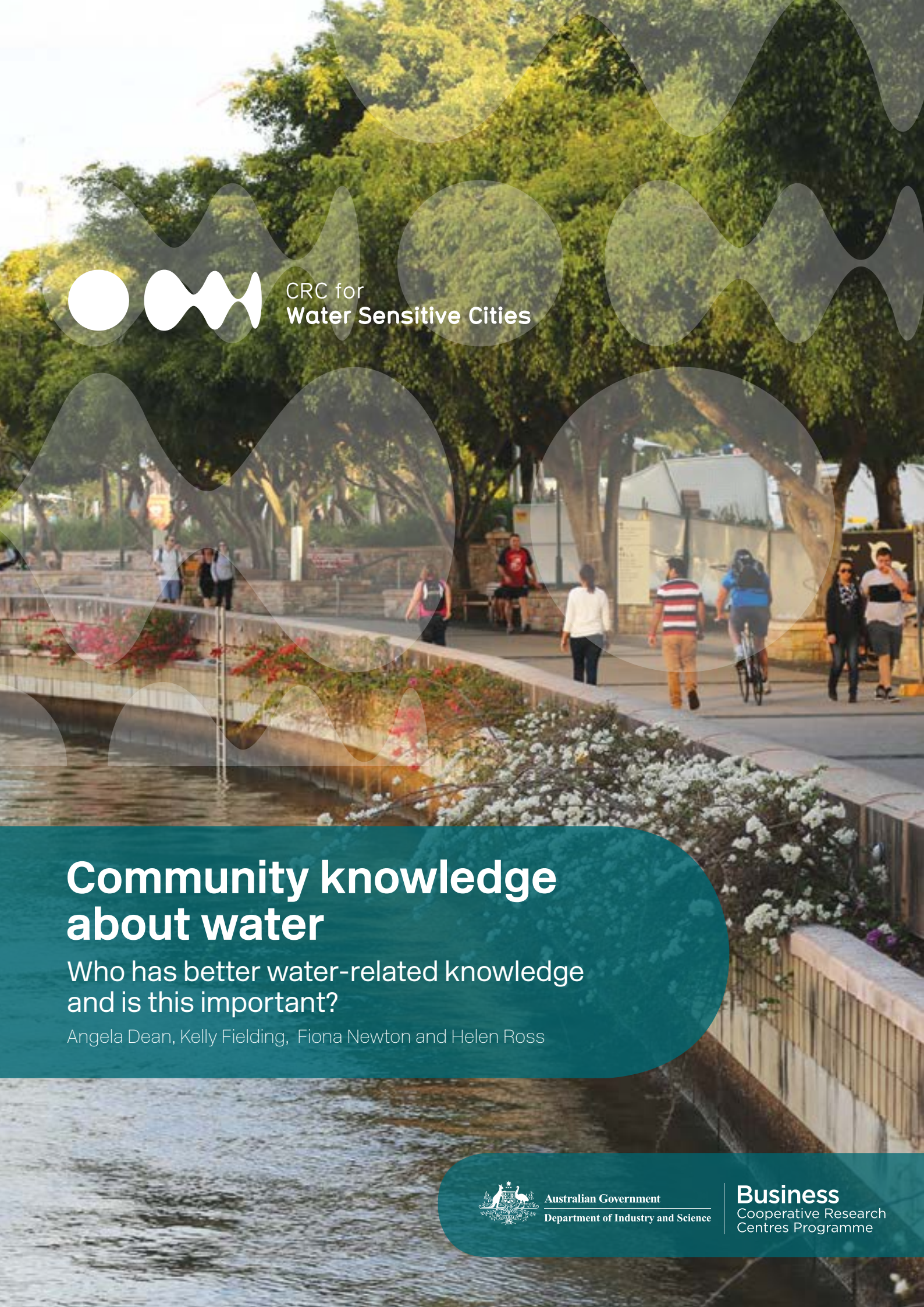


CRC for
Water Sensitive Cities

# Community knowledge about water

## Who has better water-related knowledge and is this important?

Angela Dean, Kelly Fielding, Fiona Newton and Helen Ross

Australian Government
Department of Industry and Science

Business
Cooperative Research
Centres Programme

**Community knowledge about water: Who has better water-related knowledge and is this important?**
*Engaging communities with Water Sensitive Cities* (Project A2.3)
A2.3 – 3 – 2015

**Authors**

Angela Dean, Kelly Fielding, Helen Ross (University of Queensland) and Fiona Newton (Monash University)



**Publisher**

Cooperative Research Centre for Water Sensitive Cities

Level 1, 8 Scenic Blvd, Clayton Campus
Monash University
Clayton, VIC 3800

**p.** +61 3 9902 4985
**e.** info@crcwsc.org.au
**w.** www.watersensitivecities.org.au

**Date of publication:** November 2015

**An appropriate citation for this document is:**

Dean A, Fielding K, Newton F & Ross, H. (2015) *Community knowledge about water: Who has better water-related knowledge and is this important?* Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.

# Table of Contents

# Executive Summary

## Background and rationale

Integrated water management involves integrating investment, policy, and technological solutions to pursue water security and waterway protection. Many water management approaches promote engaging with the community – not only for targeting household water demand or individual behaviours, but as a means of cultivating trust in reform processes and building support for new policies or investment. Engagement activities are more successful when aligned with the communities' existing knowledge. Identifying community knowledge about water related issues is an essential precursor of effective community engagement. The two studies presented here aim to assess Australians' water-related knowledge and examine the individual and contextual factors that influence this knowledge.

## Study 1: National survey

**What was done?**

We surveyed a representative sample of Australian adults (n=5172). We assessed water-related knowledge using 15 questions about impact of household activities on water quality, the urban water cycle, and water management. The survey also examined demographics, psychosocial characteristics, exposure to water-related information, and water-related attitudes and behaviours.

**What was found?**

- *Water knowledge:* Participants correctly answered a mean of 8.0 questions (Range 0-15). Most respondents knew that household actions can reduce water use and influence waterway health, whereas less than one third correctly identified that domestic wastewater is treated prior to entering waterways, urban stormwater is not treated, and that these are carried via different pipes.

- *Social factors influencing water knowledge:* Higher water knowledge was associated with older age, being male, higher education and living in non-urban areas. Poorer water knowledge was associated with speaking a language other than English in the home, and having at least one migrant parent. Garden size, experience of water restrictions, environmental identity, satisfaction, waterway use for swimming, and certain information sources were also associated with greater knowledge.

- *Does knowledge influence attitudes and behaviours?* Greater water knowledge was associated with a range of personal behaviours and policy support: support for alternative water sources, support for raingardens, use of everyday water-saving behaviours, uptake of water-saving devices, and engagement in pollution-reduction behaviours. These findings confirm the importance of community knowledge, and identify potential subgroups who may require additional targeting to build knowledge and support for water management initiatives.

# Study 2: Focus groups

**What was done?**

To extend our understanding of community knowledge about water, especially stormwater management, we conducted six focus groups, held in Brisbane, Townsville, Melbourne, Bendigo, Perth, and Geraldton. Focus groups were recruited via a social research company and reflected a representative mix of genders, ages and incomes. The focus groups included discussions about perceptions of water and stormwater, and knowledge about diverse management practices to mitigate stormwater pollution.

