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Abstract

The Australian water crisis can be addressed in many ways: ranging from increasing water conservation behaviours to minimize demand, through to producing water through large scale water augmentation projects. Due to the extended drought experienced in many locations across Australia in recent years, there has been a recent focus on developing wastewater recycling and seawater desalination plants. While this is an important measure for emergency water supply, water conservation should still play a major role in reducing demand for water. The aim of this study is to provide much-needed empirical data about Australian attitudes towards water conservation, and their water conservation behaviours. This market insight provides a knowledge basis for the development of public policy measures and social marketing campaigns aimed at increasing water conservation among Australian residents. Results from a survey study of 1495 people indicates that Australians generally have very positive attitudes towards water conservation and water saving appliances, however these positive attitudes are not consistently translated into actual behaviour. The main barriers to adoption of water conservation behaviours identified in the study are: the perception of inconvenience and impracticality, as well as costs associated with purchasing water saving appliances. These findings highlight the fact that there is still substantial potential to be harvested in Australia though water conservation measures. Opportunities for public policy makers to stimulate this process are identified.

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Australians' Water Conservation Behaviours and Attitudes

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Abstract
The Australian water crisis can be addressed in many ways: ranging from increasing water conservation behaviours to minimize demand, through to producing water through large scale water augmentation projects. Due to the extended drought experienced in many locations across Australia in recent years, there has been a recent focus on developing wastewater recycling and seawater desalination plants. While this is an important measure for emergency water supply, water conservation should still play a major role in reducing demand for water. The aim of this study is to provide much-needed empirical data about Australian attitudes towards water conservation, and their water conservation behaviours. This market insight provides a knowledge basis for the development of public policy measures and social marketing campaigns aimed at increasing water conservation among Australian residents. Results from a survey study of 1495 people indicates that Australians generally have very positive attitudes towards water conservation and water saving appliances, however these positive attitudes are not consistently translated into actual behaviour. The main barriers to adoption of water conservation behaviours identified in the study are: the perception of inconvenience and impracticality, as well as costs associated with purchasing water saving appliances. These findings highlight the fact that there is still substantial potential to be harvested in Australia though water conservation measures. Opportunities for public policy makers to stimulate this process are identified.

Key words: water conservation, Australia, survey research, attitudes, behaviour

1. Introduction

The conservation of water through the reduction of demand has long been considered an important component of water management (Krutilla 1967; Postel 1985) and has been applied in various locations around Australia, particularly in times of drought (Anderson 1995). In response to the importance of demand management, a large body of research has investigated Australian attitudes to drought and water conservation. These have ranged from studies conducted by water authorities and government departments (including: Australian Bureau of Statistics 1985; Duncan 1991; Metropolitan Water Authority 1985) to more independent and academic work (including: Howard 1999; Moore et al. 1994; Murphy et al. 1991; Roseth 2006; Watson et al. 1999). Despite these studies, little is known about Australians' actual conservation behaviours, including their use of water efficient appliances – particularly over the past decade.

This paper addresses this gap in knowledge by providing baseline data about Australians':

- attitudes to water conservation
- stated water conservation behaviour
- attitudes towards water efficient appliances
- stated ownership of water efficient appliances, and
- stated barriers to installing water efficient appliances

In so doing, this study contributes to knowledge about Australians' attitudes and behaviours in relation to water conservation. Both attitudes and behaviours are included in this study in acknowledgement of the fact that, while it is ultimately behaviour that matters, attitudes are known to influence behavioural intentions and behaviour (Ajzen, 1991) and therefore represent a crucial antecedent construct which can be targeted with advertising or public education messages.

This research is timely given current debates about the continued role that water conservation (through demand management initiatives such as restrictions) should have, particularly once large scale centralised infrastructure projects (such as desalination) come on line in cities. The National Water Commission regards temporary water restrictions as *"an inequitable and inefficient way of balancing supply and demand"* (Frontier Economics 2008), giving rise to the National Water Commission's recently published National Review of water restrictions in Australia (Institute for Sustainable Futures and ACIL Tasman Pty Ltd 2009). The review highlights the differences perceived by both the water industry and the public in relation to the role of permanent (low level) restrictions to water use and temporary (and often more severe) levels of restriction. It acknowledges the need for further information in order to determine the best way forward in the future, specifically in relation to engaging the community and industry in decision making and to understanding their views and values. This paper provides more recent information on Australian attitudes to water conservation.

