CRC for
Water Sensitive Cities

Specifying the Urban Water Governance Challenge

Better governance for complex decision-making

December 2013

An Australian Government Initiative

Specifying the Urban Water Governance Challenge
Better governance for complex decision-making (Project A3.1)
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ISBN: 978-1-921912-31-3

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Date of publication: December 2013

An appropriate citation for this document is:
Bettini, Y. and Head, B. (2013) Specifying the Urban Water Governance Challenge. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.

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Introduction

The broad suite of activities needed to create a Water Sensitive City (WSC) is complex and interrelated. New infrastructure and integrated management approaches for water resources need to be developed. Adaptable governance and administrative arrangements to support these infrastructure systems must be designed and institutionalised. Perhaps most importantly, social learning needs to occur—across the urban water industry, other public services sectors, public administration organisations, and civil society—so the approach to water management reflects societal water values, meets people's needs, and is accepted.

The governance arrangements needed to support these diverse activities will themselves be complexly interdependent and highly contingent on the institutional legacies of local jurisdictions. As with many complex public policy issues, there are no simple blueprint solutions. However, there are some shared ideas of what governance for WSC will entail.

First, a WSC will be built on governance arrangements that embed sustainable urban water management[1] (SUWM) practices (Wong and Brown, 2009). This requires that governance instruments encourage water to be managed in a way that balances environmental, social and economic needs over the short, medium and long term. To do so, anthropogenic and non-anthropogenic water uses, local contexts, and all part of the water cycle need to be considered in planning and decision-making processes, with the involvement of all relevant stakeholders (Mitchell, 2006).

Second, the journey to a WSC will be a long and complicated one. Many technical and institutional experiments will need to be conducted to develop suitable water services systems and the management approaches needed to support them. In addition, the uncertainty surrounding future conditions necessitates that modelling data be used with a greater appreciation of underlying assumptions and margins of error (Milly et al., 2008). Thus decision-making processes and governance arrangements will need to be adaptable; capable of anticipating and responding to feedbacks and changed circumstance, rather than perpetuating a myth of certainty and stability.

These two concepts—sustainable urban water management and adaptive governance—provide starting points for realising WSC. This CRC project seeks to engage with the current institutional challenges to progressing these ideas; by exploring how the complex decision-making processes they involve might be better supported in governance arrangements. The research will identify where and how current hierarchical and centralised governance modes can be supplemented or complimented with alternative governance approaches, to better enable SUWM and adaptability. In this way, the project aims to develop new governance models capable of dealing with the complexity, in content and process, of decision-making for a WSC.

The purpose of this report is to scope and outline the research activities for Project A3.1 *Better governance for complex decision-making*. The report identifies the key governance challenges facing the urban water sector in Australia, and briefly outlines the proposed research that will be

[1] We use the SUWM to encompass the various paradigms of water management the literature recognizes as alternatives to traditional centralized, highly engineered solutions. These include Integrated Water Resources Management, Total Water Cycle Management, Total Catchment Management etc. While each have their own origins and emphasis, essentially they aim for more sustainable use and management of water resources, and so provide the basic tenet for water management in a Water Sensitive City.

conducted to inform solutions to these challenges. The report also seeks to identify some of the other research projects in the CRC WSC that may contribute insights, knowledge and tools for addressing these governance challenges.

Section 1 presents a discussion of what is meant by urban water governance and proposes the objectives that governance arrangements should be designed to deliver, in order to achieve sustainable urban water management. This section is based on a review of relevant literature.

Section 2 identifies some of the current challenges preventing the achievement of these governance objectives for sustainable urban water management. These challenges have been drawn from a review of key contemporary events, policies and reforms which have affected the urban water sector and highlighted the governance issues. The challenges identified in were ground-truthed and clarified through initial discussions with a range of CRC industry partners from Perth, Melbourne and Brisbane.

Section 3 discusses the governance challenges and identifies three key lines of enquiry to develop knowledge for solutions to address them. The section then outlines the proposed research approach for Project A3.1 to generate and apply this knowledge. The section also identifies other CRC projects that may contribute insight, knowledge and tools for these governance challenges.

This milestone report provides an opportunity for industry partners to access the early outputs of the research and provide feedback on future directions of the project. The authors would welcome input on the governance challenges identified, suggestions of empirical examples which might offer useful insight into successful alternative governance approaches, and ideas on specific areas of knowledge and capacity development which might provide the leverage to implement such alternatives. *Section 4* provides a feedback guide to collect this input.

Executive Summary

The premise of Project A3.1 is to engage with the governance challenges of sustainable urban water management, through an exploration of how complex decision-making and adaptability can be better facilitated in governance arrangements. This report clarifies what is meant by governance, collates the principles and objectives of governance arrangements for sustainable urban water management (Section 1) and examines the contemporary challenges to achieving these in Australian cities (Section 2). The report thereby sets out the key governance issues which will need to be addressed in the development of Water Sensitive Cities (WSC). The report then distils these challenges into three key knowledge and capacity gaps, flagging the key lines of inquiry research activities will focus on in order to develop alternative governance models for supporting progress to WSC (Section 3).

Informed stakeholder feedback is sought on the governance challenges identified in this report and on the proposed direction of the subsequent research activity. This will ensure the research targets the governance knowledge gaps and capacity issues faced by the Australian urban water sector, to inform solutions and how better governance models might be applied. Feedback will also help to identify suitable empirical studies to generate new knowledge and identify existing solutions. A feedback guide is provided in Section 4 (page 48) to facilitate this input.

Clarifying urban water governance

This research views governance as combinations of processes, structures and actors, which provide the architecture to achieve agreement on the values and uses of water, and to coordinate actions to realise these values and uses in water management practice.

Actors (individuals, groups and organisations) come together in processes of decision making (including value judgments, goal clarification, negotiation and commitment to actions) to design systems of rules (structures of ownership, authority, legitimacy and accountability) composed of various instruments (structures to create incentives or sanctions) to guide practice (water management) toward collective interests (objectives and outcomes).

This broad definition of water governance provides the opportunity for Project A3.1 to explore the ‘soft’ motivational and perceptual influences that translate and implement the ‘structural’ legislative, regulative and policy frameworks of governance, alongside the arrangement of these formal systems of rules into suitable governance models.

Governance objectives for sustainable urban water management

The urban water literature recognises that governance arrangements are becoming ineffective at managing water to meet societies' water needs under the current environmental, socio-political and economic conditions. Urban water scholarship has widely recognised that traditional arrangements have not responded to the need for:

- integration of issues and sectors
- management of problem sources not effects
- more flexible management approaches
- more attention to management of human behaviour through 'soft' measures
- participatory management and collaborative decision making
- the environment to be explicitly incorporated in management goals
- open and shared information sources (including linking science and decision making),
- incorporating iterative learning cycles into the overall management approach

There is now a consistent view in the literature that a new style of governance is needed to account for these deficiencies. The following governance objectives are widely regarded as the foundational principles needed to manage water in a sustainable manner:

- Provide a process to develop **a shared understanding of the outcomes** water management should produce, **establish commitment to clear time-bound objectives** toward achieving this vision, and to **review and evaluate** progress
- Set **roles, responsibilities and accountabilities** for delivering a range of benefits and services with water resources, which align with the vision
- **Embed total water cycle management principles**, and require **integration with other sectors** through these administrative arrangements and aligned outcomes and objectives
- Provide **clear rules and guidance on trade-off decisions and acceptable risk**, including robust methods of option assessment and costing
- **Consider a full range of instruments** (regulatory, economic and educational), and the mix that incentivises and sanctions effective organisational practices and cultures and appropriate consumer behaviours
- **Distribute financial resources** to provide reliable **base funding**, appropriate **mixes of investment** (research & development, innovation, education, marketing, capacity building etc.), and mechanisms for **discretionary/strategic funds**
- **Minimise or manage disruptive influences** (organisational change, change of Government, climatic extremes, media reporting)
- Require **transparency** in planning and decision-making
- Establish **monitoring and evaluation cycles** of key processes, initiatives, activities and organisations which **capture learning and the evidence-base** needed for **reflexive practice**
- Determine clear points of consultation, engagement and empowerment for stakeholders and citizens, and guidance on appropriate **processes for participation**

(Compiled from: Dovers, 2005b; Geldof, 2005; van der Brugge et al., 2005; Mitchell, 2006; Wong and Brown, 2009; Biswas and Tortajada, 2010; Van De Meene et al., 2010; Pahl-Wostl et al., 2011)

This list presents the best available knowledge of what structural arrangements, types of processes, and actor memberships and activities will be needed to instigate resilient and adaptable on-ground water management practices and infrastructure systems. The specific governance instruments for achieving these objectives may include informal, collaborative network-style solutions and market-based mechanisms; alongside more traditional top-down arrangements. These objectives provide a starting point for developing the combination of governance arrangements that will embed SUWM, providing the water management foundations of a WSC.

Identifying the governance challenges

A desktop review was conducted to explore how urban water governance has weathered the last few decades, what have been the challenges faced, what governance responses and solutions were implemented, and what the emerging challenges are. These challenges were further refined, clarified and expanded through discussions with industry practitioners in Perth, Melbourne and Brisbane. These practitioners worked at a policy/strategy level in State government departments, water businesses, local governments and land development agencies (n = 17).

This provided a list of governance challenges that will need to be addressed in order to move toward the sustainable urban water management underpinning a water sensitive city. These challenges are listed in Table 1, and are matched to the main governance objectives they impede.

Table 1: Governance objectives and challenges for achieving Sustainable Urban Water Management

Governance objectives for SUWM	Current challenges
Develop a shared understanding of the outcomes, and establish clear objectives	Inadequate processes for developing shared understandings, motivations and objectives, at multiple scales of government and across government bureaucracies.
Set roles, responsibilities and accountabilities for delivering a range of water benefits and services	Missing accountability, legitimacy and capacity for some water management functions.
Enable total water cycle management, and integration with other sectors	Discontinuity between relevant legislative frameworks in: principles and objectives, planning processes, decision-making frameworks, and stakeholder and citizen participation. Inadequate incentives or processes for collaborative action at multiple scales of government and across government bureaucracies.
Provide clear requirements and guidance for trade-off decisions and acceptable risk, including robust methods of option assessment	Conflicting or contradictory objectives between commercial management of water services and water resources management for public benefit. Lack of accepted valuation and assessment tools to make and support decisions. Increased complexity of managing multiple water sources for multiple and/or fit-for-purpose uses, with untested protocols and procedures and underdeveloped skills and capacities in the workforce.
Consider a full range of instruments that incentivise and sanction appropriate organisational practices and cultures	Limited knowledge of governance instruments that incentivise efficiency, collaboration and innovation in organisational cultures. Limited understanding of how to adapt business models to incentivise flexibility and innovation within the public sector's backdrop of politics, high regulation, high fixed transaction costs, and lower risk tolerance.
Consider a full range of instruments that incentivise and sanction appropriate consumer behaviours	Limited knowledge of governance instruments and mixes that incentivise desired behaviours and attitudinal change.
Distribute financial resources to provide reliable base funding, appropriate mixes of investment and discretionary/strategic funds	Lack of appropriate valuation tools. Low understanding of the connections between political risks and financial decision-making Assessment criteria for price regulation unclear for issues beyond economic considerations
Minimise or manage disruptive influences	Limited checks and balances on hierarchical governance powers embedded in current arrangements. Lack of mechanisms to enable long-term public service-citizens relationships: to develop on-going informed discourse, trust and confidence in public decision-making, and community capacity for participation.
Require transparency in planning and decision-making	Inadequate requirements and/or accountability for information distribution and meaningful public reporting.
Establish cycles of performance evaluation at various levels linked to open reflexive learning and planning	Limited monitoring and reporting on triple bottom line outcomes of water management and disconnected from organisational performance appraisals.
Determine clear points and appropriate processes for participation of stakeholders and citizens	Lack of guidance on appropriate scope and design of participation processes in various water management activities.

