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Attitudes to conservation and water consumption

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ARTICLE INFO

Published on line 7 May 2008

Keywords:

Attitudes
Behaviour
Pricing
Domestic
Water

ABSTRACT

Sydney's water supply is under great pressure as the demand continues to rise. Demand mitigation strategies have had some success, but domestic consumption remains high. This paper discusses the attitudes of households to their water consumption in a search for ways in which domestic demand for water may be reduced. Evidence on attitudes of households in different kinds of housing was obtained using a telephone interview survey supplemented by information derived from focus groups drawn from households in the same areas. The information was collected in a period when strong water use restrictions were in place and major arguments were being mounted in favour of water pricing as a way of moderating demand. The paper argues that the complexity of the forces shaping demand needs to be understood in the context of the socio-demographic composition of households in different kinds of dwellings, as well as the cultural, behavioural and institutional aspects of consumption, if public policy is to be successful in reducing consumption and/or providing alternative domestic supplies of potable water.

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1. Introduction

With Sydney having undergone its third hottest summer on record in 2005/2006 (Sydney Morning Herald, May 23, 2006) and drought condition across much of NSW which only broke in late 2007, pressure remains high on finding a solution to Sydney's water supply problems. A substantial literature has been generated both in the industry and in the media on how this issue can be best tackled. There is no shortage of proposed technological 'fixes' for this 'problem': by increasing supply at the macro-scale through major desalination plants, constructing more dams, tapping underground water supplies, recycling industrial wastewater, and at the micro or domestic scale by installing water tanks, recycling household 'grey' water, and other domestic adaptations. There is also a plethora of initiatives to reduce consumption by using water efficient fittings within the home and by encouraging changes in garden practices. Some of these are now enshrined in the BASIX framework in NSW introduced in 2005 (NSW

Department of Planning, 2007), under which new and renovated dwellings are required to comply to higher levels of water conservation standards through the installation of, for example, dual flush toilets, low flow shower heads, rain water tanks and low water consumption gardens, to reduce household water consumption.

More generally, there is increasing public concern over the ecological sustainability of Australian cities (Commonwealth of Australia, 2005). Part of this concern is reflected in increasing attention being paid to issues of global climate change and to the way water and energy resources are exploited. Much debate on these issues is focused on aggregate measures of energy and water consumption and of the technical or economic aspects of maintaining supply of these resources. While this is a useful level of debate when trying to negotiate international agreements or develop urban planning interventions, it has little purchase on the consumption behaviour of individuals and households that are the prime sources of the stresses we create in the natural systems on

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doi:10.1016/j.envsci.2008.03.003

which our cities depend (Head et al., 2005; Head and Muir, 2006; Hurliman, 2006).

The suburbanisation of Australian cities carried with it the seeds of the present crisis in urban water consumption. The paradise offered by suburbanisation was in large measure the attraction of a verdant environment in which houses were set among trees, shrubs, flower and vegetable beds, all of which were made possible by assured water supplies to sustain plants during long dry summers. The gardens in which houses were located were at once aesthetically pleasing, a source of food, an expression of status, a source of recreation and a secure place for children to grow and experience contact with nature (Troy, 1991). They offered an image of relaxation in beauty and flexibility in adapting to the varying demands of households. They were also the sites for accommodation of the trophies and possessions of the consumerist society. Later they became important as sites for entertainment. As early as 1941 Robert Menzies, later to become Prime Minister for 17 years until his retirement in 1966, recognised the importance of the house with its garden as a powerful force shaping households' ambitions and aspirations when he spoke of the desire of people to own their own home (Brett, 2007). Gaynor reminds us of the fundamental nature of these ambitions when she writes of the garden as an expression of a household's desire for 'independence' but goes further when she illustrates the significance of household garden production (Gaynor, 2006). The 'garden city' idea that was powerfully influential in town planning policies and practice in Australian cities reinforced these notions (Freestone, 2000). Reduction in garden watering affects the utility of gardens to provide for the activities and meet the desires of households and could undermine the garden city ideal central to urban planning for much of the last century.

Mullins (1981a, 1981b, 1996) was one of the earliest to demonstrate the importance of domestic production and consumption in development of the high standard of living enjoyed by Australians. Although he did not explore the connection in depth, it is clear that water consumption was important in maintaining high levels of domestic production. Other research has focussed on social distinction and conformity to explain apparently high levels of water consumption on household gardens (Askew and Mcguirk, 2004) and on the importance of gardens as places where people engage with nature (Head et al., 2005; Head and Muir, 2006), but gives no indication of the effects of household size on comparative consumption.

Other writers have also noted socio-demographic, behavioural, institutional, and cultural factors that appear to influence the propensity to maintain gardens and thereby affect water consumption (Duruz, 1994; Holmes, 1999; Hitchings, 2003; Johnson, 1994; Allon and Sofoulis, 2006; Sofoulis, 2005). These socio-demographic considerations supplement exploration of economic factors such as income and physical factors such as temperature and rainfall that have been used to 'explain' the levels of water consumption (Aitken et al., 1991; Bell, 1972; Dandy, 1987; Eardley et al., 2005; Espey et al., 1997; Turner et al., 2005; White et al., 2003). The difficulties and limitations of educational campaigns and the dissemination of knowledge in changing behaviour (Sofoulis, 2005; Barr, 2003), together with the impact of consumerism on water

consumption through the daily routines and perceptions of entitlement, also point to the complexity of factors that affect water consumption (Trentmann and Taylor, 2006). A limitation of socio-demographic studies is that they tend to use estimated National or State averages of garden water consumption which have the effect of obscuring important elements of the assumptions underlying this approach. The socio-demographic approaches have also ignored the impact that different forms of housing may have on the propensities of households to use water, and the effect different forms of housing may have on their attitudes and perceptions of water use. This issue is becoming more important as Australian cities are transformed through the impact of compact cities policies and development pressures (Bunker et al., 2005).

Moreover, there is no simple 'read-off' between expressed opinions on the environmental matters and actual conservation behaviour (Hamilton, 1985). Ungar (1994) contends that the environment is a domain in which attitudes do not predict behaviours very well. Sofoulis (2005) (and others, e.g. Shove, 2003) goes beyond the limitations of polling identified by Ungar to point out that consumption is directly influenced by socio-technical considerations which may not change quickly or evenly. Residents may not be able to change their behaviour rapidly because of the rigidities or path dependencies created by the water supply and waste disposal systems they have available to them. These path dependencies are often reinforced by the institutional structures (and cultures established in them) created to provide the services.

We take this position further by arguing that the type of housing consumers live in, specifically the density of the dwelling form (high rise or low rise), the tenure of those dwellings (rental or owned) and the water using facilities they provide, together with their life style position and profile, will greatly impact on an individual household's capacity to respond to water saving and this in turn will be reflected in general attitudes and behaviour to water conservation. This is a result of physical and technical aspects of housing form and ownership, as well as the socio-demographic profile of households in different forms of housing.

