



Water for a Healthy Country

Sustainable Water Use at the Household Level

A Scoping Report

Alison L. Browne, David I. Tucker,
Catherine S. Johnston and Zoe Leviston

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1. Introduction

There is growing awareness that with water becoming an increasingly scarce resource, Australia is facing unprecedented water management challenges. Many projects to address these challenges focus on large scale technological and public infrastructure projects and solutions (Allon, 2007). However, an integral part of the challenge is to begin to understand water in everyday life (Allon; Allon & Sofoulis, 2006). One way of achieving this is by exploring the values and usage of water in daily life, the way these relate to consumption patterns and potential locations for change to water consumption behaviours at a household level.

There are currently a variety of mechanisms being implemented in Australia to encourage water use efficiency and conservation in the household. While there is a level of effectiveness in existing water conservation measures (such as water saving appliance rebates and watering restrictions), it is inevitable with broader trends for climate change and increased population growth that further water conservation measures will be required in the future. This is particularly so when the drought breaks and the severity of water restrictions potentially are lessened. As additional savings are sought, people's lifestyles will be increasingly affected. Accordingly, ever further reductions in individual household water consumption will become significantly more difficult to attain. What will therefore be required is not simply increased knowledge or education about water conservation, but a shift in people's *values* relating to water use in their homes and gardens.

This scoping study sets out to explore some of these values, and how they relate to water-using behaviours in the home and garden.

1.1. Household Sustainability

Recent research undertaken by ARCWIS (Porter, Leviston, Nancarrow, Po & Syme, 2005) has identified several variables critical to the community when determining satisfaction with water supply systems. A key characteristic of an acceptable water supply system is "long term sustainability". This suggests that, at a societal level, communities expect and desire sustainable water supply systems. However, it has been found that water using behaviours at the household level do not always reflect these values of sustainability (Kantola, Syme & Campbell, 1984).

That there is only a moderate link between people's *attitudes* and their *behaviours* has been well documented and established since the 1960's. A review of 47 empirical studies of attitudes and behaviours (Wicker, 1969) concluded that attitudes barely predict behaviour, usually correlating at less than .30. The studies covered a wide range of topics, from young mothers' attitudes and behaviours about breast feeding, to businessmen's attitudes and behaviours toward football, career and sleep. This trend has also been established between people's attitudes towards the environment and their conservation behaviours (Kantola, Syme & Campbell, 1984). Several theories have emerged over the years that attempt to account for this surprising lack of correlation.

One diagnosis is that other variables besides attitude influence behaviour. People's behaviour may follow social and cultural conditioning, or there may be barriers to certain behaviours (time, cost and so on) that may prevent people from carrying out behaviours that are aligned with their attitudes. Similarly, attitudes that are expressed may be coloured by social desirability – a propensity to comply with the norms for responses that reflect positively on the individual. There are also psychological mechanisms (such as cognitive dissonance) that may play a role in the attitude behaviour disconnect.

1.2. Objectives/Outcomes

The purpose of this scoping study was to generate hypotheses pertaining to the interaction between social and cultural norms, household water usage patterns and behaviours, and factors which facilitate or act as barriers to certain water-saving behaviours and household sustainability. Rather than promoting a particular definition of conservation behaviours, an objective of the focus groups was to allow participants to explore what *they* perceived to be 'sustainable' and 'unsustainable' household behaviour in relation to water use both internally and externally.

Building on previous research investigating linkages between domestic water use and greenspace use and irrigation (Syme, Fenton & Coakes, 2001; Syme, Shao, Po & Campbell, 2004), a further aim was to investigate the value and role of private and public greenspaces and open spaces, and how different values of these greenspaces may (directly or indirectly) influence domestic water saving behaviours. The term "greenspace" includes private gardens, large public parks and vegetated areas, but may also be "a subset of open space, consisting of any vegetated land or structure, water or geological feature within urban areas" (Williams & Green, 2001, p.1). An aim of the study was to explore the importance attributed to particular features of private gardens and public greenspace. As such, the terms "private greenspace" and "public greenspace" are often referred to throughout this report.

Hypothesis generation was achieved through a comprehensive literature review and several focus groups, as discussed in the next section.

2. Methodology

2.1. Literature Review

A literature review was conducted at the commencement of the scoping study to inform the direction of research. Attitudinal and behavioural implications of sustainability with respect to a wide range of issues (consumption, energy use, household recycling, and water savings) were examined. Further reviews were conducted throughout the scoping study, in line with an iterative-generative reflective methodological approach (Bishop, Sonn, Drew & Contos, 2002).

2.2. Focus Groups

The metropolitan regions of Canberra and Perth were selected as study locations. This allowed testing for any major differences between the two cities. It was anticipated that there may be some differences due to water restriction levels. Canberra has been under harsher watering restrictions for some time, with an increase to Level 3 Water Restrictions in December 2006 (the most severe restrictions imposed in the ACT to date), with preparations to move to Level 4 restrictions. In contrast, Perth has enjoyed relatively mild watering restrictions, with, at the time of the focus groups, no anticipated moves to more stringent restrictions in the near future (see Appendix A for water restrictions levels for Canberra and Perth). It was also anticipated that there may be differences due to cultural variations between the two cities.

Suburbs were stratified socio-economically (into lower, medium and higher socio-economic groups) based on average weekly family income figures.¹ Two suburbs in each socio-economic group were then selected on the basis of proximity and accessibility to the focus group venues,

¹ Source: Australian Bureau of Statistics, 2001 Census

so as to maximise attendance. Table 1 shows the suburbs where focus group participants were recruited from.

Table 1. Canberra and Perth Suburbs by Each Socio-Economic Category

	Lower Socio-Economic	Medium Socio-Economic	Higher Socio-Economic
Canberra	Kaleen	Garran	Forrest
Perth	Cloverdale	Doubleview	Cottesloe

Thirty-three participants were recruited for the Canberra focus group - 11 from each of the three suburbs, with 16 males and 17 females in total. The refusal rate for the Canberra focus group was 75%. Table 2 provides a summary of refusal details.

