Although the New South Wales State Government concern for stormwater is slowly increasing (cf. NSW Government 2010), it does not seem to be a high priority as stormwater does not belong to any State Department’s formal responsibilities (Van de Meene 2010). Ongoing waterway degradation and technology-centred planning in the catchment and limited State Government directive to improve stormwater management and waterway health led to disappointment among the champions who later initiated the experimental governance process.

6.3.3 *Methods*

To characterise how an alternative approach to urban water management experimentation can emerge and evolve into a legitimised experimental governance process in conventional, technocratic resource management contexts, a single-embedded case study method (Yin 2009) was employed. The rationale for studying governance experimentation in the Cooks River Catchment can be found in that it is a unique and distinctive case as key-actors were explicitly aiming to develop governance experimentation instead of technological experimentation. In addition, this case is one of the first ongoing governance experiments within the context of sustainable urban water management in Australia and beyond that has been systemically analysed and reported upon in scholarly literature. Scholz and Tietje (2002) describe this form of case-study as a groundbreaking case for the reason that the

governance experiment under research is a totally new governance approach towards urban water management and no knowledge on such a process is available that has been obtained by the means of a structured research approach. The purpose of studying the governance experiment was to identify how the process was initiated, established and further developed within the current urban water management regime. The research has drawn on multiple sources of evidence through qualitative and quantitative research methods. The chosen approach followed Creswell's (2009) concurrent embedded strategy of mixed-methods as qualitative data primarily guided the research project and quantitative data provided a supporting role. The mixed-methods model of data collection was used to gain a broader perspective on the governance process from a larger number of catchment actors than what would have been possible using a qualitative method only. This is due to the size of the case-study. Both authors have been emerged in the case-study in different stages over the past 10-years. The principal author of this article has been a direct observer of processes over the last three years, taking field notes and interacting with network participants in an informal observation capacity through attending workshops and other activities associated with the initiative. The earlier part of this governance process has been partially directly observed by the second author. It has been retrospectively analysed by the first author. Table 6.1 provides an overview of the involved stakeholder groups in the research and the methods employed in this research, which includes oral histories (n=6), in depth, semi-structured interviews (n=14), group interviews (n=10 totalling 65 participants) and questionnaires (n=127). Oral histories were used to reflect upon the urban water sector in Sydney and the Cooks River Catchment prior

to emergence of this governance experimentation. They also reflected on experiences and observations by which the experiment emerged and replicated itself. The interviews and group interviews also reflected on these same matters but focused predominantly on the processes and perceived outcomes during this broadening phase. Interviewees were also asked to consider dynamics by which the experimentation influenced the traditional regime. Surveys were used to evaluate the experimental governance process and reflect on individual, organisational and societal learning. During the data collection, the researchers have gone back to interviewees several times to gain maximal insight in different stages of the governance process under study. Deeper understanding and insight of context and process emergence were sought through the analysis of policy, organisation and media documentation and existing scientific literature. Data analysis occurred in three stages: (1) coding interview transcripts (Kitchin and Tate 2000), (2) descriptive analysis and coding of survey data (Jansen 2010), and (3) comparison and integration of interview outcomes and survey outcomes. The qualitative data was analysed using grounded theory techniques (Blaikie 2000). Systematic reduction of data took place through coding data into grouped themes. Codes and themes were derived from analytical induction on the basis of patterns that emerged from the data (Creswell 2007). Interim research findings were presented to fellow academics for critique and reflection. The discussions and feedback have been used to refine the synthesis of the final results. These findings were also shared with key-individuals within the Cooks River Catchment for verification. Their feedback was used to ensure accurate representation of the process of governance experimentation.

Table 6.1 Stakeholder groups vs. methods employed in research.

Stakeholder groups	Methods	Oral histories and semi-structured interviews	Group interviews	Surveys
Environmental officers/managers (municipal)		✓	✓	✓
Technical officers/managers (municipal)			✓	✓
Executive/senior managers (municipal)			✓	
Scientists		✓		
Residential community				✓
Other catchment stakeholders (e.g. regional groups, State Government, consultants)		✓	✓	

6.3.4 Phases of governance experimentation

This section investigates the 10-years of governance experimentation within the Cooks River Catchment which developed new ways of thinking, doing and organising within local municipalities and in the broader catchment. It seeks to examine the practical initiatives which made up the different phases within this process and also investigates the key dynamics that enabled the emergence of each of these initiatives.

Overview of 10-years of governance experimentation

Three distinct phases can be distinguished within this emergent process of experimentation. These phases represent three, consecutive practical initiatives which are outlined in Table 6.2. Each initiative sought to trial something new, at a larger and more complex scale. The initiatives also increasingly involved more senior and influential catchment actors. Outcomes of the initiatives were not pre-determined and the potential of failing

existed and was generally accepted due to the novelty of the initiatives undertaken.

This fits the notion of experimentation as it carries an implicit acknowledgement of fallibility.

Process dynamics of each phase of governance experimentation

Urban Storm Water – Integrated Management (USWIM) 2002 - 2006

The USWIM initiative was preceded by the emergence of a small, informal discussion platform, led by two key-individuals (champions²) who independently observed a problem with urban stormwater management, municipal responses and the means by which State Government attempted to address these problems. Albeit from different backgrounds (practitioner vs. scientific), both champions had come to understand that more sustainable forms of urban stormwater management are the emergent attributes of social processes instead of purely technical attributes (Steyaert and Jiggins 2007).

² Key individuals within this 10-year governance process have been referred to as champions. According to Taylor (Taylor *et al.* 2011), scholars agree that champions are ‘emergent leaders’ who are centrally involved in bringing about change. This description of champions fit this case-study as the ‘emergent leaders’ were largely driven by intrinsic motivation and commitment rather than formal employment responsibilities.

Table 6.2 Description of initiatives during the 10-year period of governance experimentation.

Initiatives Key Features	Urban Storm Water – Integrated Management (USWIM)	Cooks River Sustainability Initiative (CRSI)	Cooks River Alliance
Timeframe	2002–2006	2007–2011	2009–ongoing (started under CRSI)
Purpose	Initiative to broaden understanding of and build organisational commitment to healthy waterways through improved management of local urban catchment dynamics.	Initiative to improve Cooks River health, conserve water resources, increase the capacity of municipalities and its communities, and improve collaboration within and between these municipalities.	Initiative to strengthen river catchment governance arrangements to develop effective partnerships and sustainable management practices through engaging the municipal community and increasing municipal efficiency and capacity.
Processes and activities	The development of an alternative approach (and its guidelines) to water planning which enables local collaborative processes for identifying and defining stormwater management priorities and adoptable solutions at the sub-catchment level. The process was trialled within three sub-catchments within one local municipal area.	The application and adaptation of the multi-disciplinary, participatory USWIM planning approach in six diverse sub-catchments across eight municipalities. As in USWIM, detailed social, physical and organisational assessments were undertaken to ensure an in-depth understanding of the sub-catchments characteristics and planning context.	The development of a formalised, political catchment wide association with dedicated core funding to coordinate regional information, communication and collaboration. The Alliance will also further build community and municipal capacity, and actively seeks funding for shared catchment projects.
Key players	Engineers, social planners, environmental scientists, educators, parks and recreation managers, residents, businesses and other government agencies.	Engineers, environmental professionals, parks and recreation managers, municipal senior executives, councillors, residents, businesses, other government agencies, and the CRSI project team.	Political representatives, alliance staff, municipal staff, community and other catchment stakeholders
Outcomes include:	Community water vision for 2050 and community management plans endorsed by the municipality; Establishment of an interdepartmental Integrated Urban Water Management group; A new appointment of full time dedicated environmental engineer; Organisational commitment to develop sub-catchment plans for all sub-catchments within the municipal boundary	Community water visions and management plans developed for six diverse local areas (endorsed by eight municipalities); Education and training for community and professionals; Identification of key barriers/gaps within municipalities and across the catchment; Implementation of site-specific water sensitive technologies that treat stormwater and save potable water. Some technologies are designed and constructed for first time by municipalities in-house; Elements of the collaborative planning process adopted within several municipalities and State Government; Social–political capital generated for change in water governance structure.	Not yet operational. Anticipated outcomes include: enhanced sustainable water and catchment management practices through support for water sensitive on-ground works, active community engagement, biodiversity conservation and riverbank restoration

Through a lengthy self-organised process during 2001-2002 a common understanding of the complex nature of the urban stormwater management problem was created. Within this shared understanding, urban stormwater was viewed as a societal challenge instead of a purely technical problem. This differed substantially from what was standard practice at the time, where stormwater problems were *a priori* defined as either a flooding problem or a stormwater quality problem, which required an end-of-pipe solution. Based on this insight, a vision for healthy, sustainable urban water ways was developed. The associated agenda outlined the strategic need for improved processes and outcomes of urban stormwater planning within a sustainability framework. This agenda was translated into broad ideas for the USWIM initiative which on the one hand aspired to identify a satisfactory solution to urban stormwater planning in the form of developing guidelines for such a planning process. On the other hand, it aspired to reveal that stormwater in urban catchment is characterised by uncertainty, complexity, interdependency and multiple stakeholders. By doing so the initiative implicitly aimed for social learning which was considerably different in its epistemological assumptions from existing policy instruments. The champions played a critical role in gathering new science and integrating existing science that challenged conventional practice of urban stormwater planning. The design of the USWIM approach was partly based on the findings of previous social research that evaluated urban stormwater planning across Sydney which concluded that the then planning processes were ineffective because of complexities such as catchment size, population dynamics and conventional engineering principles (Brown and Ryan 2000, Brown *et al.* 2001). Science in the field of ecology and stormwater engineering were also drawn into the process during its development and execution of the initiative.

The peculiarity of the initiative was especially highlighted in open forums where

municipal staff were invited to provide feedback and participate in discussions around the USWIM process. These forums were not as well attended as desired and therefore there was minimal interest in the initiative from those actors traditionally responsible for urban water management such as municipal engineers and their senior executives. However, this lack of interest allowed those involved to develop an alternative form of urban water management without any restrictions being imposed by more conventional policy perspectives. Additionally, opportunities for innovation were opened up as a result of environmental departments of municipalities at the time being an immature area of public domain. Their mandate within the municipality proved rather ambiguous as their role was not clear at that time. This precarious position, however, provided a great level of autonomy in which direction activities could be developed. In particular, if activities had the potential to receive external grant funding they were approved within the municipality. In turn, administering grant funding provided a great deal of autonomy as there was limited internal and external monitoring. This entire phase was financed through several consecutive external grants. This funding legitimised time for the champions to brainstorm, envision and realise their agenda. It stimulated willingness to take risks among the champions as there were low levels of accountability within the municipality on how the grant was spent (in comparison to 'internal' funding). External grants especially quarantined the municipal champion from serious negative consequences in case of project failure. If the initiative (with its unusual focus on sub-catchments and external stakeholder engagement) had been unsuccessful, nothing – besides personal reputation – would be lost as; firstly, no municipal resources, except some staff salaries, were used for this innovation and; secondly, low expectations existed among municipal and other actors in regard to the precise outcomes of this innovation. The

novelty of the USWIM initiative in terms of ideas and processes resulted in unclear boundaries around the project. Consequently, there were no rigid controls and deadlines on what was to be achieved within a certain timeframe. This provided a supportive environment for searching and learning. Partnership between the municipality and a university legitimised a slow project implementation process as it was accepted among stakeholders that research is a time-consuming process.

Cooks River Sustainability Initiative (CRSI) 2007 - 2011

During the first phase, the champions recognised that improved urban water planning processes in one municipality would have minimal positive impact on river health and sustainable use of water resources within the Cooks River Catchment as a whole. This fuelled the champions' desire to replicate the newly developed planning approach within municipalities across the catchment. It also highlighted the need for enhanced collaboration between different municipalities and other stakeholders. An opportunity for the champions to realise their agenda was provided in 2006, when the New South Wales Government made a call for projects of significant environmental benefit, delivered through partnerships between (local) governmental agencies, businesses, community organisations and residents. However, to fulfil the requirements of these highly competitive grants, the champions needed to acquire project partners in support of their agenda. The champions identified the existing Cooks River Foreshores Working Group (CRFWG) as a platform to develop such a coalition. The CRFWG, a voluntary association established by municipalities in 1997, was aimed at improving health and amenity of the Cooks River, its foreshores and catchment environment. This municipal officer level group was well aware of sustainability problems in regard to the Cooks River and its lack of coordinated approach in addressing the rivers problems.

The group regularly initiated and coordinated regional efforts to obtain State and Federal investment in the Cooks River. Over time, trust was built among the group members and strong networks with catchment stakeholders were established. The group was well acquainted with the USWIM project as it was undertaken within one of its member municipalities and regularly reported upon. The practice-based champion was a member of this group.

As part of generating support, the champions sought conceptual input among CRFWG members for a collaborative project within the scope of the available grant funding. However, at the time no innovative, inter-organisational project ideas aimed at environmental benefit were present within the group. This provided a crucial opening for champions to put forward their ideas for a project which aimed to replicate and extend the USWIM model collaborative planning approach and improve catchment collaboration. Even though the suggested processes were foreign within municipalities, no critical argument with regard to why they should not engage in this endeavour was voiced. The group members unanimously agreed to pursue the initiative. These actors, who shared meaning for environment and improved river health, became important players as petitioners for project support at executive and political levels within their municipalities.

A grant funding proposal for replicating the USWIM in six sub-catchments (see Figure 6.1) was developed by all project partners and was politically endorsed by the mayors of each of the participating municipalities. The NSW Government gave preliminary approval to the proposal, however an in-depth, project business plan was required before further funding was to be released. The presence of grant funding to develop this business plan provided project partners with time to develop the details of the content and process of the second phase in a participative manner.

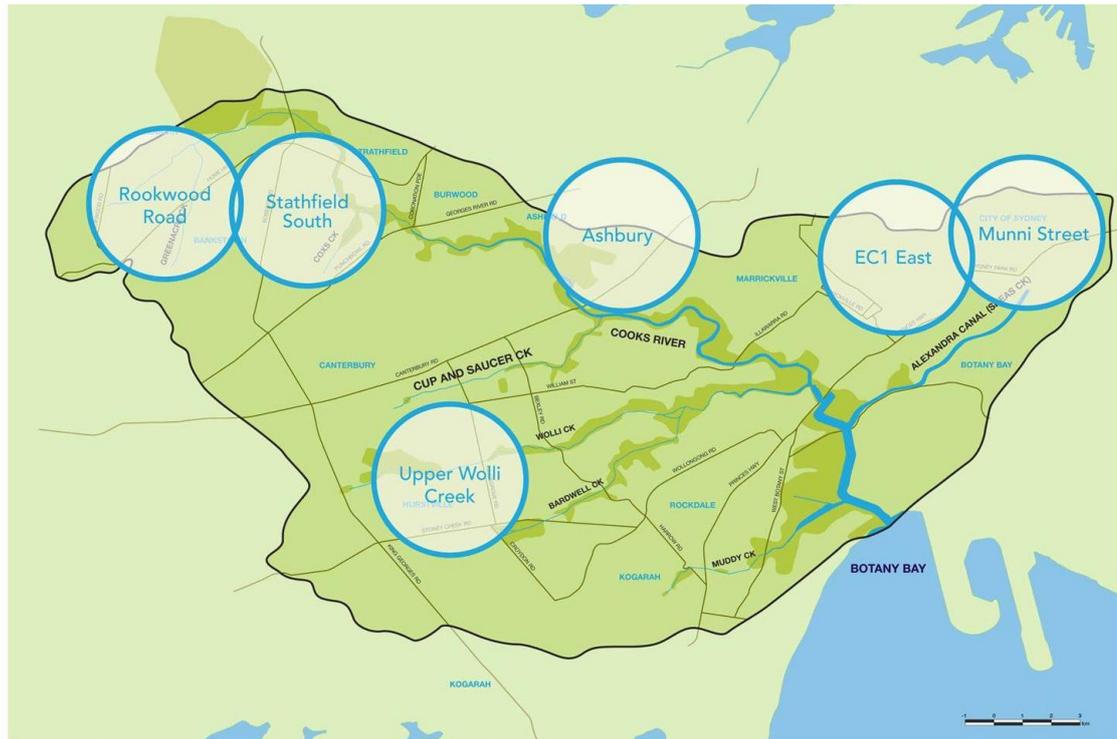


Figure 6.1 Overview of sub-catchments and municipalities involved in Cooks River Sustainability Initiative

In 2007, all participating municipalities' Mayors signed off on executing this project. The establishment of a coalition with support at officers and political levels for the CRSI project was a relatively straightforward process. The data analysis suggests several factors which may have supported this process. Firstly, USWIM became well-known among different stakeholder groups in the Sydney urban water sector. In particular, its underlying scientific approach proved to be highly regarded at executive and political levels within municipalities as they trusted the approach. Benefits of the initiative were also recognised in wider circles of local government as it won an 'Excellence in Sustainability within Local Government' award. Project findings were also shared at stormwater industry conferences (Thomas et al. 2007) and through promotion of the initiative by leaders in the field of sustainable urban water management. As a result of the project and its publicity, both champions became trusted leaders in the field and were

regularly invited to speak at events. The practice champion was seen as highly innovative in municipal networks. USWIM's reputation and the opportunity to enhance a municipality's reputation by being involved in such an innovative, sustainable water initiative were dominant drivers for municipalities to become project partners. Secondly, legacy issues that were important for individual municipalities to address (such as risk and costs) were covered by grant funding from the Environmental Trust. In addition, the funding supported a dedicated inter-organisational project implementation team to work across the participating municipalities. The project was therefore perceived as having a low additional workload for each of the individual municipalities. Thirdly, the USWIM project had been running parallel with the 'water sensitive urban design program', a small capacity building program which commenced in Sydney in 2002. This organisation served as a knowledge broker for improved surface water quality, water conservation and

alternative green technological options that could be applied to achieve the former. It brought together various stakeholders within the field of urban water management and helped to build a base for alternative forms of urban water management. One of the program's main target audiences were staff and politicians within all Sydney metropolitan municipalities. This organisation assisted in building municipal receptivity towards partnering in CRSI.

Cooks River Alliance 2009 – ongoing

Developing effective partnerships for embedding sustainable urban water management practices within the catchment through improved governance arrangements had been prominent on the champions' agenda since the USWIM initiative. Aware of its own shortage of resources (human and financial) and low levels of political influence within and beyond the catchment, CRFWG members agreed to express an aspiration of developing new Cooks River Catchment arrangements within the CRSI proposal. Although this ambition had a stated direction, there were no defined expectations on the outcome of this process. This unspecified end-result provided a great level of uncertainty to what these new governance arrangements would entail, who would be involved and what exact purpose this arrangement would serve. From quite early on in the project, some key project stakeholders labelled this aim "over-ambitious". As a result, no dedicated activities in relation to the establishment of new governance arrangements took place for well over two years. However, during this time early regular CRSI activities (second phase) were already indirectly supporting a process of developing new governance arrangements when a new project manager arrived and formalised this process.

Over the period of one year, the project manager facilitated numerous discussions and workshops with officers, executives and mayors from eight municipalities to develop content and support for new governance

arrangements to embed sustainable water practice within the catchment. The outcome of this interactive, reiterative process was directly informed by CRSI project dynamics and results. Knowledge generated from the research on each partner municipality's capacity for sustainable urban planning and management served as a starting point to discuss regional catchment issues. In particular, this in-depth analysis drew attention to common organisational capacity deficits. Tangible results from the second phase in terms of community visions, capacity building, on ground works etc. have highlighted the limitations of CRFWG. Firstly, it has shown how much more can be achieved in terms of alternative sustainable practice with higher-level support within municipalities. Secondly, it exposed how additional staff members who possess key skills (such as water sensitive urban design skills, community engagement skills, etc) that are in demand across the catchment can support municipalities in the development and implementation of sustainable water practices. The CRSI project team's functioning as a bridging organisation proved pivotal in provision of technical support and as a coordinator and facilitator of collaboration among project stakeholders and across different municipal levels (officer, executive and political).

An impetus for sustainable urban water management through deepening of knowledge and a developing network has significantly motivated municipal officers and executive staff to pursue alternative venues to support sustainable practices. As with the USWIM initiative, CRSI has become well-known among different stakeholder groups in the Cooks River Catchment and the wider Sydney urban water sector. A large number of catchment stakeholders (including residential, municipal, and political) have been engaged during project execution.

Table 6.3 provides an example of the activities that have taken place within CRSI and what catchment stakeholders have participated within these activities.

Table 6.3 Opportunities and scale of stakeholder involvement within CRSI.

Project activities	Participants/Audience
Collaborative processes including visioning sessions and planning forums	Over 500 residents, Councillors, community groups, local and state government officers, large landowners and technical experts
Workshops, interviews and surveys to inform and reflect on municipal capacity for sustainable urban water management	Over 1100 municipal staff across hierarchical levels and disciplines
Survey on knowledge, attitudes and behaviours related to water use, re-use and the environment	2465 residents and 200 businesses
Water Wise community tours	60 residents
Sustainable urban water management training sessions	37 municipal officers
Construction project information sessions or rain garden planting days	214 residents, Councillors and Mayors
Bi-monthly newsletter containing project up-dates and sustainable urban water management educational content	Over 750 households and businesses.
Presentations, meetings and presence at forums and festivals	Hundreds of municipal staff across hierarchical levels and disciplines, residents, regional environmental groups, urban water practitioners, scientists and other interested parties.

Early indicators from extensive evaluation processes show overall high levels of satisfaction from a range of stakeholders with the project processes and/or the project outcomes. In 2010, the project won two prestigious awards in relation to Local Government and excellence in sustainability initiative and it was highly commended for a third award. CRSI's tangible results and reputation were important drivers for partner municipalities to support and recommend the newly developed governance structure. Another major driver for municipalities is the recognition of the combined strength of the municipalities, the ability to secure State and Federal funding for more sustainable forms of urban water management in the Cooks River Catchment will be significantly enhanced.

The role and characteristics of the project manager were central to the development of the new governance arrangements. The project manager, who turned out to be a dedicated leader in this process, developed a coherent, meaningful dialogue which resulted in political commitment. From early on, this

new champion involved regime-actors such as senior executive and political leaders who have the power to change existing structures (Van den Bosch 2010). Science on the urban water sector in Sydney and knowledge developed as part of the earlier phases were used to build a sound rationale for the new governance structure. Although this new champion facilitated and led the process, a strong ownership of the outcome is held by municipal officers and executive staff.

After the Mayors' in-principle approval of the Cooks River Alliance proposal, it was these regime actors that put a report to Councillors for final endorsement. Specific leadership traits that were demonstrated during this phase include: the ability to communicate between different hierarchical levels and between different disciplines, translating abstract thinking into concrete options, expressing and maintaining enthusiasm and confidence, and persistence. This champion also displayed an effective balance of process skills and skills needed to manage a project. Interestingly, the champion

had not taken part in establishing a vision for the Cooks River Catchment, and neither possessed a multi-sectoral network in the Cooks River Catchment or the wider Sydney water sector. However, the new champion did have time and space to embark the uncertain process of developing new governance arrangements as this ambition was openly stated in the CRSI proposal. Approval of this grant-funded project had provided legitimacy to build an executive and political coalition for the development and approval of a structure supporting sustainable practices in the Cooks River Catchment. At present, eight municipalities have internally endorsed and committed to funding to the Cooks River Alliance; six have already done so for three years. Currently, a few more municipalities are considering signing up to the Alliance. The Alliance has become operational from late 2011 onwards.

6.3.5 *Transition experiments: the role of learning and its enabling factors.*

Confirming theoretical conjectures

The case study demonstrates that the described phases of experimentation have been highly effective as it led to a significant change in governance structure in terms of mobilising municipal resources and power dedicated to sustainable urban water management approaches and practices in the catchment, with some urban water sector professionals describing this as 'miraculous', given the Australian urban water context. Therefore, the research has revealed local governance experiments have the ability to transform technocratic, conventional socio-technical regimes. This case demonstrates an experimental governance process by which a shadow network (see Olsson *et al.* 2006) strengthened and developed sufficient social-

political capital (see Putnam 1993, 1995, Portes 1998) to create change within the established socio-technical regime. The transitional change within this case signifies what De Haan and Rotmans (2011) term an 'adaptation' in which the existing socio-technical regime incorporates new functioning. This adaptation took place through a serendipitous cyclic process in which the same activity clusters feature that can be found in the descriptive Transition Management framework (Loorbach 2010) (see Figure 6.2).

Therefore, the case can be understood as an ongoing transition experiment. Dynamics that transition management *prescribe* as part of their deliberate governance approach are found in this *emergent* case. Within this case-study, the three described phases of experimentation correspond to the three mechanisms of deepening, broadening and scaling-up within the Transition Management framework (Van den Bosch 2010). In Transition Management it is thought that through these mechanisms, transition experiments contribute to socio-technical system changes. This has been now been empirically observed within this process of governance experimentation. The USWIM initiative (2002-2006) denotes *deepening* as this phase was about learning as much as possible in the local context about how to fulfil the societal need of urban water management in a completely different manner through an alternative planning approach. The CRSI (2007 – 2011) characterises the *broadening* mechanism as this phase refined and replicated the USWIM approach in a broader catchment setting with multiple organisations. Lastly, values and ideas underpinning the earlier initiatives are scaled up and embedded in new ways of doing and organising through a change in governance structure; the Cooks River Alliance (2009 – ongoing).

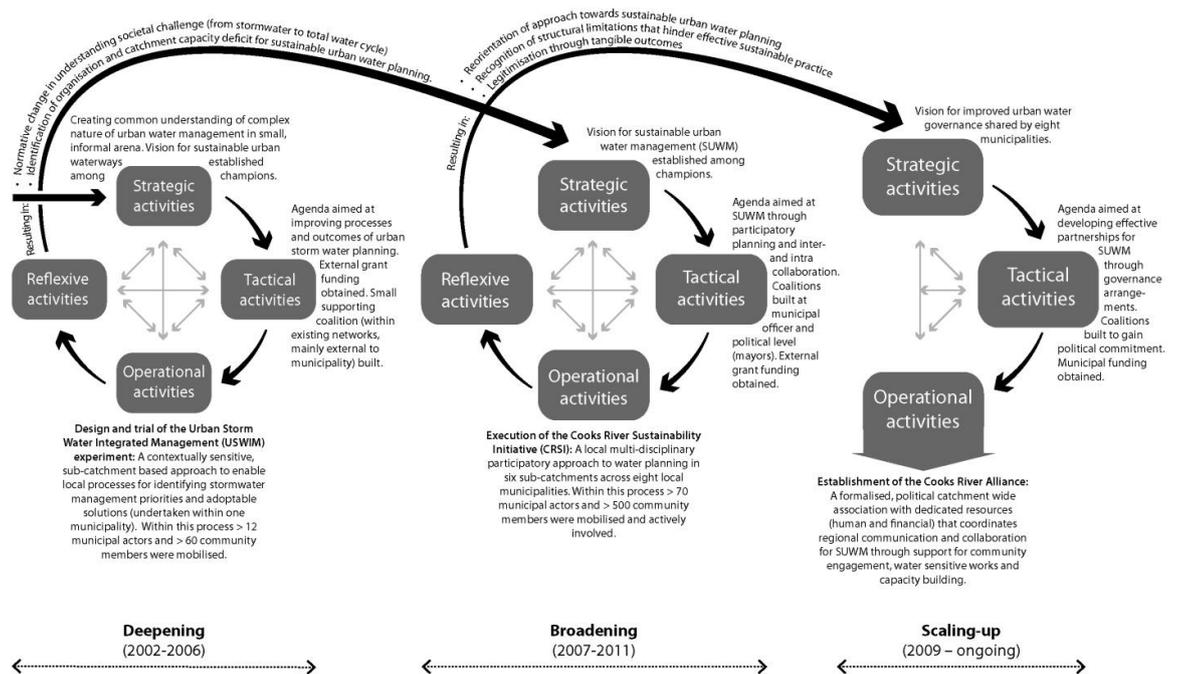


Figure 6.2 Phases of governance experimentation leading to adaptation in water governance structures in the Cooks River Catchment, Sydney

Each of the experimental phases has been supported by, what Loorbach (2010) calls, strategic, tactical, operational and reflexive activities. It is claimed that transition experiments will be mostly effective if they do not take place in isolation but are embedded in a broader governance approach which reflects such activities. In each of the phases it were these activities which outputs provided direction to the initiatives, established coalitions to carry out visionary agenda's and provided reflection to further the experimental processes. It was, however, individual and group learning from formal and informal activities which provided the impetus for emergence of the initial and following-on phases. Learning is a central concept within transition experiments to achieve change in existing societal cultures, structures and practices. The mechanisms of deepening, broadening and scaling up explicitly aim to facilitate learning in such a manner that learning experiences accrue and support such a change. Van de Kerkhof and Wiczorek (2005) highlight the need to be more specific about learning within the field of Transition Management. Hence, the following section

provides insight into the nature of learning within each of the phases and its influence on socio-technical systems change.

Learning within the transitional governance process.

Examining the case revealed that three types of learning were evident in the transition process: technical (single-loop), collaborative/social (double-loop) and conceptual learning (triple-loop) (Glasbergen 1996, Pahl-Wostl 2009). The dynamics of how these different types of learning have contributed to transitional change are similar to Farrelly and Brown's (2011) assertion that a shift from technical to conceptual learning can be stimulated through social learning, and this may, in turn, also stimulate technical learning. Within the case, conceptual learning is demonstrated by key catchment stakeholders recognising structural limitations that hinder effective implementation of sustainable urban water practice and acting upon this by enabling a supporting institutional structure. This up-scaling of sustainable practice in the dominant ways of organising was brought

about by a social learning process which aimed to challenge actors' conventional belief system in regard to managing urban water and question current practice. As mentioned in the introduction, social learning requires open, flexible networks as they provide opportunities for new dialogues and interactions (Stubbs and Lemon 2001, Gunderson *et al.* 2006). Throughout the experimental governance process, the project networks were open to a range of individuals beyond actors who were directly concerned with project decision-making. Municipal professionals, residents and other organisations traditionally not involved with urban water management were engaged throughout the process. In this process, new formal and informal networks developed, existing networks connected and individuals moved in and out of the project. The scale and results of social learning processes developed through these networks highly differed between the deepening (USWIM) and the broadening (CRSI) phase. While social learning through small-scale deepening was important for learning as much as possible about water planning at local level, it was the broadening phase which strengthened learning experiences and increased the potential influence of the experimentation. During this phase, simultaneous activities took place within the six sub-catchments. Information, insights, and experiences were shared on regular basis between primarily the municipal stakeholders (at various hierarchic levels) and the overseeing project team. Through increasing the scale of the initiative in a coordinated manner, its accumulated effects became highly visible within the catchment and it became easier to involve all relevant (and higher level) stakeholders in the learning process. This resulted in an emergent field of municipal practitioners, catchment decision-makers, communities and other stakeholder around sustainable forms of urban water management. Their cumulative learning experiences (Geels and Raven 2006) led to wide-spread conceptual learning and the developed impetus for change.

Alternative perspectives on existing urban water management practices resulted also in technical learning within the 'new' paradigm of urban water management. The collaborative planning processes led to development and implementation of novel and alternative technological options (such as vegetated swales, rain gardens and permeable paving and sand filter projects), which were informed by social, administrative, natural and built dimensions. Through formal curriculum and on-the-job guidance, professionals developed expertise, understanding and confidence in the feasibility of these alternative technological options. Increased cognitive capacity leading to tangible on-ground outcomes was highly valued and proved to be of major importance in the legitimacy of the broadening phase for many professionals and other catchment stakeholders. Nevertheless, it was the development of relations among actors and the quality of their interactions (Glasbergen 1996, Fiorino 2001) that provided the coordination mechanisms for capturing and sharing of insights and information which ultimately led to change in the socio-technical regime. Through these mechanisms learning at different levels took place: learning within the USWIM and CRSI experiments among a variety of stakeholders within each of the sub-catchments, learning between the experiments in the different sub-catchments among catchment stakeholders involved in the experimentation, and learning from the cumulative experiences within the broader catchment and stakeholders within the urban water sector in Sydney. While the vast majority of actors engaged in this 10-year period of governance experimentation recognise the occurrence of extensive learning through this form of experimentation, not all actors have appreciated the open network in which community and other external actors have engaged in decision-making processes. The collaborative governance approach has been labelled by some as 'how not to do catchment planning' (Local Government Engineer respondent) and reinforces the

authority often assumed with the engineering profession which exclude involvement of external parties. This case of innovative, successful governance experimentation in the water sector emerged and was directed by actors outside the engineering realm.

The Cooks River Alliance can be described as an emergent property of a set of interactions (Goldstein 1999) which occurred through learning processes within the deepening, broadening and scaling-up phases. While diverse learning in the catchment was crucial for this structural change to occur, it was the interplay between a set of factors that created the enabling context which shaped, constrained and presented the opening for each experimental phase to emerge.

Enabling context factors

This case study identified six critical factors (champions, networks, space, reputation, science/research, bridging organisations) and their role in bringing about practice dynamics at different stages during the process of governance experimentation (see Table 6.4). Throughout the transitional process from initiation until scaling up, these factors have co-evolved and created practice dynamics for deepening, broadening and scaling-up. Within these practice dynamics each phase displays a range of deliberate forms of action and steering, however non-deliberate action has been of significant importance to the outcome of the overall process as well. Farrelly and Brown (2011) have provided a list of enabling factors that could help mainstream alternative technologies. This list is broken down in informal and formal factors and which factor is needed during experimentation depends on the learning context and problem contested. While this list is a step forward in raising policy attention to get an enabling environment for socio-technical transitions to occur, it is not specific as to what is needed in what phase of experimentation and how some of the necessary enabling factors may be created. The below findings contribute to filling this gap.

Champions

Champions were important initiators and drivers throughout the transition process as they provided direction and leadership to each of the phases. These champions operated outside the field traditional responsible for managing urban water and possess hybrid backgrounds in terms of education and/or professional experience³. The case study disclosed the large potential for a small group of champions to create substantial change. They have prepared and helped shift the initial and following-on phases within the transitional process. Diverse champion practice and behaviour were presented at the onset of each phase. Visionary and strategic leadership not only for emergence but also for on-going continuation of the process were predominantly displayed in the deepening and broadening phase by thinking ahead and planning timely for ways in which the process of experimentation could expand and embedded in the existing socio-technical regime. Although specific outcomes were not known, early strategic thinking ensured continuation of momentum within the 10-year process. In particular, it provided legitimacy to pursue ways how values underlying the experiment could be scaled-up. Leadership in the scaling-up phase required much more operational focus such as facilitating information flows between different levels of governance. Throughout the experimental process the champions' main focus has been the adjustment of catchment relations, the course of future interaction between catchment stakeholders and ensuring investment in sustainable water practices in the catchment. Literature also refers to these professionals as 'boundary spanners' (Roberts and King 1996) individuals who connect groups, centres and levels. Boundary spanners have been identified as important for the orchestration of networks (Williams 2010).

³ Taylor (2010) describes this as a distinguishing attribute for actors championing environmental practices in comparison to leaders such as 'technical innovators' and 'maintainer/implementer'.

Networks

Although champions, as boundary spanning individuals, have been the source of the new and strengthened networks, it is in turn these shadow networks prepared the conventional social–technical system for change through identification of gaps in current urban water management practices and by facilitation information derived from the learning processes. In addition, existing networks have been of major support in enabling champions to facilitate such extensive transition-oriented governance processes. During the deepening phase existing niche networks provided the knowledge on which the initial initiative was built. Existing catchment networks were drawn upon for broadening the initial initiative. This network became a supportive coalition for replicating the ideas and provided lower level entry within the municipalities.

Space

Space created through availability of time and budget allowed unconventional and high quality processes of thinking, learning, and reflecting which led to the emergence and development of each phase. Creative space through voluntary absence of traditional urban water role players within these thinking processes led to new visions and discourse around urban water management in the initial deepening phase. This ‘absence of interest’ created what Loorbach (2010) terms a transition arena where such creative space exists and where at the same time novel ideas and agendas can be developed between champions. Within this case-study this arena was fundamental for the development of radical new ideas. Lack of ideas for grant funding among existing networks meant that

initial ideas for broadening were adopted without critical argument. This was another venue by which the novel initial ideas of collaborative water plan stayed intact.

Space has been extremely useful for the development of content and process of the initiatives. They also sheltered the initiatives from the dominant water regime through the absence of negative consequences. Kemp et al. (1998) and Hoogma et al. (2002) use the notion of creating ‘protected space’ in unsympathetic regimes to protect the innovation from the dominant or mainstream practices. Within Transition Management space can be understood as financial, mental, organisational or juridical space (Van den Bosch 2010). In this case, continuity of funding prevented a ‘boom and bust’ trajectory of the initial initiative which often occurs with innovation projects funded by short-term grants (Brown and Clarke 2007).

Reputation

Individual and project reputation, in which different catchment stakeholders have positive knowledge, impressions, perceptions or beliefs (Rindova *et al.* 2010) about the champions and/or initiatives gave the process legitimacy to start and continue. Although highly divergent from conventional regime attributes, the study revealed that the experimental actions and processes become seen as appropriate within some socially constructed systems of norms and values (see Suchman 1995). Through winning awards (a culturally very important characteristic of success in Australia) and other forms of formal and informal exposure, the initiatives contributed to constructing these responsive social systems to achieve more sustainable forms of urban water management.

Table 6.4 Key factors enabling each phase of governance experimentation.