1.1. Background to this study

The research reported here follows earlier studies including a pilot study of water and energy consumption in Adelaide (Troy and Holloway, 2004; Troy et al., 2003) and research on the spatial water consumption profile of the Sydney metropolitan area (Troy et al., 2005). The latter study constructed an 'account' of local water consumption patterns from a stratified sample of 29,000 residential addresses in Sydney using Sydney Water consumer records, thereby providing a profile of water consumption for households and individuals in different kinds of dwellings throughout the Sydney metropolitan area.

This paper extends the research on Sydney's water consumption patterns through an exploration of the impact that socio-economic, attitudinal and behavioural factors may have on water consumption across urban areas. It is generally held that reduced water consumption is likely to reduce the environmental stress generated by urban areas, particularly in terms of impacts on water catchments, wastewater and sewage outputs. Little research has been conducted to understand how

different types of built form contribute to these environmental impacts, what the contribution of social and behavioural factors on these impacts are, and how they play out across the city.

Despite sustainability becoming a central concern of urban planning in recent years, few estimates have been made of the per capita use of water or energy by dwelling type and policy is often shaped on the notion that broad brush economic, technical or regulatory measures will be effective in reducing average consumption. The objective of this research is to explore the way water consumption is shaped by the behaviour, attitudes and facilities used by different kinds of households in different types of dwellings in Sydney and to their perceptions of their water use and attitudes to conservation measures. The research is an attempt to understand some of the behavioural aspects of water consumption in Sydney during a period when Level 2 (Sydney Water, 2007) water restrictions were in place, which, together with price rises, have become the principle methods to reduce water consumption. The implications these have for environmental planners and service providers in future decision-making to achieve more sustainable urban outcomes are discussed.

We use here a simple definition of 'behaviour' to mean the actions reported by people in response to direct questions to them about the way they consume water. It will be clear from the text when the 'behaviour' refers to some future intended action(s) and where we include comment on the reliability of their response. Our definition of 'attitudes' refers to the responses of people when invited to assess the efficacy or perceptions of the behaviour of others or when they are invited to express a view about their own behaviour. This definition is somewhat less general or technical than that found in Eagly and Chaiken (1998), but it implicitly acknowledges the point made by them in discussing Stern et al. (1995) research that '...people derive their attitudes on specific environmental issues from their general values and internalized norms...' (Eagly and Chaiken, 1998)(Eagly and Chaiken, 1998:284). Stern's later work (2000:422) acknowledges the difficulty and complexity in understanding environmentally significant behaviour, but does point out that the attitudinal causes of such behaviour 'have the greatest predictive value for behaviours that are not strongly constrained by context or personal capabilities'.

The research here improves the understanding of service providers and environmental planners of the roles the built environment and consumer attitudes and behaviour play in determining water consumption. This includes the kinds of changes in pricing, regulation or availability of services that may be needed to encourage reduced water consumption by individuals living in different types of dwellings, differences in tenure and in different kinds of households. It is important in reviewing this study to understand that the attitudes reported are those of Sydney residents. Attitudes and behaviour in other cities will be conditioned by their prevailing culture, social behaviour, system technology and local climate patterns.

2. Method

The data for the research was obtained through a random quota telephone survey of 2179 addresses in a random

stratified sample of 140 Census Collectors' Districts (CDs) used for the earlier research by the authors on water consumption in Sydney reported above (Troy et al., 2005). Fig. 1 maps their location. The survey was conducted between December 2004 and April 2005 by the national market research company, AC Nielsen. The 140 CDs were stratified into four categories each of 35 CDs comprising areas of separate houses, areas of predominately semi-detached dwellings, areas of predominately flats in a block of less than 4 storeys and areas of predominately flats in a block of 4 or more storeys. Target quotas of 500 responses per dwelling type were set, but the difficulties of obtaining responses from flats meant the final quotas were skewed towards houses (for a full account of the survey and focus group research see Troy and Randolph, 2006). The resulting data have been weighted to reflect the distribution of dwelling types and dwelling tenure in Sydney as a whole. The results therefore may be viewed as a reflection of attitudes of households across Sydney.

Additional information was obtained through a series of six targeted focus groups conducted in April and May 2005 by SMS Research that explored the behavioural aspects of water consumption among key types of households, defined by dwelling type and household/life stage type. The groups were asked about awareness of conservation programs and policies, attitudes to more sustainable consumption practices and attitudes to pricing strategies and the kinds of measures that could be employed to encourage households to reduce water consumption.

As noted above, the fieldwork was undertaken in a period when Level 2 water restrictions were in force. Water was a major news item and strongly debated in the Sydney media. Water conservation had also been the focus of a strong advertising campaign by Sydney Water in the period preceding the research. Respondents were expected to reveal a heightened awareness of the issues involved and might also be expected to report behaviour towards water use reflecting that concern.

3. The socio-demographic profile of water users in Sydney

A key starting point for the analysis was the socio-demographic differences between the occupants of the four main dwelling types identified in the study. These differences were most prominently expressed in terms of household size. Overall, two in five (19%) households were lone persons, a third (33%) comprised two people and three in ten had four or more people in the household (Table 1). But there was a substantial difference between dwelling types in terms of their household size. While 40% of households in separate houses had four or more persons, the proportion fell to 9% for those in flats. Households in flats were most likely to have only one person (39% of low rise flats and 32% of high rise flats). On average, households contained 2.59 persons, ranging from 2.86 persons for households in separate houses to 2.37 persons for those in semis and 1.97 persons for those in flats.

Overall, then, respondents living in houses had significantly larger households. But they were also older on average and were also likely to have higher household incomes than other

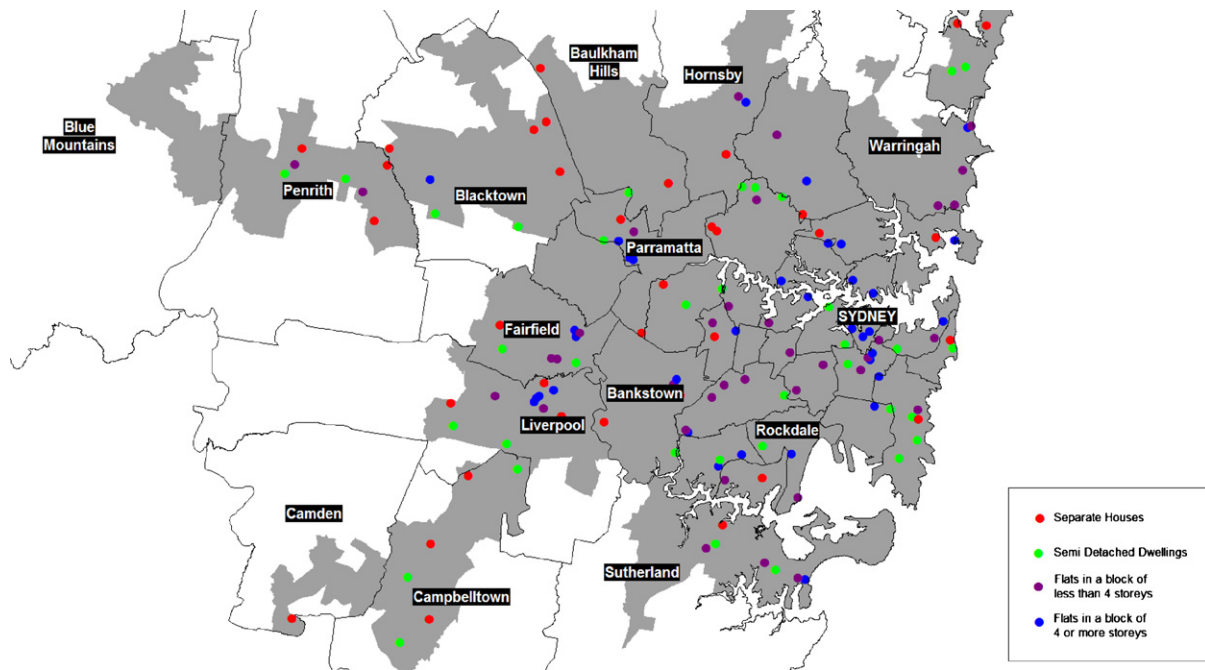


Fig. 1 – Distribution of sampled Census Collectors' Districts (CDs) in the Sydney metropolitan area.