2. Previous research

An overview of prior research investigating Australian attitudes and behaviours relating to drought and water conservation is provided below. This overview is organised thematically, highlighting key studies. It is anticipated that there are many more studies which have been conducted but which are not widely available in the public realm due to the nature of their publication (e.g. commercial in confidence restrictions and water authority reports, rather than widely available national/international journal publications).

2.1 Water consumption and associated behaviours

There has been a significant body of research conducted by various water authorities and governments around the country to establish the water use behaviours of the public. These studies have provided valuable insights into water behaviours, and have established that water use often differs depending on location and factors such as climate, water use restrictions, and ownership of household water use appliances.

Outdoor water use tends to account for a smaller percentage of household water consumption, but is more variable than indoor water consumption due to seasonal changes in demand. Connelly et al.'s (1991) study in Melbourne found that outdoor water use accounted for 38% of total use in the 1980s, however Roberts (2005) reports that usage decreased to 25% in 2000-2004 even after a period of lower rainfall and further restrictions. This compares to studies conducted in Perth which in 1985 found 42% of total water use occurred outdoors (Metropolitan Water Authority 1985), and had increased to 56% by 2003 (Loh and Coghlan 2003). The increase in outdoor use found by Loh and Coghlan (2003) was attributed mainly to changes in behaviour over time, including the use of automatic sprinklers.

A number of qualitative academic research projects have been undertaken which provide significant in-depth information regarding Australian water behaviours. Allon and Sofoulis (2006) conducted a qualitative exploration of domestic water cultures. They found that participants envisage alternatives to the current centralised supply of water and are prepared to do more to move to a different water culture, however, they face significant barriers to achieving this. Barriers identified included feeling stuck within current 'socio-technical' systems of water. Evidence of altered water behaviours in response to drought is also provided by other studies, including Head and Muir (2007). They provide detailed descriptions of how residents of Sydney and Wollongong are facilitating the use of alternative water sources and actively adapting their previous water practices in response to drought.

Askew and McGuirk (2004) researched water behaviours and attitudes, particularly related to gardens. They surveyed 48 residents of new suburbs in New South Wales and found that 71% of respondents indicated that they use mulch in their garden, 63% have water efficient plants, and 54% have a water efficient lawn. Overall, previous work into water conservation has provided valuable insight into the way Australians think about water conservation, but it lacks the comprehensive detail required to fully understand current levels of water conservation behaviour and barriers to engaging in such behaviour.

2.2 Factors that influence water consumption

A number of studies were conducted by Australian Water Authorities in the 1980s and 1990s to investigate factors that influence water consumption. Aitken et al. (1991) investigated residential demand for water in Melbourne. Using cluster sampling they modelled household water consumption with variables including survey data of household socio-demographic data, 1981 census information, and property value data. They found that the number of residents per household, and the net annual property value dominated the models, explaining 45% of the data variability. Troy et al's (2006) study of domestic water consumption in the Australian Capital Territory found that water consumption fell by an average of 19% during the period of 2001 and 2004. They attribute this fall to a number of reasons, some of which are dependent on location. These reasons include the combined effect of education programs, extended drought, water restrictions and demand management initiatives.

2.3 Attitudes to water shortages and conservation

The largest study of Australians' views on water shortages and conservation was conducted by Roseth (2006) in October and November 2005. Roseth surveyed 700 residents in Adelaide, Darwin, Melbourne, Perth and Sydney (3,500 in total). The study found that water shortages were not 'top-of-

mind' for respondents relative to other environmental and social issues. However, 93% of respondents agreed that water must be carefully conserved. Respondents believed that the main factor contributing to water scarcity was population growth. Although they placed a high value on gardens (50% agreed that people have the right to keep their garden looking green and healthy), 94% of respondents believed that water should be saved all the time, not just in times of drought. The most frequently stated barrier to water conservation was the high expense of purchasing water saving devices (but only 21% of respondents stated this was a barrier). Provision of further information was identified as potentially beneficial, with 20% of respondents agreeing that they don't know enough about what they can do to save water. Across all locations, the main driver for saving water was found to be '*making sure we don't run out of water'*, although interesting differences in opinion were found for residents of Darwin, a more water abundant location, where 19% of respondents stated they were not saving water because there was no shortage. Overall this research indicated an acknowledgement by the public that water conservation is important, and that there is a willingness by the public to conserve water.