Phase in experimentation	Deepening (USWIM) (2002-2006)	Broadening (CRSI) (2007-2011)	Scaling-up (Cooks River Alliance) (2009 – ongoing)
Factors			
Champions	Champions developed a vision and agenda for alternative forms of urban water management. They initiated and facilitated the development of a novel approach to urban water planning and connected different professional stakeholders and community members in this process.	Champions searched for opportunities and facilitated the building of coalitions to replicate novel approaches to increase collective action for water management in wider catchment.	Initial champions developed agenda for change in governance structure within broadening proposal. Newly emerged champion facilitated and connected multi-level processes to operationalise this agenda.
Networks	Niche networks provided support and knowledge to develop alternative approach.	Existing network of junior municipal staff served as platform by which new approach could enter other municipalities.	Networks of different actors in which ideas spread have been developed and/or strengthened through broadening processes. This led to sufficient socio-political capital for change.
Space	Financial – availability of grant funding to develop and implement idea. Grant provided space in which risks could be taken. Time – through funding contract obligations to develop content and process Creative – to innovate processes through i) ‘absence of interest’ to initially participate in project by conventional water planning stakeholders, and ii) absence of project boundaries as no-one knew what to expect from novel approach and from project and environmental departments at the time.	Financial – availability of grant funding to develop project proposal in participative manner and implement project. Grant provided space in which risks could be taken. Creative – to develop novel grant proposal through absence of competing, innovative, inter-organisational ideas within existing municipal network.	Financial – i) grant funding for facilitating change process, and ii) internal municipal funding to establish and sustain the new institutional structure. Time – legitimacy to build coalitions for the development and approval of new governance structure.
Science/Research	Previous research on failed policy attempts used as input to develop alternative approach. Scientific underpinning of approach made business case for funding.	Knowledge derived from USWIM attracted political interest among other municipalities. Partnership with university provided legitimacy for replicating project.	Urban water research and local knowledge has been used as rational for building political approval and therefore spending core municipal resources.
Reputation	Individual champion reputation derived from previous interactions with funding agency. This resulted in straightforward funding of novel ideas.	USWIM project reputation resulted in other municipalities wanting to engage in similar initiatives. It also created municipal peer pressure to be part of such an innovative process.	CRSI project reputation proved to municipal actors that collaborative action can achieve results that cannot be achieved by individual organisations.
Bridging organisations		A small organising entity which advocated improved urban water management became active during USWIM. This unit promoted sustainable water practices and shared experiences derived from USWIM among municipalities within the region.	The CRSI project team facilitated and coordinated information and brought together a range of catchment stakeholders.

Science/Research

Partly linked to reputation and legitimacy was the availability and development of trusted and reliable scientific knowledge and expertise and involvement of a University throughout the process. In particular, sub-catchment social profiling gained high level political attention during the deepening phase. Also, early development of the initial initiative was informed by the scientific evaluation of previous failed programs and the original project ideas were based on this knowledge. Knowledge resulting from organisational profiling exercises within the broadening phase provided a sense of urgency for new structures supporting sustainable water practices as gaps within the catchments had been clearly displayed.

Bridging organisations

Bridging organisations have been fundamental in sharing new knowledge and science before and during the experimental governance process. Moreover, such organising units served as nodal points, not only in developing connections between different actors and organisations within the catchment but also in “creating arenas for new ways of thinking about and dealing with water” (Moss 2009: 1490). Folke et al. (2005) stress the reduction in learning and transactions costs of collaboration that such an organisation can bring, while increasing social incentives for stakeholders to constructively strive for achieving common sustainable solutions. This has been recognised by key catchment stakeholders and, hence, the enthusiasm and commitment of these stakeholders to support the newly developed governance structure.

The process of governance experimentation as outlined in this paper has resulted in considerable changes from stakeholder understandings, new forms of relational capacities through to the construction of innovative water infrastructure. While these changes represent a significant success to the key players in the Cooks River Catchment, it must be noted that

this is one of many catchments within metropolitan Sydney and urban Australia more broadly. Therefore, the boundaries of this process of experimentation are yet to influence the broader institutional setting, routines, regulations and associated practice to enable widespread SUWM.

6.3.6 Conclusion

This paper examines an empirical case of governance experimentation aimed at enabling a shift towards sustainable urban water management. From the analysis, governance experimentation in conventional, technocratic regimes has the ability to create and strengthen networks by which social learning is enhanced leading to a transition in an existing governance structure. The Cooks River case-study provides an important insight into how societal problems can be made evident, contested, accepted and acted upon. These insights clearly point to the need for experimentation processes in which the outcome is collaboratively developed through emergent structures rather than through pre-determined ideas of problems and solutions. Through the process of governance experimentation catchment actors potentially develop and/or strengthen relations and their interactions provide coordination mechanisms for capturing and sharing perspectives, insights and experiences into a societal problem. However, further to social learning the study emphasises the importance of other forms of learning to achieve actual socio-technical change in a conventional, technocratic setting. In particular, technical learning through on-ground successful trials can help to create legitimacy for alternative forms of governance. This helps to demonstrate that alternative forms of governance do not only serve as a coordination mechanism but can also lead to actual on-ground change.

Within this case-study three distinct phases of experimentation are characterised. The manner these phases contribute to socio-technical change in the Cooks River catchment substantiate the theoretical

propositions of deepening, broadening and scaling up within the Transition Management literature. Even though the need for transition experiments in order to support sustainability transitions is broadly outlined within the scientific literature on Transition Management, this study is one of the first which empirically confirms the three mechanisms by which experimentation contributes to transitions. Experiences from this case-study, and the theoretical framework on transition experiments it appears to confirm, provide clues and insights on the relationship between experimentation and fundamental change of complex systems. In particular, it suggests that experimentation can be designed in such a way that its influence extends beyond the direct context of an experiment and can contribute to change in cultures, structures and practices.

Firstly, the design of experimentation should explicitly focus on social processes which facilitate the development of innovation networks around the societal problem in question. Focus on social processes does not exclude technical experimentation; it does, however, offer the potential of exploring alternative solutions, appropriate to its context. In addition, it widens the options of cultural change, alongside structural reforms to create more sustainable practice.

Secondly, policy makers who aim for socio-technical system change aimed at sustainable development need to explicitly create a context for experiments which is not dominated by cultural-cognitive engineering frameworks that focus on professional

knowledge and utilise heuristic frameworks to solve problems.

Thirdly, the design of experimentation should, in early stages of the process develop strategies of how learning from such an experiment can increase its potential influence on an existing regime. The mechanisms as outlined in the theory of transition experiments and demonstrated in this paper are valuable as they provide an integrated perspective on the roll-out of such a process. Planning such a process addresses expectations of influencing change, which experiments often carry.

This case-study shows that a single experiment can be an important birthplace for influencing socio-technical change. The paper has identified six key factors (champions, networks, space, reputation, science/research, and bridging organisations) that create an enabling context for facilitating the emergence of each of the mechanisms.

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References have been moved to a consolidated reference list at the end of the thesis.

Chapter 7

Review and Implications

This research on governance experimentation in the urban water sector has aimed to deepen and increase (empirical) understanding of transition-oriented governance approaches to enable transition to more sustainable forms of urban water management.

The framing of this thesis has largely derived from:

- i) Literature on water resources management that strongly argues for demonstration and experimentation for more sustainable outcomes. However, within the water sector, experimentation is geared towards technical innovation rather than experimentation that enables wider societal learning (as discussed on page 3 and 107).
- ii) Social learning and environmental governance literature that frames the water resources sector as primarily single loop and highlights the idea of innovation in governance as an mechanism to enable second, and third loop, or reflexive learning (as discussed on page 4, 76 – 78).
- iii) The opportunity to study a real-life case in the Cooks River catchment in Sydney, Australia, where actors deliberately innovated with governance for sustainable outcomes.

The research employed a pragmatic research strategy and utilised qualitative and quantitative data collection methods. This chapter reflects on the achievement of the research objectives, highlights the theoretical and practical implications of the research, outlines its limitations, and identifies an agenda for future research.

7.1 Realising the research objectives

The overall research aim was met by addressing four research objectives. This section outlines how this research realised each of its objectives, and integrates and presents the summarised key research findings.

Objective 1: Identify the key features that characterise a governance experiment.

Based on the literature study (encompassing literature on sustainability transitions, social learning, participation, collective planning and environmental governance) and empirical findings, as described in Sections 5.3 and 6.3, a governance experiment can be characterised as “a formalised initiative in which multiple actors trial innovative processes and/or tools to stimulate social learning and reconfigure decision-making and action for addressing complex societal challenges”. Successful governance experimentation will have

strengthened and/or established new innovation networks by which transitional change can be pursued and sustainability ideas can be translated into practice.

The first distinguishing feature of a governance experiment is that such an initiative is an actual innovation with novel forms of governance, outside the conventional mechanisms for addressing a certain societal issue (Hoffmann 2011). A governance experiment implies trial and error of processes by which decision-making occurs. These processes involve, but are not limited to, interaction between societal actors who are in the traditional forms of governance unconnected or loosely related. Governance experimentation carries an implicit acknowledgement of fallibility.

The second key feature of governance experimentation is that it purposefully pursues the creation of a social learning situation in regard to a societal challenge. Therefore, such initiatives need to be guided by a learning agenda that helps actors to appreciate: i) the diversity of perspectives that exist on a societal issue; ii) the system nature of a socio-technical situation in its local, historical and cultural context; and iii) the interdependence of a variety of system actors (Collins and Ison 2009a). While broad system learning should take place among a wide range of societal actors, governance experimentation recognises that governance operates at different levels. Therefore, not all actors need to learn the same to enable socio-technical system change, as revealed in Section 5.3.4. Therefore, rather than relying on a single mechanism for social learning⁴, governance experiments may offer multiple, concurrent processes and approaches to stimulate learning at different levels of a socio-technical system. Governance experimentation is not bounded to scale. Its boundaries depend on a number of attributes:

1. The scale of a real-life problem that is being addressed in an initiative;
2. The operational mandate of organisations and individuals involved, and;
3. The relationship, scale and degree of deliberate political support and state of intergovernmental dynamics.

The third important feature of a governance experiment is that while such initiatives may have a broad societal direction (normative stance), its outcomes are not pre-defined but are determined by its learning and searching processes (Section 5.3 and 6.3). Depending on the operational level of the innovation in governance (i.e. overall socio-technical system level or local implementation level) different outcomes are to be

⁴ It should be noted that individual learning (single and double loop) is encapsulated within our definition of governance experimentation.

expected relating to change in practice, culture and/or structure. While social learning as a single outcome does not imply that a governance experiment has been unsuccessful, experience from the Sydney case study reveals (Section 3.3.4) that legitimacy of such a process in a technocratic, conventional socio-technical regime is gained by attaining operational outcomes such as education projects, capital works, etc.

Governance experiments differ from traditional participatory initiatives as they purposefully pursue an agenda aimed at social learning and searching for alternatives, instead of an agenda that is merely focused on participation. The concept of governance experiments has similarities to transition experiments (Raven *et al.* 2007, Van den Bosch 2010) in terms of focusing on a societal challenge and addressing an uncertain and complex problem through searching and learning in a multi-actor environment. However, a key difference can be found in the fact that transition experiments are “aimed at developing and learning about a specific type of innovation” (Van den Bosch 2010, p. 232). The types of innovation in transition experiments are broad and can be a radical change in, for example, a technology, organisational culture, or regulation. Governance experiments, on the other hand, are strictly about innovations in governance for developing new perspectives and implementation of alternatives. While a new technology, for instance, may become the subject of trialling in a governance experiment, this technology will not become the primary focus and intent of the experiment.

Objective 2: Examine if and how governance experimentation advances sustainable urban water management practices.

Experiences from governance experimentation in the urban water sector in the Cooks River catchment in Sydney, described in Section 3.3, 5.3 and 6.3, prove that there is great potential for SUWM idea translation through such an initiative. The research revealed that the OurRiver-Cooks River Sustainability Initiative’s intended capacity-building and cooperative efforts were successful and that, albeit on a small scale, potable water is saved and stormwater run-off treated. To be more specific, the effects of the governance experiment in furthering SUWM are summarised as follows:

Changes in actor-relationships and structures

As elaborated in section 5.3.4, the research revealed that actor relationships developed at three different levels within the socio-technical system of the Cooks River catchment; the sub-catchment, the municipal and the catchment level:

At the sub-catchment level, new relationships between actors, who were previously not related and included community members, were established to develop future visions

for water in a local area. Subsequently, goals and actions to achieve these water visions were developed considering the local social, organisational and biophysical context. Options for addressing urban water management that are appropriate to the local situation are considered to be essential in developing SUWM (Brown 2003, Grizzetti *et al.* 2012). Furthermore, well developed relationships at the sub-catchment level built 'publics'. Publics, which can be seen as residential "groups surrounding common issue interests" (May 1991, p. 190), are considered critical in increasing political commitment to collective action for SUWM. In this case study, creating and maintaining publics helped to secure attention and on-going support for SUWM by elected officials.

At the *municipal level*, relationships were developed between municipal actors who were previously loosely connected during the sub-catchment vision and planning activities and through the development and implementation of the subsequent actions. As indicated in Figure 4.3 all organisations improved their intra-organisational collaboration as a result of the experiment. This is important for furthering SUWM as professional silos within organisations inhibit the development of innovative solutions in the urban water industry (Brown 2008a).

At the *catchment level*, relationships were developed across municipalities at the officer as well as at the executive levels to guide, direct and support the initiative. Actors at the officer level were loosely connected through an existing structure and there were no pre-existing formal relations between the executive actors in regard to urban water management in the catchment. As detailed in Section 5.3 and 6.3, the governance experiment resulted in a bottom-up change in governance structure of the Cooks River Catchment. This new establishment, the Cooks River Alliance, formalises the cooperative structure of the OurRiver-Cooks River Sustainability Initiative and is an application of the initial governance innovation. While it is beyond the scope of this research to assess its actual contribution to SUWM from a bio-physical perspective, the Alliance is designed to operate as a bridging organisation that will serve as a nodal point to support and enhance SUWM practice in the catchment. Such bridging organisations reduce learning and transaction costs of collaboration, and increase social incentives for societal actors to constructively strive for achieving common sustainable solutions, such as SUWM (Folke *et al.* 2005).

Social learning (explained in Section 5.3.1), generated simultaneously at each of these three levels within the socio-technical system, was found to underpin these newly developed relational capacities (Healey 1997, Pahl-Wostl *et al.* 2008) The research also revealed that relational change stimulated, shaped and informed decision-making in ways that were unthinkable of before the OurRiver-Cooks River Sustainability Initiative started.

Change in individual understanding

As reported extensively in Section 5.3.4 and to a lesser extent in Section 3.3.4 and 4.3.5, it was found that changes in individual understanding occurred among a wide range of participating actors. These changes involved both single and double-loop learning.

Single-loop learning involved changes in cognitive understanding and three types of increased cognitive knowledge (Kaiser and Fuhrer 2003) for advancing SUWM were acquired. Municipal and community actors gained *declarative knowledge* in regard to the state and nature of managing urban water. In particular, increased recognition of the different goals pursued by various disciplines and actors involved in managing urban water was reported. Acquired *procedural knowledge* included better knowledge and understanding of the functionality of systems and infrastructure, a diversity of technological options and alternative governance processes by which SUWM can be achieved. *Effective knowledge* was obtained on the comparative effectiveness of these different processes, water sensitive technologies and non-structural measures trialled as part of the experiment. In this manner, the governance experiment contributed to professional expertise, understanding and confidence in the feasibility of alternative SUWM technologies and processes.

Single-loop learning resulted in double-loop learning among a number of municipal actors who translated their new understandings into new values and assumptions for managing urban water. This was demonstrated by actors actively pursuing new forms of action beyond the initial initiative, as detailed in Section 3.3.4 and 5.3.4. As already inferred above, the experiment led to the desire among municipal actors to increase intra-organisational collaboration as they had gained new insights and understandings of how different professions hold diverse, complementary knowledge of importance for managing urban water. This is of significance for SUWM as individuals will be increasingly required to work with other professionals in organisations to realise sustainable practices (Brown 2005, Cettner *et al.* 2012).

Increased organisational priority and commitment

The results revealed that the initiative developed organisational capacity in support of sustainable urban water practice among all organisations participating in the governance experiment, as shown in Section 4.3.5. In particular, the governance experiment contributed to increasing the priority and commitment to SUWM in organisations that had low levels of capacity at the start of the initiative. Lack of a dedicated internal agenda and senior and/or elected official commitment to a sustainability cause is not only limiting to the development of other areas of organisational capacity but also causes reluctance for inter-governmental (May *et al.*

1996) or other forms of inter-organisational (Hoberecht *et al.* 2011) collaboration. Therefore, development of an organisation's agenda and increase in commitment as occurred in the OurRiver-Cooks River Sustainability Initiative, is required to support the potential for change in a system of organisations, which is needed for socio-technical system change as desired in the urban water sector.

Changes in the bio-physical system

Implementation of actions developed among societal actors at the sub-catchment level has resulted in structural measures that directly affect the bio-physical system. As a direct result of the initiative, ten site-specific water sensitive technologies that treat runoff from ≈ 5.5 hectares ($\approx 31,000$ KL/year), and save $\approx 10,000$ KL /year were designed and constructed. The initiative also instigated non-structural measures to influence water sensitive behaviour such as an educational campaign.

Overall, the research revealed that governance experiments have the ability to transform technocratic, conventional socio-technical urban water management regimes. The findings indicate that the configuration of the governance experiment was central to generating the above effects. Through a strategic arrangement of project structure and processes a dynamic was created that enables individual and collective learning. This translated in changes in the social and also the technical system of the Cooks River catchment. The experiment was designed with open project networks and a range of individuals, beyond actors who were directly concerned with on-going decision-making, were involved in the projects. Learning and practical experiences were purposefully coordinated and shared from the local to the regional level. As outlined in Section 3.3.5 and 5.3.5, attributes of specific importance in bringing about the above effects were: i) discovering and working together through sub-catchment processes and activities; ii) participating in cross-municipal support groups; iii) strong leadership; iv) support from a dedicated project team; v) processes open to adjustment, and vi) availability of a realistic budget.

The study found that it is much more demanding and uncertain to successfully undertake governance experimentation than to carry out experimentation that conforms to existing practices and paradigms. Firstly, governance experimentation's undefined outcomes challenged existing administration procedures. Secondly, initially a high level of complexity in understanding and executing the initiative was experienced among participating actors. Thirdly, leading municipal actors revealed that the governance experiment was very time intensive. Lastly, keeping a continuous focus on the innovation in governance was challenging during a leadership vacuum.

Objective 3: To identify and develop mechanisms that strengthen the theory and practice of governance experimentation.

Scholarship on sustainability transitions highlights the importance of experimentation in fostering learning for transitioning to more sustainable futures (Geels 2006, Van der Brugge and Rotmans 2007). In particular, transition management can be viewed as a 'governance experiment', as the approach aims to influence socio-technical transitions in sustainable directions through innovations in governance. Over the past decade, transition management has provoked debate in the scientific fields of transitions and environmental governance (Shove and Walker 2007, Voß *et al.* 2009, Rotmans and Loorbach 2010, Shove 2010). The approach is currently being trialled and tested in a number of policy areas, mostly in Europe (Frantzeskaki *et al.* 2012, Van Eijndhoven *et al.* 2013) and recently in Melbourne, Australia (Ferguson *et al.* 2012).

This research has identified two important areas within the scholarship of transition management that need to be addressed. While the underlying notion of transition management is that through strategic interplay between various actors change in a socio-technical system is generated (Loorbach 2010), there is currently lack of empirically verified approaches for assessing the features and dynamics of the actors participating in such a process. Over the last 10 years there has been a great effort by the Dutch Research Institute for Transitions, and beyond, to operationalise transition management and sustainable transitions in general. However, there is yet to be a dedicated effort in the transitions literature to develop an analytical tool to map and characterise organisational dynamics that affect transition processes. To address this first limitation, this research has proposed a multi-organisational assessment procedure, as elaborated in Section 4.3.2, to assess organisational capacities to obtain support and build organisational competencies for system change. The procedure combines and adapts insights from Brown's (2008a) typology of organisational development phases (which ranges from a very low to a very high capacity to undertake a certain sustainable practice) with McKinsey & Company's (2001) seven variables of organisational capacity (aspirations, strategy, organisational capabilities, human resources, systems and infrastructure, organisational structure and culture), see Figure 4.1. The research also developed an accompanying data collection instrument. Application of the tool in six relatively co-located organisations in the same socio-political and bio-physical context revealed very different capacities for SUWM. While the tool provides in-depth insight into a particular organisation, it also allows for comparison between organisations. It does so not only in terms of pre-existing capacity, but also in terms of outcomes, interim or otherwise, by organisations participating in a transition process. From our systemic analysis, it is shown that organisations that

achieved primarily internal changes may have been considered failures in a transition program in the absence of an in-depth organisational capacity assessment.

Second, the theoretical fields of socio-technical transitions (Rip and Kemp 1998, Geels 2004), social-ecological systems (Gunderson *et al.* 1995) and transition management (Rotmans 2003, Loorbach 2010) all highlight that social learning fostered through experimentation is of high importance in overcoming system lock-in and enabling restructuring of current socio-technical systems. While the transitions and wider transformational change literature is increasingly exploring social learning and furthering its application as a mechanism for creating fundamental change (Pahl-Wostl 2002; 2009, Van de Kerkhof and Wieczorek 2005, Grin and Loeber 2007, Loeber *et al.* 2007, Mostert *et al.* 2007, Wals 2007, Armitage 2008, Berkes 2009, Collins and Ison 2009a; 2009b, Garmenda and Stagle 2010, Rodela 2011), there are few detailed empirical examples of social learning in the scholarly, published literature. Furthermore, there is little empirical insight into “how context, method, process design” actually stimulate social learning processes (Muro and Jeffrey, 2012, p3). In addition, within the literature of transition management there is limited attention for specific design and organisational characteristics of experimentation at the operational level. While Van den Bosch (2010) state that all relevant stakeholders should get involved in an experiment to enable social learning, little guidance is provided on how this could be done in practice.

Based on the review of scholarship on social learning and insights from the case-study of how social learning was generated, a design framework for creating a social learning situation (Table 5.10) was developed. This framework outlines a set of starting conditions (shared learning agenda, initial legitimacy, resources) that guide the design and structure of a governance experiment and facilitate its (ongoing) legitimacy and execution. Embedded in the starting conditions are a suite of design and organisational features that facilitate formal and informal interaction between diverse actors at horizontal and vertical levels within, across and beyond organisations. This implies a range of interconnected interventions, each connected to a wider learning agenda. The proposed features for design and organisation involve: focus projects, multi-organisational peer groups, distributed facilitation, adaptability and flexibility, time and science and research. Specifically, focus projects and multi-peer groups shed new light on how the design of governance experimentation can support learning and sharing of experiences. Strategic design of these aspects also strongly supports informal relational processes becoming active and connecting with the formal processes.

Objective 4: To map the emergence and translation of governance experimentation into an institutionalised process.

To understand how a governance experiment in a conventional, technocratic resource management regime can translate into an institutionalised process, the research sought to critically examine the emergence of the Cooks River Alliance, which is the new governance structure in the Cooks River catchment.

It was found that while the OurRiver - Cooks River Sustainability Initiative was most significant to the establishment of the Cooks River Alliance, this initiative had actually emerged from a previous phase of governance experimentation, called the Urban Storm Water-Integrated Management initiative. Therefore, three distinct phases of experimentation could be distinguished within the emergent process of addressing SUWM in the Cooks River catchment. Each of these phases represented a consecutive practical initiative that strived to trial a new innovation in governance, at a larger and more complex scale, see Section 6.3.4. The change in governance took place through an unforeseen cyclical process that resembled the same activity clusters that can be found in transition management (see Figure 6.2). The three phases of experimentation correspond to the three theoretical mechanisms of deepening, broadening and scaling-up (Van den Bosch 2010) within the transition management framework. While, all of these mechanisms were found in each individual phase of governance experimentation, the research found that one of the mechanisms was more dominant than the two others during a particular phase. Hence, the Urban Storm Water – Integrated Management phase (2002 -2006) has been described as deepening, the OurRiver – Cooks River Sustainability Initiative phase (2007 -2011) as broadening, and the Cooks River Alliance (2009 – ongoing) as scaling-up. As indicated, the three phases turned out to be similar to those postulated prescriptively in transitions experiments literature. This similarity is an empirical corroboration of transition management, not a presupposition. This not only confirms some of transition management’s theoretical notions, it also provides insights in how governance experiments can be used to build socio-political capital for change and, therefore, has a degree of independence from the transition management contribution.

As shown in table 6.4, the research revealed six context factors critical for enabling, developing and sustaining the different phases of governance experimentation. These factors (champions, networks, space, reputation, science, bridging organisations) have co-evolved and created practice dynamics which support of each of the phases. Within these practice dynamics, each phase displayed a range of deliberate and non-deliberate forms of steering and action.

7.2 Implications of the research

Overall, the research contributes to scholarly debates in the field of sustainability transitions and social learning. It also informs the urban water sector about the role of governance experimentation as an instrument in advancing the ideology and practice of sustainable urban water management. Lastly, the research offers some additional reflections in regard to undertaking multi-actor, field-based, industry funded empirical investigations. The implications are detailed below.

7.2.1 *Scholarly implications*

Sustainability transitions

There are six important implications for the scholarship on sustainability transitions and, in particular, transition management.

First, this study is one of the first rich, detailed empirical case-studies in regard to transition-oriented experimental governance processes. As the study undertook an in-depth, structured investigation of a real-life governance experiment and analysed its processes, structures and (learning) outcomes, it provides deep insight into the dynamics of transition processes. By doing so, the research is addressing a critical gap in transition studies as it is widely acknowledged that there is lack of comprehensive knowledge and thorough understanding about the dynamics and effects of transition processes through empirical investigations (Farla *et al.* 2012, Markard *et al.* 2012).

Second, the developed characterisation of governance experimentation, including its distinctive features, can be used as an analytical instrument to enhance understanding and facilitation of governance experimentation aimed at contributing to a socio-technical transition. The developed description helps to distinguish governance experimentation from other forms of innovation and/or experimentation. It highlights the importance of innovation in governance, the creation of social learning situations, and its un-defined outcomes, which informs the design and implementation of such experimentation.

Third, the analytical procedure and associated tools for assessing multi-organisational capacity, developed in Section 4 of this thesis, provides a first attempt in understanding the organisational capacity of organisations participating in a transition process. Utilisation of the multi-purpose tool supports the design of purposive transitions programs as it potentially: i) assists in the development of context specific transition strategies; ii) helps to provide transition managers and/or frontrunners with the right type of support during experimentation; iii) offers conceptual insights into transition dynamics; and iv) provides a benchmark for monitoring and evaluation of

transition processes. While transition management scholarship highlights the importance of monitoring and evaluation as a reflective activity in transition management, its literature offers very limited tools and methods that support this process. Therefore, this capacity assessment tool adds to what Wiezcoreck et al. (2010, p. 15) term “infrastructure for strategic intelligence” that supports the facilitation and implementation of processes aimed at socio-technical system change.

Fourth, the design framework for creating social learning situations, developed in Section 5.3.6 of this thesis, also contributes to the practical application of transition management. By identifying starting conditions and operational features, the framework provides a comprehensive and practical strategy for designing and operationalising policy and governance reform agendas that embrace learning situations. Beyond its initial purpose, the framework is also envisaged to be of use for strategic evaluation of transition management initiatives, such as those adopted by Dutch policy makers. In the future, the framework could be enhanced and developed to become a checklist for assessing the quality of social learning situations. The development of this framework draws in particular on insights from the scholarship on social learning. Therefore, this research has built new bridges between the established literatures of sustainable transitions and social learning. Developing such connections are considered of great significance in advancing current transition approaches, however, they are under-explored in the transitions literature (Markard *et al.* 2012).

Fifth, the research found that each of the phases of governance experimentation in the Cooks River catchment aligned to the theoretical propositions of deepening, broadening and scaling up within the transition management literature (see Section 6.3.5). This study attributes these three mechanisms sequentially, in contrast to Van den Bosch (2010) who argues that these mechanisms act simultaneously during each phase of experimentation. While indeed all of the mechanisms were found to coexist during each of the phases, one mechanism was distinctly overriding the others during that phase. For instance, societal learning was the main aim of the OurRiver-Cooks River Sustainability Initiative phase. However, the primary intent of the key actors was to broaden the innovation in governance in order for social learning to happen. Therefore, this phase was specified as the broadening phase. Empirical evidence suggests that the three mechanisms can occur consequently instead of concurrently, and still influence socio-technical system change. Moreover, this research suggests that deepening was needed to build socio and/or political capital before the initiative could fully broaden, and subsequently scale-up. These substantiated insights extend the theoretical notions of how transition experiments are able to influence the potential of a socio-technical transition.

Sixth, the research provides empirical evidence of the variables that support and enable the emergence, continuation, and institutionalisation of governance experimentation (Section 6.3.5). These factors create a more systemic insight into the prerequisites necessary for starting and undertaking effective experimental transition processes. They can be viewed as the carriers (Sahlin-Andersson and Engwall 2002) of translation processes, needed to help an idea/ideology to find its way through the architecture of a transition. These carriers enable sustainable ideologies to be transmitted from one place to another.

Social learning

While the research was primarily embedded in the literature on sustainable transitions, the study also drew heavily on the scientific field of social learning to obtain its insights and develop the design framework. The research developed three important contributions for the scholarship on social learning.

First, the research undertook an in-depth, detailed analysis of practical social learning processes in the context of governance experimentation. Based on mixed-methods research, the thesis presents a rare, empirical example of social learning. This is a major contribution to the scholarship on social learning as most existing literature reports on research that is not intended to evaluate learning or evaluate what interventions lead to learning (Rodela *et al.* 2012).

Second, while the research presents a rich case study of experimental governance in the context of transiting to sustainable urban water management, it provides also deep insights and innovative ideas for facilitating similar social learning processes in other sectors. In particular, the framework for creating social learning situations remains a practical strategy for designing and operationalising policy and governance reform agendas that embrace learning situations, irrespective of what sectoral issue is addressed or whether the initiative is undertaken in the context of transition studies or not.

Third, literature on social learning implies that every actor needs to learn the same for socio-technical system change to occur. Based on empirical results, this study challenges these current propositions and argues that a social learning situation should determine the type of system learning required amongst the diverse participating actors. This does not suggest that broad system learning should not take place among a wider range of societal actors; rather it acknowledges that one size and type of learning does not fit all.

7.2.2 *Practical implications*

An underlying ambition of the research was to critically inform the urban water sector on how experimental governance processes could be used as instruments to further sustainable urban water management. There are four practical implications of this research that are of relevance to the urban water sector.

First, the research provides a detailed, empirical, valid case study that demonstrates that governance experimentation has the potential to foster system change in a conventional urban water system. While not all participating actors fully appreciated the innovation in governance, there was widespread agreement that the initiative had created change beyond expectation and was of a nature that had not been seen before in the catchment. Therefore, governance experimentation has the potential to achieve changes in socio-technical systems that technical experimentation on its own is unlikely to realise.

Second, a growing body of urban water management literature argues that SUWM should be mainstreamed in order to address the sectors' problems and challenges. Barriers to widespread implementation of the SUWM ideology have been extensively outlined in this literature (Blomquist *et al.* 2004, Brown *et al.* 2006, Mitchell 2006, Wong 2006b, Brown and Farrelly 2009, Ashley *et al.* 2010, Truffer *et al.* 2010). While these impediments help to understand why the implementation of SUWM proceeds slowly, it does not offer critical insight into the processes by which SUWM can be advanced. This thesis provides a promising pathway for how SUWM can be pursued, accelerated and translated into practice. The research provides guideposts to policy makers and other practitioners for how to facilitate governance experimentation in order to achieve system change.

From an overall perspective, a governance experiment is an innovation in governance, intended to bring about social learning that alters decision-making and actions. Therefore, with governance experimentation it is essential that sufficient investment is made in the design of processes. Such design should explicitly focus on social processes which facilitate the development of innovation networks around the societal problem in question. The design framework for creating a social learning situation, developed in Section 5.3.6, provides operational guidance to actors wanting to facilitate such a process. The framework can be directly applied in the water sector. Insights derived from the framework can also be used to inform the design of other platforms that aim to facilitate learning and changed action in the water sector, such as the emerging Learning Alliances (LAs) (Verhagen *et al.* 2008) and Learning and Action Alliances (LAAs) (Van Herk *et al.* 2011, Ashley *et al.* 2012) approaches.

The scale of a governance experiment depends not only on its purpose but also on the level of existing socio-political support for pursuing the ideology. For cases with little socio-political support, experiments can start small, like the first phase of governance experimentation in this study. However, to increase the potential influence of a small experiment on an existing regime, the actors pursuing the experimentation would need to develop strategies of how learning from such an experiment can be expanded. The mechanisms of deepening, broadening and scaling up could be of value for increasing learning influences, as they provide an integrated perspective on the roll-out of such a process.

Besides socio-political capital, there are other key factors that actors developing a governance experiment need to have a sense of, for instance opportunities that provide space (financial, time, creative) in order to allow unconventional high quality processes of thinking, learning and reflecting. Depending on context and culture, such an actor also needs to strategically use existing forms of positive and/or acclaimed reputation for initiating governance experimentation. Partly linked to reputation, is the need for identification of trusted and reliable scientific knowledge and 'outsider' expertise in order to provide a sense of urgency for and legitimacy of an initiative. If a governance experiment consists of multiple organisations, an independent, process focused leader should be considered for facilitating of the overall governance experiment. An external leader is likely to be seen as more objective and perceived not to be favouring any of the participating actor(s) (organisations). If a dedicated project team is appointed, expectations related to resource intensiveness need to be shared at an early stage in order to keep momentum and prevent conflict or disappointment. However, it should be understood (or made to be understood) among all participating actors that the outcome of such an experiment is not pre-defined and that therefore flexibility is needed. This is a radical concept and requires regular reinforcement and re-commitment through the experiment.

Third, while wider literature on sustainability transitions (Rip and Kemp 1998, Schot and Geels 2008) and social-ecological systems (Gunderson *et al.* 2006) is arguing for innovation in governance to influence whole system change, overall there is very limited systemic investigation of such initiatives and their effects on the system in the field of water management (Von Korff *et al.* 2012). Within the water resources literature, Huitema and Meijerink (2010) have studied policy transition processes. These authors provide insight into the process of creating new policy and aspirations for system change, and highlight the role of policy entrepreneurs (individual and groups) in this process. Their focus on policy transitions at the national level is different from this research, which primarily concentrates on how an alternative policy intervention

creates change in practice at the catchment scale. Nevertheless, two important lessons can be drawn from this research that are of relevance to Huitema and Meijerink's work.

Huitema and Meijerink (2010, p. 2) state that "policy change has to be prepared in advance, and this is done by individuals who work hard to develop and sell alternative approaches". The initial intervention in this study Cooks River catchment started with two individuals who wanted to create change in policy and were successful in doing so. The research revealed how these 'policy entrepreneurs developed networks and built coalitions for change through focus projects (Section 5.3.5). Furthermore, the study identified context factors that supported the policy entrepreneurs in undertaking interventions that resulted in policy changes in the Cooks River catchment (Section 6.3.5) By doing so, this research provides substance to the strategies that policy entrepreneurs need to employ for stimulating change, as outlined by Huitema and Meijerink (2010).

7.2.3 Reflections on undertaking empirical research

Historical interaction between Marrickville City Council (Sydney) and Monash University (Melbourne) resulted in this postgraduate research opportunity within the OurRiver - Cooks River Sustainability Initiative. Such research is perceived to deepen insights and learning beyond general project evaluation and is understood as having the potential to contribute critical insights that practice-based reflections, on their own, are unlikely to reveal. Therefore, this type of research is not only thought to enrich scholarly understanding of societal transitions but also to substantially improve the opportunity for enabling practical sector-wide transitions towards more sustainable practices. While this model of industry-funded scientific research alongside real-life projects is increasingly advocated, literature pays little attention to how such research is conducted. Research methodology texts may detail specifics of the qualitative or quantitative nature of the research, however the practical dynamics and challenges of cooperation between research partners, is not often reflected upon.

Based on insights derived from this research, Table 7.1 presents key-lessons for both researchers and industry participants in undertaking industry-funded social research. These lessons help to ensure that this type of research is successful so that research objectives can be met. These lessons intend to support social researchers to prepare for implementation of their research and to help industry actors to create an enabling environment for social research to be undertaken

Table 7.1 Key-lessons for engagement in industry-funded social research

Dimension	Researcher	Industry partner
Role of researcher	The researcher needs to be thinking carefully about what role he/she wants to take in research and ensure this is agreed with industry partner. A role may change during the research project but needs to be planned in advance.	Industry partners should clearly outline what role they expect the researcher to play. If the role is a co-creator role, the researcher is much more deeply involved in the project than when the researcher is an observer.
Research process	The researcher has a responsibility to keep research partners updated on research progress. Expectations around communication in regard to objectives, data collection, and reporting need to be agreed upon early in the research.	Industry partners are entitled to know what is going on within the research project and can expect to be updated. However, industry partners need to maintain an open disposition to the research plan changing as new findings reveal themselves.
Methods	The researcher needs to be able to clearly explain the value and processes of the scientific methods, why they are chosen, potential generalisability and their implications for the integrity of the research outcome.	Depending on the methods, industry partners need to be active in supporting and providing access to organisations and staff. Industry partners should also support as much as possible staff involvement where needed.
Access	Even when the industry partners have granted access to the organisation(s), the researcher cannot expect immediate legitimacy with prospective participants and must develop a plan for pro-actively engaging research partners in order to undertake research in organisations.	Industry partners can help researchers by providing a stable contact person within the organisation and outline the procedures required for internal approval for research. In addition, senior support is desired for signing off on approvals to access organisations.
Confidentiality	The researcher should maintain confidentiality as basic practice and should reassure confidentiality as often as necessary.	University sanctioned research involving humans in Australia is strictly bound by ethical approvals that ensures research is conducted is ethically and safely. Researchers are required to obtain information from the research partners to attain ethical approval. Industry partners can support this by providing the supporting materials the researcher needs for gaining this ethical approval.
Sharing of findings	The researcher needs to be prepared to share interim/preliminary findings. The researcher needs to reinforce that the ultimate findings are unknown and that they may change.	Industry partners should understand that findings may be preliminary and should accept this, otherwise researchers may not be willing to share until the end of the research project. Research processes are taking place over a long time and may not necessarily give results in short time frames as may be desired.
Need for champion	It is desirable for the researcher to find a senior champion associated with the project that understands research processes and can help with expectations management.	
Skills and qualities of a researcher	A researcher needs empathy to listen but also skill to analyse issues at a project level rather than an individual level.	

7.3 Limitations to the research

Notwithstanding the identified contributions, it is important to acknowledge several limitations to this research. This case in its entirety, including its empirical detailed analysis, is unique to the best of the author's knowledge. Particular findings have been discussed and compared within the broader literature. However, contrasts and/or comparisons with other studies, which would be required for a full external validity test from a scholarship perspective, are not possible due to lack of opportunity.

Further, the empirical basis of this study lies in urban water management in the Cooks River catchment in Sydney Australia. The case-study area represents a western, democratic, political context and its water system is affected by drought, floods, heat waves and aged infrastructure. While the case context is similar to problems and conditions in many other first world urban water contexts, it does not represent all situations that suffer water-related challenges. Therefore, the insights and frameworks developed in this thesis are thought to be primarily of value to inform governance experimentation in similar socio-political contexts. Even though the research was framed in transition studies, the study was strictly bounded to water and no further domains of societal needs (such as energy, health, waste, mobility) that necessitate a transition were considered.