households. They were more likely not to be in the labour force (i.e. at home or retired) but they had the lowest unemployment rate for those in the labour force. They were the least mobile and also much more likely to be home owners or buyers.

Those in *low-rise flats* were the most likely to be working but were also the most likely to be unemployed and to have lower incomes than households in other dwelling types. They included the largest proportion of single person households, which helps to explain their lower household income levels. They were generally younger than respondents in houses or semis, but compared with those in high-rise flats, the proportion aged 35–55 was significantly larger.

Respondents in *high-rise flats* were the youngest group but had relatively higher incomes, especially compared with those in low-rise flats. At the same time, the proportion over 55 years was higher than those in low-rise flats. These findings indicate both a large youthful market but also an older 'empty nester' and higher income market in the high-rise sector. They were also the most mobile, with 61% having moved into their current home within 2 years of the survey. The profile of respondents living in *semi-detached* housing lay somewhere between those in houses and those in flats, suggesting a more diverse sector.

Most significantly, the tenure profile of the four groups varied considerably. While 80% of respondents in houses owned their homes or were buying them on a mortgage, only 38% of flat dwellers were owner occupiers. In contrast, while 17% of house dwellers rented, well over half (61%) of flat dwellers did. As we argue below, these housing tenure differences are significant factors in explaining the different attitudes and perceptions of our sampled respondents, in large part because they reflect very different levels of control over the provision and use of, and payment for, water services between owners and renters. This factor is highly correlated

with the characteristics of residents, with renters highly associated with flats, which in turn was associated with high mobility levels (17% of respondents in houses had moved in the previous 3 years compared with 44% for those in semi-detached houses and to 55% for all flats), lower incomes and a more youthful population compared with those in houses and semis.

One of the main reasons for differences in the perceptions and attitudes of households between respondents in the four dwelling types we discuss below is clearly the different tenure and socio-demographic composition of occupants of these dwelling types. We would argue that this 'compositional' effect is critical in understanding the variations in responses we discuss at length in the rest of the paper.

Flat dwellers and many of those in semi-detached housing live in strata developments, where multiple individually owned flats (or 'lots') share a single property 'title' (which encompasses the entire apartment block). In Australia, water bills are usually sent to the owner of the property to which the title refers which, in the case of strata developments, is the owners' corporation (made up of all individual lot owners, who jointly own the block). The overall water usage bill for the block is then apportioned *pro rata* to individual owners usually in relation to the size of the apartment, irrespective of their actual usage. Most individual flat owners therefore have no way of knowing or estimating how much water they use each quarter, as their actual consumption is not shown on their quarterly strata levy. Similarly, renters, especially for those in strata title property, have little understanding of how much water they use or how much it costs. Moreover, renters have little control over the provision of water using facilities they use, such as water efficient washing machines and other water saving fittings, while under the current tax and subsidy systems, landlords have absolutely no incentive to provide them.

Table 1 – Socio-demographic profiles of dwelling types

	Separate houses	Semis	All flats	Low rise flats	High rise flats	Total
Household size						
1	13%	20%	36%	39%	32%	19%
2	29%	40%	40%	38%	46%	33%
3	18%	21%	14%	15%	13%	17%
4 plus	40%	18%	9%	9%	9%	30%
Average size	2.86	2.37	1.97	**	**	2.59
Age of respondent						
18–34	18%	32%	41%	41%	45%	25%
35–54	44%	38%	32%	35%	24%	41%
Over 55	37%	39%	26%	24%	29%	34%
Employment status of respondent						
Employed full-time	46%	50%	56%	58%	54%	49%
Employed part-time	16%	17%	12%	12%	11%	15%
Unemployed	4%	5%	7%	8%	6%	5%
Not in labour force	29%	22%	21%	19%	24%	26%
Other	4%	6%	4%	3%	4%	4%
Household income						
Up to \$31,200	18%	27%	24%	25%	22%	20%
\$31,201–\$52,000	17%	16%	22%	24%	17%	17%
\$52,001–\$78,000	16%	13%	15%	15%	16%	15%
\$78,001–\$104,000	12%	19%	15%	16%	14%	14%
More than \$104,001	20%	16%	13%	11%	17%	18%
Housing tenure						
Owned outright	49%	35%	25%	22%	26%	42%
Buyer	31%	23%	13%	14%	11%	25%
Private renter	12%	36%	55%	57%	54%	25%
Public renter	5%	5%	6%	5%	9%	5%
Other/do not know	3%	2%	1%	2%	0%	2%
Year respondent moved in						
2004–2005	6%	20%	26%	23%	32%	13%
2002–2003	11%	24%	29%	29%	29%	17%
2001–2002	16%	15%	14%	16%	11%	15%
1996–1999	14%	12%	11%	12%	10%	13%
Pre-1996	51%	28%	20%	21%	18%	41%
Base (100%)	1395	248	536	334	185	2179

4. Water use inside and outside the home

The ability to use water is also highly dependent on the range of water using amenities available to a household, regardless of its size and socio-economic profile. The second starting point of the study was therefore to profile the differences in the access to the range of domestic water consuming facilities people have and how they use them, particularly in terms of the frequency of use. Again, there were some clear differences between the four dwelling categories for both water use inside as well as outside the home that help to explain the differences in attitude and behaviour towards water use revealed in the survey.

5. Water use inside the home

Virtually all houses had a shower, laundry, kitchen sink, basin, bath, washing machine (98%), and a substantial proportion had additional facilities such as dish washers (49%), multiple showers (43%) and wash basins (42%). Flats had, on average, lower levels of space and amenity compared with houses

which meant that they had fewer multiple bathrooms, toilets and separate laundries. Low-rise flats, which tend to be older and of poorer quality, have the lowest standards of all the dwelling types (Table 2).

While dwellings had a wide range of water using facilities and equipment, respondents also reported a wide range of water using behaviours. Those washing dishes by hand in a sink may have very different washing methods, making the control of water use highly dependent on the individual's approach to dish washing. These differences become very important, especially when attempting to encourage households to reduce water use within the home.