**What was found?**

The prevailing community perception about stormwater is that it is an issue of excess water, flooding, and overflowing drains. Few participants spontaneously mentioned issues related to pollution in waterways, especially non-visible pollution.

The focus group discussions also highlighted the following points:

- When people think about water they think of it in terms of the benefits it provides to them—for drinking, showering, recreating—and for the essential part it plays in life.
- Most people are unaware of the issues of stormwater pollution, especially non-visible pollutants, and everyday strategies to reduce stormwater pollution and its impacts.
- When presented with examples of water sensitive urban design initiatives, most participants reported lack of awareness of, or prior exposure to, these types of initiatives.
- Discussion indicated that young people were likely to have poor awareness of stormwater management issues.
- When provided with explanations about the urban water cycle and stormwater pollution, people understand the concepts.
- When presented with information about everyday strategies to reduce stormwater pollution, although most people had not thought about these in relation to stormwater management, they reported that they were reasonable and doable.
- Most participants were supportive of educational initiatives about stormwater management. They emphasised wanting to know about the beneficial impacts of different pollution-reduction behaviours (such as covering soil in the garden, or washing the car in an area that drains to a garden), at individual and community levels.

**Implications for practice**

These findings have a number of practical implications for water practitioners and information providers. It is important to recognise that knowledge is not binary, but varies in depth and breadth across issues: individuals may be well informed on some water issues, but poorly informed on others. When planning community engagement or education initiatives, it is important not to assume pre-existing knowledge, and to make information relevant for the target group.

Poor understanding of words like ‘catchment’ and ‘stormwater’ are a reminder to minimise the use of jargon and technical terms when engaging with communities. For example, use of the word stormwater will create images of flooding for most communities members. If we need community members to consider pollution-related issues, this will need to be made explicit.

Identifying factors associated with poorer water-related knowledge may facilitate better targeting of certain community sub-groups for information or engagement-focused campaigns. It is unclear whether solely focusing on knowledge improvements would translate into increased uptake of water conservation or pollution-reduction behaviours in these groups. Although knowledge and literacy can be cultivated (Nutbeam, 2008, Baker, 2006), it is likely that certain target groups will require more intensive interventions to change existing attitudes and behaviours.

# Where to next?

These findings will inform ongoing research exploring effective ways to communicate about water management issues to the community, and strategies to engage communities in water management.

# Background

Integrated water management involves integrating investment, policy, and technological solutions to pursue water security and waterway protection (Marlow et al., 2013, Brown et al., 2009, Vorosmarty et al., 2010). Many water management approaches promote engaging with the community – not only for targeting household water demand or individual behaviours, but as a means of cultivating trust in reform processes and building support for new policies or investment (Marks and Zadoroznyj, 2005, Marlow et al., 2013). Because engagement activities are more successful when aligned with the communities' existing knowledge (Wallington et al., 2010, Department of Sustainability, 2012, McDuff et al., 2008, Buhr and Wibeck, 2014), identifying community knowledge about water related issues is an essential precursor of effective community engagement. The aim of our research was to assess Australians' water-related knowledge, identify which groups have stronger or poorer knowledge, and explore the relationship between knowledge and water-related attitudes and behaviours.

## Why is knowledge important?

Public knowledge and understanding is considered a core ingredient of solving water-related problems (Daugs and Israelsen, 1984). The concept of 'water literacy' integrates knowledge about water, with both the willingness and capacity to apply water-related knowledge. Psychological models of environmental behaviour highlight the importance of knowledge, suggesting that knowledge is a necessary, although not sufficient, ingredient to generate behaviour change (Kaiser and Fuhrer, 2003). Research also shows that knowledge is associated with support for public policies (Salvaggio et al., 2014, Safford et al., 2014). Provision of information about recycled water, for example, may enhance support for recycled water initiatives (Fielding and Roiko, 2014).

## What do we know about water-related knowledge?

Little research has examined water-related knowledge – most existing studies have been conducted in regions of the United States. For example, various surveys have reported the following findings:

- Only 28% could identify the correct definition of a catchment (Giacalone et al., 2010)
- Only 38% knew that stormwater flows to the nearest waterway and 30% of respondents incorrectly thought that stormwater is treated prior to discharge (Baggett et al., 2008)
- Less than half of the respondents were very familiar with a series of 14 water-related terms (e.g., groundwater, water reuse) (Pritchett et al., 2009),
- Only 36% of respondents had heard of the name of their catchment region (McDuff et al., 2008)
- One third of respondents could not identify activities that contribute to water pollution (Hoppe, n.d.).

One Australian study examined water-related knowledge in 3709 residents of South-East Queensland (James et al., 2010). Although 72% of respondents knew that waterways can be damaged by stormwater flows, only 33% could correctly identify that domestic wastewater is treated before entering waterways. Moreover, one in four respondents reported not knowing the specific source of their drinking water (James et al., 2010). A survey of 1000 Australians found that less than one in five felt that they were well informed about alternative water sources (Australian Water Association, 2010).

## What influences water-related knowledge?

Very little research has examined determinants of water-related knowledge. One study reported that in addition to income and gender, waterway use and longer duration of residence in the area was associated with greater knowledge (McDuff et al., 2008). Based on research from the health literacy field, we would expect a range of social factors to influence water-related knowledge (von Wagner et al., 2009, Bo et al., 2014, Sun et al., 2013). These include: demographic factors such as, age, education level and cultural or language background; life experiences such as stress or experience of drought or water restrictions; and psychological factors such as environmental identity (van der Werff et al., 2013, Whitmarsh and O'Neill, 2010). However, no studies have examined whether these factors influence water-related knowledge.

## Aims of the current study

- To assess Australians' water knowledge
- Identify who has better water-related knowledge
- Examine whether knowledge is related to attitudes and behaviours

## Why is this important?

- Effective community engagement is an essential component of integrated water management
- Engagement is more effective when targeted to existing knowledge levels in the community

## Don't we know this already?

- Very little research has examined these issues, especially in Australia
- The small amount of research done suggests that water knowledge is poor, and an important topic for further research

# What we did: National Survey

## Who was surveyed?

A detailed description of the survey methodology and initial descriptive statistics can be found in the report: A National Survey Of Australians' Water Literacy and Water-Related Attitudes (Fielding et al., 2015). A total of 5194 adults living in Australia completed an online survey during February-March 2014. The sample was representative of the Australian population, based on gender, age, education and state of residence. The average age of the sample was 46.9±16.3 years, and half were female (50.9%). The majority of respondents lived in urban centres (69.8%), had qualifications beyond high school (69.1%), and were employed at the time of the survey (54.0%). The most frequently cited ancestry was northwest European (55.5%). Almost half of the sample had at least one parent born overseas (47.7%) and 18.7% spoke a language other than English when at home. The majority of respondents report having lived through water restrictions (81.7%).

## What was measured?

**Water-related knowledge**

Fifteen questions asked about influence of household activities on water quality; catchments and the urban water cycle; and water treatment and management. For each respondent, a water knowledge score was calculated based on the number of correct responses to 15 questions about water (Range 0-15).