The research raises specific questions about the broader applicability of the results relating to: i) replication, ii) other socio-political contexts; iii) domains outside water; and iv) scale other than river catchments. While beyond the scope of this study, the findings presented are in need of further validation.

While a range of municipal actors, including executives and Councillors engaged in this study, the research participants did not include the mayors of the local governments. Assessment of political and other power dynamics was not the focus of this study, but may have provided additional insight in the creation of legitimacy and mandate for governance experimentation in practice. This insight may have provided more guidance of how to support replication of such a governance experiment in other contexts.

7.4 Future research agenda

This thesis has developed in-depth insight into the potential and design of governance experimentation. It has characterised governance experiments, distinguished a diversity of outcomes of such innovation, elicited factors that support its emergence, established a pattern of how a governance experiment can be institutionalised, provided a framework for the design and organisation of such initiatives and

developed an assessment tool for evaluating changes and capacity in a multi-actor system. However, the conceptual frameworks developed in this research need further validation. In addition, questions remain regarding implementation and dynamics of governance experimentation.

As indicated above, a number of frameworks and tools have been developed in this study. The design framework for creating social learning situations, the capacity assessment tool for multi-actor organisations, and the factors for emergence and continuation should be applied to other experimental governance approaches for further testing. To understand whether the developed frameworks and factors are attainable under different circumstances, further research should determine their relevance and reliability within different societal domains, geographical and socio-political settings, and inter-organisational contexts.

For the case study presented, future work could examine the dynamics of governance experimentation in the Cooks River catchment against the ideas and tenets described in the overall transition management framework. While it should be recognised that the transition management framework has not been prescriptively applied in the case of the Cooks River, detailed comparison could empirically demonstrate some of the features of transition management. This would shed further light on how fundamental change may unfold and how the role of different transition management elements supports this process. Such study would not only provide empirical insight into transition management processes itself, it also potentially guides further implementation of the framework. Explicit highlighting where the case-study differs from a prescribed transition management approach may reveal new areas and capacities that need to be considered in facilitating transitional change.

Within the process of governance experimentation in the Cooks River catchment different types of leaders have been very important at different stages. For the case-study presented, further work could examine the features of these key role-players, including their psychometric characteristics. Such understanding would help to identify what particular type of individuals could be targeted and/or drawn upon for establishing and implementing a governance experiment.

Future research into governance experimentation could investigate the social and political dynamics associated with such types of experimentation. Even though this study did not concentrate on this area, there is likely to be value in understanding relations prior, during and after an innovation in governance. This in-turn would provide further understanding of agency and power in transition-oriented governance approaches. Such insights may lead to enhancing the design framework for creating social learning situations.

Chapter 8

Conclusion

Cities continue to face increasing pressure on their water systems due to numerous global changes, escalating costs and various other risks and challenges. Ensuring safe and equitable access to water and sanitation, providing healthy ecosystems and functioning waterways, and maintaining and/or creating liveable cities, requires fundamental changes to the current practices of urban water management.

Sustainable urban water management is an ideological approach that encompasses holistic management of the water cycle to attain the above aspirations. Despite progress in some areas of SUWM, implementation has been slow. Innovation in governance that specifically aims for changes in underlying socio-technical systems is thought to support a transition to a more sustainable water future. Little is known about such transition-oriented experimentation in practice. Therefore, this thesis has empirically investigated the emergence, organisation, implementation and outcomes of governance experimentation. By doing so, this study has primarily contributed to the theoretical fields of sustainability transitions and social learning, and the practical field of urban water management.

In terms of understanding transition-oriented governance approaches for furthering scholarship on sustainable transitions, this thesis has demonstrated how such an approach can be designed and implemented for enabling effective change in urban infrastructure practices. This study not only details a first-hand experience of governance experimentation, it also provides an original contribution that extends insights and supports operationalisation of theoretical concepts. By implication, this thesis provides a systematic, scientific basis for subsequent development of transition studies.

In regard to furthering SUWM, this thesis has demonstrated the value of taking an innovative governance approach for advancing SUWM. The study has empirically confirmed that managing urban water in a sustainable manner does not only imply taking into consideration complex technical issues, but also the different perspectives that exist in regard to urban water at different levels of society, within and beyond organisations. The research revealed that transformation of urban water practice necessitates a broad range of actors interacting and collaborating in a deliberate coordinated manner. This thesis provides a prescription of how such a purposive approach could be designed and organised to create embedded and concurrent social learning situations, while at the same time catering for tangible on-ground changes. The study highlights that there are many uncertainties and potential risks involved in

undertaking a governance experiment. Therefore, leadership with high levels of stamina is needed to direct such an approach.

Enabling a sustainability transition, whether in the domain of urban water management or elsewhere, requires the policy elite to consider governance experimentation alongside technical experimentation in reform programs. This thesis demonstrates to all actors with an interest in sustainability, including policy makers, that transition-oriented governance approaches have the ability to create change in conventional socio-technical systems. This study has not only investigated the effectiveness of an alternative governance process, but also its design and implementation. Consequently, several conceptual frameworks have been developed to facilitate and design future experiments. Therefore, this research provides an alternative pathway for policy design and, by doing so, offers guidance to realising aspirations of a sustainable urban water future.

References

- Aerts, J., Van der Veen, A., Krywkow, J., and Werners, S., 2008. Dealing with uncertainty in flood management through diversification. *Ecology and Society*, 13 (1), 41.
- Agranoff, R. and McGuire, M., 2003. *Collaborative public management: New strategies for local governments*. Washington, D.C.: Georgetown University Press.
- Argyris, C., 1999. *On organizational learning*. 2nd edition. Oxford: Blackwell Publishers.
- Argyris, C. and Schön, D.A., 1978. *Organizational learning: A theory of action perspective*. Reading: Addison-Wesley.
- Argyris, C. and Schön, D.A., 1996. *Organizational learning II: Theory, method, and practice*. Reading: Addison-Wesley.
- Armitage, D., 2005. Adaptive capacity and community-based natural resource management. *Environmental Management*, 35 (6), 703–715.
- Armitage, D., Marschke, M., and Plummer, R., 2008. Adaptive co-management and the paradox of learning. *Global Environmental Change*, 18 (1), 86–98.
- Arthur, W.B., 1989. Competing technologies, increasing returns, and lock-in by historical events. *The Economic Journal*, 99 (394), 116–131.
- Ashley, R., Blackwood, D., Butler, D., and Jowitt, P., 2004. *Sustainable water services: A procedural guide*. London: IWA Publishing.
- Ashley, R. m., Blanskby, J., Newman, R., Gersonius, B., Poole, A., Lindley, G., Smith, S., S. Ogden, and Nowell, R., 2012. Learning and action alliances to build capacity for flood resilience. *Journal of Flood Risk Management*, 5 (1), 14–22.
- Ashley, R.M., Newman, R., Walker, L., and Nowell, R., 2010. Changing a Culture: Managing Stormwater Sustainably in the UK City of the Future – Learning from the USA and Australia. In: S. Struck and K. Lichten, eds. *Low Impact 2010: Redefining Water in the City*. Proceedings of Low Impact Development International Conference 2010, April 11-14, San Francisco, United States. Reston: American Society of Civil Engineers, 1571–1584.
- Barman, E. and MacIndoe, H., 2012. Institutional pressures and organizational capacity: The case of outcome measurement. *Sociological Forum*, 27 (1), 70–93.
- Bates, B.C., Kundzewicz, Z.W., Wu, S., and Palutikof, J.P., eds., 2008. *Climate change and water: Intergovernmental Panel on Climate Change (IPCC) technical paper VI*. Geneva: IPCC Secretariat.
- Beck, U., 1994. The reinvention of politics: Towards a theory of reflexive modernization. In: U. Beck, A. Giddens, and S. Lash, eds. *Reflexive modernization: Politics, tradition and aesthetics in the modern social order*. California: Stanford University Press, 1–55.
- Beers, P.J., Sol, J., and Wals, S., 2010. Social learning in a multi-actor innovation context. In: I. Darnhofer and M. Grötzer, eds. *Building sustainable rural futures : the added value of systems approaches in times of change and uncertainty*. Proceedings of 9th European IFSA Symposium, 4-7 July 2010, Vienna, Austria. Wien: University of Natural Resources and Applied Life Sciences, 144–153.
- Béland, D., 2009. Ideas, institutions, and policy change. *Journal of European Public Policy*, 16 (5), 701–718.
- Bell, S. and Park, A., 2006. The problematic metagovernance of networks: Water reform in New South Wales. *Journal of Public Policy*, 26 (1), 63–83.

- Benson, D., Jordan, A., and Huitema, D., 2012. Involving the public in catchment management: An analysis of the scope for learning lessons from abroad. *Environmental Policy and Governance*, 22 (1), 42–54.
- Berkhout, F., 2002. Technological regimes, path dependency and the environment. *Global Environmental Change*, 12 (1), 1–4.
- Berkhout, F., Smith, A., and Stirling, A., 2004. Socio-technical regimes and transition contexts. In: B. Elzen, F.W. Geels, and K. Green, eds. *System innovation and the transition to sustainability*. Cheltenham: Edward Elgar, 48–75.
- Black, S. and Ulrich, D., 1999. The new frontier of global HR. In: P. Joynt and B. Morton, eds. *The global HR manager: creating the seamless organisation*. London: CIPD Publishing, 12–38.
- Blaikie, N., 2007. *Approaches to social enquiry: Advancing knowledge*. Cambridge: Polity Press.
- Blaikie, N.W.H., 2000. *Designing social research: The logic of anticipation*. Cambridge: Polity Press.
- Blomquist, W., Heikkila, T., and Schlager, E., 2004. Building the agenda for institutional research in water resource management. *Journal of the American Water Resources Association*, 40 (4), 925–936.
- Bolton, A., Edwards, P., Lloyd, S., and Lamshed, S., 2007. Needs analysis: An assessment tool to strengthen local government delivery of water sensitive urban design. In: *Rainwater and Urban Design 2007*. Proceedings of 13th International Rainwater Catchment Systems Conference and 5th International Water Sensitive Urban Design Conference, 21-23 August, Sydney, Australia. Barton: Engineers Australia.
- Bos, J.J. and Brown, R.R., 2012. Governance experimentation and factors of success in socio-technical transitions in the urban water sector. *Technological Forecasting and Social Change*, 79 (7), 1340–1353.
- Bos, J.J., Brown, R.R., Farrelly, M.A., and De Haan, F.J., 2012. Governance experimentation: A descriptive analysis of translating sustainable urban water management in practice. In: *Proceedings of the 7th International Conference on Water Sensitive Urban Design, 21 - 23 February 2012*. Melbourne, Australia.
- Van den Bosch, S., 2010. Transition experiments: exploring societal changes towards sustainability. PhD thesis. Erasmus University, Rotterdam.
- Van den Bosch, S. and Taanman, M., 2006. How Innovation Impacts Society: Patterns and mechanisms through which innovation projects contribute to transitions. Presented at the Innovation Pressure Conference. Rethinking Competitiveness, Policy and the Society in a Globalised Economy, 15 -17 March 2006, Tampere, Finland.
- Brown, M., 2012. Enhancing and measuring organizational capacity: Assessing the results of the U.S. Department of Justice rural pilot program evaluation. *Public Administration Review*, 72 (4), 506–515.
- Brown, R.R., 2003. Institutionalisation of integrated urban water management: Multiple-case analysis of local management reform across Metropolitan Sydney. PhD thesis. University of New South Wales, Sydney.
- Brown, R.R., 2005. Impediments to integrated urban stormwater management: The need for institutional reform. *Environmental Management*, 36 (3), 455–468.
- Brown, R.R., 2008a. Local institutional development and organizational change for advancing sustainable urban water futures. *Environmental Management*, 41 (2), 221–233.
- Brown, R.R., 2008b. Social and institutional components. In: T.D. Fletcher and A. Deletic, eds. *Data requirements for integrated urban water management*. London: Taylor & Francis, 281–299.

- Brown, R.R. and Clarke, J., 2007. Transitioning to water sensitive urban design: The story of Melbourne, Australia. Facility for Advancing Water Biofiltration, Monash University.
- Brown, R.R. and Farrelly, M.A., 2009. Delivering sustainable urban water management: A review of the hurdles we face. *Water Science & Technology*, 59 (5), 839–846.
- Brown, R.R. and Keath, N., 2008. Drawing on social theory for transitioning to sustainable urban water management: Turning the institutional super-tanker. *Australian Journal of Water Resources*, 12 (2), 73–83.
- Brown, R.R., Keath, N., and Wong, T.H.F., 2009. Urban water management in cities: Historical, current and future regimes. *Water Science & Technology*, 59 (5), 847–855.
- Brown, R.R. and Ryan, R., 2000. Evaluation of the stormwater management planning process. Environmental Protection Authority, Sydney, Australia.
- Brown, R.R., Ryan, R., and McManus, R., 2001. An Australian case study: Why a transdisciplinary framework is essential for integrated urban water planning. In: C. Maksimovic and J.A. Tejada-Guibert, eds. *Frontiers in urban water management: Deadlock or hope*. London: IWA Publishing, 251–259.
- Brown, R.R., Sharp, L., and Ashley, R.M., 2006. Implementation impediments to institutionalising the practice of sustainable urban water management. *Water Science & Technology*, 54 (6), 415–422.
- Van der Brugge, R., 2009. Transition dynamics in social-ecological systems: The case of Dutch water management. PhD thesis. Erasmus University, Rotterdam.
- Van der Brugge, R. and Rotmans, J., 2007. Towards transition management of European water resources. *Water Resources Management*, 21 (1), 249–267.
- De Bruijne, M., Van de Riet, O., De Haan, A., and Koppenjan, J., 2010. Dealing with dilemma's: How can experiments contribute to a more sustainable mobility system? *European Journal of Transport and Infrastructure Research*, 10 (3), 274–289.
- Budde, B., Alkemade, F., and Weber, K.M., 2012. Expectations as a key to understanding actor strategies in the field of fuel cell and hydrogen vehicles. *Technological Forecasting and Social Change*, 79 (6), 1072–1083.
- Van Bueren, E. and De Jong, J., 2007. Establishing sustainability: Policy successes and failures. *Building Research & Information*, 35 (5), 543–556.
- Bulkeley, H. and Castán Broto, V., 2012. Government by experiment? Global cities and the governing of climate change. *Transactions of the Institute of British Geographers*, 10.1111/j.1475-5661.2012.00535.x.
- Van Buuren, A. and Loorbach, D., 2009. Policy innovation in isolation? *Public Management Review*, 11 (3), 375–392.
- Castán Broto, V., 2012. Social housing and low carbon transitions in Ljubljana, Slovenia. *Environmental Innovation and Societal Transitions*, 2, 82–97.
- Cettner, A., Ashley, R., Viklander, M., and Nilsson, K., 2012. Stormwater management and urban planning: Lessons from 40 years of innovation. *Journal of Environmental Planning and Management*, doi: 10.1080/09640568.2012.706216.
- Chocat, B., Ashley, R., Marsalek, J., Matos, M.R., Rauch, W., Schilling, W., and Urbonas, B., 2007. Toward the sustainable management of urban storm-water. *Indoor and Built Environment*, 16 (3), 273–285.
- Christensen, R.K. and Gazley, B., 2008. Capacity for public administration: Analysis of meaning and measurement. *Public Administration and Development*, 28 (4), 265–279.
- Collins, K. and Ison, R., 2009a. Living with environmental change: Adaptation as social learning. *Environmental Policy and Governance*, 19 (6), 351–357.

- Collins, K. and Ison, R., 2009b. Jumping off Arnstein's ladder: Social learning as a new policy paradigm for climate change adaptation. *Environmental Policy and Governance*, 19 (6), 358–373.
- Cowie, G.M. and Borrett, S.R., 2005. Institutional perspectives on participation and information in water management. *Environmental Modelling & Software*, 20 (4), 469–483.
- Cox, R.H., 2001. The social construction of an imperative: Why welfare reform happened in Denmark and the Netherlands but not in Germany. *World Politics*, 53 (3), 463–498.
- Creswell, J.W., 2007. *Qualitative inquiry and research design: Choosing among five approaches*. Second Edition. California: Sage Publications.
- Creswell, J.W., 2009. *Research design: Qualitative, quantitative, and mixed method approaches*. California: Sage Publications.
- Creswell, J.W. and Plano Clark, V.L., 2007. *Designing and conducting mixed methods research*. California: Sage Publications.
- Curtin, J., 1999. New public management meets civic discontent? The Australian public service in 1999. *Australian Journal of Public Administration*, 59 (1), 115–124.
- Czarniawska, B. and Joerges, B., 1996. Travel of ideas. In: B. Czarniawska and G. Sevón, eds. *Translating organizational change*. Berlin: Walter de Gruyter, 13–48.
- Daigger, G.T., 2012. Designing and implementing urban water and resource management systems which recover water, energy and nutrients. In: V. Lazarova, K.-H. Choo, and P. Cornel, eds. *Water-energy interactions in water reuse*. London: IWA Publishing, 3–18.
- Denscombe, M., 2007. *The good research guide: For small-scale social research projects*. Maidenhead: McGraw-Hill International.
- Department of Environment and Climate Change (DECC), 2007. *Managing Urban Stormwater: An integrated approach*. Department of Environment and Climate Change & Sydney Metro Catchment Management Agency, Sydney, Australia.
- Diduck, A., 2010. The learning dimension of adaptive capacity: Untangling the multi-level connections. In: D. Armitage and R. Plummer, eds. *Adaptive capacity and environmental governance*. Berlin: Springer, 199–221.
- Dieleman, H., 2007. Cleaner production and innovation theory. Social experiments as a new model to engage in cleaner production. *Revista Internacional de Contaminación Ambiental*, 23 (2), 79–94.
- Dirven, J., Rotmans, J., and Verkaik, A.P., 2002. *Samenleving in transitie: Een vernieuwend gezichtspunt*. Innovatie Netwerk Groene Ruimte en Agrocluster, Den Haag, the Netherlands.
- Dollery, B., Crase, L., and Johnson, A., 2006. *Australian local government economics*. Sydney: UNSW Press.
- Dollery, B., Grant, B., and O'Keefe, S., 2008. Local councils as "place-shapers": The implications of the Lyons Report for Australian local government. *Australian Journal of Political Science*, 43 (3), 481–494.
- Dunphy, D.C., Griffiths, A., and Ben, S., 2003. *Organizational change for corporate sustainability: A guide for leaders and change agents of the future*. London: Routledge.
- Van Eijndhoven, J., Frantzeskaki, N., and Loorbach, D., 2013. Connecting long- and short-term via envisioning in transition arenas. In: J. Edelenbos, N. Bressers, and P. Scholten, eds. *Water Governance As Connective Capacity*. London: Ashgate Publications, Ch.9.
- Elzen, B., Geels, F.W., and Green, K., 2004. *System innovation and the transition to sustainability*. Cheltenham: Edward Elgar.

- Elzen, B. and Wieczorek, A., 2005. Transitions towards sustainability through system innovation. *Technological Forecasting and Social Change*, 72, 651–661.
- Emerson, K., Nabatchi, T., and Balogh, S., 2011. An integrative framework for collaborative governance. *Journal of Public Administration Research and Theory*, 22 (1), 1–29.
- England, P., 2008. Climate change law for planners, developers, local government and greenies: A quick stock take and some ideas for the future. Research Paper 16. Griffith University, Brisbane, Australia.
- Eversole, R. and Martin, J., 2005. *Participation and governance in regional development: Global trends in an Australian context*. Aldershot: Ashgate Publishing.
- Farla, J., Markard, J., Raven, R., and Coenen, L., 2012. Sustainability transitions in the making: A closer look at actors, strategies and resources. *Technological Forecasting and Social Change*, 79 (6), 991–998.
- Farrelly, M. and Brown, R., 2011. Rethinking urban water management: Experimentation as a way forward? *Global Environmental Change*, 21 (2), 721–732.
- Feilzer, M.Y., 2010. Doing mixed methods research pragmatically: Implications for the rediscovery of pragmatism as a research paradigm. *Journal of Mixed Methods Research*, 4 (1), 6–16.
- Ferguson, B.C., Brown, R.R., and Deletic, A., 2012. Diagnosing transformative change in urban water systems: Theories and frameworks. *Global Environmental Change*, doi: 10.1016/j.gloenvcha.2012.07.008.
- Ferguson, B.C., Frantzeskaki, N., Skinner, R., and Brown, R.R., 2012. Melbourne's transition to a water sensitive city: Recommendations for strategic action. Monash Water for Liveability, Monash University, Melbourne.
- Fiorino, D.J., 2001. Environmental policy as learning: A new view of an old landscape. *Public Administration Review*, 61 (3), 322–334.
- Flyvbjerg, B., 2006. Five misunderstandings about case-study research. *Qualitative Inquiry*, 12 (2), 219–245.
- Folke, C., Hahn, T., Olsson, P., and Norberg, J., 2005. Adaptive governance of social-ecological systems. *Annual Review of Environment and Resources*, 30 (1), 441–473.
- Frantzeskaki, N., Loorbach, D., and Meadowcroft, J., 2012. Governing societal transitions to sustainability. *Int. J. Sustainable Development*, 15 (1/2), 19–36.
- Freeman, C., 1987. *Technology, policy, and economic performance: Lessons from Japan*. London: Pinter Publishers.
- Gardiner, A. and Hardy, M., 2005. Beyond demonstration mode: the application of WSUD in Australia. *Australian Planner*, 42 (4), 16–21.
- Garmendia, E. and Stagl, S., 2010. Public participation for sustainability and social learning: Concepts and lessons from three case studies in Europe. *Ecological Economics*, 69 (8), 1712–1722.
- Geels, F. and Raven, R., 2006. Non-linearity and expectations in niche-development trajectories: Ups and downs in Dutch biogas development (1973-2003). *Technology Analysis & Strategic Management*, 18 (3-4), 375–392.
- Geels, F.W., 2002. Technological transitions as evolutionary reconfiguration processes: A multi-level perspective and a case-study. *Research Policy*, 31 (8-9), 1257–1274.
- Geels, F.W., 2004. From sectoral systems of innovation to socio-technical systems: Insights about dynamics and change from sociology and institutional theory. *Research Policy*, 33 (6-7), 897–920.

- Geels, F.W., 2005. *Technological transitions and system innovations: A co-evolutionary and socio-technical analysis*. Cheltenham: Edward Elgar.
- Geels, F.W., 2006. Co-evolutionary and multi-level dynamics in transitions: The transformation of aviation systems and the shift from propeller to turbojet (1930-1970). *Technovation*, 26 (9), 999–1016.
- Geser, H., 1992. Towards an interaction theory of organizational actors. *Organization Studies*, 13 (3), 429–451.
- Giddens, A., 1984. *The constitution of society: Outline of the theory of structuration*. Berkeley: University of California Press.
- Giddens, A., 1999. Risk and responsibility. *Modern Law Review*, 62 (1), 1–10.
- Glasbergen, P., 1996. Learning to manage the environment. In: W.M. Lafferty and J. Meadowcroft, eds. *Democracy and the environment: Problems and prospects*. Cheltenham: Edward Elgar, 175–193.
- Glaser, B. and Strauss, A., 1967. *The discovery of grounded theory: Strategies for qualitative research*. New York: Aldine.
- Goldstein, J., 1999. Emergence as a construct: History and issues. *Emergence*, 1 (1), 49–72.
- Gössling, S., Hall, C.M., Ekström, F., Engeset, A.B., and Aall, C., 2012. Transition management: a tool for implementing sustainable tourism scenarios? *Journal of Sustainable Tourism*, 20 (6), 899–916.
- Greenwood, D.J. and Levin, M., 2007. *Introduction to action research: Social research for social change*. 2nd ed. California: Sage Publications.
- Grin, J. and Loeber, A., 2007. Theories of policy learning: Agency, Structure, and Change. In: F. Fischer, G.J. Miller, and M.S. Sidney, eds. *Handbook of public policy analysis: Theory, politics, and methods*. London: Taylor & Francis Group, 201–219.
- Grizzetti, B., Bouraoui, F., Gooch, G., and Stålnacke, P., 2012. Putting the “integration” in the science-policy-stakeholder interface. In: G. Gooch and P. Stålnacke, eds. *Science, policy and stakeholders in water management: An integrated approach to river basin management*. London: Earthscan, 17–26.
- Gunderson, L.H., Carpenter, S.R., Folke, C., Olsson, P., and Peterson, G., 2006. Water RATs (resilience, adaptability, and transformability) in lake and wetland social-ecological systems. *Ecology and Society*, 11 (1), 16.
- Gunderson, L.H., Holling, C.S., and Light, S.S., 1995. *Barriers and bridges to the renewal of ecosystems and institutions*. New York: Columbia University Press.
- Gupta, J., Termeer, C., Klostermann, J., Meijerink, S., Van den Brink, M., Jong, P., Nooteboom, S., and Bergsma, E., 2010. The Adaptive Capacity Wheel: a method to assess the inherent characteristics of institutions to enable the adaptive capacity of society. *Environmental Science & Policy*, 13 (6), 459–471.
- De Haan, J.H. and Rotmans, J., 2011. Patterns in transitions: Understanding complex chains of change. *Technological Forecasting and Social Change*, 78 (1), 90–102.
- Harding, R., 2006. Ecologically sustainable development: origins, implementation and challenges. *Desalination*, 187 (1-3), 229–239.
- Harremoës, P., 2002. Integrated urban drainage, status and perspectives. *Water Science and Technology*, 45 (3), 1–10.
- Harris, A., 2008. Distributed leadership: According to the evidence. *Journal of Educational Administration*, 46 (2), 172–188.
- Healey, P., 1997. *Collaborative planning: Shaping places in fragmented societies*. Vancouver: UBC Press.

- Hegger, D.L.T., Van Vliet, J., and Van Vliet, B.J., 2007. Niche management and its contribution to regime change: The case of innovation in sanitation. *Technology Analysis & Strategic Management*, 19 (6), 729–746.
- Hendriks, C.M. and Grin, J., 2007. Contextualizing reflexive governance: The politics of Dutch transitions to sustainability. *Journal of Environmental Policy & Planning*, 9 (3), 333–350.
- Van Herk, S., Zevenbergen, C., Ashley, R., and Rijke, J., 2011. Learning and Action Alliances for the integration of flood risk management into urban planning: A new framework from empirical evidence from The Netherlands. *Environmental Science & Policy*, 14 (5), 543–554.
- Hill, M. and Hupe, P., 2002. *Implementing public policy: governance in theory and in practice*. London: Sage Publications.
- Hill, M. and Hupe, P., 2003. The multi-layer problem in implementation research. *Public Management Review*, 5 (4), 471–490.
- Hoberecht, S., Joseph, B., Spencer, J., and Southern, N., 2011. Inter-organizational networks: An emerging paradigm of whole systems change. *OD Practitioner*, 43 (4), 23–27.
- Hoffmann, M.J., 2011. *Climate governance at the crossroads: Experimenting with a global response after Kyoto*. New York: Oxford University Press.
- Holland, J.H., 1996. *Hidden order: How adaptation builds complexity*. Massachusetts: Perseus Books.
- Holtz, G., 2012. The PSM approach to transitions: Bridging the gap between abstract frameworks and tangible entities. *Technological Forecasting and Social Change*, 79 (4), 734–743.
- Hoogma, R., Kemp, R., Schot, J., and Truffer, B., 2002. *Experimenting for sustainable transport: The approach of strategic niche management*. London: Taylor & Francis.
- Hoppe, T. and Coenen, F., 2011. Creating an analytical framework for local sustainability performance: a Dutch case study. *Local Environment*, 16 (3), 229–250.
- Hoverman, S., Ross, H., Chan, T., and Powell, B., 2011. Social learning through participatory integrated catchment risk assessment in the Solomon Islands. *Ecology And Society*, 16 (2), 22.
- Huitema, D. and Meijerink, S., 2010. Realizing water transitions: the role of policy entrepreneurs in water policy change. *Ecology and Society*, 15 (2), 26.
- Huitema, D., Mostert, E., Egas, W., Moellenkamp, S., Pahl-Wostl, C., and Yalcin, R., 2009. Adaptive water governance: Assessing the institutional prescriptions of adaptive (co-)management from a governance perspective and defining a research agenda. *Ecology and Society*, 14 (1), 26.
- Ingram, H. and Schneider, A., 1990. Science, democracy and water policy. *Water Resources Update*, 113 (1), 21–28.
- Ison, R. and Watson, D., 2007. Illuminating the possibilities for social learning in the management of Scotland's water. *Ecology and Society*, 12 (1), 21.
- Jansen, H., 2010. The logic of qualitative survey research and its position in the field of social research methods. *Forum: Qualitative Social Research*, 11 (2).
- Johnson, B. and Hagstrom, B.O., 2005. The translation perspective as an alternative to the policy diffusion paradigm: The case of the Swedish methadone maintenance treatment. *Journal of Social Policy*, 34 (3), 365–388.
- Johnson, R.B. and Onwuegbuzie, A.J., 2004. Mixed methods research: A research paradigm whose time has come. *Educational Researcher*, 33 (7), 14–26.
- Kaiser, F.G. and Fuhrer, U., 2003. Ecological behavior's dependency on different forms of knowledge. *Applied Psychology*, 52 (4), 598–613.

- Katz, D. and Kahn, R.L., 1966. *The social psychology of organizations*. Canada: John Wiley & Sons.
- Kauffman, S.A., 1995. *At home in the universe: The search for laws of self-organization and complexity*. Oxford: Oxford University Press.
- Keath, N.A. and Brown, R.R., 2008. Are Extreme Events a Crisis or Catalyst for Sustainable Urban Water Management? The Case of two Australian Cities. In: *Proceedings of the 11th International Conference on Urban Drainage, 31st of August - 5th of September 2008*. Edinburgh, Scotland.
- Keen, M., Brown, V.A., and Dyball, R., 2005. *Social learning in environmental management: Towards a sustainable future*. London: Earthscan.
- Keen, M. and Mahanty, S., 2006. Learning in sustainable natural resource management: Challenges and opportunities in the Pacific. *Society & Natural Resources*, 19 (6), 497–513.
- Kemp, R. and Van den Bosch, S., 2006. Transitie-experimenten. Praktijkexperimenten met de potentie om bij te dragen aan transitie. No. 01. Kenniscentrum voor Duurzame Systeeminnovaties en Transitie (KCT), Delft, the Netherlands.
- Kemp, R. and Loorbach, D., 2006. Transition management: A reflexive governance approach. In: J.P. Voß, D. Bauknecht, and R. Kemp, eds. *Reflexive governance for sustainable development*. Cheltenham: Edward Elgar, 103–130.
- Kemp, R., Schot, J., and Hoogma, R., 1998. Regime shifts to sustainability through processes of niche formation: The approach of strategic niche management. *Technology Analysis & Strategic Management*, 10 (2), 175 – 198.
- Van de Kerkhof, M. and Wieczorek, A., 2005. Learning and stakeholder participation in transition processes towards sustainability: Methodological considerations. *Technological Forecasting and Social Change*, 72 (6), 733–747.
- King, B.G., Felin, T., and Whetten, D.A., 2010. Finding the organization in organizational theory: A meta-theory of the organization as a social actor. *Organization Science*, 21 (1), 290–306,309.
- Kitchin, R. and Tate, N.J., 2000. *Conducting research in human geography: Theory, methodology and practice*. Harlow: Prentice Hall.
- Klijn, E.-H. and Koppenjan, J.F.M., 2000. Public management and policy networks: Foundations of a network approach to governance. *Public Management*, 2 (2), 135–158.
- Knight, L. and Pye, A., 2005. Network learning: An empirically derived model of learning by groups of organizations. *Human Relations*, 58 (3), 369–392.
- Konrad, K., Markard, J., Ruef, A., and Truffer, B., 2012. Strategic responses to fuel cell hype and disappointment. *Technological Forecasting and Social Change*, 79 (6), 1084–1098.
- Konrad, K., Truffer, B., and Voß, J.P., 2008. Multi-regime dynamics in the analysis of sectoral transformation potentials: Evidence from German utility sectors. *Journal of Cleaner Production*, 16 (11), 1190–1202.
- Von Korff, Y., Daniell, K.A., Moellenkamp, S., Bots, P., and Bijlsma, R.M., 2012. Implementing participatory water management: Recent advances in theory, practice, and evaluation. *Ecology and Society*, 17 (1), 14.
- Kouzes, J.M. and Posner, B.Z., 2008. *The leadership challenge*. 4th ed. San Francisco: John Wiley & Sons.
- Krishnaveni, R. and Sripirabaa, B., 2008. Capacity building as a tool for assessing training and development activity: an Indian case study. *International Journal of Training & Development*, 12 (2), 121–134.
- Lawhon, M., 2012. Contesting power, trust and legitimacy in the South African e-waste transition. *Policy Sciences*, 45 (1), 69–86.

- Lehtonen, P. and Martinsuo, M., 2008. Change program initiation: Defining and managing the program–organization boundary. *International Journal of Project Management*, 26 (1), 21–29.
- Lloyd, S.D., Wong, T.H.F., and Chesterfield, C.J., 2002. Water sensitive urban design: A stormwater management perspective. Cooperative Research Centre for Catchment Hydrology and Melbourne Water, Melbourne, Australia.
- Loeber, A., Van Mierlo, B.C., Grin, J., and Leeuwis, C., 2007. The practical value of theory: Conceptualising learning in the pursuit of a sustainable development. In: A.E.J. Wals, ed. *Social learning towards a sustainable world: Principles, perspectives, and praxis*. Wageningen: Wageningen Academic Publishers, 83–98.
- Loorbach, D., 2007. *Transition Management: New Mode of Governance for Sustainable Development*. Utrecht: International Books.
- Loorbach, D., 2010. Transition management for sustainable development: A prescriptive, complexity-based governance framework. *Governance*, 23 (1), 161–183.
- Loorbach, D. and Rotmans, J., 2010. The practice of transition management: Examples and lessons from four distinct cases. *Futures*, 42 (3), 237–246.
- Lundvall, B.A., 1992. *National systems of innovation: Toward a theory of innovation and interactive learning*. London: Pinter Publishers.
- Maksimovic, C. and Tejada-Guibert, J.A., 2001. *Frontiers in urban water management: Deadlock or hope*. London: IWA Publishing.
- Margerum, R.D., 2001. Organizational commitment to integrated and collaborative management: matching strategies to constraints. *Environmental Management*, 28 (4), 421–31.
- Markard, J., Raven, R., and Truffer, B., 2012. Sustainability transitions: An emerging field of research and its prospects. *Research Policy*, 41 (6), 955–967.
- Marsalek, J., Rochfort, M.Q., and Savic, P.D., 2001. Urban water as a part of integrated catchment management. In: C. Maksimovic and J.A. Tejada-Guibert, eds. *Frontiers in urban water management: Deadlock or hope?* London: IWA Publishing, 37–83.
- Martin, M., 2007. To govern well, create a learning agenda. *Nonprofit World*, 25 (4), 19–20.
- May, P.J., 1991. Reconsidering policy design: Policies and publics. *Journal of Public Policy*, 11 (2), 187–206.
- May, P.J., Burby, R.J., Ericksen, N.J., Handmer, J.W., Dixon, J. E., Michaels, S., and Ingle Smith, D., 1996. *Environmental management and governance: Intergovernmental approaches to hazards and sustainability*. London: Routledge.
- McGuire, M. and Silvia, C., 2010. The effect of problem severity, managerial and organizational capacity, and agency structure on intergovernmental collaboration: evidence from local emergency management. *Public Administration Review*, 70 (2), 279–288.
- McKinsey & Company, 2001. *Effective Capacity Building in Nonprofit Organizations*. Venture Philanthropy Partners, available at <http://www.vpppartners.org/sites/default/files/reports/full_rpt.pdf> accessed 8 December 2008.
- Meadowcroft, J., 2005. Environmental political economy, technological transitions and the state. *New Political Economy*, 10 (4), 479–498.
- Van de Meene, S.J., 2010. Development of a guiding framework for sustainable urban water governance. PhD thesis. Monash University, Melbourne.

- Van de Meene, S.J., Brown, R.R., and Farrelly, M.A., 2010. Capacity attributes of future urban water management regimes: projections from Australian sustainability practitioners. *Water Science & Technology*, 61 (9), 2241.
- Van Mierlo, B., Leeuwis, C., Smits, R., and Woolthuis, R.K., 2010. Learning towards system innovation: Evaluating a systemic instrument. *Technological Forecasting and Social Change*, 77 (2), 318–334.
- Mitchell, B., 2005. Integrated water resource management, institutional arrangements, and land-use planning. *Environment and Planning A*, 37 (8), 1335–1352.
- Mitchell, V.G., 2006. Applying integrated urban water management concepts: A review of Australian experience. *Environmental Management*, 37 (5), 589–605.
- Moore, M. and Hartley, J., 2010. Innovations in governance. In: S.P. Osborne, ed. *The new public governance? Emerging perspectives on the theory and practice of public governance*. Routledge, 52–71.
- Morgan, D.L., 2007. Paradigms lost and pragmatism regained: Methodological implications of combining qualitative and quantitative methods. *Journal of Mixed Methods Research*, 1 (1), 48–76.
- Morison, P.J., 2009. Management of Urban Stormwater: Advancing Program Design and Evaluation. PhD Thesis. Monash University, Melbourne.
- Morison, P.J. and Brown, R.R., 2010. Avoiding the presumptive policy errors of intergovernmental environmental planning programmes: A case analysis of urban stormwater management planning. *Journal of Environmental Planning and Management*, 53 (2), 197–217.
- Morison, P.J. and Brown, R.R., 2011. Understanding the nature of publics and local policy commitment to water sensitive urban design. *Landscape and Urban Planning*, 99 (2), 83–92.
- Moss, T., 2009. Intermediaries and the governance of sociotechnical networks in transition. *Environment and Planning A*, 41 (6), 1480–1495.
- Mostert, E., Pahl-Wostl, C., Rees, Y., Searle, B., Tabara, D., and Tippett, J., 2007. Social learning in European river-basin management: Barriers and fostering mechanisms from 10 river basins. *Ecology and Society*, 12 (1), 16.
- Mouritz, M.J., 1996. Sustainable urban water systems: Policy and professional praxis. PhD Thesis. Murdoch University, Institute for Science and Technology Policy, School of Social Science, Perth.
- Muro, M. and Jeffrey, P., 2008. A critical review of the theory and application of social learning in participatory natural resource management processes. *Journal of Environmental Planning and Management*, 51 (3), 325–344.
- Muro, M. and Jeffrey, P., 2012. Time to talk? How the structure of dialog processes shapes stakeholder learning in participatory water resources management. *Ecology and Society*, 17 (1), 14.
- Myers, M.D., 2008. *Qualitative research in business & management*. London: Sage Publications.
- Nelson, R.R. and Winter, S.G., 1977. In search of useful theory of innovation. *Research Policy*, 6 (1), 36–76.
- Newman, P. and Kenworthy, J.R., 1999. *Sustainability and cities: Overcoming automobile dependence*. Washington, DC: Island Press.
- Niemczynowicz, J., 1999. Urban hydrology and water management—present and future challenges. *Urban Water*, 1 (1), 1–14.