Those living in houses generally have a greater opportunity to use water, including external use on gardens and lawn areas and multiple toilets and/or bathrooms. Despite having more opportunities to use water, as we noted above, on an average per capita basis, residents in houses in Sydney do not use significantly more water than those living in flats (Troy et al., 2005). Nevertheless, the perception among focus group participants was that people in flats did not use much water as those in houses:

Table 2 – Water using facilities by dwelling type

	Separate houses	Semis	All flats	Low rise flats	High rise flats	Total
Showers (%)						
0	0	1	1	1	1	1
1	46	62	79	86	67	56
2 or more	54	37	20	13	32	43
Baths (%)						
0	11	12	13	11	16	12
1	79	85	84	86	82	81
2 or more	10	3	3	3	2	7
Kitchen sink (%)						
0	0	1	0	0	0	0
1	64	64	75	77	70	67
2 or more	36	35	25	23	29	33
Washing basin (%)						
0	3	7	7	6	7	5
1	47	50	72	79	61	54
2 or more	50	43	21	15	32	42
Laundry sink (%)						
0	2	5	16	17	15	6
1	90	93	82	82	84	88
2 or more	8	2	2	2	1	6
Dual flush toilets (%)	64	55	49	46	54	51
Indoor Spa bath (%)	12	6	5	2	7	9
Outdoor spa bath (%)	5	5	2	0	6	4
Swimming pool (%)	24	9	14	5	29	20
Dishwasher (%)	57	41	31	20	51	49
Front load wash/machine (%)	13	25	19	16	23	16
Top load wash/machine (%)	87	75	74	76	71	82
Base (100%)	1395	248	536	334	185	2179

“I don’t think that units can waste that much” (Group 6)

It was acknowledged, however, that within blocks of flats there were likely to be heavy and light users, but the heavy users were not identifiable:

“It’s hard to pin down the identity of high users in blocks of units” (Group 6)

Both the use of water saving devices and *adoption* of water use practices in the home were highly variable. While half of those surveyed said they had at least one water efficient shower head, only a third reported having reducer fittings on taps in the kitchen or bathroom and few have them fitted in the laundry. Flats generally reported having fewer of these kinds of fittings than other kinds of property.

While one in ten respondents said they never washed dishes by hand, a third washed by hand daily. Rinsing of dishes while washing them was common, with three quarters either rinsing before, during or after washing their dishes, although a clear majority rinsed in a plugged sink rather than under running water. Flat dwellers were twice as likely to rinse under running water, which may reflect the fact that they wash fewer items compared with larger households in houses.

A perhaps surprising finding is that one in ten of those who had a dishwasher (about half those sampled) say they never use it, a figure that increases to a quarter among high-rise flat dwellers. This finding may reflect the view held by focus group participants that there was an increased propensity among

flat dwellers to eat out or to eat take-away meals at home which in turn meant there was reduced water consumption in food preparation, cooking and cleaning. More positively, two-third of dishwasher users used economy settings, although it is not clear if this was all the time.

Turning to clothes washing, the survey found that on average, a Sydney household washed clothes around four times a week. Nearly all used their own washing machine while a quarter also washed by hand. Very few used laundromats or shared laundries and virtually all those who did lived in flats. In considering reducing washing frequency, some focus group participants with children acknowledged that although not all the children’s clothes they washed were actually dirty, it was easier to wash all the clothes worn at least once rather than separate the dirty from the clean. This may be regarded as an example of behaviour being shaped by the convenience of modern washing machine operations (as well as to attitudes to dirt) in the same way Hand et al. (2003) write about showering.

6. Water use outside the home

6.1. Gardens

The nature of the prevailing water restrictions in Sydney implied that reduced external water use was to be expected. While there appears to be a major potential for water conservation with respect to garden use, given the high proportion of respondents who have gardens, when asked how

frequently respondents with garden beds (excluding lawns) watered them, 25% said they did so 3–4 times a week or more frequently, in breach of the permitted levels. However, we did not determine whether this was by using recycled water (such as dish washing water). A further 37% watered once or twice a week, broadly in line with permitted watering under the water restrictions. About one in ten (11%) watered their garden beds fortnightly, but a quarter (24%) said they never watered their gardens. The latter proportion increased for flats, where 36% said the gardens around their building were never watered.

When asked whether they had changed their garden watering practices during the previous year to reduce watering, 56% of respondents with gardens said they had not. Savings from reduced garden watering therefore appear to have been generated by less than half of all garden owners. At the other extreme 4% admitted they watered their gardens beds daily, despite the restrictions. There appears to be a small hard core among the heaviest garden waterers who remain impervious to the call to reduce their consumption.

6.2. Lawns

Of those who lived in a property with a lawn for which they had responsibility, 72% said they never watered it, 7% watered fortnightly, 15% watered it once or twice a week (approximately the maximum permitted under water restrictions), while another 6% watered it more often than that.

Had the restrictions made a difference to these proportions? Just under a half (47%) of all respondents with a lawn said they had not reduced watering in the previous year. However, half (51%) of those who said they now never watered the lawn also said they reduced watering in the previous year. So it is possible that as many as half those who said they never water their lawn may have stopped this practice in the period the restrictions had come in. For frequent lawn waterers, old habits die hard. Only a third of those who watered their lawn 3–4 times a week or more frequently also said they had reduced watering in the previous year.

Water restrictions therefore appeared to have had more impact on lawn watering than for general watering of garden beds, but the difference was not huge. The survey revealed both a continued use of more frequent garden watering by a small minority, with a more general reduction of use among the many. The proportion who never watered their garden and who had not changed watering practices in the year before the survey was substantial: perhaps between a quarter and a third of those with gardens. Water restrictions therefore had little significance for them.

6.3. Swimming pools

Despite the maximum usage of pools being in the summer months, only a minority of those with pools (12%) regularly used a pool cover to reduce evaporation, the major source of water loss from pools in hot weather.

6.4. Car washing

Finally, car washing has also been thought of as a major domestic use of water. Car washing at home was restricted at

the time of the survey to washing using a bucket. Half of those with a car said they never washed it at home and almost two in five said they never or rarely washed their car at all and 18% said they only did so every 6 months or less. At the other extreme 6% washed their vehicle weekly, while a further 10% washed every fortnight. The frequency of washing second or subsequent vehicle was lower. At best, car washing restrictions had directly impacted on only half of all car owners. The most frequent car washers were the least likely to have changed their car washing habits in the previous year during which car washing restrictions had been introduced. Flat dwellers were most likely to externalise water use for car washing as only a minority washed their cars at home, most probably because there was nowhere for them to do so.

7. Behavioural responses to water conservation

So how do the interrelated socio-demographic, dwelling amenity and tenure 'compositional' effects relate to attitudes and behaviour towards water consumption and conservation? The following section summarises the main findings with respect to attitudes to and behavioural aspects of water conservation in the home. The main concern is to explore differences in responses between respondents living in different dwelling types. The compositional factors that might drive these differences are discussed where they appeared to be significant.

