

Reducing Household Water Consumption: A Social Marketing Approach

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This is an Accepted Manuscript of an article published in the *Journal of Marketing Management* on 24/10/2014, available online:

http://www.tandfonline.com/doi/abs/10.1080/0267257X.2014.971044?journalCode=rjmm20#.VK_d4nvLlIs

Please cite:

Lowe, Ben, Lynch, David, and Lowe, Julian, (2015), "Reducing Household Water Consumption: A Social Marketing Approach," *Journal of Marketing Management*, Vol. 31 (3-4), 378-408. DOI: 10.1080/0267257X.2014.971044

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Abstract

There is increasing pressure for society to move towards more sustainable use of its resources, and calls in the literature have been made to reassess marketing's role in achieving such goals. This research examines how key behavioural factors influence household water use, in the context of a social marketing programme to reduce household water consumption. A model of the key drivers of household water consumption is developed and tested using a sample of 909 households in a regional city in Australia. The findings from this study support the model developed and show that in the absence of price as a rationing mechanism, the social marketing programme significantly reduces household water consumption.

Statement of contribution: This is the first study to develop a comprehensive and empirically tested model of the non-price drivers of household water consumption, within the context of a social marketing intervention. The findings make a contribution to the field of consumer behaviour and social marketing by illustrating key behavioural drivers of water consumption. Consequently the study also shows how marketers can assist in preserving essential goods and services such as water.

Keywords: Theory of Planned Behaviour, social marketing, sustainable consumption/marketing, water consumption, behavioural change

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Introduction

There is increasing pressure for society to move to more sustainable consumption. This applies particularly to natural and energy resources, many of which are limited in their supply. In an increasing number of countries there is also growing pressure on household water consumption. Because access to clean water is seen as a basic human right (Clarke, 1991; Phipps & Brace-Govan, 2011), the sustainable management of water resources has become a pivotal societal and political issue. Achieving reduced household water consumption whilst securing public health, equity and community support is a key challenge that may require companies and governments to think beyond volume restrictions and price increases. If attitudes can be managed more effectively, and if technical solutions are devised to support more efficient use of water through enhancing consumer ability to act, consumers can contribute to broader sustainability goals by developing a sense of consumer social responsibility (Wells et al., 2011) and self-managing reduced water use. Marketers have a unique role in this process through designing effective social marketing tools that can replace traditional economic approaches (Kotler, 2011). Understanding the different levers that marketers can use to influence behaviour change for environmental purposes is a growing area of research in marketing and one that is not well understood (Goldstein et al., 2008; Kronrod et al., 2012).

This research reports on a focused and successful social marketing programme (referred to here as 'Project Hydro') in a large regional city of Australia. As one of the first studies to examine changes to household water consumption within the context of a social marketing

programme designed to reduce consumption, it contributes to the literature in several ways. First, this research provides a detailed case study of Project Hydro's characteristics, integrating literature from the area of social marketing and demarketing (Kotler and Levy, 1971; Kotler and Zaltman, 1971; Peattie and Peattie, 2009). We examine demarketing that is undertaken by the producer and revenue receiver as they struggle to profitably allocate their product across consumers and over time. This is different to the more oft-quoted case of public or regulatory demarketing of a 'harmful' product – e.g., tobacco or gambling. Second, a conceptual model with testable hypotheses pertaining to the key non-price drivers of household water consumption is developed through augmenting the Theory of Planned Behaviour (TPB) with literature at the confluence of social marketing, environmental management, and social psychology. Third, the research provides empirical support for these hypotheses using a quasi-experiment based on residents who had participated in Project Hydro (n=310), and residents who had not participated (n=599).

This article proceeds by discussing the water consumption problem and the typical tools policy makers have used to address the challenge of over-consumption. It then distinguishes between social marketing and demarketing as approaches to consumption reduction. The research context and a description of Project Hydro are then presented, and the conceptual framework is provided with hypotheses for testing.

The water sustainability problem: Approaches to reduce consumption

Sustainable water policies: An increasing challenge

Drought is a recurring and pervasive problem in many rural and urban areas worldwide (Economist, 2011; OECD, 2013). With large proportions of some populations facing drought,

and extensive use of water restrictions (e.g., parts of the US, Australia, China in the US, Australia), the sustainable management of water has become a key national priority in many countries (McAllister, 2009). Even in wetter, but more densely populated areas of the world such as the UK, pressures on water resources are intense. Recent reports, for example, confirm that parts of the UK have become susceptible to drought despite winter floods and higher than average rainfall (DEFRA, 2012) indicating that water restrictions and other policy changes will be necessary to combat shortages.

Governments and privatised water companies typically use a mix of tools and policy measures to manage water resources, including, 1) increasing supply through building new dams or desalination plants, 2) restrictions on outdoor use of drinking-quality water, 3) recycling waste water, 4) reducing leakage, 5) increasing block water tariffs for households, and 6) imposition of levies on water retailers (Severn Trent Water, 2013; South East Water 2013; Victorian Government 2004). The most common tool to manage water consumption is the use of water restrictions, particularly on outdoor water use. Generally water restrictions are considered fair but they have been criticised because they focus on constraining certain uses of water (e.g., watering gardens, washing cars), rather than water use more generally. They have also been criticised for being too expensive relative to other ways of managing water. For example, one Australian government funded study finds that the full per capita economic cost of water restrictions amounts to AU\$360, because the public buy more water saving devices, take a longer time to perform tasks without a hosepipe, and amenities (e.g., sports fields) are reduced in value (Allen Consulting Group, 2007).

Another common approach to water allocation involves pricing, with around two-thirds of OECD countries using water meters within houses. The transition from flat tariffs or decreasing block tariffs towards increasing block tariffs is becoming more common as organisations adopt

more value based pricing strategies. However, pricing as a way to allocate water resources has often been criticised as being regressive and unfair to some sections of society. In some countries, changes to water prices require authorisation by government, take a considerable amount of time and are a sensitive and potentially damaging political issue (e.g., Australia). Typically, price increases have to be related to the consumer price index and the costs of accessing and transporting water. Price is rarely used as a rationing device because of equity implications. Furthermore, consumer response to price changes is often inelastic (Barrett, 2004), partly because of a lack of knowledge by consumers of the price charged by utilities. Understanding consumer attitudes and other behavioural factors affecting water consumption has received far less attention than economic factors in the literature, but offers a unique social marketing perspective to encourage voluntary behaviour change. Supply side solutions meet opposition from stakeholders concerned with resource conservation, protection of the environment, perceived risks to public health, public funding of large civil engineering projects and an increasingly influential green movement. Though intuitively appealing, supply side initiatives are regarded as being expensive relative to demand initiatives, and because of this and the opposition from pressure groups, demand management of water is an increasing priority for many water companies.

Structural and voluntarist approaches

Some scholars divide remedies for such consumption challenges into structural approaches and voluntarist approaches (e.g., Dobson, 2007). Structural approaches include price and restriction policies and are designed to directly influence behaviours. Voluntarist approaches try to encourage environmental citizenship amongst consumers through changing attitudes, which in turn change behaviours. This is more consistent with hierarchy of effects models in marketing, and is more consistent with the notion of social marketing and *voluntary behaviour change*.

Voluntarist remedies try to achieve more permanent change. In a recent article in the *Journal of Marketing*, Kotler (2011) highlights key challenges for marketers and the marketing paradigm in tackling environmental issues, and mentions the need to combat water shortages through social marketing approaches designed to change behaviour. This is consistent with the message in other social marketing research which shows the benefits of a social marketing approach to behaviour change (e.g., Collins, Tapp & Pressley, 2010; Lawther et al., 1997; Hastings & Saren, 2003). Yet, even in light of much recent research in the area of social marketing, our understanding of the effectiveness and peculiarities of social marketing programmes in specific contexts remains quite sparse. Indeed, as argued by Andreasen (2003, p. 298), the benefits of a social marketing approach need to be illuminated in a ‘...wider range of organizations and a wider range of applications...’.