**Characteristics of survey respondents**

Respondents were asked about the following issues:

- *Demographics:* age, sex, education, household income, and current employment status. Postcode was used to classify distance from urban centre (major cities, inner regional, outer regional, remote/very remote) (Australian Bureau of Statistics, 2002).
- *Cultural background:* Aboriginal or Torres Strait Islander heritage, time lived in Australia, ancestry, and whether languages other than English were spoken at home
- *Household characteristics:* number of people living in household, number of children in household; time living at current address; whether their home was rented or owned, and the size of their garden.
- *Information sources:* sources of water-related information received (if any) in the last 6 months
- *Experience:* whether they had experienced water restrictions, and changed their behavior during restrictions
- *Waterway use:* whether they were regular users of waterways for fishing, boating or swimming
- *Life satisfaction:* satisfaction with ten different aspects of life
- *Participation:* the number of community organisations in which they were active
- *Environmental identity:* whether they viewed their household as valuing environmental sustainability

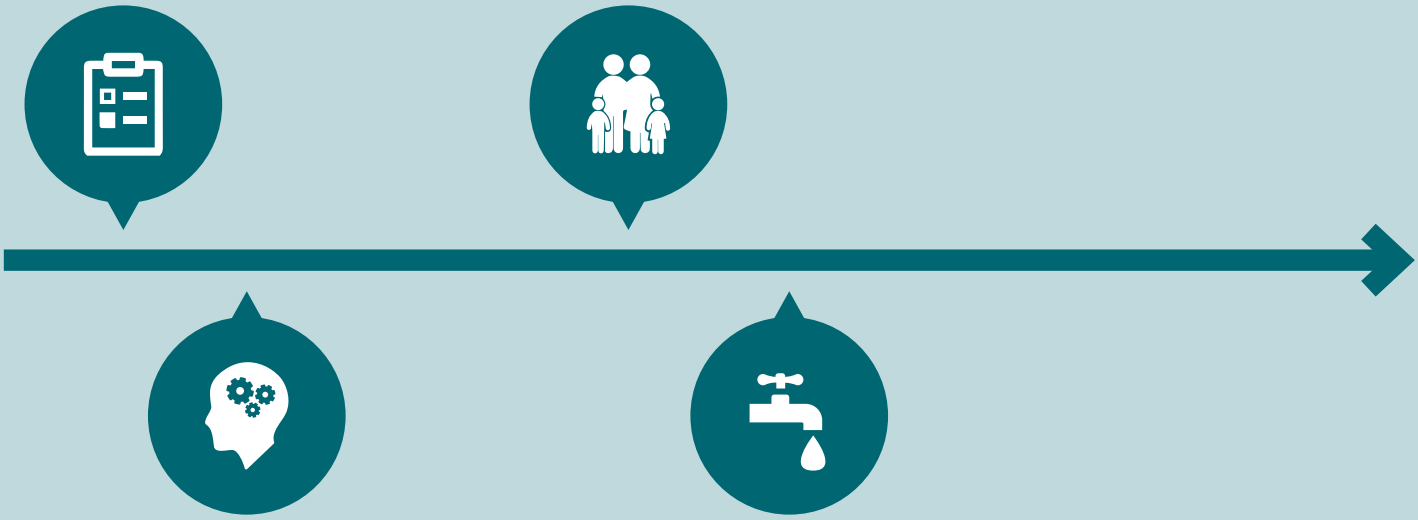
**Water-related attitudes and behaviours**

- *Support for alternative water sources:* support for use of recycled water, stormwater, or desalinated water for drinking and non-drinking purposes
- *Support for raingardens:* willingness to support a raingarden on their property or in their street
- *Uptake of water saving devices:* the number of water-saving devices installed in their home
- *Everyday water-saving strategies:* use of everyday water-saving strategies in the home (e.g. fixing leaks quickly, taking shorter showers).
- *Pollution-reduction behaviours:* engagement in everyday pollution reduction behaviours (e.g. preventing animal waste from entering waterways, putting rubbish in the bin, reporting pollution incidents).

**We recruited a representative sample of 5194 adults living in Australia to complete an online survey.**

**Participant characteristics:**

- Demographics and cultural background
- Household characteristics
- Information sources
- Life experience, satisfaction and participation
- Waterway use
- Environmental identity



**Water knowledge score:** the number of correct responses to 15 questions about water management

**Water-related attitudes and behaviours:**

- Support for alternative water sources
- Support for raingardens
- Uptake of water-saving devices
- Use of everyday water-saving behaviours
- Use of pollution-reduction behaviours

# How good is water-related knowledge in Australia?

The overall level of water-related knowledge was low, with only 1 in 5 of respondents correctly answering at least 80% of questions. The average number of questions correctly answered was 7.97 (SD = 3.99; Range 0-15, M = 7.97 equivalent to a score of 53%). Only 1.7% of respondents (n=89) answered all items correctly.

Almost three quarters of respondents knew that household actions can reduce urban water use and influence the health of waterways (Table 1: items 1 and 2), whereas less than one third correctly identified that domestic wastewater is treated prior to entering waterways, urban stormwater is not treated, and that these are carried via different pipes (Table 1: items 13, 14 and 15).

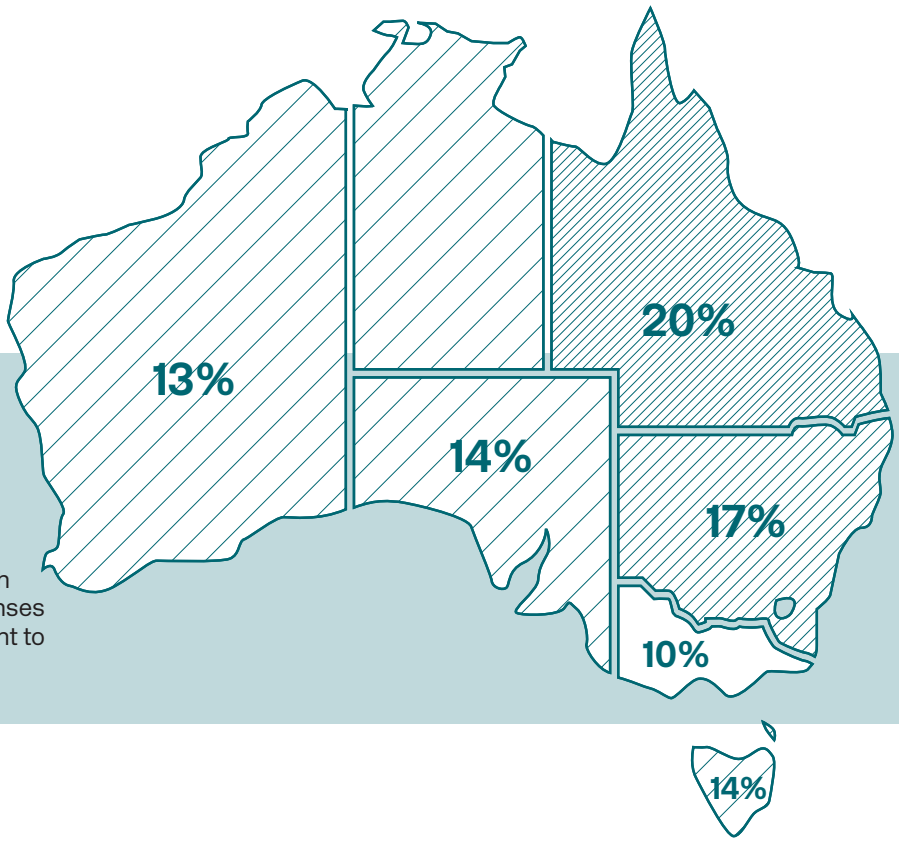
Research shows that information is more likely to be transmitted and retained if it is relevant (Kreuter and Wray, 2003, de Vries et al., 2014). Consistent with this, our findings reveal higher levels of water-related knowledge about issues directly related to household-level behaviours, and lower levels of knowledge about issues that households have little control over. Water supply and treatment systems are often 'invisible' to households (Cockerill, 2010) and may be perceived as not relevant (Mankad et al., 2010).