Developing governance and policy capacity for a Water Sensitive City

Through the processes of reviewing literature and initial discussions with practitioners, the following capacity issues were frequently raised as underlying many of the governance challenges identified in Table 1:

- Regulatory constraints to new solution adoption (both technical and non-technical)
- Regulatory constraint to organisational change in service delivery focused organisations
- Lack of available tools to both make and justify policy decisions, by showing clear benefits, relative costs, and the demand for various services/outcomes of different policy options
- Limited incentive mechanisms to encourage solution innovation, organisational/'business' innovation, the emergence of leadership and champions, and collaboration

As such, it is proposed that the future activities of Project A3.1 focus on the following key lines of enquiry:

1.) Incentive structures and sanctioning mechanisms for innovative solution development—and for the organisational change, leadership, and championing needed to adopt these new ideas
2.) Policy capacity in: options assessment methods, decision support tools, aligning objectives and priorities horizontally and vertically, selling the message to decision-makers—and how to access the resources, knowledge and skills for this policy work
3.) Collaborative capacity across the sector in: requirements and/or guidance for stakeholder and citizen engagement, resource and skill availability, and matching engagement purpose with the right process for quality collaborative outcomes

The next phase of research in Project A3.1 will review governance models and mechanism from complex policy areas nationally and internationally, focusing on generating knowledge in these three key areas. A number of discrete empirical research projects will also be conducted to explore these three main lines of enquiry. Initial ideas include:

- Surveying of spatial/statutory planners to understand how complex trade-off decisions are made and justified within a policy framework covering a number of sectors, how these decisions interface with other sectors, and what tools help to support such decision-making processes
- Reviewing the tools and techniques available from the natural resources management sector for effective engagement of community and stakeholders, and workshopping these to develop guidance on how they may be adapted or adopted in the urban water sector
- Workshopping the results of the regulatory mapping conducted by Project A3.2 to understand how these frameworks incentivise or sanction innovative practice and organisational culture, to identify how better incentives might be built into water regulation and legislation
- Examining the outcomes of Project A3.3 to understand how the policy development process can better influence political considerations and priorities
- Understanding how performance information drives innovation and change in water utilities, and exploring the perceived value of different types of this information from an organisational culture perspective
- Examining the collaborative and boundary spanning strategies of key actors to bridge divergent institutional and organizational logics, and how these strategies expedite the uptake and establishment of water sensitive practices on ground (current PhD)
- Exploring how radical system innovations such as water recycling or decentralised supply infrastructure become institutionalised across the water industry (current PhD)

The Project A3.1 team would welcome ideas for possible case studies which may produce knowledge and insight into the three key areas of enquiry that have been developed in this report (incentives, policy and collaboration capacity), and any further ideas about the governance challenges identified in this report. A feedback guide with key questions is provided in Section 4 (page 48) to assist with providing this input.

Section 1: Clarifying urban water governance

The concept of governance has many meanings. It may encompass the various pieces of water legislation and organizations responsible for administering this framework, or it could refer to the model of leadership roles and responsibilities within an organization. It could be used as an umbrella term to capture a broad range of collective and representative decision-making on issues effecting society, or the specific processes and procedures of a group such as a committee or a club. Such a variety of meanings show diverse scales, subject matter and objectives of governance, and reflect the many fields of research that draw on the concept (Kjær, 2004; Tiihonen, 2004). Some authors suggest that the term governance is becoming somewhat of a catch-all term (Lafferty, 2004; Kjaer, 2011). In the urban water space there is a tendency to use the term to capture the broad range of non-technical facets of urban water management. It is therefore important to establish a working definition of governance to bound this research, situate it in the broader suite of CRC projects, and establish an understanding of the concept across the CRC community of researchers and industry partners.

Government to governance

The relatively recent emergence of governance as a popular concept (Tiihonen, 2004; Treib et al., 2007) can be traced along a number of disciplinary heritages (Kjær, 2004). We follow the public administration/political science lineage, as it is central to our main concern – the management of a natural resource for the public interest. The concept of governance emerged because of a need to recognize the variety of elements that create systems of rule in modern society. By the 1980s, significant changes in the political economies and civil society of many developed nations were diminishing the financial, intellectual and institutional capabilities which governments required to govern effectively (Pierre & Peters, 2000). Market-based political philosophies justified the shifting of financial and intellectual capital to the private sector (Rhodes, 1997), while the increasing complexity of government services and higher community expectations led to calls for increased participation, greater transparency and better accountability in decision-making (Kjær, 2008). While governments were still regarded as the right mechanism for pursuing the collective interests of society, their capacity to do this seemed to be diminishing. Rhodes' (1997) seminal work suggested this represented a 'hollowing-out' of the state. While scholarly debate continues over whether these developments have resulted in the decline of Government's ability to govern, (Marinetto, 2003; Rhodes, 2007; Bell and Hindmoor, 2009; Kjaer, 2011), there is general agreement on two key observations: i) that the traditional authority of the state, based on hierarchical structures, was no longer the sole mechanism for governing (van Kersbergen and van Waarden, 2004; Rhodes, 2007; Kjær, 2008) and, ii) the line between governor and governed had become blurred (Peters and Pierre, 2000; Rhodes, 2007). Linear, top-down, command and control public administration has been replaced with aspirations for inclusive, polycentric forms of governance (Ostrom, 2005) that employ a broader range of instruments and approaches (Bell and Hindmoor, 2009). Consequently, the diversity of ideas and practices encompassed by the concept of governance are so broad as to move beyond the authority of governments (Stoker, 1998). Distinguishing between government and governance (Rhodes, 1997) provided a way to examine how the latter might be 'supplied' through the alternative forms of societal organization that were being identified (Young, 2010a). This recognition—that patterns of rules and norms to steer (govern) society, could exist beyond a

Government (Blomberg, 2004)—opened the way for the development of theories on how such alternative systems of rule could be designed (Kjær, 2004; Rhodes, 2007; Young, 2010a).

Governance literature provides many perspectives on these new ideas of governance, including: common principles of good governance (Graham et al., 2003), institutional design principles for achieving these (Dovers, 2001), typologies of governance modes (Meuleman, 2008), and frameworks for understanding and analysing the diversity of governance arrangements (Ostrom, 1998; Crosby and Bryson, 2005; Pahl-Wostl et al., 2010). These developments capture important insights into understanding how 'steering' capability—the act at the heart of governing (Mayntz, 2003)—can be achieved through alternative governance arrangements (Bell and Hindmoor, 2009).

This new idea of governance has expanded the conceptual space for understanding how governments can manage water and deliver water services within the context of a complex decision-making environment. To understand governance for complex decision-making in the urban water environment, we first need to understand what forms urban water governance may take, and what purpose it needs to serve, or, What is it aiming to achieve?

A working definition of governance

In a meta-analysis of governance related literature, Trieb and colleagues (2007) identify three main strands which often structure discussions of governance: whether the focus is on *politics* (actor constellations and power relations between them), *polity* (systems or forms of rule and authority structures), and *policy* (steering processes and instruments). Other governance scholars also follow the use of this triad of components to understand the system of governance (Marinetto, 2003; Crosby et al., 2010; van de Meene et al., 2011). Indeed Rhodes (2007) notes that the decentered view of governing that governance provides is '*an alternative way of conceptualizing institutions, actors and processes of change in government*' (Rhodes, 2007: 1259). We use these concepts of *actors*[2], *structures* and *processes* to describe the substantive elements of governance, and propose the following working definition of urban water governance as:

Combinations of processes, structures and actors, which provide the architecture to achieve agreement on the values and uses of water, and to coordinate actions to realise these values and uses in water management practice.

Within this definition actors come together and through processes of decision-making (including value judgments, goal clarification, commitment to actions) to design systems of rule (structures of ownership, legitimacy, authority and accountability) composed of a variety of instruments (types of structures including incentives and compliance mechanisms) to guide practice (water management) toward collective needs and interests.

It is important to distinguish between water governance and management, as a lack of clarity between the two could lead to research that encompasses an all too broad range of activities, muddling insight and confusing findings and recommendations. Governance arrangements establish a membership of actors to set principles and objectives for some shared pursuit, and the structures and instruments to facilitate actions to achieve these goals. The actions which result as actors make

[2] Actors may be individuals, groups or organisations. We also distinguish between actors as stakeholders (having a formally recognized role in managing water) or citizens/customers (the general community).

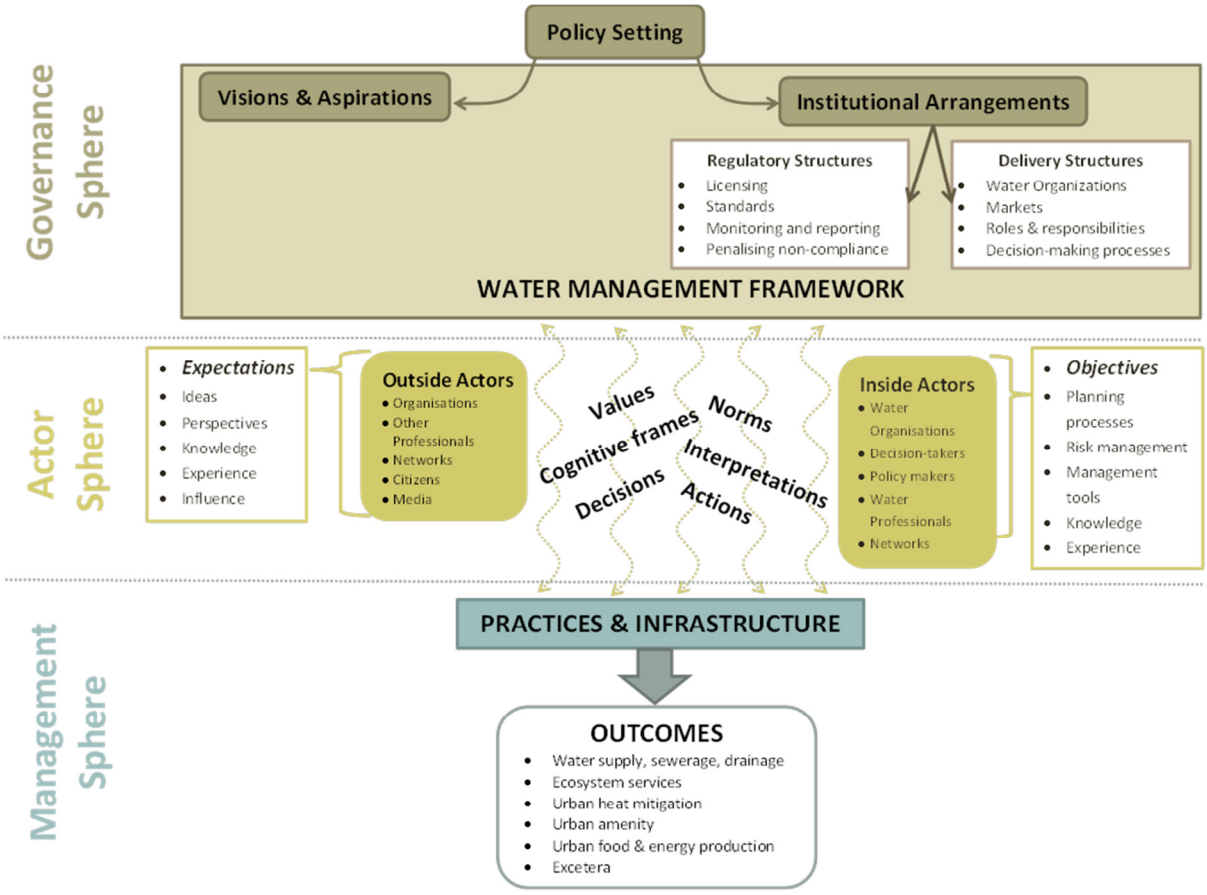
use of this administrative architecture to deliver water services, is management. To further expand this important point, water governance:

- Sets up who is responsible for water
- Determines what they should be aiming to deliver through their respective water management roles
- Provides boundaries around what actions they can take to achieve these delivery objectives using incentive and compliance mechanisms, and
- Provides for monitoring on the performance of these activities (regulation, policy review e.c.t.)

Water management is the implementation of these prescriptions to organise water resources to achieve the stipulated goals. This involves the interpretation and translation of the governance arrangements into activities and physical infrastructure.

These ideas are illustrated in Figure 1, which represents governance as a gathering together of actors (or their representatives) to: determine the values of water to a city (policy setting), develop mutual goals to realise these values (visions and aspirations) and, agree on roles, responsibilities, strategies, activities, guidelines, monitoring and compliance mechanisms (the water management framework) to steer water management practices toward the achievement of these goals (outcomes).