- Novotny, V., 2009. Sustainable urban water management. *In: J. Feyen, K. Shannon, and M. Neville, eds. Water and urban development paradigms: Towards an integration of engineering, design and management approaches.* London: Taylor & Francis Group, 19–30.
- NSW Government, 2010. 2010 Metropolitan Water Plan. New South Wales Government, available at <<http://www.waterforlife.nsw.gov.au/planning-sydney/metropolitan-water-plan>> accessed 10 January 2011.
- O'Toole, L.J., Jr, 2003. Interorganizational relations in implementation. *In: G.B. Peters and J. Pierre, eds. Handbook of Public Administration.* London: Sage Publications.
- Olsson, P., Folke, C., and Berkes, F., 2004. Adaptive comanagement for building resilience in social ecological systems. *Environmental Management*, 34 (1), 16.
- Olsson, P., Gunderson, L.H., Carpenter, S.R., Ryan, P., Lebel, L., Folke, C., and Holling, C.S., 2006. Shooting the rapids: Navigating transitions to adaptive governance of social-ecological systems. *Ecology and Society*, 11 (1), 21.
- OurRiver, 2011. Final report on the award-winning OurRiver - Cooks River Sustainability Initiative. Marrickville City Council, Sydney, Australia.
- Pahl-Wostl, C., 2002. Towards sustainability in the water sector: The importance of human actors and processes of social learning. *Aquatic Sciences-Research Across Boundaries*, 64 (4), 394–411.
- Pahl-Wostl, C., 2006. Transitions towards adaptive management of water facing climate and global change. *Water Resources Management*, 21 (1), 49–62.
- Pahl-Wostl, C., 2007. The implications of complexity for integrated resources management. *Environmental Modelling & Software*, 22 (5), 561–569.
- Pahl-Wostl, C., 2008. Requirements for adaptive management. *In: C. Pahl-Wostl, P. Kabat, and J. Möltgen, eds. Adaptive and integrated water management: Coping with complexity and uncertainty.* Berlin: Springer, 1–22.
- Pahl-Wostl, C., 2009. A conceptual framework for analysing adaptive capacity and multi-level learning processes in resource governance regimes. *Global Environmental Change*, 19 (3), 354–365.
- Pahl-Wostl, C., Craps, M., Dewulf, A., Mostert, E., Tabara, D., and Taillieu, T., 2007. Social learning and water resources management. *Ecology and Society*, 12 (2), 19.
- Pahl-Wostl, C., Jeffrey, P., Isendahl, N., and Brugnach, M., 2011. Maturing the new water management paradigm: Progressing from aspiration to practice. *Water Resources Management*, 25 (3), 837–856.
- Pahl-Wostl, C., Mostert, E., and Tabara, D., 2008. The growing importance of social learning in water resources management and sustainability science. *Ecology and Society*, 13 (1), 4.
- Pahl-Wostl, C., Sendzimir, J., Jeffrey, P., Aerts, J., Berkamp, G., and Cross, K., 2007. Managing change toward adaptive water management through social learning. *Ecology and Society*, 12 (2), 18.
- Pahl-Wostl, C., Tabara, D., Bouwen, R., Craps, M., Dewulf, A., Mostert, E., Ridder, D., and Taillieu, T., 2008. The importance of social learning and culture for sustainable water management. *Ecological Economics*, 64 (3), 484–495.
- Palaniappan, M., Cooley, H., Gleick, P.H., and Wolff, G., 2007. Water infrastructure and water-related services: Trends and challenges affecting future development. *In: Infrastructure to 2030 (Volume 2): Mapping policy for electricity, water and transport.* Paris: Organisation for Economic Co-operation and Development, 269–340.
- Pallant, J., 2011. *SPSS survival manual: A step by step guide to data analysis using the SPSS program.* Crows Nest: Allen & Unwin.

- Pelling, M., High, C., Dearing, J., and Smith, D., 2008. Shadow spaces for social learning: A relational understanding of adaptive capacity to climate change within organisations. *Environment and Planning A*, 40 (4), 867–884.
- Pini, B., 2009. Australian rural local governments and environmental sustainability: An evaluation of progress. *Australian Journal of Public Administration*, 68 (2), 182–193.
- Portes, A., 1998. Social capital: Its origins and applications in modern sociology. *Annual Review of Sociology*, 24, 1–24.
- Proehl, R.A., 2001. *Organizational change in the human services*. California: Sage Publications.
- Putnam, R.D., 1993. *Making democracy work: Civic traditions in modern Italy*. New Jersey: Princeton University Press.
- Putnam, R.D., 1995. Bowling alone: America's declining social capital. *Journal of Democracy*, 6 (1), 64–78.
- Rauch, W., Seggelke, K., Brown, R., and Krebs, P., 2005. Integrated approaches in urban storm drainage: Where do we stand? *Environmental Management*, 35 (4), 396–409.
- Raven, R., Van den Bosch, S., and Weterings, R., 2007. Strategic niche management and transition experiments: From analytical tool to a competence kit for practitioners. In: *Proceedings of the 4th Dubrovnic Conference on Sustainable Development of Energy, Water and Environment Systems, June 4-8 2007*. Dubrovnic, Croatia.
- Reed, M., Evely, A.C., Cundill, G., Fazey, I.R.A., Glass, J., Laing, A., Newig, J., Parrish, B., Prell, C., Raymond, C., and Stringer, L., 2010. What is social learning? *Ecology and Society*, 15 (4), 10.
- Renwick, C., Pastorelli, J., Muir, L., Sheppard, H., Denby, J., and Chalcraft, G., 2008. Cooks river integrated interpretation strategy. The Cooks River Foreshores Working Group, Sydney, Australia.
- Rindova, V.P., Williamson, I.O., and Petkova, A.P., 2010. Reputation as an intangible asset: Reflections on theory and methods in two empirical studies of business school reputations. *Journal of Management*, 36 (3), 610–619.
- Rip, A. and Kemp, R., 1998. Technological change. In: S. Rayner and E.L. Malone, eds. *Human choice and climate change*. Columbus: Battelle Press, 327–399.
- Rittel, H.W.J. and Webber, M.M., 1973. Dilemmas in a general theory of planning. *Policy Sciences*, 4 (2), 155–169.
- Roberts, N.C. and King, P.J., 1996. *Transforming public policy: Dynamics of policy entrepreneurship and innovation*. San Francisco: Jossey-Bass.
- Rodela, R., 2011. Social learning and natural resource management: The emergence of three research perspectives. *Ecology and Society*, 16 (4), 12.
- Rodela, R., Cundill, G., and Wals, A.E.J., 2012. An analysis of the methodological underpinnings of social learning research in natural resource management. *Ecological Economics*, 77, 16–26.
- Rotmans, J., 2003. *Transitiemanagement. Sleutel voor een duurzame wereld*. Assen: Koninklijke Van Gorcum.
- Rotmans, J. and Loorbach, D., 2009. Complexity and transition management. *Journal of Industrial Ecology*, 13 (2), 184–196.
- Rotmans, J. and Loorbach, D., 2010. Towards a better understanding of transitions and their governance: A systemic and reflexive approach. In: J. Grin and J. Schot, eds. *Transitions to sustainable development: New directions in the study of long term transformative change*. New York: Routledge, 105–199.

- Ryan, C.M. and Klug, J.S., 2005. Collaborative watershed planning in Washington state: Implementing the watershed planning act. *Journal of Environmental Planning and Management*, 48 (4), 491–506.
- Sahlin, K. and Wedlin, L., 2008. Circulating ideas: Imitation, translation and editing. In: R. Greenwood, C. Oliver, K. Sahlin, and R. Suddaby, eds. *The SAGE handbook of organizational institutionalism*. London: Sage Publications, 218–242.
- Sahlin-Andersson, K., 1996. Imitating by editing success: The construction of organizational fields. In: B. Czarniawska and G. Sevón, eds. *Translating organizational change*. Berlin: De Gruyter, 69–91.
- Sahlin-Andersson, K. and Engwall, L., 2002. *The Expansion of Management Knowledge: Carriers, Flows, and Sources*. Stanford: Stanford University Press.
- Schein, E.H., 1996. Culture: The missing concept in organization studies. *Administrative Science Quarterly*, 41 (2), 229–240.
- Scholz, R.W. and Tietje, O., 2002. *Embedded case study methods: Integrating quantitative and qualitative knowledge*. California: Sage Publications.
- Schön, D.A. and Rein, M., 1995. *Frame reflection: Toward the resolution of intractable policy controversies*. New York: Basic Books.
- Schot, J. and Geels, F.W., 2008. Strategic niche management and sustainable innovation journeys: Theory, findings, research agenda, and policy. *Technology Analysis & Strategic Management*, 20 (5), 537–554.
- Shove, E., 2010. Beyond the ABC: Climate change policy and theories of social change. *Environment and Planning A*, 42 (6), 1273–1285.
- Shove, E. and Walker, G., 2007. CAUTION! Transitions ahead: Politics, practice, and sustainable transition management. *Environment and Planning A*, 39 (4), 763.
- Shove, E. and Walker, G., 2010. Governing transitions in the sustainability of everyday life. *Research Policy*, 39 (4), 471–476.
- Silverman, D., 2006. *Interpreting qualitative data: Methods for analyzing talk, text and interaction*. London: Sage Publications.
- SLIM, 2004a. SLIM (social learning for the integrated management and sustainable use of water a catchment scale) framework: Social learning as a policy approach for sustainable use of water. available at <<http://www.slim.open.ac.uk>> accessed 14 December 2010.
- SLIM, 2004b. SLIM (social learning for the integrated management and sustainable use of water a catchment scale) - Developing conducive and enabling institutions for concerted action. SLIM Policy Briefing 3. available at <<http://www.slim.open.ac.uk>> accessed 14 December 2010.
- Smith, A., 2007. Translating sustainabilities between green niches and socio-technical regimes. *Technology Analysis & Strategic management*, 19 (4), 427–450.
- Smith, A. and Raven, R., 2012. What is protective space? Reconsidering niches in transitions to sustainability. *Research Policy*, 41 (6), 1025–1036.
- Smith, A., Stirling, A., and Berkhout, F., 2005. The governance of sustainable socio-technical transitions. *Research Policy*, 34 (10), 1491–1510.
- Smith, R. and Wiek, A., 2012. Achievements and opportunities in initiating governance for urban sustainability. *Environment and Planning C: Government and Policy*, 30 (3), 429 – 447.
- Speers, A., 2007. Water and cities - overcoming inertia and achieving a sustainable future. In: V. Novotny and P.R. Brown, eds. *Cities of the Future: Towards Integrated Sustainable Water and Landscape Management*. London: IWA Publishing, 18–31.
- Stake, R.E., 1995. *The art of case study research*. California: Sage Publications.

- Stake, R.E., 2000. Case studies. In: N.K. Denzin and Y.S. Lincoln, eds. *The handbook of qualitative research*. California: Sage Publications, 435–454.
- Steyaert, P. and Jiggins, J., 2007. Governance of complex environmental situations through social learning: A synthesis of SLIM's lessons for research, policy and practice. *Environmental Science & Policy*, 10 (6), 575–586.
- Stubbs, M. and Lemon, M., 2001. Learning to network and networking to learn: Facilitating the process of adaptive management in a local response to the UK's national air quality strategy. *Environmental Management*, 27 (3), 321–334.
- Suchman, M.C., 1995. Managing legitimacy: Strategic and institutional approaches. *The Academy of Management Review*, 20 (3), 571–610.
- Sundewall, J. and Sahlin-Andersson, K., 2006. Translations of health sector SWApS – A comparative study of health sector development cooperation in Uganda, Zambia and Bangladesh. *Health Policy*, 76 (3), 277–287.
- Taylor, A., 2009. Advancing water sensitive urban design in the Lower Georges River catchment: A rapid assessment of institutional capacity in local government agencies. Worksheets. Rockdale City Council, Sydney, Australia.
- Taylor, A., 2010. Sustainable urban water management: The champion phenomenon. PhD Thesis. Monash University, Melbourne.
- Taylor, A., Cocklin, C., Brown, R., and Wilson-Evered, E., 2011. An investigation of champion-driven leadership processes. *The Leadership Quarterly*, 22 (2), 412–433.
- Thomas, F., Orton, J., and Brown, R., 2007. Sub-catchment planning in Marrickville: The urban stormwater integrated management (USWIM) project. In: P. Coombes, ed. Proceedings of the 5th International Conference on Water Sensitive Urban Design and the 7th International Conference on Urban Drainage Modelling, 21-23 August 2007, Sydney, Australia.
- Tortajada, C., 2010. Water governance: Some critical issues. *Journal of Water Resources Development*, 26 (2), 297–307.
- Tovey, J., 2010. A case of too many cooks for an urban river. Sydney Morning Herald. available at <<http://www.smh.com.au/environment/water-issues/a-case-of-too-many-cooks-for-an-urban-river-20100507-ujp0.html>> accessed 14 May 2010.
- Truffer, B., Störmer, E., Maurer, M., and Rued, A., 2010. Local strategic planning processes and sustainability transitions in infrastructure sectors. *Environmental Policy and Governance*, 20 (4), 258–269.
- Truffer, B., Voß, J.P., and Konrad, K., 2008. Mapping expectations for system transformations: Lessons from sustainability foresight in German utility sectors. *Technological Forecasting and Social Change*, 75 (9), 1360–1372.
- Verhagen, J., Butterworth, J., and Morris, M., 2008. Learning alliances for integrated and sustainable innovations in urban water management. *Waterlines*, 27 (2), 116–124.
- Vlachos, E. and Braga, B., 2001. The challenge of urban water management. In: C. Maksimovic and J.A. Tejada-Guibert, eds. *Frontiers in urban water management: Deadlock or hope?* London: IWA Publishing, 1–36.
- Voß, J.P. and Bornemann, B., 2011. The politics of reflexive governance: Challenges for designing adaptive management and transition management. *Ecology and Society*, 16 (2), 23.
- Voß, J.P. and Kemp, R., 2006. Reflexive governance for sustainable development: Introduction. In: J.P. Voß, D. Bauknecht, and R. Kemp, eds. *Reflexive governance for sustainable development*. Cheltenham: Edward Elgar.

- Vofß, J.P., Smith, A., and Grin, J., 2009. Designing long-term policy: Rethinking transition management. *Policy Sciences*, 42 (4), 275–302.
- Vreugdenhil, H.S.I., 2010. *Pilot project in water management: Practicing change and changing practice*. PhD Thesis. Delft: VSSD.
- Vreugdenhil, H.S.I., Slinger, J.H., Thissen, W.A.H., and Rault, P., 2010. Pilot projects in water management. *Ecology and Society*, 15 (3), 26.
- Walker, W., 2000. Entrapment in large technical systems: Institutional commitment and power relations. *Research Policy*, 29 (7-9), 833–846.
- Wals, A.E.J., ed., 2007. *Social learning towards a sustainable world: Principles, perspectives, and praxis*. Wageningen: Wageningen Academic Publishers.
- Webler, T., Kastenholz, H., and Renn, O., 1995. Public participation in impact assessment: A social learning perspective. *Environmental Impact Assessment Review*, 15 (5), 443–463.
- Westley, F., Olsson, P., Homer-Dixon, T., Vredenburg, H., Loorbach, D., Thompson, J., Nilsson, M., Lambin, E., Senzimir, J., Banerjee, B., Galaz, V., and Van der Leeuw, S., 2011. Tipping toward sustainability: Emerging pathways of transformation. *AMBIO*, 40 (7), 762–780.
- Wieczorek, A., Hekkert, M.P., and Smits, R., 2010. Systemic policy instruments and their role in addressing sustainability challenges. In: *Proceedings of the 8th GLOBELICS International Conference, Making innovation work for society: Linking, leveraging and learning, 1 - 3 November 2010*. Kuala Lumpur, Malaysia.
- Williams, P., 2010. Special agents: The nature and role of boundary spanners. Presented at the ESRC research seminar series – Collaborative futures: New insights from intra and inter-sectoral collaborations, Birmingham, United Kingdom.
- Windell, K., 2006. Corporate social responsibility under construction: Ideas, translations, and institutional change. PhD Thesis. Uppsala University, Uppsala.
- Wong, T.H.F., 2001. A changing paradigm in Australian urban stormwater management. In: *Proceedings of the 2nd South Pacific Conference on Comprehensive Stormwater and Aquatic Ecosystem Management, 27 - 29 June 2001 (Keynote)*. Auckland, New Zealand.
- Wong, T.H.F., 2006a. An overview of water sensitive urban design practices in Australia. *Water Practice & Technology*, 1 (1), 1–8.
- Wong, T.H.F., 2006b. Water sensitive urban design - The journey thus far. *Australian Journal of Water Resources*, 10 (3), 213–222.
- Wong, T.H.F. and Brown, R.R., 2009. The water sensitive city: Principles for practice. *Water Science & Technology*, 60 (3), 673.
- Wong, T.H.F. and Eadie, M.L., 2000. Water sensitive urban design – A paradigm shift in urban design. In: *Proceedings of the 10th World Water Congress, 12-16 March 2000*. Melbourne, Australia.
- Woodhill, A.J., 2003. Dialogue and transboundary water resources management: Towards a framework for facilitating social learning. In: S. Langaas and J.G. Timmerman, eds. *Environmental information in European transboundary water management*. London: IWA Publishing, 44–59.
- Woodhill, J., 2010. Capacities for institutional innovation: A complexity perspective. *IDS Bulletin*, 41 (3), 47–59.
- Yin, R.K., 2009. *Case study research: Design and methods*. 4th ed. California: Sage Publications.

Appendix A - Guiding Interview Questions

A.1 Initial/Half-Way One-to-One Interviews

Interview topic	Sample guiding questions
Sustainable urban water management (SUWM)	<ul style="list-style-type: none"> • What SUWM (or related concepts like Integrated Urban Water Management of Water Sensitive Urban Design) mean to you? • When did you hear first about SUWM? • Has your understanding of the concept changed? • How have you seen the concept evolve in the sector and, if relevant, in your Council? What have been factors of influence in this process? • How is SUWM talked about in your Council? • Are you trying to contribute to SUWM in your professional role? If so, in what manner? What helps or hinders you in doing so?
Governance experiment: OurRiver – Cooks River Sustainability Initiative (CRSI).	<ul style="list-style-type: none"> • What do you understand by what CRSI is trying to achieve? • Do you think the CRSI approach is different to previous urban water management approaches? In what manner? • What do you expect this program to achieve? • What do you see as the success and achievements so far in implementing the CRSI project? • What do you see as the main challenges so far in implementing the CRSI project?
Actors and partnerships	<ul style="list-style-type: none"> • Is there willingness to participate in the program among different stakeholders, in and beyond the Council? Are there currently any effects generated through collaboration between the different stakeholders? • To what extent is there co-ownership of the program between different participating actors (project team, steering/champions committee, Council staff, and so on)

A.2 Municipal Focus-Group Interviews

Interview topic	Sample guiding questions
Capacity assessment rating tool	<ul style="list-style-type: none"> • Any feedback to or insights of the capacity assessment rating tool that you have just filled out?
Sustainable urban water management (SUWM) in council	<ul style="list-style-type: none"> • How did the Council come to get involved in SUWM? • What does SUWM mean to the Council? • What makes you want to engage in SUWM? <i>(Is SUWM a Council responsibility?)</i> • What currently supports you in your efforts to address SUWM? • What challenges do you face in addressing SUWM? • <i>(What priority does the community place on waterway health? What about commitment of different actors within the organisation? Do different department collaborate to address urban water management? For what in what manner?)</i>
Knowledge of OurRiver – Cooks River Sustainability Initiative (CRSI)	<ul style="list-style-type: none"> • What do you know about CRSI? • What do you understand by what CRSI is trying to achieve? • How does it differ from other grant funded programs? How does it differ from regular urban water planning activities? • What do you see as the value of CRSI to your organisation and the Cooks River catchment (at present and in future)?

A.3 Oral Histories

Interview topic	Relevant guiding questions
<p>Explore how meaning for an alternative form of urban water management has developed among actors who were instrumental in the emergence of the Cooks River Sustainability Initiative (CRSI).</p>	<p>How did you come to realise that urban water management should be approached in a different manner in comparison with the current form?</p> <ol style="list-style-type: none"> a. What were the main factors, processes, issues that made this happen? Around what time did this happen? b. Where there actors involved? Who were the main actors? Around what time did this happen?
<p>Explore how ‘new’ understanding of urban water management led to recognising the need for explicitly experimenting with governance approaches instead of experimenting with technology only.</p>	<p>Could you tell me what made you realise that you should be experimenting or doing demonstration projects with governance approaches instead of technology?</p> <ol style="list-style-type: none"> a. What lead to the community planning approach b. What lead to shared sub-catchments c. What lead to approaching governance within catchment d. What lead to integration of social, urban and physical context
<p>Factors and processes that helped/hindered translation of this new understanding of urban water management into a legitimised governance process.</p>	<p>So as you had ideas about this process, what factors/processes/people made it translate into the Urban StormWater – Integrated Management project and later in into the CRSI project?</p> <ol style="list-style-type: none"> a. Were there a lot of happy accidents or was it mostly a conscious process? b. What was the response of the conventional/technocratic system you are working in? What were the things factors/processes you could build on? And what were the one you were hindered by? How did you overcome them?

A.4 End-of-Experiment One-to-One and Focus Group Interviews

Interview topic	Sample guiding questions
Introduction - overall impression on OurRiver – Cooks River Sustainability Initiative (CRSI)	<p>(In group - card session)</p> <ul style="list-style-type: none"> • In your opinion, overall has CRSI been successful? Why/Why not? • What has been the greatest difficulty (or disappointment) for you in implementing CRSI? • Has anything surprised you about CRSI?
(Learning) outcomes	<ul style="list-style-type: none"> • Has your perspective on the nature of the urban water management changed through participating in CRSI? • Do you believe the program has influenced practice of SUWM (individual, Council, catchment, community)? Why? • Do you see any further outcomes (physical/non-physical) from the program? Examples? • If learning/capacity building is mentioned – Who has learned? Is there proof that this learning occurred? • What program elements (or other drivers) have been important in generating these (learning) outcomes? How? • Were you aware of the programs learning goals throughout the initiative? • Could learning have been enhanced?
Collaborative approach	<ul style="list-style-type: none"> • Is anything gained from bringing catchment stakeholders together? If so, what? • After being engaged with the program, do you feel that urban water planning should be collaborative? Why/why not? With what purpose? Is there a difference how you feel personally about this and what you think Council can achieve in this regard? • What elements of the CRSI approach will (or have already been) adopted by your Council?

Role of actors	<ul style="list-style-type: none">• Tell me what has been the role of different actors (including you) during CRSI? How have actors supported or blocked CRSI and/or its processes? Have roles changed through the program?• How has communication between actors been experienced during CRSI?
Lost opportunities / risks	<ul style="list-style-type: none">• What have been lost opportunities in the program?• What did you experience as risky elements of the program?

Appendix B - Survey Questions

B.1 Organizational Capacity - Rating Instrument

Capacity for Sustainable Urban Water Management

Information about You

1. Which council do you work for?

Ashfield
 Baintown
 Canterbury
 City of Sydney
 Hurstville
 Marrickville
 Rockdale
 Strathfield
 Other (please specify)

2. What is the department of division in which you work?

3. At what level are you positioned within your organisation's hierarchy?

Executive
 Senior
 Middle manager or supervisor
 Officer with no management responsibility

4. Broadly, what is the main type of work that you do?

Elected official (i.e. politician)
 Strategy / Policy
 Planning
 Design
 Construction
 Maintenance & Operations
 Regulation / Auditing
 Research / Science
 Education / Marketing / Communications
 Landscape Architecture
 Sustainability/Environment
 Other (please specify)

Capacity for Sustainable Urban Water Management

Introduction

Thank you in advance for participating in this survey.

The survey is being undertaken as part of an organisational assessment on (sustainable) urban water management and PhD research within the context of the OurRiver - Cooks River Sustainability Initiative. The OurRiver project trials an innovative model of collaborative urban water management and your council is one of the project partners.

This questionnaire should take between 30 and 45 minutes to complete. If you get interrupted, you can close this questionnaire (click 'exit survey' at top right) and complete it later by re-clicking on the link. When you re-open it, you will be able to pick up from where you left off.

This questionnaire is anonymous and has been approved by Monash University's research ethics committee (for detailed information on how your confidentiality will be maintained, please read the Explanatory Statement below). Before commencing this questionnaire, it is a Monash University requirement that you read the following 'Explanatory Statement' for this research project.

Please read the following explanatory statement and then answer the question below.

Once again, thank you for your assistance.

Yours Sincerely,
 Annette Boe and A/Professor Rebekah Brown

Capacity for Sustainable Urban Water Management

5. What is your highest qualification?

Doctorate
 Masters Degree
 Bachelors Degree
 TAFE
 High School
 Other (please specify) _____

6. What is your PRIMARY professional training/qualification (i.e. the qualification you draw upon most to do your work)?

Planning
 Policy
 Engineering
 Natural Resource Management
 Social Science
 Humanities
 Science (environmental, biological, physical, health etc)
 Education
 Law
 Management
 Business / Economics
 Marketing / Communications
 Urban Design / Architecture / Landscape Architecture
 I do not have professional training/qualifications
 Other (please specify) _____

Capacity for Sustainable Urban Water Management

7. In which area of water management do you primarily work in?

Water supply
 Sewage
 Drainage
 Stormwater quality / water way health
 Stormwater harvesting
 Development Control
 Flood management
 Park and garden irrigation
 Total Water Cycle Management
 I don't work in any area of water management
 Other (please specify) _____

8. How long have you been working in your current position?

1-2 years
 < 1 year
 2-5 years
 6-10 years
 11-15 years
 16-20 years
 20+ years

9. How long have you been working for this council?

0-1 year
 1-2
 2-5 years
 6-10 years
 11-15 years
 16-20 years
 20+ years

Capacity for Sustainable Urban Water Management

Defining Sustainable Urban Water Management

Sustainable Urban Water Management (SUWM) aims at holistic management of water streams (water supply, wastewater, and stormwater) while minimising the import of large quantities of potable water into cities and minimising discharge of wastewater and stormwater to urban waterways.

- 1) This integrated approach is linked to the well-being of the catchments and receiving water environments (including surface and sub-surface) and human populations.
- 2) It involves making the most appropriate use of water from all stages of the water cycle to deliver social, ecological and economic sustainability at a variety of scales.
- 3) It considers the local context in terms of environmental, physical, social, cultural and economic perspectives.
- 4) It includes all stakeholders in planning and decision-making processes.

It is important to note that the questionnaire adopts 'sustainable urban water management' as a broad umbrella term to encompass the diverse language used across the urban water sector to describe more sustainable practices (for example 'total water cycle management', 'water sensitive urban design', 'integrated urban water management' and 'integrated land and water management').

10. I rate my understanding of Sustainable Urban Water Management

No understanding
 Little understanding
 Modest understanding
 Significant understanding
 Full understanding

Capacity for Sustainable Urban Water Management

Aspirations

11. Which situation would best describe your organisation in terms of SUWM aspirations?

Please tick the most appropriate situation

No shared understanding of what the organisation aspires to become with regard to SUWM.
 Little shared understanding of what the organisation aspires to become with regard to SUWM.
 Somewhat clear or specific understanding of what the organisation aspires to become or achieve in regard to SUWM, held by only a few. Sustainability aspirations are documented in strategic and corporate documents.
 Clear or specific understanding of what organisation aspires to become or achieve in regard to SUWM, held more widely throughout the organisation; SUWM aspirations are clearly articulated in strategic and corporate documents.
 Clear, specific and compelling understanding of what organisation aspires to become or achieve, broadly held throughout the organisation; SUWM aspirations are clearly articulated in strategic and corporate documents and are integrated across a range of operational areas.
 I don't know as I am not familiar with the situation.

Capacity for Sustainable Urban Water Management

Aspirations

12. Which situation would best describe your organisation with regard to councillor commitment to SUWM?

Please tick the most appropriate situation

No councillor commitment or priority to SUWM issues within council.

Broad councillor commitment to environment and sustainability but these are not translated into practice. Councillors are collectively concerned about environmental reputation; Minority of councillors interested in SUWM issues; Councillors initiate or request the organisation to report on environmental issues; A forum for community, council staff and councillors to tackle environment/sustainability matters is established.

Councillors are interested in a range of SUWM issues; The environment is on the councillor's agenda and some broader interest in SUWM starts to appear; Councillors occasionally attend environment events; An environment committee is established and attended by councillors; Councillors ask staff to report on SUWM issues; A notice of motion on a SUWM related subject is being submitted occasionally.

Collective commitment to SUWM across councillors; Councillors actively participate with community and council staff in an environment/SUWM committee; Councillors regularly attend environmental events; A notice of motion on a SUWM related subject is submitted regularly; Councillors request staff reports on SUWM and environmental issues.

I don't know as I am not familiar with the situation.

Capacity for Sustainable Urban Water Management

Aspirations

13. Which situation would best describe the passion and vision for SUWM by senior executives within your organisation?

Please tick the most appropriate situation

Complete lack of awareness (or disinterest in) of SUWM; Some senior staff may be actively resistant to changes in council practice towards SUWM.

No active vision or strategy within council but senior staff allow junior staff to pursue SUWM activities.

More than one senior staff member within the organisation has included SUWM within the department's annual management plan with some dedicated budget.

Senior executive vision and passion is driving innovative SUWM projects, this is expressed within the organisational leadership strategy; An inter-departmental committee with support by senior staff exists.

Continuous and active commitment towards integration of SUWM principles within the organisation through an inter-departmental committee with active participation of senior staff; Performance management reviews at CEO or senior executive level includes KPI's for SUWM.

I don't know as I am not familiar with the situation.

Capacity for Sustainable Urban Water Management

Aspirations

14. Which situation would best describe the internal political priority for SUWM by management and staff within your organisation?

Please tick the most appropriate situation

Internal political priority for SUWM issues is largely non-existent.

Internal political priority for SUWM is ad-hoc being put on the agenda by an individual or a loose informal network of like-minded people.

Internal political priority for SUWM issues is carried by a small consistent formal or informal network of people which results in some SUWM related activities, but the group has relatively limited influence.

Internal political priority for SUWM is carried by a consistent formal or informal multi-disciplinary network of people, which has moderate influence in setting direction for sustainability priorities.

Internal political priority for SUWM issues is firmly embedded into the organisational structure; a structure, such as a working group for SUWM, exists, in addition to a sustainability or environmental working group. In this SUWM group multi-disciplinary professionals and operational staff collaborate.

I don't know as I am not familiar with the situation.

Capacity for Sustainable Urban Water Management

Culture

15. Which situation would best describe your organisation in terms of SUWM as shared beliefs and/or values?

Please tick the most appropriate situation

No common set of basic beliefs and values regarding SUWM exist within the organisation.

Some individuals have values regarding SUWM but not widespread within department and council.

Shared beliefs/values at team level/dept; Some senior managers may support and share these values but not yet across rest of council.

SUWM values are included in council vision statement; Part of standard staff training and induction for relevant staff.

The council values and promotes staff and councillor learning and research in SUWM as part of reinforcing corporate commitment; As a leader in the field, the council is offering their knowledge, skills and support to the industry.

I don't know as I am not familiar with the situation.

Capacity for Sustainable Urban Water Management

Strategy

16. Which situation would best describe your organisation in terms of policy for SUWM? Please tick the most appropriate situation

SUWM activities driven by regulatory compliance from State Government e.g. Basic.

An internal policy/strategy for sustainability or the environment – which includes reference to 'water as a resource' is developed but there is no relationship to the council management plan.

Broad SUWM policy/strategy exists (or SUWM is clearly part of the overall strategy) and is increasingly used in organisational decision-making as it is linked to the council management plan.

Specific SUWM policies/strategies are often used to direct actions and set priorities. Policies/strategies have been translated in cross sectional responsibilities, which are spelled out in council management plan.

Specific SUWM policies/strategies consistently used to direct actions and set priorities. Initiatives set out in the management plan, are adopted and reflected in the work plans.

I don't know as I am not familiar with the situation.

Capacity for Sustainable Urban Water Management

Strategy

17. Who was involved in the process of developing the council management plan? Please tick the most appropriate situation

Prepared by corporate planning department only. Little or no engagement with community.

Prepared by executives and corporate planning department. Some consultation with community – mostly one-way information giving.

Prepared by executives, planning department and elected officials. Community consultation and communication plan developed as part of the planning process.

Prepared by executives, planning department, elected officials and officers. Good level of community engagement with community invited to participate throughout the planning process.

Prepared by executives, planning department, elected officials, officers and interested members of the community. High level of community engagement and collaboration in the planning process.

I don't know as I am not familiar with the situation.

Capacity for Sustainable Urban Water Management

Strategy

18. Which situation would best describe your organisation in terms of funding for SUWM ?

Please tick the most appropriate situation

SUWM related activities are highly dependent on scattered grants-in-aid; No dedicated internal resources for SUWM.

SUWM related activities highly dependent on external grants; Environmental team is actively trying to secure funding through writing grant applications; Very limited or no dedicated internal resources for SUWM.

SUWM related activities funded through some dedicated internal resources which are reflected in the council budget; Environmental team is often successful in obtaining project based external grants.

Dedicated internal resource allocation (reflected in council budget) for funding of ongoing SUWM activities on top of external dedicated funds; Budget roughly distributed according to priority as outlined in a SUWM plan.

Solid bases for funding through dedicated internal resources (reflected in council budget) allocation for ongoing SUWM activities on top of external dedicated funds; Budget distributed according to priority as outlined in plan; Benchmarking of SUWM funding is being undertaken with neighbouring or a grouping of councils.

I don't know as I am not familiar with the situation.

Capacity for Sustainable Urban Water Management

Strategy

19. Which situation would best describe your organisation's local implementation goals and performance targets for SUWM?

Please tick the most appropriate situation

Targets for environment or SUWM are non-existent or are State Government driven such as SEPP only.

Targets are either too easy or impossible to achieve; Targets not directly related to informed decision-making as it is politically driven rather than evidence based.

Realistic targets for SUWM in few areas of Council. Targets exist for only one area e.g. quality, quantity, use of recycled water, septic tanks, etc; Targets mostly align with specific strategies or management plans, however targets don't provide guidance to daily practice; Staff may or may not know and adopt targets.

Tangible targets in most areas of SUWM; Targets linked to annual management plan; Targets are known and adopted by most staff who use them to broadly guide their work; Evidence of implementation and monitoring.

Concise set of tangible performance targets in most areas of SUWM; Targets are closely linked to the annual management plan and individual officers' positions; Targets have clear milestones; Staff consistently adopt targets and work diligently to achieve them; Resources are dedicated to achieving the targets; Multiple sections of organisations are striving to achieve targets; Targets are audited, monitored and reported upon to a variety of organisations.

I don't know as I am not familiar with the situation.

Capacity for Sustainable Urban Water Management

Organisational Capabilities

20. Which situation would best describe your organisation in terms of measuring SUWM performance?

Please tick the most appropriate situation

No or very limited measurement and tracking of performance, unless there exist a regulatory obligation.

Limited measurement and tracking of performance. At or most evaluation based on anecdotal evidence; Organisation collects some data on environmental activities and outputs e.g. contents of gross pollutant traps.

Performance partially measured and progress partially tracked against council management key performance indicators; Organisation beginning to collect solid data on SUWM activities and outputs; Some review processes might be in place but not necessary systematically implemented; Reporting measures mainly via newsletters.

Performance measured and progress tracked for SUWM against targets which are derived from the annual management plan; Monitoring is influencing refinement of actions; SUWM related activities are reflected and measured through staff performance plans; An Environmental Management System (EMS) is in place and implemented; Physical outcomes appear in annual report.

Well-developed, comprehensive, integrated system used for continuous measuring of organisation's SUWM performance targets and progress; Monitoring results are improving processes or targets; SUWM related activities are reflected and measured through staff performance plans at all levels; Formal processes such as EMS, ISO 14000 or the Risk Register are being used to monitor and assess SUWM activities; Physical outcomes appear in annual report and management's response to outcomes are indicated.

I don't know as I am not familiar with the situation.

Capacity for Sustainable Urban Water Management

Organisational Capabilities

21. Which situation would best describe your organisation in terms of day-to-day operations for SUWM?

Please tick the most appropriate situation

Organisation runs SUWM operations unintentionally – they occur on a purely day-to-day basis with no short- or long-term planning at strategic or work plan level; No experience in SUWM related operational planning.

Some ability and tendency to develop SUWM operational plan via external assistance (grant funded or temporary position); Operational plan not linked to strategic planning activities and used roughly to guide operations.

Some ability and tendency to develop SUWM operational plan either internally or via external assistance (grant funded or temporary position); Operational plan loosely (or not) linked to strategic planning activities and used roughly to guide operations, but some funds allocated to SUWM.

Ability and tendency to develop and refine concrete, realistic operational plan for SUWM; Some internal expertise (by means of an internal working group) in operational planning for SUWM or access to relevant external assistance; Operational planning carried out on a near regular basis; Operational plan linked to strategic planning activities and used to guide operations.

Organisation develops and refines concrete, realistic, and detailed operational plan; Has critical mass of internal expertise at all levels in operational planning for SUWM related activities, or efficiently uses external, sustainable, highly qualified resources; Operational planning exercise carried out regularly; Operational plan tightly linked to strategic planning activities and systematically used to direct operations.

I don't know as I am not familiar with the situation.

Capacity for Sustainable Urban Water Management

Organisational Capabilities

22. Which situation would best describe your organisation in terms of development and nurturing of external relationships for SUWM?

Please tick the most appropriate situation

Limited development of external SUWM relations; Relationships with other stakeholders for SUWM based on fulfilment of State Government regulatory requirements.

External stakeholder engagement with, for example, regulatory authorities, other councils and community groups is mainly to support internal legitimacy purposes and to advocate for more resources for SUWM. Some individuals within the council might have a meaningful relationship with an external stakeholder for SUWM purposes.

Sophisticated external consultation techniques exist within the council. Some departments manage a growing and established external stakeholder network within the community.

