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Abstract

Many rural and urban areas around the world are facing challenges to the supply of water. A key method of addressing water shortage is water conservation. The success of conservation measures depends on public support and behaviour change. While it is known that the public is generally supportive of water conservation measures, little is known about the dependence of water conservation attitudes and behaviour on geographical location and the water situation at specific locations. The present study investigates whether individual attitudes to water conservation, and reported participation in water conservation behaviours, differ between two Australian locations that vary significantly in their water situation. The first location, Darwin, is an urban location with a water surplus, whereas the second location, the Mallee in north-western Victoria, is a rural environment that has experienced an extended period of drought. Results indicate that there are significant differences in attitude and participation between the two areas. Significantly more people from the water-scarce location are supportive of most water conservation behaviours, and they are significantly more likely to state that they participate in water conservation behaviours. Implications for water policy are discussed.

Keywords

influence, does, attitudes, conservation, context, water, behaviour

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Does water context influence behaviour and attitudes to water conservation?

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Does water context influence behaviour and attitudes to water conservation?

Abstract

Many rural and urban areas around the world are facing challenges to the supply of water. A key method of addressing water shortage is water conservation. The success of conservation measures depends on public support and behaviour change. While it is known that the public is generally supportive of water conservation measures, little is known about the dependence of water conservation attitudes and behaviour, on geographical location, and the specific water situation at locations. The present study investigates whether 1) individual attitudes to water conservation, and 2) reported participation in water conservation behaviours, differ between two Australian locations which vary significantly in their water situation: Darwin, an urban location with a water surplus, and The Mallee in Victoria, a rural location which has experienced an extended period of drought. Results indicate that significant differences exist. **Significantly more** people from the water scarce location are supportive of most water conservation behaviours, and **are** significantly more likely to state that they participate in water conservation behaviours. Implications for water policy are discussed.

Key words: water conservation, behaviour, attitude, Australia, The Mallee, Darwin

1. Introduction – the water context globally with a focus on Australia

Fresh water is a fundamental natural resource. It is essential to sustaining life, it supports the development of ecosystems and economies, has cultural significance, and is used as a recreational resource (Gleick 1998). As such, water must be consumed in a sustainable manner. In line with traditional concepts of sustainability, this means using the resource in a way that “*meets the needs of the present without compromising the ability of future generations to meet their own needs*” (World Commission on Environment and Development (WCED) 1987, p.8). Central to this concept is the realisation that while water is a renewable resource, it is finite – there are certain limitations on its ability to meet the needs of present and future generations (WCED 1987), particularly given demand often far exceeds need.

The fragility of natural water resources has become apparent in Australia recently with locations having been plagued by prolonged periods of drought (Pigram 2007).

Demand on water resources has reached unsustainable levels due to declining and increasingly variable rainfall patterns, population growth, urbanisation and increasing per capita water consumption (Davison 2008; Dingle 2008; Gleick 1998; Pigram 2007). Governments and policy-makers can facilitate sustainable water management practices in many ways, including supply augmentation (water recycling and desalination) and demand management practices aimed at reducing consumption. Behaviour change is a key component of water conservation policy success, as demonstrated in California (Shaw et al 1992).

Despite the serious drought in Australia, the average level of water consumption for Australian urban citizens is currently above 300 litres per day – close to three times the level of consumption from the mid-nineteenth century (Davison 2008). This is extremely high; it greatly exceeds the levels (50-60 litres per person per day) required to satisfy basic human requirements such as drinking, cooking, cleaning and washing (Crockett and Carroll 1997; Gleick 1996; Gleick 1998). Wasteful water practices have endured in Australia, where as much as 30-50% of all domestic water use can be attributed to outdoor garden watering (Pigram 2007; Smith, 1999).