Roseth's study can be compared to other Australian studies on attitudes to water conservation. In a study of Melbournian attitudes to water conservation during the period 1983 – 1989, Duncan (1991) found that most respondents were of the opinion that water conservation is important (98% in 1983 and 94% in 1986). With regards to doing things around the house to conserve water in 1984, 86% of respondents stated they do. This figure dropped to 68% in 1986 but increased again to 83% in 1989.

A study conducted by Nancarrow and Syme (1989) measured public attitudes to, and perceptions of, a range of water management topics and public involvement in communication issues using a sample of Sydney, Perth and Canberra residents. The study found that given facts about a water management situation, the public comes to solutions which are similar to that of water planners, and are prepared to take some responsibility for these solutions. In measuring public attitudes to water issues, the study found that water conservation was not the environmental issue of most concern to respondents; of most concern instead was the conservation of the ozone layer. Overall, only 35% of respondents agreed with the statement 'our household could use a lot less water without affecting our lifestyle', however, 98% of respondents believed that in times of drought or water shortage, water restrictions should be introduced. This was reduced to 60% in agreement with the statement '*water restrictions should be introduced each summer to prevent excessive water use in cities'*. There was strong support for financial incentives for conservation with 57% supporting a pay for use policy, and 80% favouring a rebate system being introduced whereby efforts to conserve water would be rewarded by paying less.

Connelly et al. (1991) wrote the Interim Report for the Melbourne Water Resources Review which informed strategy for the future management of the city's water supply. The strategy considered demand management options, alternative water supplies and also new supplies of water. It was informed by a range of community consultation measures including focus groups, a telephone survey, information booths and surveys, and public submissions. For the demand management options, the public consultation found that the encouragement of water saving appliances was a high priority option. In the telephone survey 77% of respondents felt that an appliance rating scheme would be effective in encouraging people to use less water, and 74% felt that tax rebates on appliances would encourage them to conserve. The consultation also indicated that the water tariff structure needed to be reformed to become a user pays system otherwise there is little financial incentive for spending money on efficiency.

More recently, a study by the Institute for Sustainable Futures (2003) found that attitudes towards conserving water appeared to be positive, though respondents wanted to be convinced of both the costs and benefits of their efforts. In 2002, the CSIRO published a report on water use and appliance

ownership in Perth, and examined the way in which people think about water (CSIRO 2002). The study found that people viewed water as a scarce resource that must be carefully conserved. Respondents saw the importance of preserving water as it provides habitat for wildlife and vegetation. Very few people saw no reason to conserve water. In another Perth study, Meinck and Leathersich (2003) conducted a survey of water customers and found that moderate water use restrictions are acceptable, but severe restrictions were not perceived as acceptable.

2.4 Factors that influence water conservation

As summarised by Duncan (1991) research has found that the effectiveness of demand management campaigns depends on a number of factors including: climate, consumer willingness to change behaviours, existing levels of water wastage, and the structure and intensity of the campaign. Duncan (1991) reviewed the behaviour of water demand in Melbourne in light of the Water Board's 1983 demand management campaign, introduced after water restrictions were employed to combat drought. The campaign involved appliance redesign, consumer education, and in 1987, the introduction of a 'pay for use' charging system. Duncan found that domestic water consumption decreased by 32% as a result of these changes, but subsequently increased each year afterward. Connelly et al's (1991) telephone study found that 21% of respondents in Melbourne claimed they had installed a water efficient shower head.

In a July 2005 study of factors that influence water conservation in Melbourne, Clarke and Brown (2006) surveyed 2,600 residents of the Bayside area. They focused on three water use behaviours / appliances, finding that 6% of respondents had a rainwater tank, 52% had a water efficient showerhead, and 5% reuse greywater. With regards to water behavioural change they found that this is dependent upon the capacity of individuals to acquire and apply water saving and reuse measures. The authors also report that the key barriers to a widespread practice of conservation and alternative water usage includes: difficulty of implementation, cost and renter status.