Figure 1: Conceptual model of current urban water governance



Some notable governance issues, often discussed in environmental governance literature and raised anecdotally by urban water professionals, are also illustrated in Figure 1, including:

- the distinction between inside and outside actors, highlighting long debated issues of representation and participation
- the external nature of the policy setting arena, where values are determined, formalised in visions and aspirations, and connected to institutional arrangements, in a highly political environment
- the disconnection between inside actors objectives and outside actors expectations, which result from implicit value judgments and representation/participation issues
- the perception that a water management framework made up of delivery and regulatory structures will deliver suitable water management practices and technologies, when the 'filtering' effect of actor's interpretations, decisions, norms and actions can alter the implementation (and outcomes) of the framework
- the one-way flow of policy implementation, with limited formalised and resourced feedback mechanism for policy evaluation, learning and performance monitoring
- the distinction between operational level and policy level, presuming that governance challenges may differ between the two levels
- the challenge of connecting these levels, requiring an understanding of how actor networks interpret, translate and navigate the formal management framework through informal institutions, and
- that a broad range of actors are now involved in translating water governance arrangements into practices and physical infrastructure solutions while others can have indirect influence over the outcomes achieved.

Figure 1 illustrates an understanding of governance which recognises the policy arena establishing a formal water management framework, and the informal processes within actor networks which translate this framework into water management practices and infrastructure. The governance system is therefore a product of interaction between governance structures (institutional frameworks such as legal arrangements, legislation, organisational remits) and the nature and activities of actors (problem frames, interpretations, relationships and capacity for agency), through various processes (decision-making, goal setting, water planning, trade-offs and negotiations, policy and budget cycles).

With this understanding of urban water governance, the next key question is, how do we know if governance arrangements are working or not? What should successful or appropriate water governance arrangements achieve?

Governance objectives for sustainable urban water management

The discussion above has framed governance as a system of shared agreements and supporting conventions that bring actors together to work toward common goals. But how does this understanding of governance help to address urban water management problems? Why is current urban water governance apparently ineffective at managing water to meet societies' water needs? Why are they not functioning under the current environmental, socio-political and economic conditions? Pahl-Wostl (2008) provides a distilled list, recognising that traditional arrangements have not responded to the need for:

- integration of issues and sectors
- management of problem sources not effects
- more flexible management approaches
- more attention to management of human behaviour through 'soft' measures
- participatory management and collaborative decision making
- the environment to be explicitly incorporated in management goals
- open and shared information sources (including linking science and decision making),
- incorporating iterative learning cycles into the overall management approach

Van der Brugge and colleagues (2005) suggest a new style of governance is needed to account for these deficiencies. Their comparison of traditional and predicted governance styles to support more sustainable water management are adapted in Table 2.

Table 2: Traditional and anticipated governance styles for water management

Old Governance Style	New Governance Style
Command and control	Prevention and anticipation
Focus on solutions	Focus on design
Planning approach	Process approach
Technocratic	Societal
Reactive	Anticipative and adaptive
Sectoral water policy	Integral spatial policy
Optimisation of discrete service delivery	Effectual, efficient provision of multiple services and benefits
Hierarchical and closed	Participatory and interactive

Adapted from van der Brugge et al. (2005)

Recent research into the Australian water sector also suggests new forms of governance which incorporate a mix of hierarchical, market and network instruments will be needed to achieve the aspirations of sustainable urban water management (SUWM)[3] (van de Meene et al., 2011; Rijke et al., 2013). Designing and implementing new governance forms will, of necessity, be on a case-by-case basis. One-size-fits-all governance designs are widely regarded as ineffective, as they do not account for local conditions, historic legacies, embedded institutions, and cultures (Ostrom and Cox, 2010). However, translating the style characteristics listed in Table 2 into applied objectives which governance arrangements should be aiming to achieve is an important first step to understanding what governance for a WSC will look like. Such objectives can then be adapted and translated into local contexts with appropriate mixes of difference governance instruments. Drawing from the literature on SUWM and environmental governance and policy, the following governance objectives to support more sustainable management of urban water resources and services were compiled; governance arrangements should aim to:

- Provide a process to develop **a shared understanding of the outcomes** water management should produce, **establish commitment to clear time-bound objectives** toward achieving this vision, and to **review and evaluate** progress
- Set **roles, responsibilities and accountabilities** for delivering a range of benefits and services with water resources, which align with the vision
- **Embed total water cycle management principles**, and require **integration with other sectors** through these administrative arrangements and aligned outcomes and objectives
- Provide **clear rules and guidance on trade-off decisions and acceptable risk**, including robust methods of option assessment and costing
- **Consider a full range of instruments** (regulatory, economic and educational), and the mix that incentivises and sanctions effective organisational practices and cultures and appropriate consumer behaviours
- **Distribute financial resources** to provide reliable **base funding**, appropriate **mixes of investment** (research & development, innovation, education, marketing, capacity building etc.), and mechanisms for **discretionary/strategic funds**
- **Minimise or manage disruptive influences** (organisational change, change of Government, climatic extremes, media reporting)
- Require **transparency** in planning and decision-making
- Establish **monitoring and evaluation cycles** of key processes, initiatives, activities and organisations which **capture learning and the evidence-base** needed for **reflexive practice**
- Determine clear points of consultation, engagement and empowerment for stakeholders and citizens, and guidance on appropriate **processes for participation**

(Compiled from: Dovers, 2005b; Geldof, 2005; van der Brugge et al., 2005; Mitchell, 2006; Wong and Brown, 2009; Biswas and Tortajada, 2010; Van De Meene et al., 2010; Pahl-Wostl et al., 2011)

[3]We use the term (SUWM) to encompass paradigms of water management the literature recognizes as alternativess to traditional centralized engineered solutions. These include integrated water resources management, total water cycle management, total catchment management etc. While each have their own origins and emphasis, they essentially aim for more sustainable use and management of water resources, and so provide the basic tenet for water management in a Water Sensitive City.

This list presents the best available knowledge of what structural arrangements, types of processes, and actor memberships and activities will be needed to instigate resilient and adaptable on-ground water management practices and infrastructure systems. The specific governance instruments for achieving these objectives may include informal, collaborative network-style solutions and market-based mechanisms; alongside more traditional top-down arrangements. These objectives provide a starting point for developing the combination of governance arrangements that will embed SUWM, providing the water management foundations of a WSC.

Readers may recognise areas where current governance arrangements are delivering these objectives well, and others that are problematic. The next section will identify which objectives are being met, and which need work. The latter category we describes as governance challenges throughout this discussion paper. These will be the focal point for the research—identifying the structures, processes and actor relationships that can address these challenges and deliver on the objectives listed above.

Section 2: Identifying the governance challenges

This section describes recent developments and current forms of water governance in Australian cities. We explored how urban water governance has weathered the last few decades; what have been the challenges faced, what responses were that were reflected in governance reforms, and what are the emerging challenges for contemporary urban water governance. This review provides a starting point for targeting the governance issues and questions addressed by Project 3.1. to the needs of CRC Industry Partners.

The section does not attempt to provide a comprehensive account of governance arrangements. Rather, it explores key shifts in water policy and governance responses over the last 20 years. This time period has been one of significant industry reform, in contrast to the relatively stable arrangements in urban water management prior to the early 1990s (Davis, 2012). This timeframe provides the backdrop to contemporary governance arrangements and challenges. The following events provided the drivers behind major shifts experienced by the sector during this time:

- Commercialisation of public utilities
- The rise of Integrated Water Management
- National policy frameworks
- Millennium drought and flood

The governance responses to these drivers have been identified through a desktop study, and discussions with industry practitioners working at a policy level in State government departments, water businesses, local governments and land development agencies (n = 20). The commentary provides a contemporary understanding of water governance in Australia, the use of instruments and approaches, and what the emerging challenges may be. A number of these events have over-lapping time frames or are continuations of earlier developments, so influence governance responses concurrently.

To guide the exploration of these phases of governance change, the following key questions were constructed based the understanding of water governance discussed in Section 1:

- What were the key policies or policy agendas?
- How were the roles and responsibilities for water structured across the sector?
- What were the key instruments, incentives and compliance mechanisms employed?
- How did stakeholders and the general community participate in governance processes?
- What were the results of the reforms? What was learned? What issues and challenges emerged?

These questions frame the commentary on each phase of reform and help to extract some of the governance challenges Project A3.1 may seek to examine. Key questions relating to the governance issues the commentary raises are highlighted at the close of each section.

Commercialisation of public utilities

Prior to the late 1980's, urban water organisations[4] were predominantly large engineering focused public works boards/commissions. These organisations maintained planning, funding and ownership responsibility for major infrastructure assets and water services in the name of State governments. In regional areas and some metropolitan areas (e.g. Brisbane and Hobart) supply and service functions were devolved to local councils, who created business units to deal with these responsibilities. Overtime these business units evolved into successful commercial enterprises (Paddon, 2013). Even where responsibility for the supply of water services did not rest with the State government, a Public Works department often existed to provided technical and financial support to, and some retained the right to approve works (Davis, 2012). The larger and/or less populated States and territories (WA, SA, NT, ACT) tended toward a model of one large State organisation providing water services across their jurisdiction. These governance arrangements had remained relatively stable since publically funded capital works programs had emerged to provide water services to the growing colonies. The late 1980s/early 1990s saw a wave of reforms that fundamentally changed the 'rules of the game' in urban water service provision. It could be argued that the impact of these reforms is still being grappled with today. This section explores the origins and early implementation of these reforms through the Council of Australia Governments (CoAG) Water Reform Framework, and takes stock of the governance challenges that resulted.

Policy agendas

In the 1980's a move toward micro-economic reform resulted in a paradigm shift in the way governments did business (Paddon, 2013). The water sector was one of a number of public services subject to significant reforms. Known as New Public Management, this change to public administration was driven largely by an efficiency remit. The size, structure and operational processes of government were seen as too inefficient. To remedy the adverse effects of this internal inefficiency, business models from the private sector were applied. These models focused on outputs and outcomes, measuring results, and a preference for 'leaner, flatter' organisations with greater autonomy (Bell and Hindmoor, 2009: 87). This shift from the public *administration* to a public *management* model of government permeated CoAG water reform discussions in the early 1990s. A plan for strategic water reform was agreed in a 1994 meeting of CoAG (Council of Australian Governments, 1994) and this agenda was subsequently included as the water industry reform package of the National Competition Policy in 1995 (Paddon, 2013). The reforms agreed to by the State and Commonwealth governments predominantly covered economic and institutional themes such as: consumption based water pricing, full cost recovery, removal of cross subsidies, and the separation of water services, regulation and policy development. The agreement also encompassed procedural issues such as, consideration for integrated management of water and environmental concerns in decision-making, inclusion of public consultation and education mechanisms, and requirements for independent performance monitoring and benchmarking (Jane and Dollery, 2006).

[4] This report uses the term organisation as a generic reference to the diverse entities with a role in managing and governing urban water; from statutory authorities, government departments and agencies, and independent commissions to the water businesses operating under various models of corporatisation.

Roles and responsibilities

Implementation of the reforms was pursued through major restructuring of the sector. Policy, service delivery and regulatory functions were designated to different organisations and States and Territories reformed their water service organisations following corporate business models, providing a greater level of autonomy from central Government (Jane and Dollery, 2006). This increased autonomy saw a greater diversity in management and financing approaches for water services: from contracting for business services (e.g. legal, accounting etc.) and build and operation of infrastructure (e.g. Build-Operate-Own-Transfer contracts), to the private operation of water services (e.g. SA Water's contracting out of water supply and wastewater services in Adelaide) (Davis, 2012; Paddon, 2013).

While the issue of public ownership of essential services becomes a periodic public debate, Paddon (2013) argues the CoAG water reforms resulted not so much in changes in ownership but changes in the financing and operations of water utilities. As Sheil (2000) highlights, the overarching impact of the commercialisation of the sector was the rationalisation of organisational activities. Operations of water utilities were narrowed to only those 'core business' activities needed to meet compliance requirements. For example, while water businesses could justify water resources planning as an essential activity to ensure viable operation into the future, activity to address more strategic, emerging or cross-cutting issues such as integrating water management with land use or diffuse water quality management, were not as easily argued. Nevertheless, some organisations saw and argued the benefits of including these issues in their remit to a certain extent.

These governance changes are traced in Table 3, which provides an overview of the roles and responsibilities for urban water management in the years following the CoAG reforms. It is by no means a comprehensive account of these complex arrangements, as water management functions can cross over multiple organisations, each jurisdiction interprets water management functions differently , and functions can lose emphasis (hence traceability) during machinery of government changes. In an attempt to capture some of the complexity, the prime organisation which was responsible for each water management function is listed, and succeeding organisations are also recorded to trace the responsibility for the functions as much as possible. The organisations are traced from the mid-1990s until the mid-2000s, when the impacts of the drought bought a new wave of structural reform.