The council collaborates with external parties such as research institutions and large scale environmental non-governmental organisations.

The organisation as a whole collaborates with external parties such as research institutions and large scale environmental non-governmental organisations. This is formalised in agreed partnerships.

I don't know as I am not familiar with the situation.

Capacity for Sustainable Urban Water Management

Organisational Capabilities

23. Which situation would best describe your organisation in terms of council's level of engagement with communities in water management related initiatives?

Please tick the most appropriate situation

Council only fulfils statutory requirements for community consultation i.e. public exhibition.

The council is engaging community through the provision of information which assists in understanding services, problems, alternatives and solutions; Community is informed about what is happening pre, during and post activity; Main engagement methods include public exhibition, web-sites, news releases, fact sheets.

The council (or some sections) have a willingness or interest to engage the community by obtaining feedback on analysis, alternatives and/or decisions; Intention is to keep community informed and to develop a 2-way process of engagement. Council listens to and acknowledges concerns and aspirations; Community has voice but not necessarily power; Main engagement methods include focus groups, surveys, and meetings.

Council (or some sections) have a willingness or interest to engage the community by working directly with them through processes designed to achieve integrated SUWM; Intention is to ensure that community concerns and aspirations are directly reflected in alternatives developed and that the community understand their role in achieving SUWM and feel they are part of the solution; Main engagement methods include envisaging, workshops, and deliberative polling.

Community engagement is recognised as important across all departments and council partners with residents involved in each aspect of decision-making including development of alternatives and choice of the preferred solution; Intention is to look for advice and innovation in formulating solutions by incorporating community's recommendations into final decision making to the maximum extent possible; Community negotiates with traditional power holders, agreeing rules, roles, responsibilities and levels of control; Main engagement methods include commissions, committees, and participatory decision-making.

I don't know as I am not familiar with the situation.

Capacity for Sustainable Urban Water Management

Organisational Capabilities

24. Which situation would best describe your organisation in terms of influencing State SUWM policy making?

Please tick the most appropriate situation

Organisation does not have the ability nor inclination to influence SUWM State policy making.

Organisation does not have the ability to influence State SUWM policy making. Environmental staff proactively attends forums, where experience is shared.

Organisation would like to influence State SUWM policy-making. Some readiness and skill to participate, but rarely invited to substantive policy discussions. Sometimes staff present SUWM experiences at a conference.

Organisation is aware of its ability to influence SUWM State policy-making and is one of several organisations actively involved in policy discussions. Organisation contributes to submissions; Advocacy campaigns have been developed

Organisation pro-actively and re-actively influences SUWM policymaking, in a highly effective manner, always ready for and often called on to participate in substantive policy discussions such as state reviews; Organisation takes lead in submission to State Government on environment and SUWM.

I don't know as I am not familiar with the situation.

Capacity for Sustainable Urban Water Management

Human Resources - Staffing

25. Which situation would best describe your organisation in terms of staff hours, positions and interdisciplinary integration to support SUWM?

Please tick the most appropriate situation

No dedicated staff hours for SUWM responsibilities.

No staff positions for SUWM; SUWM related hours are created on an ad-hoc basis.

Staff positions for SUWM related activities might have been created. Otherwise a certain number of hours are dedicated to SUWM activities within existing positions.

Staff positions related to SUWM have been created; Responsibilities related to SUWM are starting to be shared over multiple sections of organisation.

Staff positions related to SUWM have been created. Staff responsibilities for SUWM vertically and horizontally in organisations.

I don't know as I am not familiar with the situation.

Capacity for Sustainable Urban Water Management

Human Resources - Skills

27. Which situation would best describe your organisation in terms of overall expertise and depth of knowledge of SUWM?

Please tick the most appropriate situation

Overall experience and depth of knowledge on SUWM is low.

Overall experience and depth of knowledge on SUWM is not likely to be high, individual knowledge in regular positions may be high.

Overall experience and depth of knowledge on SUWM is high in specific SUWM position(s), not necessarily at other sections of organisation.

Overall experience and depth of knowledge on SUWM is high within SUWM staff position(s), SUWM person/team has important networking and knowledge brokering skills, which translates in ad-hoc cross-departmental collaboration in terms of SUWM.

Overall experience and depth of knowledge on SUWM is high through different sections and at different levels of the organisation, SUWM person/team provides support to regular inter-disciplinary, cross departmental SUWM related initiatives.

I don't know as I am not familiar with the situation.

Capacity for Sustainable Urban Water Management

Human Resources - Staffing

26. Which situation would best describe your organisation in terms of staff permanency of position and continuity for SUWM?

Please tick the most appropriate situation

Responsibilities for SUWM related activities are fulfilled by a single person within an existing department, SUWM dedicated hours and/or positions are filled; These are generally on a temporary basis, and typically funded by external grants.

Most critical SUWM positions/hours are staffed (no or few vacancies); These are permanent but lack of continuity is experienced.

SUWM position(s) are almost all staffed; Limited turnover problems.

SUWM positions are fully staffed; Few turnover problems.

I don't know as I am not familiar with the situation.

Capacity for Sustainable Urban Water Management

Human Resources - Skills

28. Which situation would best describe your organisation in terms of skills for engaging communities in water management related initiatives?

Please tick the most appropriate situation

Skills for community engagement related to SUWM are not considered necessary.

Skills for information provision around SUWM initiatives exist.

Willingness to engage exists, but not the necessary skills which may result in tokenistic engagement.

Necessary skills to have meaningful engagement exist within council.

Necessary skills to empower the community to participate in decision-making exist.

I don't know as I am not familiar with the situation.

Capacity for Sustainable Urban Water Management

Human Resources - Skills

29. Which situation would best describe your organisation in terms of skills for assessing SUWM development applications?

Please tick the most appropriate situation

Council staff does not have necessary knowledge to deal with SUWM development applications (DA's), DA's are approved (or not) without full understanding.

Council staff are not sure how to handle SUWM in DA's but informally seek advice from other relevant staff and departments within council.

Council staff does not have the necessary knowledge to deal with SUWM DA's. External advice is sought formally and informally on how to deal with the specific DA. External pressure pushes the DA staff to develop formal planning responses e.g. developer lead WSUD application.

Council has a number of SUWM DA's come through and recognises need for standardised knowledge and processes on how to deal with these.

Council has a clear process and knowledge for SUWM DA's.

I don't know as I am not familiar with the situation.

Capacity for Sustainable Urban Water Management

Human Resources - Skills

30. When engaging in SUWM initiatives, what situation would best describe to what degree your organisation is dependent on external skills?

Please tick the most appropriate situation

No or very limited internal skills for SUWM; fully dependent on external skills.

Highly dependent on external skills but starting to think about increasing internal capacity. Staff are increasingly able to have informed engagement with external providers and are able to give direction but still highly dependent on these providers; Staff identifies SUWM needs and dedicates budget for upgrading internal SUWM skills.

Staff skilled to engage, partner and direct external providers; Staff have the ability to question external providers; Still dependent on external skills but are able to complete small projects themselves; Actively invest in learning about cutting edge SUWM.

Collectively, staff have the skills to carry out most projects internally; External providers are used only when there are constraints in resources (time and staff availability); Knowledge partnerships are developed with leading universities and R&D organisations.

I don't know as I am not familiar with the situation.

Capacity for Sustainable Urban Water Management

Human Resources - Skills

31. What situation would best describe to what degree your organisation is developing skills for SUWM?

Please tick the most appropriate situation

No or very limited internal skills development for SUWM

Some limited external ad hoc training opportunities for SUWM related activities are being made available at an individual request.

SUWM related training (in house and external) is available when necessary e.g. MUSIC modelling and WSUD training courses

SUWM related training is available to a wider staff base; in house capacity exists for mentoring and training in MUSIC.

SUWM related training is available to a wider staff base; in house capacity exists for mentoring and training in these new skills. Staff are regularly asked for provision of external training programmes.

I don't know as I am not familiar with the situation.

Capacity for Sustainable Urban Water Management

Human Resources - Skills

32. Which situation would best describe your organisation in terms of SUWM leadership (any champion or network of champions)?

Please tick the most appropriate situation

- No champion for SUWM.
- Individual champion for SUWM internally in organisation with limited influence within the organisation.
- Individual champion or multiple internal champions for SUWM with moderate influence within the organisation.
- Distributed network of champions for SUWM internally with strong influence within the organisation.
- Distributed network of champions for SUWM internally in organisation; in addition this distributed network of champions is also externally recognised as leaders in the field of SUWM.
- I don't know as I am not familiar with the situation.

Capacity for Sustainable Urban Water Management

Organisational Structure

33. Which situation would best describe your organisation in terms of organisational structure for environmental and SUWM management?

Please tick the most appropriate situation

- Organisational design related to environment is neither formalized nor clear; No one (or team) has responsibility for SUWM; Activities related to SUWM if dealt with are allocated to the engineering department or are contracted to an external party.
- An organisational unit or department related to environment is clearly defined; Activities related to SUWM if dealt with are generally dealt with by an individual (engineer, planner, landscape architects, and environment officers) who is part of an established department or has their own department.
- An environment team is well defined within the council; Staff from across the organisation have informally established a project team to address SUWM – this may include engineers, environment officers, landscape architects, urban planners.
- There is a defined lead department that deals with SUWM related issues. However, SUWM related activities are shared across a few different departments.
- SUWM projects are a shared responsibility amongst all departments and environmental issues have the same weight as other issues e.g. engineering (Still one department might have the lead); A diversity of views exists as various actors, representing different levels within the organisation participated in working groups on SUWM.
- I don't know as I am not familiar with the situation.

Capacity for Sustainable Urban Water Management
Systems and Infrastructure

35. Which situation would best describe your organisation in terms of actual SUWM projects and council engagement in SUWM?

Please tick the most appropriate situation

No SUWM projects.

No/new SUWM undertaken by council, but council is increasingly engaged (or required to engage) in response to external grant allocations; Council has responsibility of overseeing consultant; No day-to-day practice.

Council becomes more pro-active and trials a limited set of 'well proven' technologies on the ground; SUWM projects are ad-hoc and seen as demonstration sites.

Council is undertaking SUWM projects on the ground and open to including all types of technologies.

SUWM implementation is an everyday activity within council.

I don't know as I am not familiar with the situation.

Capacity for Sustainable Urban Water Management
Organisational Structure

34. Which situation would best describe your organisation in terms of different departments coordinating and cooperating on SUWM?

Please tick the most appropriate situation

No/limited coordination with other units/departments regarding SUWM.

SUWM is not always considered as a legitimate area of organisational activity; Organisational departments/ units related to SUWM function in silos; little or dysfunctional coordination especially between engineering, environment, parks, urban designers and planning; not clear where roles and responsibilities lay.

SUWM is considered as a legitimate area of organisational activity; However, still tension between different units/departments exist especially engineering, environment and planning and therefore they still often function in silos.

Interactions between different organisational departments such as planning, environment and engineering are generally good, though co-ordination issues in regard to SUWM with other departments exist; All programs and units function together effectively with sharing of information and resources; few coordination issues.

Consistent integration for SUWM between different organisational departments with few coordination issues; relationships are dictated by organisational needs (rather than hierarchy or politics) and an active inter departmental committee dedicated to SUWM activities exists.

I don't know as I am not familiar with the situation.

Capacity for Sustainable Urban Water Management
Systems and Infrastructure

36. Which situation would best describe your organisation in terms of SUWM planning and development?

Please tick the most appropriate situation

Planning for SUWM does not occur and is not supported by any planning documents; SUWM is externally driven. Planning for SUWM happens on an ad hoc basis and is not supported by any key planning documents; Council recognises that SUWM related management controls for new developments are important for minimizing the impact of developments on water quality and quantity; A need for change is recognised but no dedicated staff and skills to SUWM which are able to make a change.

Some strategies and policies are in place that address SUWM, however no statutory requirements are established. These plans include general requirements for appropriate water management from new urban developments in its planning instruments; The plans encourage new developments to incorporate water sensitive urban design.

Development control plans (DCP) for SUWM are developed, which include generic requirements for mitigating the water related impacts of new urban developments and optimises the use of storm or recycled water; DCP requires water sensitive urban design in some new large developments; Training to builders and developers on SUWM related activities is provided regularly; Council regularly evaluates the effectiveness of some of council's new development controls and refinements made as required.

Development control plans (DCP) for SUWM are well understood and implemented; plans include specific requirements for mitigating the water related impacts of new urban developments and optimising the use of storm or recycled water as a resource in its planning instruments; DCP requires water sensitive urban design in all new developments; Active training to builders and developers on SUWM related activities is provided; Council regularly evaluates the effectiveness of some of council's new development controls and refinements made as required. The findings of the evaluations are made available to a range of stakeholders, including the community.

I don't know as I am not familiar with the situation.

Capacity for Sustainable Urban Water Management
Systems and Infrastructure

37. Which situation would best describe your organisation in terms of knowledge management regarding SUWM?

Please tick the most appropriate situation

No formal systems to capture and document internal knowledge related to SUWM; Knowledge about different aspects of SUWM held by individuals or in sole departments.

Systems to capture data exist in a few areas but either not user friendly or not comprehensive enough to have an impact; Systems known by only a few people, or only occasionally used. Generally reporting systems are seen as burdensome because they are not explained well (or endorsed by council) or staff are not skilled in using them. There is no staff allocation for these systems to keep them fresh and useful.

Well-designed, user-friendly systems in some areas and these systems are seen as being necessary; not fully comprehensive; Systems are known by many people within the organisation and often used. Necessary resources (e.g. staff allocations) are made available for some of these systems.

Well-designed, comprehensive systems to capture, document, and disseminate knowledge internally in all relevant areas; All staff are aware of systems, knowledgeable in their use, and make frequent use of them; Links are made between some existing 'systems' (such as asset management, data management, property information GIS, resources, etc) and SUWM. An example could be a link between GIS and SUWM co-management.

System is regularly managed, updated & kept current and used for monitoring and reporting processes; It is clear how all the processes support and affect each other (e.g. recording community flooding complaints and SUWM solutions); Part of the system might be public such as case studies on council website to educate/inform community and other interested parties.

I don't know as I am not familiar with the situation.

Capacity for Sustainable Urban Water Management
Systems and Infrastructure

38. Which situation would best describe your organisation in terms of actual SUWM projects on the ground, driven and implemented by council and funded from the capital work program?

Please tick the most appropriate situation

No on ground projects.

Few projects on ground, these are small scale examples.

Few small scale examples and starting to consider/plan large scale SUWM projects; WSUD is beginning to be considered as a standard element of capital works.

A few major projects being implemented; Projects across different land tenures (not scale, precinct, regional catchment) start emerging; WSUD is considered standard for most capital works.

Range of projects implemented across many land tenures; WSUD is considered standard for all capital works.

I don't know as I am not familiar with the situation.

Capacity for Sustainable Urban Water Management
Systems and Infrastructure

39. Which situation would best describe your organisation in terms of internal funding for SUWM operation and maintenance (O&M)?

Please tick the most appropriate situation

No SUWM projects, so no funding required.

SUWM projects funded by grants with no allowance internally for O&M; No agreement internally as to which department should be funding O&M.

Ad hoc SUWM demonstration projects, funded by grants and council surplus with short term funding provision for O&M; O&M is likely to be contracted out.

SUWM projects regularly occur. Funding has increased for O&M and O&M is being managed by internal and external providers.

All O&M is included in project design and budget preparation; Full, resourced in house maintenance team to cover all aspects of SUWM asset management and maintenance with realistic budgets.

I don't know as I am not familiar with the situation.

Capacity for Sustainable Urban Water Management

Systems and Infrastructure

40. Which situation would best describe your organisation in terms of the extent of operation and maintenance undertaken as required ensuring the intent of the delivered projects?

Please tick the most appropriate situation

No SUWM projects implemented.

O&M carried out on an ad-hoc basis for demonstration of SUWM. Some data recorded but inconsistent capture and no reporting.

O&M service agreement established but not well monitored. Data capture is consistent but not reported.

O&M staff involved in design. O&M service agreements in place, well resourced and understood. Some community capacity established to participate in O&M. Data is captured consistently and used to inform performance indicators.

O&M practices are part of SUWM process and O&M is identified early in program design and development. Data capture is documented consistently and reported. Data is reviewed regularly to inform programs as part of a continuous improvement process. Considerable community capacity and activity to participate in O&M of SUWM.

I don't know as I am not familiar with the situation.

B.2 Managing Urban Water – Now and in Future

Managing Urban Water – Now and in Future
1. Explanatory Statement

My name is Rebekah Brown, an associate professor, in the School of Geography and Environmental Science at Monash University and the Program Leader of the National Urban Water Governance Research Program (www.urbanwatergovernance.com). As part of the program's research, PhD student Annette Bos will be investigating the characteristics and processes of past and current efforts to translate the concept of sustainable urban water management into actual practice. The information obtained in the research will be used to advance the design of current and future sustainable urban water management projects.

We are requesting your participation in a voluntary and anonymous questionnaire, which is expected to take approximately 30 minutes to complete.

The data you provide may be available to the other researchers referred to above, but your name and identity will not be revealed in any way. The survey results will be securely stored by the researchers and available to no other persons, unless the researchers give permission. In accordance with Monash University policy, the transcripts will be destroyed in 5 years.

Monash University's Ethics Committee has approved this research project (reference 2009000429). Should you have any complaints concerning the manner in which this research is conducted, please do not hesitate to contact the Monash University Standing Committee on Ethics in Research Involving Humans (SCERH) at the following:

The Secretary
The Standing Committee on Ethics in Research Involving Humans (SCERH)
Building 3e, Room 111
Research Office
Monash University Victoria 3800
Tel: [REDACTED] Fax: [REDACTED]
Email: [REDACTED]

If you require more information about the project or should you request a summary of the results of this research project, you can contact the researchers (contact details below).

Thank you for your time. Your input into this research is very much appreciated.

Associate Professor Rebekah Brown

Managing Urban Water – Now and in Future
1. Introduction

Thank you in advance for participating in this survey.

The following survey is being undertaken as part of an organisational assessment on (sustainable) urban water management and PhD research within the context of the OurRiver - Cocks River Sustainability Initiative. The OurRiver project trials an innovative model of collaborative urban water management and your council is one of the project partners.

This questionnaire should take around 25 minutes to complete. If you get interrupted, you can close this questionnaire (click 'exit survey' at top right) and complete it later by re-clicking on the link. When you re-open it, you will be able to pick up from where you left off.

This questionnaire is anonymous and has been approved by Monash University's research ethics committee (for detailed information on how your confidentiality will be maintained, please read the Explanatory Statement below). Before commencing this questionnaire, it is a Monash University requirement that you read the following 'Explanatory Statement' for this research project. Once you have read the statement, and you agree, please tick the box at the bottom of the page to commence the survey.

Once again, thank you for your assistance.

Yours Sincerely,
Annette Bos and AProfessor Rebekah Brown

Managing Urban Water – Now and in Future
 School of Geography and Environmental Science
 Monash University
 PO Box 11A
 Clayton Campus
 Victoria 3800
 Ph: [REDACTED]
 Email: [REDACTED]

Ms Annette Bos
 Ph: [REDACTED]
 Mb: [REDACTED]
 Email: [REDACTED]

Yes, I have read and agree to the information in the Explanatory Statement for this research.
 No, I do not agree

Managing Urban Water – Now and in Future
 2. Information about you

This section aims to gain broad trends around the range of survey participants. This information is not for the purpose of identifying individuals and remains anonymous.

2. Which council do you work for?
 Ashfield
 Bankstown
 Canterbury
 City of Sydney
 Hurstville
 Marrickville
 Rockdale
 Strathfield

3. What is the department or division in which you work?

4. At what level are you positioned within your organisation's hierarchy?
 Executive
 Senior
 Middle manager or supervisor
 Officer (no management responsibility)

Managing Urban Water – Now and in Future

7. What is your PRIMARY professional training/qualification (i.e. the qualification you draw upon most to do your work)?

Planning
 Policy
 Engineering
 Natural Resource Management
 Social Science
 Humanities
 Science (environmental, biological, physical, health etc)
 Education
 Law
 Management
 Business / Economics
 Marketing / Communications
 Urban Design / Architecture / Landscape Architecture
 I do not have professional training/qualifications

8. In which area of water management do you primarily work in? (More than one response possible)

Water supply
 Sewage
 Drainage
 Stormwater quality / waterway health
 Stormwater harvesting
 Development Control
 Flood management
 Park and garden irrigation
 Total Water Cycle Management
 My work is not directly related to water management
 Other (please specify)

9. What is your gender?

Male
 Female

Managing Urban Water – Now and in Future

5. Broadly, what is the main type of work that you do?

Elected official (i.e. politician)
 Strategy / Policy
 Planning
 Design
 Construction
 Maintenance & Operations
 Regulation / Auditing
 Research / Science
 Education / Marketing / Communications
 Landscape Architecture
 Sustainability/Environment
 Other (please specify)

6. What is your highest qualification?

Doctorate
 Masters
 Bachelor
 Technical Training
 Other (please specify)

Managing Urban Water – Now and in Future

10. What is your age group?

20 or under
 21 – 30
 31 – 40
 41 – 50
 51 – 60
 61 or over

11. How long have you been working in your current profession (e.g. since graduating or joining the industry)?

0-1 year
 2-5 years
 6-10 years
 11-15 years
 16-20 years
 20+ years

12. How long have you been working in your current position?

0-1 year
 2-5 years
 6-10 years
 11-15 years
 16-20 years
 20+ years

13. How long have you been working for this council?

0-1 year
 2-5 years
 6-10 years
 11-15 years
 16-20 years
 20+ years

Managing Urban Water – Now and in Future

14. How long have you been working in Local Government?

0-1 year
 2-5 years
 6-10 years
 11-15 years
 16-20 years
 20+ years

Managing Urban Water – Now and in Future

16. In your opinion, which of the tasks and activities regarding urban water management below have expanded in YOUR organisation over the past 5 years? (Select a maximum 3 tasks or activities)

- Water quality improvement
- Water quantity management
- Waterway health improvement
- Water conservation
- Ecological restoration
- Stormwater recycling
- Wastewater recycling
- Water amenity improvement
- Safety against flooding
- Urban water planning
- Integration of total water cycle
- Community engagement
- Land use planning
- Urban design
- Asset management
- Biodiversity
- Catchment management
- Pollution control
- Water art
- I don't know
- None of the above tasks or activities has expanded in my organisation
- Other (please specify)

Managing Urban Water – Now and in Future

3. Urban Water Management

In this section, we ask for YOUR views on priorities and changes in current urban water management.

15. Please give us your personal opinion on a scale of 1 (totally disagree) to 7 (totally agree) about the following statements?

	Totally Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree	Totally Agree
In situations where there are close calls between economic development and protecting the environment, it is more important to protect economic development.	<input type="radio"/>					
People worry too much about human progress harming the environment.	<input type="radio"/>					
Urban water management should be primarily based on technical judgement.	<input type="radio"/>					
Water should be managed by government on behalf of communities.	<input type="radio"/>					
Councils have a duty to protect the health of the waterways.	<input type="radio"/>					
Councils have a responsibility to protect life and property from flooding and contaminated water.	<input type="radio"/>					
Government should regulate and control risk related to urban water management.	<input type="radio"/>					

Managing Urban Water – Now and in Future

17. What do YOU think are the highest priority technical issues to be addressed related to urban water management within your council? (Select maximum two issues)

- Waterway health / Ecological conditions
- Aging urban drainage infrastructure
- Sewer overflows
- Effects of climate change
- Lack of roof top rainwater harvesting
- Lack of stormwater harvesting
- Flooding
- Water shortages and droughts
- Diffuse pollution within catchment
- Point source pollution
- Lack of recycling sewage
- High consumption of water
- Total water cycle management
- I don't know
- Other (please specify)

Managing Urban Water – Now and in Future

4. Defining Sustainable Urban Water Management (SUWM)

Sustainable Urban Water Management (SUWM) aims at holistic management of water streams (water supply, wastewater, and stormwater) while minimising the import of large quantities of potable water into cities and minimising discharge of wastewater and stormwater to urban waterways.

1) This integrated approach is linked to the well-being of the catchments and receiving water environments (including surface and sub-surfaces) and human populations.

2) It involves making the most appropriate use of water from all stages of the water cycle to deliver social, ecological and economic sustainability at a variety of scales.

3) It considers the local context in terms of environmental, physical, social, cultural and economic perspectives.

4) It includes all stakeholders in planning and decision-making processes.

It is important to note that the questionnaire adopts 'sustainable urban water management' as a broad umbrella term to encompass the diverse language used across the urban water sector to describe more sustainable practices (for example, 'total water cycle management', 'water sensitive urban design', 'integrated urban water management' and 'integrated land and water management').

18. I rate my understanding of Sustainable Urban Water Management as:

- No understanding
- Little understanding
- Modest understanding
- Significant understanding
- Full understanding

Managing Urban Water – Now and in Future
 6. Sustainable Urban Water Management - Integration

21. In your opinion, how important is it at present to YOUR organisation to pursue integration in the following areas of urban water management?

	Totally unimportant	Very unimportant	Slightly unimportant	Neutral	Slightly important	Very important	Totally important
Integrating management of the three urban water streams of potable water, wastewater and stormwater.	<input type="radio"/>						
Integrating the scale of urban water management from individual allotments and buildings, to precincts and regions.	<input type="radio"/>						
Integration of water conservation measures into the built form, incorporating building architecture, landscape architecture and public art.	<input type="radio"/>						
Integration of stormwater quality measures into the built form, incorporating building architecture, landscape architecture and public art.	<input type="radio"/>						
Integration of structural (eg implementation/operations) and non-structural (eg police/songong budgets) measures.	<input type="radio"/>						

22. How do YOU rate the importance to pursue integration in the following areas of urban water management?

	Totally unimportant	Very unimportant	Slightly unimportant	Neutral	Slightly important	Very important	Totally important
Integrating management of the three urban water streams of potable water, wastewater and stormwater.	<input type="radio"/>						
Integrating the scale of urban water management from individual allotments and buildings, to precincts and regions.	<input type="radio"/>						
Integration of water conservation measures into the built form, incorporating building architecture, landscape architecture and public art.	<input type="radio"/>						
Integration of stormwater quality improvement and flow control measures into the built form, incorporating building architecture, landscape architecture and public art.	<input type="radio"/>						
Integration of structural (eg implementation/operations) and non-structural (eg police/songong budgets) measures.	<input type="radio"/>						

Managing Urban Water – Now and in Future
 5. Sustainable Urban Water Management

In this section, we ask for YOUR views on the importance of advancing a range of measures for water conservation & aquatic ecosystems.

19. In your opinion, how important is it at present to YOUR organisation to pursue the following measures for Water Conservation and Aquatic Ecosystem Protection?

	Totally unimportant	Very unimportant	Slightly unimportant	Neutral	Slightly important	Very important	Totally important
Demand management	<input type="radio"/>						
Rainwater (harvested from building rooftops)	<input type="radio"/>						
Stormwater (harvested from overland urban land)	<input type="radio"/>						
Greywater/blackwater reuse	<input type="radio"/>						
Landscape amenity	<input type="radio"/>						
Peak flow reduction	<input type="radio"/>						
Stormwater quality improvement	<input type="radio"/>						
Preserving hydrologic characteristics	<input type="radio"/>						
Infiltration/inflow reduction	<input type="radio"/>						

20. How do YOU rate the importance of pursuing the following measures for Water Conservation and Aquatic Ecosystem Protection?

	Totally unimportant	Very unimportant	Slightly unimportant	Neutral	Slightly important	Very important	Totally important
Demand management	<input type="radio"/>						
Rainwater (harvested from building rooftops)	<input type="radio"/>						
Stormwater (harvested from overland urban land)	<input type="radio"/>						
Greywater/blackwater reuse	<input type="radio"/>						
Landscape amenity	<input type="radio"/>						
Peak flow reduction	<input type="radio"/>						
Stormwater quality improvement	<input type="radio"/>						
Preserving hydrologic characteristics	<input type="radio"/>						
Infiltration/inflow reduction	<input type="radio"/>						

Managing Urban Water – Now and in Future

7. Sustainable Urban Water Management - Technologies & Infrastructure

23. Do you think the following technologies and/or infrastructure are proven to work in practice?

The terminology is described below the response options.

	Totally Disagree	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree	Totally Agree	I don't know
New dams	<input type="radio"/>							
On-site greywater systems	<input type="radio"/>							
Sewer Mining (tapping into a sewer and extracting sewage)	<input type="radio"/>							
Indirect potable reuse schemes (for recycled wastewater)*	<input type="radio"/>							
Direct potable reuse schemes (for recycled wastewater)**	<input type="radio"/>							
Sewer Desalination plants	<input type="radio"/>							
Stormwater quality treatment systems (for protecting receiving waterways i.e. wetlands and bio-retention systems)	<input type="radio"/>							
Stormwater harvesting at neighbourhood scale (i.e. road harvesting)	<input type="radio"/>							
Rainwater tanks	<input type="radio"/>							

***Indirect potable reuse** in this context is where purified recycled water is pumped into an underground aquifer or a dam. It then mixes with the water that is already there and the mixed water is pumped out and treated for the potable drinking water supply.

****Direct potable reuse** in this context is where purified recycled water is added directly to the potable or drinking water supply.

Managing Urban Water – Now and in Future

24. In your opinion, for which of the following development contexts should the listed technologies be utilised? (Please note that one or more than one context can be selected).

The terminology is described below the response options.

	Urban Retrofitting*	Urban Renewal**	Greenfield Development***	I don't know
New dams	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
On-site greywater systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sewer Mining (tapping into a sewer and extracting sewage)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Indirect potable reuse schemes (for recycled wastewater)*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Direct potable reuse schemes (for recycled wastewater)**	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sewer Desalination plants	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stormwater quality treatment systems (for protecting receiving waterways i.e. wetlands and bio-retention systems)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stormwater harvesting at neighbourhood scale (road and street-scope harvesting)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rainwater tanks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

***Urban retrofitting** in this context is when purified recycled water is added directly to the potable or drinking water supply.

****Direct potable reuse** in this context is where purified recycled water is pumped into an underground aquifer or a dam. It then mixes with the water that is already there and the mixed water is pumped out and treated for the potable drinking water supply.

***Urban retrofitting** is defined as the installation of infrastructure into the existing urban fabric, without significantly altering the appearance or location of other infrastructure and urban form. This could potentially be done at any time.

****Urban renewal** is defined as the installation of infrastructure in accordance with urban renewal cycles (typically 50 to 150 years). The location and form of the infrastructure may be significantly altered and larger areas are allowed compared to retrofitting.

*****Greenfield development** is defined as the development of land previously not used for urban functions/development. This could occur at any time and at a variety of scales.

Managing Urban Water – Now and in Future
 9. Sustainable Urban Water Management – Institutional Arrangements

26. In YOUR opinion, how EFFECTIVE are the existing INSTITUTIONAL ARRANGEMENTS across your service area for enabling the following practices?

	Totally ineffective	Very ineffective	Slightly ineffective	Neutral	Slightly effective	Very effective	Totally effective	I don't know
Stormwater Quality Management (for protecting receiving waterways).	<input type="radio"/>							
Delivering and managing an interconnected mix of centralised, through to decentralised water supply technologies.	<input type="radio"/>							
Demand management for reducing water consumption.	<input type="radio"/>							
Engaging with communities for sustainable urban water outcomes.	<input type="radio"/>							
Engaging with the private sector for sustainable urban water outcomes.	<input type="radio"/>							
Multi-stakeholder collaboration for improved urban water outcomes.	<input type="radio"/>							
Building human resource knowledge and skills for sustainable urban water outcomes.	<input type="radio"/>							
Overall Sustainable Urban Water Management.	<input type="radio"/>							

Managing Urban Water – Now and in Future
 8. Sustainable Urban Water Management – Owning and Managing Water Systems

25. Please select which of the following STAKEHOLDER GROUPS you believe would be effective MANAGERS of the following technologies into the future. (You can select more than one option).

	Local Gov. State Gov.	Federal Gov.	Water Utilities/Entities	Body corporate organisations	Private enterprise	Homeowners	Community groups	Community (don't know)
Rainwater tanks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Onsite greywater systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Neighbourhood scale stormwater harvesting technologies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Possible Reuse Schemes for Recycled Wastewater (direct and indirect)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stenwater desalination plants	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stormwater quality treatment technologies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Managing Urban Water – Now and in Future

10. Sustainable Urban Water Management - Your Organisation

27. Which group/department within your organisation is leading or driving SUMM related activities?

- Corporate Services
- Engineering
- Environmental Services
- Operations/Maintenance
- Parks and Recreation
- Planning and Development
- Strategic Planning
- Sustainable Development
- Community
- Other (please specify) _____

28. Which other group(s)/department(s) are involved in undertaking SUMM related activities?

- Corporate Services
- Engineering
- Environmental Services
- Operations/Maintenance
- Parks and Recreation
- Planning and Development
- Strategic Planning
- Sustainable Development
- None
- Other (please specify) _____

Managing Urban Water – Now and in Future

29. In your opinion, how effective is the engagement between your department and the following group/department? (Please leave blank if there is no engagement or when it indicates your own department)

	Totally ineffective	Very ineffective	Slightly ineffective	Neutral	Slightly effective	Very effective	Totally effective
Corporate Services	<input type="radio"/>						
Engineering	<input type="radio"/>						
Environmental Services	<input type="radio"/>						
Operations/Maintenance	<input type="radio"/>						
Parks and Recreation	<input type="radio"/>						
Planning and Development	<input type="radio"/>						
Strategic Planning	<input type="radio"/>						
Sustainable Development	<input type="radio"/>						
Other (please specify) _____	<input type="radio"/>						

Managing Urban Water – Now and in Future

30. How often are you engaging with the following stakeholder groups regarding SUWM related activities?

	Never	Yearly	6 monthly	Quarterly	Monthly	Weekly	Daily
The general community	<input type="radio"/>						
Politicians	<input type="radio"/>						
Developers	<input type="radio"/>						
Consultants	<input type="radio"/>						
Sydney Water	<input type="radio"/>						
Academics	<input type="radio"/>						
Other local councils	<input type="radio"/>						
Environmental NGOs	<input type="radio"/>						
Media	<input type="radio"/>						
Sydney Metropolitan Catchment Management Authority	<input type="radio"/>						
Housing NSW	<input type="radio"/>						
Landcom	<input type="radio"/>						
Department of Conservation and Climate Change	<input type="radio"/>						
NSW Department of Planning	<input type="radio"/>						
NSW Department of Water and Energy	<input type="radio"/>						
NSW Maritime	<input type="radio"/>						
NSW National Parks and Wildlife Service	<input type="radio"/>						
Railcorp	<input type="radio"/>						
Roads and Traffic Authority	<input type="radio"/>						
Other (please specify)	<input type="radio"/>						

Managing Urban Water – Now and in Future

31. In your opinion, how effective is the engagement related to SUWM (indicated above) with the following stakeholders groups at present? Please leave blank, if there is no engagement

	Totally ineffective	Very ineffective	Slightly ineffective	Neutral	Slightly effective	Very effective	Totally effective
The general community	<input type="radio"/>						
Politicians	<input type="radio"/>						
Developers	<input type="radio"/>						
Consultants	<input type="radio"/>						
Sydney Water	<input type="radio"/>						
Academics	<input type="radio"/>						
Other local councils	<input type="radio"/>						
Environmental NGOs	<input type="radio"/>						
Media	<input type="radio"/>						
Sydney Metropolitan Catchment Management Authority	<input type="radio"/>						
Housing NSW	<input type="radio"/>						
Landcom	<input type="radio"/>						
Department of Conservation and Climate Change	<input type="radio"/>						
NSW Department of Planning	<input type="radio"/>						
NSW Department of Water and Energy	<input type="radio"/>						
NSW Maritime	<input type="radio"/>						
NSW National Parks and Wildlife Service	<input type="radio"/>						
Railcorp	<input type="radio"/>						
Roads and Traffic Authority	<input type="radio"/>						
Other (please specify)	<input type="radio"/>						

Managing Urban Water – Now and in Future

11. Sustainable Urban Water Management – general questions

32. In your opinion how has the concept of sustainable urban water management evolved over the last 20 years?

33. Do you consider any person/people as frontrunners or innovators in the field of sustainable urban water management?

No Yes

If yes, who you answer who you see as frontrunners/innovators/impersons in the field of SUWM?

34. What are the constraining factors stopping your organisation to implement sustainable urban water management? (Select maximum 3 factors)

Community Perception
 Capital Cost
 Maintenance Cost
 Technical Feasibility & Performance
 Professional Knowledge & Expertise
 Lack of cooperation between departments
 Current Federal Government Policy
 Current State Government Policy
 Current Council Policy
 Management Arrangements & Responsibilities
 Mayor/Councillor commitment
 Senior Executive commitment
 Shared beliefs and values within organisation regarding SUWM
 Regulation & Approval Processes
 Current Property Access Rights
 Environmental Outcomes
 Public Health Outcomes
 Other (please specify)

Managing Urban Water – Now and in Future

35. What are the factors that could make (or makes) sustainable urban water management happen within your organisation? (Select maximum 3 factors)

Community Perception
 Capital Cost
 Maintenance Cost
 Technical Feasibility & Performance
 Professional Knowledge & Expertise
 Lack of cooperation between departments
 Current Federal Government Policy
 Current State Government Policy
 Current Council Policy
 Management Arrangements & Responsibilities
 Mayor/Councillor commitment
 Senior Executive commitment
 Shared beliefs and values within organisation regarding SUWM
 Regulation & Approval Processes
 Current Property Access Rights
 Environmental Outcomes
 Public Health Outcomes
 Other (please specify)

36. In your opinion, does your work contribute to sustainable urban water management?

Yes
 No
 Sometimes
 I am not sure

Managing Urban Water – Now and in Future

13. Waterway Health - Stormwater Treatment

38. Please indicate to what extent the following strategies for stormwater treatment are being implemented by your council.

	No extent	Little extent	Moderate extent	High extent	Full extent	I don't know
The council has a comprehensive program for installing appropriate stormwater treatment measures to reduce stormwater pollution through systems such as swales and raingardens.	<input type="radio"/>					
The council selects stormwater treatment measures based on minimizing impacts from specific pollutants on local receiving environments, including bushland.	<input type="radio"/>					
The council ensures stormwater is treated to the maximum extent feasible and practical across all urban areas to minimise impacts on environmental values of waterways and bushland.	<input type="radio"/>					
The council ensures that any incidental environmental impacts from stormwater treatment measures are minimised to ensure they result in a net environmental benefit.	<input type="radio"/>					
The council regularly evaluates the effectiveness of all stormwater treatment measures and refinements made as required.	<input type="radio"/>					

Managing Urban Water – Now and in Future

12. Waterway Health - Stormwater Pollution Prevention

The following questions aim to draw out information on the development of particular strategies aimed to improve waterway health.