Table 2. Refusal Details for Canberra Focus Group

Reason	n
Too Busy	60
Not Interested	41
Limited English	14
Elderly	5
Unwell	5
Hung Up	2
<i>TOTAL</i>	<i>127</i>

Of the 33 recruited participants, 22 attended the focus group – 12 males and 10 females, with 9 from the lower socio-economic suburb, 4 from the medium and 9 from the higher.

Thirty-three participants were recruited for the Perth focus group - 11 from each of the three suburbs, with 16 males and 17 females in total. The refusal rate for the Perth focus group was 78%. The table below provides a summary.

Table 3. Refusal Details for Perth Focus Group

Reason	n
Not Interested	74
Too Busy	46
Elderly	24
Unwell	22
Hung Up	7
Limited English	2
<i>TOTAL</i>	<i>175</i>

Of the 33 recruited participants, 11 attended the focus group – 9 males and 2 females, with 3 from the lower socio-economic suburb, 3 from the medium and 5 from the higher.

Non-attendance rates were particularly problematic among women for both cities.

2.2.1. Focus group structure

The Canberra focus group ran for approximately 3 hours, while the Perth focus group ran for approximately 2.5 hours. After being welcomed and introduced to the purpose of the focus groups and the topics for discussion, participants were split into two subgroups to maximise deliberative group decision-making capabilities.² Each group was guided by a set of broad questions that were applied in a semi-structured manner (see Appendix B). Each group had a facilitator and a note-taker.

At the conclusion of discussions, participants were requested to complete a brief questionnaire, and asked for consent to allow the research team to gather their household water consumption figures for the previous five years from the relevant authorities. This allowed comparison of expressed water savings attitudes and actual domestic water consumption.

² Smaller groups have been shown to be more interactive and less prone to the effects of dominant speakers (Fay, Garrod & Carletta, 2000).

3. Results

3.1. Qualitative Focus Group Results

The following section highlights the major themes that emerged from the focus groups. It combines the results from the Canberra and Perth focus groups as many themes between the two cities were consistent. Where important differences emerged between the two cities these have been noted in the discussion of results.

3.1.1. Water Sustainability Definitions

Water Sustainability

Participants at both focus groups were asked to provide their definitions or understandings of water sustainability. As part of these definitions the following emerged as the major themes.

- Social change
 - Urban planning and building design occur within the context of current climatic conditions.
 - Recognition that it may take generations to change water usage habits.
 - A return to past behaviours and values e.g., washing clothes less often, using bath water for more than one purpose, shorter/less frequent showers etc.
- Good decision making characteristics
 - Addresses root cause (not bandaid solutions).
 - Uses planning and foresight (not reactive or crisis driven).
 - Is responsive to Australian conditions.
 - Applies intelligent and innovative thinking.
 - Occurs within a long-term decision making framework (multi-generational).
 - Includes citizen involvement in decision making.
- Taking responsibility
 - Personal responsibility is taken for actions.
 - There is a personal responsibility to achieve sustainable lifestyles/actions - it is not just about achieving a sustainable supply.
- Equity issues
 - Rural versus urban water usage: looking at rural usage and not just targeting urban usage.
 - Agricultural water usage versus domestic usage (inefficiency of current agricultural practices. e.g., cotton, rice; improving rural irrigation efficiency).
 - Economic (cost) disincentives for water usage - disadvantage the poor.
 - Water is protected for future generations.

- Management changes
 - Two-fold management: reduces demand and increases supply.
 - Water is a community resource (not for private enterprise).
 - Effective management of current resources.
 - Using resources *and* replenishing for predicted futures/populations.
- General comments
 - Water is only one part of achieving sustainability.
 - An affinity with nature.
 - Water conservation and efficiency.
 - Sufficient supply.
 - Good quality and aesthetics of water.

Non-Water Sustainability Attitudes

While many of the sentiments listed above were shared by participants of both the Canberra and Perth focus groups, there were notable differences in the discussion that could be attributable to the Canberra context of a more severe water shortage and associated higher levels of water restrictions. Participants in Canberra showed a greater acceptance of sustainable water use and, while supporting domestic responsibility towards this end, looked at how to better manage the existing (limited) source both currently and into the future. In contrast, while some of these views were shared by focus group participants in Perth, more people expressed a lesser acceptance of the need for water sustainability and corresponding support for economic and infrastructure solutions that could be implemented to solve the ‘water crisis’. For example, a participant from Perth said:

We are a rich society, there must be other solutions! We are getting to have a peasant mentality in regards to water use. I don't want to muck around saving water if I don't need to! I am willing to pay a lot. What is needed is the big answer.

Another set of reflections from a number of participants was that there was a misperception about a water shortage in WA. This was captured in the comment “we are not as short on water as people think”. This view tended to be linked with the availability of other water supplies to be accessed in Western Australia, for example from additional underground aquifers and from the Ord River in the Kimberley.

It is a different situation in WA than over east... There are plenty of places they [the government] can get it from.

There was also one Perth participant who commented on the limit to sustainable water use, commenting “I have already given up as much water as is reasonable. Hopefully with leaders’ foresight we won’t face dire circumstances like in other cities such as Adelaide”. For this person, there appeared to be a limit to sustainable water practices that they were willing to partake in.

Water Conservation Practices In and Around the Home

Participants were also asked about the types of water ‘conservation’ practices they undertook in and around their home. Table 4 lists the practices inside and outside the home that participants identified as being engaged in to save water.

As Canberra participants were subject to more stringent water regulations that more strongly regulate water use practices outside the home, activities have been marked to indicate whether they were specific to a particular city or relevant for both cities (see 'Key' below Table 4).