The Australian Bureau of Statistics – ABS (1985) conducted a study for the Melbourne Metropolitan Board of Works relating to water efficient appliances of Victorian households. The study found that 9.8% of households had a water tank, 10.1% had at least one dual flush toilet, and 23.8% had a dishwasher. In Perth, the situation was different. A study published by the Metropolitan Water Authority (1985), found that only 1% of households had a dual flush toilet. While rainwater tank ownership was not reported in this study, bore ownership was, with 24.1% of households owing a bore, and a further 3% having access to one. Bore ownership was said to be gaining in popularity due to increased restrictions on the central water supply and mounting prices.

Overall these studies provide useful insight into water conservation attitudes and behaviours of the Australian public, albeit in a piecemeal location by location fashion. The study reported in this paper seeks to provide an overview of more recent attitudes and behaviours for a nationally representative Australian sample, providing further insight towards how these factors change over time. The details of our method are provided below.

3. Method

A national on-line survey was conducted in January 2009 using a permission-based online panel which is for research purposes only. Participants were sent an email inviting them to participate in the online survey and those who completed the survey were given a small financial payment to compensate them for their time. In total 1495 people participated in the survey. Quota sampling ensured that the sample was representative of the Australian population based on demographic characteristics.

To inform the development of the questionnaire, an extensive qualitative study phase was conducted in June and July 2008, including ten in-depth interviews and one focus group in each of eight locations across Australia. The locations for the qualitative study phase (Adelaide, Brisbane, Darwin, Mallee, Melbourne, Perth, Sydney, and Toowoomba) were chosen specifically to ensure maximum heterogeneity of water circumstances. Recruitment of respondents was outsourced to a professional fieldwork company to ensure that respondents from a wide range of socio-demographic backgrounds could be included. The results of this qualitative phase can be found in Dolnicar and Hurlimann (2009).

Survey questions used in the nationally representative questionnaire were derived from insights gained during the qualitative study phase. The survey included questions about: 1) attitudes to water conservation; 2) water conservation practices; 3) water efficient appliances, and 4) barriers to the purchase of water efficient appliances. Due to the qualitative study previously conducted, it was possible to formulate all these questions as forced choice binary questions (yes / no, or agree / disagree) rather than open-ended questions. The advantage of this two-step approach is that (1) the qualitative phase ensured that all critical answer options were included, and (2) the simple survey format ensured that valid quantitative information could be obtained from a representative sample of Australians. Details on the questions are provided in the results and discussion section.

4. Results and discussion

4.1 Attitudes to water conservation

Respondents were asked whether or not they agree with a series of 19 questions about water conservation. Table 1 provides the agreement levels for each of the statements in descending order.

Table 1: Respondent attitudes to water conservation

Statement	Agreement, % (frequency)
Water conservation is important	97 (1455)
Water conservation is necessary because of water scarcity	94 (1400)
More attention to water conservation is needed	93 (1386)
I conserve water wherever I can	92 (1379)
I am very positive about water conservation	88 (1322)
It is a challenge to convince others to conserve water	83 (1237)
I could make more effort to conserve water	80 (1193)
I advocate water conservation among my friends and family	77 (1153)
I have experienced limited water supply before	74 (1104)
The need for water conservation depends on location	45 (671)
Water conservation alone can solve Australia's water problem	23 (346)
I feel no pressure to conserve water at the moment	21 (309)
Water shortage issues don't affect me	12 (173)

I am not concerned at all with water conservation	9 (137)
Water conservation isn't my responsibility	9 (131)

Overall respondents indicated positive attitudes towards water conservation, with 97% of respondents stating that water conservation is important. This is comparable to the findings of Duncan's (1991) study in Melbourne which found 98% of respondents were of the opinion that water conservation is important in 1983, and 94% in 1986. Additionally, the majority of respondents in our study believe that water conservation is necessary because of water scarcity (94%), and conserve water wherever they can (92%). This is comparable with Nancarrow and Syme's (1989) work which found 98% of respondents believed that in times of drought or water shortage, restrictions to water use should be introduced. Our results indicate that the community see the value of water conservation, despite the recent debate spurred by the National Water Commission's view on water restrictions.