37. Please indicate to what extent the following strategies for stormwater pollution prevention are being implemented by your council.

	No extent	Little extent	Moderate extent	High extent	Full extent	I don't know
The council has an ongoing community education program for stormwater pollution prevention.	<input type="radio"/>					
The council has an ongoing program in place that audits commercial and industrial premises, focusing on premises with the highest risk of creating stormwater pollution, with associated regulatory action.	<input type="radio"/>					
Council's field operations (parks and gardens, road construction, waste management) are inspected by council staff or contractors in a way that minimises pollution.	<input type="radio"/>					
The council has a comprehensive spill response system in place with suitable equipment & staff.	<input type="radio"/>					
The council has optimised street sweeping programs to target litter 'hotspots'.	<input type="radio"/>					
The council has a comprehensive program in place that monitors stormwater environmental impacts.	<input type="radio"/>					
The council regularly evaluates the effectiveness of all stormwater pollution prevention programs and refinements made as required.	<input type="radio"/>					

Managing Urban Water – Now and in Future

15. Waterway Health - Rainwater and Stormwater

40. Please indicate to what extent the following strategies for rainwater and stormwater are being implemented by your council.

	No extent	Little extent	Moderate extent	High extent	Full extent	I don't know
The council has developed a comprehensive program of rainwater and stormwater harvesting.	<input type="radio"/>					
The council has installed rainwater tanks on all council owned buildings, where this is feasible.	<input type="radio"/>					
The council has widespread stormwater harvesting schemes in place, where rainwater is used to irrigate public open space and for other appropriate uses.	<input type="radio"/>					
The effectiveness of all rainwater and stormwater harvesting schemes are regularly evaluated by the council and refinements made as required.	<input type="radio"/>					

Managing Urban Water – Now and in Future

14. Waterway Health - Stormwater Flow Management

39. Please indicate to what extent the following strategies for stormwater flow management are being implemented by your council.

	No extent	Little extent	Moderate extent	High extent	Full extent	I don't know
The council has implemented a comprehensive flood mitigation program that has mitigated the impacts of flooding on public safety and properties to acceptable levels.	<input type="radio"/>					
The council has arranged active community participation in the preparation of their flood mitigation program.	<input type="radio"/>					
The council has a comprehensive program in place for installing stormwater controls to minimise the impact of stormwater on stream erosion and aquatic ecosystem health.	<input type="radio"/>					
The council regularly evaluates the effectiveness of all stormwater flow controls and refinements made as required. The findings of these evaluations are made available to the local community.	<input type="radio"/>					

Managing Urban Water – Now and in Future

17. Waterway Health - Operations and Maintenance

42. Please indicate to what extent the following strategies for operations and maintenance are being implemented by your council.

	No extent	Little extent	Moderate extent	High extent	Full extent	I don't know
The council has prepared and implemented operations and maintenance plans for all stormwater management controls.	<input type="radio"/>					
The council has a program for the optimal beneficial reuse of waste materials removed from stormwater treatment measures.	<input type="radio"/>					
The council has a register of all stormwater management measures on private land and has a strategy to ensure they are maintained in accordance with their operations and maintenance plan.	<input type="radio"/>					
The council operates all rainwater and stormwater harvesting schemes in accordance with their operations and maintenance plan. This includes appropriate water quality monitoring.	<input type="radio"/>					
The council regularly evaluates the effectiveness of all operations and maintenance activities and refinements made as required (including revisions to operations and maintenance plans).	<input type="radio"/>					

43. Please indicate:

	No extent	Little extent	Moderate extent	High extent	Full extent	I don't know
To what extent are the above strategies for waterway health developed with active community participation?	<input type="radio"/>					
To what extent are strategies that evaluate/measure schemes made available to the local community?	<input type="radio"/>					

Managing Urban Water – Now and in Future

16. Waterway health - Restoring Degraded Ecosystems

41. Please indicate to what extent the following strategies for restoring degraded ecosystems are being implemented by your council.

	No extent	Little extent	Moderate extent	High extent	Full extent	I don't know
The council has identified all riparian zones in their planning instruments for protection from development.	<input type="radio"/>					
The council restored all degraded waterways to the maximum extent practical.	<input type="radio"/>					
The council has ensured that riparian zones form a valuable part of terrestrial environments.	<input type="radio"/>					
The council addressed the cause of waterway degradation prior to starting all waterway restoration projects.	<input type="radio"/>					
The council has ensured that urban stormwater has no negative impacts on urban bushland.	<input type="radio"/>					

Managing Urban Water – Now and in Future
 19. OurRiver – Cooks River Sustainability Initiative

45. To what extent are the goals of the CRSI project clear to you?

Totally unclear
 Very much unclear
 Somewhat unclear
 Neutral
 Somewhat clear
 Very much clear
 Totally clear

46. Do you regard CRSI as an innovative project?

No
 Yes

Why or why not?

47. In your opinion, what is the most challenging aspect of the CRSI project?

48. Any other comments regarding CRSI?

Managing Urban Water – Now and in Future
 18. OurRiver – Cooks River Sustainability Initiative

The Cooks River Sustainability Initiative is a partnership between Ashfield, Bankstown, Canterbury, City of Sydney, Hurstville, Marrickville, Rockdale, Strathfield Councils, the Cooks River Foreshores Working Group and Monash University. The project vision is to establish the Cooks River Catchment as a leading model of collaborative urban water management. It will show how communities and councils, jointly working in varied and highly urbanised contexts, can improve the quality of their social and water environments.

44. To what extent do you know about the Cooks River Sustainability Initiative (CRSI)?

No knowledge
 Some knowledge
 Moderate knowledge
 Significant knowledge
 Full knowledge

Managing Urban Water – Now and in Future

20. Any other comments?

49. If you want to add to any of your responses or make any further comments, please do so here.

50. The last question is council specific. Therefore, we need you to again indicate which council you work for. Thank you!

- Ashfield
- Bankstown
- Canterbury
- City of Sydney
- Hurstville
- Maitland
- Rockdale
- Strathfield

Managing Urban Water – Now and in Future

21. Thank You and Prize Draw

Thank you very much for your time in completing the survey.

You now have the option to enter our competition prize draw, where you could win a Gift Voucher, offered by the OurRiver project.

[Click Here](#) to enter your contact details to be eligible. The winner will be notified by e-mail.

*Please note that your survey responses remain anonymous with entering this competition.

If you would like to find out more information about this research, please contact:

Annette Bos
National Urban Water Governance Program
Monash University
Phone: [REDACTED]
Mobile: [REDACTED]
Email: [REDACTED]

Managing Urban Water – Now and in Future

22. Thank you!

Thank you very much for your time in completing the survey.

If you would like to find out more information about this research, please contact:

Annette Bos
National Urban Water Governance Program
Monash University
Phone: [REDACTED]
Mobile: [REDACTED]
Email: [REDACTED]

**B.3 Urban Water Management - End-of-Experiment
(Municipal Staff)**

Urban Water Management - XXX Council

1. Introduction

XXX has taken part in a number of initiatives aimed at improving how Council manages water in order to ensure that our community has adequate water supply, is protected from flooding, and that nearby waterways are healthy environments. Council staff have spent considerable time and resources taking part in these initiatives.

This survey is designed to measure how Council has been influenced by these initiatives and what parts of these initiatives you see as most useful. Your time completing this survey will help Council understand the value of such initiatives and will inform future water initiatives of the Council. The survey data also informs a PhD research project that is being undertaken in the context of the OurRiver-Cooks River Sustainability Initiative project.

This questionnaire should take approximately 15 minutes to complete.

Before commencing this questionnaire, it is a Monash University requirement that you read the 'Explanatory Statement' for this research. Please read the statement below and then answer the question.

Urban Water Management - XXX Council

1. Explanatory Statement

Dear Colleague,

This survey is part of a research project which investigates the characteristics and processes of past and current efforts to translate the concept of sustainable urban water management into actual practice. The information obtained in the research will be used to advance the design of current and future sustainable urban water management projects.

We are requesting your participation in a confidential and voluntary questionnaire, which is expected to take approximately 15 minutes to complete.

The survey results will be securely stored by the researchers and used for research and evaluation purposes only. In accordance with Monash University policy, the results will be destroyed in 5 years.

Monash University's Ethics Committee has approved this research project (reference 2009000429). Should you have any complaints concerning the manner in which this research is conducted, please do not hesitate to contact the Monash University Standing Committee on Ethics in Research Involving Humans (SCERH) at the following:

The Secretary
 The Standing Committee on Ethics in Research Involving
 Humans (SCERH)
 Tel: 03 9905 5490 Fax: 03 9905 1420
 Email: scerh@monash.edu

If you require more information about the project or should you request a summary of the results of this research project, you can contact the researchers (contact details below).

Thank you for your time. Your input into this research is very much appreciated.

Professor Rebekah Brown
 School of Geography and Environmental Science
 Monash University
 Ph [Redacted]
 Email [Redacted]

Urban Water Management - XXX Council

2. Information about You

This section asks questions that will help us gain broad trends around the range of survey participants. This information is not for the purpose of identifying individuals and remains anonymous.

2. What is your PRIMARY professional training/qualification (i.e. the qualification you draw upon most to do your work)?

- Planning
- Strategy / Policy
- Engineering
- Construction
- Natural resource management / Environmental science
- Social science
- Education
- Management
- Business / Economics
- Marketing / Communications
- Urban design / Architecture / Landscape architecture
- I do not have professional training/qualifications
- Other (please specify)

3. How long have you been working for this council?

- <1 year
- 1 - 2 years
- 3 - 5 years
- 6 - 10 years
- 11 - 15 years
- >15 years

4. At what level are you positioned within your organisation's hierarchy?

- Executive
- Manager
- Team leader or Senior Officer
- Officer

Urban Water Management - XXX Council

Ms Annette Bos

Ph:

Email:

Yes, I have read and agree to the information in the Explanatory Statement for this research.

No, I do not agree to the information in the Explanatory Statement for this research.

Urban Water Management - XXX Council

6. In your opinion, to what extent do you and your colleagues believe in the importance of SUWM?

No one within the organisation really believes SUWM is important
 Only me
 A few in my department
 All in a certain department
 Individuals scattered over a number of departments
 SUWM is integrated among staff and management throughout the organisation
 Other (please explain)

7. Please give us YOUR opinion on a scale of 5 (ranging from strongly disagree to strongly agree) about the following statements in relation to your experience at Council OVER THE LAST THREE YEARS.....

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	I don't know
My own skills and ability to implement SUWM have increased	<input type="radio"/>					
Senior executive commitment to SUWM has increased	<input type="radio"/>					
Overall staff commitment for SUWM has increased	<input type="radio"/>					
Planning / strategy to implement SUWM has been developed (e.g., DA for WSUD developed)	<input type="radio"/>					
Clear targets for water efficiency and/or water quality have been developed	<input type="radio"/>					
Grant funding toward implementing SUWM on-ground works has increased	<input type="radio"/>					
Internal Council funding towards developing SUWM on-ground works has increased	<input type="radio"/>					
Council has increasingly engaged its community in urban water planning.	<input type="radio"/>					
Different disciplines have become more actively engaged in urban water management	<input type="radio"/>					
Internal knowledge / expertise for SUWM has increased	<input type="radio"/>					
The use of SUWM related tools (e.g., MUSIC models, planning and design guidelines) has increased	<input type="radio"/>					
Council has become less dependent on external skills in order to implement SUWM	<input type="radio"/>					

Urban Water Management - XXX Council

3. Sustainable Urban Water Management

Defining Sustainable Urban Water Management: Sustainable Urban Water Management is an integrated way to manage water (water supply, wastewater, and stormwater) that is sensitive to the well-being of the catchment, receiving water environments and human populations.

Sustainable Urban Water Management (SUWM) aims to:

- 1) Make the most appropriate use of water to deliver social, ecological and economic sustainability (e.g., minimise import of potable water, minimise discharge of wastewater / stormwater to waterways).
- 2) Consider the local context in terms of environmental, physical, social, cultural and economic perspectives.
- 3) Include all stakeholders in planning and decision-making processes.

Please note that this questionnaire adopts 'Sustainable Urban Water Management' as a broad umbrella term. It encompasses a number of phrases that describe more sustainable practices (e.g., 'total water cycle management', 'water sensitive urban design (WSUD)', 'integrated urban water management' and 'integrated land and water management').

5. In your position at council, how does your role contribute to Sustainable Urban Water Management (SUWM)? (Tick all that apply)

Influencing the amount of and rate that stormwater reaches waterways
 Influencing the quality of stormwater that reaches waterways
 Influencing the quantity of water used in the LGA
 Developing community education projects/materials/workshops on water conservation, stormwater pollution, etc.
 Assessing development applications for their effects on water-use, stormwater runoff, and/or sediment loading of waterways
 Participating in the design and/or construction of on-ground works (e.g., WSUD works)
 Participating in the operations and maintenance of on-ground works (e.g., WSUD works)
 Engaging the community about council's water management activities
 Planning for development and/or re-development within the LGA
 I do not have any role in SUWM
 Other (please specify)

Urban Water Management - XXX Council

8. In your opinion, what has been the most important supporting factor(s) for these changes to occur? (Maximum 2 answers possible)

- A number of water initiatives being implemented by Council
- A particular water initiative being implemented by Council
- Different leadership within Council
- Council Vision Sustainable XXX policy and direction
- State government policy and direction
- Different staff have come on board
- Community/media pressure
- Other (please describe)

Urban Water Management - XXX Council

4. Council's Implementation Of Pilot Projects

9. Could you please name or describe these water initiatives, and/or particular water initiative, and identify how they have contributed to this change in Council?

Urban Water Management - XXX Council

5. OurRiver – Cocks River Sustainability Initiative – Part 1

10. Have you been involved in the OurRiver -- Cocks River Sustainability Initiative?
(Tick all that apply)

- Yes, I participated in the workshop on water-sensitive tree pits.
- Yes, I have attended a meeting or presentation with OurRiver staff.
- Yes, I attended an OurRiver cross council Technical Working Group meeting or workshop.
- Yes, I have attended a community planning and/or vision forum associated with the OurRiver project.
- Yes, I have been involved in the OurRiver project as an Executive Champion or Steering Committee member.
- No, I am not aware of the OurRiver project.
- Other (please specify)

Urban Water Management - XXX Council

6. OurRiver – Cocks River Sustainability Initiative – Part 1

11. Please give us YOUR opinion regarding changes as a result of OurRiver - Cocks River Sustainability Initiative:

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I have an increased understanding of Sustainable Urban Water Management (SUWM).	<input type="radio"/>				
I increasingly recognise the different goals various disciplines and stakeholders pursue in regard to urban water management.	<input type="radio"/>				
I am now more likely to communicate with other departments within Council in regard to SUWM.	<input type="radio"/>				
I have gained practical experience in applying Water Sensitive Urban Design (WSUD).	<input type="radio"/>				
I am now more likely to pursue WSUD construction project opportunities.	<input type="radio"/>				
I have gained practical experience in community engagement.	<input type="radio"/>				
I am now more likely to engage the community during the early stages of a project and am able to do so.	<input type="radio"/>				
I would like to engage the community during the early stages of a project but there are too many limitations within Council to do so.	<input type="radio"/>				
I am now more likely to coordinate with other catchment Councils in regard to natural resources management.	<input type="radio"/>				
I am now more likely to consider the full context (organisational, physical, social) when making a decision.	<input type="radio"/>				
The OurRiver project has not influenced my professional behavior.	<input type="radio"/>				

12. Could you please share any other change in understanding, behaviour or practice as a result of your involvement in the OurRiver project?

Urban Water Management - XXX Council

13. What element(s) of the OurRiver project has/have contributed to increasing your knowledge and understanding of SUWM? (Tick all that apply)

	Did not contribute	Slightly contributed	Moderately/Significantly contributed	Totally contributed	Not applicable
Participating in a training and/or workshop either hosted by OurRiver or where my registration was paid by OurRiver.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Providing opportunities to implement SUWM in my job.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Participating in the design and/or delivery of the water sensitive tree pit plantings and/or for the XXX ringarden and stormwater harvesting system.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Participating in a project support group such as the Steering Committee, Executive Champions Committee, Communication Committee, Cross Council Technical Working Group.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Working with staff from other departments within council.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Project documents such as the XXX Street Subcatchment Information Booklet, XXX Street Subcatchment Management Plan, brochures, OurRiver newsletter.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Presentations by the OurRiver Project team or XXX	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Working with the OurRiver project team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Establishing community visions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Undertaking community engagement at or before decision making stages for the XXX Street Subcatchment Management Plans and the XXX upgrade.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Undertaking group discussions facilitated by XXX about how water is managed at Council.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other (please specify)	<input type="text"/>				<input type="radio"/>

14. Have you attended meetings or workshops with the cross council OurRiver Technical Working Group?

- Yes
 No

Urban Water Management - XXX Council

7. Technical Working Group

15. Please give us YOUR opinion about the following statements regarding your experience of the cross council Technical Working Group:

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I learned something by taking part	<input type="radio"/>				
I appreciated meeting staff from other councils	<input type="radio"/>				
I have an increased understanding of other councils' projects	<input type="radio"/>				
Hearing the lessons learned by other councils was useful for me	<input type="radio"/>				
I would call or email someone from this group for advice on a project similar to one they had done	<input type="radio"/>				
I have contacted someone from this group for advice	<input type="radio"/>				
I feel the group was useful	<input type="radio"/>				
I would like to continue taking part in this group after the project ends	<input type="radio"/>				
Other comments:	<input type="text"/>				<input type="radio"/>

Urban Water Management - XXX Council

8. OurRiver – Cooks River Sustainability Initiative – Part 2

16. In your opinion, what have been the main benefits of the OurRiver project in advancing SUWM in the Cooks River Catchment?

	Not at all beneficial	Slightly beneficial	Moderately beneficial	Very beneficial	Extremely beneficial
Coordinating regional meetings between councils	<input type="radio"/>				
Producing subcatchment management plans	<input type="radio"/>				
Producing organisational capacity reports	<input type="radio"/>				
Running community engagement activities that led to the community subcatchment vision, goals and actions	<input type="radio"/>				
Developing concept designs for Water Sensitive Urban Design (WSUD) works	<input type="radio"/>				
Providing funding for building WSUD works	<input type="radio"/>				
Providing expertise / mentoring to enable the building of a WSUD work	<input type="radio"/>				
Developing general expertise for SUWM	<input type="radio"/>				
Establishing and/or strengthening relationships between different departments	<input type="radio"/>				
Promoting activities my council participated in (through newsletters, award nominations, news articles, etc.)	<input type="radio"/>				
Having officer and managerial staff involved in the same project	<input type="radio"/>				
Passing on learnings from other councils	<input type="radio"/>				
Developing educational content about the river, catchment, water management, etc.	<input type="radio"/>				
Developing the proposal for a Cooks River Alliance	<input type="radio"/>				
Other (Please specify)	<input type="radio"/>				

Urban Water Management - XXX Council

9. OurRiver – Cooks River Sustainability Initiative – Part 3

17. Please give us YOUR opinion about the following statements in regard to community engagement in the OurRiver project:

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	I don't know
Community opinion was actively sought in the development of the XXX Subcatchment Management Plan	<input type="radio"/>					
Community members were directly involved in making decisions related to building the XXX rain garden and stormwater harvesting system	<input type="radio"/>					
OurRiver's community engagement has been a positive experience for me	<input type="radio"/>					
It went beyond what my council normally does	<input type="radio"/>					
I am not aware of how council used the results of the community engagement	<input type="radio"/>					

Other comments:

18. As part of the OurRiver project the following documents were developed. Please indicate to what extent you have knowledge of these documents. (Tick all that apply)

	I am not aware of it	I know it exists	I have seen it	I directly contributed to it	I have used it (or am likely to in future)
XXX Subcatchment Management Plan	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
WSUD concept designs for XXX Subcatchment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Organisational Capacity for Sustainable Urban Water Management (Result of staff survey conducted ~1 yr ago about water management)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

19. If you have used or are likely to use one of the above documents could you please identify for what purpose you used or intend to use the report?

20. What element of the OurRiver project will YOU be most likely to draw on in future?

Urban Water Management - XXX Council

10. Steering Committee

21. Did you participate in meetings of the OurRiver Steering Committee?

- Yes
 No

Urban Water Management - XXX Council

11. Cross-council Executive Champions Committee

22. Have you participated as a council Executive Champion within the project?

- Yes
 No

Urban Water Management - XXX Council

12. Cross-council Executive Champions Committee

23. Please give us YOUR opinion about the following statements regarding your participation in the Executive Champions Committee:

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
It was useful to give my feedback to the project team and other executives	<input type="checkbox"/>				
It was valuable to have all the council executives meet together	<input type="checkbox"/>				
I appreciated networking with executives from other councils	<input type="checkbox"/>				
I have an increased understanding of other councils' projects	<input type="checkbox"/>				
The Executive Champions Committee was an effective way to develop and iterate on the proposal for a Cooks River Alliance	<input type="checkbox"/>				
I feel the group was useful	<input type="checkbox"/>				
Other comments:	<input type="text"/>				

Urban Water Management - XXX Council

13. OurRiver – Cooks River Sustainability Initiative – Part 3

24. To what extent were the following project process features present in the OurRiver project?

	No extent	Little extent	Moderate extent	High extent	Full extent
Facilitation between direct project stakeholders (incl. partner councils)	<input type="checkbox"/>				
Facilitation between indirect stakeholders (incl. state agencies, businesses, wider community)	<input type="checkbox"/>				
Democratic atmosphere	<input type="checkbox"/>				
Repeated interactions between direct project stakeholders	<input type="checkbox"/>				
Repeated interactions between indirect stakeholders	<input type="checkbox"/>				
Opportunities to influence project decisions	<input type="checkbox"/>				
Open communication	<input type="checkbox"/>				
Diverse stakeholder groups participation throughout the project	<input type="checkbox"/>				
Drawing on multiple sources of knowledge	<input type="checkbox"/>				
Opportunities to brainstorm	<input type="checkbox"/>				
Opportunities to share lessons learned	<input type="checkbox"/>				

Urban Water Management - XXX Council

14. Other comments

25. Any other comments?

--

Urban Water Management - XXX Council

15. Final Remarks

Thank you very much for your time in completing the survey.

If you would like to find out more information about the research, please contact:

Rachel Wisniewski-Jakuba
Our River - Cocks River Sustainability Initiative
Tel: [REDACTED]
Email: [REDACTED]

or

Annette Bois
Monash University
Tel: [REDACTED]
Email: [REDACTED]

B.4 OurRiver-Cooks River Sustainability Initiative - End-of-Experiment (Community)

Community Survey

2. Information about You

1. Please indicate whether you have read the bi-monthly OurRiver newsletter:

Very Often
 Regularly
 Sometimes
 Once or Twice
 Never

2. Have you attended any of the following OurRiver events? (Tick all that apply)

Session where you developed a vision for your local subcatchment
 Session where you developed goals and actions to help guide a plan for achieving the subcatchment vision
 Evening meeting with other residents from my subcatchment
 Water Wise Tour
 Information and/or Planting Day for raingardens at Drew St, Greenacre (with Stratfield Council)
 Information and/or Planting Day for a vegetated swale at Carrebury Park (with Ashfield and Centenary Councils)
 Information Day for the raingarden and vegetated swales at Bundara Reserve (with Hurstville Council)
 Information Day for the raingarden at Glouchier Park (with Rockdale Council)
 Information Day for a raingarden at Graf Park (with Barnstowrn Council)
 I have not attended any OurRiver events
 Other (please specify)

Community Survey

1. Introduction

Thank you in advance for participating in this survey.

The following survey will help evaluate the effectiveness of the OurRiver - Cooks River Sustainability Initiative project (OurRiver). OurRiver is a State Government funded project with eight partner councils that aims to improve river health, conserve water, and empower communities. OurRiver is working with academic experts to utilise learnings in order to build on previous successes and avoid problems of past failures. Your responses will help inform how to successfully involve community members in managing water supply, flooding control, and local waterways.

As an incentive to complete this survey you can enter our competition to WIN a \$50 Coles/Myer voucher. Details on how to enter at the end of survey.

This questionnaire should take approximately 5 minutes to complete.

Community Survey

3. Your thoughts on OurRiver Events

3. Please give us YOUR opinion about the following statements:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	I don't know
OurRiver gave me an opportunity to participate in establishing a vision for my subcatchment.	<input type="radio"/>					
OurRiver gave me an opportunity to influence Council decision-making.	<input type="radio"/>					
I am confident that my input was genuinely sought.	<input type="radio"/>					
I felt my time and thoughts were taken seriously by OurRiver and council staff.	<input type="radio"/>					
The interaction between OurRiver staff and community participants was satisfying.	<input type="radio"/>					
My overall interactions with other community participants at OurRiver events were satisfying.	<input type="radio"/>					
OurRiver's engagement of community members went beyond what Council normally does.	<input type="radio"/>					
I am not aware how Council used the results of the OurRiver engagement.	<input type="radio"/>					

Community Survey

4. General feedback

4. Please give us YOUR opinion about the following statements:

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	I don't know
As a result of OurRiver, I have a better understanding of what ends up in waterways in my local area.	<input type="radio"/>					
As a result of OurRiver, I have a better understanding of how to manage water more sustainably (e.g., keeping waterways clean and conserving drinking water).	<input type="radio"/>					
As a result of OurRiver, I have talked with others (family, friends, colleagues, etc.) about water issues in my local area and/or what council is doing about them.	<input type="radio"/>					
The OurRiver project offered a good balance of different events in which the community could be involved.	<input type="radio"/>					
Overall my involvement with OurRiver was a positive experience.	<input type="radio"/>					

Community Survey

6.

8. My contact information to set-up an interview is:

Name:

Email Address:

Phone Number:

Community Survey

5. What would you want in the future

5. The way(s) that I would be interested in being involved in future Cooks River projects (Tick all that apply):

- Receiving e-newsletters on projects and events
- Attending festivals and/or planting days
- Attending educational workshops on things like stormwater, biodiversity, gardening to help local waterways, etc.
- Attending public forums on the Cooks River and its catchment
- Participating in periodic meetings with council staff about how councils manage water and natural resources in the Cooks River Catchment
- Sharing my opinions on management of the Cooks River and its catchment through online surveys
- I am not interested in future involvement
- Other (please specify)

6. Have you got any other comments in regards to the OurRiver project?

7. Would you be willing to be interviewed (over the phone by an independent person) about your experience so that we can learn for future projects?

Yes No

Community Survey

7. Thank You & Prize Draw

You now have the option to enter our competition prize draw, where you could win a \$50 Coles/Myer Gift Card.*

[CLICK HERE TO ENTER THE PRIZE DRAW](#)

*Please note that your survey responses remain anonymous with entering this competition.

Appendix C - Case Report - Organisational Capacity for Sustainable Urban Water Management



Organisational Capacity for Sustainable Urban Water Management XXX Council

Annette Bos
2009



Acknowledgments

My appreciation goes to the Our River steering committee members and the Our River Project team for their generous support, guidance and assistance in the preparation stage and during the data collection stage for this project. Thank you to all the participants/respondents who kindly contributed time and effort towards this project. Finally, thank you to those who agreed to review the reports.

Cover Photo

Streetscape rain garden in Victoria Park, Zetland. Photo courtesy of Our-River

EXECUTIVE SUMMARY

This organisation profiling report has been produced within the context of the OurRiver – Cooks River Sustainability Initiative [OurRiver]. This is a three year project involving eight councils in the Cooks River Catchment and Monash University that is funded by the NSW Environmental Trust. OurRiver has an explicit agenda of managing the Cooks River Catchment within a sustainability framework, with the objective to improve river health, conserve water resources and improve the sustainability performance of both councils and communities.

Urban water management is currently practised in an unsustainable manner as it facilitates the wastage of a valuable resource, contributes to the degradation of water resource environments and does not reflect contemporary aspirations of ecologically sustainable development (Ashley et al., 2004; Brown et al., 2006). Moreover, increased demands, aged infrastructures and economic feasibility are under pressure, and unpredictable events such as climate change are putting more pressure on our already stressed systems.

Addressing these problems in a more sustainable manner requires holistic assessment of the problem, including identifying the interconnections between the problems and their underlying factors. Achieving sustainable urban water management, which targets complex, uncertain and multi-stakeholder problems, is highly dependent on achieving plans and actions that are relevant to the local social, institutional and bio-physical context. In order to appropriately target plans, it is necessary to understand the physical and social characteristics and organisational capacity and influences. Understanding the context is also likely to result in more success of on-ground implementation of plans and less waste of resources as it targets the money at the right place.

This organisational profiling report aims to provide the organisational context for developing sustainable urban water management (SUWM) initiatives in your organisation. It has systematically identified the organisational capacity that will help support or act as barriers to advancing SUWM within your council. It has drawn on a range of qualitative (desktop research, interviews and focus group discussions) and quantitative (surveys) research methods. The majority of the data informing this profile has been provided by XXX Council staff (over 190 staff members participated in the process). The main areas of organisational capacity addressed within this study are intra-organisational capacity (capacity within the organisation), inter-organisational capacity (capacity to interact with external stakeholder) and the institutional arrangements (in terms of policy and legislation) for developing SUWM. Brown's (2008) five phase continuum of organisational development has been used for analysing the data. The five phases within this continuum span from a very basic level of capacity (Project) to a very high level of capacity (integrated) for SUWM. Figure 0-1 provides a summary of the organisational capacity for XXX Council.

Analysis of the data shows that XXX Council is in the growth phase (moderate level of SUWM capacity), with some areas of capacity verging on the insider phase (high level of SUWM capacity) for organisational development. Hence, Council has some effective capacity to facilitate the up-take of SUWM. In particular, capacity strengths for SUWM are found in areas of organisational structure, human resources, aspirations and strategy. However, looking beneath the surface of these strengths, there is considerable improvement needed for Council to reach its full SUWM potential. In addition, capacity areas of systems and infrastructure and culture for SUWM present some clear constraints to the uptake of SUWM. The institutional arrangements, external to the organisation, such as legislation and policy for SUWM, provide a very limited direct incentive for developing and implementation of SUWM within Council.

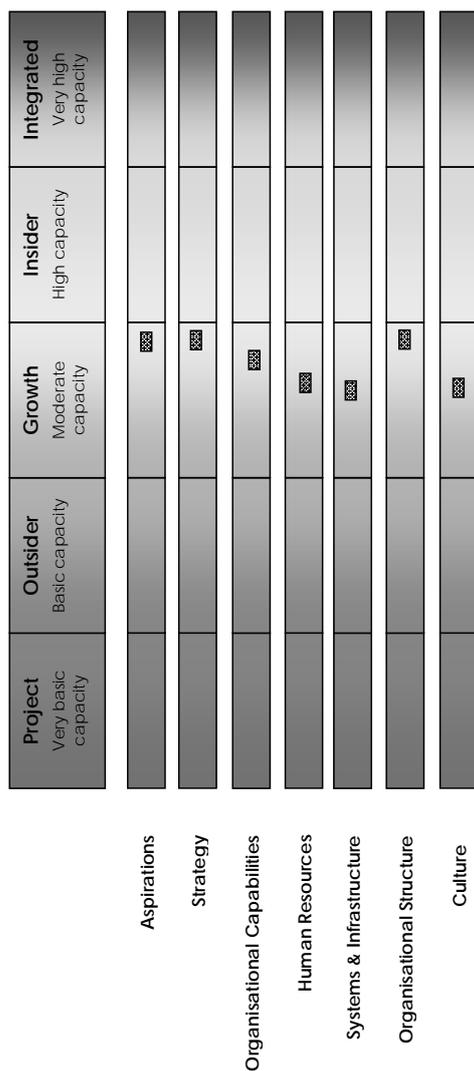


Figure 0-1: Areas of Council's capacity reflected according to organisational development phase.

Specifically, the organisational profile suggests the following aspects are priority needs for further developing capacity for SUWM within XXX Council:

- Organisational direction & common understanding of SUWM
 - o The Council should develop a clear and specific understanding of what it wants to become in regard to SUWM; current aspirations for SUWM seem only to be held by a few.
 - o Initiatives focused on the creation of shared beliefs and values regarding SUWM within the organisation should be undertaken; at present SUWM seems to be in the language but not yet in practice.
 - o The Integrated Urban Water Management Group should clarify members' roles and responsibilities in regard to SUWM and this group, and meeting agenda items that are relevant to the whole group should be developed.

- Council-wide commitment to SUWM
 - o Coherent policy for SUWM should be developed and consistently used; current provisions are very scattered throughout a number of policies, plans and other documents, and at present, direction from the Annual Management Plan is not consistently used.
 - o SUWM should become integrated in the portfolios of a broader base of staff.

- o Professional barriers (Created through content of education and professional liability – perceived risk) should be recognised and addressed at an individual and organisational level.
- Explicit targets
 - o Goals and targets for SUWM, including performance targets with attached measurable criteria should be further developed in order to create common goals between departments; help day-to-day work plans and measure Council's performance in regard to SUWM.
 - o Targets with measurable performance criteria should be provided to the Integrated Urban Water Management group.
- Awareness & Education
 - o Knowledge and skills for SUWM should be built within the broader organisation; at present, these are highly developed in only a few individuals.
 - o Awareness should be raised on potential strategies/measures aimed at improving the management of stormwater in a more sustainable manner among staff; at present, very few staff with responsibilities related to urban water management is aware of the full range of stormwater strategy options.
- (Supporting) Systems
 - o Development of strategies/measures aimed at improving the management of urban water in a more sustainable manner.
 - o Operation and maintenance (O&M) of SUWM infrastructure should be carried out on a continuous base and O&M staff should be involved in design of on-ground work, so that there is commitment, skills, and funding to keep the infrastructure functioning.
 - o Systems for creating, capturing, storing and disseminating knowledge relating to SUWM should be created.
 - o An effective environmental management system that covers water and the environment should be established.

It is beyond this organisational profile's objective to provide further detailed recommendations on future capacity development. However, the suggestions above can be a starting point for further development of SUWM within your Council. It is recommended that the identified capacity gaps are taken forward in internal group discussions so that strategies can be developed on how to address these.

While there have been similar projects to assess XXX Council's capacity to implement parts of SUWM, this is the first project that looked at SUWM in relation to Council's broader context of environmental sustainability. The report describes a number of Council characteristics that should be taken into account while developing capacity building initiatives.

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1.0 BACKGROUND

1.1 OURRIVER – COOKS RIVER SUSTAINABILITY INITIATIVE

This organisation profiling report has been produced within the context of the OurRiver – Cooks River Sustainability Initiative. The OurRiver project applies a new model for administering water planning in six subcatchments of the Cooks River (see Figure 1-1). The project has an explicit agenda of managing the Cooks River Catchment within a sustainability framework, with the objectives to improve river health, conserve water resources, and improve the sustainability performance of both councils and communities. The perceived problem or starting point underlying the rationale for the OurRiver project is that irrespective of the past and current efforts of community groups and other stakeholders, increasing urban consolidation threatens to accelerate negative impacts on water resource availability and on the already highly degraded Cooks River. OurRiver has been established from the recognition that previous planning processes compounded by complexities such as catchment size, population dynamics and conventional engineering principles have failed to adequately address the catchment and stormwater management issues for the river. The design of the OurRiver project, which is based on sustainable urban water management principles (Box 1), allows consideration of all facets of a system as complex as the Cooks River. Therefore, in-depth analysis of the social, physical and organisational context in which this initiative is taking place is of great importance to this project.

The project is a partnership between eight councils – Ashfield, Bankstown, Canterbury, City of Sydney, Hurstville, Murrickville, Rockdale and Strathfield, and includes a research component by Monash University. It has received a grant of over two million dollars from the New South Wales State Government to help achieve the OurRiver agenda.

Sustainable urban water management means:

- Reducing the amount of wastewater leaving a catchment that may cause pollution in other areas (e.g. ocean outfalls);
- Reducing the reliance on drinking quality (potable) water brought in from outside the catchment;
- Using water appropriately i.e. using potable water for consumption only – not for watering the garden or flushing the toilet; and
- Reducing the impact of stormwater on waterways.

Its underlying principles are:

- Making the most appropriate use of water from all stages of the water cycle to deliver social, ecological and economic sustainability at a variety of scales;
- Considering the local context in terms of environmental, physical, social, cultural and economic perspectives; and
- Including all stakeholders in planning and decision-making processes.

Box 1: Definition of Sustainable Urban Water Management (SUWM)

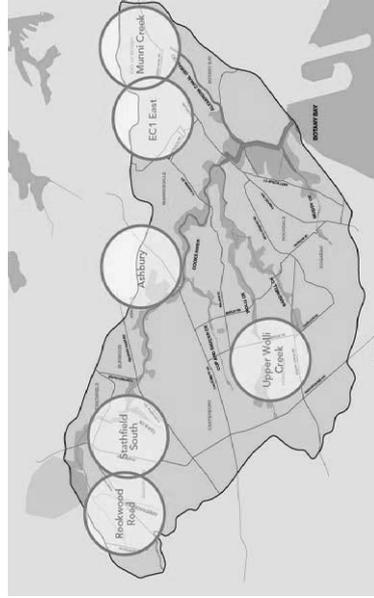


Figure 1-1: Selected subcatchments within the OurRiver – Cooks River Sustainability Initiative

1.2 WHY UNDERSTAND THE CONTEXT?

The way urban water management is managed at present is unsustainable because it facilitates the wastage of a valuable resource, contributes to the degradation of water environments and does not reflect contemporary aspirations of ecologically sustainable development (Ashley et al., 2004; Brown et al., 2006). Moreover, increased demand, aged infrastructure and economic feasibility are adding pressure, with unpredictable external events, such as climate change, are putting more pressure on our already stressed systems. The urban water management problems that society faces are extremely complex, highly uncertain, and affected by multiple actors with different perspectives and values (Marsalek et al., 2001). It is increasingly acknowledged that these problems cannot be solved by traditional means nor policy approaches that rely predominantly on technical solutions (Loorbach, 2007).

Addressing these problems in a more sustainable manner requires holistic assessment of the problem, identifying the interconnections between the problems and their underlying factors. In order to address these problems, both technical and non-technical changes are required that demand the inclusion of a multitude of stakeholders, and require cooperation and shared solutions from these stakeholders (Pahl-Wostl, 2007). These stakeholders include a variety of organisations and professions, and the people directly affected by the urban water management problems. The extent to which the urban water management problems are addressed will depend on the individual and collaborative capacity of the different stakeholders.

