Australian Water Recycling Centre of Excellence

Project Report

Water Reuse and Communities ToolKit

Module 5: The Influence of Water Scarcity on Public Willingness to Consider Water Reuse

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Australian Water Recycling Centre of Excellence

Victoria University, November 2014

Water Reuse and Communities Toolkit
Module 5: The influence of water scarcity on public willingness to consider water reuse

This report has been prepared as part of the National Demonstration, Education and Engagement Program (NDEEP). This Program has developed a suite of high quality, evidence-based information, tools and engagement strategies that can be used by the water industry when considering water recycling for drinking purposes. The products are fully integrated and can be used at different phases of project development commencing at 'just thinking about water recycling for drinking water purposes as an option' to 'nearly implemented'.

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About the Australian Water Recycling Centre of Excellence

The mission of the Australian Water Recycling Centre of Excellence is to enhance management and use of water recycling through industry partnerships, build capacity and capability within the recycled water industry, and promote water recycling as a socially, environmentally and economically sustainable option for future water security.

The Australian Government has provided $20 million to the Centre through its National Urban Water and Desalination Plan to support applied research and development projects which meet water recycling challenges for Australia's irrigation, urban development, food processing, heavy industry and water utility sectors. This funding has levered an additional $40 million investment from more than 80 private and public organisations, in Australia and overseas.

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Executive Summary

- Longitudinal meta-analysis of survey data on attitudes to water reuse, drawn from the five largest cities in Australia, demonstrates a negative relationship between water storage levels and support for water reuse. This is to say, in situations of increasing water scarcity, public willingness-to-consider water reuse increases. This provides a good evidentiary basis demonstrating the important role that considerations of water availability plays in the formation of public attitudes towards water reuse.

- The data used in this meta-analysis were derived from survey sets in Sydney, Melbourne, Brisbane, Perth, Adelaide, based on the criteria that survey items used across time were identical, administered using comparable sampling and response methodology, and that geographical prescription of the sample was representative of the water supply area it was compared to. Water storage calculations were totals of all reservoirs serving the city.

- In all cases, with the partial exception of Melbourne where trends over time were more complex, there was a strong directional association between changes in public support for recycling and changes in the water availability situation. This was true for periods of increasing and decreasing water scarcity.

- Education about the potential for water scarcity is associated with public willingness to consider water reuse options. Water retailers need to consider making short-term (actual) and long-term (potential) water security problems faced by their states a key theme in all customer engagement, motivating this as an important driver for the need to consider all possibilities for supply augmentation.

Water Reuse and Communities Toolkit

Module 5: The Influence of Water Scarcity on Public Willingness to Consider Water Reuse

Longitudinal meta-analysis of the impacts of external factors on community attitudes to reuse: dam levels and water restrictions

This module is based upon longitudinal data collated from a number of studies measuring community attitudes toward recycled water from the five major cities in Australia. One major limitation in conducting longitudinal meta-analysis on this issue is the limited supply of methodologically consistent data on attitude toward water reuse, as most studies of attitudes towards water reuse do not meet the study criteria listed below.

For this study, dam level data was used as an aggregated total for each city, incorporating all reservoirs. For the data on public willingness-to-consider water reuse as a supply option, data was matched only when adhering to the strict conditions of:

- Identical survey item – The question pertaining to support for the particular form of reuse asked about had to be consistent in wording across the repeated surveys to ensure reliability of answer.
- Identical sampling and response methodology – The method of sampling, and the mode of response (telephone, internet, paper based) had to be the same across administrations of survey to avoid inter-experimenter bias.
- Identical and appropriate geographical prescription – The sample had to be relatively representative of city-wide sentiment. This excluded many datasets which dealt exclusively with specific focus areas (for example Mawson Lakes in Adelaide) or data drawn from large national surveys in which the national sample size was sufficient, but the city-by-city sample size was not.

