SOCIO-ECONOMIC BENEFITS OF METEOROLOGICAL AND HYDROLOGICAL SERVICES

CASE STUDIES

Urban Water Demand Modelling – Case Study

ITEM	DESCRIPTION
Sector	Water - Engineering
Sub-sector	Urban water demand modelling
Case Study Name	Costing of water cycle infrastructure savings arising from Water sensitive urban design source control measures
Case Study Description	Water sensitive urban design source control measures include rainwater tanks, infiltration trenches, detention basins and constructed wetlands used in housing allotments and subdivisions.
Location	Lower Hunter River, NSW, Australia
Tools employed	WATHNET is a suite of programs for generalised water supply headworks simulation using network linear programming, annual equivalence analysis
Description of application	This study considers the benefits of the use of rainwater stored in tanks to supplement domestic indoor and outdoor water use in the Lower Hunter region, New South Wales, Australia. It describes the development of a simulation of household water demand partly satisfied from rainfall and then shows how this model is included in the simulation of the drought security of the water supply headworks system. The impact on delaying augmentation of the headworks system is examined. A comparative economic analysis is also presented.
Outcomes of application	The benefits of WSUD source control approaches arise from reduced mains water use, reduced stormwater infrastructure and improved environmental performance. A case study for the Lower Hunter region demonstrates that the use of rainwater tanks used to supply outdoor, hot water and toilet flushing demand can delay construction of new water supply headworks infrastructure by up to 34 years and reduce annual regional water demand by up to 24,700 ML.
Cost/Benefits	Use of rainwater tanks to supplement the water supply network delayed the construction of new water supply headworks infrastructure by up to 34 years. Peak demands on water supply trunk systems were reduced by up to 5%, stormwater discharges from roofs by up to 56% and household mains water demand by up to 55%. The scenario that required all new housing developments to use WSUD source controls including rainwater tanks provided the greatest benefit to the community.
Characteristics of the Case Study	A household water use model was developed to enable comparison between households that use mains water and those that supplement mains water supply with rainwater stored in tanks. Rainfall captured on roofs is directed via a first flush separation device to a rainwater tank that supplies hot water, toilet flushing and outdoor water use. The rainwater tank overflows to the street drainage system. Mains water supplies all other in-house water uses and supplements the rainwater supply when water levels are low in the tank.

	The model was used to continuously simulate main water demand using pluviograph and temperature data over the 62-year period, 1932 to 1994, which coincides with the period for which streamflow and rainfall data were available from the headworks system.
Consultation mechanisms	None
Structural interface	Direct contact to meteorological service for data/information.
Delivery mechanism	Provided in electronic format
Feedback mechanism	None
Review Mechanism	None
Other	
Lessons learnt	However, these conclusions need to be tempered by the limitations of the study. This study has not valued the environmental benefit associated with delaying the construction of dams to augment water supply. Moreover, the construction and lifecycle costs of WSUD approaches have only been assessed approximately, albeit conservatively. Therefore, the benefits of WSUD source control approaches have most likely been understated. Current work is directed at addressing these limitations.
Best Practise Advice	Best Practise would see the other elements identified above incorporated into the analysis methodology.
Possible future advances	See above
Comments	
URL	http://www.bonacciwater.com/research/wsud%20-%2004%20-%20source%20control%20measures1.pdf
Others	