Table 4. Water Conservation Practices Inside and Outside the Home (Canberra and Perth)

Inside Practices	Outside Practices
<u>Bathroom</u>	<u>Garden</u>
Save bathwater for garden and water features [B]	Let lawns/gardens die [C]
Showering:	Have smaller patches of lawn [P]
<ul style="list-style-type: none"> • limit showers (shorter/more infrequent; turn water off while soaping up) [B] • Fit AAA shower heads [P] • Bucket in shower (use water outdoors) [B] 	No lawn [P]
	Mulched gardens [B]
	Plants all in one area for watering [C]
Turn off tap when brushing teeth [P]	Put in dripper irrigation system [C]
	Changed garden to be more drought tolerant/less water intensive [C]
<u>Toilet</u>	
Weight in toilet cistern to reduce flush volume [C]	Planted native gardens [B]
Bought new dual flush toilet [C]	Use water saving heads on reticulation system [P]
Discerning flushes of the toilet [C]	Put reticulation on at night to reduce evaporation [P]
Use greywater for toilet flushing [P]	Water garden using water captured from inside [B]
<u>Kitchen</u>	Water garden with bore water [P]
Capture water from sink in tub [C]	<u>General Outdoor Area</u>
Use a bucket to rinse dishes [C]	Filled in swimming pool [C]
Wash dishes once daily [C]	Have water tank [P]
Dishwasher:	<u>General</u>
<ul style="list-style-type: none"> • Use a dishwasher sparingly [B] • Use a dishwasher instead (if dishes on sink would feel a need to wash them more than once daily) [C] 	Stop washing household windows [C]
	Do not wash the car [C]
	Wash car with buckets not hoses [B]
	Track water usage for monitoring [P]
Reduce water used when cooking [P]	
<u>Laundry</u>	
Wash only when full load [B]	
Washing machine rinse water on garden (bucket) [P]	
<u>General</u>	
Collect water from tap while waiting for hot water (for use elsewhere in the home) [B]	
Use high 'star rated' whitegood appliances [C]	
Water authority home assessment [C]	
Greywater system installed inside house (use water outside) [B]	

Key: B = both cities; C = Canberra; P = Perth.

Factors Influencing Water Use Sustainability

There are a number of influences that people identified that facilitate the promotion and encouragement of water sustainability. There were no major differences in these influences between Canberra and Perth participants. Influences on sustainable water practices included the following.

- Personal factors
 - Interest in water sustainability.
 - Social consciousness.
 - Moral stance – less use of personal water to give more for the environment.
 - Awareness of water and other sustainability issues.
- Social pressure and encouragement
 - Encouragement from neighbours and friends (e.g. for planting native gardens).
 - Pressuring and encouraging others.
 - Children and parents identifying each others' unsustainable practices.
- Financial pressure
 - Cost of water (inhibits and encourages).
- Government intervention/regulation
 - More incentives for water conservation (e.g. incentives for industry).
 - Presence of 'Water Police' in some cities.
 - Local Council support (e.g. giving out free water saving devices).
- Feedback on water supply usage
 - Personal water readings (self supplied or supplied by the water authority).
 - Reports on dam levels.
- Education and innovation
 - Provision of information about alternative ways to conserve water.
 - Education about water use efficiency and utilising alternative supplies.
 - Education for younger generations.
- Ease of conservation practices
 - Systems you do not have to think about.
 - Dual flush toilets.
 - Electronic sprinkler systems.
 - Flow reducer shower heads.
 - Bucket in sink or shower.

Interestingly, Perth participants also identified external factors that influenced them to use *more* water. For example, a number of participants suggested that they felt socially pressured by neighbours to maintain a green garden, while for those renting there was a financial or legal investment to maintain lawns and gardens to a high standard. Several Perth participants commented that they were so outraged by perceived poor political decision making for water sustainability that they refused to engage in water use efficiency practices around the home in protest. For these participants, this was exacerbated by the strong belief that there was no shortage of water availability in Western Australia.

Essential, Non-Essential and ‘Unwilling to Sacrifice’ Water Uses Around the Home

In order to gauge people’s values for domestic water use *irrespective* of whether restrictions were imposed at any given time, participants were asked to identify water uses that they would not consider giving up (essential), and those that they considered non-essential (see Table 5). They were also asked about what they were not willing to sacrifice for water conservation/ sustainability. Those things that people identified they were not willing to sacrifice are captured in Table 6. Different values emerged as to what was considered essential and non-essential for domestic water use. However, these were not attributable to whether people lived in Canberra or Perth.

Table 5. Essential and Non-Essential Water Uses Around the home

Essential Water Uses	Non-Essential Water Uses
<i>Inside</i>	<i>Inside</i>
Drinking	Washing Machine*
Cooking	Dishwasher*
Washing clothes	Evaporative air conditioners (or capture
Washing/personal hygiene	water for reuse)
<i>Outside</i>	<i>Outside</i>
Garden	Garden
Some plants	Reticulation
Washing car (professional necessity)	Swimming pool
	Washing car

*It was commented that these devices are now seen as essential household items even though they are ‘luxuries’

Table 6. Things People are Not Willing to Sacrifice for Sustainability

Activities
Showering e.g. won’t have AAA shower heads as dislike them; long showers for relaxation/therapeutic purposes
Home grown produce e.g. fruit trees and vegetables
Automatic washing machine
Spa
Cleanliness e.g. of home, self, children, clothes
Cooking and food preparation
Garden (although would do with pots if absolutely necessary)

Discussion about essential and non-essential water uses and ‘non-negotiable’ water practices highlighted other important issues for participants. For those in Canberra, the focus on (reducing) domestic water usage was seen as unfair and impractical given perceived high water inefficiency in other sectors such as industry and agriculture.

Perth participants also believed there was undue and unfair focus on changing domestic water use behaviours, but discussion centred principally on the role of technology to augment existing water supplies. It was argued that with proper utilisation of technology there was only a minimal need for people to have to change their lifestyle behaviours.

Barriers to Water Sustainability around the Home

Participants identified a number of issues that were, for them, barriers to reducing their water use around the home. These included things such as personal and family context, inconvenience and difficulty, physical constraints, home structure issues, expense/cost, aesthetics, policy contradictions, and self discipline and monitoring. Specific issues within these themes are detailed below. Comments have been marked according to the city of origin (B = both cities; C = Canberra; P = Perth).

- Personal and family context
 - Cannot control other household members' behaviours [B].
 - Difficult to have low consumption when you have a very large family [C].
 - See other people wasting water so take on a 'why bother?!' attitude [C].

- Inconvenience/difficulty
 - Anything that challenges comfort and convenience (particularly in a Western society) [C].
 - Buckets are inconvenient [B].
 - Demanding lifestyle [B].
 - Only being able to water plants when dark [C].
 - Keeping the garden alive through dripper irrigation, buckets etc [C].
 - Setting up pump for bath water to water the lawn [C].
 - Installing and maintaining greywater system [B].
 - Difficult to find a satisfactory pool cover [C].