The key factors under examination were:

- *Outcome variable of interest:* Community attitude to water reuse, at various point in time.
- *Predictor variables of interest:* City-based dam level, water restriction conditions

Note in the graphs below, the aim was to compare the situation within the city across time, not between cities. The focus of the data is not consistency *between* cities, as the studies drawn upon used slightly different questions to measure support for water reuse. For example in Sydney, the question focused on 'water recycling for drinking', while in one of the Brisbane studies the question asked about support for using 'purified recycled water to boost drinking water supplies'.

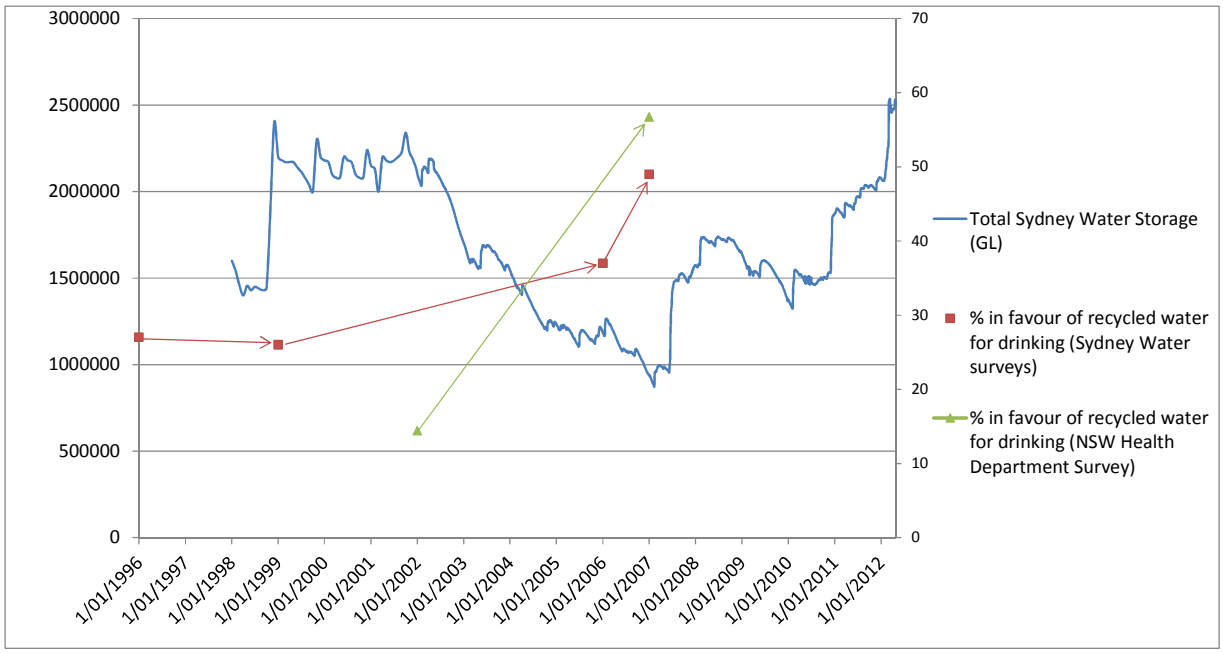
A survey of cities over time

Below are graphs displaying the recent water storage situation for the five largest Australian cities, and on the secondary axis (right-hand side) the level of acceptance for a particular form of reuse. The expected relationship between water storage and willingness to consider water reuse is inverse (which is to say, as water storage levels go up, willingness to consider water reuse goes down). Note also that the two main variables are graphed with different units, water storage on the left axis, and attitude towards reuse on the right axis. Therefore it is the trend (relative movements) of each dataset that is of interest, and not the absolute value.

Sydney

The data below is derived from the Sydney Water values survey, conducted in 2007, as well as earlier studies conducted in 1996, 1999, and 2005. Data for the combined volume of water storage for all Sydney Catchment Authority reservoirs is displayed using the blue trend line, with the measure of total gigalitre volume displayed on the left axis. The red squares and green triangles represent results from two sets of surveys, the former conducted by Sydney Water, and the latter conducted by the NSW Department of Health (n=15,000). In each case, the percentage of people within the study samples displayed represent those supportive of using recycled water to augment drinking supplies. Note that between 1997 and 2007 this number goes up, indicating increasing community support for water recycling, while dam levels go down. The direction of change between survey waves is shown for both studies using the green and red arrows. During the period of 2001 to 2007, as seasonally adjusted dam levels consistenly fall, the proportion of the public in favour of recycled water for drinking consistently rises in both studies.

