Towards An Institutional Capacity Assessment Framework For Sustainable Urban Water Management

S. van de Meene, R. Brown
National Urban Water Governance Program, School of Geography & Environmental Science, Monash University, Clayton, susan.vandemeene@arts.monash.edu.au

Abstract
The need to change urban water management to become more sustainable is widely recognised. Recently there has been considerable financial investment in urban water reform; however these reforms have not been as successful as anticipated, most likely because there is a lack of critical analysis of existing capacity and/or capacity deficits. Understanding and assessing institutional capacity is crucial to addressing existing institutional impediments. Institutional capacity includes the human resources, intra-organisational, inter-organisational and/or external rules and incentives capacity spheres. Institutional capacity assessment is essential to form coherent and demand driven capacity development strategies. This paper proposes a tentative institutional capacity assessment framework derived from a meta-analysis of empirical research, across five different disciplinary areas, into capacity attributes most likely to advance sustainable urban water management. Forty-two publications were reviewed and the most frequently determined capacity attributes identified. The proposed schema of enabling capacities for sustainable urban water management could be used by policy makers and practitioners for city-wide strategic planning of future investment in capacity building. This would improve the opportunity for critically informing and improving the design of current and future water reform practices.

Introduction
Improving the management of our urban water environments is now widely acknowledged as an important socio-political objective for a number of reasons. Urban populations are forecast to become sixty percent of the world’s population by 2030 (UNPD, 2001). As the population increases, demand for water supply, sewerage and drainage services also increases. Environmental impacts from urban water management are observed within and outside of most cities, in rivers and catchments that are dammed for water supply, and in rivers, lakes and coastal areas where water pollution negatively impacts ecological health. Climate change forecasts indicate that decreasing water availability and increasing rainfall variability will further stress already over allocated water systems and decrease the security of water to urban and other areas (McCarthy et al., 2001). Developed countries also face the challenge of addressing the end of the infrastructure life-cycle and old, degraded infrastructure due to a lack of investment (Vlachos and Braga, 2001).

Substantial research has been undertaken to improve urban water management. This has focused on developing new technologies for improving water efficiency, wastewater and stormwater treatment techniques and investigation of alternative water sources. ‘Soft approaches’ have also been developed such as education campaigns and efficiency standards for appliances. While there has been substantial progress in the physical sciences, there is still a lack of widespread implementation. Commentators such as Wong (2006) and others argue for further research into institutional issues relating to sustainable urban water management.

In response to these challenges dedicated water reform has become an important policy priority, particularly across developed countries. This has included considerable investment across tiers of government from the supra-national and national, state and local government levels. Examples of reforms include the European Water Framework Directive and the Australian National Water Initiative, the Victorian Central Region Sustainable Water Strategy and the Western Australian State Water Strategy and local water sensitive urban design policies.
However many commentators argue that despite the wide-spread recognition of inefficient water resource use and continuing waterway degradation associated with the traditional water management approach, the pace of change is too slow and ad hoc. Harding (2006, p.234) states that progress towards sustainable urban water management (SUWM) has been “slight or nonexistent!” Dovers (2005) considers that sustainability reform has been initiated at the edges of institutions and policy rather than undertaking the more substantial change widely considered to be required.

Together with the ad hoc implementation of technologies and strategies, barriers to implementing SUWM continue to perpetuate a significant delay in the current reform efforts being realised. Institutional inertia has been identified as potentially the most significant barrier to SUWM (Mouritz, 2000; Brown, 2005). Major institutional impediments include attributes such as fragmentation of administrative arrangements, poor intergovernmental relations, need for long term strategic planning, lack of integration between the water industry and other relevant sectors, lack of meaningful community participation in water planning and management and a lack of political leadership (see for example, Mouritz, 2000; Vlachos and Braga, 2001; Hatton MacDonald and Dyack, 2004; Brown, 2005). Most of these impediments are administrative and systemic and few strategies have been proposed to overcome them (Brown and Farrelly, 2007).