Consequently, there is substantial potential for water conservation to ensure more sustainable water management with minimal impact on economic growth or individual quality of life (Pigram 2007). Dovers (2008) contends that such wasteful water use practices exist because Australians have been actively encouraged by governments to use much water. Australian urban centres are now attempting to draw water from catchments well beyond their urban boundaries in an attempt to satisfy their thirst for the resource (Crockett and Carroll 1997; Davison 2008). This is an unsustainable practice given Australia is the driest habitable continent on earth and one which is subject to frequent and prolonged periods of drought (Pigram 2007). Moreover, with urban centres increasingly taking water from rural areas, the ability of those rural areas to meet their own water needs is compromised (Pigram 2007). The situation is similar in many other countries, including China (Gunaratnam and Foerster 2000) and Mexico (Falkenmark and Lindh 1993).

The focus of this paper is on community attitudes to, and behaviours relating to water conservation. The following section of the paper provides a synopsis of prior work in

this area. This review establishes that there are gaps in current knowledge of water conservation attitudes and behaviours – specifically with regard to whether there are differences between geographic locations and their water context. Therefore, the primary research questions guiding this research were:

1. To what extent does the experience of drought influence an individual's attitudes to water conservation?
2. To what extent does the experience of drought influence an individual's water conservation behaviours?

2. Synopsis of prior work on attitudes and behaviours relating to water conservation

A significant body of work has been previously conducted relating to public attitudes to and behaviours relating to water conservation and water restrictions. An overview of research directly related to the subject of this paper is provided below. Overall there is a lack of research conducted to explore differences in water conservations and attitudes between geographical locations. This is supported by Russell and Fielding's (2010) comprehensive review of water demand management research from a psychological perspective. Their review suggests the need to further explore the interrelationships between social and psychological variables and contextual factors – which the research reported in this paper seeks to address.

Climate change and water conservation attitudes / behaviour

Randolph and Troy (2008) claim that climate change and ecological crises have had little effect on the actual consumption behaviour of individuals, households and communities. Contrarily, Clark and Finley (2006) conclude that awareness of climate change and global warming was a significant factor in a person's intention to conserve water. Their study conducted in Bulgaria found that the more aware and informed a person was about climate change, the more likely they were to implement conservation measures in their own home. Roseth's (2006) study on community views on water shortage and drought identified that climate change was the second-largest factor that respondents felt contributed to water shortages, second only to other users wasting water. This suggests that despite Randolph and Troy's (2008) assertions, the

community are connecting issues of climate change with their water behaviours. However, the study did not test the effect of knowledge about climate change on water behaviour.

Drought and water conservation behaviour / attitudes

The perception of water crises has been explored with regard to influence on consumer decisions to conserve water. Bruvold (1979) suggested that the perceived seriousness of drought was a major influence on Californian residents' decision to conserve water. [More recently, a study conducted in Taiwan by Lam \(2006\) found that the more a respondent believed that a drought would occur, the more they intended to retrofit their household water appliances.](#) In Australia, governments have used drought as their primary mandate for instituting water restrictions, legally forcing consumers to reduce their water usage (Melbourne Water 2009). These conservation measures have often been actively supported by the community, with many adhering to their enforcement (Forbes and Howe 2004). Dingle (2008) contends that these attempts at enforced demand management in various parts of the nation since the 1990s have been successful at developing user conformity when citizens perceive that there is a crisis, such as drought.

However, drought does not always force all users to change water behaviour in line with government restrictions. Through an examination of attitudes to water conservation in Sydney, Randolph and Troy (2008) discovered that nearly a quarter of respondents watered their gardens more often than permitted under water restrictions. This study did not analyse whether or not those who used water more often than allowed were utilizing recycled water or tank water to do so, which are exempt from water restrictions. The same study by Randolph and Troy (2008) also identified that nearly seventy five per cent of respondents had changed the way they used water in the home since the deployment of water restrictions. The message that the perception of a crisis influences residents in their decision to conserve water is further reinforced by Roseth's (2006) study, which discovered that ensuring the community did not run out of water was the most fundamental driver for conservation of the resource.