Figure 1: Graph displaying Sydney water storage against % favouring recycled water for drinking



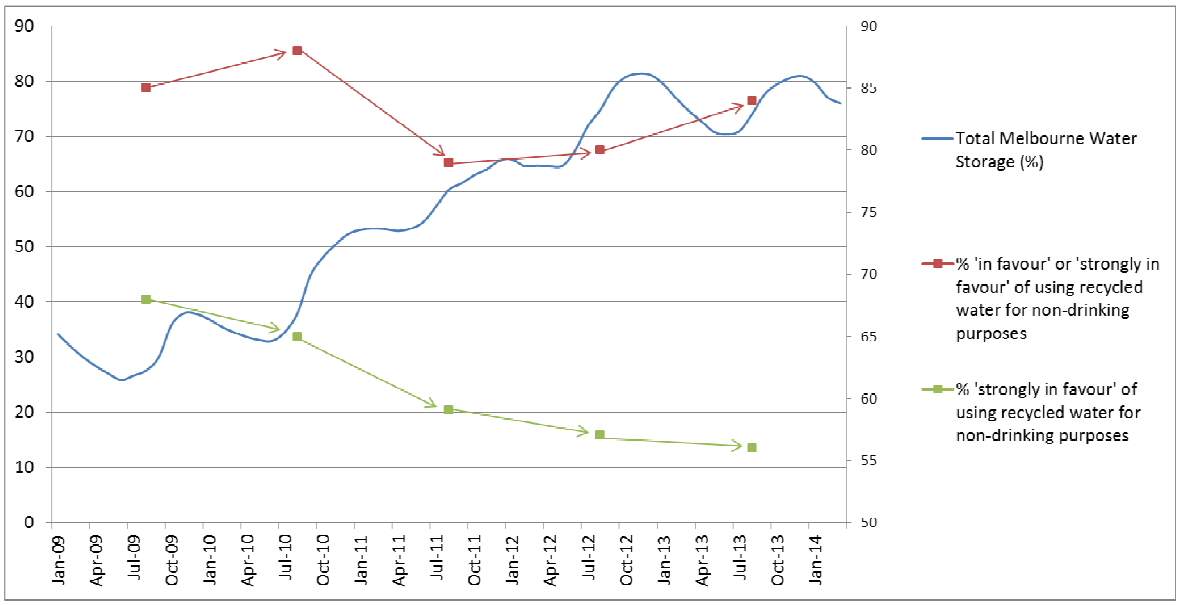
Some additional key events in the Sydney timeline that may have impacted on willingness to consider water reuse as displayed in Figure 1 were:

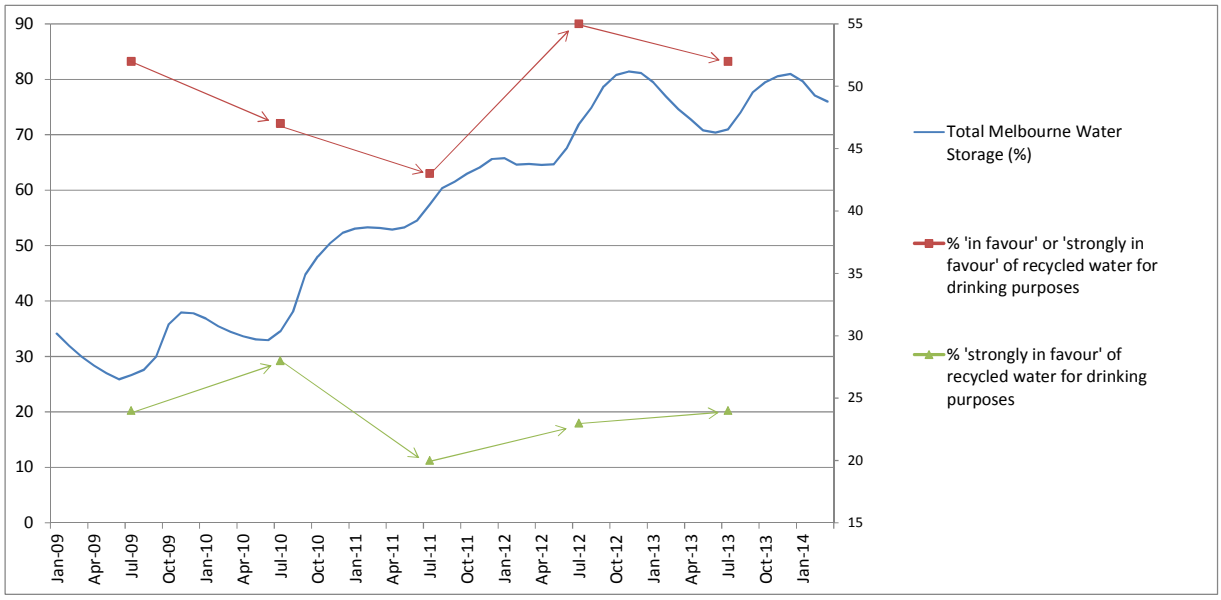
- July-September 1998: Sydney Water boil alert in response to 'Sydney Water Crisis'
- October 2003: Level 1 Water Restrictions introduced
- June 2004: Level 2 Water Restrictions introduced
- June 2005: Level 3 Water Restrictions introduced
- June 2009: Water Wise Rules replace water restrictions

Melbourne

The data displayed in Figure 2a and 2b below are derived from the surveys conducted by Newspoll on behalf of Melbourne Water. The sample size for these studies was n = 400 respondents. Data for the combined levels of water storage for all Melbourne reservoirs is displayed using the blue trend line, with the percentage scale displayed on the left axis. The first graph shows the results when respondents were asked about their favourability towards using recycled water for non-drinking purposes, while the second graph displays respondents favourability towards using recycled water for drinking purposes. Respondents were asked favourability on a five-point scale, with options of strongly favourable, favourable, neutral, against, and strongly against. The green triangles represent those selecting the *most* favourable option ('strongly favour'), while the red squares display those supporting the *two* most favourable options ('strongly favour' and 'favour', i.e. those not neutral or opposing water recycling).

Figure 2a and 2b: Graph displaying total Melbourne water storage against % favouring recycled water for (a) non-drinking purposes, and (b) drinking purposes.





As the expected relationship between water availability and acceptance is an inverse one, a less favourable attitude toward recycled water is expected as dam levels rise and the perceived necessity for supply augmentation abates. However this is only partly true for Melbourne, where the trends displayed are more complicated than other cities. In the first graph displaying results showing support for water recycling for non-drinking purposes, as water storages increase, the proportion of people strongly in favour (green line) adheres to the hypothesis of inverse relation, but for the drinking case this is less so. One key mediating factor in the Melbourne situation during 2011 and 2012 that may explain the greater willingness-to-consider recycled water for drinking purposes in spite of rising dam levels, may have been the unpopularity of the Wonthaggi desalination plant, and posing of water recycling as a possible alternative.

Some additional key events in the Melbourne timeline that may have impacted on willingness to consider water reuse as displayed in Figure 1 were:

- August 2006: Stage 1 Water Restrictions introduced
- November 2006: Stage 2 Water Restrictions introduced
- January 2007: Stage 3 Water Restrictions introduced
- December 2012: New permanent restrictions replace S 2009: Water Wise Rules replace water restriction stages.