Social marketing and demarketing

Though a widely accepted definition of social marketing remains elusive (e.g., Lee and Kotler, 2012, list eleven definitions of Social Marketing), and has attracted a great deal of controversy (Andreasen, 2002; Dibb and Carrigan, 2013; McDermott et al., 2005), this research applies one of the more comprehensive and widely cited definitions which places behaviour change at its core. Specifically we define social marketing as ‘...the adaptation of commercial marketing technologies to programs designed to influence the voluntary behavior of target audiences in order to improve their personal welfare and that of the society of which they are a part.’ (Andreasen, 1994, p.110). A process of demand reduction has come to be known as “demarketing”, and is commonly associated with the notion of social marketing (e.g., Kotler, 2011; Peattie and Peattie, 2009), but is a process central to the effective management of demand in general.

Despite early recognition within the literature (Kotler and Zaltman, 1971), calls continue to be made for a greater understanding of the use of a social marketing approach for the purposes of demarketing. This might be for products or services restricted in supply, changing customer orientation towards an understanding of the benefits of sustainability, maintaining and supporting behaviour change and developing partnering opportunities between agents in the marketplace (Peattie and Peattie, 2009). Lawther et al. (1997, p. 315) state that ‘...there have been few published attempts to further understand this notion...’ of demarketing. Peattie and Peattie (2009) develop the concept of anti-consumption and the use of social marketing for the purposes of demarketing, but also observe that the majority of studies in this area relate to personal health.

Consistent with Peattie and Peattie (2009, p. 263), we agree that social marketing has a great deal to offer in our understanding of demarketing specifically, and the development of a broader sustainability agenda in general. Kotler (2011) further confirms the importance of this synergy by stating that research in these areas is likely to grow rapidly. So far research in the area of social marketing for the purposes of demarketing is sparse, although distinct contributions have been made in relation to our understanding of how to demarket the use of tobacco (Peattie and Peattie, 2009; Shiu et al. 2008), and how to demarket the use of general anaesthesia within a dental practice (Lawther et al., 1997). While there is a great deal of research which examines how to reduce consumption using individual elements within the “social marketing mix”, there is very little research that has sought to examine how the mix works holistically. Furthermore, research has yet to understand how these concepts might be applied within the context of household water consumption, despite clear calls in the literature (Kotler, 2011).

Context and the social marketing approach

The research site was a large regional city in Australia. Its water storages had declined to eleven per cent of capacity by 2007. This was worse than the state capital city but better than some smaller towns where storages had fallen to less than five per cent. There were very few locations, other than in the far north of the country, where water storages were greater than forty per cent. The problem was widespread and some commentators and politicians had connected it to climate change. Project Hydro was launched as a social marketing programme that addressed the need for reduced household water use through a process of behaviour change designed to achieve specific and measurable objectives. Marketing communications with a message based on a social cause are generally not considered to be social marketing (McDermott et al., 2005), and genuine social marketing interventions must move beyond the use of one tool. As such the scope and nature of Project Hydro is defined in relation to Andreasen's (2002) benchmarks for identifying a genuine social marketing program. These benchmarks and their relationship to Project Hydro are illustrated in Appendix 1 and are cross referenced to Peattie and Peattie's (2009) "social marketing mix". The characteristics exhibited by Project Hydro are also consistent with other more recent frameworks such as the eight benchmarks offered by French and Blair-Stevens (2006), which build on those identified by Andreasen (2002).

Social marketing programmes that satisfy each of these criteria are noticeably rare in the literature (McDermott et al., 2005). However, the scope of Project Hydro covers most of these key themes. At the research site, in addition to an earlier outdoor watering ban, a number of measures to encourage the reduction of water use were introduced through Project Hydro. Consumption in the State in 2001 was 279 litres per person, per day, but with the increasing adoption of water saving devices and an outdoor watering ban, this consumption level dropped

significantly to around 200 litres by 2005 (Troy, 2008). However greater savings were required and a target of 150 litres was set across the State and progress towards that target was monitored in the press. At the site of the social marketing programme documented in this research, other measures were taken for industry and recreational spaces, and as a side effect probably increased community support to reduce household consumption. Under an extensively promoted scheme, subsidised installation of household water efficient devices and retrofits to leaking systems were introduced. Households could also attract subsidies to install rainwater collection tanks that could be linked to washing machines and toilet systems. Regular community consultations, education initiatives and prizes for good practice supported a press, radio and television campaign. Information about Project Hydro was provided on the water authority's website, and the project was supported by an extensive and targeted communications programme. This included the use of local advertising through a variety of media (e.g., TV, newspaper, radio, account information inserts, and road signs). Citizens could also report on households thought to be breaking outdoor watering restrictions. (Further detail on Project Hydro and its relationship to standard social marketing benchmarks is shown in Appendix 1). The national mood was one of addressing what was identified to be a major local and national threat. It was in this context of community expectations about the permanence of a change in rainfall and water storages that the research was undertaken. In spite of a plethora of research directed at understanding the effects of different policy initiatives, little research has developed and empirically tested models of household water consumption that include behavioural influences despite calls in the literature to do so (e.g., Kotler, 2011). As attitude and behaviour change are central to understanding the impact of marketing interventions, the TPB model was adopted as the framework for examining key drivers of household water consumption following the Project Hydro programme.

An augmented model for water consumption using the Theory of Planned Behaviour

Theory of Planned Behaviour

The TPB is derived from the Theory of Reasoned Action (Ajzen, 1991) and asserts that an individual's given behaviour is predicted by their intention to perform that behaviour. When an individual's behaviour is volitional then the TPB shows an individual's intention can be predicted by three primary antecedents: the individual's attitude towards the behaviour, their social norms, and their degree of perceived behavioural control. Attitude towards the behaviour is a personal variable reflecting a psychological tendency, or feeling, expressed by an individual towards a behaviour, either favourably or unfavourably. A social norm is a socially oriented variable and represents a person's beliefs about the prevalence or social acceptability of a behaviour in relation to a reference group of peers. Scholars often distinguish between descriptive norms, which refer to the perceptions one has about the frequency of a behaviour among peers, and injunctive norms, which refer to the perceived social acceptability of that behaviour. Management of social norms has been shown to be an important predictor of behaviour within the sustainable consumption literature (Cialdini, 2007; Goldstein et al., 2008; Griskevicius et al., 2008). Perceived behavioural control is an externally oriented variable and reflects how easy or difficult an individual thinks it is to perform the behaviour. Beyond the TPB literature, research has often echoed the importance of perceived behavioural control as an antecedent to consumption in environmental contexts (e.g., Wells et al., 2011). A more comprehensive review of the TPB can be found in East et al. (2008).

Although the TPB has been criticised for its focus on rational decision making, rather than emotions, it has been widely used in dozens of peer reviewed studies, and has a rich history of

use in the area of behaviour change with respect to social causes (e.g., see Wells, Ponting and Peattie, 2010). Therefore, replicating past research we expect the following:

H₁: The more positive the attitude toward water conservation, the stronger the intention to conserve water in the future.

H₂: The more positive the level of social norms, the stronger the intention to conserve water in the future.

H₃: The more positive the level of perceived behavioural control, the stronger the intention to conserve water in the future.

Although these hypotheses are only novel to the context presented here independent replication in different contexts is useful to the advancement of the discipline and also illustrates the credibility of the data and the model (e.g., by illustrating nomological validity). Despite widespread acceptance of the TPB in its most parsimonious form, with attitudes towards the behaviour, social norms and perceived behavioural control as antecedents, researchers have tried to augment the TPB and enhance its explanatory power. Indeed, Ajzen (1991, p. 199) states ‘The Theory of Planned Behaviour is, in principle, open to the inclusion of additional predictors...’. Therefore, we examine other possible factors of relevance to water consumption that might augment the conventional TPB antecedents, including perceived moral obligation, perceived water right and consumer sentiment towards the water authority’s management of the water problem. We also discuss the role of participation in Project Hydro and outline the impact of relevant socio-demographic variables.