[Other research has investigated the role of rural locations in relation to water conservation behaviour.](#) Allon and Sofoulis (2006) found government rebates for

water-saving devices (such as dual-flush toilets and low-flow showerheads) have proven popular with the Australian community. More than two-thirds of their study sample had installed these devices, many because rebates and incentives had been offered. Allon and Sofoulis (2006) note that many participants who had been exposed to rural water supplies at some point, had instituted conservation and intuitive recycling methods in their suburban homes. The authors believe it gave them an 'imaginative capacity'.

Other factors associated with water conservation behaviour / attitudes

Using Stern (2000) as a guide, Russell and Fielding's (2010) review of water demand management research categorised determinants of water conservation behaviours into five underlying causes. Their review found there has been a large body of research which has found significant predictor variables for various water conservation behaviours and attitudes. The predictor variables for each of the five categories identified in Russell and Fielding's (2010) review include: 1) attitudinal predictors: attitudes, subjective norms and perceived behavioural control, 2) belief predictors: environmental beliefs, ecological world view, and water specific beliefs, 3) habits and routines predictors: clothes washing habits, showering habits and general water use habits, 4) personal capability predictors: various age, educational, income, occupation and knowledge groups, 5) contextual factor predictors: number of residents in households; home ownership, water pricing, and type of home.

Additionally, there has been a large body of work conducted by water authorities and government organisations that have provided more practical insights into factors which predict water conservation behaviours and attitudes (including: Aitken et al. 1993; Australian Bureau of Statistics 1985; Connelly et al. 1991; Duncan 1991; Institute for Sustainable Futures 2003; Meinck and Leathersich 2003; Metropolitan Water Authority 1985; Roberts 2005). This work includes research by the CSIRO who conducted a long term study in Perth, which aimed to gauge community attitudes to water restrictions (Nancarrow et al. 2002; Nancarrow and Syme 1989). They found that the policy of no restrictions except in times of drought had become significantly less acceptable since 1995. Additionally, they found that although always considered important, implementing acceptable restrictions policy options had become significantly more important since 1988.

In Victoria and Darwin, rebates have been offered by local councils and state governments to support the installation of rainwater tanks and water-efficient devices in the home (Pigram 2007; Power and Water Corporation 2009; Spearritt 2008). These subsidies and rebates is important given that Roseth's (2006) study identified that many people perceive that water-saving devices are too expensive. They believe that the cost impedes their ability to conserve water overall, despite their willingness to conserve.

As the above review of prior research regarding water conservation attitudes and behaviours indicates, a significant amount of research has been conducted to date. However, a key gap exists with regards to understanding whether there are differences between geographic locations and their water context. The following section of the paper details the research method employed to address this gap.

3. Study Method

3.1 Study locations

Two Australian locations were chosen for comparison of water conservation attitudes and behaviours. The Mallee was chosen as the drought-affected location, while Darwin was chosen as a location which is not affected by drought. We acknowledge that these two locations differ not only in their experience of drought, but also on many other variables including importantly, the extent of urbanity, and dominant water supply provision. Ideally, the only differential in locations would be the experience of drought. However, given the context of water in Australia, with most capital cities facing water supply limitations, it is difficult to find two such locations. A longitudinal study with one location facing periods of water surplus and drought would be ideal, but difficult to achieve. Thus we believe the comparison between these two locations provide opportunities from which to learn. The geographical and water policy context of each is described below, followed by the details of the survey conducted in January 2009.

The Mallee

The Mallee is a rural region, covering 3,925,584 hectares in the northwest of Victoria and has a population of around 61,100 people (Australian Government 2009). The majority of the region's population are located in or around the Murray River towns of Mildura and Swan Hill. The largest employment sectors are agriculture, manufacturing and hospitality. The Mallee has suffered from low rainfall for an extended period of time. Ouyen, a large town in the heart of the region, has had an average annual rainfall of 329.7 millimetres since 1913 (Bureau of Meteorology (BoM) 2009a). Below average rainfall has been recorded every year since January 1996, with the exception of 2000 and 2007 (BoM 2009a). At the time of survey, reticulated water storages were languishing at just 4.9% of capacity. Stage 4 water restrictions, the toughest enforceable, were in effect across much of the region (Water Services Association of Australia (WSAA) 2009).

