Water Health & Security

Critical Policy Brief

This policy brief draws upon the expertise of RMIT's Water: Effective Technologies and Tools (WETT) Research Centre to inform policy makers and the wider community on critical challenges in planning for Victoria's future water use.

Water is a critical resource that sustains the health and liveability of our communities. Victoria is planning for water security against droughts and projected increases in future water demand as its population grows towards 10 million by 2050, adopting a forward-looking, integrated approach to water management.[1] New technologies offer opportunities to meet future water demand without significant additional investment in water infrastructure, particularly in supplying treated, fit-for-purpose recycled water.

Overview

Population growth and changing climate will place increasing pressure on the security of Victoria's water. Unless alternative water sources are tapped, further investment in major water infrastructure may be needed within 20 years.[2] The Victorian Government and water authorities recognise that use of recycled water is a key element of integrated water management.[3] Recycled water provides a clean, supplementary water source for households, industry, agriculture and urban greening. In periods of low rainfall and drought especially, the use of recycled water sources reduces the diversion of freshwater that is vital for ecosystem health.

Melbourne produces an abundance of treated, recycled water – enough to meet 70% of the city's consumption needs.[4] Yet recycled water remains under-used as a water source. Only 7% of treated recycled water in Melbourne is re-used[5], falling considerably short of Australia's national 30% target. This policy brief highlights three areas in which water management practices and technologies and can support Victoria's future water security: promoting uptake of recycled water; restoring our aquifers through stormwater capture; and managing stormwater contaminants through membrane filter technologies.

Key Messages

- Demand for water has been projected to exceed the capacity of existing water infrastructure within 20 years. This growth in water demand can be readily and affordably met through better use of recycled water and stormwater harvesting.
- Recycled water is a cost-effective and safe alternative water supply, yet only 7% of Melbourne's available recycled water is currently being used.
- Active promotion of recycled water use will bring Melbourne much closer to the national target of 30% re-use of treated wastewater. This requires planning for the provision of "third pipe" infrastructure for supply of recycled water to industry and households, and promoting best practice on-site water treatment.
- Victoria's aquifers can be replenished by captured stormwater, providing greater water security against changing climatic conditions. Further investigation is needed to identify which aquifers are most suitable for water storage and recovery.
- New membrane filtration technologies offer considerable promise in treating stormwater contaminants and providing a fit-for-purpose recycled water supply.

Promote Uptake of Fit-for-Purpose Recycled Water

The use of recycled water and stormwater harvesting provides significant opportunity to reduce consumption of water from Melbourne's reservoirs. In Werribee's Riverwalk housing development, for example, residents can reduce consumption of reservoir-sourced water to just 40% of Melbourne's average consumption.[6] Industry could realise similar water savings through greater use of recycled water.

Recycled water can be especially beneficial for agricultural purposes, as wastewater can be treated in a fit-for-purpose way, retaining nutrients such as nitrogen and phosphorus. This reduces farm consumption of fertilisers, as well as lowering the operating costs of wastewater treatment plants.[7] Environmental benefits can also result through less reliance on diversions of fresh water needed to sustain the ecosystem, particularly within the Murray-Darling Basin. The availability of large amounts of recycled water from metropolitan wastewater treatment plants could be used to sustain agriculture in peri-urban areas.

Victoria has clearly established guidelines for the use of recycled water[8] and advances in water treatment technologies enable recycled water to be supplied both cost-effectively and safely. However, uptake of recycled water remains low. This has been attributed to lack of awareness of its potential as a cheap alternative supply for most water uses, and community perceptions about the quality of recycled water.

Government promotion of the benefits of recycled water to industry and households can stimulate uptake and our progress toward achieving the national 30% re-use of wastewater target. "Third pipe" infrastructure is required across Melbourne to enable delivery of recycled water to businesses and households. Promoting the potential of on-site treatment facilities in new land developments would also provide for a lower cost, built-for-purpose alternative water supply. The integrated water system at Fisherman's Bend, for example, has delivered a 45% reduction in water consumption and halved the amount of wastewater discharged to the sewer system.[9]

Use Stormwater to restore Aquifers

Captured stormwater can be used to restore Victoria's aquifers, building resilience during periods of low-rainfall. Stormwater capture provides the additional benefit of moderating stormwater flow, reducing both flooding and the spread of contaminants from stormwater overflow. The potential of aquifer storage and recovery has been demonstrated by the Anglesea Aquifer Storage Transfer and Recovery scheme, which has been estimated to provide a net benefit of $54 million over 50 years.[10] To make best use of stormwater recharge, further investigation is needed to identify which aquifers are most suitable for water storage and recovery.