Perceived moral obligation and perceived water right

Despite much research in the area of environmental consumption little research has empirically examined the notion of consumer responsibility (Wells et al. 2011). In morally relevant

situations, similar to the context here, Gorsuch and Ortberg (1983) test the effect of moral obligation and find that this enhances the TPB model, though their effects are somewhat inconsistent. Perceived moral obligation is the degree to which an individual feels morally obliged to perform a particular behaviour, and so may be relevant in cases where consumers consider the effect of their decisions upon others (e.g., donating blood, drink driving). Hart et al. (1997) outline three criteria for defining a moral situation, including 1) that the choice is important and significant, 2) that moral rules are not arbitrary, and cannot be made up, and 3) that appeals to obey moral rules are based around the premise that the rules are important in themselves rather than a function of primarily utilitarian motives. In light of these principles, the consumption of water in a drought affected region is a relevant context through which to further study the effects of perceived moral obligation on individuals' consumption decisions.

This is further supported by Lam (1999) who, in the context of developing a model to examine water consumption behaviour, uses perceived moral obligation to enhance the basic TPB model. Lam (1999) also enhances the TPB model, by including an individual's perceived water right. Perceived water right is the degree to which individuals feel they have a right to use water as they wish. Its importance in understanding water consumption has been highlighted in other water consumption studies (e.g., Clarke, 1991; Lowe et al., 2014; Phipps & Brace-Govan, 2011).

Interestingly the results of Lam's study indicate that including perceived moral obligation does not meaningfully augment the statistical model, and the effect of perceived water right is empirically inconsistent. The study presented here proceeds on a similar basis and examines water consumption with an augmented TPB model, including perceived moral obligation and perceived water right, because of their theoretical relevance and the inconsistent results found in Lam (1999). This leads to the following hypotheses:

H4: The higher the level of perceived moral obligation, the higher the intention to conserve water in the future.

H5: The higher the level of perceived water right, the lower the intention to conserve water in the future.

Institutional sentiment and the water authority's management of the water problem: Reciprocity

In the context of explaining consumer behaviour towards public goods, we also propose that consumers' sentiment towards the institutions managing the water supply, and their management of the water situation is an important explanatory variable for water consumption. Neoclassical economic theory tends to view consumers as being fundamentally motivated by self-interest. Water consumption may adapt to prices charged as individuals maximise their own utility although there is evidence that consumers are often unaware of the prices they pay for utilities (Barrett, 2004). A lack of knowledge is likely to hinder the effectiveness of price. Experimental economists and evolutionary psychologists portray a much more complex picture of the consumer that departs from the view of *homo-economicus* that sometimes dominates the debate. Consumers are increasingly seen behaving in the context of reciprocal tendencies in an exchange relationship (e.g., Fehr & Gächter, 2000; Hoffman et al., 1998). Specifically, reciprocity is an '...in-kind response to beneficial or harmful acts.' (Fehr & Gächter, 2000, p. 160). Although the factors influencing reciprocal behaviour are somewhat disputed, in essence this means that individuals reward kind behaviours and punish unkind behaviours, even in situations when it is costly for them (cf. Rabin, 1993; Falk & Fischbacher, 2006). Other research in the context of water consumption argues that institutional trust, a concept related to but distinct from attitudes towards the organisation, plays a role in water consumption decisions (Jorgensen et al., 2009). However, this is yet to be empirically tested.

Extending this logic and applying the theory of reciprocity to water consumption within the context of a social marketing intervention to reduce water consumption, it is argued that household water consumption decisions are dependent upon the degree to which residents in the area perceive that their water is being managed well by the institutions responsible for its management. Thus if consumers perceive their region's water is being managed well (e.g., through informative, positive and useful marketing communications) they will exhibit positive reciprocity and reduce their water consumption. On the other hand if they feel their water is not being managed well (e.g., through less informative marketing, and/or negative marketing communications) consumers will exhibit negative reciprocity and punish the water authority by paying less attention to their water consumption. As such it is predicted that consumers' intentions to consume water are positively associated with institutional sentiment in relation to the water authority's management of water. Therefore we test the following hypothesis:

H₆: More positive institutional sentiment toward the water authority's management of the water situation, the stronger the intention to conserve water in the future.

H₃ might also be influenced by whether or not the household participated in Project Hydro, since participation is designed to enhance an individual's control over their decision to use less water (e.g., through the subsidisation of water efficient devices). Participation or non-participation in Project Hydro might also be associated with intentions to conserve water. In general the social marketing literature speaks positively of the effect of social marketing programmes on behaviour change (e.g., Hastings & Saren, 2003). More specifically, although it is difficult to attribute all of the anticipated reduction in water use to Project Hydro, it played a major role such that the programme gained an international award for its scope and impact.

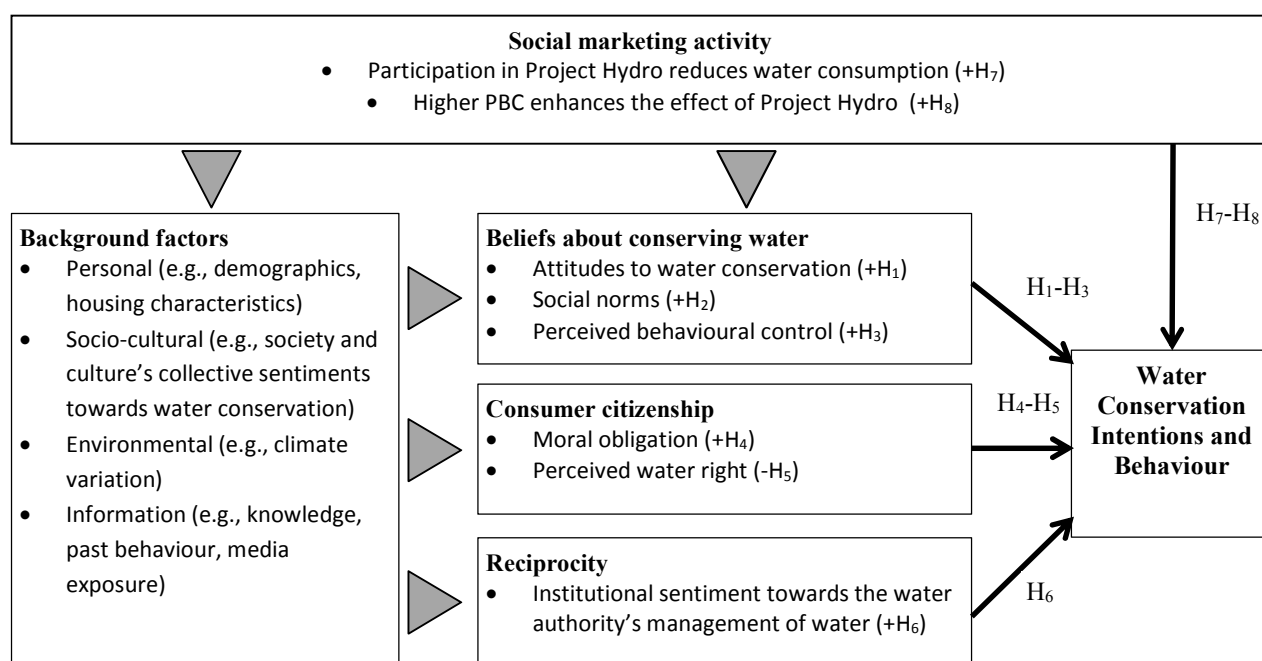
However, we also expect that the effect of Project Hydro on intentions to conserve water will be strengthened when an individual has a higher level of perceived behavioural control. Individuals often face a variety of physical constraints which affect their ‘...environmentally significant behavior...’ (Stern, 2000, p. 407), such that those with a low level of perceived behavioural control will not perceive they can affect any actual water consumption changes, even if attitudes become more positive after taking part in the program. Therefore, we anticipate the following hypotheses:

H₇: Participants of Project Hydro will have a stronger intention to conserve water in the future.