Much of Mallee's water policy has been formulated by the Victorian state government. Regional water authorities implement restrictions to water use and modify them based on local and regional water supply concerns. Traditionally the Victorian government had focused on a program of building new dams to make up for the shortfalls in supply (Dingle 2008). However, it has been recognized that in rural areas building new dams for townships takes valuable water away from those who are most reliant on it for their livelihoods, such as farmers (DSE 2004).

Recently the Victorian Government's water management strategies have shifted to a broader range of initiatives such as the reuse of greywater, the treatment and recycling of wastewater, and the construction of a desalination plant. In 2002, the government released policies with the aim of developing Melbourne as a water smart city and at encouraging recycled water initiatives state-wide (Government of Victoria 2002a; Government of Victoria 2002b). In 2004 the government released its long-term state water plan (DSE 2004) the development of which was guided primarily by the prospect of Melbourne being close to reaching its water limits. Pivotal to the plan was the development of a target to reduce per capita usage of potable water (1990s levels) by 15% by 2010. To achieve this aim, the government engaged in a series of approaches including changing the pricing structure of water, educating and informing the public about wasteful water practices, offering a rebate scheme for water saving devices and encouraging the development of water smart gardens. The

government also introduced mandatory permanent water saving measures, which [came](#) into effect in March 2005 and were subject to financial penalties for non-compliance (Pigram 2007).

The state water plan also sought to pursue recycled water programs, primarily for rural irrigation and use on recreational reserves such as golf courses. Specific to the Mallee region, the plan dedicated funding to the Wimmera-Mallee pipeline, a project anticipated to deliver more water to urban and rural customers in the area (DSE 2004) while reducing environmental stress on the river system and inefficiencies in delivery. It is estimated that previously, more than 80% of the water was lost prior to delivery to customers, through evaporation and seepage from the inefficient open channel system (DSE 2009). In 2007, the plan was revised and updated, with the release of a new policy document (DSE 2007) which [advocated further water conservation measures and committed to constructing a desalination plant](#).

[In summary](#), the state government of Victoria has produced a significant number of water management policies over the past decade. These policies have focused on the state capital, Melbourne, but have also been applicable to other regions of the state. The production of these policies has coincided with the continuation of drought conditions in many parts of the state. Many of the initiatives outlined, have been highly controversial and received much community opposition ([e.g. Watershed Victoria 2008](#)).

Darwin

Darwin is the capital city of the Northern Territory and has a population of approximately 120,000 people (Australian Bureau of Statistics (ABS) 2009), and is one of the fastest growing capital cities in the country. The two biggest sectors in Darwin's economy are mining and tourism. The city is located in a tropical climate and has an average annual rainfall of 1707.4 millimetres, with much of this falling in the wet season of October to April (BoM 2009b). Darwin has recorded above average rainfall in all but three years since January 1996 (BoM 2009b). At the time of survey, water storages were at 90.6% of capacity (WSAA 2009). The city has not been subject to water restrictions, and is the only capital city in Australia to be in this situation ([Power and Water Corporation 2006](#)).

The Northern Territory's water policy context is considerably different to Victoria's. Key players in Darwin include the Darwin City Council, the [Power and Water Corporation](#) and the Northern Territory government. Official policy documents relating to Darwin's water supply are sparse. There are a few documents detailing the city's water history and future supply options, [additionally](#) there is one document advocating consumer conservation. The lack of extensive water policy may be due to Darwin's fortunate climate and water situation. The [Power and Water Corporation](#) is responsible for supplying Darwin and much of the Northern Territory with water. It produced a document in 2006 entitled *The Darwin Water Story*, which examined the historical context of Darwin's water situation, before engaging in a discussion about future supply options. It details how Darwin built dams and tanks as traditional methods to augment their water supply and help cope with a ten-fold increase in demand since 1950 ([Power and Water Corporation 2006](#)). More recently, Darwin has explored water conservation, the use of household rainwater tanks, household greywater reuse and large-scale water recycling ([Power and Water Corporation 2006](#)).