This paper attempts to build on the current knowledge of institutional impediments by focusing on institutional capacity assessment tools. The proposition of this paper is that reform efforts are currently less successful than anticipated. This is most likely because their design and implementation has not been critically informed by an assessment of the capacity development needs and/or ‘capacity deficits’. Institutional capacity relates to human resource, intra- and inter-organisational and/or directive and facilitative capacities. Understanding and evaluating these capacity attributes is the key to addressing institutional impediments. However as argued by Brown et al. (2006), there is a lack of practical tools available to assess capacity. This paper is a contribution to this important knowledge gap, and reports on a meta-analysis of empirical research into the capacity attributes most likely to advance SUWM, and the tentative development of an institutional capacity assessment framework.

**Building Capacity to Advance Sustainable Urban Water Management**

While water reform efforts across developed countries are varied in their scope and level of implementation, there are some common challenges (Hussey and Dovers, 2006). Water reforms have been criticised for not considering the socio-political impacts of rearranging organisational boundaries and how these new organisations will interact with other related organisations (Moss, 2003). Criticism has also been levelled at the scope of reform with regards to achieving integration between the different components of the urban water cycle and the impact of urban development on receiving waters (Wong, 2006). Additionally, the pace of implementation is considered to be too slow (Harding, 2006).

Building institutional capacity is advocated as a means of achieving institutional change in a variety of disciplines, such as urban management, technology innovation and development, natural resource management and water resources management. Institutional capacity refers to the ability of the whole institution, from individuals through to organisations and the legislation and policy instruments used, to undertake a task, in this case, sustainable urban water management. Institutional capacity has recently been recognised as underpinning the successful development, adoption, and implementation of SUWM technologies (Wong, 2006).
Institutional capacity assessment (ICA) is essential to form coherent strategies for investment in capacity development and water reform. The objective of ICA is to identify the underlying constraints so that relevant and effective capacity building interventions can be designed and implemented (Grindle and Hilderbrand, 1995). ICA enables the capacity deficits to be identified and therefore ensure that there is a demand for capacity building interventions (Peltenburg et al., 2000).

In order to undertake ICA, an assessment tool is needed, however ICA in urban water management is a relatively new field of research. There are some suggested conceptual frameworks (see for example, de Loë et al., 2002; de Loë and Lukovich, 2004; Ivey et al., 2006) but there are no empirically informed and practical frameworks that could be used as an ICA tool. The most recent ICA framework (ICAF) developed in the urban water area has drawn on public administration and urban management literature; Brown et al. (2006) present a nested model that maps four interrelated capacity spheres and links each sphere to capacity building interventions to advance SUWM.

The four spheres of capacity are: human resources, intra- and inter-organisational capacity and capacity of external rules and incentives. Human resources capacity is the knowledge, skills, and motivation of individuals. Intra-organisational capacity refers to organisational culture, management practices and procedures. Inter-organisational capacity refers to organisational relationships which include communication and information sharing. Lastly, capacity of the external rules and incentives relates to legal, regulatory and policy instruments (Brown et al., 2006).

In developing the framework based on their experience and literature from other disciplines, the authors state “there has been limited research or available guidance on how to assess and determine the quality of institutional capacity” to advance SUWM (Brown et al., 2006, p5-3). This paper acknowledges this call for further investigation and expands on the model as described below.

**Literature Assessment Method**

The objective of the literature meta-analysis was to develop an empirically based schema of the capacity attributes likely to advance SUWM. Publications were selected based on the following criteria. First, empirical studies were included where in-depth case studies or stakeholder surveys or interviews were discussed. Both peer reviewed and grey literature was included, with 90 percent peer reviewed. Second, publications were included if they drew conclusions about attributes of capacity or discussed ICA. Third, publications were required to be forward thinking or focused on the application of innovative practices or technologies. This criterion was established to exclude publications that would not provide insight into future capacity attributes. Fourth, only research based in developed countries was included. Research in developing countries was excluded as the urban water issues facing developing countries are regarded as considerably different to those facing developed countries.

Forty-two publications were selected for review so far with publishing years ranging from 1985 to 2007 (for the full list of references, refer to http://www.arts.monash.edu.au/ges/research/nuwgp/publications.html) and 36 were published after 2000. Publications drew from a range of fields relevant to SUWM: water resource management (16 publications), natural resource management (8 publications), urban planning and management (5 publications), technology innovation and development (9 publications).
and community development (4 publications). The research covered Canada and the United States (48%); Europe (17%), Australia (17%), the United Kingdom (14%) and Japan (4%).