H₈: Higher levels of perceived behavioural control will strengthen the effect of participation in Project Hydro on intention to conserve water in the future.

Following calls in the literature to understand the complexity of water consumption in the context of households’ socio-demographic composition (Randolph & Troy, 2008), we also include a variety of socio-demographic variables. These variables serve to refine the model, based on their inclusion in prior social marketing and sustainability related studies, including income, age, gender, property tenure, and whether or not the household has dependent children (e.g., Jorgensen et al., 2009; Randolph & Troy, 2008). The focus of this study was to examine the influence of psychological variables on water conservation intentions; therefore, these socio-demographic factors were included as control variables to enable comparison with studies in the field. A summary of the proposed model for testing is shown in Figure 1.

Figure 1 A model of household water consumption



Methodology

To evaluate consumers' attitudes towards reducing household water consumption across the target population, residents of a large, regional centre in Australia were surveyed. The procedure was typical of other TPB studies in the literature (e.g., Prugsamatz, Lowe and Alpert, 2010) and followed the broad suggestions of the TPB manual (e.g., Francis et al., 2004). Key constructs from the TPB were measured (i.e., future intentions to save water, attitudes towards saving water, perceived behavioural control, social norms), and perceived water right, perceived moral obligation, institutional sentiment towards the water authority, and other demographic characteristics identified in the literature as being linked to the consumption of water, were included to enhance the precision of estimates within the model. Participation in Project Hydro

was also recorded based upon sampling participants and non-participants within a quasi-experiment.

Focus group discussions

Four focus groups were conducted at the outset of the study, with findings from this exploratory research used to inform development of the survey instrument. Participants in the focus groups were randomly selected from the target population based on respondents from previous surveys who had shown an interest in further participation and others who were recruited from a newspaper advertisement. Three of the focus groups consisted of householders, with each group evenly represented by gender, but differing by age (18-34, 35-55, 55+). The fourth group were Project Hydro participants and this group was relatively evenly represented by gender and age group. Each group had eight participants and lasted about 90 minutes.

The focus groups enabled interaction between a diverse group of water consumers to explore the nature, extent and drivers of changing water use, and to understand the potential moderating effects of demographics on water use behaviours. The Project Hydro focus group also examined motivations for participation in Project Hydro. Within all groups significant discussion revolved around the performance of the water company and the individual personal responsibilities of householders to help sustain local water resources. A professional facilitator was used to manage the process and findings from the facilitator were then fed back to researchers to include, where relevant, within the survey instrument.

Key themes that emerged from the focus groups supported some of the hypotheses developed here. For example, participants indicated very positive attitudes to conserving water, perhaps because of the obvious and severe problems that over consumption may lead to in the future. Likewise, social norms were a key theme with significant concern that other individuals might

not be actively reducing their water consumption. Subjects were suspicious about free riders not “doing their bit”, enhancing the notion of an attitude that water conservation is a community issue. For example, one respondents commented:

“The longer I hear the message, the more frustrated I become with other people who don’t listen (participant, 55+ age group)”

Consequently, participants seemed to indicate a great deal of social pressure to reduce household water use. Other participants indicated that the general expectation within the community was that water should be saved, and expressed concern and annoyance about residents “shirking” on their responsibilities. This reflected a strong degree of perceived moral obligation. In a similar vein, respondents regularly commented that even though indoor water use was not regulated, conservation of water within the house was the “fair” and “right” thing to do given the current water situation:

“...frightening idea of what will happen if we do run out of water...it’s terrifying (participant, 18-34 age group)”

In summary, the focus groups indicated the importance of subjects’ attitudes to conserve water, their attitudes towards the installation of water saving devices, their ability to control changes in their water use (e.g., due to water saving devices being too expensive), a strong role of social influence, institutional sentiment towards the water authority’s management of the water situation, and personal values congruent with a perceived moral obligation. Other demographic and socio-economic characteristics were also brought up within the discussions (e.g., families with teenage children were likely to find it more difficult to conserve water).

Measurement

Measures for constructs were taken from the TPB Manual (Francis et al., 2004) and were refined based on the context of this research and the four focus group discussions. The measures were

presented to respondents as statements anchored by Likert scales from 1 (strongly disagree) to 5 (strongly agree). For the TPB variables attitude towards water conservation was measured by averaging two statements, including ‘Conserving water will save my household money’ and ‘Conserving water will reduce my impact on the environment’. Perceived behavioural control was measured by averaging two statements, including ‘The decision to use less water in my household is beyond my control’ and ‘The decision to install water-saving appliances in my household is beyond my control’. Social norms were measured by multiplying consumers’ injunctive norms (i.e., ‘Most people whose opinions I value would approve if I used less water’ and ‘Most people whose opinions I value would approve if I installed water saving appliances’) by their motivation to comply (i.e., ‘Generally speaking, I care greatly what important people in my life think I should do’). Perceived moral obligation and perceived water right were each measured by single items derived from Lam (1999), and included the statements ‘Water is a really scarce resource in our city and must be carefully conserved’, and ‘It is my right to use as much water as I want when I want’. Institutional sentiment towards the water authority’s management of water resources was measured based on the conception of trust outlined in (Jorgensen et al., 2009), and included four statements: ‘I feel quite optimistic that the future of the water situation in <____> is improving’, ‘<____> has done a good job assisting the community to save water’, ‘<____> is managing our water resources effectively’, and ‘<____> provides me with enough information to help me manage the current water situation’. Future intentions to conserve water were measured by two items, including ‘I plan to use less water in my household over the next twelve months’ and ‘I plan to install water-saving appliances in my home over the next twelve months’. Participation in Project Hydro and a variety of demographic characteristics (gender, number of children, homeownership status, age and income) were also measured.

Although the majority of the constructs were measured by at least two items, perceived moral obligation and perceived water right were each measured by one item. This was based on the dimensions of each construct extracted from the focus group discussions, and is also consistent with prior research on water conservation behaviour (e.g., Lam, 1999). The use of single item and shortened scales follows a growing trend in marketing research and TPB studies to use more parsimonious scales (e.g., Drolet and Morrison, 2001; Gironda and Korgaonkar, 2014), which can perform just as well as longer scales (Bergkvist and Rossiter, 2007; Rossiter, 2002), and which are particularly important for research involving commercial partners. Although the conventional approach in marketing science is to use multiple-items, the use of single item and shorter measures has been advocated for ethical reasons and is common within similar large scale social surveys (Eisinga et al., 2013), to reduce participant burden and fatigue, which can lead to lower quality responses and reduced response rates.

Data collection and sample

The surveys administered to the two groups (i.e., participants and non-participants in Project Hydro) were conducted by a professional market research organisation using Computer Assisted Telephone Interviewing (CATI). CATI was deemed the appropriate choice for administering the survey because, i) it allowed random sampling from the two populations to facilitate statistical inference, ii) it allowed survey protocols to be put through to the adult responsible for household budget management, and iii) call back arrangements could be made in an efficient manner to reduce non-response issues. The survey of non-participants was administered randomly to residents of the location covered by Project Hydro, but who were not participants in that project, and who were connected to the distribution system of the water authority. The survey of Project Hydro participants was conducted by randomly selecting households from the 2,041 participating

households. The interviews were conducted over a six week period during the weekdays and weekends to maximise the chances of capturing a representative cross section of the target population. In total there were 599 respondents from the general population (a response rate of 34 per cent based on contacting 1762 residents), and 310 respondents from the Project Hydro target population (a response rate of 58 per cent based on contacting 535 Project Hydro participants).