The Darwin City Council reinforces calls for alternative supply options to be considered in its *Environmental Management Plan* (DCC 2007). [The plan](#) advocates the development and implementation of a 20-year water sustainability program [to](#) increase water conservation practices, [investigate](#) supply alternatives, and [promote](#) efficient devices and appliances amongst consumers. [Despite this](#), Darwin has the highest per capita water consumption of any capital city in Australia ([Power and Water Corporation 2006](#)). This may have been the reason behind the [Power and Water Corporation's](#) recent water conservation campaign, whereby consumers were supplied with a brochure entitled *The Green Guide*. The guide ([Power and Water Corporation 2009](#)) is a non-binding advocacy document compelling consumers to institute energy and water conservation, largely for environmental purposes though the installation of water efficient devices and appliances, shorter showers, only washing when machines are full; and curbing outdoor uses of water ([Power and Water Corporation 2009](#)).

Overall most policy in Darwin discusses options, but does not assess their feasibility. This is despite recognition by the [Power and Water Corporation](#) that an increasing population and variable wet season rains may cause future water shortages. [To date](#),

water restrictions have never been imposed in Darwin (Power and Water Corporation 2006).

3.2 Survey

A survey study was conducted. A professional online survey company was used to administer the fieldwork. This online survey company maintains a large panel of respondents who are interested in participating in surveys and who allow representative samples to be drawn. The survey was made available in an online environment and panel members residing in Darwin and the Mallee were targeted and invited via email to participate in the survey. Respondents who completed the survey received a small monetary compensation for their time (in line with the online panel company's guidelines for compensation). Data was collected in January 2009. On average respondents required 39 minutes to complete the survey. An on-line survey is appropriate for this research because it provides respondents with a greater sense of anonymity in comparison to other collection methods (Babbie 2008). The final available sample sizes were 195 in Darwin (16% response rate) and 119 in the Mallee (8% response rate). These sample sizes were the maximum obtainable samples given the size of the panel membership in those two locations and the response rates achieved.

The questionnaire included (1) attitude statements about water conservation (see Table 2), asking respondents to indicate whether they agreed or disagreed, and (2) a list of water conservation behaviours (see Table 3) asking respondents to indicate (yes or no) whether they participated in those behaviours. Demographic characteristics of respondents (age, gender, education and income) were collected and reported. The Statistical Package for the Social Sciences was used to analyse the results. The Chi square test was used to compare differences between the two locations.

4. Results

Demographic characteristics (detailed in Table 1) were comparable between locations: 76% of Mallee respondents were female, compared to 72% from Darwin; the main age category was 35-44 years of age, with 24% of Mallee respondents falling into this category compared to 25% from Darwin. The vast majority of

respondents from both locations had not undertaken any higher education, with only 35% of those in Darwin and 24% of those in the Mallee possessing a Bachelor's degree or higher.

Table 1: Demographic Characteristics of Respondents

| | | The Mallee (%) | Darwin (%) |
|-----------------------|------------|----------------|------------|
| Number of Respondents | | 119 | 195 |
| Response Rate | | 8 | 16 |
| Age | 18-24 | 12 | 10 |
| | 25-34 | 19 | 20 |
| | 35-44 | 24 | 25 |
| | 45-54 | 20 | 21 |
| | 55-64 | 18 | 19 |
| | 65-99 | 7 | 5 |
| Gender | Male | 24 | 28 |
| | Female | 76 | 72 |
| Education | Tertiary | 24 | 35 |
| | < Tertiary | 76 | 65 |

4.1 Water Conservation Attitudes

Table 2 shows participant agreement levels with water related statements for each location, highlighting significant differences. The majority of respondents from both locations indicated positive attitudes about water conservation, understood that it was necessary because of water scarcity and stated that they conserved water regardless of inconvenience, additional expenses or time taken. Fewer respondents stated they would conserve water if it involved additional expense, than if it inconvenienced them or took additional time.