Table 3: Water management roles and responsibilities following the 1994 CoAG reforms to the mid-2000s

Management Functions	Melbourne	Perth	SEQ	Hunter Region	Sydney	Adelaide
Bulk Water Supply	Melbourne Water	Water Corporation	SEQ Water Local government	Hunter Water	Sydney Water (-1999) Sydney Catchment Authority (1999 -)	SA Water[3]
Retailer(s)	Yarra Valley Water South East Water City West Water	Water Corporation	Local government	Hunter Water	Sydney Water	SA Water
Wastewater	Melbourne Water	Water Corporation	Local government	Hunter Water	Sydney Water	SA Water[3]
Drainage	Melbourne Water Local Councils	Local Government Water Corporation	Local government	Local government	Sydney Water	Local government
Catchment management	Melbourne Water Port Phillip and Westernport CMA (2002-)[1]	Swan River Trust Water Corporation Local Government NRM Councils	Water Resources Commission Dep of Primary Industries (-1996) » Dep of Natural Resources (1996-2001) Local government	Hunter-Central Rivers CMA	Sydney Catchment Authority (1999-)[2] Dep Urban Affairs & Planning (1995-2001) » Dep Planning (2001-03) » Dep Sustainable Natural Resources & Sydney Metropolitan CMA (2004-13)	Water Catchment Boards (1995-2006)
Environmental Regulation	EPA	Dep of Environmental Protection (1994-2004) » Dep of Environment (2004-06)	Dep of Environment and Heritage » EPA (1998-2009)	EPA		EPA
Human Health Regulation	Dep of Health	Dep of Health	Queensland Health	NSW Health Dep		EPA
Economic Regulation	Office of the Regulator-General (1994 – 2002) Victorian Essential Services Commission (2002-)	Office of Water Regulation (1996-2004) Economic Regulation Authority (2004-)	Queensland Competition Authority (1997-)	Government Pricing Tribunal (1992-1996) Independent Pricing & Regulatory Tribunal (1996-)		Essential Services Commission of SA (2002-)
Policy development/long-term planning	Dep of Conservation and Environment » Dep of Natural Resources and the Environment (1996-2002) » Dep of Sustainability and Environment (2002-13)	Water and Rivers Commission (1995-2007) » Dep of Water (2008-)	Dep of Primary Industries Water Resources Commission (-1995) » Dep of Natural Resources (1995-2001)	Dep of Land & Water Conservation (1995-2003)		SA Water Water Catchment Boards

[1] From 2002 the Port Phillip and Westernport CMA was established to coordinate and facilitate catchment management. However Melbourne Water retails the role of 'caretaker' of river health through its operations including management of water quality, regional drainage and river diversions, regulation of works and role in development application approvals

[2] The Sydney Catchment Authority's responsibilities are limited to the management and protection of water catchment areas and infrastructure for potable water quality and public health risks.

[3] Operation and maintenance of the Adelaide metropolitan water and waste water services were contracted out to United Water International until 2011. The current contract is held by the ALLWATER consortium.

Sources: State government online public record archives, organisation's websites and other historic accounts.

Instruments, incentives and compliance

Implementation of the 1994 CoAG agenda was driven by significant milestone payments to State Governments through the National Competition Policy reform process (Paddon, 2013). Despite these economic incentives and the comprehensive, clear, time-bound targets within the CoAG agreement, studies note that this was not sufficient to drive a full implementation of the reforms (Musgrave, 2000; McKay, 2005).

In terms of instruments for water services delivery, there are clearly legislated obligations through the operation licences of water utilities. Another instrument to set service delivery standards is the legislated provision for water businesses to define their standards of service in Statements of Obligations, Customer Contracts or similar operating charters. Compliance mechanisms for service delivery are outlined in the conditions for operation licences, Commonwealth Corporations law and other relevant State legislation. Two key issues that emerged to pose challenges to governance; mechanism for Community Service Obligations (or similar) and innovation incentives for corportised water businesses.

A key dilemma arising from the commercialisation of water services is the ability to deliver a full range of water management outcomes for broad community benefit. Commercial operating principles narrow activities to only 'core business,' as efficient delivery and cost minimisation drives decisions; cutting back activities to deliver only those outcomes which would be penalised for non-compliance. Any additional benefits which might be attained through alternative approaches and/or additional investment are considered beyond the remit of the organisation, and thus expenditure cannot be justified.

A mechanism for delivering broader benefits of water is the community service obligation provisions in legislation of most jurisdictions, which go under various names. These provisions are structured in different ways, but ultimately aim to provide a way for water utilities to justify decisions and/or expenditure on those benefits which are beyond the immediate commercial interests of the organisation. How this mechanism performs in practice to broaden the benefits delivered by water management (i.e. beyond supply, sewerage and drainage), is a key area for further attention if SUWM is to be achieved.

A second important incentive mechanism is that for innovative practice—ensuring the business and operational activities of water organisations are utilising best available knowledge and technologies. One of the arguments for instilling business principles and introducing competition into the water sector was to encourage innovation and continual improvement. However there is a growing body of evidence that the fundamental differences between public and private sector operational environments may negate this effect. For example, Potts and Kastelle (2010) argue that the public operates by different incentive structures to the private sector, due to their overarching political processes, and so models of innovation from the private sector may not successfully translate to public organisations. Sorensen and Torfing (2011) note that public services are complex, multifunctional and based on statutory rights and obligations, making it difficult to alter arrangements without working across and between the layers of the bureaucracy. In this environment, transaction costs of innovation can be multiplied when compared to the private sector, where companies operate with a greater degree of autonomy to choose who they work with. In light of these ideas, a better understanding of incentive structures in the

public sector needs to be developed, and appropriate instruments to drive innovation identified.

Participation processes

In most States the legislative basis for achieving the CoAG objective to *'set in place arrangements to consult with the representatives of local government and the wider community in individual catchments*,' (Council of Australian Governments, 1994: Section 6b, p.5) are contained within water and/or natural resources legislative frameworks. With the primary aim of setting up water authorities as commercial enterprises, most of the enabling legislation for water businesses did not include specific requirements for citizen engagement and participation. Some contain provisions for the inclusion of community members on boards and review committees, and some note that the organisation's Statement of Obligations may include provisions for customer consultation. Thus while most of the legislation determining how water authorities were to operate stipulated that the water needs of consumers should be taken into account, a process for determining what these needs are is not explicitly outlined.

If the processes for citizen engagement is contained in natural resources legislation, exploring the extent to which the urban water industry is involved in enacting these broader pieces of legislation could help to determine how well current legislative frameworks enable and facilitate SUWM; through inclusion and collaboration with relevant stakeholders, positioning of urban water management activities within catchment-scale management, and the consideration for the interdependencies with other natural resources.

With regard to stakeholder engagement and consultation, stipulation of when and how to involve other affected organisations and groups in urban water management decision-making is generally outlined in legislative frameworks other than the founding legislation of water utilities. Water resources and catchment management legislation tends to stipulates stakeholder consultation processes for specific catchment/water resources planning activities. Strategic whole-of-government water policy integration activities are triggered by planning and environmental protection legislative frameworks. Exogenous triggers such as climatic events or water system failures highlight a need for better coordination of or consistency within water management frameworks. However, the stakeholder engagement processes of these types of reviews are determined by the program managers of the lead agencies involved. There are two implications of these mechanisms for stakeholder engagement: i) strategic, integrated resources policy planning tends to occur outside water services networks, ii) clear processes for stakeholder engagement are only stipulated for statutory policy changes, which occur at long intervals. These point to a gap in more ongoing, proactive engagement mechanisms for policy integration, and between water stakeholders.

Further, there appears to be few stipulated requirements and guidelines for proactive engagement between water organisations, other than that implied by the broad principle of integrated water resources/catchment management. This summation does not reflect actual practice of water organisations in this regard, as there are many examples of proactive partnerships throughout the sector in each State and nationally. However, reflecting on the suite of reforms included in the CoAG agreement, the need to '*develop administrative*

arrangements and decision-making processes to ensure an integrated approach to natural resource management' (Council of Australian Governments, 1994: s.6a, p.5) has perhaps not been institutionalised as directly or with the clarity and accountability needed. Without a direct mandate to drive proactive collaboration and engagement across the sector, integrated management efforts within the various policy frameworks and across organisations is unlikely.

Results, issues and challenges

The Productivity Commission reported decreases in domestic and commercial water prices following implementation of the CoAG water agenda (quoted in Musgrave, 2000). However, McKay (2005) concluded in her review of the reforms that while representing a successful reform package, the corporatisation of the sector has raised a number of new governance issues. These include the level of autonomy organisations had under particular corporate models (Jane and Dollery, 2006), divergence between the intent of reforms and the preferences of stakeholders/right-holders, conflicts between public and private interests that have not been altogether resolved through the provisions for community service obligations, the costing of externalities in pricing, and questions surrounding the allocation and use of dividend payments from water businesses (McKay, 2005). The mix of organisational roles and responsibilities for water management may have introduced transparency and efficiencies in supply provision and costing, but there is anecdotal evidence that this creates problems for information sharing, collaboration, and integrated management, as each organisation works under its own 'culture of reporting.' (McKay, 2007).

In terms of achieving efficiency through public-private partnerships, contracted projects and infrastructure operations have been the dominant model of private sector involvement in most jurisdictions, with the contracting out of water services in Adelaide the major exception (Paddon, 2013). While this has been beneficial in bringing in private sector investment and expertise, there have also been some instances of perceived and actual service delivery failure resulting from unclear accountability within contractual arrangements, such as the *Cryptosporidium* event in Sydney and the 'Big Pong' in Adelaide. Spruyt (2007) notes this dilemma between public good and private interest is a major and as yet unresolved contradiction stemming from the commercialisation of a public good. This is a significant one, given the emphasis on urban water markets as the main mechanism to achieve allocation efficiency (Crase et al., 2008; Sibly, 2008). Sadler (1998) noted another significant contention within the reform objectives; on the one hand moving toward better returns on investment and debt reduction, while on the other requiring large capital works at the same time as seeking to reduce demand through new pricing systems. Indeed McKay's (2007) survey of water utility CEO's found that the perception of an unsupportive policy framework remains an issue to sustainable water management.

Overall, Davis (2012) observed that some services and activities water organisations had traditionally conducted became increasingly contestable under the reforms. In some cases the role and/or conduct of particular management functions such as long-term planning were lost (Head, 2010), while the corporatisation of the water utilities remained a work-in-progress in some jurisdictions (Jane and Dollery, 2006) . Finally the reforms required

fundamental shifts in mindset within the water management profession (Godden and Ison, 2010). As Sadler argued, such a paradigm shift in the management approach relies on properties of individuals – not only leadership but the ability to be strategic and opportunistic, embrace new values and mindsets (Sadler, 1998). An assessment of workforce capacity concluded that these entrepreneurial traits need to be developed further within the industry, and that reform fatigue following the last two decades of change could undermine the successful operation of the sector into the future (McKay, 2005).

Governance questions arising from the commercialisation of urban water utilities include:

- Do legislative frameworks allocate responsibilities for all the management functions needed to achieve sustainable water management?
- How are trade-offs between commercial interests and public goods made in decision-making processes?
- How can green assets be appropriately valued?
- Are Public Service Obligations (and similar mechanisms) proving to be adequate to balance commercial operating principles and delivering broad public benefits?
- What operational models (contracts/tenders) have been employed. What are their strengths, weakness and factors for success?
- How can risk management be balanced with the need to innovate?
- How can new knowledge of risk assessment and management be captured in demonstration projects, and how can this knowledge feedback into operational decision making and the development of new standards?
- What are the incompatibilities between long-term planning and achieving environmental outcomes, with budget and political cycles?

The rise of Integrated Water Management

Occurring in parallel with the reforms described in the previous section was a significant shift in natural resource management more generally. From the 1960s a growing global environmental consciousness developed, and providing environmental issues with increasing political currency (Robins, 2007). Amid this groundswell of environmental interest, the Australian Government committed to the global ecological sustainable development agenda, *Agenda 21,* following the 1992 Rio Earth Summit. The influence of this sustainability agenda on water management has been broad and varied (Gleick, 2000), but can perhaps best be highlighted by three key tenets of the natural resource management policy agendas which arose as a result: a new regional delivery model for natural resources management (Head, 2005; Robins, 2007), an emphasis on citizen participation in decision-making (Eversole and Martin, 2005; Harrington et al., 2008), and expectations for greater collaboration across organisations, governments and resource sectors (Dovers, 2005a). Some of the implications of these developments for the urban water sector are raised in the following sections.

With origins and focus more in rural and regional Australia, the concept of integrated resource management[5] did not drive reforms in the urban water sector per se. However, the underlying concepts of 'holistic' 'integrated' and 'ecosystem' management did translate to shifts in thinking in urban water management (Gleick, 2000). Related ideas such as

[5] Popularly termed integrated or total catchment management – see Hussey and Dovers, 2006.