The characteristics of the samples are shown in Table 1. Although there are some small differences between the samples on some characteristics (e.g., respondents in the Project Hydro group were more likely to be males and were more likely to be aged over 70), they were largely similar. The samples also broadly reflected the characteristics represented in other water usage studies (e.g., Randolph & Troy 2008) in terms of socio-demographic characteristics. The presence of non-response bias was estimated in two separate ways. Firstly, following the procedures of Armstrong and Overton (1977), differences between early respondents and late respondents was not detected. In light of the survey being conducted over the telephone early respondents were classified as those who responded to the survey invitation on the first call, and late respondents were classified as those who could not take the call the first time, but who were given a call back on their agreement, and who responded. Thus, late respondents were people delaying responding to the survey, and they were no different in terms of post code and other individual characteristics from the early respondents. Secondly, those respondents who were contacted, but did not wish to participate further, were asked if they would respond to the two questions on future water consumption intentions. For those respondents who answered these questions, their responses were similar to those who responded to the entire survey, again suggesting that non-response bias was not a significant problem.

Table 1 Characteristics of the sample

		Survey Returns (%)		
		Project Hydro (n=310)	General Residents (n=599)	Total
<i>Gender</i>	Male	46	39	41
	Female	54	61	59
<i>Age</i>	18-24	1	3	2
	25-29	2	2	2
	30-39	10	16	14
	40-49	14	20	18
	50-59	21	25	23
	60-69	23	21	22
	70+	28	14	19
<i>Income (AUD\$000's pa)</i>	<10	2	2	2
	10-19	15	14	14
	20-39	25	22	23
	40-59	20	19	20
	60-99	22	24	23
	100+	16	19	18
<i>Household</i>	Live alone	23	21	21
	Share-house	6	5	5
	Couple with children	31	35	34
	Couple without children	35	32	33
	Single parent	5	6	6
	Other	1	2	2
<i>Property tenure</i>	Owned outright	67	52	58
	Owned with mortgage	32	33	33
	Rented	1	14	10

Analysis and results

Measure validity

Using standard measures of internal consistency is not appropriate for this study given the majority of measures are formative in nature (Diamantopoulos and Winklhofer, 2001). However,

the constructs exhibit content validity, given their derivation from the focus group discussions, and exhibit nomological validity based on comparisons of the sign and magnitude of the coefficients within the standard TPB model. The TPB constructs correlate with each other in the way intended and have comparable average coefficients (see Table 2) to those identified from a TPB meta-analysis of 187 independent studies (Armitage and Conner, 2001). This suggests that the measures used are accurate representations of the underlying constructs.

Descriptive statistics: Overall perceptions about reducing household water consumption

Descriptive statistics for the constructs are shown in Appendix 2. A one-sample t-test was conducted on each construct to evaluate whether their mean was significantly different from neutral (i.e., a rating of 3 on a 5 point scale). Mean attitude towards reducing water consumption was relatively high ($M = 3.79$, $t_{908} = 22.35$, $p = .000$). The effect size d of 1.48 indicates a strong positive attitude towards water conservation overall. Mean behavioural intentions to conserve water were above neutral ($M=3.10$, $t_{908} = 2.45$, $p = .015$) indicating a small intention to consume less water over the subsequent 12 months ($d = .16$). As such respondents tended to have a highly positive attitude towards conserving water but only mild behavioural intentions to reduce future water consumption. This is consistent with water consumption having been reduced by a number of significant measures. Further reductions would require major behaviour changes if not accompanied by increased investment in water efficient devices. (respondents had been living in a drought for several years and may have felt that they could do little more to reduce their consumption further, and this may have accounted for the mean observed here).

Mean perceived behavioural control scores (1=high control, 5=low control) were quite low ($M=1.91$, $t_{906} = -29.49$, $p = .000$) indicating that individuals perceived a strong degree of control ($d = 1.96$) over the decision to save water. Mean social norms were slightly lower than neutral

($M=2.48$, $t_{868} = -10.23$, $p = .000$), indicating a moderate level of disagreement about the influence of significant others ($d = .69$). Mean institutional sentiment towards the water authority was higher than neutral ($M=3.25$, $t_{906} = 8.31$, $p = .000$) indicating a moderate degree of positive sentiment towards the water authority's management of the water problem ($d = .55$). Interestingly, mean perceived moral obligation was extremely high ($M=4.77$, $t_{909} = 92.89$, $p = .000$) indicating that respondents tended to perceive there was a very strong moral obligation to use less water ($d = 6.16$). Likewise, mean perceived water right was very low ($M=1.68$, $t_{899} = -36.35$, $p = .000$) indicating that individuals, in general, disagreed that they had the right to use as much water as they wanted ($d = 2.42$). This finding is largely consistent with Phipps and Brace-Govan (2011, p. 2), who argue that individuals' have '...shifted their perspective on water consumption from a right to consume, to a view that water needed to be consumed responsibly.'

Comparison of the conventional TPB model with the augmented model

We compare the validity of the augmented TPB framework against the standard TPB framework using Ordinary Least Squares regression following the procedures outlined in Hair et al. (2010). Assumption testing was conducted before and after testing of the augmented TPB according to the guidance offered in Hair et al. (2010), and did not indicate any severe issues within the dataset (e.g., after assessing multicollinearity, heteroscedasticity, and normality of the residuals). The two statistical models are compared in Table 2 using the F-test for model comparison. Overall the conventional TPB model performs acceptably ($R^2 = .159$, $F_{3, 738} = 46.667$, $p = .000$). Attitude towards water conservation increases intention to conserve water ($\beta_{AWC} = .333$; $p = .000$), and social norms increases intention to conserve water ($\beta_{SN} = .140$; $p = .001$). However, perceived behavioural control does not appear to be associated with intention to

conserve water ($\beta_{PBC} = -.026$; $p = .444$), indicating some degree of support for the basic TPB model in the water consumption context.

After the addition of perceived moral obligation, perceived water right, institutional sentiment towards the water authority, participation in Project Hydro, the interaction between participation in Project Hydro and perceived behavioural control², and the other demographic variables, model fit improves and the nature of some of the relationships between the TPB antecedents changes somewhat. Firstly, overall, the TPB for water consumption performs acceptably ($R^2 = .224$, $F_{15, 726} = 13.950$, $p = .000$) and the R^2 improves over the conventional TPB in a substantively and statistically significant way (F of $R^2 = 5.010$, $p = .000$). The R^2 values reported here are sufficient for data such as this given that lower R^2 values are typically associated with cross-sectional data, primary data, and large sample sizes (Reisinger, 1997). Furthermore, the values reported here are quite typical of other TPB studies (e.g., Lam, 1999; Shaw et al., 2000), and are consistent with average R^2 values reported in meta-analysis studies on the TPB (Armitage & Conner, 2001).

The explanatory variables in the augmented TPB model

Attitude towards water conservation increases intention to conserve water (H_1 , $\beta_{AWC} = .265$; $p = .000$), supporting hypothesis 1, and social norms increases intention to conserve water (H_2 , $\beta_{SN} = .113$; $p = .002$), supporting hypothesis 2. With the addition of the new variables perceived behavioural control also becomes statistically significant and reduces intention to conserve water (H_3 , $\beta_{PBC} = -.070$; $p = .097$) at the 10 per cent level of significance, providing support for hypothesis 3. With the addition of the new variables the results become theoretically more meaningful and more consistent with the conventional TPB model. Thus, adding the new

² The interaction term was assessed following the procedures outlined in Hair et al. (2010), where the main effects model was compared against the model with main effects and the interaction term using an F-test for model comparison. The model with the interaction term had a better model fit using the F-test $F_{1,905}=6.63$.

variables not only improves the explained variance in behavioural intentions, but also improves the theoretical meaningfulness of the results in this context, and the consistency of the model with other TPB studies (Armitage & Conner, 2001; Sheppard et al., 1988).