*Table 1. Knowledge statements*

| Knowledge statements | % correct (n) |
|---|---|
| 1. Water conservation actions by householders can significantly reduce the amount of water used in urban areas | 74.3% (3860) |
| 2. What individual residents do in their home and garden has consequences for the health of waterways and coastal bays | 72.5% (3767) |
| 3. Waterways can be damaged by stormwater flows | 68.6% (3563) |
| 4. Planting native plants along a waterway's bank improves the health of waterways | 68.2% (3540) |
| 5. The fertilizers that individual householders use in their garden can have a negative impact on the health of waterways | 67.7% (3514) |
| 6. Soil erosion from urban areas does not affect the health of waterways | 61.1% (3175) |
| 7. The pesticides that individual householders use in their garden have no negative impact on the health of waterways | 59.3% (3078) |
| 8. I know where my household drinking water comes from (e.g., dam, groundwater, desalinated water etc.) | 56.2% (2920) |
| 9. Waterways can cope easily with large amounts of sediment (i.e. eroded soil suspended in the water) | 54.0% (2805) |
| 10. A catchment is the total land area draining to a specific waterway | 45.9% (2386) |
| 11. The amount of water available for use is finite | 40.7% (2116) |
| 12. I know what catchment my household is part of | 38.7% (2009) |
| 13. Stormwater from roofs and roads is treated to remove pollutants before entering the waterways | 32.0% (1663) |
| 14. Domestic wastewater and stormwater are carried through the same pipes | 30.3% (1571) |
| 15. Wastewater from domestic bathrooms and laundries receives little or no treatment before entering waterways | 27.5% (1425) |

## Which states have the highest and lowest water knowledge?

Percentages denote proportion of population with 'high water knowledge, defined as correct responses to at least 14 of 17 knowledge questions (equivalent to 80% correct, or in grade terms, a high distinction)




## Where do people get information about water?

The most commonly cited sources of water-related information were water utility bills (26.0%), television (24.4%) and newspapers (18.3%) (Table 2). More than half the sample (51.3%) reported no exposure to water-related information in the previous six months.

*Table 2. Information sources*

| Information sources | % (n) |
|---|---|
| Water utility bill | 26.0% (1348) |
| Television | 24.4% (1266) |
| Newspapers | 18.3% (950) |
| Water utility newsletter | 12.7% (658) |
| Radio | 10.0% (521) |
| Local government newsletter | 9.0% (465) |
| Online news | 7.9% (410) |
| Water utility website | 6.6% (341) |
| Social media | 2.7% (138) |
| No information about water | 51.3% (2665) |

## What factors influence knowledge?

Statistical modelling shows that water-related knowledge was significantly associated with a range of respondent characteristics (Dean et al., 2015). Knowledge was higher in males, in older respondents, in those with higher household income, in those with a post-school qualification, in those who were currently studying, and those living in non-urban areas. Water-related knowledge also varied by ethnicity and longer duration of living in Australia. Having a northwest European Ancestry was associated with greater knowledge; having at least one parent born outside Australia or speaking a language other than English at home were associated with lower water-related knowledge.

Positive associations were also found between water-related knowledge and garden size, experience of water restrictions, household environmental identity, life satisfaction and regular waterway use for swimming. Higher levels of water-related knowledge was also associated with receiving recent water-related information in newsletters from water utilities or local government. Respondents reporting no exposure to any water information in the previous six months exhibited poorer water-related knowledge.

These findings suggest that a range of life experiences – such as experience of water restrictions, managing a garden, living in Australia, or being older – can contribute to water-related knowledge. These experiences may create opportunities to learn about water and apply knowledge, or it might improve the retention of water-related information by making it more relevant. Many people reported no exposure to information, and this was associated with poorer knowledge. This highlights the potential to target these groups in information campaigns. The findings described above are summarised in the following figure.

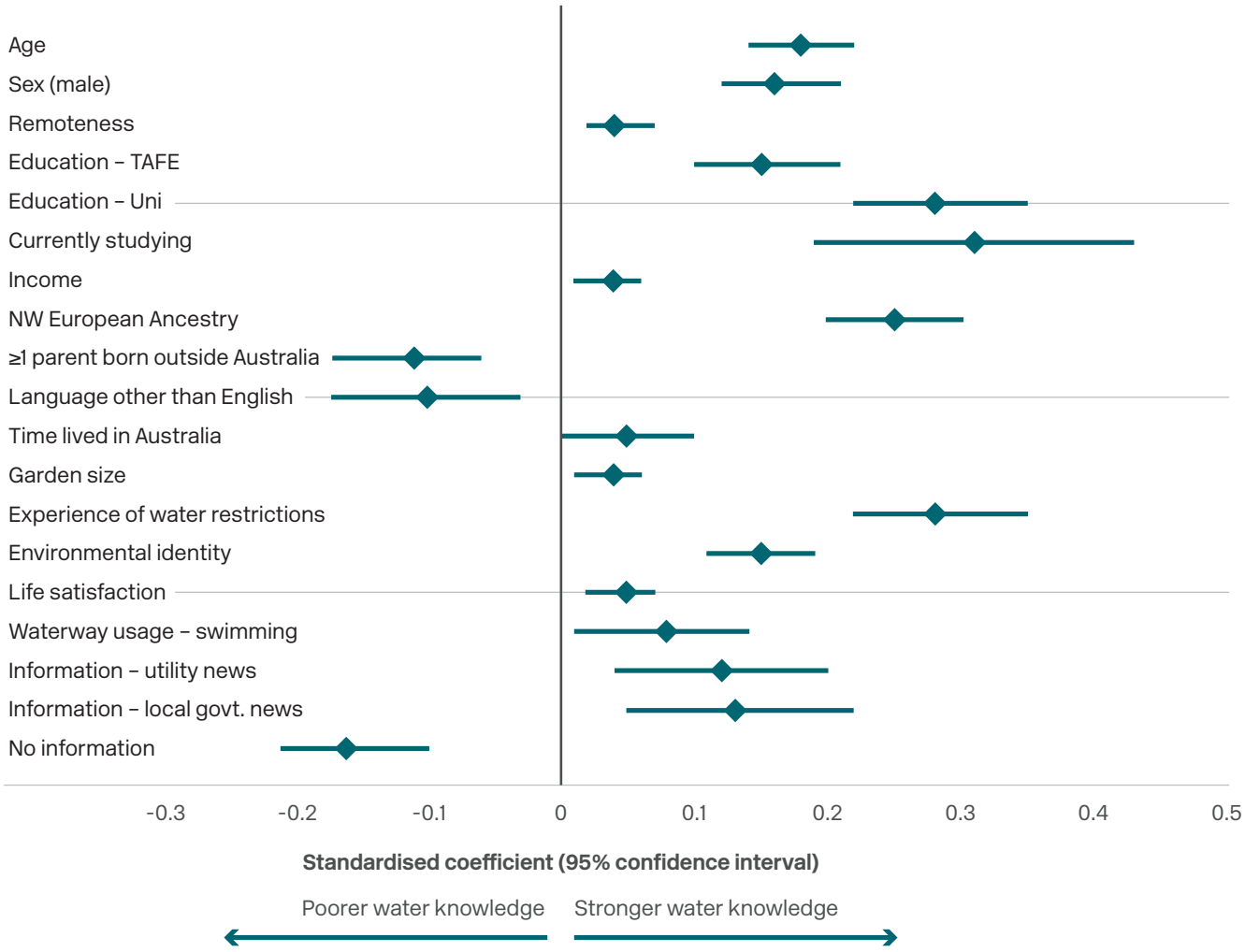
## Who should we target for improving water-related knowledge?