Integrated Water Resources Management (IWRM) (Mitchell, 2005) and the 'soft path' approach (Brooks et al., 2009) were being applied to urban water management. The sustainability philosophies behind these alternative ideas helped in part to fuel stormwater quality management through concerns for receiving waterway health (Brown and Clarke, 2007). The various gains to be made from integrating water management with land development (Hedgcock and Mouritz, 1993; Newman and Mouritz, 1996; Mitchell, 2005) and urban design more broadly (Wong, 2006) found a practical expression in the rise of Water Sensitive Urban Design (WSUD).

Also reflecting an integration rhetoric, but driven by strong urban population growth rather than the environmental sustainability movement, was the need for more strategic, long-term infrastructure planning. The need to integrate the construction of and investment in a range of public services (public transport and roads, water, telecommunications, power, waste management etc) with urban development planning has been highlighted in the future growth plans of many cities. Despite this policy recognition, the job of strategic cross-government, cross-sector policy coordination remains the remit of many but the responsibility of none. As a result, State-level policy coordination and integration for infrastructure planning and provision remains problematic in most jurisdictions. While water organisations often advocate for more strategic and collaborative planning, and local governments are able to effect coordination within their own areas, ultimately guidance and direction is needed at the State policy level to enable effective regional level planning and management coordination of these essential services.

This situation, requiring policy coordination across sectors and jurisdictions, is a similar circumstance to integrated natural resources management. As such, the governance challenges are likely to be comparable. Due to the more readily available documentation and evaluations of integrated natural resource management policy and initiatives, and the national scale of influence of this policy driver (infrastructure planning is largely driven at a regional level with particular arrangements, processes and initiatives at this scale), the commentary in this section focuses on the governance challenges revealed in experiences of pursuing integrated water management in the context of the natural resources sector. However, industry partners may like to provide feedback on the specific governance challenges faced when trying to integrate water management in the context of the urban infrastructure and services sector in their jurisdiction.

Policy agendas

Alongside the nation's commitment to sustainable development issues such as rising salinity and the over-allocation of the Murray-Darling Basin drove a federal level policy focus on better integration and investment in natural resources management (NRM) (Dovers, 2013). Following its success at the 1996 national election, the Howard Government set up a large investment program, known as the Natural Heritage Trust (NHT) (Robins, 2007). Influenced by the global sustainability agenda and rising grassroots groups such as Landcare, the NHT had a significant focus on regional delivery and greater community participation in NRM planning and management (Dovers, 2013). While this new regional delivery model posed governance and capacity problems of its own (Head, 2005; Robins and Dovers, 2007; Lane et

al., 2009), the NHT program and its subsequent iterations[6] represented a significant move toward a devolved and collaborative governance model for NRM.

The water policy agenda of NHT was clearly focused on the regional/rural sector (Dovers, 2013). Nevertheless, the urban environment was identified as a theme cutting across the suite of NHT programmes (PPK Environment and Infrastructure, 2000), and gained more prominence during the second tranche of the NHT, when peri-urban areas because an investment priority. However, studies of the influence of the NHT programme on urban communities are few (Ewing et al., 2013), and the influence this significant policy shift and investment in integrated NRM had on urban water management has not been well explored.

Roles and responsibilities

Legislative developments to implement the ecologically sustainable development (ESD) agenda did not result in direct changes to urban water management roles and responsibilities. However, there may have been some cross-pollination of ideas given the legislative reforms for CoAG were occurring in a similar timeframe. The major changes for urban water management created by the adoption of ESD were the increased range of stakeholders, and requirements for urban water management to be viewed within a broader catchment context.

Legislative change to implement NRM at the state level increased the range of stakeholders within the water resources management portfolio. Government departments were significantly restructured, moving away from single-issue organisations to more holistically focused entities: water, soil, forestry, public land management and coastal management were often combined into a 'natural resources and conservation' department (Robins, 2007). New regional delivery organisations (catchment management/NRM authorities, boards and committees) were also established with the general remit to collaboratively plan and prioritise actions for achieving integrated NRM at the catchment/community scale. Significant joint Commonwealth and State funding for strategic investment to implement these plans was channelled to regional bodies through the NHT programme (Hajkowicz, 2009). This establishment of a prominent, coordinated, and better resourced NRM sector changed the operational environment for urban water organisations, and proivded a new set of legislative requirements for urban water businesses to adhere to. There were also a new range of stakeholders with broader interests than water—regionally focused NRM organisations, 'mega' State Government departments, and the community—who now had a formalised role in planning and decision-making. This range of actors and interests could be expected to have had an impact on the operational environment of water businesses to varying extents across the jurisdictions.

Instruments, incentives and compliance

One of the key incentives for action on integrated water resources management was the billions of dollars in Commonwealth and State funding that became available through the NHT programmes (Hajkowicz, 2009). While this was predominantly earmarked for protective/remedial works and community education/engagement, it nevertheless provided

[6] NHT2 and the National Action Plan for Salinity and Water Quality, and Caring for Our Country

a significant incentive to engage in waterway health and the integrated NRM agenda. The mid-term review of NHT1 covering the urban investments found better strategic planning for urban rivers within their catchments had been achieved, along with raising urban communities' environmental awareness and capacity for action (PPK Environment and Infrastructure, 2000: pp. vi - x). However, this review also noted there had been only modest achievements in strengthening cooperative partnerships for NRM in urban areas, and the alignment of water resources and catchment planning was still highlighted as a gap in 2011 (National Water Commission, 2011a: 57).

In some jurisdictions the integration agenda also began to drive changes to water allocation and licencing. In particular a new legal right to water for the environment was developed as a key step toward the establishment of water markets. This significant change in the allocation mechanism for water resources is arguably yet to impact fully on the urban water sector (Byrnes et al., 2006; Crase et al., 2008; Sibly, 2008), but the policy intention is for water markets to operate across urban/rural geographies in the future (Council of Australian Governments, 2004; Hussey and Dovers, 2006). The introduction of market-based incentives for NRM has also provided a testing ground for a variety of instruments, such as price-based tendering and auction processes for environmental services (Rolfe and Mallawaarachchi, 2007; Hajkowicz, 2009).

A new, though somewhat indirect, compliance mechanism that arose during this period was the rise in public reporting on the environment. From various geographic scales of State of the Environment reporting, monitoring and reporting the catchment-scale outcomes of NHT investment, to environmental benchmarking studies at regional, state and national levels (e.g. the SE Qld Healthy Waterways Ecosystem Health monitoring program, the Victorian State Government's Index of Stream Condition, and the National Land and Water Quality Audits). In some jurisdictions, these moves toward more extensive reporting on water quality also drove collaboration to streamline monitoring programs, and to review licencing conditions for discharge into receiving waterways.

While there are difficulties and significant lag-times in measuring environmental and social impacts of on-ground works and community engagement activities (Ewing et al., 2013), this range of reporting highlighted the complex connections between resources use and environmental health. As such, these reporting programs prompted greater public recognition of the urban water industry's connections to waterway and coastal health.

The extent to which this new range of incentives prompted or allowed water businesses to adopt SUWM principles in their operations differed according to the legal constraints and interpretations of each organisation (McKay, 2007). How broader environmental concerns are captured in monitoring and performance reporting requirements for water businesses, and questions surrounding who pays for these non-core business services, were highlighted as a key area for future action in a review of the National Water Initiative (National Water Commission, 2011a). Therefore, the question of how to connect water management outcomes with performance reporting of water organisations appears to be a key research area.

Participation processes

As discussed earlier, the moves toward integrated NRM was predicated on the sustainable development agenda, which had strong founding principles of inclusiveness and participation. This is reflected in the various resources management Acts passed in each state, which included engagement and involvement of the catchment community as an overall objective of the legislation. For example the NSW *Water Management Act 2000* includes a specific objective '*to recognise the role of the community, as a partner with government, in resolving issues relating to the management of water sources*' (NSW State Government, 2000: s.3d, p.2). Some legislation stipulated the role of water businesses to operate with this underlying principle in mind. For example Victoria's *Water Act 1989* establishes that water businesses must have regard for '*the need to encourage and facilitate community involvement in the making and implementation of arrangements in relation to the use, conservation and management of water resources*.' (Victorian State Government, 1989: s.93;2b, p.328). Some legislation also provided statutory based catchment planning, and outlined the process for community involvement in these tasks, such as the Queensland *Water Act 200.* This Act sets out a procedure for gaining community input in the preparation and approval of water resource plans (Queensland State Government, 2000). McKay's (2007) survey of water utility CEO's across the country found that in trying to implement ESD, they put most effort into gaining broad community involvement, developing cost-effective policies and integrated decision-making processes. However, results also showed that partnerships between community and State Governments are mixed, and can be impaired by a lack of trust and the perception of a lack of mutually supporting water related policies.

The strength and application of these participation principles will vary across jurisdictions. Determining the extent to which these engagement principles are implemented within the urban water space could have bearing on how urban water governance delivers on some of its objectives; for example, enabling total water cycle management, appropriately involving stakeholders, and balancing multiple objectives. Therefore, better understanding of the types of engagement processes employed by water business, and their participation in broader policy networks, could help to address a number of governance challenges for urban water management in a WSC.

Results, issues and challenges

While the policy focus resulting from the rise of integrated water management has been predominantly on the rural/regional context of water resources management, the integrative nature of this agenda did encompass urban water cycle management activities. The extent to which this cross-over impacted governance reforms in the urban water industry appears to be a large gap in the literature. Research on the relationships between the rise of integrated NRM policy and the urban water sector focused predominantly on the establishment of water markets and the implications of new water trading and licencing arrangements on allocations for urban consumption. However, one apparent governance challenge highlighted by these developments in integrated water resources management was the constraint the commercial operational principles of urban water organisations posed on contributing to ecosystem services and other catchment scale public benefits. It

seems feasible that having to view their water resource allocations in light of broader catchment-scale planning, and in a context of expanded and diversified stakeholders, would have had an impact on how water organisations went about their business.

Many of the governance issues the rise of integrated NRM policies posed: recognition of the need for more collaborative and devolved decision-making, achieving multiple environmental services and social benefits, and measurement of environmental and social outcomes, show parallels with some of the urban water governance challenges highlighted in this discussion paper. Comparisons to the NRM rural/regional experience could yield significant insight into the challenges involved in; collaborative, long-term, integrated resource management planning and monitoring; implementation of programs at a number of scales; and how to engage with a broad range of stakeholders, including the wider community.

Governance questions arising from the rise of integrated water resources management include:

- Are current legislative and regulatory frameworks supportive of integrated water resources/natural resources management in the urban context?
- How can integrated water resource management be negotiated among diverse stakeholder interests? What are appropriate stakeholder engagement and collaboration processes?
- How can dollars spent on environmental outcomes achieved be better accounted for? (i.e. the business case for the soft path approach as opposed to the engineered path)
- How can complex decisions with inevitable trade-offs be supported by evidence to justify decisions?

National water policy frameworks

Following the expiry of the 1994 CoAG agreement in 2002, and linked National Competition Policy payments, CoAG noted some areas of the original agreement had not yet been addressed (Council of Australian Governments, 2004). Despite the good progress made, they recognised that growing water demands, drought, increased research into ground-surface water connections, and the progress in developing water markets, provided new drivers and knowledge to build on the original reform agenda (Council of Australian Governments, 2004). The subsequent agreement negotiated between Commonwealth, State and Territory governments—the National Water Initiative (NWI)—represented a significant shift in water policy. The Initiative brought a number of agendas together under a national framework, to which all State and Territory water policy and legislation should comply (Hussey and Dovers, 2006). The agreement's objectives were to achieve a nationally compatible water market, and regulatory and planning based systems for surface and ground water resources across rural and urban landscapes to optimise economic, social and environmental outcomes. In this, the Initiative linked urban water use to the principles of integrated water resource management, making urban water reform a key element (Council of Australian Governments, 2004: pp. 4, 19-20). However, the NWI also shifted incentives and compliance mechanism away from monetary payments toward a milestone-based program of planning and public reporting on progress. As Connell and colleagues observed (2005), the NWI was a

promising package of policy, but overlooked some significant implementation issues. These governance issues are explored in the following sections.

Policy agendas

The strength of the NWI was in drawing together many interests and agendas under a national policy direction for water resources management. Having such a goal statement, or vision, agreed to by all States and Territory governments[7], is recognised as a key success factor for significant and complex change processes (Olsson et al., 2004; Loorbach, 2010). Bringing together important ideas and discussion points under the NWI, provided them with legitimacy, and allowed policy makers at all levels of government to develop proposals, analyse options and conduct more detailed planning on how to implement new ideas (Connell et al., 2005).