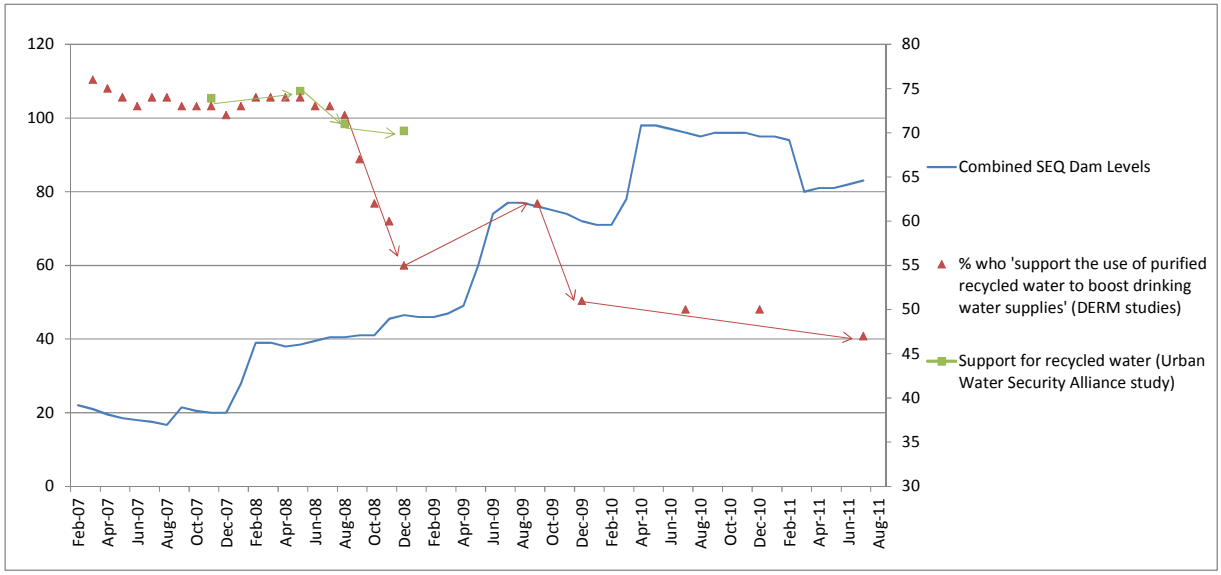
In the same Newspoll survey, respondents were asked about their awareness of dam levels. This dropped significantly after the repeal in March 2011 of the 'Target 155' campaign, which encouraged households to limit their water usage to 155L per person per day through media messaging and providing normative comparisons about expected usage on bills. In 2010, 40% of respondents reported awareness of current dam levels, but this dropped in the following years of 2011 (6%), 2012 (10%), and 2013 (5%). As important as actual dam levels in driving openess to alternative water

source options, is the public's awareness and understanding of the potential for future water scarcity problems.

Brisbane

The data sets in Figure 3 are derived from two studies conducted in Brisbane, the first by the former Department of Environment and Resource Management (DERM), and the second as part of an Urban Water Security Alliance project (Price et al, 2009). The sample sizes of the DERM studies between 2008 and 2001 were in the range of n=2401 and n=2840. Data for the combined volume of water storage for SEQ Water Authority is displayed using the blue trend line, expressed as a percentage of total potential water storage on the left axis. In each case, the percentage of people within the study samples displayed represent those supportive of using recycled water to augment drinking supplies.

Figure 3: Graph displaying Brisbane water storage against % favouring recycled water for drinking