Review of the urban water related literature quickly demonstrated its insufficiency in this area. Therefore other fields, as highlighted above, were drawn upon to complete the analysis. These other fields were selected to reflect both the social and physical aspects and their mix in urban water management. Literature addressing natural resource management comprises similar socio-physical systems and was therefore included in the review. The problem of advancing SUWM is that it is a complex and ‘wicked problem’ (Freeman, 2000) meaning that administrative and systemic barriers need to be overcome through integrated solutions involving numerous sectors. Natural resource management and other social policy problems, such as urban development, are also complex (Holling, 2001) and were therefore relevant to the meta-analysis. SUWM is likely to require technological innovation evidenced by the research progress made (see for example, Wong, 2006); this led to the inclusion of technological innovation and development literature in the analysis. Community participation is strongly promoted in the urban sustainability discourse (see for example, UNCED, 1992), therefore community development and urban planning and management literature was included. This brief description demonstrates that the attributes of capacity drawn from the literature are applicable to SUWM.

For each publication, the findings of capacity attributes likely to advance SUWM were allocated to the relevant capacity sphere defined by Brown et al. (2006). Attributes were generally documented as a ‘need’ or ‘objective’ in the discussion section. Where attributes could be located in multiple capacity spheres, they were assigned to the sphere which had most control over them. For example the capacity attribute of clear organisational roles and responsibilities relates to inter-organisational capacity but is often delegated by legislation and so was assigned to the external rules and incentives capacity sphere. Numerous attributes of enabling capacity were identified; the five most frequently discussed attributes within each sphere are presented in Table 1. During the analysis it was observed that the publications from the five discipline areas reviewed appeared to concentrate on particular capacity spheres. For example urban planning publications focused more on the inter-organisational and external rules and incentives capacity spheres and the natural resource management publications focused on the intra-organisational sphere.

Findings and Discussion
Attributes of Enabling Institutional Capacity for SUWM
Table 1 presents the results of the meta-analysis - a list of enabling capacity attributes synthesised across the findings of the five disciplinary areas. The capacity attributes represent an ideal case of the capacities expected to be attained when SUWM is mainstream practice. These enabling attributes of capacity are not too dissimilar to those preliminarily suggested by Brown et al. (2006) however, they are organised quite differently within the framework. The main attribute themes derived from the meta-analysis, which include staff knowledge and skills, training, human resources management, inter-organisational communication and networks, and supportive administrative arrangements, are also discussed by Brown et al. (2006).

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<th>Capacity Attribute</th>
<th>Table 1 Summary of Capacity Attributes for SUWM</th>
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<td><strong>Intra-Organisational</strong></td>
<td>- There is senior government commitment (political leadership) to SUWM involving vision, appropriate</td>
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**Incentives**
- Legislation and policies, financial and technical support
  - There are established and effective community participation mechanisms
  - Legislation is holistic and provides a supportive framework for SUWM
  - Clear roles and responsibilities are defined for all organisations
  - Regulations and policy tools encourage SUWM

**Inter-organisational**
- Collaborative arrangements with state and federal government agencies are present
  - Mechanisms for effective coordination and cooperation between vertical and horizontal organisations exist
  - Mechanisms for clear and effective communication are in operation
  - Urban water related information is shared and communicated between vertical and horizontal organisations
  - Research partnerships with local universities are developed

**Intra-organisational**
- Organisation employs staff, or has access to staff, to undertake technical activities or that understand and can use technical information
  - Organisation provides training to all staff
  - Organisation has policies and procedures to attract, develop and retain staff
  - Organisation is competent in financial management
  - Organisation has adequate scientific and technical knowledge
  - Organisation encourages innovation

**Human Resources**
- Staff have skills and knowledge to undertake tasks and can understand and make use of relevant information
  - Staff have appropriate qualifications to undertake tasks
  - Staff can think laterally and exhibit innovation
  - Staff demonstrate leadership
  - Staff are aware of available opportunities

The external rules and incentives are important for providing guidance and structure to the other capacity spheres for advancing SUWM. External rules and incentives are provided by the legislative framework which should be oriented around the objective, SUWM. The definition of clear organisational roles and responsibilities directly relates to inter-organisational capacity but is established at the external rules and incentives strategic capacity sphere. Political leadership refers to the importance of government and leaders having a clear vision and showing initiative, which flows into government support with financial and technical resources. Political leadership can create additional impacts such as stimulating discussion of SUWM issues within the broader community. Finally, the means for community participation must be established at this strategic sphere to ensure that all parties are aware of the mechanisms for participation and it is incorporated as intended.