The specific agendas and interests incorporated under the NWI included; the efficiency agenda of neo-liberalism, in particular through the establishment of nationally consistent water rights and markets; better water resource accounting; more transparent and participatory public policy making, highlighting indigenous interests and the need for education and capacity building; ecologically sustainable development with an emphasis on both regional development and urban water reform; and the integrated management of water to protect environmental and ecosystem services values and other public benefits. Specific aims of the urban water reforms included: providing healthy, safe and reliable supplies; increasing water use efficiency; encouraging re-use and recycling; facilitating water trading; encouraging innovation in water supply sourcing, treatment, storage and discharge, and; improve pricing. (Council of Australian Governments, 2004: 19).

While the NWI consolidated all the above objectives into a national level framework, a number of authors highlighted that the Initiative had some significant implementation flaws. They argue that there are fundamental points of contention between some principles and objectives contained in the NWI, which are left to be resolved in implementation processes (Hussey and Dovers, 2006). However, there is a lack of clarification about processes to resolve these inevitable trade-offs, and to coordinate this between jurisdictions (Connell et al., 2005). Nevertheless, the NWI provided for the formalisation of water management principles through State and Territory statutory water plans, to guide ecologically sustainable water resource development across the country (Hussey and Dovers, 2006). Exploring the impacts of this shared policy framework on jurisdictional commitment, coordination of actions, and development of shared understandings of problems and solutions, could provide key foundational knowledge of how governance arrangements function spatially and across levels of government.

Roles and responsibilities

Changes to roles and responsibilities for water management the urban water sector were not largely driven by the NWI, given the reforms conducted under the 1994 CoAG agreement. The main developments during this period related to the governance of water

[7] Tasmania and Western Australia were not initially signatories to the NWI, but signed in 2005 and 2006 respectively.

within the federal system, in particular an increased emphasis on regional delivery, and a new auditing and reporting role in the National Water Commission (NWC).

The NWI highlighted that regional catchment management authorities would be main implementation instrument for many of the proposed actions. While State and Territory governments had carriage of producing implementation plans, the regional bodies were recognised as the primary source of information on the water values and needs of local and indigenous communities, as well as provide insight into the user preferences expressed in the market and collect data on water trading (Hussey & Dovers, 2006). However, some commentators recognised substantive deficiencies in these regional institutions to implementing their current statutory requirements (Head, 2005; Robins and Dovers, 2007), let alone the expanded and politically complex remit the NWI delegated (Connell et al., 2005).

The establishment of the NWC provided a national coordinating body for water management, with a comprehensive auditing and reporting brief (Connell et al., 2005). This role provided the main mechanism for ensuring compliance with the NWI, and a 2011 report into the future of the NWC recommended its role was an important element of the NWI and its auditing, monitoring, assessment and knowledge leadership role should continue (Rosalky, 2011).

Connell and colleagues (2005), reflecting on the organisational arrangements for the NWI, provided the following description of how the roles and responsibilities of all the players unfolded in the implementation process;

> 'The Commonwealth government supplied the bulk of the funds to a variety of recipients, but has to rely on indirect processes of accountability to influence implementation. States have substantial direct power, but limited funds. Research bodies provide findings that can bolster some positions in public controversies, discredit others and sometimes shift the basic assumptions upon which such debates are conducted. Regional industry bodies are formally subject to state governments, but have independent legal standing, sometimes receive Commonwealth funding and have easy access to state and federal parliamentarians representing their areas. Non-government organisations, such as the Australian Farmers Federation and the Australian Conservation Council, influence the wider electorate whose support is needed for major funding programs. Local government has planning powers that can play a decisive role at the district level. Members of the general community tend to be involved only intermittently, but when activated en masse can be a decisive and unpredictable political force….In practice, decisions are…the product of complex cycles of interaction in which the participants have varying degrees of influence and where no single actor is dominant.'
>
> (Connell et al., 2005: 91)

While this description relates predominantly to the regional management of water, parallels with the urban sector can also be recognised. The challenge raised in the recognition that 'decisions are…the product of complex cycles of interaction…' represents the key governance issue for the urban water sector of the future.

Instruments, incentives and compliance

The dominant instrument in the NWI is the use of water markets to allow water trading to shift water to the highest value uses. There is an ongoing debate in the literature as to whether market mechanisms can be designed to achieve this aim successfully (see Sheil, 2000; Fisher, 2004; Connell et al., 2005; Byrnes et al., 2006; Hussey and Dovers, 2006; Spruyt, 2007; Crase et al., 2008; Sibly, 2008; Buxton, 2012).

While the review of the NWI in 2011 highlighted that water access and entitlement reforms had created more secure rights to water and provided benefits to water users (National Water Commission, 2011a), Connell and colleagues (2005) suggest that more research, investment and refinement of market-based instruments is needed to ensure that the principles of the NWI are achieved, and the instruments can be translated to the urban water sector successfully.

In addition to market instruments, the NWI encouraged the use of a range of other instruments to achieve the urban water reforms, including:

- increasing water efficiency through a mandatory labelling scheme for certain household and garden appliances
- introducing permanent water saving measures in conjunction with public education and behavioural change strategies
- continuing the reforms to ensure water pricing reflects the cost of storage and delivery
- developing national guidelines to encourage water re-use and efficiency in urban planning and development and
- reviewing statutory requirements for water cycle planning and management

(Compiled from Council of Australian Governments, 2004)

Within this range of instruments, there is perhaps substantial insight that could be provided by the reform of statutory water planning.

With regard to the range of compliance and incentive tools to encourage implementation, the NWI shifted from the progressive payment structure of the CoAG reforms to extensive reporting requirements. Each State and Territory was required to develop a detailed implementation plan with clear timelines and milestones. These were accredited and assessed against a national framework of performance indicators by the National Water Commission (NWC). However, Connell et al (2005) argued, beyond public reporting of the results, there was no direct penalty for non-compliance, providing a weak incentive for compliance.

Participation processes

In terms of participation, two key issues are highlighted in the assessment of the NWI; the delegation of substantive consultation responsibility to regional bodies, and the lack of guidance on cross-jurisdictional coordination and negotiation of trade-offs in decision making (Connell et al., 2005). While the 2011 review of the NWI found that water planning and knowledge sharing had improved across jurisdictions, there were still noted deficiencies in the transparency of decision-making, assignment of risks, and the incorporation of indigenous objectives into water plans (National Water Commission, 2011a). Thus while some progress has been made to coordinate water management efforts across jurisdictions,

this finding suggests capacity issues at both regional and state levels for broader consultation and participation processes remain.

Results, issues and challenges

The establishment of the NWI reflected the policy agendas of a number of stakeholders, under the banner of a national framework, providing some potential to coordinate water resources management at different scales. In this way the Initiative represented a consolidation of environmental sustainability in water resources management (Hussey and Dovers, 2006). However, the mix of agendas brought contentions which have not been centrally debated and, as such, flow through to cause issues with implementation (Hussey and Dovers, 2006). Exploring how these contentions have played out and been addressed (or not) in policy, consultation and decision making processes surrounding the implementation of the NWI could provide knowledge relevant to the urban water sector on trade-off decision-making.

The reform efforts in statutory water planning are also relevant to the urban water sector; both in terms of the content/cross overs with urban water resources planning, and the processes of objective setting, prioritisation, socio-economic assessment of options, and consultation on plans. The NWC's review of progress in this area highlighted that while water planning had improved under the NWI (National Water Commission, 2011a), persistent disconnection between water resource planning and catchment planning, and transparency in a range of decisions within the planning process, remained.

The success of performance monitoring and reporting as a compliance mechanism, to increase transparency and encourage innovation in the implementation of NWI could also be explored. While there is a NWC program of reporting on the performance of urban and rural water utilities (National Water Commission, 2013), this focus of the reporting framework is on service delivery performance, including metrics such as amount of wastewater recycled, length of service operation disruption, and CO2 emissions from operations. As such, the assessment does not cover broader sustainability concerns such as the achievement of social and environmental objectives, or examine the governance performance of the utilities. As the National Water Commission noted in its report on the urban water sector, there is a need to clarify the role of the urban water sector in achieving broader sustainability outcomes; agree on objectives, trade-offs and who should pay; and ensure these decisions are more transparent (National Water Commission, 2011b: viii-ix). A more triple bottom line approach to auditing and reporting on water businesses may encourage innovation, increase transparency and lead to better integration of water resources planning.

Overall, the content of the NWI and its process of implementation could yield some key insight into how States and Territories have addressed a number of governance challenges in regard to water markets, comprehensive water planning and reporting, compliance and incentive mechanisms, and the processes of decision-making in multi-scale, multi-agenda, multi-actor contexts.

Governance questions arising from National water policy frameworks include:

- How can national, state and local water priorities, agendas and interests be aligned?
- How do national and regional organisations feature in the mix of water management stakeholders? What is their role and how do they fit in the urban context?
- Is there a separation between rural/regional and urban policy agendas? Should there be?
- How can transparency and accountability be maintained?
- When and where can market-based instruments for achieving environmental outcomes be effective?
- How can water markets be translated to the urban environment?

Millennium drought and flood

Since Australia's settlement, drought has featured as a clear driver for water policy development (Hussey and Dovers, 2006), and the recent drought has had a profound impact on contemporary water policy and governance issues (Kendall, 2013). The extended period of dry conditions in the early 2000s[8] tested physical water infrastructure, professional knowledge and assumptions, political will power, community values and uses of water, and caused a range of environmental, social and economic impacts (Keath and Brown, 2009; Isler et al., 2010; Wallington et al., 2012; van Dijk et al., 2013). The spring/summer of 2010-2011 saw the breaking of the drought in eastern Australia in spectacular fashion, with widespread flooding across most of eastern Australia (National Climate Centre, 2011). These unprecedented conditions and the rapid succession from extreme drought to flood have raised a number of governance challenges for current urban water managers, governments and communities.

Policy agendas

The predominant impact of the drought from a policy perspective was that water resources planning had been inadequate to see cities through a drought of such magnitude. Conservative forecasts for population and economic growth were also compounding factors, leaving some cities ill prepared to meet their water service needs. However, there is an argument that underlying institutional arrangements were also a contributing factor to the crisis, leaving the important task of strategic water resources planning of interest to many but the responsibility of none.

While most jurisdictions were conducting water resources planning prior to the drought, as water scarcity increased new plans were developed and introduced a new rhetoric around 'climate proofing,'[9] 'portfolios of supply' and 'security through diversity.' There were also tough trade off decisions to be made as water scarcity became a crisis. Western Australia's *Water Forever* plan put the options to the community through extensive consultation

[8] This dry period began in the mid-1970s in WA.

[9] As distinct from the long held 'drought proofing' terminology - see Isler, P. L., Merson, J. & Roser, D. (2010). 'Drought Proofing'Australian Cities: Implications for Climate Change Adaptation and Sustainability. *World Academy of Science, Engineering and Technology,* **46**: 352-360.

(Water Corporation, 2009), while the Victorian Government embarked on widespread engagement processes to develop Sustainable Water Strategies for key geographic areas of the state (Department of Environment and Primary Industries, 2013), and the South East Queensland Water Strategy focused on providing an adaptable blueprint to guide management of the region's water infrastructure while providing transparency in water planning and operations (Queensland Water Commission, 2010). The South Australian Government took a different approach, appointing an independent Commissioner for Water Security to bring the Government's water related policies together to provide a program for integrating activities and securing the state's water supplies (Office for Water Security, 2010).

From a more political perspective, debate centred on the 'climate-proofing' and 'portfolio of supply' rhetoric versus accusations of inadequate infrastructure planning and development leading to costly capital investment (Dowling, 2013b; Houghton, 2013). The impacts of these political discourses on public opinion and the public service may provide some interesting insight into the relationships between political will, leadership and progressing governance reform.

Roles and responsibilities

While the drought did not drive such wide-spread sectoral change as the 1994 CoAG reforms (except perhaps in SEQ where significant institutional reform was pursued), some key developments emerged in most jurisdictions in response to the drought. The overview of roles and responsibilities following the drought (taken from about 2006 onward) are summarised in Table 4.