Table 2: Individual Attitudes to Water Conservation – The Mallee versus Darwin

| Attitude Statement | The Mallee Agree (%) | Darwin Agree (%) |
|---|----------------------|------------------|
| I am very positive about water conservation | 90 | 85 |
| Water conservation is necessary because of water scarcity | 94 | 90 |
| Water conservation isn't my responsibility | 7 | 7 |
| I am not concerned at all with water conservation*** | 6 | 19 |
| More attention to water conservation is needed | 91 | 91 |
| I advocate water conservation among my friends and family | 72 | 62 |
| Water shortage issues don't affect me*** | 8 | 51 |
| I conserve water wherever I can** | 94 | 85 |
| I feel no pressure to conserve water at the moment*** | 13 | 52 |
| I only conserve water if water conservation does not inconvenience me | 17 | 22 |
| I only conserve water if water conservation does not cause additional expenses for me | 34 | 33 |
| I only conserve water if water conservation does not take more time | 16 | 23 |
| The need for water conservation depends on location*** | 46 | 75 |
| I have experienced limited water supply before*** | 87 | 58 |
| It is a challenge to convince others to conserve water | 85 | 84 |

| | | |
|---|----|----|
| I could make more effort to conserve water** | 72 | 86 |
| Water conservation is important | 96 | 96 |
| Water conservation ALONE can save Australia's water problem | 17 | 20 |

* = significant at the 0.05 level, ** = significant at the 0.01 level, *** = significant at the 0.001 level

Interestingly the same proportion of respondents from both locations agreed that water conservation is their responsibility; that more attention to water conservation is needed and that water conservation is important. There was a statistically significant difference in agreement between locations for seven of the eighteen attitudinal statements. **Significantly more Mallee respondents: perceived** pressure to conserve water; **perceived** that the water shortage does not affect them; disagreed that they are not at all concerned with water conservation; agreed that they conserve water wherever they can; and **indicated** that they have experienced limited water supply before. Significantly more Darwin respondents agreed that they could make more effort to conserve water, and that water conservation depends on location. Overall it appears differences between locations related predominantly to the impact of drought and location.

4.2 Water conservation behaviours

The results regarding self-reported **water** conservation behaviours are presented in Table 3 indicating significant differences between locations. The majority of respondents in both locations indicate they conserve water in a number of ways including: making sure taps do not drip; have a dual flush toilet; only use the washing machine when it is full; and use minimal water for cleaning.

There were significant differences between locations for 16 of the 23 stated behaviours. Significantly, more Mallee respondents stated **they** conserve water. The only anomaly was that more Darwin respondents have a dual flush toilet. This could be explained by the higher average age of dwellings in The Mallee area. **It could also be explained by the Power and Water Corporation's recent water conservation campaign for Darwin, the likes of which a large proportion of Mallee participants would not be subject to given they are not on reticulated water supplies. Additionally, in a focus group session held in Darwin prior to this phase of the research, participants discussed the fact that there are constant articles in the Darwin media about the drought in the country's south east, and that they are conscious of their fortunate**

water situation. They are also discussed the fact that they are reminded of the drought from family and friends who are living in other cities in the country. These social factors could be strong influences on conservation behaviour.

Table 3: Individual Water Conservation Behaviours – The Mallee versus Darwin

| Behaviours | Mallee Yes (%) | Darwin Yes (%) |
|---|----------------|----------------|
| I have a rain water tank*** | 43 | 7 |
| I collect water from shower /sink/bath for use elsewhere*** | 72 | 21 |
| I take shorter showers* | 87 | 77 |
| I make sure that taps do not drip | 98 | 99 |
| I strictly adhere to water restrictions** | 85 | 72 |
| I collect water when it rains (not in a tank)*** | 49 | 31 |
| I use a water efficient dishwasher | 53 | 54 |
| I use a water efficient/front loading washing machine | 38 | 43 |
| I have a dual flush toilet* | 86 | 93 |
| I rarely water the garden** | 76 | 63 |
| I have a drought-tolerant / low water consumption garden*** | 80 | 55 |
| I recycle greywater from the washing machine for outdoor use*** | 86 | 29 |
| I recycle greywater from the shower for outdoor use*** | 77 | 22 |
| I minimize toilet flushing where possible | 83 | 76 |
| I use water efficient showerheads* | 81 | 70 |
| I use water efficient taps | 73 | 65 |
| I only use the washing machine when it is full* | 90 | 82 |
| I only use the dishwasher when it is full | 77 | 69 |
| I hand wash clothes | 25 | 17 |
| I do not wash my car with water*** | 62 | 28 |
| I use minimal water for cleaning** | 92 | 81 |
| I do not hose my driveway*** | 91 | 68 |
| I do not conserve any water*** | 3 | 21 |