- Pragmatic constraints
 - Physical
 - Buckets too heavy to carry [C].
 - Hard to do the physical work required to keep my garden alive [C].
 - Home
 - Size of house block required to install a blackwater system is larger than the actual size of block owned [P].
 - Home ownership/rental status – those who rent do not have as much control over type/maintenance of gardens, certain appliances etc [P].
 - Living in townhouses, strata and units – difficult to know own water usage with common meters and limited in reducing overall water usage on the property [B].
 - People cannot see water usage inside the home so there is less pressure to conserve [P].

- Expense/cost
 - Not wanting to pay for washing the car at a car wash [B].
 - Not having money to install water-saving technology [P].
 - Not being prepared to spend money on various technologies [P].

- Too costly to plumb whole house up to a greywater system [P].
 - Expensive to convert old houses to be sustainable [P].
 - Takes a long time to recoup overheads for water conservation technology/infrastructure [C].
 - Too expensive to get rid of a swimming pool [P].
 - Money wasted with changing restrictions (e.g. irrigation technology has to be changed) [C].
- Aesthetic sacrifice
 - Showerheads are not aesthetically pleasing [C].
 - Letting gardens die is difficult as they are pleasing to look at, good for others and for the economy [C].
- Policy contradictions
 - Pool cover creates algae which is treated with chemicals (sustainable behaviour results in doing something environmentally unfriendly) [C].
 - Domestic water tanks reduce the amount of water available as runoff in the natural system [C].
 - Other sectors are not subject to same restrictions as households (e.g. watering lawns for the Parliamentary green areas) [C].
- Self discipline and monitoring
 - Water meter is not in a convenient spot to check usage regularly (unlike electricity meter) [P].
 - Hard to conserve as it is so easy to access high quality water in the home [C].
 - Do not have month-to-month comparisons of water usage (unlike electricity bills) [P].
 - Do not know about water usage level so do not feel pressure to conserve [C].
- Other issues
 - Householders do not know the effects of greywater reuse on the plants and soil [C].
 - Education is not enough – children (especially teenagers) use a lot of water [C].
 - We are removed from the natural environment and so do not see the consequences of our actions [C].

Water Behaviours with Abundant Supply

Participants were asked to identify what they thought they would do differently if there was an abundant supply of water with no restrictions. Similarly, they were asked which behaviours they would continue in this situation. Although the level of water restrictions in Perth and Canberra were quite different, there was a similar set of responses that focused on increased showering and bathing, increased usage on gardens and plants, and a more relaxed focus to issues of water wastage and usage. A number of people did suggest, however, that there is now a greater level of awareness to always be more careful. Responses for this question are shown in Table 7.

Table 7. Water Behaviours with Abundant Supply and No Restrictions

Restrictions Lifted – Continued Practices	Restrictions Lifted – Revert to Previous Practices
Using less water for cleaning	Grow more plants
Drought tolerant garden and dripper system	Reticulation on for longer
More careful in general as will always be bad years	Back to sprinkler system (not drip irrigation)
	Have a lawn again
	More baths
	Longer showers
	Water garden/clean car with hose
	Would not bother with water wastage e.g. dripping tap
	Stop capturing water with a bucket
	Stop pumping bath water onto lawn

3.1.2. Public and Private Greenspace and Water Use

The Meaning of Gardens

Some interesting initial findings emerged about the meaning of gardens in people’s lives, and the lifestyle changes and behaviour changes that people would be willing to make to keep their gardens.

The distinctions are blurred. Having a garden might not be essential to stay alive, but it is very important to our wellbeing anyway. Having a large, non-drought tolerant garden might not be essential, but a smaller, drought tolerant garden is quite essential.

The significance of this desire to keep gardens was highlighted in both the focus groups through a discussion of the meaning of gardens, and of private and public greenspace in people’s lives. All of the features identified were shared by participants in both groups, although the importance of private greenspace for private conversations was of particular note for some participants in Perth.

The main elements of *private* greenspace that people felt very important to them are summarised below.

- Wellbeing and personal health
 - A garden is essential for people’s wellbeing.
 - The garden is a sanctuary.
 - Visually needing some green and some vegetation.
 - Lawns and gardens are people’s hobbies and some people’s ‘pride and joy’.
 - Provides personal space.
 - Part of lifestyle and everyday life e.g. all break times spent in garden.
 - Relaxation space.
 - Private place to sit and think.

- Private conversations, a place to talk privately.
 - Site for important conversations (communication is different when in public, in parks or inside).
 - Familiarity and comfort, place to have a cup of tea and chat.
- Practical benefits of a garden
 - Lawn is better for children's play than other surfaces e.g. compared to gravel, wood chips and so on.
 - Good for when parents do not want to go to a park, but children still want to play outside.
 - Gardens are buffers between neighbours e.g. stops noise, adds privacy screenings.
 - Are not exposed to the anti-social activities that can occur in public parks e.g. public drinking.
 - A personal garden required to grow own food due to cultural issues (i.e. in a European culture of 'commons' gardens accessible to all people, but as this is not a part of Australian culture there are strong issues of security, safety, and respect in using public/common gardens for growing food).
- Greenspace as a necessity
 - Cannot live in a 'concrete garden' or 'dust bowl'.
 - An aesthetic *and* practical necessity in summer.
- Preferred attributes and features of private greenspace
 - Vegetation and greenery.
 - Things with perfume and aroma e.g. basil, lavender.
 - Shade and potted trees.
 - Birds.
 - Colour.
 - Variation between inert and concrete, and living and changing.
 - Somewhere to sit and relax.

Public Greenspace

Participants were asked to comment upon a range of questions about public open space and greenspace. This included questions about substituting green spaces and open spaces for private greenspace, and the essential attributes of 'acceptable' public greenspace with a view to possible substitution. A summary of the perceived advantages and disadvantages, and the important features of public greenspace is outlined below.

- Advantages
 - Easier to use parks than maintain private garden (especially for the elderly).
 - Use of parks could encourage health and fitness.