Improved Stormwater Treatment

Flooding is becoming more frequent in Melbourne and other Victorian urban centres due to increased severe storm events and an increase in non-permeable surfaces.[11] Stormwater overflow following heavy rainfall disperses waterborne contaminants with significant impacts on the health of our waterways and catchments. Stormwater flows can be managed through greater uptake of water sensitive urban design, such as sediment basins and natural filtration through raingardens and swales, as has been recognised in government promotion of blue-green infrastructure.[12] Treatment systems need to be developed that can cope with large stormwater flows such as those that follow flood events.

Stormwater is currently treated through granular filtration systems to produce high-quality (Class A) recycled water. Recent research indicates the need to characterise specific stormwater contaminants for targeted treatment[13], removing detrimental nutrients while retaining those that provide benefit for use (such as specific types of nitrogen beneficial for farming). Membrane filtration systems now under development[14] provide the capability of removing specifically identified contaminants, offering the promise of adaptable treatment filters to produce fit-for purpose recycled water.

For further information contact Professor Veeriah (Jega) Jegatheesan, jega.jegatheesan@rmit.edu.au

Author: Professor Veeriah (Jega) Jegatheesan

[1] The State of Victoria Department of Environment, Land, Water and Planning (2016), Water for Victoria: Water Plan.
[2] The State of Victoria Department of Environment, Land, Water and Planning (2016), Water for Victoria: Water Plan, p. 86.
[3] See Plan Melbourne 2017-2050 Outcome 6, p. 115; Water for Victoria: Water Plan, p. 86.
[4] Melbourne Water Annual Report, 2016-17, p. 9, 27.
[5] Melbourne Water Annual Report, 2016-17, p. 21.
[6] Riverwalk residents consume 65 litres of reservoir-sourced water daily compared to the Melbourne average of 161 litres per day (Melbourne Water Annual Report, 2016-17, p. 24).
[7] European Commission (2016), Common Implementation Strategy for the Water Framework Directive and the Floods Directive: Guidelines on Integrating Water Reuse into Water Planning and Management in the context of the WFD.
[8] Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 1), 2006, Natural Resources Management Ministerial Council, Environmental Protection and Heritage Council, Australian Health Ministers Conference; Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 2): Augmentation of Drinking Water Supplies, 2008, Natural Resources Management Ministerial Council, Environmental Protection and Heritage Council, National Health and Medical Research Council.
[9] South East Water website, accessed 9 August 2018.
[10] Vanderzalm J.L., Dillon P.J., Tapsuwan S., Pickering P., Arold N., Bekele E.B., Barry K.E., Donn M.J., McFarlane D. (2015), Economics and experiences of managed aquifer recharge (MAR) with recycled water in Australia, Australian Water Recycling Centre of Excellence, p. 43.
[11] Melbourne Urban Stormwater Institutional Arrangements Review, Department of Environment, Land, Water and Planning website, accessed 6 August 2018.
[12] Department of Environment, Land, Water and Planning (2017), Planning a Green-Blue City A how-to guide for planning urban greening and enhanced stormwater management in Victoria.
[13] Lucke T., Drapper D. and Hornbuckle A. (2018) Urban stormwater characterisation and nitrogen composition from lot-scale catchments — New management implications, Science of the Total Environment, Vol. 619–620, pp. 65–71.
[14] Moazzem S., Wills J. and Jegatheesan V. (2018) Treating car wash wastewater by ceramic ultrafiltration membranes for reuse purposes, Environmental Science and Pollution Research, Vol.25(9), pp. 8654-8668; Shurvell T., Keir G., Jegatheesan V., Shu L. and Farago L.(2014) Removal of Lower Molecular Weight Persistent Organic Pollutants through Nano-Filtration and Reverse Osmosis, Desalination and Water Treatment, Vol. 52, (4-6), pp. 643-649.