Lower education

Younger people

Urban residents

Lower income




Women


Language other than English at home

Less time in Australia or a parent born outside Australia

No gardens

# Does knowledge influence water-related attitudes and behaviors?

Statistical analysis tested five models examining the relationship between water-related knowledge and attitudes and behaviours. Water-related knowledge was significantly and positively associated with:

- support for alternative water sources
- support for raingardens
- use of everyday water-saving strategies
- uptake of water-saving devices
- pollution-reduction behaviours

All analyses controlled for household environmental identity, experience of water restrictions, and experience of changing behaviour during restrictions.

These findings reinforce the importance of knowledge as a necessary ingredient contributing to policy support or behaviour change. Knowledge has been shown in past research to be a 'necessary but not sufficient' factor for behaviour change, with many other factors such as values, social norms, or cost also influencing behaviour (Kaiser and Fuhrer, 2003, van der Linden, 2015).

**How might knowledge influence attitudes and behaviours?**

There are many potential pathways between knowledge and changes in attitudes or behaviour. Knowledge may raise awareness of the importance of an issue, and encourage someone to care about the issue. Knowledge can also facilitate effective information processing or promote additional information seeking, which in turn, continues to enhance knowledge acquisition and literacy (Stanovich and Cunningham, 1993, Suka et al., 2015). However, this is not the only way that knowledge may have an influence.

For example, someone with poor water-related knowledge may:

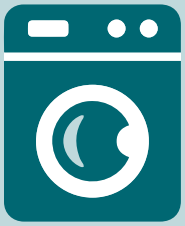
- avoid seeking advice about water-related issues due to embarrassment, poor issue awareness or not knowing what to ask
- have difficulty processing new information about water, which may limit the effectiveness of information initiatives
- avoid informal conversations about water with friends or colleagues, limiting the potential for informal information sharing or activating social norms about water use (Paasche-Orlow and Wolf, 2007)

Knowledge about how to act (procedural knowledge) may have a stronger influence on environmental behaviour than general awareness (declarative knowledge) (van der Linden, 2015, Kaiser and Fuhrer, 2003). The concept of water literacy – with its focus on processing information, acquiring knowledge and applying knowledge to decisions – allows us to recognise the importance of different types of knowledge and the importance of life experience in acquiring and retaining knowledge (Kaiser and Fuhrer, 2003, von Wagner et al., 2009).

## Higher water-related knowledge is associated with water-sensitive attitudes and behaviours

Greater support for raingardens

Greater support for alternative water sources



Higher uptake of water-saving devices

Greater use of everyday water-saving strategies

Greater engagement in pollution reduction behaviours

# Extending our understanding of community perceptions using Focus Groups

To extend our understanding of community knowledge and perceptions about water, we conducted a series of focus groups. These focus groups contained discussions about perceptions of water and stormwater, and knowledge about diverse management practices to mitigate stormwater pollution.

## Who participated?

We ran these focus groups in Brisbane, Townsville, Melbourne, Bendigo, Perth and Geraldton. Community members, with a representative mix of genders, ages and incomes were recruited via a social research company. We recruited 6-8 participants for each focus group, with 40 participants in total; each focus group discussion lasted 90 minutes.

## What comes to mind when you think of water?

To begin the focus groups, participants were asked "what comes to mind when you think about water?". The responses reflected four key functional areas provided by water:

- *Drinking:* many of the responses reflected an emphasis on drinking water, with individual responses being *"well, you drink it"*, *"drinking – I love water"*, or *"drinking from the tap"*.
- *Water in the home:* water practices in the home are a core part of our lives, providing what has been termed the 'three Cs' of water practices – cleanliness, comfort, and convenience (Shove, 2003). This was reflected in many of the responses, such as *"warm showers in winter"*, *"long showers"*, and *"keeping cool"*.
- *Recreational activities and spaces:* a strong emphasis for all respondents related to the use of water for swimming, in either natural or man-made facilities. Responses included *"beaches and oceans"*, *"swimming in the sea"* and *"swimming pools... chlorine"*. Gardens and outdoor spaces were also reflected, with responses including *"watering the garden"*, *"my beautiful garden"* and "*fountains"*. In some cases, these examples had a social focus, such as *"being in the spa with my grandchildren"*, whereas others had an aesthetic focus, with responses such as *"just blue, the blue sea"* or *"greenness"*. The desirability of proximity to ocean landscapes was reflected in comments such as *"it's too far away!"*
- *Essential resource:* many responses reflected that water is an essential resource, with adjectives such as *"essential"*, *"precious"* or phrases such as *"it's everything – you can't live without it"*, and *"we need it, it is a giver of life"*.

Other less frequent responses included 'wastage', 'dripping taps', and only one respondent mentioned rain.

## What comes to mind when you think about water?

## Community perceptions about stormwater

Participants were then asked what came to mind when they were presented with the word 'stormwater'.

By far the most frequent responses were related to excess water, and flooding. Almost two thirds of participants reported either 'flooding', flash flooding', 'water from the sky', or pointed towards the impacts of flooding, with descriptions such as 'full gutters', 'overflowing pipes', 'blocked pipes', 'drains', water down the street' and 'leaks'.

Three participants referred to stormwater as a potential resource that could be harvested, with comments such as *"wastage, its just water that could be collected... it could be captured or something"*, or *"an opportunity for our catchments, for our dams to catch up on water"*.