- Disadvantages
 - Inconvenience e.g. have to prepare and buy things, whereas you have everything at home.
 - Less convenient e.g. parents at home working on domestic tasks while kids play when at home.
 - Often 'an outing' takes effort (prepare, pack, use car/petrol, face traffic, takes more time).
 - Do not want to have to do anymore driving/go out on weekend.
 - Part of iconic Australian culture – do not want to give up the Aussie backyard (cricket!).
 - More pressure to purchase from shops and cafes in public greenspace.
 - Does not offer same privacy as private greenspace.
 - Not as safe for children as private greenspace.
 - Public greenspace is not necessarily more water friendly than domestic gardens.

- Preferred attributes and features of public greenspace
 - Same features as what we have in private greenspace.
 - Accessible (close to house, do not have to drive).
 - High quality.
 - Personal safety/security (nothing walled that gives people things to hide behind).
 - Good facilities (particularly at the larger parks – facilities at local parks not needed as much because of proximity to home etc): toilets; [free] barbeques; rubbish bins; drinking fountains; seating.
 - Well maintained facilities.
 - Shade (and trees).
 - Shelter.
 - Good lighting.
 - Sporting and play equipment (goal posts; tennis courts; basketball hoops; climbing equipment; swings and other entertainment for children).
 - Safe equipment.
 - Space for games e.g. sport, frisbee etc.
 - Good walking areas.
 - Separate bike and pedestrian paths.
 - People and dog friendly (provision of 'doggy poo' bags).
 - Ability to use it for family/friends gatherings e.g. children's birthday parties.
 - Public events.
 - Caters to all ages.
 - Aesthetically pleasing.
 - Pleasant to be in.
 - Water nearby.
 - Popular/well used.

- Grass (with options to optimise type of grass and watering of it).
- Bushland parks and other areas with native flora/fauna spaces (not just grassed greenspaces), with facilities.

It was evident that many people could see the benefit of using public greenspace rather than personal outdoor space. Further, a number of people in the Perth focus group discussed how, in their local area, using public open space was already an important part of local culture. However, it was still felt overall that public greenspace could not fully substitute a private garden (even if reduced in size/nature). This was because of the practical and wellbeing benefits of private gardens, as well as the high cultural value given to ‘the Aussie backyard’.

Views about ‘greyspaces’ such as malls, cafes, terraces, squares and other urban spaces were also explored. While many of these public areas were enjoyed by participants, it was thought they could not substitute for the beach or greenspaces. Further, a preference for private greenspace again took precedence. This was attributed to strong cultural values, with a strong contrast being made with European culture where public use of open space was an integral part of everyday life. In contrast, Australian people would be forced to make an enormous shift in their cultural values and practices and, whilst “possible”, it was impractical and unnecessary. The skew in the age distribution of participants towards older people could account for this view to some extent. As a younger participant commented, usage of public open space was acceptable when single, but less so when in a family situation. Hence, generational issues may play a part in preferences for greenspaces and greyspaces in and around urban areas.

3.2. Quantitative Results

At the end of the group discussion, participants were asked to complete a short questionnaire. This questionnaire contained a number of attitudinal and lifestyle questions, and also asked about the type of activities people undertook in their homes in respect to water use. The results from each of the questionnaire sections are detailed below.

3.2.1. Attitudinal Statements

Participants were asked to respond to 15 attitudinal statements using a five point response scale ranging from *strongly disagree* (1) through to *strongly agree* (5). The statements were intended to identify general environmental attitudes, beliefs about water availability, value of greenspace and public open space, and barriers/pathways to change. The mean responses to these items can be seen in Table 8, where higher scores indicate greater agreement. The responses indicated that participants felt that water resources were limited and warranted conserving, and that greenspace was of particular importance. Participants generally did not agree that nature or scientists would be able to solve the water crisis.

Table 8. Mean Responses to Attitudinal Statements

Attitudinal Statement	Mean response
Water is a limited resource in Australia and we must be careful if we don't want to run out (n=30)	4.43
Neighbourhood parks and gardens are an important part of my lifestyle (n=30)	3.87
If things continue on their present course there will soon be an environmental catastrophe (n=29)	3.76
When people interfere with nature it often ends in disaster (n=30)	3.57
It is essential that I have enough water to keep my garden alive (n=30)	3.43
People are severely abusing the environment (n=30)	3.40
The earth has plenty of resources if we just learn how to develop them (n=30)	3.23
The amount of money I could save by changing my water usage is important to me (n=30)	3.00
Australia doesn't really have a water shortage, we just need to manage it better (n=30)	2.97
The way I use water in my household doesn't have much impact on Perth/Canberra's overall water supply (n=30)	2.93
My household cannot make any more changes to the ways we use water (n=30)	2.70
People will eventually learn enough about how nature works to be able to control it (n=29)	2.55
People have the right to change the environment to suit their needs (n=30)	2.27
Scientists will solve our water crisis (n=29)	1.93
Nature will solve water supply problems (n=30)	1.83

3.2.2. Lifestyle Attitudes

Participants were presented with a number of lifestyle options and were asked to indicate how important these were to them, using a five point scale ranging from *not at all important* (1) through to *very important* (5). The mean response for each item can be seen in Table 9. The results indicate that, on average, participants placed a greater level of importance on greenspace and lifestyle than on those options relating explicitly to water use, such as swimming pools or long showers.

Table 9. Mean Response Ratings for the Importance of Lifestyle Options

Lifestyle option	Mean response*
Neighbourhood parks and gardens	3.90
A green home environment (plants/garden)	3.80
The garden for leisure activities	3.73
A garden suitable for entertaining	3.33
A reticulated garden	3.13
Large areas of lawn in your garden	2.60
Large areas of garden beds	2.47
Long hot showers	2.13
A relaxing bath	1.90
A back yard swimming pool/spa	1.13

* Higher numbers indicate greater importance

3.2.3. Awareness of Water Issues

Participants were asked to rate their awareness of water issues in their city. Ratings were made using a five point scale ranging from *not at all aware* (1) through to *very aware* (5). The frequency of responses (Table 10) indicated an extremely high level of perceived awareness with most people believing they were *very aware* of water issues in their cities (55.2%).

