Transitioning Water Systems to a Greater Resilience

S Tait, E Westling, E Sharp, R Ashley

Panel: RESILIENCE IN WATER, FLOOD AND DROUGHT RISK MANAGEMENT - CONTROLLING THE UNTAMEABLE; RECONCILING URBAN PLANNING AND WATER

Urban water systems have never been more strategically important for society, the continued reliable provision of safe potable water, drainage and wastewater services are essential. In the developed world this need is met with the use of technologically based large infrastructure. To meet future challenges (climate change, water scarcity, floods, water security, floods, population change and expectations of public health), these systems require urgent and radical change in order that the existing and deteriorating infrastructure may best be utilized. However, there are significant resource, regulatory and knowledge constraints in moving our current water systems to a state in which they are capable of responding to these new impacts. One key constraint is the uncertainty associated with predictions of the future and the impact this uncertainty can have on human action. In addressing the impacts of climate change a large scale technological approach of simply building larger infrastructure can be adopted, however this approach can no longer be relied upon to deliver an acceptable level of risk in the medium term at an economically viable cost. A more flexible adaptive approach is required that would involve the consideration and implementation of a wider range of more frequent smaller scale interventions. Such interventions will evolve as knowledge of climate change and its impacts develops.

Given the uncertain nature of the drivers that our urban water systems face and the impacts on society when these systems fail, the challenge is how to ensure that water systems can develop a greater resilience. Resilience is traditionally concerned with the ability of a system to recover its function after being impacted by an external driver, but has evolved to also include opportunities for, innovation and creation of new trajectories for systems as a consequence of change. In this light, resilience provides adaptive capacity, crucial in order to govern future uncertain, complex and unpredictable impacts on the water cycle. Hence, there is a need to define what aspects characterize a more resilient water system and in particular, knowledge is needed about how we can encourage the transition from the current water systems, dominated by large infrastructure, with long design lives, to systems that are diverse and more resilient to future changes. It is recognized that technology can be used to improve resilience, however the governance and management of organizations can be equally or more important in developing a resilient system. A key characteristic of a resilient system is its ability to change based on experience or new knowledge. This means that in order to develop resilience, institutions must build this capacity to self-learn and reflect so as to be able to identify opportunities to benefit from climate change as well as developing strategies to deal with the detrimental impacts.

This paper draws on the adaptive management and resilience literature, as well as transition and institutional theory to discuss what constitutes a resilient water system, the capacity to transition to a more resilient water
future, and finally the role of institutional dynamics in enabling and constraining such transition.