Qualities of enabling intra-organisational capacity are focused on the organisation’s ability to manage its human resources such as recruitment and ongoing training. It also involves position descriptions and career development pathways. The type and qualities of staff are also important, particularly their technical skills and abilities in financial management. The
importance of organisational culture is revealed in how the organisation encourages innovation which could be influenced by leadership and participatory structures and processes.

The most frequent human resources attributes of enabling capacity discussed in the literature address the technical knowledge of individuals and also their personal qualities. Personal qualities relate to the individuals’ attitudes and ability to exhibit leadership and also their awareness of available opportunities to promote SUWM. This means that individuals will need to show initiative and make use of opportunities to advance SUWM. These qualities are broader than the traditional approach to human resources management that focuses on skill and knowledge development.

**Institutional Capacity Assessment and Building in Practice**

Institutional capacity building programs in the Australian water industry have been operating for a number of years with substantial financial investment at the human resources and intra-organisational capacity spheres. Examples include Clearwater in Victoria, the Water Sensitive Urban Design in Sydney Project, and the Healthy Waterways (South East Queensland Healthy Waterways Partnership). The results of the meta-analysis of the literature (Table 1) support the activities of these programs in working to develop some of the capacity qualities of the human resources and intra-organisational capacity spheres. Capacity development programs have involved conducting training, workshops and site visits to increase knowledge among practitioners and facilitate intra-organisational communication by organising design competitions requiring inter-disciplinary teams. However, these types of programs often only address two of the four capacity spheres, revealing a potentially important gap in capacity building interventions at the inter-organisational and external rules and incentives capacity spheres. This gap indicates that SUWM will not effectively be achieved and explains the observed institutional barriers to date. It also highlights the need for further investigation into capacity at these macro-spheres, and capacity assessment to develop interventions that address the identified capacity deficits.

The attributes of enabling capacity identified in the meta-analysis (Table 1) represent ideal institutional capacity characteristics. Practitioners and policy makers involved with any capacity sphere could use this schema to design their ICA efforts across a region. The ICAF would be used to identify or map current capacity and capacity deficits and the results of this assessment could then be used for city-wide strategic planning of future investment in capacity building. The ICA results are likely to indicate that the capacity in different cities would vary, with strengths in different capacity spheres. The interim ICAF could also be used as a communication tool to stimulate discussion between all stakeholder groups including politicians and community representatives about capacity deficits and how they can be addressed.

The literature analysed revealed capacity attributes for the broad time frame relevant to each publication. As the publications were purposefully selected to be forward thinking, it is likely that the capacity attributes will be relevant for SUWM into the future. However, as social and physical research progresses, further knowledge will be available to develop these attributes of enabling capacity.

Results of this research have both empirically substantiated and further developed the ICAF developed by Brown *et al.* (2006). Further research is required to empirically test the adequacy and scope of these attributes and develop an ICAF to advance SUWM. The original
framework indicates that the capacity spheres are nested but does not expand on the relationships between the spheres further. The future empirical testing of these capacity attributes will also involve investigation into the nature of these relationships.

Conclusion
This paper has developed a tentative institutional capacity assessment framework derived from a meta-analysis of empirical research presented in the literature. Literature across five disciplinary areas that identify capacity building as a means of achieving sustained social change was analysed. The interim framework developed consists of the five most frequently determined attributes of enabling capacity from each of the capacity spheres, including human resources, intra- and inter-organisational and external rules and incentives capacity spheres.

Dedicated capacity assessment focused on SUWM is needed to ensure that reform interventions are critically informed of institutional capacity deficits and capacity development needs, and have a significantly improved opportunity for success. The interim ICAF is the first step in addressing the important knowledge gap of identifying key capacity attributes and of developing an empirically based, practical tool for use in strategically planning future institutional capacity building interventions to advance SUWM.

While the interim ICAF can be used immediately, this integrated literature review forms the basis of empirical research in the area of SUWM, aimed at developing a more robust framework. Future doctoral research will involve a case study approach and employ qualitative and quantitative research methods in large Australian cities to further develop the ICAF.

References