8. Attitudes to water usage, pricing and water saving in the home

A key element of the survey was to explore the awareness of the use of water. If water users are unaware of the amount of water they are using, pricing controls may well be meaningless. Attitudes toward current and alternative pricing approaches were also the focus of a number of questions. The aim was to find out how much support there was for differential pricing and other conservation methods, including the restrictions prevailing at the time of the survey.

One in five (19%) of all respondents said they knew how much water they used in a quarter. Despite the low level of awareness of actual water uses, most thought they used about average or below average amounts of water, compared with other water users like themselves in Sydney. Two in five thought they used around average amounts of water compared with similar households, while half thought they used below average. Only 7% thought they were above average users, while 7% did not know. Most respondents believed they used average or below average amounts of water, clearly a statistical improbability!

Part of the reason why few knew how much water they used is the fact that the high proportion of fixed fees (for mains infrastructure, sewage disposal, etc.) in quarterly water accounts masks the cost of water actually consumed and tends to reduce the relative significance of variation in seasonal consumption. The fixed fees are as much as half the total bill for the average consumer and may exceed the

water charge for low water users. Participants of the focus groups confirmed this point. Even among participants who owned their dwelling and who brought their water bills to the session, few had any idea of their total consumption, let alone how it was constituted.

“I have no concept of what (*appliance*) uses how much” (Group 3).

Among apartment dwellers, the common practice of allocating water bills between owners on the basis of apartment size regardless of actual usage was not felt to be fair and seen as a disincentive to saving water.

“We all have to pay if one person is wasting water” (Group 1).

Participants clearly thought that those in houses consumed more than those in flats. They also thought that baths and showers, followed by the laundry, were the places where most water was consumed in their homes. They also believed that kitchen and toilet consumption were about the same. When informed of the Australian Bureau of Statistics' estimate that toilet consumption was approximately one-quarter of total consumption they expressed surprise.

“The figure for toilets amazes me.” (Group 1)

Other simply said they did not think of how much water was used to flush toilets.

“I am oblivious when I flush the toilet” (Group 4)

Having been told that the average person in Sydney used approximately 250 L per day, focus group participants expressed disbelief. This reaction reflected both shock at how high the figures was and the implications it held for water management.

“That’s horrifying, especially when so little is actually drunk” (Group 1)

“The lack of grey water recycling is insane” (Group 2)

Those who were home owners were asked to estimate how much water they used in their own households per quarter in terms of both volume and cost. The overwhelming finding here was that most had no idea of how many litres of water they used per quarter and no confidence in trying to work it out. Those willing to estimate made guesses which ranged from 35 kL to 100's of kLs, but all said they did not know.

“I wouldn't have a clue” (Group 4)

The main reason why estimating the volume of water used was felt to be so hard is that few look at the amount consumed as they are primarily interested in the overall price they have to pay. While many are interested in comparing consumption levels with that of previous quarters, as facilitated by a graph provided on the bill, details such as number of kL are ignored in favour of whether any fluctuation had occurred and, if so, in

what direction. In other words, they were more interested in how much water they have used in relative rather than absolute terms.

The increased meaningfulness of comparative, rather than absolute, use of water was illustrated when participants compared their bills with each other during the group session. Some admitted to being embarrassed if their bill was significantly higher than someone with the same size of household or their bill was higher than someone with a smaller household. We concluded from this that only comparative amounts have meaning, because the volumes reported on the bill are beyond most people's comprehension.

8.1. Is current water pricing fair?

Despite the high level of uncertainty over actual levels of water use, views on water pricing were more clearly defined. Just over half (55%) of all respondents thought that the current pricing of water was fair, with 21% saying it was not. But a fifth simply did not know (Fig. 2). Three out of five (58%) respondents in houses thought that the current pricing of water was fair as did 56% of those in semis and 44% of residents in flats. But two out of five flat dwellers did not have a view on this issue.

The responses of focus groups to this question suggested a high degree of consensus that water prices, though fair, were nevertheless “ridiculously cheap” (Group 1) or “surprisingly cheap” (Group 3), clearly implying that the water price was too cheap to be a significant factor in moderating consumption. Flat owners were particularly ignorant about the cost of water because of the way in is absorbed into body corporate fees.

“I go to body corporate meetings and it is never raised as an issue, ever.” (Group 1)

Many participants took the view that water was a necessity and it was therefore difficult to have a price attributed to it.

“I don't understand what it's worth anyway” (Group 5)

8.2. Does water pricing encourage conservation?

More pertinently, respondents were asked if they thought current water pricing might encourage the conservation of water. On the whole, water charging was thought not to encourage conservation: 44% thought that it did not compare

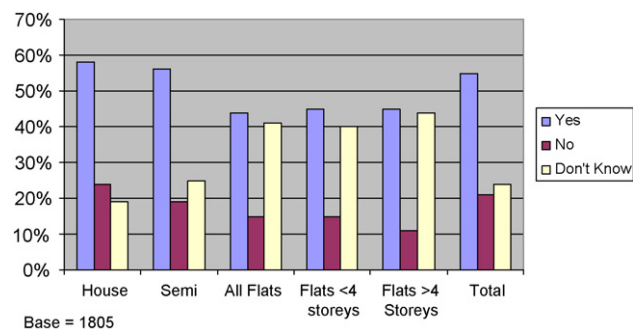


Fig. 2 – Is current water pricing fair?

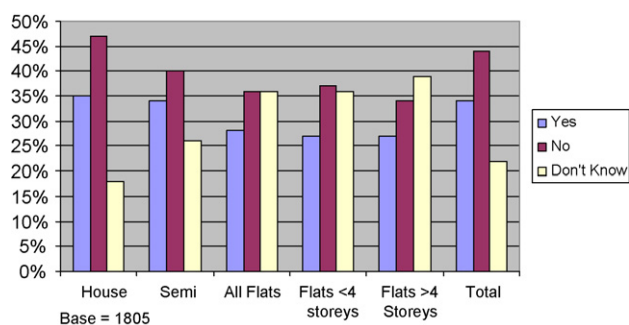


Fig. 3 – Does water pricing encourages conservation?

with 34% who thought it did (Fig. 3). Those in houses were most likely to think that current water pricing did not encourage conservation. These are the people most likely to know what water costs and to use water in the garden. Those living in flats, especially those in high-rise flats, were most likely not to have a view on this issue.

Focus group participants expressed a range of more nuanced responses to this question, suggesting a greater awareness of the complexities surrounding pricing and conservation among consumers. Some argued there was a need to increase the price:

“They should increase the price and use the extra revenue to build dams” (Group 3)

“Wouldn’t you rather pay five times as much and have more to use?” (Group 3)

Others took a different view, however, arguing that water conservation was not a price issue but an educational and behavioural one.

“I don’t care if it is 1c a litre. You still want to cut it down” (Group 4)

While the issue of water rights was not specifically explored, some focus group participants expressed the belief that they had a ‘right’ to water—not in the sense of property rights over water, but in the sense of a human right to a minimum amount for their basic wellbeing (a distinction made by Morgan, 2004) which they implicitly felt was essentially price-less. Those taking such a position were reluctant to agree that there was any need to increase the price of water, especially since it was known that Sydney Water made considerable surpluses on their operations which were paid to the State Treasury.