Achieving sustainable urban water management, which targets these complex, uncertain and multi stakeholder problems, is highly dependent on achieving mutually reinforcing change across both the bio-physical and socio-institutional realms (Brown et al., 2006). **Therefore, plans and actions aimed at improving urban water management should be made relevant to its local social, institutional and bio-physical context.** In order to target these plans, including their implementation and operation mechanisms, it is necessary to understand the catchment, or chosen planning unit, in terms of physical and social characteristics and its organisational capacity and influences (see Figure 1-2). This information provides a context map, which is intended to provide all stakeholders with the relevant information in order for effective communication and decision making processes within the catchment. Understanding the context is also likely to result in more successful on-ground implementation of plans and less waste of resources as it targets the money at the right place.

This report aims to provide the organisational context for developing sustainable urban water management initiatives in XXX Council. Please note that the information provided in this organisational report is a snapshot in time.

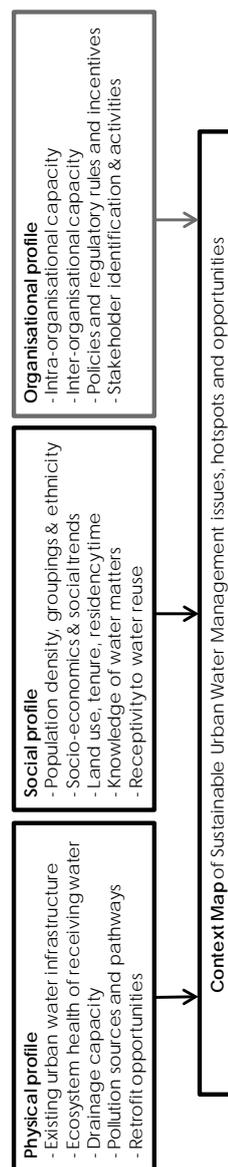


Figure 1-2: Three main areas for context mapping (Brown, 2008a)

2.0 ORGANISATIONAL PROFILING

2.1 WHAT IS ORGANISATIONAL PROFILING

Organisational profiling is an assessment process which helps to understand the organisational context in which Sustainable Urban Water Management (SUWM) is taking place. Essentially it is a process designed to assist in systematically identifying the organisational characteristics that can provide insight into advancing SUWM within councils and the Cooks River Catchment. Hence, the organisational profiling process consists of an assessment of current policies, plans, practices, capacity and perceptions that help or hinder the development of SUWM in its given context.

2.2 THE IMPORTANCE OF ORGANISATIONAL PROFILING

For SUWM development to be successful, professionals and decision-makers involved in the planning and management of SUWM initiatives should understand the organisational profile and key issues in relation to organisation capacity (see Box 2) that may facilitate or impede these SUWM initiatives. Proposed SUWM actions should be skilfully matched to the existing capacity of the organisation in which the development is taking place. In case of catchment management planning initiatives, proposed final SUWM action plans should correspond to the existing collective capacity of the implementing organisations. Projects and actions arising from SUWM initiatives should facilitate a shift from the status quo but should not be beyond the reach of the organisation. Therefore, they need to be realistically matched to the organisation's capacity to deliver in the short, medium and long term (Brown, 2008c, 283).

2.3 PRACTICAL USE OF THE ORGANISATIONAL PROFILE

The organisational profiling process produces a measurable description of XXX Council, which can be used for different purposes. The organisation profile:

- highlights the areas of best practice, which Council can build on;
- provides Council with a baseline for managing change and designing its capacity building strategies;
- provides Council with a benchmark for monitoring ;
- provides urban water management planning with a basis for evidence based decision-making;
- provides, when used collectively, a basis for collaboration and coordination between key stakeholders in the Cooks River Catchment, and;
- provides information that could be of use for the development of the sustainability management frameworks (as required by the NSW Department of Local Government's new Integrated Planning and Reporting legislation).

Box 2: Definition of organisational capacity

An organisation's 'capacity' is its ability to anticipate and influence change, make informed and intelligent policy decisions, attract, absorb, and manage resources, and evaluate current activities to guide future action (Honadle, 1981).

¹ Adapted from Marrickville Council (2007)

2.4 ASSESSMENT AREAS FOR ORGANISATIONAL PROFILING

Based on a review of the international and local academic and supporting literature, variables for organisational profiling have been identified². The main variables addressed within this report are:

1. **Intra-organisational capacity** - the essential internal elements that define the organisation's capacity for SUWM. These elements consist of:
 - **Aspirations:** A mission, vision, and commitment by different hierarchical levels within the organisation towards SUWM, which collectively articulate its common sense of purpose and direction.
 - **Strategy:** The coherent set of actions and programs aimed at fulfilling the organisation's overarching goals regarding SUWM.
 - **Organisational capabilities:** The sum of the organisation's capabilities for SUWM, including such things (among others) as performance measurement, operation planning, and inter-organisational collaboration.
 - **Human Resources:** The collective skills, experiences, and potential of staff for SUWM.
 - **Systems and Infrastructure:** The organisation's systems such as planning and knowledge management, as well as the physical and technological assets that support SUWM within the organisation.
 - **Organisational Structure:** The combination of organisational design and inter-functional coordination that shapes the organisation's structure.
 - **Culture:** The connective tissue that binds together the organisation to achieve a more sustainable manner in which urban water is managed.
2. **Inter-organisational capacity** - the essential elements that facilitate productive cooperation between catchment stakeholders for SUWM, such as effective inter-agency collaboration and organisational value and skill for community participation. This profile also identifies the main stakeholders for SUWM within the Cooks River Catchment.
3. **External rules and incentives** – the broader policy and incentive instruments that enable or deter SUWM development within the Cooks River Catchment.

² Based on (Brown, 2008a; 2008b; Brown, 2008c; McKinsey & Company, 2001)

3.0 THE ORGANISATIONAL PROFILING PROCESS

3.1 DATA COLLECTION

Data for this organisational profile has been collected through a range of qualitative and quantitative research methods, outlined below. This mixed methods approach is increasingly used in the social sciences as it is more reliable than the use of a single method (Creswell, 2009). The approach enables the researcher to gain an in-depth, cross-cutting understanding of disparity between talk and action, between formal plans and practice, between activities and accounts, and between managers and operations. In addition, the quantitative data collection instruments (surveys) will be beneficial to Council as these survey questions can be repeated in the future. In this way, the surveys can act as a research instrument that helps to identify how conditions have changed over time. The data collected for this organisational profile is preliminary, based on surveys and interviews with staff within Council. Figure 3-1 describes the organisational profiling process and highlights the methods used for its data collection. Section 3.2 provides a profile of the respondents to each of the surveys and facilitated group discussion.

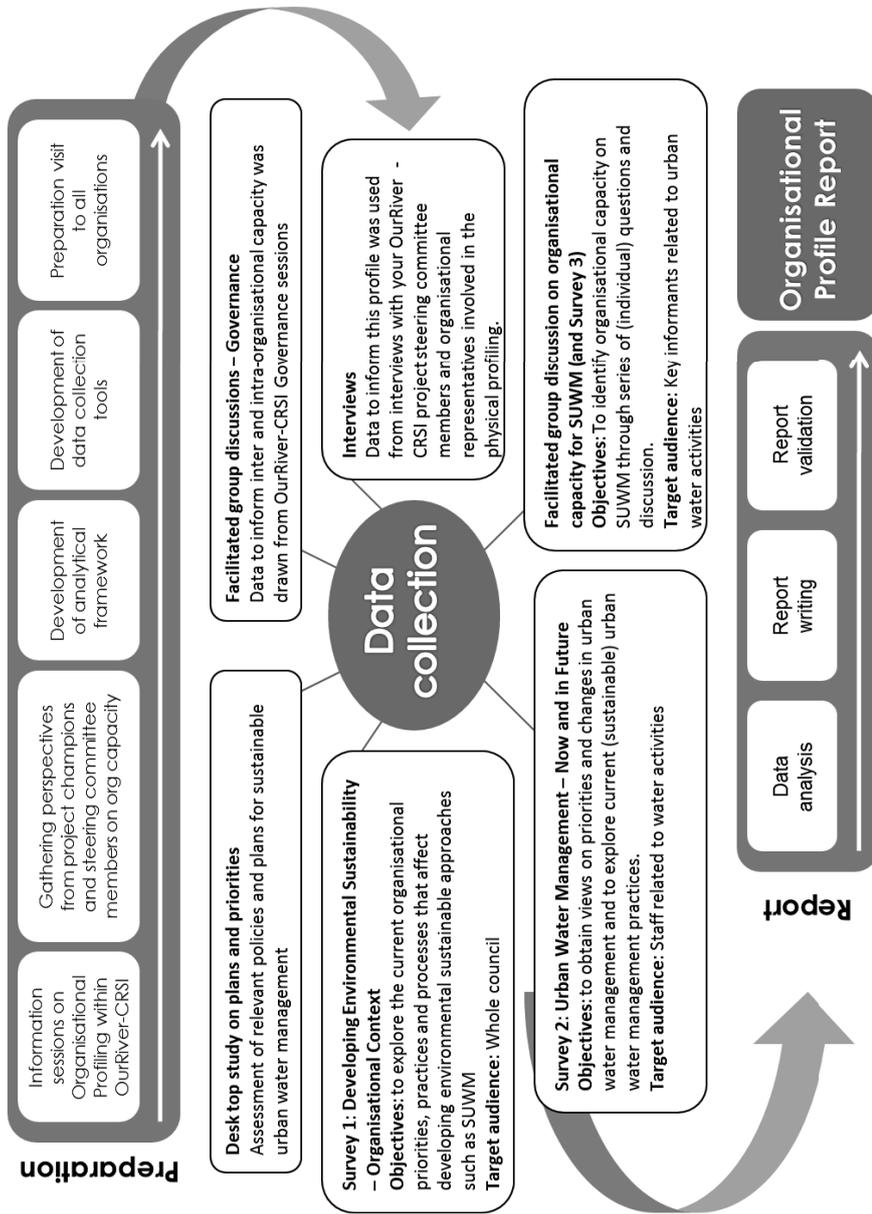


Figure 3-1: The organisational profiling process (including data collection methods)

Survey 2: Urban Water Management – Now and in Future (urban water staff)
 A total number of 15 people responded to this survey. Figure 3-7 shows the main type of work they perform. A third identified significant understanding of SUWM (see Figure 3-8).

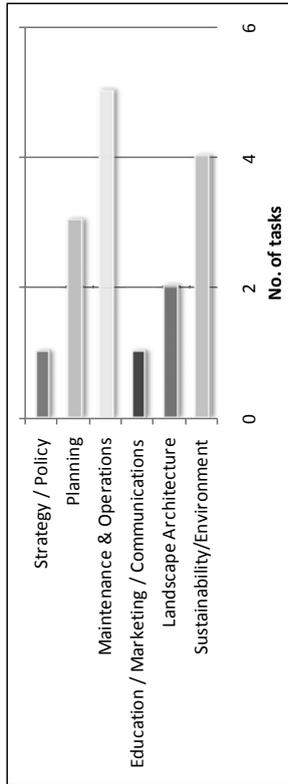


Figure 3-7: Main type of work performed by respondents.

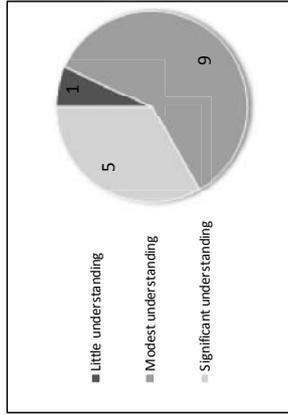


Figure 3-8: Respondents understanding of SUWM (actual numbers)

Facilitated Group Discussion on Organisational Capacity for SUWM (including survey 3)(focus Group)³
 Ten people participated in the facilitated group discussion and 11 people have responded to this survey. Figure 3-9 shows main type of work performed by respondents. Four respondents identify significant/full understanding of SUWM (see Figure 3-10).

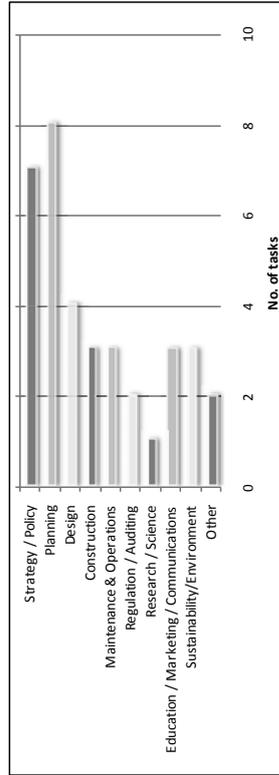


Figure 3-9: Main type of work performed by respondents

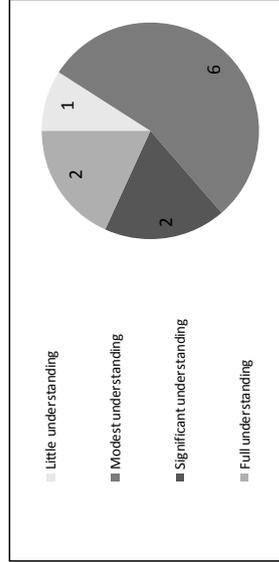


Figure 3-10: Respondents understanding of SUWM (actual numbers)

³ Note: Each of the survey names has been abbreviated. These abbreviations are used to identify from which surveys particular results have been derived.

3.3 ANALYSING THE DATA

Brown's (2008a) five-phase typology of organisational development has been used to analyse where XXX Council lies in terms of inter- and intra-organisational capacity for SUWM. This conceptual model provides a framework to determine where Council is positioned along a five phase continuum of best practices for each element of the organisational capacity as described in section 2.4. The five phases span from a very basic level of capacity (project) to a very high level of capacity (integrated) for SUWM. The main characteristics of each phase are briefly described in Table 1. From a combined analysis of the surveys, (group) interviews, and document data, Council's capacity is summarised into one of these five phases. Where appropriate, reference is made to the data collected through the environmental sustainability survey (all staff survey). This data, informed by views across Council, is used to provide an insight into the organisational context in which the organisation is developing SUWM.

Table 1: Typology of organisational development phases⁴ (Brown, 2008a; Morison, 2009; Taylor, 2009)

Project (Very basic level of capacity)	Outsider (Basic level of capacity)	Growth (Moderate level of capacity)	Insider (High level of capacity)	Integrated (Very high level of capacity)
<ul style="list-style-type: none"> • SUWM not an organisational priority • Basic compliance with state mandates (policy and community engagement) • Commitment deficit (ideological and capacity related) • No dedicated staff hours for SUWM activities; ad hoc activities are with individual technical officer • An isolated, externally-funded SUWM project may exist • Any SUWM activity externally driven; not related to core business • Very limited inter-departmental relations 	<ul style="list-style-type: none"> • Some organisational unit or department related to environment is defined • Still low priority for SUWM • SUWM activity dealt with by individual, likely to be environmental or technical officer. • Internal conflict between departments; especially between environmental officer(s) and other departments in organisation • Reliance on successful grants for operations and maintenance of on-ground works • External stakeholder engagement for legitimacy relationships 	<ul style="list-style-type: none"> • Growing commitment for SUWM at political, managerial and community level. • SUWM driven by consistent formal/informal network • Dedicated staff hours • Dedicated to SUWM activities • Still highly dependent on external skills • Some internal conflict regarding roles and responsibilities persists • Proficient in obtaining external grants for projects • Increasing internal funding for SUWM • Champions with moderate influence are becoming apparent • Extended stakeholder network established, but tensions between the organisations • Increasingly extended community consultation 	<ul style="list-style-type: none"> • Stronger inter-agency relationships, but collaboration is limited to some units. • Emerging industry leader • Good knowledge and skills on SUWM across departments • Stronger departmental relations particularly between engineering, planning and environment • Collaboration with research and non-governmental organisations. • Development Control Plans for SUWM developed • Operation and maintenance (O&M) staff involved in design 	<ul style="list-style-type: none"> • Commitment to SUWM policy at all levels within the organisation • Sustainable policies translated into work plan and built in performance assessments • Dedicated and effective interdepartmental committees • Dedicated funding for SUWM projects, including their O&M • Organisational culture values cooperation, research, community participation and principles of sustainability • Systems to measure SUWM performance and manage knowledge well developed, reported upon and used. • Intergovernmental leadership role; organisation has high ability to influence • Strong community governance

⁴ Note that there is limited detail within this table.

4.0 RESULTS

This chapter firstly presents a one page summary of XXX Council's capacity for SUWM (see Figure 4-1. Each area of capacity (as outlined in section 2.4) is associated with the five-phase organisational development continuum (as outlined in section 3.3). Each area of (inter- and intra-) organisational capacity is explored in more depth in the following sections. It should be noted that Council may have progressed and regressed along the continuum because of, for example, new policies, and change in staff since data for this organisational profile has been collected. Therefore, the information provided in this report is a snapshot in time. An overview of the current governance situation in the catchment is also provided. It outlines the external rules and incentives by which Council is affected.

Note: Please do not be discouraged if Council scores on the left side of the continuum as building capacity for SUWM is a relatively new area for most councils. It is hoped that this organisational profile provides sufficient information for Council to start or keep developing its SUWM related activities.

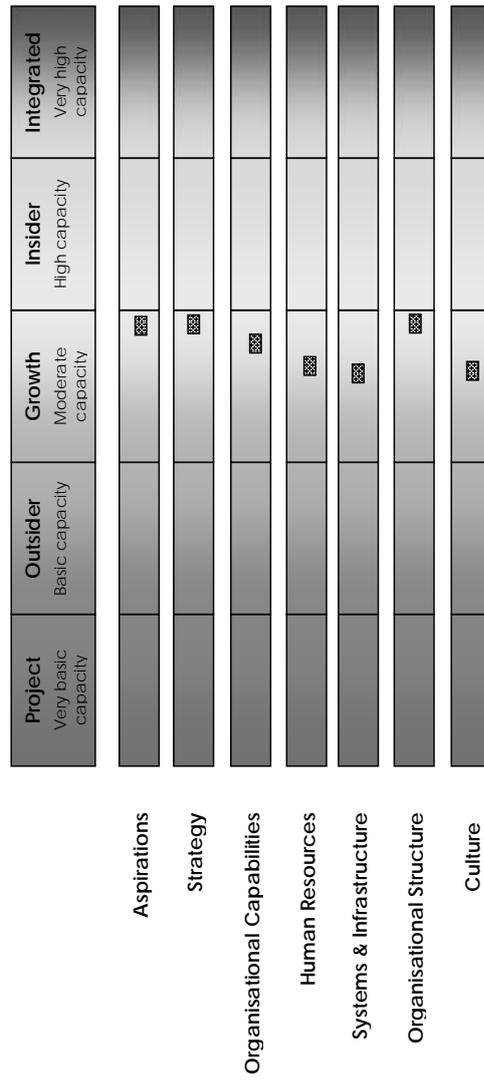


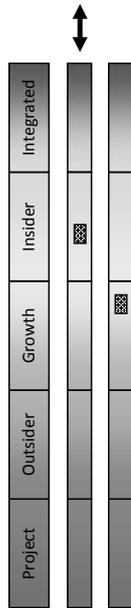
Figure 4-1: Areas of Council's organisational capacity reflected according to organisational development phase.

4.1 ASPIRATIONS

Rationale:

Aspirations define what the organisation determines to do and what it will not do in regard to SUWM. They provide direction for the organisational priorities and approach towards the management of urban water.

Results⁵:



Drawing from the individual questions during the focus group discussion on average a moderate to high level of aspirations to SUWM across Council has been identified (see Figure 4-2).

Commitment and drive

Although XXX Council has not clearly articulated what it aspires to become with regard to SUWM, there is some understanding of what the organisation is aiming for. This is mainly outlined in the Annual Management Plan. These aspirations are strongly carried by a multi-disciplinary network of people, which have a moderate influence in the organisation. According to surveyed officers (Focus Group), there is moderate to high commitment from the senior executives and the Councillors, though some respondents are not sure of the level of Councillor commitments to SUWM. Although general sustainability aspirations are known within Council, specific SUWM aspirations seem only to be held by a few. Even within the 'Integrated Urban Water Management' (IUWM) Group the specifics are not clear to all members.

When asked who the main driver is for addressing sustainability within Council, it is interesting to find that respondents (all staff survey) identify the same driver and level of commitment for environmental sustainability as is found for SUWM. Over 30% of these respondents identify that environmental sustainability is currently driven by a dedicated group of individuals within the organisation, followed by commitment from the Councillors and the senior executives. Only 10.8% of the respondents are of the opinion that at present all staff is driving environmental sustainability. However, it is believed (32.5%) that all staff should take a much higher responsibility for driving the agenda than currently is the case.

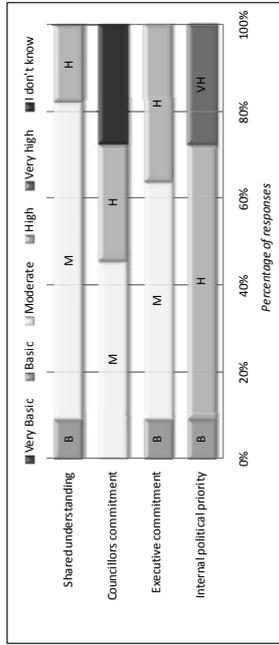


Figure 4-2: Perceived level of capacity in areas of aspiration (n=11)
(Based on individual survey questions during facilitated group discussion)

⁵ 'Survey FG results' refer to results from the individual questions asked during the focus group interview (facilitated session) with SUWM key informants. 'All data' refers to the results based on all data gathered. The text provides justification for this adjustment.

Council priorities and SUWM

Over 70% of the respondents (all staff survey) view that environmental sustainability is driving Council's agenda. Respondents that were neutral or of the opinion that environmental sustainability is not driving the agenda come largely from Technical Services, Engineering, Parks and Reserves, Resource Recovery and Parks and Streetscapes. There is a significant difference in what respondents see as Council's current priority and what it should be. It was identified that air quality, climate change, habitat/green corridors and sustainable transport needs to be given a much higher priority by the organisation. In contrast, waste has also been identified as a high priority (all staff survey); however, respondents are of the view that this should be significantly lower than it is at present (see Figure 4-3).

Water pollution and conservation are of medium importance to Council at present (all staff survey). Interestingly, the respondents stated that water pollution and conservation currently get the appropriate level of priority. Over 69% of the respondents see SUWM as important to Council at present. Respondents who are aware of SUWM activities rate the importance of SUWM to Council as slightly higher than the respondents who are not aware of SUWM activities. Respondents generally view that SUWM could still become more important to Council (see Figure 4-4). Nearly 22% of respondents are of opinion that environmental sustainability is highly adequately addressed within Council, while 44.7% views it as adequate.

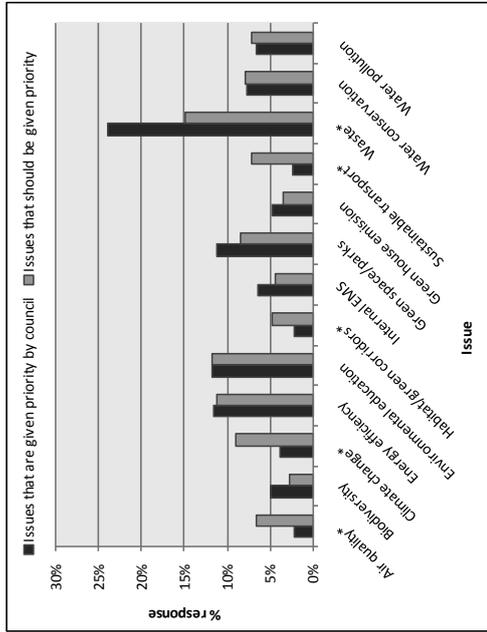


Figure 4-3: Present and desired priorities of environmental sustainability. *Shows significant correlation between current priority and desired priority.

The main reasons identified for the necessity of Council to be engaged with SUWM are:

- present lack and waste of water resources;
- political pressure (green councillors);
- a politically aware community;
- reputation; and
- the iconic Cooks River on the doorstep.

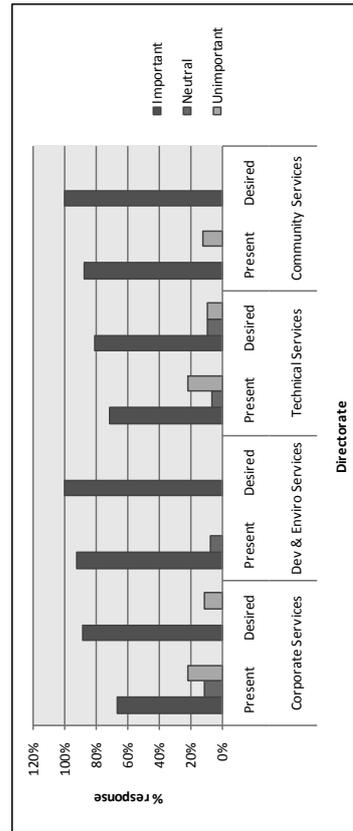


Figure 4-4: Present and desired level of importance of SUWM per directorate

SUWM priorities at present

This subsection presents urban water staff views of SUWM priorities related to urban water management. Figure 4-5 shows their views on the expanded tasks and activities related to urban water over the last five years. Notably, tasks related to urban water planning and catchment management have expanded.

The same respondents have identified the level of importance for Council to pursue certain SUWM measures for water conservation and aquatic ecosystem protection and integration in a number of areas of urban water management at present (see Figure 4-6). It is important to note that there seems to be some disparity between perceived importance and actual practice (see section 4.6 of this report). Most respondents would prefer to see more organisational importance placed on the SUWM measures outlined in the figures:

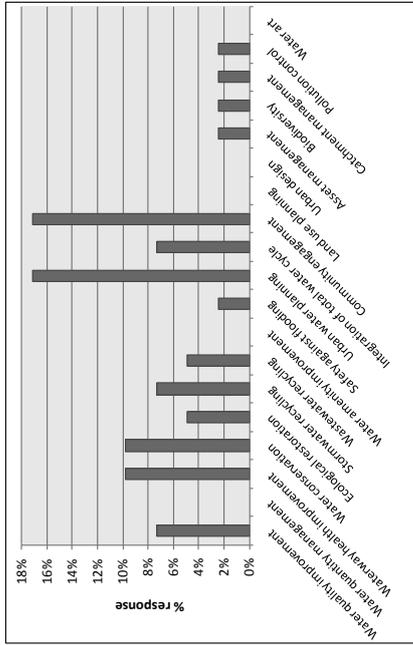


Figure 4-5: Urban Water Management activities expanded in the last five years

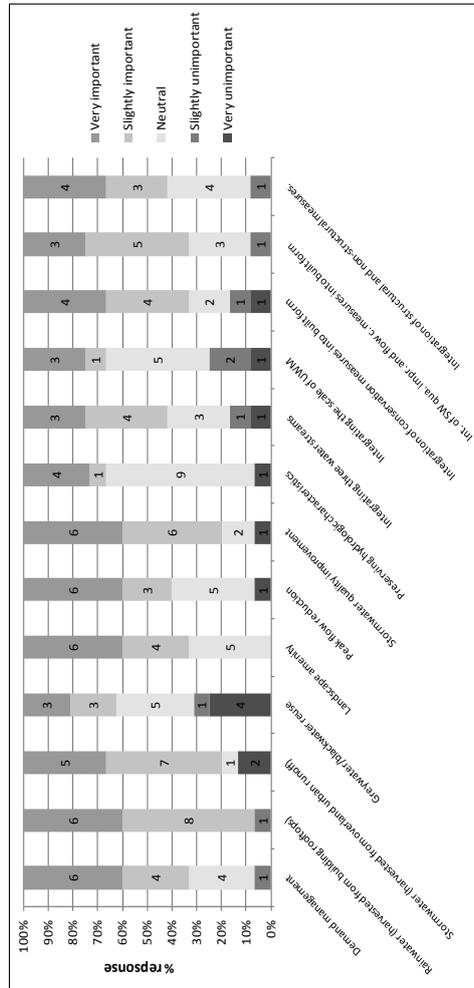


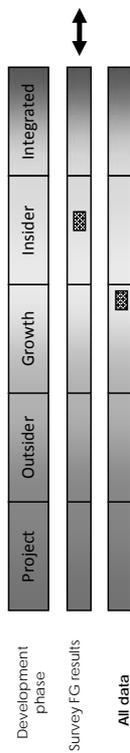
Figure 4-6: Level of importance of SUWM measures and integrated management of SUWM within Council



4.2 STRATEGIES

Rationale: SUWM strategies help the organisation to reach its aspirations. Ideally, in committing to SUWM, the organisation implements strategies that are coherent, well integrated and linked to its purpose and objectives. This section outlines XXX Council's strategies, such as policy, goals and targets, and funding for SUWM.

Results:



Drawing from the individual questions during the focus group discussion, moderate to high levels of organisational strategies to achieve SUWM have been identified (see Figure 4-7).

Policy/Strategy

There is consensus that there are provisions in policy/strategy for SUWM and these are used for organisational decision-making. These provisions are currently scattered throughout a number of policies, plans and other documents. Difference in opinion exists between respondents as to whether policies and plans are actually being translated in cross-departmental responsibilities. Table 2 shows the guiding documents that provide direction to water and the environment. Please note that this table does not include specific policies and planning documents.

Realistic goals and targets for SUWM

There seems to be a need for clarifying the goals and, specifically, performance targets with attached measurable criteria to provide clear direction to what Council is trying to achieve. Although there is consensus that goals and targets exist in some areas of SUWM and are increasingly becoming reflected in the annual management plans, the specifics of these targets are not well known within the organisation. The existing targets certainly act as motivator for staff to get engaged with SUWM but the lack of specifics seem to create a lack of common goal between the departments. It became evident that initiatives set out in the management plan are increasingly but not yet consistently used direct actions and set priorities. In addition, the current goals and targets are not fully adopted and reflected in the work plans of all staff. In comparison, 58.4% of the respondents (all staff survey) that environmental related priorities are to some or a greater extent reflected in the work plans. Although priorities might be translated to the work plans, it is unlikely that respondents are accountable for these to the organisation. Over 30% of the respondents do not know whether environmental priorities are incorporated in their own work plan.

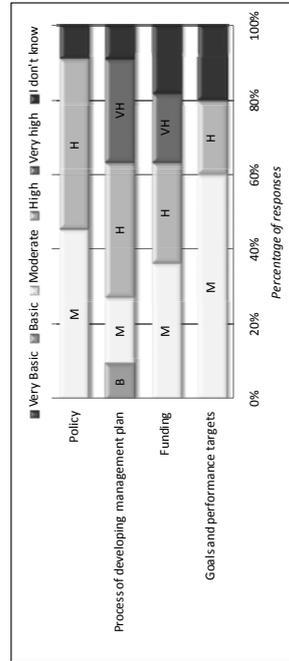


Figure 4-7: Perceived level of capacity in areas of strategy (n=11)

(Based on individual survey questions during facilitated group discussion)

Table 2: Strategic documents that provide guidance to water and environment

Document	Relation to water and environment
XXX Community Plan 2025	<ul style="list-style-type: none"> Vision statement of the key goals of the XXX community and guiding principles that determines Council's approach to planning (integrating social, environment, economic, governance and cultural objectives)
Strategic Plan 2006-11	<ul style="list-style-type: none"> Realisation of the Community Plan through specific targets and measurable outcomes by 2010-11
Annual Management Plans	<ul style="list-style-type: none"> Use of Quadruple Bottom Line (OBL) sustainability reporting framework.
XXX Urban Strategy 2007	<ul style="list-style-type: none"> Establishes a vision for XXX by 2031 (consistent with the XXX Community Plan 2025) with coordinated directions addressing a range of planning, community and environmental issues; to guide short, medium and long term strategic planning policies.
Local Agenda 21 (2003)	<ul style="list-style-type: none"> Includes a Water Action Plan to achieve the goal to reduce water pollution by 20% by 2010 on 1997 levels.
Stormwater Management Service Charge Management Framework (2007)	<ul style="list-style-type: none"> Guides the internal cross-departmental IJWM group Includes the Quadruple Bottom Line (OBL) criteria for selection of projects to be funded by the Charge.
Local Environment Plan 2009/10 (draft)	<ul style="list-style-type: none"> Underpinned by ESD principles, specifically includes water quality objectives in relation to improving biodiversity. Current LEP only includes water efficiency (no quality).

Residential community engagement in annual management plan. The facilitated group questions revealed different opinions on whether the community is engaged in the process of developing the annual management plans. The high diversity of responses might be caused by whether the respondents themselves had been involved in this planning or not. Another cause could be different understanding of what a high level of community engagement and collaboration entails. Overall, Council officers acknowledge some extent of community engagement in plan development (all staff survey). Only 13.9% identify that the community is to a high extent involved in the council management plan.

Funding

The Stormwater Management Service Charge provides dedicated funding directed to SUWM activities within the XXX LGA. This funding provides support but opinions differ whether it provides a solid base of funding. Flaws in the use of the stormwater charge have been identified, such as the pressure to spend it within a year. In addition, there is some fear that funding will be withdrawn. Dedicated funding for stormwater activities has not only brought on ground projects, but also contributes to an improved relationship between Engineering and Environmental Services.

Looking at the broader context for developing environmental sustainability (all staff survey), there seems to be little understanding across Council about budget requirements for developing environmental sustainability within the Council as over 35% of respondents do not know if current funding is adequate (see Figure 4-8). Furthermore, only 16% of the respondents identified the budget allocation for 2009/2010 as inadequate; however when asked what they see as main barriers towards further development of environmental sustainability, the same group identifies a lack of budget as the single most important barrier.

Respondents with a higher level of understanding identified a higher level of adequacy in terms of budget.

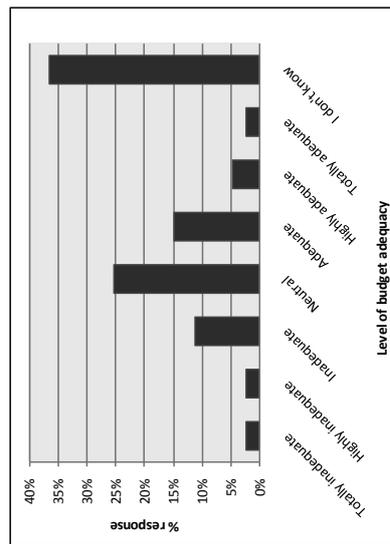


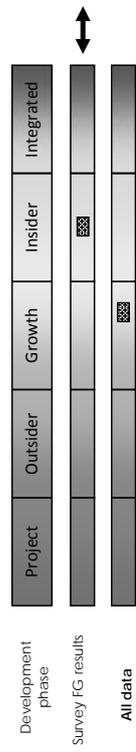
Figure 4-8: Adequacy of budget allocation for 2009/2010

4.3 ORGANISATIONAL CAPABILITIES

Rationale:

An important element for organisations is the process through which they develop, implement, and measure SUWM activities. Developing a successful process for the adoption of SUWM draws on a variety of an organisation's capability. Appropriate design of human resources, systems, and organisational structure will ensure delivery of the identified organisational capabilities for SUWM.

Results:



Drawing from the individual questions during the focus group discussion, moderate to high levels of organisational capabilities to achieve SUWM have been identified (see Figure 4-9).

SUWM operations and measuring of performance

XXX Council has some ability and a tendency to develop SUWM operational plans. These plans roughly guide operations but are not yet fully integrated in the day-to-day operations and linked to a more strategic plan. The earlier identified lack of widely known targets are likely to impede on the day-to-day operations and the measuring of performance. Performance is partially measured and progress tracked against Council targets. Mechanisms such as environmental management systems (EMS) to measure environmental performance have been established. However, the EMS (SAFE – Safe And For the Environment) does not seem completely effective for managing water and the environment as the mechanism is mainly focused on human safety. The inter-departmental IUWM Group shows promise in positively affecting the day-to-day operations for SUWM. The potential of this group could be enhanced as it has been identified at present that there is a lack of critical multi-disciplinary evaluation that assesses and addresses causes and issues of SUWM activities.

Residential community engagement

Capacity to engage the community in water related activities is highly developed and utilized for SUWM. This high level of community engagement in water activities does not seem representative for initiatives across the organisation as only 15.8% of respondents (all staff survey) identify a great extent of community engagement in land use planning and infrastructure development. It should also be noted that there seems to be very different perspectives between departments about what community engagement entails.

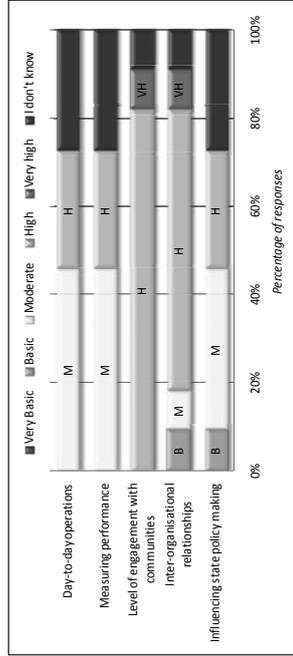


Figure 4-9: Perceived level of capacity in areas of org capability (n=11)

(Based on individual survey questions during FG discussion)

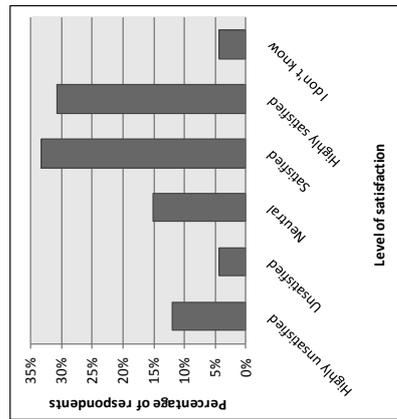


Figure 4-10: Perceived satisfaction of the residential community with the council services.

collecting and assessing the residential community's level of satisfaction with Council's performance. At least half of the respondents from all the following departments are not aware of the process for assessing community satisfaction (such as the annual Community Survey): Finance, Information Systems, Development Applications, Engineering, Parks and Reserves, Civil Works, Parks and Streetscapes, Community Development, Library Services and Community Facilities and Recreation. Resource Recovery showed the highest awareness in this field. XXX Council has some strong relationships with local residents concerning SUWM. One example is a local resident who, as a "Sustainable Water Ambassador", often promotes Council run workshops, WSUD tours and the Rainwater Tank Incentive Scheme on his personal blog.