Table 10. Awareness of Water Issues

Level of awareness of water issues	Number of responses (n=29)
Not at all aware	0
Vaguely aware	0
Somewhat aware	1
Aware	12
Very aware	16

Awareness of personal water use and comparisons with other households

Participants rated their awareness of the amount of water used in their households using the same 5 point scale as above. The frequency of responses (Table 11) indicated that almost three-quarters of participants thought they were *aware* or *very aware* (73.3%) of the amount of water used in their households, while only 10% were *not at all aware*.

Table 11. Awareness of Amount of Household Water Use

Level of awareness	Number of responses (n=30)
Not at all aware	3
Vaguely aware	1
Somewhat aware	4
Aware	18
Very aware	4

Participants also rated how they thought their household water use compared with other people they knew, using a 5 point scale ranging from *considerably lower* (1) through to *considerably higher* (5). The frequency of responses showed that no one thought they used a *considerably higher* amount of water than others, with the majority of responses (57.7%) falling somewhere in between *about the same* and *considerably lower* (Table 12).

Table 12. Perceived Comparison with Other Households

Comparison with other households	Number of responses (n=26)
Considerable lower	4
2	7
About the same	12
4	3
Considerably higher	0

3.2.4. Water Saving Activities around the Home

Eighty percent of participants said that they undertook activities around the home to help save water (outside of any restrictions that may have been imposed on them). Those participants were asked what these activities were. The most common responses are listed in Table 13 (a full list of responses can be seen in Appendix D).

Table 13. Water-Saving Activities

Water saving activity	Number of responses (n=85)
Collect cold water as it warms up to use of the garden/cooking etc	7
Water efficient shower heads	5
Bucket in the shower	4
Reuse dishwashing and/or washing machine water	4
Getting rid of lawn	4
Short showers	4
Excess water to gardens	4
Water efficient appliances	4

Water saving devices

More than three quarters of participants (76.7%) said that they had some form of water saving device installed in their home. The most common responses can be seen in Table 14 (a full list of responses is listed in Appendix E).

Table 14. Type of Water Saving Devices Used Around the Home

Water saving device	Number of responses (n=60)
Water efficient shower heads	13
Grey water hose and system to garden	7
Drip irrigation	7
Dual flush toilet	6
Tap aerators	4
Rainwater tank	3

Rebates on water saving devices

Perth participants were asked whether they had received rebates for water saving devices. Only two participants reported receiving rebates.

Household bores

Perth participants were also asked if they had a private household bore from which they could draw water for outdoor uses. Four participants of the eleven had bores, with three stating they did not have a bore and a further four not commenting.

3.2.5. Differences between Canberra and Perth participants

A comparison between Canberra and Perth participants revealed surprisingly few statistically significant differences ($p < .05$).

- Canberra participants were generally in agreement (mean=3.42) with the statement *the amount of money I could save by changing my water usage is important to me*, while Perth people were generally in disagreement (mean=2.27).
- Perth participants rated neighbourhood parks and gardens as significantly more important (mean=4.45) than did Canberra participants (mean=3.58).

3.2.6. Demographics

Participants were asked a number of demographic questions.

House type

The majority of participants lived in detached houses (66.7%) with only 3.3% living in semi-detached or duplex houses and 13.3% living in townhouses or villas.

Gender

There was a higher proportion of males to females overall in the sample group (66.7% male, 33.3% female) despite recruiting an approximately even number.

Number of people living in the household

Table 15 shows the breakdown of the number of people in the participants' households.

Table 15. Number of People in Participants' Households

Number of people in the home	Number of responses (n=30)
One	5
Two	15
Three	5
Four	2
Five	0
Six	3

3.2.7. Water consumption figures

Participants were asked if they would give consent to having their actual water consumption data examined. Both ACT Electricity and Water (ACTEW) and The Water Corporation agreed to supply us with this data upon participants' consent. Twenty-five out of the thirty participants (83.3%) gave their consent. There was much variability in water consumption as can be seen in Table 16, indicating that the focus groups were attended by a range of water users from low

through to high. ACTEW supplied block size information for Canberra participants, and there was a very strong significant correlation between block size and average annual water consumption ($r=0.96$, $p<.01$).

Table 16. Dispersion of Annual Water Use for all Participants

Minimum Usage (kL)	Maximum Usage (kL)	Mean Usage (kL)	Standard Deviation
42.60	1314.00	395.13	303.21

Due to small sample sizes and differences between Perth and Canberra’s water situation (for example differing water restrictions, and the existence of private bores in Perth) a comparison of average water use across the locations was not viable.

Correlation analysis indicated a number of significant correlations between average annual water consumption and attitudinal and lifestyle statements. The following significant relationships were identified in Canberra ($p<.05$):

- The importance of *neighbourhood parks and gardens* and average water use per year had a strong positive relationship ($r=0.62$), indicating that people who thought *neighbourhood parks and gardens* were important used more water
- The importance of having a *garden suitable for entertaining* and the amount of water used per year had a strong positive relationship ($r=0.70$), indicating the people who valued a *garden suitable for entertaining* were more likely to use more water on average.
- Average annual water use was significantly correlated with the question *how would you rate your household consumption compared to other people you know* ($r=0.76$) indicating that people’s perceptions of their water consumption were relatively accurate reflections of actual water use in Canberra.

4. Discussion and Future Directions

A number of themes emerged from the focus groups and the questionnaire. These suggested a number of possible areas of future research, reflecting the need for a range of research designs, methodologies and analyses.

The themes are summarised below.