Perceived moral obligation is not associated with changes in intention to conserve water (H_4 , $\beta_{PMO} = .038$; $p = .272$), not supporting hypothesis 4. Perceived water right is positively associated with intentions to reduce water consumption (H_5 , $\beta_{PWR} = -.077$; $p = .026$), supporting hypothesis 5, and institutional sentiment towards the water authority is positively associated with intentions to reduce water consumption (H_6 , $\beta_{AWA} = .082$; $p = .027$), supporting hypothesis 6. Interestingly, participation in Project Hydro as a main effect is not associated with intentions to conserve water (H_7 , $\beta_{PA} = -.056$; $p = .393$), not supporting hypothesis 7, but it's interaction with perceived behavioural control is associated with intentions to conserve water at the 10 per cent level of significance (H_8 , $\beta_{PA \times PBC} = .116$; $p = .093$), providing support for hypothesis 8. In other words participation in Project Hydro alone is not sufficient to reduce water consumption, but participation in Project Hydro is likely to reduce water consumption *if individuals perceive they have a sufficient level of control over the decision to reduce their water consumption*.

For the socio demographic variables, home ownership status ($\beta_{HO} = -.011$; $p = .754$) and gender ($\beta_{GE} = -.025$; $p = .450$) are not associated with intentions to conserve water, consistent with other research. Whether or not the household has children is positively associated with intentions to reduce water consumption ($\beta_{CHILD} = .078$; $p = .039$). The age range of 18-39 years is positively associated with intentions to conserve water ($\beta_{AGE1} = .168$; $p = .000$) and the age range of 40-59 years is positively associated with intentions to conserve water ($\beta_{AGE2} = .148$; $p = .001$). This implies that water conservation intentions are lower for respondents aged more than 60 years of age. Neither respondents with a medium income ($\beta_{INCM} = .009$; $p = .829$) or respondents

with a high income ($\beta_{\text{INCH}} = .047$; $p = .272$) are associated with intentions to conserve water, so income does not appear to be a relevant factor in explaining intentions.

Table 2 Comparison of the TPB with the augmented TPB for water consumption

	Variables	Standardized β (Std. Error)	Zero- order	Partial	Part	Tolerance (VIF)
TPB ($R^2 = .159$, F of $R^2 = 46.667^{***}$)	AWC	.333 ^{***} (.040)	.376	.326	.317	-
	SN	.140 ^{***} (.037)	.242	.143	.133	-
	PBC	-.026 (.029)	-.025	-.028	-.026	-
TPB_{Water Consumption} ($R^2 = .224$, F of $R^2 = 5.010^{***}$)	AWC (+H₁)	.265 ^{***} (.043)	.376	.249	.226	.731 (1.368)
	SN (+H₂)	.113 ^{***} (.029)	.242	.117	.104	.841 (1.190)
	PBC (+H₃)	.070 [*] (.046)	-.025	-.062	-.054	.597 (1.674)
	PMO (+H₄)	.038 (.068)	.138	.041	.036	.903 (1.107)
	PWR (-H₅)	-.077 ^{**} (.038)	.029	.083	.073	.895 (1.117)
	SWA (+H₆)	.082 ^{**} (.046)	.227	.082	.072	.773 (1.293)
	PH (+H₇)	-.056 (.165)	.038	-.032	-.028	.248 (4.033)
	PHxPBC (+H₈)	.116 [*] (.093)	.066	.062	.055	.223 (4.489)
	HO	-.011 (.149)	-.042	-.012	-.010	.837 (1.195)
	GE	-.025 (.082)	-.055	-.028	-.025	.942 (1.062)
	CHILD	.078 [*] (.098)	.172	.076	.068	.742 (1.348)
	AGE1	.168 ^{***} (.139)	.158	.134	.119	.506 (1.976)
	AGE2	.148 ^{***} (.110)	.116	.120	.107	.521 (1.918)
	INCM	.009 (.100)	.077	.008	.007	.625 (1.599)

INCH	.047 (.131)	.080	.041	.036	.598 (1.673)
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**** $p < .001$ *** $p < .01$ ** $p < .05$ * $p < .10$

Note: Dependent variable=future intentions to conserve water, AWC=attitudes towards water conservation, SN=social norms, PBC=perceived behavioural control, PMO=perceived moral obligation, PWR=perceived water right, SWA=Institutional sentiment towards the water authority's management of the water problem, HO=homeownership (home owners vs. renters), GE=gender (male vs. female), PH=participation in Project Hydro (participants vs. non-participants), CHILD = if respondent has children (children vs. no children), AGE1 = 18-39 years of age vs. 60+ years of age AGE2 = 40-59 years of age vs. 60+ years of age, INCM = medium income vs. low income, INCH = high income vs. low income

Discussion, and implications for theory and practice

This research sought to understand key non-price drivers of household water consumption in the context of Project Hydro, a social marketing programme aimed at reducing water consumption. Though individual level behavioural data was not collected for this study, aggregated statistics reveal household water consumption in the area decreased to 142 litres after Project Hydro ended, supporting the findings here (Essential Services Commission, 2010).

This study contributes in the following ways. Through a detailed exploration of Project Hydro it provides a case study which explores the use of social marketing for the purposes of demarketing household water consumption by an industry supplier. Few other similar examples of this exist within the literature (a notable exception being the Truth anti-tobacco programme by Peattie & Peattie, 2009). It then develops and empirically verifies a comprehensive conceptual model of household water consumption, based upon the TPB, a widely used and highly cited model of volitional behaviour change. Some other models exist within the environmental management literature (e.g., Jorgensen et al., 2009; Lowe et al., 2014) but remain untested.

As with most survey research, the generalisability of such research is limited to the population of interest. This study was undertaken in a drought affected area of Australia and the context does limit the ability to generalise the results from this study to other regions with different

environmental, social and cultural characteristics. However, context specific work is important to further develop our understanding of theory, which can be validated and replicated in other contexts (see, for example, Zainuddin et al., 2011 or Vargo and Lusch, 2008). Despite this limitation, the study also contributes by developing a standardised instrument and conceptual framework for understanding the relationship between residential water use attitudes, beliefs and behaviour. This provides the opportunity for future research to test the replicability of this study's findings in different contexts by assessing the influence of location and time (Rea & Parket, 2012). Specific findings and their theoretical and managerial implications are now discussed.

Attitudes towards water conservation, perceived behavioural control, social norms and participation in the programme

The results here show that the conventional TPB model is valid in explaining intentions to conserve water. Given the TPB is a highly cited model to explain volitional behaviour change this substantiates the findings here. By augmenting the TPB (Figure 1) with the new constructs (e.g., perceived water right, institutional sentiment towards the water authority, the interaction between perceived behavioural control and participation in the water saving programme etc.), the explanatory power of the model was enhanced and perceived behavioural control became a statistically significant predictor of behavioural intentions. Thus inclusion of these new variables statistically and substantively improves the model. Therefore, despite its influence and widespread application in behaviour change research (Armitage & Conner, 2001; Sheppard et al., 1988), the findings here indicate the importance of modifying the TPB model based upon its context and highlight the key drivers of behaviour change for reducing water consumption.

Consistent with prior TPB research (e.g., Shaw et al., 2000) the results here showed that attitudes have the greatest effect upon intentions to consume less water (H₁). As such, a key focus

for policy makers is focusing on changing consumer attitudes towards consuming water. Therefore, voluntarist approaches to behaviour change (Dobson, 2007) are an integral part of the policy maker's toolbox, and are likely to be key contributors to longer lasting behavioural change. Also consistent with other TPB research, and supporting the validity and generalisability of the main constructs in the model, social norms were shown to influence behavioural intentions (H₂). Though the influence of social norms on behaviour is well documented, recent research highlights the fact that individuals are largely unaware of its impact upon them (Griskevicius et al., 2008), and as such communications which make social norms more salient are an important behaviour change lever. For example, research into electricity consumption shows that consumption can be reduced by pitting consumers against one another, relating their consumption patterns to those of significant others (e.g., Schultz et al., 2007). Individuals who have consumed less electricity than their peers will receive a smiley face on their electricity bill, showing their consumption against others in the neighbourhood, and individuals who have consumed more electricity than their peers will receive a frowning face on their electricity bill. The results from this research suggest that a similar mechanism may also be effective for water consumption. Furthermore, given the importance of social norms it would seem pertinent to ensure such messages are communicated to students within schools in their formative years, through education initiatives.