Figure 4-11 reflects how Council's urban water staff views the effectiveness of communication with the main catchment stakeholders. This figure is based on respondents who have identified that they actually engage with these catchment stakeholders. Staff in Environmental Services have the highest level of engagement across the widest range of stakeholders. It should be noted that this figure is

Inter-organisational relationships and influence

There is some consensus that sophisticated external consultation capacity exists within Council that goes beyond internal legitimacy purposes and advocacy for more resources for SUWM. Some individuals/departments might have a meaningful relationship with an external stakeholder (such as research groups or Monash University) for SUWM purpose, and manage a growing external stakeholder network for SUWM including the local residents and businesses. XXX Council shows leadership in catchment planning and experiences are widely shared with other councils through projects such as the Cooks River Sustainability Initiative. There is desire to influence State SUWM policy-making and readiness and skills to do so exist, but Council's actual capability for higher influence is not completely known at present. Council informs and influences at a local level through its contributions to local media, such as the Glebe newspaper's Green Page about environmental topics generally and has on occasions promoted SUWM initiatives and its people.

A high percentage of respondents (64.1% all staff survey) assume the community is satisfied to a highly satisfied with Council services (see Figure 4-10). Nearly 40% of the respondents do not know whether Council has a systematic process for

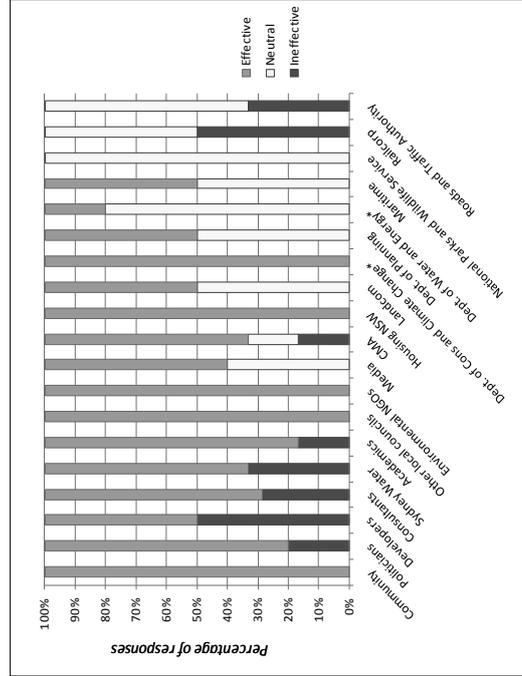


Figure 4-11: Effectiveness of communication with catchment stakeholders (from Council perspective). * These state government departments have now merged with other departments.

based on quite a small number of respondents. Nevertheless these respondents do play an important role in urban water management.

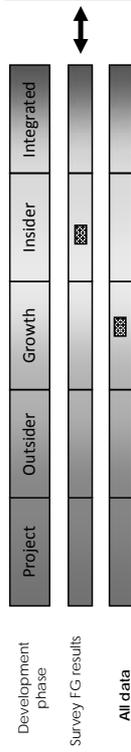


4.4 HUMAN RESOURCES

Rationale:

Human resources represent the collective knowledge, skills, experiences and availability of staff within the organisation to make SUWM happen.

Results:



Drawing from the individual questions during the focus group discussion, a moderate to high level of human resources capacity to achieve SUWM has been identified (see Figure 4-12).

Staff availability and permanency

Staff positions related to SUWM have been created and some critical positions have been filled. However, a position for the stormwater engineer is proving difficult to fill.

Knowledge and expertise.

Within XXX Council, overall experience and depth of knowledge for SUWM is perceived as moderate to high. Although this might be true in specific positions, this does not seem the case throughout the organisation when assessing specific knowledge and skills for SUWM (See Figure 4-13). It should be noted that there is a contradiction in data on the level of skills. Therefore, this figure should be internally verified. In addition, there are ranging opinions to what extent Council is dependent on external skills for SUWM. Based on all data, the organisation is highly dependent on consultants, staff might increasingly have the ability to question external providers but as key work is generally outsourced to different consultants, there is very limited development of corporate knowledge. At present, strategies are being developed so that over time a relationship with a group of consultants can be built and skills can be transferred. It should be noted that all consultants do not have all the knowledge, even very good consultants could be focused on one aspect of the work, such as the development of the physical profile, without incorporating social and planning information. Within the organisation, there are training opportunities for SUWM-related activities. However, this does not seem to be available to a wide staff base. It also does not seem to be widely known if and what training opportunities are available.

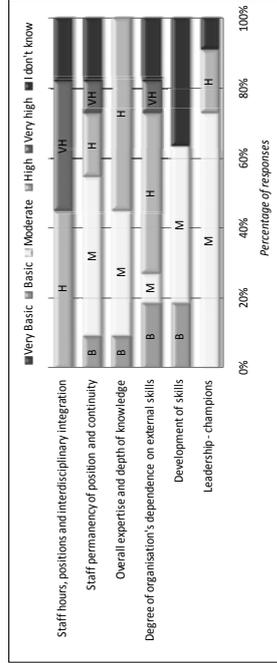


Figure 4-12: Perceived level of capacity in areas of human resources (n=11)

(Based on individual survey questions during facilitated group discussion)

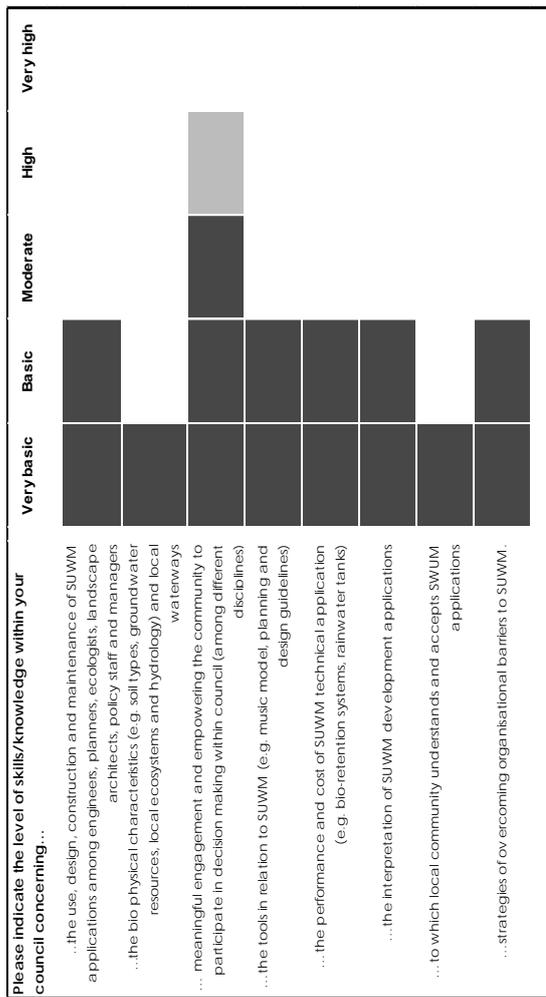


Figure 4-13: Level of skills and knowledge in relation to SUWM existing within XXX Council

Knowledge and learning

In order to target human resources capacity development, it is important to recognise how different people learn and have insight into how they take on new knowledge. The environmental sustainability survey (all staff survey) includes a series of questions around knowledge and the following observations are based on this information.

It has been identified that Council does not have a culture of sharing information. Figure 4-15 shows how respondents learn about what is going on within other Council departments. It is interesting to note that a trend could not be identified for any departments in the way they hear what is going on in different departments. Figure 4-14 provides an overview of how respondents learn about new developments/thinking within their field of work. Respondents from Technical Services and Community Development learn about new development through field-specific literature and professional meetings, whereas respondents from Engineering learn through conferences and professional meetings. Staff in Civil Works, Parks and Reserves, and Parks and Streetscape mainly hear about new developments through the respective supervisors, followed by internal newsletters and fellow workers. Environmental Services staff identified conferences and professional workshops as the main learning opportunities. Library staff identified hearing new things via professional workshops as their mainstay for hearing about new things. No trends could be identified for the other departments/directorates.

Most respondents identified that their job requires them to learn new skills occasionally. It seems though that only a very small percentage of the learning that took place over the past two years is related to matters of improved environmental sustainability. Skill development is mainly initiated by superiors (52.4%) followed by individual initiation (38.1%). In some cases, it has been done collaboratively. 67.3% of the respondents identified no constraints to learn/develop within their job. Figure 4-17 provides an overview of what the remaining respondents view as a barrier to their learning/development.

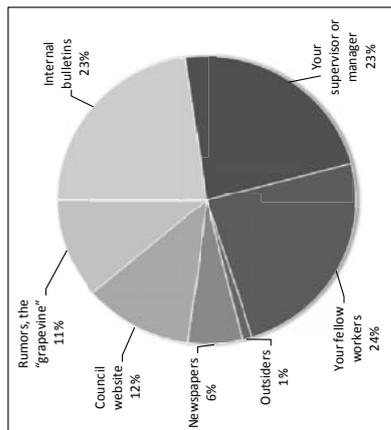


Figure 4-15: How respondents hear what is happening in other departments

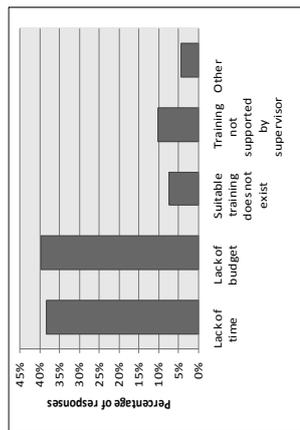


Figure 4-17: Barriers to learning/development

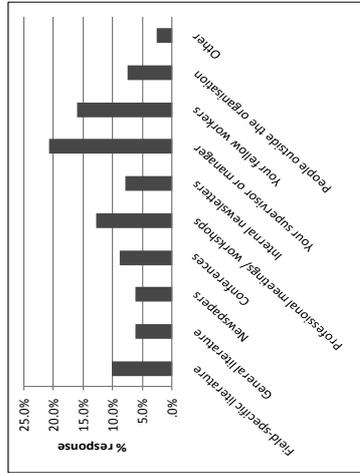


Figure 4-14: How respondents learn about new developments/thinking in their field

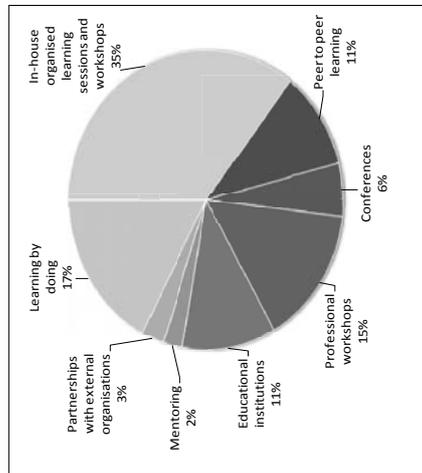


Figure 4-16: How training/development predominantly takes place.

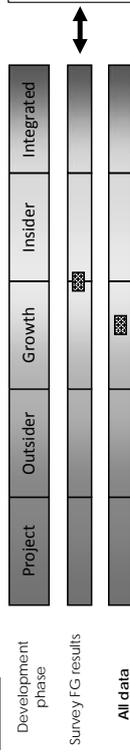
Figure 4-16 shows how training /development predominantly takes place among the respondents. In-house learning is preferred by respondents from Information Systems, Development and Environmental Services, Technical Services, Park and Reserves, Resource Recovery, Civil works, Parks and Streetscapes, and Community Services. Learning by doing is preferred by respondents from People and Workforce, Development and Environmental Services, Resources Recovery, Parks and Streetscapes, Community Development. Respondents from Technical Services and Environmental Services, Professional Services and Engineering prefer identified for respondents from other departments.

4.5 SYSTEMS AND INFRASTRUCTURE

Rationale:

The organisation's systems can be seen as the formal and informal processes that can make SUWM work within Council. Infrastructure describes actual SUWM technical infrastructure and non-technical infrastructure and the assets that contribute to SUWM within the organisation. Elements of systems and infrastructure are often better understood in relation to capacity building than the other components described in this framework (VPP, 2001).

Results:



Drawing from the individual questions during the focus group discussion, a moderate level of capacity for systems and infrastructure to achieve SUWM has been identified (see Figure 4-18).

Planning and Development

There is some provision for SUWM in the current planning and development documentation, the main ones being the Development Control Plan (DCP) 32 (Energy Smart Water Wise) and DCP 35 (Urban housing). Neither makes specific reference to WSUD; however, DCP 32 does claim to focus on more effective water cycle management (especially for sites greater than 1000m²) and within DCP 35 the Stormwater, Detention, and Sediment controls support the Stormwater and On-Site Detention (OSD) Code. A new DCP that integrates WSUD is being developed at present.

Infrastructure (structural and non-structural)

Within XXX Council, it is acknowledged that SUWM should aim at integrating the three streams of water, wastewater, stormwater and the mains water supply. In contradiction to the impression given in Figure 4-6, at present, the main internal focus is on improving the management of stormwater; water supply and wastewater have not been considered except in the sub-catchment plans. An assessment of potential stormwater strategies revealed little extent of implementation of these strategies by Council (see Figure 4-19)⁶. Levels of consensus among respondents (water staff and/or member of IUWM Group) vary regarding the level of implementation. High consensus is found for the strategies associated with rainwater, stormwater and operation and maintenance, and the assessment shows that most respondents are familiar with rainwater and stormwater measures. A large number of staff (urban water staff) (>40%) did not know anything about measures within the following strategies: stormwater flow management, restoring degraded ecosystems and operations

⁶ It should be noted that each area for the stormwater strategy is made up of 5 – 7 measures; a score was given for each of the measures.

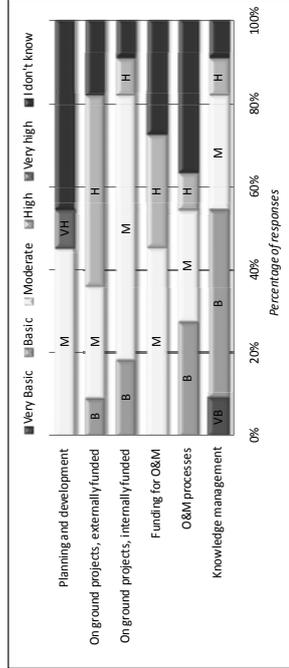


Figure 4-18: Perceived level of capacity in systems and infrastructure (n=11)

(Based on individual survey questions during facilitated group discussion)

and maintenance. There is consensus that Council does not evaluate the different measures or does this only to a little extent. Another problem identified is that it is not clear how data and information can be used when it is collected.

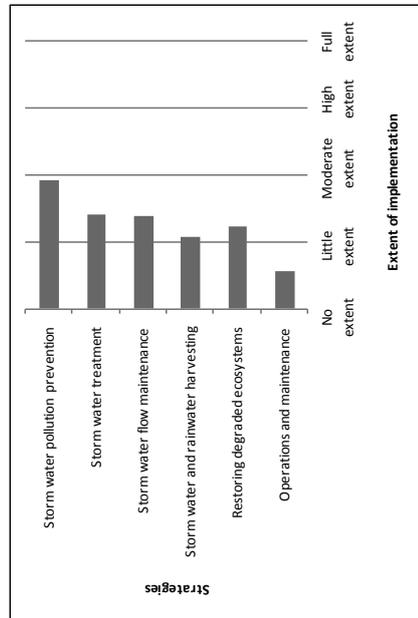


Figure 4-19: Extent of stormwater strategy implementation

XXX Council is becoming more proactive and a set of technologies has been trialled on the ground; however, the experience of costly of failing WSUD projects remains a threat to organisational commitment. Although debated by some, the majority of the respondents identify that Water Sensitive Urban Design (WSUD) is beginning to be considered as a standard element of capital works.

Information technology (IT) is generally well developed. IT systems such as MUSIC modelling for developing SUWM technological options is available but not widely used within Council. External IT infrastructure of use to the Council staff is the Sydney Metropolitan Catchment Management Authority's (CMA) Water Sensitive Urban Design (WSUD) Program, which provides, among other things, web-based resources for developing WSUD. Other non-structural measures that aim to increase the up-take of SUWM within the community include the XXX Council Rainwater Tank Incentive Scheme, the free Sustainable Water workshops and the Watershed, a sustainability resource centre that is a joint initiative of City of Sydney and XXX councils.

Operation & Maintenance (O&M)

Some provisions are made for O&M, but continuous measures for undertaking O&M are carried out to a limited extent. It seems that O&M staff is to a very limited extent involved in design of sustainable urban water infrastructure and that on-going operation costs are not taken into account when WSUD elements are planned and constructed. At present O&M seems viewed as an add-on that is trying to get a portion of an already stretched and limited resource.

Knowledge Management

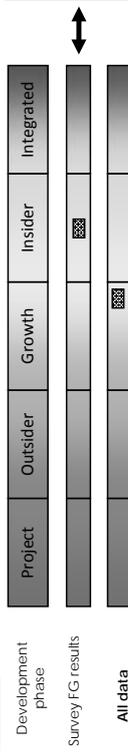
The environmental context survey (all staff survey) shows that 40% of the respondents find Council's systems for the creation, capture, storage and dissemination of information are adequate. However, there is no consensus on the adequacy of knowledge management for SUWM. Some systems to capture data exist (such as SAFE), but are either not comprehensive or effective enough for water and the environment.

4.6 ORGANISATIONAL STRUCTURE

Rationale:

A combination of organisational design and inter-functional coordination shapes the organisation's structure to enable SUWM.

Results:



Drawing from the individual questions during the focus group discussion, a moderate to high level of organisational structure to achieve SUWM has been identified (see Figure 4-20).

There is overall consensus that SUWM is considered as legitimate area of organisational activity. It is widely acknowledged that Environmental Services is leading SUWM related activities within Council. However, SUWM related activities are starting to be horizontally shared across a few sections. However, there could be more integration and sharing at the vertical level within the organisation. Interdepartmental involvement in urban water management projects is increasing but tension still exists between different departments, therefore they still often function in silos. Project management and unclear processes with regards to responsibilities and shared objectives are identified as obstacles across the departments. A noticeable tension exists between Parks and other groups within the organisation, especially Environmental Services. Environmental Services score effectiveness of cooperation with other departments/directorates slightly lower than these departments view their effectiveness of cooperation with Environmental Services (Figure 4-21).

The IUWM Group is recognised as a mechanism that potentially can bring change for working across Council through a structure instead of ad-hoc, although the group has not yet reached its potential. It has been very successful in helping different disciplines to better understand each other's languages. The intensified communication has especially helped Engineering and Environmental Services into a closer relationship through intensified personal communication between different people⁷. There is certainly a level of commitment to IUWM Group by the different group members, although it is not clear to everyone what their role is within the group. Some involvement of group members seems at present based on collegial relationships and corporate responsibility rather than meaningful engagement. Targets and measures for the group could be made clearer and meeting agenda items and discussions could be worked out in such a way that they become more relevant to everyone.

⁷ Other factors that helped grow the relationship between Engineering and Environmental Services are the direction provided by the Annual Management Plan, the structure of the urban water management plan, and shared responsibility for the Stormwater Management Service Charge.

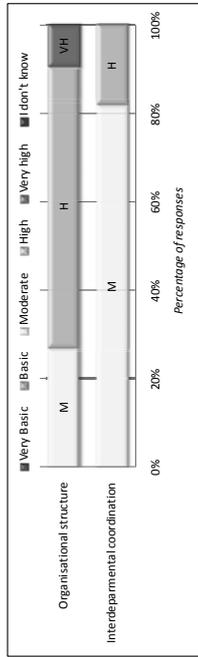


Figure 4-20: Perceived level of capacity in areas of org structure (n=11)
(Based on individual survey questions during facilitated group discussion)

Within the broader context of the Council (all staff survey), 23.9% of staff identify themselves as being members of an inter-departmental group. 63.5% of respondents are of the opinion that interdepartmental group collaboration is important for addressing environmental sustainability, 10% do not know whether it would be of importance to them. Those within Development and Environmental Services, Environmental Services, Technical Services and Community Development identify that it is important to have an interdepartmental group for addressing environmental sustainability. Engineering responses were very diverse with some respondents identifying that interdepartmental groups are not at all important, to others who find it very important. It is interesting to find that a lower number of respondents (49.1% compared with 63.5%) view it as important for them to be part of an inter-departmental group addressing environmental sustainability. There is, however, a positive correlation between respondents that find it important to have an interdepartmental group addressing environmental sustainability and wanting to be involved in such a group.

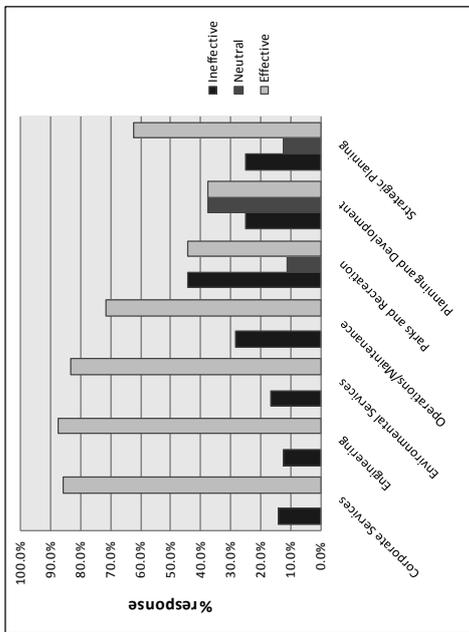


Figure 4-21: Effectiveness of communication with council groups / departments (from respondent perspective)

4.7 CULTURE

Rationale:

Culture is considered the connective tissue that binds together the organisation to work towards a more sustainable practice of managing urban water.

Results:

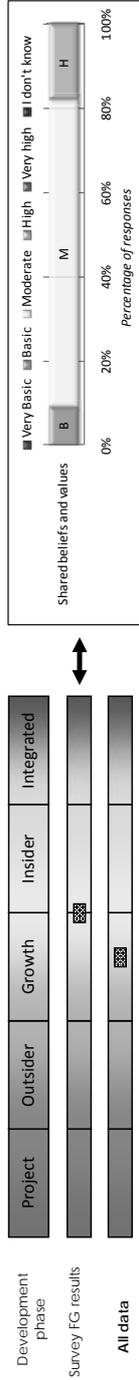


Figure 4-22: Perceived level of capacity in areas of culture (n=11)
(Based on individual survey questions during facilitated group discussion)

Drawing from the individual questions during the focus group discussion, a moderate level of capacity for systems and infrastructure to achieve SUWM has been identified (see Figure 4-22).

Shared beliefs/values for SUWM exist at the team / departmental level, and some senior managers support and share these values, but they are not yet held across the whole of Council. However, SUWM is not a cultural practice that is well established at XXX Council. It seems to occur in the language (which is an achievement in itself) but not in practice. Some explanations in the organisational profile for this relate to:

- Benefits underestimated: costs are emphasised, benefits are not taken enough into account;
- Lack of accountability: SUWM is not clearly part of the portfolio of a range of people;
- Risk adversity: SUWM (approach and technology) seen by some as a risk and liability for the Council and community;
- Existing work pressure: current workloads, plans and budgets are not taken into account when requested to take on new initiatives; grants can be seen to cause a lot of pressure;
- Challenging intellectual furniture: people identified the contradiction between their training (get rid of stormwater as quick as possible) and SUWM principles;
- Normal change processes: there are early adopters and laggards in adopting new things; and
- SUWM is not a Council responsibility: this view was at times expressed as SUWM at local level is seen as cost shifting from State level.

A lack of shared beliefs and values regarding SUWM within XXX Council was, together with other factors, identified as a high constraining factor, stopping Council from implementing SUWM (See Figure 4-23). Although barriers to a shared culture might have been identified, values such as sustainability, community engagement and collaboration are increasingly becoming recognised across the organisation.

Nearly 55% of the overall respondents (all staff survey) are not aware of SUWM activities within Council. Respondents that are least aware are from Parks and Reserves, Resource Recovery, Parks and Streetscapes, Community Development and Communication and Cultural

Services. Although Technical Services included a high number of people who are aware of SUWM activities, still over 30% of the respondents identified that they were not aware of SUWM activities.

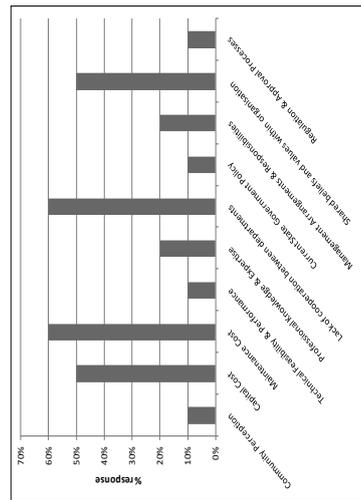


Figure 4-23: Factors constraining Council's SUWM implementation

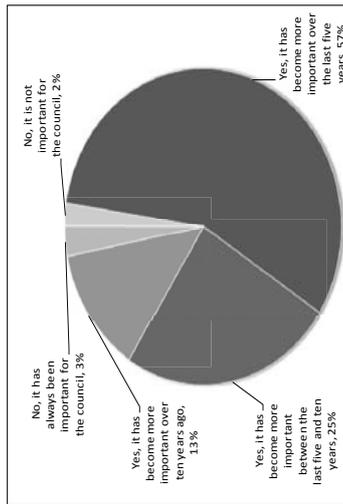


Figure 4-25: Has environmental sustainability become more important for XXX council?

When further developing the SUWM ideology and implementation, it could be helpful to understand the wider views on environmental sustainability and change within Council that help or hinders initiatives. Looking at the broader context for sustainability (all staff survey), 57% of the respondents identify that environmental sustainability has only become more important over the last five years (see Figure 4-25). Over 75% of the respondents view XXX Council as satisfactory to very high performing in terms of environmental management and 60% see that XXX is performing above average in this field in comparison to other councils (see Figure 4-24).

Nearly 50% of Environmental Services respondents are slightly unsatisfied with Council's environmental management performance while respondents in most other departments seem satisfied, most notably Corporate Services and Community Services. The majority of Technical Services views the Council performance as good compared to other councils.

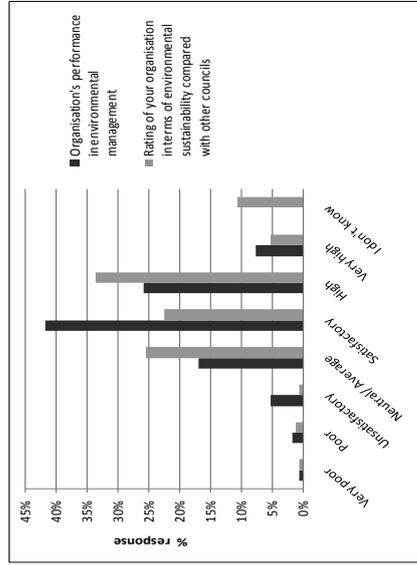


Figure 4-24: Council performance in environmental sustainability

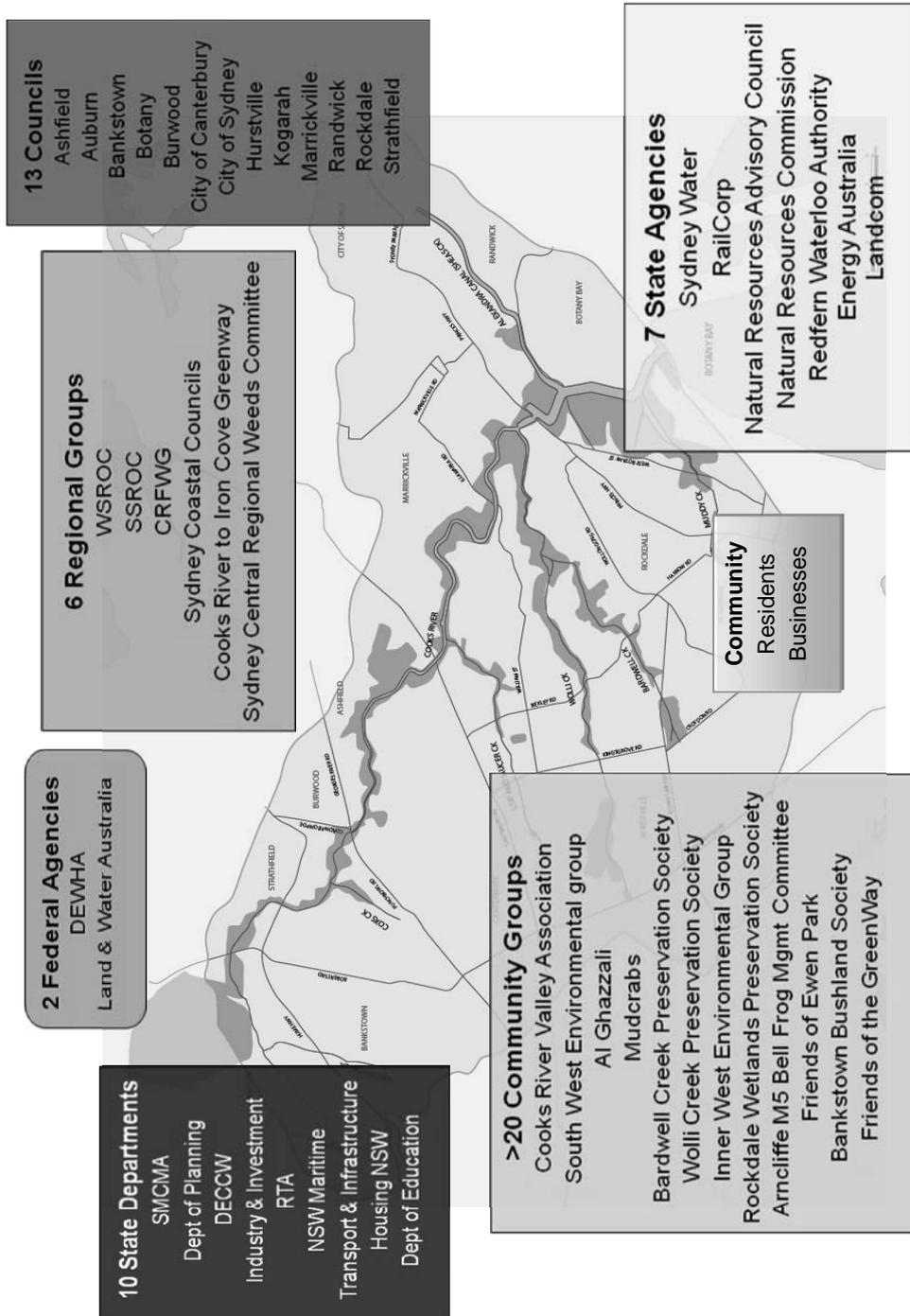
78% of the respondents experience a moderate to high level of freedom in planning their work and 60.4% feel that their ideas are given some consideration within the organisation. A high proportion of respondents, nearly 60%, are comfortable with change in the workplace, while roughly half (51.5%) rate general staff openness to implementing change in the Council as slightly lower.

4.8 EXTERNAL RULES AND INCENTIVES

The current external rules provide a very limited direction for developing and implementation of SUWM. Respondents clearly identified a lack of direction from State Government, which can leave councils with limited incentives to act. This section describes some of the external rules (including policies) and incentive landscape that can facilitate or discourage the implementation of SUWM.

1. Federal Level
 - a. The National Water Initiative (NWI) is an agreement between the Federal Government and all state and territory governments. Clause 92 of the NWI requires the signatories to “review the institutional and regulatory models for achieving integrated urban water cycle planning and management, followed by preparation of best practice guidelines by 2006”. The NWI includes actions related to improving the capacity of all relevant stakeholders (including governments and communities) to achieve Sustainable Urban Water Management.
2. State Level
 - a. Protection of the Environment Operation Act 1997 (Environmental planning)
 - i. Managing Urban Stormwater guidelines
 - b. Environmental Planning & Assessment Act 1979 (Land use planning)
 - i. SEPP (State Environmental Planning Policy) 2008: Rainwater tanks now classed as exempt and complying if they meet certain conditions
 - ii. BASIX (Building Sustainability Index) scheme: all new houses built in Sydney must reduce their mains supplied water consumption by 40 per cent, compared to the current average home
 - c. NSW Catchment Management Authorities Act (Sydney Metro CMA)
 - d. Local Government Act 1993 (stipulates each council to properly manage, develop, protect, restore, enhance and conserve the environment of the area for which it is responsible, in a manner that is consistent with and promotes the principles of ecologically sustainable development)
 - i. Stormwater Management Service Charge
 - e. NSW Water Conservation Strategy (2000): Reduce per capita water consumption by 35%.
 - f. The NSW Metropolitan Water Plan (2006), Meeting the challenges – Securing Sydney’s water future outlines an integrated approach to metropolitan water and includes demand management strategies, water reuse initiatives and urban development guidelines.

4.9 STAKEHOLDERS IN THE COOKS RIVER CATCHMENT



5.0 CONCLUSION

The purpose of this profile is to determine the organisational context in which urban water management is taking place within XXX Council. It has systematically identified the organisational characteristics that will help support or act as barriers to advancing SUWM within Council and the Cooks River Catchment.

Analysis of the data shows that XXX Council is in the growth phase (moderate level of SUWM capacity), with some areas of capacity verging on the insider phase (high level of SUWM capacity) for organisational development. Hence, Council has some effective capacity to facilitate the up-take of SUWM. In particular, capacity strengths for SUWM are found in areas of organisational structure, human resources, aspirations and strategy. However, looking beneath the surface of these strengths, there is considerable improvement needed for Council to reach its full SUWM potential. In addition, capacity in the areas of systems and infrastructure, and culture for SUWM have some clear constraints to the uptake of SUWM. The institutional arrangements external to the organisation, such as legislation and policy for SUWM, provide a very limited direct incentive for developing and implementation of SUWM within Council.

Specifically, the organisational profile suggests the following aspects are priority needs for further developing capacity for SUWM within XXX Council:

- Organisational direction and common understanding of SUWM
 - Council should develop a clear and specific understanding of what it wants to become in regard to SUWM; current aspirations for SUWM seem only to be held by a few.
 - Initiatives focused on the creation of shared beliefs and values regarding SUWM within the organisation should be undertaken; at present SUWM seems to be in the language but not yet in practice.
 - The Integrated Urban Water Management Group should clarify member's roles and responsibilities in regard to SUWM and this group, and meeting agenda items that are relevant to the whole group should be developed.
- Council-wide commitment to SUWM
 - Coherent policy for SUWM should be developed and consistently used; current provisions are very scattered throughout a number of policies, plans and other documents, and at present, direction from the Annual Management Plan is not consistently used.
 - SUWM should become integrated in the portfolios of a broader base of staff.
 - Professional barriers (created through content of education and professional liability – perceived risk) should be recognised and addressed at an individual and organisational level.

- Explicit targets
 - Goals and targets for SUWM, including performance targets with attached measurable criteria should be further developed in order to create common goals between departments; help day-to-day work plans and measure Council's performance in regard to SUWM.
 - Targets with measurable performance criteria should be provided to the Integrated Urban Water Management Group.

- Awareness & Education
 - Knowledge and skills for SUWM should be built within the broader organisation; at present, these are only highly developed in some individuals.
 - Awareness should be raised on potential strategies/measures aimed at improving the management of stormwater in a more sustainable manner among staff; at present very few staff with responsibilities related to urban water management is aware of the full range of stormwater strategy options.

- (Supporting) Systems
 - Development of strategies/measures aimed at improving the management of stormwater in a more sustainable manner.
 - Operation and maintenance (O&M) of SUWM infrastructure should be carried out on a continuous base and O&M staff should be involved in design of on-ground work, so that there is commitment, skills, and funding to keep the infrastructure functioning.
 - Systems for creating, capturing, storing and disseminating knowledge relating to SUWM should be created.
 - An effective environmental management system that covers water and the environment should be established.

It is beyond this organisational profile's objective to provide further detailed recommendations on future capacity development. However, the suggestions above can be a starting point for further development of SUWM within XXX Council. It is recommended that the identified capacity gaps are taken forward in internal group discussions so that strategies can be developed on how to address these. While developing Council's capacity for SUWM, it should be taken into account that this happens in an organisational environment where a large percentage of the staff are (highly) satisfied with the organisation's performance in terms of environmental management and where staff believe that water pollution and conservation currently are getting the priority that they deserve.

REFERENCES

- Ashley, R., Blackwood, D., Butler, D. & Jowitz, P. (2004) Sustainable Water Services - A procedural guide, London, UK, IWA Publishing.
- Bolton, A., Edwards, P., Lloyd, S. & Lamshed, S. (2007) Needs analysis: an assessment tool to strengthen local government delivery of water sensitive urban design. 13th International Rainwater Catchment Systems Conference and 5th International Water Sensitive Urban Design Conference, Sydney.
- Brown, R. R. (2008a) Local Institutional Development and Organizational Change for Advancing Sustainable Urban Water Futures. *Environmental Management*, 41 (2), 221-233.
- Brown, R. R. (2008b) Social and Institutional Components. In Fletcher, T. D. & Deletic, A. (Eds.) *Data Requirements for Integrated Urban Water Management*. London, Taylor & Francis.
- Brown, R. R. (2008c) Social and Institutional Considerations. In Fletcher, T. D. & Deletic, A. (Eds.) *Data Requirements for Integrated Urban Water Management*. London, Taylor & Francis.
- Brown, R. R., Sharp, L. & Ashley, R. M. (2006) Implementation impediments to institutionalising the practice of sustainable urban water management. *Water Science & Technology*, 54 (6), 415-422.
- Creswell, J. W. (2009) *Research Design: Qualitative, Quantitative, and Mixed Method Approaches*, Sage Publications Inc.
- Honadle, B. W. (1981) A capacity-building framework: A search for concept and purpose. *Public Administration Review*, 41, 575-580.
- Loorbach, D. (2007) *Transition Management: New Mode of Governance for Sustainable Development*, Utrecht, International Book, the Netherlands.
- Marrickville Council (2007) *Subcatchment Planning for Sustainable Water Management: Guidelines for Councils*. RiverLife Urban Stormwater Integrated Management Project, Sydney, XXX Council (in partnership with Monash University).
- Marsalek, D. J., Rochfort, M. O. & Savic, P. D. (2001) Urban water as a part of integrated catchment management. In Maksimovic, C. & Tejada-Guibert, J. A. (Eds.) *Frontiers in urban water management: Deadlock or Hope?* London, IWA Publishing.
- Mckinsey & Company (2001) *Effective Capacity Building in Nonprofit Organizations*. Washington D.C., Venture Philanthropy Partners.
- Morison, P. J. (2009) *Management of Urban Stormwater: Advancing Program Design and Evaluation*. Melbourne, Monash University.
- Pahl-Wostl, C. (2007) The implications of complexity for integrated resources management. *Environmental Modelling & Software*, 22 (5), 561-569.
- Taylor, A. (2009) *Advancing Water sensitive Urban Design in the Lower Georges Rives Catchment: A Rapid Assessment of 'Institutional Capacity' in Local Government Agencies*. Worksheets.