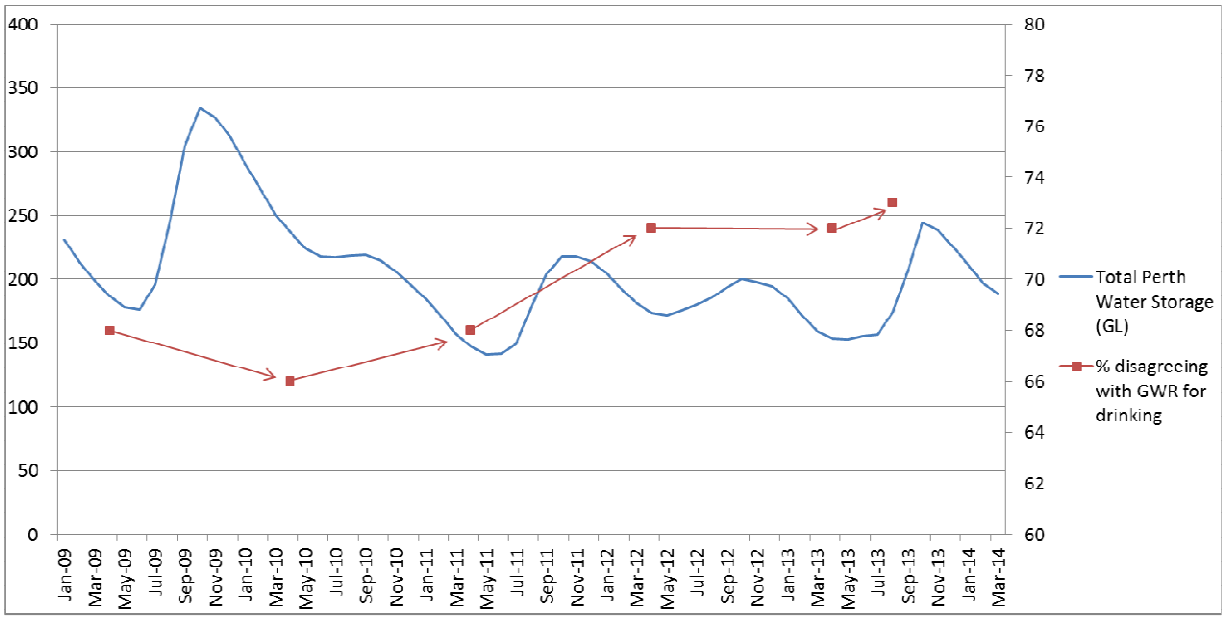


In Figure 3 above, the number of respondents opposed to recycled water for drinking increases as the level of water availablility increases, factoring in a potential lag effect. The direction of change between survey waves is shown for both studies using the green and red arrows. The DERM study shows a correlation with some lag, with public opinions following the stituation of water scarcity some time afterwards.

Perth

The data below is derived from the Groundwater Recharge Study conducted by Water Corp WA. In these studies, the sample size was between n=400 and n=415. Data for the combined volume of water storage for all Perth reservoirs is displayed using the blue trend line, with the measure of total gigalitre volume displayed on the left axis. The red squares represent the proportion of people surveyed disagreeing with Groundwater Recharge for drinking.

Figure 4: Graph displaying Perth water storage against % favouring GWR for drinking.