8.3. Should extra charges be made for high water usage?

The concept of differential water pricing to reflect usage was widely supported. Three quarters of survey respondents thought that an additional fee should be charged for consumers who use well above average amounts of water while only one in six did not support this proposition. Those in houses were less enthusiastic than those in higher density

dwellings, reflecting the larger average household size of house dwellers: one in five of those in houses rejected the proposition, compared with one in ten of those in semis and only 7% of those in flats. Nevertheless, a clear majority was in favour of the notion of higher users being charged a differential, and higher, rate. At the same time, seven in ten thought that charges should also be discounted for households who used well below average water use.

8.4. Should water prices be increased to encourage people to use less water?

Despite widespread support for differential pricing to reflect water consumption, and the fact that more respondents said that current water prices did not encourage conservation compared with those who did, a clear majority (60%) of respondents said they did not think water prices should be increased to encourage lower water use. This paradoxical result may be explained by the perception among many that they should not be asked to pay more to meet conservation objectives or to reduce environmental stresses that they feel are primarily caused by others (see above). House dwellers were less inclined to support increased water prices compared with respondents in medium and higher density housing. The result no doubt reflected water use and payment arrangements with those in houses being more aware of the cost of water.

The 30% of respondents who supported the proposition that water prices should rise to encourage people to use less water were asked a supplementary question to find out how much prices should rise. The answer was generally ‘not a great deal’: 40% of these respondents said up to 5% more should be charged and a further 31% said between 5 and 10% more, while 17% said between 10 and 20% and 13% were happy for water charges to go up over 20% to encourage lower water use. These responses suggest that pricing policies to encourage lower water use would only have minority support among domestic water users and that even among those in favour, the price increases supported are relatively modest, with seven in ten supporting rises below 10%.

8.5. Should water prices be increased generally to pay for improved conservation policies and practices?

Half (52%) did not agree with price increases to fund general policies to improve water conservation, although two in five agreed with the proposition. This may have been due to the fact that the NSW State government had levied Sydney Water with allegedly substantial environmental charges for some years. Those in favour of increased charges to pay for improved conservation policies and practices supported more modest price increases compared with those who supported increased charging to encourage lower use (reported above): half said prices should rise by up to 5% and a further three in ten said between 5 and 10%, leaving 20% supporting price rises above 10%. There was, therefore, only minority support for increasing water charges either to encourage lower water use or to fund conservation policies.

Pricing policies have been long promoted as a way of regulating user demand for water. Recent changes to the

pricing structure of water in Sydney have included additional charges for high end users in an attempt to increase the revenue stream of Sydney Water and to send a price signal to those who use well above the average amount of water to reduce their consumption. But if water users do not respond to pricing signals because they have little idea how much water they are using or how much it costs, pricing policies that attempt to encourage conservation will fail. The fact that few people are aware of the amount of water they use or the amount they are charged for water strongly suggests that pricing policies, *on their own*, are unlikely to reduce water use for most households, or would have to be punitive to make a difference. To be effective, these findings strongly suggest that pricing policies to encourage conservation will require a consistent and long term educational program to raise awareness of use levels, relative costs and the actual amount used in different uses in the home. People need to know much more about how much water they use and which activities use the most water to make a substantial difference.

8.6. How much water could you save?

Despite generally favourable views towards water conservation in the home, relatively few survey respondents thought they could go much further in saving water at home. How much further did they think they could go in saving water? Only 7% thought they could do a lot more, 18% thought they could do some more and a further 44% would only do a little more. As many as 31% said they thought there was nothing more they could do to save water (Fig. 4). These responses suggest that further domestic water savings may be limited by prevailing attitudes and patterns of behaviour. This finding might be seen as confirmation of the conclusion by Barr (2003:237) who suggests that “the assumption that basic knowledge dissemination will have more than a minor indirect effect on behaviour is naïve” although Bamberg (2003) argues that general attitudes are important indirect determinants of specific behaviours.

We found no substantial difference in claims about how much water they could save between those living in houses,

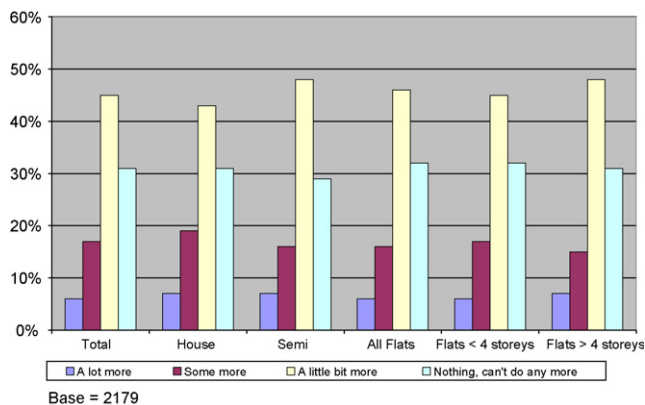


Fig. 4 – Thinking about how your household uses water, how much do you feel that your household could do to save water?

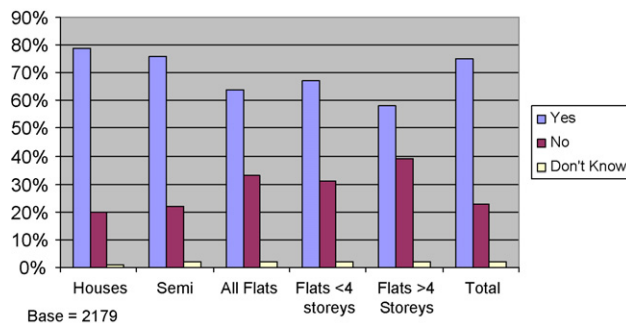


Fig. 5 – Have you changed your water use inside your home since water restrictions came in?

semi-detached houses or flats, both high and low rise. Attitudes to the ability to save water does not, therefore, seem to be related to current levels of water use, which varies between households in different dwelling types (Troy et al., 2005). On the other hand, housing tenure did seem to be associated with different attitudes to water saving. Almost half (47%) of public tenants felt they could not do any more to reduce consumption compared with 28% of private tenants, while 10% of both rental tenure types thought they could do a lot more. Buyers (19%) were half as likely as outright owners (37%), the latter being mainly elderly, to say they could not do any more whereas only a small proportions of owners (4%) and buyers (6%) say they could do ‘a lot more’.

8.7. Has water usage inside the home changed since water restrictions?

The survey findings suggest that the restrictions and the associated media campaign by the NSW government had influenced internal water use. Three-quarter (75%) said they had changed the way they used water inside the home since the water restrictions had been in force. There was a clear differential between respondents in houses and those in higher density housing. While 79% of those in houses and 75% of those in semi-detached homes had changed their internal water use patterns, only 67% of respondents living in low-rise flats and 58% in high rise flats said they had (Fig. 5). The level of inaction on internal water conservation doubled from one in five for houses to two in five for high-rise flats. Home owners and buyers were more likely to have changed their usage inside the home (80%) compared with private renters (63%) although, perhaps surprisingly, even more public tenants said they had (87%).

