Optimised real-time monitoring and control of networked stormwater harvesting systems to augment household water supply, reduce nuisance flooding and provide environmental flows to streams

project summary

Project C6

Melbourne Waterway Research Practice Partnership

This project will contribute to identifying a model for cities around the world in adapting to a changing climate, turning damaging urban runoff into a dual resource of water supply and environmental flows for downstream receiving waters.

Project Team:
University of Melbourne:
Tim Fletcher
Darren Bos
Kathy Russell
Chris Walsh
Mat Burns
Gen Hehir
Rob James
Peter Poelsma
Stephanie Lavau
Claudia Niklason

Melbourne Water:
Rhys Coleman
Slobodanka Stojkovic
Bridgett Russell
Blair Smith
Jarrod Polkinghorne
Tiana Preston
Charlotte Beresford
Michael Godfrey
Joanne Thom
Rory Costello

South East Water:
David Bergman
Ninad Dharmadhikari

Yarra Ranges Council:
Beth Wallis
Gavin Prentice

Expected Impacts

Improved confidence in the ability of RTC networks to improve stream condition. Achievement of HWS objectives for stormwater management and eFlows in the Monbulk Creek catchment. Refined RTC optimisation algorithms and network operation. Achievement of IWM forum Strategic Direction Statement Action 35 for Dandenong Creek. Prevention of the loss of local platypus population.

Background

In recent years, researchers around the world have demonstrated the importance of returning more natural flow regimes and improving water quality in protecting the biodiversity of urban waterways. Informed by modelling of urban flows and their ecological risks and benefits, Stormwater Control Measures (SCMs) are designed to capture runoff, retain excess flows, and release filtered water to mimic natural flow regimes.

Despite the promise of SCMs, large-scale experiments aiming to improve the health of degraded streams using widespread implementation of SCMs (on public, and increasingly private, land) have so far failed to achieve the desired or hypothesised improvements to streamflow and ecological outcomes.

Real-Time Control (RTC) technology offers the potential to revolutionise the way small-scale, highly distributed SCMs operate—to overcome the identified limitations. RTC can allow for the collective coordination of SCMS, as a virtual reservoir that can be actively managed to achieve specific flow and water quality conditions . It can also optimise the use of the storage capacity of individual SCMs, potentially reducing storage volumes and space requirements.

Objective

The overarching objective is to test the technical and social feasibility of operating distributed stormwater control measures using real-time control, to improve the hydrology and ecological health of urban streams.

The project will test this through three complementary research questions:

1. Can networked SCMs and RTC technology improve the flow regime in Monbulk Creek?
2. In what ways do household water practices support or challenge the social sustainability of networked rainwater tanks being co-managed for private and public good? and
3. Do the increased baseflows and reduced stormflows platypus foraging habitat?

Methods

The project will test the technical and social feasibility of the technology-enabled co-management model, through a major experimental intervention in an urban catchment (Monbulk Creek, Melbourne).

It will involve collaboration with Melbourne Water and Yarra Ranges Council, equipping the two large storages on Monbulk Creek with RTC outlets, along with the installation of a number of RTC-enabled SCMs on both public and private land All of these will be controlled by an optimised control network using cutting-edge technology developed by the project's third partner, South East Water.