However, changes to attitude must be coordinated with a wider behaviour change programme designed to heighten perceptions of control over changing the behaviour (H₃). Therefore, participation in the water saving programme alone was not sufficient to reduce water use intentions (H₇). Instead, participation was effective in reducing water use intentions if coupled with respondents' perceptions that they had control over water consumption decisions (H₈). For example, the program may well be influential in changing *attitudes* towards the consumption of

water but if an individual feels that their taps, shower heads and toilets are out of date and inefficient then they are less likely to change their behaviour. Therefore, behavioural change programmes must focus not only on changing attitudes in order to reduce consumption, but also on increasing individuals' perceived behavioural control, as was the case with Project Hydro (e.g., by influencing their actual behavioural control or by re-educating the target market about usage). Indeed, one distinguishing characteristic of the social marketing programme was a focus on *enabling* behaviour change through incentivised installation of water saving devices, rather than simply to change attitudes. If this had not been done within Project Hydro then one outcome could have been a change to attitudes but a smaller change in intention and behaviour. Specifically, in order to translate positive attitudes and intentions into actual behaviour change, organisations must first seek to understand the factors impeding behaviour change, and then provide consumers with the means to change their behaviour through targeted approaches. This finding is consistent with recent meta-analysis research in the area of ethical consumption (Bray et al., 2011; Carrington et al., 2010) which looks at the discrepancy between attitudes and behaviours, and concludes that studies which enhance actual behavioural control tend to have a smaller gap between intention and behaviour. Technology has a key role to play here in facilitating behaviour change through enhancing an individual's level of control over a behaviour, as has been shown in other studies of sustainable consumption behaviour (e.g., Lowe, de Souza-Monteiro and Fraser, 2013).

Institutional sentiment towards the water authority

A key factor associated with water consumption was the respondents' sentiment to the water authority's management of the water situation. If they felt the water authority was doing a good job, this was a key influencer of behavioural intentions (H₆). Therefore, the notion of reciprocity

seems important in influencing people's consumption decisions. The results here illustrate that when organisations respond to their environmental challenges clear communication about how these challenges are being managed, and the results that have been achieved may invoke a sense of moral responsibility and reciprocity among consumers, who enhance their own efforts to achieve these objectives. Thus, it's not so much *what you do* that's important, but *how you communicate what you do* as an institution in charge of managing a scarce public resource. Consumers that perceive an organisation is managing resources effectively are likely to collaborate with that organisation's policies by reducing their consumption to a greater extent than what they would have done otherwise.

Despite some research advocating the importance of institutional trust (Jorgensen et al., 2009), a related but distinct concept, so far no empirical research has supported this relationship (Lowe et al., 2014). This highlights the unique and influential role of carefully designed social marketing programmes in increasing participation and interaction with an idea. We suspect that this finding is not peculiar to the context of water consumption per se, but is likely to be applicable in other similar social marketing contexts too (e.g., management of public transport, energy use, congestion, blood donations) where we see the emergence of the consumer-citizen. Wells et al. (2010) expand on this notion of consumer responsibility and highlight its importance within consumer behaviour models of climate change and other similar contexts. Likewise, McDonald et al. (2012) illustrate the unique characteristics of a similar segment of consumers termed "Translators" who are receptive to behaviour change, but who may be difficult for marketers to engage with. Therefore, sentiment towards the water authority should be seen as a central construct in models of water consumption behaviour. This implies that organisations trying to change behaviours should have clear, transparent goals and plans, and their progress towards these should be monitored and communicated clearly to consumers and residents. One issue, for

example, within the City of London, is that leaking water pipes based on infrastructure that is 150 years old could lead to severe water shortages (BBC, 2005, 2012). While it may not be cost effective to divert resources to fixing pipes on a large scale, and accepting some wastage, the notion of reciprocity would imply that fixing the pipes might enhance sentiment towards the company and encourage City residents to reduce their own consumption by “buying in” to the company’s plans.

Perceived water right and perceived moral obligation

The results indicated perceived water right is another important determinant of intentions to consume water (H₅). Interestingly, this is the first time in the literature that this effect has been empirically illustrated. In other studies (e.g., Lam, 1999) the effect has been hypothesised but only marginally empirically supported, providing strong evidence of the need to augment the TPB in household water consumption models. For the data presented here, average perceived water right was relatively low (M = 1.68), indicating that individuals did not perceive a strong, universal right to use water according to one’s own self-interest. However, in cases where a perceived water right may be stronger (e.g., the UK), marketing communications designed to reduce water consumption might try to focus on reducing an individual’s perceived water right by using appeals to change respondents’ values. In light of the heterogeneity among consumers in terms of their perceived water right, organisations should initially seek to understand the degree to which consumers perceive water as a right and this should have a bearing on how future marketing programmes and communications are designed. In this situation, household water might be repositioned as a product with economic and environmental costs, or repositioned as a privilege, rather than a right. This would also be consistent with the literature on consumer citizenship, which highlights the importance of understanding ethical consumption decisions

through the notion of consumer responsibility (Wells et al., 2010). On the other hand, if individuals within an area had a low perceived water right (e.g., Australian consumers) then appealing to consumer sentiments about water rights might not have much impact on water saving, so other appeals should be used.

Consistent with other studies in the water management literature (e.g., Lam, 1999), perceived moral obligation did not affect intentions to reduce water consumption, despite its intuitive appeal and despite its theoretical foundations (H₄). However, on closer inspection of the data it should be noted that mean perceived moral obligation was extremely high ($M = 4.77$) on a scale anchored by 1 (strongly disagree) and 5 (strongly agree), with 83 per cent of respondents strongly agreeing, and 14 per cent agreeing with the statement. It could be that respondents' perceptions were exacerbated within this research context because of the prolonged drought. As such it is difficult to statistically discern its impact within water consumption models. In light of this research could focus on developing more accurate measures of the construct.

Future research and limitations

Though Project Hydro achieved its objectives of reducing daily water consumption to below 150 litres per person over a two year period (Essential Services Commission, 2010), and though the TPB is a widely cited and robust model of volitional behaviour, it should be noted that individual level behavioural data was not collected in this study. In light of a clear attitude-behaviour gap in ethical consumption situations (Bray et al., 2011; Carrington et al., 2010), future research should take this into account through study design. It is not always possible to collect individual level behavioural data, but recent meta-analysis studies suggest key factors that could reduce this attitude-behaviour discrepancy. For example, Bray et al. (2011) find several factors that impede the strength of the relationship between attitudes and behaviour, including inertia and

habit, enhancing actual behavioural control, negation of responsibility and scepticism about what they as individuals could achieve. Many of these factors were taken account of in Project Hydro, and in this study (e.g., enhancing control over consuming less water, and measuring perceived moral obligation), but by implication, future research should explicitly consider these factors.

Despite widespread use of the TPB, other alternative models exist which could add to our understanding of behaviour change in this context. For example, the Integrative Model of Behavioural Prediction (Fishbein, 2008) builds upon the TPB by including other important constructs such as respondents' environmental constraints and their knowledge and skills. Thus, further research could examine water consumption decisions using other behaviour change models, and this may help to augment our explanation of the behaviour. Given its slight skew towards an older demographic future research could also be conducted on younger consumers.