9. Actions respondents had taken to reduce water use

Given that water restrictions had clearly prompted changes in water use behaviour among respondents, what was the range of actions taken to reduce consumption? A series of questions probed this issue, in terms of action already taken and actions that might be taken in the future, in order to identify the most significant changes in water use around the home.

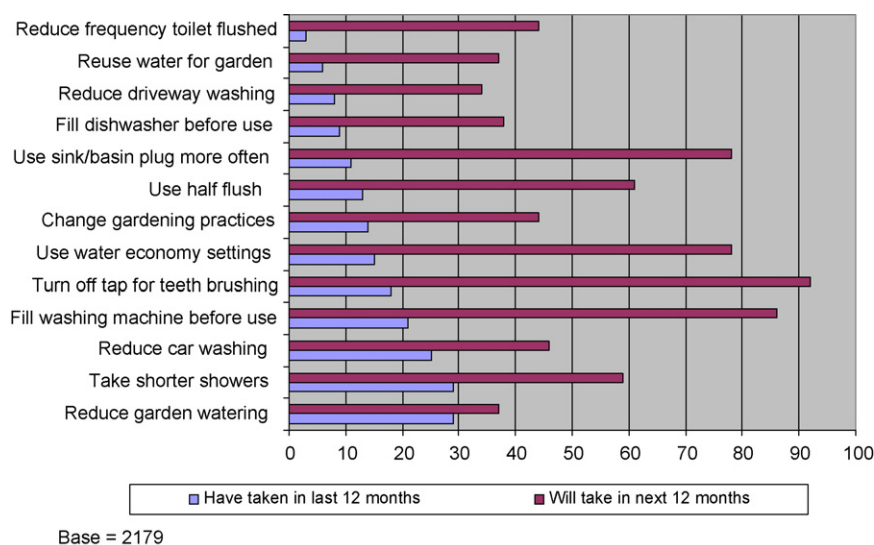


Fig. 6 – Actions taken in last 12 months to reduce water consumption and actions likely to take in the next 12 months to reduce water consumption.

9.1. Actions taken over the last year

Respondents were asked whether they had reduced water consumption over the last year (Fig. 6). Sydney households had reduced water use across a broad range of activities. The actions were highly variable and dependent on the type of activity and the respondents' direct control over the amount of water used. The results suggest Sydney residents have some way to go before attitudes to water conservation lead to widespread and substantial changes in behaviour to achieve further reductions in water consumption.

The most common actions to reduce water use over the previous 12 months were reducing garden watering (discussed above) and taking shorter showers, both reported by three in ten of respondents. Reduced garden watering is hardly surprising given it was one of the specific targets of the restrictions and the penalties for exceeding permitted watering. When these responses are restricted to respondents with a front, back or communal garden, the proportion increases to 37% overall. These results show that garden watering restrictions directly impacted on the consumption behaviour of less than two in five households with a garden. Despite the relatively low proportion of households who were actually impacted by the garden watering restrictions, focus group participants made many suggestions on how garden watering could be reduced ranging from changing the types of plants to using recycled water. The latter being seen as allowing them to regain the freedom to use water as and when they choose.

“With recycled water you can use it whenever you like” (Group 10)

A similar proportion of respondents also reported trying to reduce water usage in showers suggesting that attitudes to water use more generally have been altered. Showering is the type of large-scale water use that people can modify without the need for new equipment or modifications to the home.

There was little variation across the dwelling types in the proportions reporting reduced shower times. Focus group participants unanimously nominated households with children as the biggest users of water attributing this to the perceived length of showers taken by teenagers. Shove (2002) suggests that showering is more a function of cultural and social factors than concern over cleanliness, implying that encouraging people to take fewer showers may not be a successful strategy without additional effort to address these behavioural factors. Participants' responses tended to support this view, especially among those who commented on the difficulties they experience in trying to get teenagers to take shorter and less frequent showers.

Even those who took baths were not immune to the need to reduce consumption.

“I pump out the bath onto the lawn using a thing you put on the end of the hose that my dad bought me.” (Group 8)

The restrictions also appear to have resulted in a reduction in the frequency of car washing for a sizeable minority, with 29% of all respondents with a vehicle saying they had reduced car washing. Respondents in houses were more likely to report this action (31%) compared with those in flats (18%), the latter figure reflecting lower car ownership.

The lack of action to reuse 'grey water' is perhaps surprising, but for most households this is both costly and impractical.

9.2. Actions likely to be taken over the next year

There was some indication that there is greater potential or willingness by consumers to change their water use practices. Respondents were asked what measures they would be likely to undertake in the next 12 months to reduce usage. While there is a considerable difference between a speculative answer to a telephone interviewer's question and real

intentions or outcomes, the survey implied widespread willingness to contemplate changed behaviour, as well as indicating the relative priorities respondents' placed on various conservation practices. Oliver (1999) who, reporting on a case study of water conservation, found that there was a considerable gap between stated attitudes and manifested actions. The findings of this study tend to provide support for this contention although we note that the relationship between attitudes and behaviour is more likely to be dynamic. That is, the propensity of households to change behaviour depends not only on their own capacities and attitudes, but to the institutional context within which they live (in this case, housing tenure and management) and the extent to which a culture of change is encouraged.

The most common water conservation practice respondents said they would adopt during the year was to turn off the tap while brushing teeth (Fig. 6): 92% said they would do this more regularly. This may be considered as a symbolic gesture, but it shows that the conservation message has been taken on board by almost everyone. This was followed by a range of actions which also take place inside the home: ensuring the washing machine is full before use (86%); the greater use of water economy settings and using a plug more frequently in sinks or basins (both 78%); using the half flush for the toilet (61%); and again, taking shorter showers (59%).

Efforts to further reduce water use in the garden, for cleaning paved areas or cars were proposed by small proportions of households. Reducing the frequency of toilet flushing and ensuring dishwashers were full before use were less frequently quoted as targets for the next year. Half said they would not reduce toilet flushing or contemplate recycling shower or other household water for garden use. The former is clearly a matter of preference and focus group participants revealed strong opposition to such a practice.

"I hate it when the kids don't flush the loo!" (Group 9),

But the latter is more likely to reflect the difficulties households have in actually recycling water on a practical and convenient basis (especially for flat dwellers).

While the responses as to likely future action appear highly optimistic given the actual behaviour recorded over the previous 12 months, the survey suggests strong support for further action. Changes in external water use appear to have lower priority compared with actions already taken, reflecting the fact that many households had reduced water use in this area and there was limited capacity to extend this activity. The scope for further substantial reduction in water use *outside* the home is therefore limited. Despite NSW Government proposals to legalise the use of grey water for garden watering, these responses suggest that without a significant educational campaign or subsidies to encourage the use of grey water, it is unlikely that many will take up the opportunity. The most likely water conservation behaviour in the immediate future is by focusing on a range of activities *inside* the home, especially in the way households use their kitchen, bathrooms and washing appliances.

Those living in flats were less likely than those in houses to report water saving action, either over the previous 12 months or in the next 12 months. Flat dwellers had only partial

awareness of the costs or amount of water they use and therefore may not perceive water conservation to be a particular concern for them. But it is also likely to be much more difficult for flat residents to adopt conservation practices that require access to external areas or modifications to equipment and facilities.