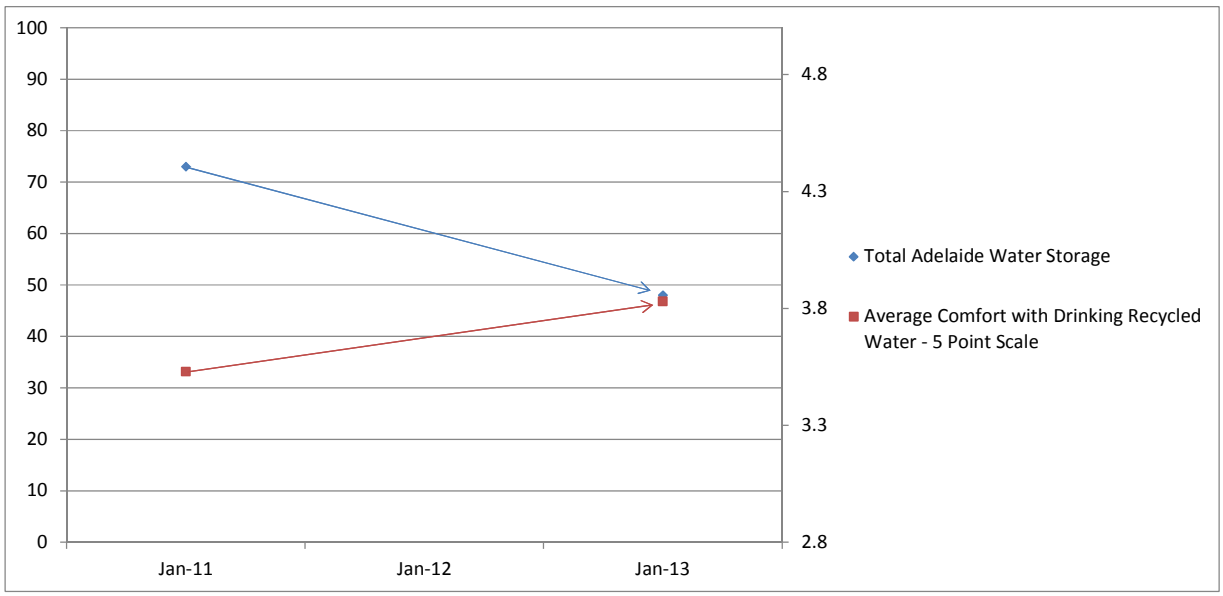


In this case, public willingness to consider GWR for drinking seems to correlate fairly reasonably to the situation of water availability, until the last reading in August 2013.

Adelaide

Data from Adelaide that fulfilled the analysis criteria was limited, despite the existence of a significant body of data dealing with the Mawson Lakes development. In this case that data was not used, as the case of an emerging greenfields development was considered to be driving by significantly different (and additional) dynamics that willingness to consider water reuse on a broader scale. The data below is derived from two waves of a Managed Aquifer Recharge Stormwater Use Options (MARSUO) study conducted by the Goyder Institute and CSIRO. Scales used were developed and validated by the study, and administered in both years with a subject pool of 1043 respondents (2011) and 614 respondents (2013) via an online survey.

Figure 5: Graph displaying Adelaide water storage against % comfortable with using recycled water for drinking.



Despite the limited data, the directionality of the trend is consistent with the other four cities for which data was available.

Conclusions

There is a clear association between water scarcity and indications of public support for various forms of water reuse. In most cases, water storages have gone down in recent times, reflected in rising willingness to consider water reuse. However, in Melbourne, water storages have gone up, while willingness to use recycled water for drinking and non-drinking purposes has not necessarily always followed an inverse relationship (water storages have also recently increased in Sydney and Brisbane, however no matching data on willingness to reuse was available for those cities at the time of writing.

Other background variables, such as water restrictions, the political situation, and the degree of engagement and education by water authority have clearly shape willingness-to-consider water reuse as a supply augmentation option. However this meta-analysis shows that the situation of water availability is associated with community willingness-to-consider water reuse amongst the population of Australia's large cities. Some of the implications of the linking of this key contextual variable with public openness to water reuse are illustrated in Table 1 below.

Table 1: Key opportunities and challenges presented by link between public attitudes to water reuse and water storage levels.

Opportunities	Challenges
• Clear opportunities to communicate and involve public in long-term engagement around reuse during periods of water scarcity. • Importance of educating and engaging consumers to build awareness of current situation regarding water storage, and promoting understanding of water security threats from rainfall, drought, climate change, and demand growth. • Possibility of phased rollout of water reuse, consisting of long-term preparation during periods of non-scarcity, trialling and normalisation during period of scarcity when openness is high, then continuation of water reuse after habituation regardless of water situation.	• Public less interested in, and less open to consider, water reuse options when water storages are increasing. • Necessary to adopt long-term framework for education around the safety, need, and benefit for water reuse, even against prevailing context. • Long-term strategic investment may not be easy to justify to the ratepayer in times of water abundance.

In developing engagement strategies, water authorities should take into account the importance of environmental drivers in public opinion, and should seek to promote community understanding of water security planning as key to their engagement strategy. This can be done by fostering awareness about situations of water scarcity through all communication channels. These include:

- Interactions with water consumers (e.g. bills and mail-outs)
- Print (Newspaper weather, news articles)
- Internet (News websites and Bureau of Meteorology, Water Company pages)
- Broadcast (TV weather, news reports, radio).