Unprompted, only six of the 40 participants considered water quality issues with stormwater. Of these a number referred to potential contaminants, with comments such as *"I think of sewage build up"*, or *"don't' drink the stormwater!"*, whereas one highlighted flooding impacts on waterways - *"that silt in Moreton Bay after the flooding"*. Two participants linked stormwater with the potential for other types of pollution, with comments such as *"I just think of all that crap that gets washed into the river"*. Interestingly, one participant associated stormwater with pure water: *"I think not polluted, I mean, it's pure water... to me, rainwater is pure"*.

During discussions about stormwater, a number of participants indicated awareness that *"what goes in drains ends up in rivers"* and *"everything ends up in the sea eventually"*, with one participant stating that *"a lot of stormwater just ends up in the street"*.

## Discussing community knowledge about stormwater

Participants were presented with a definition of stormwater that included the issue of urban stormwater pollution affecting waterways. The groups then discussed community knowledge about these issues.

Overall, most participants agreed that there was limited awareness about stormwater in the community. For example, on participant stated *"I don't know much about it, and I wouldn't say any of my friends would know anything about stormwater"*

*"I don't think people are too conscious of it... I certainly don't think of pollution when I think of stormwater and run-off from stormwater. I definitely don't, never really thought of it in that way"*

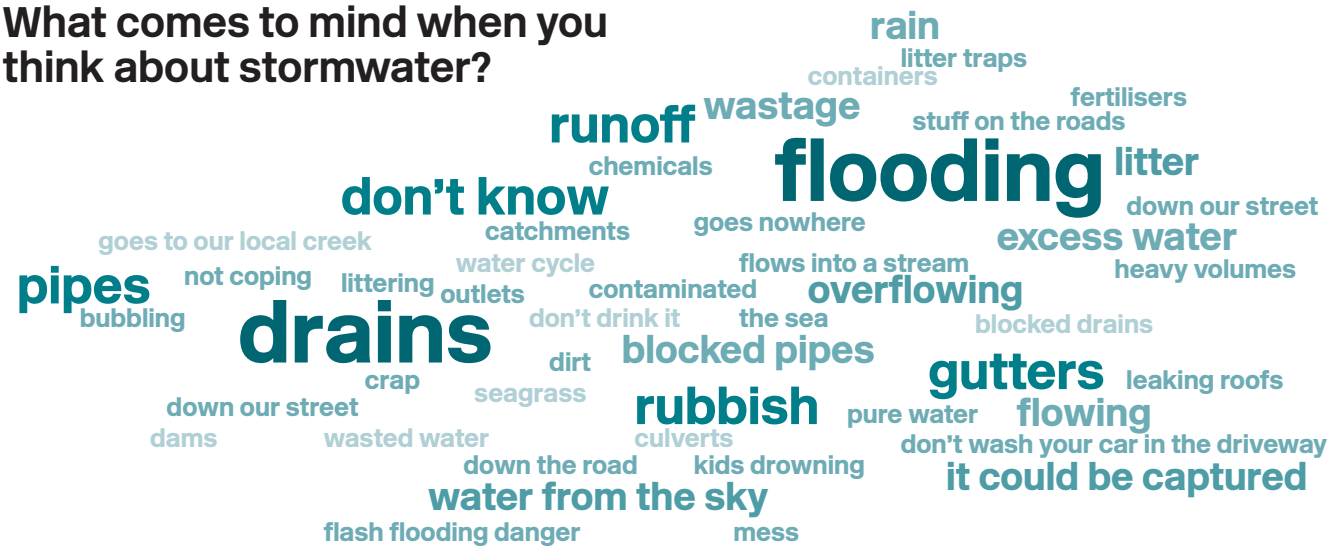
*"I didn't realise that stormwater washed all the rubbish out to sea, I thought it just cleaned everything up, you know, not that it did any harm"*

Much of the discussion focused on the lack of visibility of stormwater pollution – that people were not aware of this issue because they could not see the impacts, or they were not in close proximity to the impacts. For example, one participant stated: *"not here, we're not close to the ocean, major rivers ...we're not close enough to it"*

*"There is no big river here, so people go, 'oh, its not an issue"*

*"We don't see, to a large extent, where our stormwater goes"*

## What comes to mind when you think about stormwater?



## Individual actions to manage stormwater pollution

The discussion then focused on different actions that individuals could take to reduce stormwater pollution or the negative impacts of pollution on waterways. Some respondents could identify certain practices, such as *"don't wash your car with detergent in it and that sort of stuff..."*. Most of the suggested actions related to visible litter, with suggestions including: *"put your cigarette butts in the bin"*, *"don't chuck rubbish out the bloody car windows"*, or *"make sure your property is clear of debris"*. Some participants identified water demand reduction strategies, such as *"don't let your hose run while washing the car"*, or *"don't leave the tap on while brushing"*. Overall, participants indicated limited knowledge about actions that could reduce stormwater pollution, with comments such as:

*"...but when you say, 'how can we manage stormwater', I'm kind of like 'well, its rain, you can't really stop it'"*

*"First off, I think yeah, the care factor is pretty low for stormwater, it's not high on my list of concerns. Secondly, I wouldn't know what to do"*

Participants were provided with a list of potential practices that could reduce stormwater pollution, such as reducing concrete or hard surfaces, covering loose soil, ensuring cars are serviced regularly to prevent leaks, or disposing of oils and paints properly.

Many responses indicated that participants liked these suggestions, with responses such as *"these are common sense"*, *"good advice, yeah"* and *"If someone presented these to me like that, I would do as many of those that I could - they're all relatively easy and sensible things to do."*

Some of the discussion continued on the topic of whether people knew that these types of practices could reduce stormwater pollution. Some participants thought that most people would know these things, with comments such as: *"I think most of the people I know would be aware, they're fairly aware..."* or *"I think my friends would understand... and they probably would do most of this"*

In contrast, others indicated that knowledge about these actions was low:

*"I wouldn't think of planting trees to stop stormwater pollution...that wouldn't spring to mind..."*

*"Yeah, I never thought of a few things on here..."*

*"The one about notifying council if stormwater drains are blocked, I suppose it's not something I would, I've actually considered... I'd just go out there and "oh, the stupid drains are blocked"*

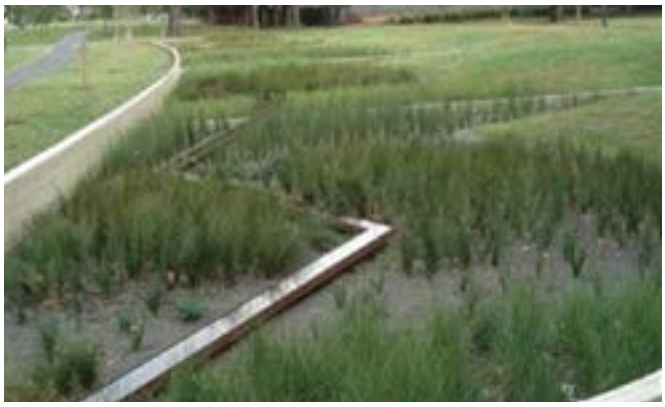
Relevance was also a key issue for some participants, for example:

*"It might not be something that applies to everyone.... If it was like 'Don't use pesticides', well, I'm not using any pesticides ..."*

*"For me, that's a bit tricky to relate to because I'm in an apartment with a very small courtyard"*

## Perceptions of water sensitive urban design

Participants were presented with a range of water sensitive urban design initiatives that could contribute to management of stormwater pollution. The examples included: raingardens, bioretention treatment wetlands, porous paving, and swales.