It should also be noted that some of the press activity surrounding Project Hydro could have carried over to the general population (e.g., the control group). However, Project Hydro was more than just a social advertising programme and included a range of measures which only participants in the scheme were involved with. Despite this limitation the possible influence of some of the press activity on the general population appears to make these findings even more robust. Future research could examine these issues using statistical techniques such as propensity score matching, which would enable a more accurate understanding of the effect of the programme. Simple comparison of means across groups using the current data would assume homogeneity of the samples between groups, and any differences observed could potentially be due to individual differences (e.g., greater environmental friendliness etc.) rather than the programme itself. The use of such techniques would enable the researcher to partial out any differences in beliefs and intentions attributed to individuals.

This research used a series of shorter, parsimonious scales to measure the constructs under

investigation. Longer scales may have provided more accurate measures of the constructs under investigation. However, there was evidence in this research that the scales exhibited nomological validity as well as content validity. As such we believe the benefits from having conducted this research outweigh the possible limitations of the shorter scales used.

Conclusion

This was one of the first studies to develop a comprehensive model of water consumption behaviour, drawing on the Theory of Planned Behaviour, a highly cited and widely used model for understanding behaviour change. While much research has been conducted on the supply side of the water management problem, little research has been conducted on the non-price drivers of water consumption. Therefore, the research presented here provides a contribution to the literature on social marketing by illustrating the key drivers of voluntary behaviour change with respect to water consumption, and highlights the role of social marketing in providing a solution to complex social issues that remain politically contentious.

Appendix 1 Characteristics of Project Hydro Contrasted against Andreasen's (2002) Benchmarks

Adapted from Andreasen's (2002) Benchmarks	Project Hydro
1. Behaviour-change is the benchmark used to design and evaluate interventions.	<ul style="list-style-type: none"> • Project Hydro was a local social marketing programme with a target of reducing water consumption to less than 150 litres per person day.
2. Projects consistently use audience research to (a) understand target audiences at the outset of interventions, (b) routinely pretest intervention elements before they are implemented, and (c) monitor interventions as they are rolled out.	<ul style="list-style-type: none"> • The project was pretested and trialled in a small country town and was initially evaluated through the use of focus groups. Feedback on attitudes from the community was a central feature of this. This was repeated on a small scale in a larger town prior to the full launch of the Project Hydro program. • Once launched, Project Hydro included extensive feedback through focus groups and questionnaires. • Over the life of the project and reported in the Water authority's annual report, the impact of Project Hydro was evaluated in qualitative and quantitative terms. It is important to note that the project worked very closely alongside the other initiatives.
3. There is careful segmentation of target audiences to ensure maximum efficiency and effectiveness in the use of scarce resources.	<ul style="list-style-type: none"> • Initially, segmentation was done geographically in recognition of the need to capture residents within the water authority area. However, it was more difficult to segment <i>within</i> the geographical area given the nature of household water as a public good. Initial audience research (see benchmark 2) did reveal a number of factors relevant to understanding water consumption behaviour, including: i) the perceived lack of control that larger families had over water consumption in the household, and ii) the importance of the convincing the bill payer within the household about the need to adopt water saving and water storage devices, This assisted in the development of subsequent benchmarks (see benchmarks 4, 5 and 6).
4. The central element of any influence strategy is creating attractive and motivational exchanges with target audiences.	<ul style="list-style-type: none"> • Though many residents had a positive attitude toward reducing household water consumption, audience research revealed a number of ways in which the act of behaviour change could become more attractive to residents, including enhancing their perceived control over the behaviour (e.g., subsidising water saving devices and rainwater collection tanks), educating them about simple ways to change the behaviour, and motivating the behaviour through a focus on social norms (e.g., providing prizes to residents for good practice which were communicated to other residents via the website). There were also draws and competitions that Project Hydro participants were entered into. • An interesting aspect of the positioning of Project Hydro was that it focused on enabling behaviour change by providing the means to reduce water use. It also operated in an environment where a number of other measures approached that goal through exhortation, penalties, involvement of the whole community including industry and some limited restrictions. These factors influenced the environment for attitude and behaviour change and created a positive and supportive environment for households to act.
5. The strategy attempts to use all four Ps of the traditional marketing mix; for example, it is not just advertising or communications.	<ul style="list-style-type: none"> • <i>Promotion/social communication:</i> Local advertising and leafleting was conducted. Regular community consultations were held for participants, which involved focus groups and water company presentations. Participants were also involved in education initiatives including information on how to be a 'smart' water user. The water authority maintained a website which provided details of the programme and

-
- monitored progress towards the goals. Citizens were also able to report on households thought to be flouting on restrictions.
- *Product/proposition*: The proposition in this case was using less water. However, physical products were also involved through the distribution of retrofit water-saving devices and advice about comparative water use and sources for saving water. Water supplied to households through the state distribution system remained the same throughout the period of Project Hydro. However, participants who installed rainwater tanks (see placement/distribution) were able to use rainwater, rather than water supplied from the water authority, to perform water intensive tasks (e.g., clothes washing, flushing etc.).
 - *Placement/accessibility*: Participants were provided with subsidised installation of water saving devices and retrofits to leaking systems to facilitate distribution and take-up of the products. Participants were also provided with subsidies to install rainwater tanks which could be linked to other water using devices within the home (e.g., toilets and washing machines). Water restrictions were in place also.
 - *Price/cost of involvement*: Price was not altered during the programme because price setting was governed by regulatory control via the Essential Services Commission. The price of water is based on a fixed and variable charge through a two part tariff. An interesting aspect of adoption of Project Hydro is that it was unlikely to reduce significantly the size of water bills. The price of retrofit water saving devices was subsidised.
6. Careful attention is paid to the competition faced by the desired change behaviour.
- The competition was less controlled water use. Initial audience research (see benchmark 2 above) revealed factors competing with the desired behaviour change, including: i) a positive sentiment to repair leaking equipment and adopt water saving devices and rainwater collection tanks, yet a negative perception of the cost in doing so, ii) family composition with larger families perceiving a lack of control of their children's behaviours, and iii) neighbours flouting restrictions. This led to a range of initiatives manifested through adaptations to the marketing mix such as subsidised water saving devices and rainwater collection tanks, education initiatives for children, simple tools such as the 3-minute shower timer, and the ability for residents to inform on neighbours who were disregarding water restrictions.
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Appendix 2 Construct Measures and Descriptive Statistics

Construct	Items	Project Hydro (n=310) Mean (St.Dev.)	General Residents (n=599) Mean (St.Dev.)	Total (n=909) Mean (St.Dev.)
FI	I plan to use less water in my household over the next twelve months	3.18 (1.13)	3.06 (1.24)	3.10 (1.21)
	I plan to install water-saving appliances in my home over the next twelve months			
AWC	Conserving water will save my household money	3.92 (.95)	3.74 (1.13)	3.79 (1.08)
	Conserving water will reduce my impact on the environment			
PBC	The decision to use less water in my household is beyond my control	1.87 (1.08)	1.93 (1.13)	1.91 (1.11)
	The decision to install water-saving appliances in my household is beyond my control			
SN	Most people whose opinions I value would approve if I used less water (normative belief)	2.53 (1.47)	2.46 (1.50)	2.48 (1.49)
	Most people whose opinions I value would approve if I installed water saving appliances (normative belief)			
	Generally speaking, I care greatly what important people in my life think I should do (motivation to comply)			
PMO	Water is a really scarce resource in our city and must be carefully conserved	4.80 (.55)	4.76 (.59)	4.77 (.58)
PWR	It is my right to use as much water as I want when I want	1.58 (.99)	1.73 (1.14)	1.68 (1.10)
SWA	I feel quite optimistic that the future of the water situation in < ____ > is improving	3.36 (.95)	3.19 (.99)	3.25 (.98)
	< ____ > has done a good job assisting the community to save water”			
	< ____ > is managing our water resources effectively			
	< ____ > provides me with enough information to help me manage the current water situation			

Note: FI=future intentions to conserve water, AWC=attitudes towards water conservation, SN=social norms, PBC=perceived behavioural control, PMO=perceived moral obligation, PWR=perceived water right, SWA=institutional sentiment towards the water authority’s management of the water problem,

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