- ***Understanding household water use through cognitive dissonance***, a psychological theory that is concerned with the implications of people becoming aware of a mismatch between their attitudes and their behaviour. Cognitive dissonance may be a useful insight into the relationships between personal conservation ideals and actual behaviours.
- ***Investigating trade-offs in household water conservation***. Conversations about essential and non-essential water uses in the focus groups illustrated that some people may be prepared to make sacrifices in one area of their water use so that they can continue to use water in other areas. For example, people may consider shorter showers in order to continue watering their garden every day.
- ***Investigating linkages and ‘substitutability’ between private gardens, domestic water use and public greenspaces***. The focus group findings reinforced the idea that domestic gardens are an important part of people’s lifestyle and wellbeing. As such, it is important to understand the meaning and value of public green spaces and open spaces in people’s lives, and links with private gardens and domestic water consumption. How substitutable are these different ‘greenspaces’ and how does this impact upon water usage?
- ***Understanding the linkages between the high water use and the meaning of gardens***. Gardens are a part of the national cultural heritage, and the role of gardens in that heritage is expressed in the participants’ comments about the importance of private greenspace and backyards in people’s lives. What impact does this cultural heritage have on the way we use domestic water in our gardens? How can we use these understandings to inform policy in relation to reducing private water use?
- ***Understanding the values people place in greenspace and the implications for watering restrictions of greenspace***. How important are the aesthetics of greenspace? How tolerant will people be of a ‘decline’ in this aesthetic?
- ***Understanding personal water use practices in a social and cultural context***. How do changes in the wider cultural landscape influence patterns of domestic water usage? What influence do ‘public utilities’ and having water ‘on call’ have on water usage and consumption?

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APPENDIX A

WATER RESTRICTIONS FOR CANBERRA AND PERTH AT THE TIME OF FOCUS GROUPS

CANBERRA STAGE 3 WATER RESTRICTIONS

Private gardens and lawns; commercial nurseries, market gardens and turf-growing businesses



No sprinkler or other irrigation system may be used. ^{**}

Watering of lawns not permitted.

A hand-held hose fitted with a trigger nozzle, a bucket or a watering can may be used to water plants between 7am and 10am and between 7pm and 10pm on alternate days as per the “odds and evens” system.

At all times gardens may only be watered without causing pooling or runoff.

** General Exemptions

Drippers alternate days (plants only)

As an alternative to hand-held hoses, buckets or watering cans, drippers may be used for watering plants between 7-10am and 7-10pm on alternate days as per the odds and even system. Watering of lawns by drippers is not permitted under this general exemption.

Landscape Contractors

Businesses contracted to install new plants (not new lawns) may water outside allowed watering hours provided that:

Watering occurs within ONE hour after planting each plant;

Watering is done by hand-held hose fitted with a trigger nozzle, a bucket or watering-can; and

No more water is used than is reasonably required for initial establishment of the plant.

No variations will be given to these general exemptions. Exemptions can be revoked by ACTEW at any time.

Lawns and plants at parks, sports amenities, golf courses and public gardens



The target of a 35% reduction in water use should be met.

At all times lawns and plants may only be watered without causing pooling or runoff.

Paved areas



Water must not be used to clean paved areas unless necessary as a result of accident, fire, health hazard or other emergency.

Private ponds and fountains



Fountains must be switched off.

Only ponds that support fish may be topped up, and then only using a hand-held hose fitted with a trigger nozzle, a bucket or a watering can.

Public ponds and fountains



Existing ponds must not be filled or topped up other than with non-potable water.

New ponds may not be filled with any water.

No fountains may be operated or filled or topped up with any water

Private swimming pools



Pools must not be emptied, filled or topped up without written exemption.

General Exemptions under Stage 3: topping up private pools

Public swimming pools



Pools may not be emptied, filled or topped up without written exemption.

Water storage tanks, dams, and lakes.



Must not be filled or topped up other than with non-potable water.

Vehicles



No washing of any vehicle except at a commercial car wash that recycles water and holds an exemption allowing use of potable water.

Boat motors may be flushed or rinsed after use.

General Exemptions

Water can be used to wash a vehicle's windows, mirrors or lights, and for spot removal of corrosive substances, and then only with a bucket or watering can filled directly from a tap (not by means of a hose).

Motorcycles can be cleaned ONCE per month, and then only with a bucket or watering can filled directly from a tap (not by means of a hose).

No variations to these general exemptions will be permitted.

General exemptions can be revoked by ACTEW at any time.

Windows and buildings



No washing unless necessary as a result of accident, fire, health hazard or other emergency, provided that building gutters may be cleaned at any time.

Construction and related activities



Unless impractical, water may only be used by means of a hose fitted with a flow cut-off device.

Wherever practicable non-potable water should be used.

Source: www.actew.com.au

PERTH WATER RESTRICTIONS

All homes in Perth, Mandurah, Bridgetown, Boyup Brook, Hester, Mullalyup, Kirup, Greenbushes, Balingup, Pinjarra and along the Goldfields Pipeline have been allocated two specific days each week when watering with sprinklers or reticulation systems is allowed. This is based on the last digit of your house or lot number.

Gardens can be watered by reticulation on your allocated days during either but not both the morning (before 9am) or the evening (after 6pm). You may need to adjust your reticulation system if it is set close to these times.

Source: www.watercorporation.com.au

APPENDIX B

FOCUS GROUP QUESTIONS

HOUSEHOLD SUSTAINABILITY –FOCUS GROUP QUESTIONS AND AGENDA: CANBERRA, 14 APRIL 2007

1.00–1.15

INTRODUCTION (15 mins)

- water is an increasingly critical issue in Canberra and around Australia, so it's important for planning future domestic water supply to understand what's important to people about water use around the home.
- this is an exploratory study about people's household water use, finding out ways water is used around the home, what's most important/not at all important for water uses, things that affect people's water use and that make it easy or hard to change water use in the home
- also looking at the importance of greenspace and open space, public and private, for lifestyle.
- we know everyone is trying to save water in the home but we have to be realistic about the ways we can save, and about what is just so hard we're not prepared to do it
- is to get personal opinions, you are the "experts". No right or wrong, just what you think and value

- not just talking about restrictions but about water supply

Housekeeping – toilet, exit/assembly point.

1.15–1.30

GENERAL ENVIRONMENTAL SUSTAINABILITY QUESTION (15 mins)

Identifying how people think about environmental sustainability as a concept and what it means to them on an everyday level.

Q. What does sustainability mean to you in terms of water supply?

(In general and around the home. Prompts incorporate recycling; efficiency, rural/urban, private/industry...]

1.30-2.45

GENERAL WATER CONSERVATION QUESTIONS (1 hr 15 mins)

Assessing how this relates to water conservation in the home.