*"Raingardens in parks absorb water and filter out pollutants."*

*"Wetlands absorb water, reduce run-off and filter out pollutants."*

Examples of water sensitive urban design provided to participants

The groups consistently reported knowing very little about these types of design options. Many participants were curious about how they work and the nature of the benefit provided. Some participants raised concerns about cost or perceived effectiveness and expressed the need for more information and understanding:

*"It sounds great, but we don't know what it is..."*

*"I don't think it would hurt to have some signage 'Look, this is what we're doing, and this is what it does, and this is why'..."*

Many participants reinforced the need to be able to 'see' the benefit that these initiatives generate, especially compared to other local government activities:

*"... you can actually see the things we want the councils to do, like in an extra zebra crossing... they're all tangible things you can physically see, touch, and feel. This (stormwater management strategies) has got a long term benefit but nothing you can see"*

# Role for education

**Pros and cons of educational initiatives**

During a discussion about the merits of educational initiatives about stormwater pollution, most participants indicated that education would be useful.

*"I think there needs to be a bit more awareness about it, because you don't see or hear too much about it"*

*However, not everyone agreed, with one participant stating: "to be honest with you, I think it would be money wasted if they try to get the community involved... because we don't know. No-one on this table knows, and nobody out there knows that much about stormwater pollution..."*

**Demonstrating impact**

One of the strong messages emerging from this discussion related to the need for education to not only explain stormwater pollution, but to provide a strong rationale for different actions and information about their effectiveness.

*"I think its an education thing ... no one would realise that stormwater was a big problem. It's not highlighted, it's not mentioned ... we're not environmental scientists or anything like that"*

*"I think there is a real value in education... it would be really interesting to show people how much rubbish builds up in a given week..."*

*"I would be interested to see what sort of stats, and what sort of chemicals are actually going into the environment ... things that explains what's happening... I'd be interested to know"*

*"...saying "well, this is why I'm asking you to do it" would be a stronger message than just 'Don't do it' ... you want to know the impact ..."*

*"If they're saying 'wash your car on the lawn'... explain why..."*

*"Show the difference we can make"*

In particular, many participants questioned whether individuals could make a difference to stormwater pollution, and indicated that it would be useful to demonstrate collective impacts of various actions:

Whatever I do is not going to have an effect... they need to demonstrate that it's not just you. We're trying to get, you know, 1.5 million people doing the same thing... well, what's the point if the neighbours keep doing it?

If you focus saying how each little individual's effort contribute to that effect, not how my individual effort is going to have that consequence.

**Who should education target?**

Overall, participants had strong views about which social groups knew more or less about stormwater pollution. The main issue discussed was age. Some older participants considered that young people would be more informed about stormwater, because younger people knew more about environmental issues. For example, one participant stated: *"I think the younger you are, the more aware of what type of pollution affects – because it's part of the curriculum..."*. However, other participants, especially parents of teenagers, or the youngest participants disagreed, with responses including:

*"The younger generation don't know this... my kids would go 'huh'?"*

*"Yeah, being a teen, people would have no interest in this whatsoever"*

# Summary

The two studies presented here provide important contributions to our understanding of water-related knowledge in the community.

Findings from the National Survey are the first to comprehensively examine water-related knowledge, its determinants, and its impacts, among a nationally representative sample. Our findings identify strengths and weaknesses in the Australians' knowledge about water-related issues, and a range of demographic and psychosocial factors associated with this knowledge. These findings provide a basis for information and education campaigns targeting either:

i) content areas of poor water-related knowledge, such as issues related to wastewater and stormwater treatment

ii) demographic subgroups with poorer levels of water-related knowledge, such as younger women and individuals who do not speak English in the home, or

iii) population subgroups who are not accessing suitable sources of water information.

Importantly, water-related knowledge was associated with diverse water-related attitudes and behaviours.

Findings from our focus groups indicate that community perceptions associated stormwater with flooding and drainage issues, rather than pollution and waterway health. Once informed about different practices to manage stormwater pollution, participants shared positive attitudes about many pollution reduction initiatives, Participants stressed the importance of building awareness about the effectiveness of different behavioural options to reduce pollution.

**Implications for practice**

These findings have a number of practical implications for water practitioners and information providers. It is important to recognise that knowledge is not binary, but varies in depth and breadth across issues: individuals may be well informed on some water issues, but poorly informed on others. When planning community engagement or education initiatives, it is important not to assume pre-existing knowledge, and to make information relevant for the target group.

Poor understanding of words like 'catchment' and 'stormwater' are a reminder to minimise the use of jargon and technical terms when engaging with communities. For example, use of the word stormwater will create images of flooding for most communities members. If we need community members to consider pollution-related issues, this will need to be made explicit.

Identifying factors associated with poorer water-related knowledge may facilitate better targeting of certain community sub-groups for information or engagement-focused campaigns. It is unclear whether solely focusing on knowledge improvements would translate into increased uptake of water conservation or pollution-reduction behaviours in these groups. Although knowledge and literacy can be cultivated (Nutbeam, 2008, Baker, 2006), it is likely that certain target groups will require more intensive interventions to change existing attitudes and behaviours.

**Where to next?**

These findings will inform ongoing research exploring effective ways to communicate about water management issues to the community, and identify strategies to engage communities in water management.

# References


Australian Bureau Of Statistics (2002). Australian Standard Geographical Classification (Asgc) 2002. . Abs Cat. No. 1216.0. Canberra: Abs.

Australian Water Association (2010). Attitudes Towards Water In The Australian Community. Summary Report. Australian Water Association.

Baggett, S., Jefferson, B. & Jeffrey, P. (2008). Just How Different Are Stakeholder Group Opinions On Water Management Issues? Desalination, 218, 132-141.

Baker, D. W. (2006). The Meaning And The Measure Of Health Literacy. Journal Of General Internal Medicine, 21, 878-883.

Bo, A., Friis, K., Osborne, R. H. & Maindal, H. T. (2014). National Indicators Of Health Literacy: Ability To Understand Health Information And To Engage Actively With Healthcare Providers - A Population-Based Survey Among Danish Adults. Bmc Public Health, 14.

Brown, R. R., Keath, N. & Wong, T. H. (2009). Urban Water Management In Cities: Historical, Current And Future Regimes. Water Sci Technol, 59, 847-55.

Buhr, K. & Wibeck, V. (2014). Communication Approaches For Carbon Capture And Storage: Underlying Assumptions Of Limited Versus Extensive Public Engagement. Energy Research & Social Science, 3, 5-12.

Cockerill, K. 2010. Communicating How Water Works: Results From A Community Water Education Program. Journal Of Environmental Education, 41, 151-164.

Daugs, D. R. & Israelsen, C. E. (1984). A Philosophy And Framework For Water Education. Water International, 9, 84-89.