9.3. *Would subsidising water saving devices affect water saving practices?*

We saw above that pricing policies to reduce consumption might only have relatively limited impacts given the lack of general understanding of the level of water use among consumers. The alternative is to subsidise water saving devices to encourage take up and thereby affect a general lowering of water use. In fact, almost half the respondents (48%) said they would be willing to fit water saving devices even if they had to pay for them entirely. Nevertheless, the willingness to fit these devices rose to three quarters (77%) if the price was subsidised by a half, while potential take up increased to just under nine in ten (86%) if devices fitted freely. This suggests that support by government for such devices could be critical in promoting general acceptance of water saving technologies.

But there was a clearly economic dimension to this question. Those buying their home were most likely to use water saving devices if they had to pay for them, while those renting public housing were least likely to. This response in part reflects the economic position of the latter group and the critical influence income, and hence subsidies, is likely to play in the uptake of water saving technologies. But it may also reflect an attitude among public housing tenants that their landlord, the NSW Department of Housing, should take responsibility for this matter.

10. Conclusion

These findings generally suggest that Sydneysiders are aware of water conservation as an important issue and also have good intentions in terms of making an effort to reduce water use further. There is also evidence that for many householders, water conservation has its practical limitations. This confirms the conclusions of other researchers (e.g. Hand et al., 2003; Shove, 2002) that the picture is not simple and there will need to be much more thought put into policy development if the promise of this general awareness and support for more water conservation is to be made effective in terms of sustained reductions in domestic water usage.

In the context of such criticism, several important additional conclusions can be drawn from this research in relation to urban water demand management policies. The first is that the kind of homes people live in and whether they own or rent not only influences overall water consumption levels, but also how people think about water use. This is important in terms of the general debates on the environmental benefits to be gained from shifting residential demand from low density to higher density housing. Households in houses consume more than those in flats on average because they tend to be larger, although it may be that the influences

of household dynamics introduces a degree of ‘social’ control in houses that may restrain consumption simply because facilities are more likely to be shared. They are also more likely to achieve economies of scale that cannot be achieved by smaller households that tend to live in flats. This point was noted in the IPART study of water consumption in Sydney in 2003 (IPART, 2004).

But earlier research by the authors indicated that on a *per capita* basis, whether you live in a house or a flat had relatively little impact on average individual water use (Troy et al., 2005). The findings discussed here help to explain why this might be the case. Home owners are likely to have direct control over their homes and are in a position to undertake refitting their homes or buying new appliances that can assist in lowering overall potable water use. On the other hand, tenants, who account for a quarter of Sydney’s households and two-third of apartment dwellers, have little or no control over these aspects of their home and also do not necessarily see the water bill. Tenants are often young and transient, with little knowledge of practical conservation methods around the home, even if they support conservation issues. Most importantly, at present, landlords have little interest in or incentive to equip their investments to reduce water consumption.

Flat dwellers are also much less likely than house dwellers to know how much water they use as their water consumption is usually paid as part of the service charge payment in the case of flat owners and implicitly as a non-itemised component of their rent for renters. There were noticeably lower compliance rates among high-rise flat dwellers on the use of water saving devices. The combination of strata title management and private rental is even more important in the flat market. As 35% of the housing stock in Sydney is medium or higher density, most of it under strata management arrangements, and with around six in ten private flats in the city owned by investors (Bunker et al., 2005), this is not an insubstantial barrier to the uptake of greater water conservation practices across the city as a whole. It may be of little use to promote water saving measures generally among tenants, especially those in flats – they do not have any say in the standard of equipment and fittings they have in their homes – without also targeting bodies corporate, landlords and strata managers.

The complexity of the management and ownership of the flat sector means that a more specific educational and information program needs to be targeted at flat owners and managers rather than leaving it to consumers. This is a serious issue. With 70% of the housing in the next 30 years in Sydney (and comparable proportions in Melbourne and SE, Queensland) expected to be higher density, it may no longer be a simple matter to encourage water saving among consumers. By 2025 it is possible that 45% of Sydney resident will live in strata-managed property (Randolph, 2006). Without strategies to promote water saving among this population, the battle for water demand management will effectively be lost. Now that the second round of BASIX, which introduced more stringent conservation requirements for residential development, explicitly excludes flats, other measures will need to be implemented to encourage water conservation in this important and expanding sector. Flats

therefore pose a significant problem for water demand managers in Sydney. The complexity of differences in attitudes and behaviour between those who live in flats compared with those living in houses confirms the point made by Gilg and Barr (2006) that the efficacy of attempts to change water consumption behaviour will be conditioned by the way individuals relate to their household, the communities in which they live, the social norms and conventions of their society and whether or not it facilitates or encourages changes in behaviour. It will also be conditioned by the limitations of the ecosystems in which they live.

Secondly, this research strongly suggests that simply increasing water prices is unlikely to be an effective method of managing domestic water demand in the short to medium term. As few consumers understand what water costs (although they acknowledge that it is very cheap) or how much they use, simple economic solutions to managing water demand are unlikely to be effective. Most think they use below the average amount of water (a statistical improbability) and few think they should pay more to conserve water. The minority who would consider paying more do not want to pay much more. In other words, most think the water consumption problem is caused by someone else and they should not have to pay for a solution. That is not to say that people who use substantial amounts of water should not be charged more, a proposition most support—so long as it is not them.

The third general conclusion concerns the need to retro-fit the existing housing stock with water efficient technologies and appliances. In NSW, while BASIX is now modestly chipping away at water demand generated by new housing stock, it is clear that it will be many years before the benefits of BASIX filters down to even a bare majority of the population in NSW. Unless BASIX or its equivalent is applied progressively to existing housing, the vast majority of households will continue to live in homes with poor water conservation outcomes. A significant reduction in domestic water consumption through increased efficiency can only be achieved by retro-fitting the existing housing stock, including where practical, blocks of apartments, with rainwater tanks, grey water treatment technology, more efficient tap and other water fittings. This would entail significant public subsidies of some form, either in grants or tax allowances. However, there is clearly a substantial potential demand to be opened up should such support become available. Water conservation policies, moreover, also need to be tailored for different housing markets and population segments. A simple one-policy-fits-all approach is unlikely to achieve meaningful results. Gilg and Barr (2006:412) make this point eloquently when they conclude that “policy makers who wish to encourage water savings and other conservation activities are likely to achieve greater success if policies take account of behavioural complexity behavioural groupings and lifestyle types”.

More than anything else, a substantial and sustained education campaign needs to be instituted that will show how we can all address this issue in a practical and achievable manner. Government and the water supply industry need to take a clear lead on this as matter of urgency. Leaving public consciousness on this issue to ephemeral media interest and hoping we all get the message and act on it will not be good enough.

Acknowledgments

We wish to acknowledge the assistance of our colleagues who provided criticism of earlier drafts. We are also indebted to the NSW Environmental Trust for the funding to undertake this research (Environmental Trust Grant 2003 RD0005). We are particularly grateful for the comments and suggestions made by two anonymous referees.

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