With regard to water policy, 93% of respondents to our study agree that more attention to water conservation is needed, and 80% of respondents admit they could do more to conserve water. This is comparable to 79% of respondents from Roseth's (2006) study. A small proportion of respondents stated that they feel no pressure to conserve water at the moment (21%), that water shortage issues do not affect them (12%), that they are not concerned with water conservation (9%) and that it is not their responsibility (9%).

4.2 Water conservation practices

Respondents were asked whether or not they implement a series of 24 water conservation measures. Results are presented in Table 2.

Table 2: Water conservation practices of respondents

Conservation practice	Yes, % (frequency)
I make sure that taps do not drip	98 (1467)
I use minimal water for cleaning	90 (1342)
I only use the washing machine when it is full	89 (1331)
I strictly adhere to water restrictions	88 (1312)
I take shorter showers	88 (1311)
I have a dual flush toilet	87 (1295)
I do not hose my driveway	86 (1290)
I minimise toilet flushing where possible	85 (1286)
I use water efficient showerheads	82 (1230)
I only use the dishwasher when it is full	81 (1205)
I rarely water the garden	77 (1155)
I use water efficient taps	76 (1140)
I have a drought tolerant / low water consumption garden	74 (1109)
I use a water efficient dishwasher	64 (957)
I use a water efficient / front loading washing machine	50 (752)
I do not wash my car with water	50 (744)
I collect water from shower/sink/bath for use elsewhere	47 (705)

I recycle grey water from the washing machine for garden / outdoor use	47 (697)
I recycled grey water from the shower for garden / outdoor use	44 (652)
I collect water when it rains (not in a rainwater tank)	39 (582)
I have a rain water tank	34 (508)
I hand wash clothes	23 (344)
I don't conserve any water	7 (98)

As can be seen, the main water conservation practice is making sure taps do not drip (98%), followed by using minimal water for cleaning (90%), then only using the washing machine when it is full (89%). A number of respondents indicated they use an alternative source of water around the house, the main source being from the washing machine (47%), followed by the shower (44%). This is an increase from the 8.5% of households that indicated they used recycled water on their garden in 1985 in the ABS (1985) study.

In total, 34% of respondents indicated that they have a rainwater tank. This is an increase in ownership from the 9.8% of households from the ABS study (1985) conducted in Melbourne in the 1980s. In comparison to Clark and Brown (2006), our study found higher rates of rainwater tank ownership, use of efficient shower heads, and grey water use. This may be because our study was conducted nationally whereas Clark and Brown's was only in the Bayside area of Melbourne. Alternatively, it could be because water practices have changed significantly in the five year period since Clark and Brown's study, perhaps due to the fact that water scarcity in Melbourne has persisted since then, with tighter water restrictions introduced.

With regard to gardens, where approximately 25% (Roberts 2005) to 42% (Loh and Coghlan 2003) of household water use is stated to occur in Australia (depending on location) – 74% of respondents indicated they have a drought tolerant garden, and 77% of respondents rarely water the garden. Additionally, 74% of respondents from our study indicated that they have a water efficient garden, this is slightly higher than Askew and McGuirk's (2004) 64%-71% of respondents living in new suburbs in New South Wales, and the 56% of respondents who indicated they mulch their garden in the ABS (1985) study.

In our study 87% of respondents indicated they have at least one dual flush toilet. Again this is an increase from previous studies – 10.1% (ABS 1985), and 1% (Metropolitan Water Authority 1985). Reported use of water efficient showerheads had increased in our study with 82% of respondents indicating they used these, in comparison to 21% in Connelly et al's (1991) Melbourne study. A small segment of the respondents in our study (7%) stated that they do not conserve water at all.

4.3 Water efficient appliances

Respondents were asked to rate their agreement with a series of 14 statements about water efficient appliances. Responses are displayed in Table 3.