Some of the key changes in different jurisdictions during this period included:

- The centralisation of water services delivery in SEQ, and establishment of the Queensland Water Commission to oversee the management of the State's water resources
- The establishment of a dedicated water portfolio in the South Australian Government and the appointment of an independent Commissioner for Water Security in South Australia
- The establishment of the Office of Water within the Victorian Department for Sustainability and Environment
- The establishment of the Department of Water in Western Australia

Table 4: Water management roles and responsibilities following the 2000s drought

Management Functions	Melbourne	Perth	SEQ	Hunter Region	Sydney	Adelaide
Bulk Water Supply	Melbourne Water	Water Corporation	Seqwater LinkWater[1] SEQ Water Grid Manager[1] WaterSecure[2]	Hunter Water	Sydney Water (-1999) Sydney Catchment Authority (1999 -)	SA Water
Retailer(s)	Yarra Valley Water South East Water City West Water	Water Corporation	Queensland Urban Utilities UnityWater Allconnex Water[3]	Hunter Water	Sydney Water	SA Water
Wastewater	Melbourne Water & retailers	Water Corporation	Retailers	Hunter Water	Sydney Water	SA Water
Drainage	Melbourne Water Local Councils	Local Government Water Corporation	Local government	Local government	Sydney Water	Local government
Catchment management	Melbourne Water Port Phillip and Westernport CMA (2002-)[4]	Swan River Trust (-2013) » Dep of Parks & Wildlife Dep of Water Water Corp	Seqwater SEQ Catchments Healthy Waterways Partnership	Hunter-Central Rivers CMA	Sydney Catchment Authority Dep Sustainable Natural Resources Sydney Metropolitan CMA	Regional NRM Boards
Environmental Regulation	EPA	Dep of Water Dep of Environment and Conservation » Dep of Environmental Regulation	EPA (1998-2009) » Dep Environment & Resource Management (2009-13) » Dep of Environment & Heritage Protection		EPA	EPA
Human Health Regulation	Dep of Health	Dep of Health	Queensland Health		NSW Health Dep	EPA
Economic Regulation	Victorian Essential Services Commission	Economic Regulation Authority of WA	Queensland Competition Authority		Independent Pricing & Regulatory Tribunal	Essential Services Commission of SA
Policy development/long-term planning	Dep of Sustainability and Environment (2002-13) Dep. Of Environmental Primary Industries (2013 -) Office of Living Victoria	Dep of Water	Queensland Water Commission (– 2013)[4] Dep. Energy Water and Supply (2013-) SEQ water & Retailers		Sydney Water	Dep. for Water Commissioner for Water Security

[1] Until January 2013 when distribution and management functions were transferred to Seqwater
[2] Until July 2011 when alternative water supplies management were transferred to Seqwater
[3] Until early 2012 when retailing and distribution functions were returned to Redlands, Gold Coast and Logan city councils
[4] Until January 2013 when water security and efficiency responsibilities were transferred to SEQ Water and policy functions transferred to Dep. Energy and Water Supply

Sources: State government online public record archives, organisation's websites.

Instruments, incentives and compliance

A major development during the drought was the extensive use of education and behaviour change instruments to reduce water usage; employed by both water businesses and state governments. While major domestic consumption reductions were achieved during and post-drought[10], it seems in some cities the water saving behaviours are now beginning to relax with the lifting of water restrictions (Moore, 2012; Dowling, 2013a). Subsidies for water efficient domestic appliances and rainwater tanks were also provided as a demand management measure, however some economists argue these policy instruments are not as effective as price signal incentives (Byrnes et al., 2006; Olmstead and Stavins, 2009). Perhaps the key compliance mechanism to reduce water demand was the use of water restrictions. While a long standing strategy, water restrictions imposed in most States and Territories were at a higher level than those imposed in the past. Coupled with the education and behaviour change strategies, these restrictions were accepted by most communities as necessary, and the introduction of more permanent water saving measures were also adopted in some cases.

A major outcome resulting from the drought and floods was the elevation of water onto the political agenda. Heightened public debate on the issue generated political will for decisive action. Whether the subsequent decisions represented the best solutions or most efficient long-term investment is a topic of debate in scholarly literature and the media (Barnett and O'Neill, 2010; Dowling, 2013b; Houghton, 2013). Nevertheless, the public attention to water arising from the quick succession of extreme drought to flood generated incentives for action at all levels, from the local householder up to State Premiers and territory Chief Ministers.

Participation processes

A feature of the period was the explosion of water-related information and debate in the public domain: from consultation on long-term water resources planning strategies, water saving advertisements and subsidy schemes to political and expert debates on the issues and solutions. However, the extent to which the increased discourse on water issues in the public domain resulted in greater community engagement in water management, particularly opening avenues for participation in planning and decision-making, remains a key question to be explored.

The effect of the water scarcity crisis, and the aftermath of the floods, also generated new internal connections and cross-government initiatives to deal with the emerging water issues. Further investigation of these processes (how they were initiated, what form they took, who was involved and their outcomes) could reveal new knowledge on how learning and collaboration can occur within the water sector. Understanding these processes, and the trust and relationships built as a result, might then be translated into more on-going collaborative processes for improved integrated and adaptive water governance.

[10] According to the ABS Water Accounts for 2010-11, per capita domestic usage decreased 8% from 2009-10 levels, despite the breaking of the drought during this time period. Australian Bureau of Statistics. (2012). Australian's water consumption decreases yet prices rise. *Media Release*, 27 November 2012.

Results, issues and challenges

One of the more obvious results of the drought was the new 'portfolios of supply' approach to water management. Following this, the water supply chain is now more flexible, but also more complex. A new set of questions for urban water managers has arisen around system design, optimal mix of solutions, how to deliver fit-for-purpose water, and the implications for regulatory compliance.

The diverse range of approaches to water planning also raise questions about the appropriate scope, focus, consultation processes and level of political and bureaucratic buy-in for successful sustainable water resources planning (Baldwin et al., 2009; Hamstead, 2009). The National Water Commission's 2011 review of the NWI highlighted that water planning had proved too weak to address the drought (and perhaps remain as relevant when the floods arrived). The Commission suggested that better 'pressure testing' of these strategies, clearer objectives, greater transparency in decision making, more rigorous assessment of non-consumptive use, and closer alignment between water and catchment planning are needed (National Water Commission, 2011a: 57). As key documents for setting visions and goals for water management and guiding inter-governmental collaborations, these strategies are also critical for engendering community trust and confidence (Hamstead, 2010). As such, water resources planning processes warrant closer attention as a key mechanism for addressing various governance challenges.

Perhaps one of the key governance outcomes of the drought and flooding was the testing of the governance arrangements in terms of the clarity of roles and responsibilities, relationships between organisations and key decision makers, and how the decision hierarchy in legislative frameworks manifested in the face of complex decision-making in politically charged environments and natural disaster situations. Looking at how these arrangements performed under these pressurised circumstances would likely yield some important lessons for governing under crisis conditions.

The importance of community participation in planning and decision making is linked with the idea in the literature that these times of crisis may provide the opportunity for system change or reform (Kingdon, 2003; Fuller, 2010). However research has found that preparatory work to utilise these opportunities is required (Keath and Brown, 2009; Young, 2010b). Given the influence of the voting public on political will and leadership— which is needed for transformative change processes (Brown and Farrelly, 2009)—and the idea that water sensitive cities will be under pinned by informed communities engaged in water management (Wong and Brown, 2009), processes and appropriate forms of community participation should be a key consideration in the design of governance arrangements.

The sensationalism of media reporting on water issues has sometime lease to the topic becoming politicised. The impact of this in terms of misinformation and polarisation of views presents real risk to public trust and confidence in governments and their agencies. The public debates and disagreements over the decisions that were made between politicians and water experts can leave confusion, and the political-fall out has been evident in a number of states. While differences of opinion will always exist, the challenge for governance arrangements is to ensure, as much as possible, that these debates are well informed and that dialogues with communities can be built. Therefore, discovering the

connections between public discourses and opening opportunities for reform, particularly in times of crisis, will provide critical knowledge for designing better adaptive governance models.

Governance questions arising from the millennium drought and floods include:

- How can decentralised and centralised infrastructure be designed and operated?
- How can the appropriate mix of governance instruments be determined for prevailing circumstances?
- How can long-term planning be conducted in a political environment?
- What degree of independence do authorities have from Governments? How does this affect the outcome of water management decisions during crises?
- How can the need for consultation be balanced with the need for timely decision-making?

Governance responses

Reflecting on the range of governance responses in Australia's urban water sector over the last 20 years, there have been waves of significant sectoral reform. The emphasis of these reforms had focused largely on administrative and economic efficiency through top-down changes, establishment of markets, pricing change and greater economic regulation. More recently, governance change has been driven by the immediate need for water during drought, as a reaction to perceived flood management issues, and focusing on governance to support new water source developments to ensure longer-term water security.

Despite rhetoric of sustainable and integrated water resources management (SUWM/IWRM), the challenges raised in this review indicate a lack of supportive governance for sustainable water management in practice. This is illustrated in Table 5, which matches the principles of SUWM to the key governance challenges currently faced by water management practitioners, as identified through this review.

Table 5: Principles of SUWM and existing governance challenges to achieving them

SUWM Principles	Governance challenges
Consider all parts of the water cycle, natural and constructed, surface and subsurface, recognizing them as an integrated system.	Lack of horizontal alignment of management principles/priorities across different policies, sectors and jurisdictions Allocation and clarity of roles and responsibilities for a full range of water resources management functions
Consider all requirements for water, both anthropogenic and ecological.	Accounting for the full suite of water management outcomes
Consider the local context, accounting for environmental, social, cultural, and economic perspectives.	Lack of vertical alignment of management principles/priorities at different levels of government
Include all stakeholders in planning and decision-making processes.	Lack of guidance and skill in complex and contested stakeholder engagement processes Difficulty justifying resource and time investments for uncertain outcomes
Strive for sustainability, aiming to balance environmental, social, and economic needs in the short, medium, and long term.	Difficulty making and justifying trade-off decisions due to lack of information, guidance and unsupportive/conflicting policy and regulatory frameworks Underlying tensions between adhering to commercial principles while delivering public good outcomes The need for long-term planning vs short-term budget and political cycles, critical to the approval and implementation of the plans

(Adapted from Mitchell, 2006)

The disconnect between aspirations for SUWM and current practice—indicated by the rhetoric for SUWM principles within governance arrangements which still favour the status quo—is posing continual problems for practitioners to navigate. Past research acknowledges that a mix of mutually reinforcing hierarchical, market and network governance instruments will be needed to break this lock-in and enable movement toward more sustainable water resources management (Keast et al., 2006; van de Meene et al., 2011; Rijke et al., 2013). Yet detail on the specific types of governance instruments that can be employed, and how they address the governance challenges currently faced, is limited.

Governance arrangements for water are built up overtime in response to local conditions, issues and events. The legislative and regulative frameworks for water management, as well as the prevailing management paradigms and socio-political attitudes to water, are a product of this history. This diversity in governance structures, routine processes and entrenched powers mean that new governance models cannot be successfully transposed without some translation to make them context specific *and* legitimate. However, this review has revealed the following common issues for each type of governance approach, which provide starting points for understanding how these approaches might be better combined:

- The use of market-based instruments is premised on a limited understanding of when, how, and for what purpose they are most effective
- The extent to which network governance instruments are actively drawn upon is limited, as is knowledge of how and where their development can support governance objectives or other instruments
- Hierarchal power structures embedded in current governance arrangements can compromise the efficacy of other governance instruments

Given the principles of IWRM provide the basic tenets for achieving the sustainable water management needed for a water sensitive city, effort now needs to be directed toward removing governance arrangements that favour segmented and optimised supply, sewerage and drainage services as an indication of efficiency. The following section outlines the range of governance challenges that need to be addressed to enable such a shift, identified in this review of governance responses and issues, and puts forward the research approach for addressing them.