Q. What does sustainability mean to you in terms of water use in and around the home?

Q. What kinds of things do you do around your home that are 'sustainable' or 'unsustainable' in relation to water use?

Identifying barriers to water conservation (perceived and actual).

Q. What are the easy things for you to do for water conservation or for you to reduce water use around your home?

- things you're already doing?
- things you're not currently doing?

Q. What things do you find more difficult?

- what makes these things difficult to do?
- **how do you cope with these difficulties?** (e.g. stops you from performing these activities, means you do them less often, or you persevere regardless to save water?)

Exploring the delineation between non-discretionary (must have) and discretionary (can do without) water use.

Q. What water uses are essential?

Q. What water uses are non-essential/optional?

Identifying potential 'trade-offs'

Q. Are there reductions in water use that you aren't prepared to make?

- are there things that you are willing to do to make up for this?

(e.g. won't water the garden less but will take shorter showers).

Identifying external influential factors on water use.

Q. Do you feel pressured or influenced to use less water by anyone or anything?

(Prompts: family; friends; neighbours; media; water authorities; local authorities; scarcity; cost...).

Do you feel pressured or influenced to use more water by anyone or anything?

(Prompts: neighbours; family; friends; media; water authorities; local authorities; scarcity; cost...).

Q. How do you respond to these pressures?

WATER QUOTA QUESTIONS

SCENARIO

A water shortage situation in Canberra means that a limited water allocation for each household has been imposed. In usual circumstances this would mean that the following restrictions would be applied, as per ACTEW's Level 3 restrictions for outdoor water use (as per the following - list supplied for participants reference):

- watering of lawns is not permitted
- plants may only be watered every second day using a handheld trigger hose or a dripper irrigation system, early morning or later evening every second day
- no sprinkler or irrigation system may be used other than a dripper irrigation system
- pooling or run-off from watering is not permitted
- water cannot be used to clean paved areas or vehicles at home
- washing of the home and windows is not permitted
- swimming pools cannot be filled or topped up

- fountains must be switched off
- only ponds that support fish may be topped up, and only with a hand-held hose equipped with a trigger nozzle or a watering can
- water storage tanks cannot be topped up other than with non-potable water

However, a new system is being trialled by ACTEW in which **people receive a reduced amount of water allocated to them with personal choice as to choose how and where they will use it anywhere in the household.** Restrictions as we now know them wouldn't exist, there is just the equivalent amount of water. **Instead of restrictions you get a quota of water.** However, as with restrictions for outdoor water use, if people use more than this quota penalties will apply – usually in the form of fines.

So, if you were given this set water allocation to use as you choose, what would you do, and where and how would you use the water?

Identifying the types of discretionary uses people value.

Q. What would you do differently if you had an abundant water supply, with no restrictions on water use?

2.45-3.00 AFTERNOON TEA BREAK (15 mins)

3.00-3.40

GREENSPACE/OPENSOURCE QUESTIONS (40 mins)

Assessing how much people think public greenspace and other open spaces can be a worthy substitute for personal (private) green space.

Q. If external water use were to be totally banned (e.g. in the case of a 20 year drought, or evidence of climate change dramatically reducing rainfall), what would you do with your outdoor space?

(prompts such as paving, natural rock features...).

Q. How willing would you be to use public greenspace and other forms of open space in place of your private greenspace at home?

(what types are preferred or not preferred - list of urban greenspaces and open spaces made available to participants for reference).

Q. What attributes would this public greenspace/open space need to be considered 'acceptable' greenspace for you?

(Prompts: size; type; availability; accessibility; number; choice; quality; management; type of use; levels of use; other users; security; shade/shelter; facilities; aesthetics...).

Q. Do you have a preference for greenspace or open space, or would you use a combination of both for your lifestyle needs if you had to give up your own private greenspace?

(Would you be more likely/prefer to use greenspace [parks, community gardens, urban ‘wilderness’ and state parks/forests etc] to add value to your lifestyle or substitute use of private greenspace? Or would you prefer to use ‘greyspace’ as defined in the previous question? Or a combination of both?).

3.40-4.00

Fill in questionnaire, feedback form and approval sheet.

APPENDIX C

WATER SAVING ACTIVITIES UNDERTAKEN BY PARTICIPANTS

Table 1. Water-saving activities

Water saving activity	Number of responses (n=85)
Collect cold water as it warms up to use of the garden/cooking etc	7
Water efficient shower heads	5
Bucket in the shower	4
Reuse dishwashing and/or washing machine water	4
Getting rid of lawn	4
Short showers	4
Excess water to gardens	4
Water efficient appliances	4
Reuse washing machine water	3
Put in native gardens	3
Irregular watering as needed	3
Mulch	3
Only use dishwasher/washing machine when full	3
Water efficient garden/reticulation	2
Collect rainwater for garden use	2
Sub-surface irrigation/deep irrigation	2
Discerning toilet flush	2
Don't use air conditioners	2
Reuse wastewater/greywater	2
General care and low use	2
Reduce cistern flow	2
Tap aerator	2
Weta soil/water absorbents	2
Don't use dishwasher	1
Children wash every second day	1
Bath water to lawn	1
Little water use when cleaning	1
Tap timers	1
No water play for grandchildren	1
Urinate outside	1
Educate others	1
Front load washer	1
Use bucket to water lawn/garden	1
Turn hose off when not in use	1
Hose water garden	1
Wash car with bucket on lawn	1
Water garden at night only 2 nights a week and not after rain	1

APPENDIX D

WATER SAVING DEVICES USED BY PARTICIPANTS

Table 2. Type of water saving devices used around the home

Water saving device	Number of responses (n=60)
Water efficient shower heads	13
Grey water hose and system to Garden	7
Drip irrigation	7
Dual flush toilet	6
Tap aerators	4
Rainwater tank	3
Tap fitting to lower Pressure/flow restrictions	2
Valve in cistern	2
Water efficient washing machine	2
Water efficient dishwasher	2
Bath water pump	1
Tap timers	1
Collect rainwater	1
Reuse from washing machine	1
Sub-surface irrigation	1
Mulch	1
No swimming pool	1
No leaking taps	1
No air conditioner	1
Siphon/bucket in laundry	1
Efficient sprinkler heads	1
Weta soil	1