Table 3: Respondent attitudes to water efficient appliances

Statement	Agree, % (frequency)
Water efficient appliances are a good idea	98 (1462)

I would consider purchasing a water efficient appliance	97 (1452)
Water efficient appliances are necessary	92 (1370)
I look for a good water usage rating when buying appliances	91 (1355)
I think they are good if they are cost effective	90 (1350)
I purchase water efficient appliances whenever possible	86 (1290)
Water efficient appliances should be mandatory	77 (1146)
I don't know how much water they actually save	69 (1023)
I would need more information to make a purchase decision	66 (990)
Water efficient appliances cost too much	44 (655)
I don't know much about water efficient appliances	42 (630)
Water efficient appliances don't save enough water to be worth the cost	22 (328)
Water efficient appliances can be a hassle to use	19 (287)
I don't think appliances use much water anyway	17 (258)

As can be seen, there is wide support for water efficient appliances, with 98% of respondents agreeing that water efficient appliances are a good idea, 97% of respondents agreeing they would consider purchasing a water efficient appliance, and 92% of respondents agreeing that water efficient appliances are necessary. Conversely, 81% of respondents disagree that water efficient appliances can be a hassle to use. It should be noted, however, that 66% of respondents feel that they need more information about water efficient appliances, 69% of respondents do not know how much water they actually save and 42% of respondents admit not to know much about them. In comparison, Roseth's (2006) study found that only 20% of respondents indicated they did not know enough about what they can do to save water. Overall, this indicates that, while general support is expressed by Australians, many actually lack crucial information to appreciate the contribution that the use of water efficient appliances makes. Maybe even more of a concern, 44% of respondents state that water efficient appliances cost too much; this is a higher percentage than the 21% of respondents who indicated cost is a barrier to implementing water efficient appliances in Roseth's (2006) study. It is likely that this represents a major barrier to purchase.

The actual ownership of water-efficient appliances was measured in a separate question. Results are presented in Table 4.

Table 4: Ownership of water efficient appliances

Appliance	**Yes, % (frequency)**
Dual flush toilet	87 (1302)
Water efficient showerhead	82 (1225)
Water efficient washing machine	75 (1124)
Water efficient taps	74 (1109)
Hot water insulation	62 (927)
Water efficient dishwasher	58 (868)
Tap/hose timers	43 (639)

Water collection system for sink/washing machine/shower	41 (611)

Given that legislation has been introduced making ownership of a dual flush toilet mandatory, the most employed water efficient appliance is a dual flush toilet (87% of respondents have one installed). It is now virtually impossible to purchase a new toilet that does not have two flush buttons. The second most employed water efficient appliance is an efficient showerhead (82% of respondents have one installed), followed by a water efficient washing machine (75% of respondents own one), then water efficient taps (74% of respondents have one installed). Although respondents were not asked why they owned these devices, it should be noted that all of the devices which attracted agreement levels of 74% or more have been actively encouraged by public policy in some locations: water efficient showerheads and taps were provided to households at no cost and rebates were offered for water efficient washing machines. These results suggest that public policy decisions may influence the public's water conservation behaviour. This verifies the results found in Nancarrow and Syme's (1989) study which indicated 80% of respondents favoured a rebate system being introduced whereby conserving water would be financially rewarded.

Finally, respondents were asked which of six factors (identified in the qualitative study phase) would prevent them from purchasing a water efficient appliance (Table 5).

Table 5: Barriers identified to acquiring water efficient appliances

Statement	Yes, % (frequency)
If it was impractical	86 (1282)
Quality	82 (1218)
No need for a new appliance	79 (1178)
Cost	76 (1130)
If it was inconvenient	63 (937)
Aesthetics	29 (433)
I use communal appliances / don't buy my appliances currently	18 (264)

Results (Table 5) indicate that the biggest barrier was perceived impracticality (86% of respondents agreed), followed by quality (82% of respondents agreed), no need for a new appliance (79% of respondents agreed), then cost (76% of respondents agreed) and inconvenience (63% of respondents agreed). Please note that impracticality related specifically to the higher burden perceived in using the appliance, as opposed to the burden of buying and installing a new appliance. Twenty-nine percent of respondents indicated aesthetics would be a barrier.

The results from the investigation of barriers indicate that a substantial proportion of Australians perceive a range of factors prevent respondents from purchasing water efficient appliances. Of those, the perception of impracticality, inconvenience and quality can be addressed in at least two ways: (1) by improving the design of these appliances to increase quality or improve usability as desired by the market and (2) by counteracting the perception of impracticality through communication campaigns. From a public policy maker perspective actions by manufacturers cannot be directly controlled, although they could be indirectly impacted through rebates on well designed appliances. Communication campaigns are under direct control of public policy makers.