Section 3: Developing governance and policy capacity for a Water Sensitive City

This discussion paper has set out to specify the key governance challenges hindering the Australia urban water management sector's efforts to achieve sustainable urban water management (SUWM). These challenges are listed in

Table 6, and are matched to the main governance objectives they impede, which were developed in Section 1:

Table 6: Governance objectives and challenges for SUWM

Governance objectives for SUWM	Current challenges
Develop a shared understanding of the outcomes, and establish clear objectives	Inadequate processes for developing shared understandings, motivations and objectives, at multiple scales of government and across government bureaucracies.
Set roles, responsibilities and accountabilities for delivering a range of water benefits and services	Missing accountability, legitimacy and capacity for some water management functions.
Enable total water cycle management, and integration with other sectors	Discontinuity between relevant legislative frameworks in: principles and objectives, planning processes, decision-making frameworks, and stakeholder and citizen participation. Inadequate incentives or processes for collaborative action at multiple scales of government and across government bureaucracies.
Provide clear requirements and guidance for trade-off decisions and acceptable risk, including robust methods of option assessment	Conflicting or contradictory objectives between commercial management of water services and water resources management for public benefit. Lack of accepted valuation and assessment tools to make and support decisions. Increased complexity of managing multiple water sources for multiple and/or fit-for-purpose uses, with untested protocols and procedures and underdeveloped skills and capacities in the workforce.
Consider a full range of instruments that incentivise and sanction appropriate organisational practices and cultures	Limited knowledge of governance instruments that incentivise efficiency, collaboration and innovation in organisational cultures. Limited understanding of how to adapt business models to incentivise flexibility and innovation within the public sector's backdrop of politics, high regulation, high fixed transaction costs, and lower risk tolerance.
Consider a full range of instruments that incentivise and sanction appropriate consumer behaviours	Limited knowledge of governance instruments and mixes that incentivise desired behaviours and attitudinal change.

Table 6 continued

Governance objectives for SUWM	Current challenges
Distribute financial resources to provide reliable base funding, appropriate mixes of investment and discretionary/strategic funds	Lack of appropriate valuation tools. Low understanding of the connections between political risks and financial decision-making Assessment criteria for price regulation unclear for issues beyond economic considerations
Minimise or manage disruptive influences	Limited checks and balances on hierarchical governance powers embedded in current arrangements. Lack of mechanisms to enable long-term public service-citizens relationships: to develop on-going informed discourse, trust and confidence in public decision-making, and community capacity for participation.
Require transparency in planning and decision-making	Inadequate requirements and/or accountability for information distribution and meaningful public reporting.
Establish cycles of monitoring and performance evaluation linked to reflexive learning	Limited monitoring and reporting on triple bottom line outcomes of water management and disconnected from organisational performance appraisals.
Determine clear points and appropriate processes for participation of stakeholders and citizens	Lack of guidance on appropriate scope and design of participation processes in various water management activities.

As with any wicked policy problem, some of these governance challenges are complex to unravel, with many interdependencies between them. However, there are others that may represent quick wins for some jurisdictions, such as better public reporting and linking organisational performance to triple bottom line objectives.

Through the processes of reviewing literature and initial discussions with practitioners, the following capacity issues were frequently raised as underlying many of the governance challenges identified in

Table 6:

- Limited incentive mechanisms to encourage solution innovation, organisational/'business' innovation, the emergence of leadership and champions, and collaboration
- Regulatory constraints to new solution adoption (both technical and non-technical)
- Regulatory constraint to organisational change in service delivery focused organisations
- Lack of available tools to both make and justify policy decisions, by showing clear benefits, relative risks and costs, and the demand for various services/outcomes of different policy options

As such, it is proposed that the future activities of Project A3.1 focus on the following key lines of inquiry:

1.) Incentive structures and sanctioning mechanisms for innovative solution development—and for the organisational change, leadership, and championing needed to adopt these new ideas
2.) Policy capacity in the form of: options assessment methods, decision support tools, aligning objectives and priorities horizontally and vertically, re-evaluating risks, communicating to key decision-makers—and how to access the resources, knowledge and skills for this policy work

3.) Collaborative capacity across the sector in: requirements and/or guidance for stakeholder and citizen engagement, resources, and skills and expertise development—and matching engagement purpose with the right process for quality collaborative outcomes

The next phase of research in Project A3.1 will review governance models and mechanism in these three key areas. An initial review of scholarly literature will seek to draw out examples of solutions to the issues raised above, from empirical studies and including international examples from a variety of complex policy areas.

The research activities will then focus on a number of key pieces of empirical research to explore the three main lines of enquiry identified in this paper. The team will use a number of indicative case studies which look to provide insight into these key areas of governance. Initial ideas include:

- Surveying of spatial/statutory planners to understand how complex trade-off decisions are made and justified within a policy framework covering a number of sectors, how these decisions interface with other sectors, and what tools help to support such decision-making processes
- Reviewing the tools and techniques available from the natural resources management sector for effective engagement of community and stakeholders, and workshopping these to develop guidance on how they may be adapted or adopted in the urban water sector
- Workshopping the results of the regulatory mapping conducted by Project A3.2 to understand how these frameworks incentivise or sanction innovative practice and organisational culture, to identify how better incentives might be built into water regulation and legislation
- Examining the outcomes of Project A3.3 to understand how the policy development process can better influence political considerations and priorities

The Project A3.1 team would also welcome ideas for other possible case studies which may produce knowledge and insight into the three key areas of inquiry that have been developed in this report.

As well as reviewing scholarly literature and empirical studies for insight into these three key areas of governance capacity for specific examples and cases of governance arrangements, the Project A3.1 team will also conduct some pieces of empirical research on the Australian urban water sector specifically, focusing on:

- Understanding how performance information drives innovation and change in water utilities, and exploring the perceived value of different types of this information from an organisational culture perspective
- Examining the collaborative and boundary spanning strategies of key actors to bridge divergent institutional and organizational logics, and how these strategies expedite the uptake and establishment of water sensitive practices on ground (current PhD)
- Exploring how radical system innovations such as water recycling or decentralised supply infrastructure become institutionalised across the water industry (current PhD)

These projects will also provide insights into a number of the governance issues highlighted throughout this report, though they are yet in the early days of development.

In addition to these pieces of work, the project team will continue to liaise with other CRC projects to identify where their research outputs will provide further insight, knowledge and tools to address governance challenges, and in particular build capacity in the three key areas identified earlier (incentives, policy capacity, collaborative capacity). This will be ongoing as the research develops, but at this stage projects which look to provide key information include:

- A1.2 Valuation of economic, social and ecological costs and benefits
- A1.3 Economic incentives and instruments
- A2 Societal innovation and behaviour change
- A3.2 Regulatory frameworks
- A3.3 Influencing decision-makers
- A4.3 Socio-technical modelling tools to examine urban water management scenarios
- B5 Statutory Planning for Water Sensitive Urban Design
- D2.1 Developing Practitioner Capacity and Capability
- D3.1 Science-Policy Partnerships
- D4.1 Strengthening Educational Programs to Foster Future Water Sensitive Cities leaders

We would also welcome thoughts and ideas from CRC researchers on where cross-fertilisation of research outputs will help address some of the governance challenges that have been highlighted throughout this report.

This section has outlined the way forward the Project A.3.1 research will progress in order to address the key governance challenges facing the urban water sector in its quest to move toward sustainable urban water management for water sensitive cities. We seek industry partner feedback on these challenges and suggestions for case studies which may provide knowledge on how to overcome them. The next section provides a template for providing feedback.

Section 4: Feedback Guide

This section provides the key questions arising from this report which the Project A3.1 team seek feedback on from industry partners and other CRC researchers. This information will assist Project A3.1 to provide the best value to the research agenda of the CRC, by finding key leverage points for addressing governance challenges and where opportunities to link to other research activities and outputs lay.

Responses to any of these questions or other comments can be provided to Yvette Bettini via email (y.bettini@uq.edu.au) or over the phone (07 3365 8247) by **30th March 2014**.

A working definition of governance (page 13)

Does it encompass all aspects of governance that are important to urban water managers?

If you are a CRC researcher, does the definition align with your use of the term governance?

Governance objectives for sustainable urban water management (page 16)

Is this a comprehensive list?

Are any of these objectives of governance contestable or problematic?

Which of these objectives are achieved well and not so well in practice?

Identifying the governance challenges (page 19)

Are there any comments you would like to make about the commentary on different phases of policy shifts/events and the governance responses that were identified in this section?

Developing governance and policy capacity for a water sensitive city (page 44)

Do the challenges listed in Table 6 (page 44) reflect your experience/knowledge of urban water governance issues?

In Table 6, do you think the challenges are matched to the SUWM objective they mostly impede? Do you have any further insights into how current governance challenges impede the achievement of these objectives, which is not reflected in Table 6?

Do you think the lines of enquiry identified in this report (incentive structures, policy and collaboration capacity—described on page 45-46) provide the best leverage for finding solutions to the governance challenges identified?

Can you make any further suggestions of examples/possible case studies that could be explored through the research to generate new knowledge in these three key areas?

If you are a CRC researcher, can you see synergies between your own research aims and directions and those proposed here?

Are there any other comments you would like to contribute?

Thank you for taking the time to provide this important input into the research project.

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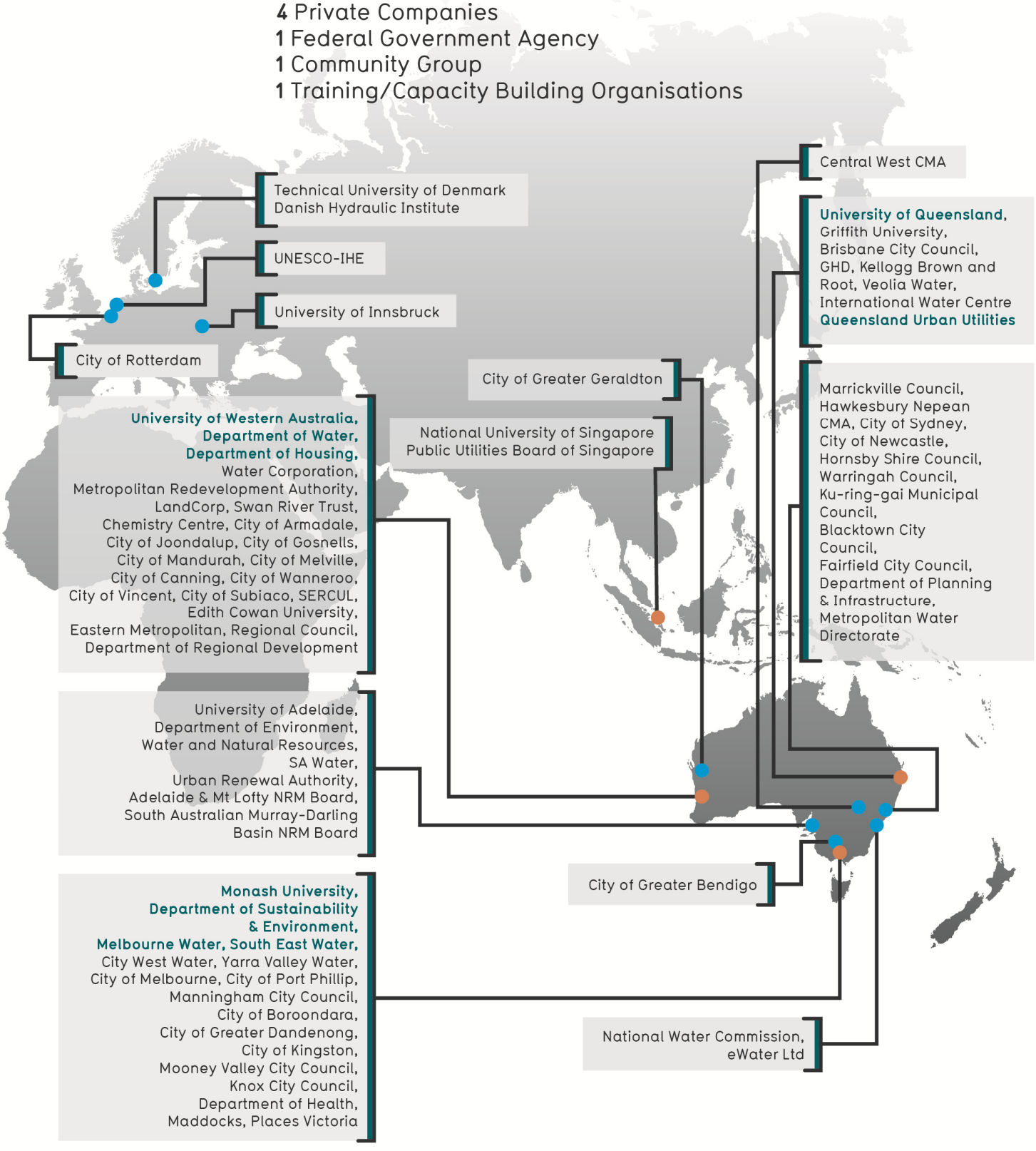
CRC for Water Sensitive Cities: Partner Organisations

30 Local Governments
14 State Government Departments/Agencies **(3 Essential Participants)**
12 Research Organisations **(3 Essential Participants)**
8 Water Utilities **(3 Essential Participants)**
4 Land Development Organisations
4 Private Companies
1 Federal Government Agency
1 Community Group
1 Training/Capacity Building Organisations



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