De Vries, G., Terwel, B. W. & Ellemers, N. (2014). Spare The Details, Share The Relevance: The Dilution Effect In Communications About Carbon Dioxide Capture And Storage. Journal Of Environmental Psychology, 38, 116-123.

Dean, A. J., Fielding, K. S. & Newton, F. (2015). Knowledge About Water: Who Has Better Knowledge And Is This Associated With Water-Related Attitudes And Behaviors? Currently Under Review, Please Contact The Authors For More Information.

Department Of Sustainability, E., Water, Population And Communities (2012). National Water Knowledge And Research Platform - September 2012. Commonwealth Of Australia.

Fielding, K., Karnadewi, F., Newton, F. & Mitchell, E. (2015). A National Survey Of Australians' Water Literacy And Water-Related Attitudes. Melbourne, Australia: Cooperative Research Centre For Water Sensitive Cities.

Fielding, K. S. & Roiko, A. H. 2014. Providing Information Promotes Greater Public Support For Potable Recycled Water. Water Research, 61, 86-96.

Giacalone, K. M. C., Mobley, C., Sawyer, C., Witte, J. & Edison, G. (2010). Survey Says: Implications Of A Public Perception Survey On Stormwater Education Programming. Jounal Of Contemporary Water Research & Education, 146, 92-102.

Hoppe, K. N.D. The General Public: Who Are They And What Do They Think? [Online]. Cfpub.Epa.Gov/Npstbx/Files/Mainegeneral.Pdf: Maine Department Of Environmental Protection. Accessed 6 May 2015].

James, A., Kelly, D., Brown, A. & Laffan, W. (2010). Behaviours And Attitudes Towards Waterways In South East Queensland: Report Prepared For South East Queensland Healthy Waterways Partnership. Brisbane: Institute For Social Science Research, University Of Queensland.

Kaiser, F. G. & Fuhrer, U. (2003). Ecological Behavior's Dependency On Different Forms Of Knowledge. Applied Psychology-An International Review-Psychologie Appliquee-Revue Internationale, 52, 598-613.

Kreuter, M. W. & Wray, R. J. (2003). Tailored And Targeted Health Communication: Strategies For Enhancing Information Relevance. Am J Health Behav, 27 Suppl 3, S227-32.

Mankad, A., Tucker, D., Tapsuwan, S. & Greenhill, M. P. (2010). Qualitative Exploration Of Beliefs, Values And Knowledge Associated With Decentralised Water Supplies In South East Queensland Communities. Urban Water Security Research Alliance Technical Report No. 25. Csiro Sustainable Ecosystems.

Marks, J. S. & Zadoroznyj, M. (2005). Managing Sustainable Urban Water Reuse: Structural Context And Cultures Of Trust. Society & Natural Resources, 18, 557-572.

Marlow, D. R., Moglia, M., Cook, S. & Beale, D. J. (2013). Towards Sustainable Urban Water Management: A Critical Reassessment. Water Res, 47, 7150-61.

Mcduff, M. M., Appelson, G. S., Jacobson, S. K. & Israel, G. D. (2008). Watershed Management In North Florida: Public Knowledge, Attitudes And Information Needs. Lake And Reservoir Management, 24, 47-56.

Nutbeam, D. 2008. The Evolving Concept Of Health Literacy. Social Science & Medicine, 67, 2072-2078.

Paasche-Orlow, M. K. & Wolf, M. S. (2007). The Causal Pathways Linking Health Literacy To Health Outcomes. American Journal Of Health Behavior, 31, S19-S26.

Pritchett, J., Bright, A., Shortsleeve, A., Thorvaldson, J., Bauder, T. & Waskom, R. (2009). Public Perceptions, Preferences, And Values For Water In The West: A Survey Of Western And Colorado Residents. Special Report No. 17. Colorado Water Institute, Colorado State University.

Safford, T. G., Norman, K. C., Henly, M., Mills, K. E. & Levin, P. S. (2014). Environmental Awareness And Public Support For Protecting And Restoring Puget Sound. Environmental Management, 53, 757-768.

Salvaggio, M., Futrell, R., Batson, C. D. & Brents, B. G. (2014). Water Scarcity In The Desert Metropolis: How Environmental Values, Knowledge And Concern Affect Las Vegas Residents' Support For Water Conservation Policy. Journal Of Environmental Planning And Management, 57, 588-611.

Shove, E. (2003). Converging Conventions Of Comfort, Cleanliness And Convenience. Journal Of Consumer Policy 26, 395-418.

Stanovich, K. E. & Cunningham, A. E. (1993). Where Does Knowledge Come From - Specific Associations Between Print Exposure And Information Acquisition. Journal Of Educational Psychology, 85, 211-229.

Suka, M., Odajima, T., Okamoto, M., Sumitani, M., Igarashi, A., Ishikawa, H., Kusama, M., Yamamoto, M., Nakayama, T. & Sugimori, H. 2015. Relationship Between Health Literacy, Health Information Access, Health Behavior, And Health Status In Japanese People. Patient Educ Couns, 98, 660-8.

Sun, X. Y., Shi, Y. H., Zeng, Q. Q., Wang, Y. L., Du, W. J., Wei, N. F., Xie, R. Q. & Chang, C. (2013). Determinants Of Health Literacy And Health Behavior Regarding Infectious Respiratory Diseases: A Pathway Model. Bmc Public Health, 13.

Van Der Linden, S. (2015). The Social-Psychological Determinants Of Climate Change Risk Perceptions: Towards A Comprehensive Model. Journal Of Environmental Psychology, 41, 112-124.

Van Der Werff, E., Steg, L. & Keizer, K. (2013). The Value Of Environmental Self-Identity: The Relationship Between Biospheric Values, Environmental Self-Identity And Environmental Preferences, Intentions And Behaviour. Journal Of Environmental Psychology, 34, 55-63.

Von Wagner, C., Steptoe, A., Wolf, M. S. & Wardle, J. (2009). Health Literacy And Health Actions: A Review And A Framework From Health Psychology. Health Education & Behavior, 36, 860-877.

Vorosmarty, C. J., Mcintyre, P. B., Gessner, M. O., Dudgeon, D., Prusevich, A., Green, P., Glidden, S., Bunn, S. E., Sullivan, C. A., Liermann, C. R. & Davies, P. M. (2010). Global Threats To Human Water Security And River Biodiversity. Nature, 467, 555-561.

Wallington, T., Maclean, K., Darbas, T. & Robinson, C. (2010). Knowledge – Action Systems For Integrated Water Management: National And International Experiences, And Implications For South East Queensland. Urban Water Security Research Alliance Technical Report No. 29.

Whitmarsh, L. & O'neill, S. (2010). Green Identity, Green Living? The Role Of Pro-Environmental Self-Identity In Determining Consistency Across Diverse Pro-Environmental Behaviours. Journal Of Environmental Psychology, 30, 305-314.

CRC for
Water Sensitive Cities


**Cooperative Research Centre for Water Sensitive Cities**

Level 1, 8 Scenic Boulevard
Monash University
Clayton VIC 3800

info@crcwsc.org.au

www.watersensitivecities.org.au