* = significant at the 0.05 level, ** = significant at the 0.01 level, *** = significant at the 0.001 level

There were no significant differences between locations with regards to use of a water efficient dishwasher and washing machine; using water efficient taps; making sure that taps do not drip; only using the dishwasher when full; hand washing clothes and minimising toilet flushing. These behaviours were less time intensive than those behaviours with a significant difference between locations such as recycling greywater from the shower for outdoor use, collecting water when it rains (other than a rain water tank). However some of the significant differences could be attributed to the fact that a higher proportion of houses in the Mallee are connected to a septic tank than Darwin. Septic systems automatically dispose of water to land on the property, indirectly reusing the water for garden watering. However information on septic tank ownership was not collected, thus was not empirically tested.

5. Discussion and conclusions

The aim of this study was to investigate whether residents of locations faced with different water situations, specifically the extent of water scarcity, differ in their attitudes towards water conservation and their water conservation behaviour.

Residents of an urban area which does not face water scarcity (Darwin) and a rural area which has faced serious drought conditions in the recent past (The Mallee) were surveyed.

Results indicate that, although everyone agrees that water conservation is important and their responsibility, respondents from the two locations differ significantly in water conservation attitudes and behaviours. More respondents from the drought-prone region feel that water shortages affect them, are concerned about water conservation, conserve water wherever they can, and have had experience with limited water supply before. More Mallee respondents state they engage in most water conservation activities. **Consequently**, it can be concluded that differences in water conservation attitudes and behaviours do exist **depending on** the water situation at the location of residence. These results are in line with previous findings **of** Bruvold (1979) that Californians' decision to conserve water was influenced strongly by their perception of the seriousness of a drought. **These results also** provide empirical evidence for the conclusion by Roseth (2006) that conservation behaviour is driven by the motivation of communities not to run out of water.

The findings of this study have major practical implications for policy makers **who are in charge of securing Australia's future water needs with minimal negative environmental impacts. While water augmentation (which can come at a significant cost to the environment) may be unavoidable in the future, measures to decrease demand should not be neglected. Results from this study show that people who have personally experienced water shortages are much more willing to change their everyday behaviours to conserve water. This is a finding that can be directly translated into communication messages that could be used in contexts in which the drought is not so tangible to people. This includes not only areas such as Darwin, but also the growing metropolitan areas of Australia. Communication messages that are likely to be successful will attempt to put the viewer in the position of imagining what it would mean to have no water and then follow up with a recommendation of how**

their behaviour can make a difference to their lives, their children's lives and the whole of Australia.

Another key finding was the heavy adoption of water saving technologies which are subsidized by the government. The policy implication that can be derived from this is that financial incentives do work and are an effective public policy measure to increase the adoption of water saving devices, both in areas that have experienced a drought and in those that have not.

This study has a number of limitations: the sample size is small and, while comparable between the two locations, it is not representative of the local populations. These limitations could be overcome in a larger-scale study in future. Given significant rainfalls leading to flood events, have been experienced in many parts of Australia's south-east in the summer of 2010/2011, there is an opportunity to survey how attitudes may have changed now the drought period has eased. This would allow us to verify the results reported in this study and to exclude the possibility that other factors may be influencing the findings (such as extent of urbanity or dominant water supply provision). It would also be interesting for future studies to include more details about people's water supply, such as sewer connections and use of septic tanks in order to be able to understand in even more detail possible reasons for attitudinal and behavioural changes.

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