



CRC for
Water Sensitive Cities



Program D: Adoption Pathways | Project D1.1 | Project duration: July 2012 – December 2014

Integration and demonstration through urban design

Overview

The project facilitates knowledge sharing between researchers and industry partners through the development and application of the Water Sensitive Cities Modelling Toolkit and coordination of a number of water sensitive demonstration projects to provide proof-of-concept for water sensitive initiatives. The toolkit provides a platform for the synthesis of green infrastructure and stormwater management research from across the CRC for Water Sensitive Cities (CRCWSC) and its application by industry as part of planning and design projects at a range of scales. Demonstration projects build researchers' and practitioners' knowledge and capacity through learning-by-doing and provide vital case studies to support the transition to water sensitive cities.

The application of the toolkit enables a wide range of green infrastructure scenarios for stormwater management and urban heat mitigation to be generated in response to user defined objectives and targets, and multiple benefits provided by different scenarios to be quantified and compared. Users can also assess specific benefits of water sensitive initiatives through the standalone application of individual scenario assessment modules.

Key outcomes

This project provides tools to support the transition to water sensitive cities and towns, and coordinates the application of research outputs from across the CRCWSC to water sensitive demonstration projects delivered by industry partners.

A fully functional version 1 beta of the toolkit was launched in July 2013, with version 2 beta released in October 2014 for testing and validation by end users. Researchers, water utilities, local governments, consultants and other organisations applying this toolkit will be able to better understand, quantify and compare multiple benefits associated with potential green infrastructure and stormwater management strategies within their area.

Application of research in demonstration projects delivered by CRCWSC partner organisations is another key outcome of this project. Examples include the development of a strategy to protect the ecological values of Gum Scrub Creek in Melbourne, Victoria, as urban development occurs within the catchment. Knowledge and capacity built through the co-planning for and co-management of a biofilter for stormwater harvesting, treatment and use in Marrickville in New South Wales (proposed for 2015) is another key outcome.

Insights into developing the toolkit: a knowledge synthesis activity

The concept for the toolkit was initially developed by the Cities as Water Supply Catchments research program which is now part of the CRCWSC. Projects that have contributed research outcomes to the toolkit include Project C1.1 (Sustainable technologies) through planning for stormwater treatment and harvesting; Project B1.1 (Urban rainfall in a changing climate) by simulating uncertainty and variability in future rainfall and evaporation at a fine spatial scale; Project B2.1 (Stream ecology) through understanding and managing the impacts of stormwater and urban waterway health; and (Project B3.1 (Green cities and microclimate) by looking at microclimatic benefits of green infrastructure at a precinct scale. Project A1.1 (Economic valuation) is currently undertaking research that will inform a non-monetary benefits module.

The toolkit comprises a scenario generation model (UrbanBEATS) and a number of scenario assessment modules that can be applied individually or collectively: stream health (hydrology, water quality and stream erosion), peak flow (minor flood reduction) and urban

heat mitigation. A rainfall prediction module (local variability and uncertainty) and an economic valuation module (non-monetary benefits of green infrastructure) continue to be developed. Dynamic links to the model for urban stormwater improvement conceptualisation (MUSIC) allow scenario assessment modules to use flow and pollutant data generated by MUSIC. The process of developing the toolkit has involved extensive collaboration and engagement between the various CRCWSC research projects that have contributed to the toolkit. This process has required researchers to reflect on how new research needs to be presented to be accessible and useful to practitioners, and to clearly define the possible applications, assumptions and limitations of their work.

Input and feedback from industry participants throughout the development process have also been critical enabling partners to understand how the toolkit may support the planning and design activities of their organisations.

Project design

The current beta version of this toolkit is the result of stormwater management research from the CRCWSC's forerunner, the Cities as Water Supply Catchments research program. Projects that have fed insights and recommendations into the toolkit include Sustainable Technologies (focused on stormwater treatment and harvesting), Rainfall in a Changing Climate (simulating future rainfall and evaporation conditions at a much finer spatial scale), Stream Ecology (understanding the impacts of stormwater management on the health of urban waterways), and Green Cities and Microclimate, which is investigating the climatic advantages of harvesting and using stormwater at a precinct scale.

There are multiple benefits of the toolkit: It allows for environmental benefits to be illustrated through computer modelling and simulations deriving a set of environmental benefit indices. This provides urban planners with convincing arguments for the implementation of water sensitive urban design. The user-friendly toolkit also comes with an intuitive graphic interface to guide users through the four stages of its application (data input, scenario generation, simulation and assessment). Another key benefit lies in its ability to automatically generate a large number of different stormwater management interventions or scenarios through the use of spatial data and urban planning considerations.



Figure 1. The Water Sensitive Cities Modelling Toolkit user interphase

Outlook

The toolkit is currently being applied to a number of case studies to test and validate the underlying concepts and algorithms across a range of urban settings.

Over the next six months, the activities of the project are expected to increase knowledge and understanding to support the transition to water sensitive cities and towns. The development of a database of future rainfall projections for many Australian capital cities will further support this transition.



About the Cooperative Research Centre for Water Sensitive Cities

The Cooperative Research Centre for Water Sensitive Cities (CRCWSC) brings together interdisciplinary research expertise and thought-leadership from Australia and the world to address current urban water management challenges facing our cities and regions. In collaboration with over 80 research, government and industry partners, it develops and synthesises knowledge into powerful tools and influences key players aiming to achieve sustainable, resilient and liveable water sensitive cities.

Further information

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