The cost issue could be addressed through rebate systems and financial incentives. For example, many states and / or councils provide rebates for water saving washing machines and rainwater tanks.

Rebates are typically paid upon proof of purchase and compliance with the rebate scheme. Rebates effectively mean that the rebated appliances are subsidized and are, consequently, significantly cheaper for people to acquire than they would otherwise be.

5. Conclusions

This study aimed to gain insight into Australians' most recent attitudes towards water conservation, their stated water conservation behaviour, attitudes towards water efficient appliances, stated ownership of water efficient appliances, and stated barriers to installing water efficient appliances. This was achieved through a two step empirical research design, including (1) an extensive qualitative phase aimed at developing a complete quantitative instrument for the survey study, and (2) a survey study with 1495 respondents representative of the Australian population.

The following key conclusions can be drawn based on the results:

(1) The results of our study were compared to previous studies relating to water conservation attitudes and behaviour. Our results indicate that many water conservation practices such as the installation of water efficient showerheads, dual flush toilets and the use of recycled water on gardens, have increased since observations conducted in the 1980s and 1990s. However there is still a high level of importance placed on water conservation, as was present in these earlier studies – no significant change observed.

(2) Australians have very favourable attitudes to both water conservation and water efficient appliances. However, these attitudes are not always translated into action. Although almost all Australians state that water conservation is important is becomes evident from the self-report of behaviours that there is still significant room for improvement. It appears that attitudes are translated into action where it is easy to do so; where water conservation does not inconvenience people. For example, people are happy to run the washing machine only when it is full, but reusing water from the washing machine, the shower, sinks, and bath is much less common.

(3) With respect to water saving appliances a similar conclusion has to be drawn: it appears that Australians are in agreement that water saving appliances are a good idea, but the proportion of actual adopters does not reflect the attitudinal enthusiasm. Less than two thirds of Australians have a water efficient dishwasher, tap or hose timers, or water collection systems for sinks, washing machines or showers. The highest adoption rates are reflective of public policy measures rather than conscious behavioural decisions made by Australians which come with a financial burden or inconvenience. Examples include the free installation of water efficient showerheads and taps and rebates offered for water saving washing machines.

(4) The main barriers to the adoption of water saving appliances are cost, perceived quality, convenience and practicality.

(5) The fact that Australians are in favour of water conservation and water efficient appliances but do not quite put their money where their mouth is presents a major opportunity for water management in Australia by highlighting that a range of solutions could be adopted simultaneously. While supply-sided measures, such as large scale water augmentation projects are required as an emergency solution, the results of this study indicate that there is still significant potential for water conservation. Australians are open to the idea, but public policy makers may need to provide people with more information to change their attitudes as well as develop incentives which will reduce the financial burden and possibly reduce the perceived inconvenience of adopting water saving alternatives in their everyday behaviours. This can be achieved through the further development of public policy measures

(e.g. financial incentives) as well as social marketing campaigns (e.g. communicating information about the quality of water saving appliances as well as demonstrating how the use of water efficient appliances can be integrated into everyday life without substantial sacrifice in convenience) to encourage the translation of pro-conservation attitudes into actual conservation behaviour. It should be noted, however, that in some instances the perceived barriers cannot be overcome so easily. For example, people who are renting properties have less opportunity to make changes related to the building, and regulations in some areas prevent rainwater tanks from being located in certain parts of a yard.

Future research would be beneficial to further explore actual behaviours. Many research studies acknowledge that attitudes towards certain behaviours do not necessarily translate into actual behaviours (Fishbein and Ajzen 1975). It would be useful to explore this in the context of water conservation behaviours. A suitable method of achieving this would be through smart meter studies, such as that conducted for Yarra Valley Water by Roberts (2005), but on a larger scale. If attitudes are found not to translate into behavioural change, it would be beneficial to explore factors that may facilitate desired behavioural change. Another area for future study is whether water conservation attitudes and behaviours are systematically related to locations which have more or less experience with water shortages. It would also be beneficial to explore community opinion regarding the role of restrictions once centralised augmentation projects (such as desalination plants) are in place. This would help inform the current debates spurred by the National Water Commission regarding the role of temporary water restrictions.

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