Water Efficiency Conference 2018

Public awareness of and attitudes towards water use and its conservation

Joshua Ward and James O. Jenkins*
School of Life Sciences, University of Hertfordshire, College Lane, Hatfield, Hertfordshire, AL10 9AB.

ABSTRACT

Understanding how the public views water use and its conservation is crucial to the effective management of water resources. More often than not such research is limited by geographical location. Therefore, with behaviour change playing an ever greater role in the management of water resources, there is a growing need to better understand how the public views water use and it conservation in particular locations. This is crucial to the development of more informed and robust policy decisions. As a result, this paper presents the findings of a small-scale research project that sought to expand the geographical scope upon which our understandings of water use and its conservation are based i.e. the county of Buckinghamshire in the United Kingdom. Questionnaires were administered to 60 members of the general public, with the issues of awareness and attitudes towards water; current consumption behaviours; and potential barriers to increasing domestic water efficiency being explored. The results of the study are shown to support previous research findings in the area of public awareness of water use and its conservation, most notably in relation to being unaware of consumption levels and the impact gender can have on engagement. It is concluded that the findings of the study support further the need for not only ongoing research but awareness campaigns targeted at changing social norms toward the need for water efficiency, with these appearing to be associated with low awareness of environmental issues more generally.

Key Words: water use, water conservation, public awareness, Buckinghamshire, United Kingdom.

*Tel: +44 (0)1707 284544
E-mail address: j.o.jenkins@herts.ac.uk

1. INTRODUCTION

Whether viewed as a natural resource, commodity or basic human right, we cannot exist without water (Adeyeye, 2014a; Beal & Stewart, 2011; Ginis, 2005; Juniper, 2013). This suggests that water should be treated with great respect, and caution applied to water resource use, yet until recently people have been naïve in their interactions with water (Allan, 2011). Citizens in developed nations are often unaware of global water supply issues, and are shielded by their government's ability to provide a consistent, safe, water supply. This sense of security is becoming increasingly scrutinised as climate change, population increase and more affluent lifestyles begin to threaten existing access to safe water supplies (Environment Agency, 2011; Medd & Chappells, 2008; ONS, 2012; Sharp *et al*., 2011; Spinks, Fielding, Price, Russell & Mankad, 2011).

Surprisingly for some, the United Kingdom (UK) is one nation showing signs of water stress, which can in part be attributed to the paradox that exists between perceived and actual water resources. The UK is often perceived as a nation with an abundance of water, yet the reality is at times significantly different. With regions varying in terms of climate, socio-economic composition and growth potential, there are areas of the UK, such as the south and south east of England that are exhibiting signs of water stress (DEFRA, 2008a; Edwards & Martin, 1995). As a result, water supply and it's security is becoming an issue of growing concern in the UK, with calls for changes in behaviour and lower levels of water consumption being increasingly made (DEFRA, 2011, DEFRA, 2008a; Environment Agency, 2008).

An important focal area for change is household water consumption. In particular, Herrington (1999) identified water consumption in England as increasing year on year, with the current average use being at 150 litres per person per day (Staddon, 2010a). This is not only a concern in terms of usage, but also because household consumption has subtler indirect impacts. For example, hot water usage in UK homes accounts for over 5% of total UK greenhouse gas emissions, equivalent to 35 million tonnes of pollution per year (DEFRA, 2008b). Water treatment and quality control also contributes to emissions and this is amplified by the fact all UK mains water is supplied to drinking quality level, despite less than 10% of mains water actually being utilised for drinking (NHBC Foundation, 2009; Orgill, Woolliscroft & Brindley, 2014). Overall, the water industry consumes 3% of total energy used in the UK, an especially significant figure when the connection between water and energy usage has not been widely acknowledged by consumers (CCW, 2015; Staddon, 2010b).

Water and energy usage are two important environmental issues, yet it can be argued consumers have not given equal attention to both resources. For instance, research by DEFRA (2007) into public attitudes and behaviours towards the environment, can be noted as highlighting that just under 50% of respondents stated they didn't pay much attention to the amount of water used at home. However, when compared to energy usage, only 23% of respondents concluded the same. This potential difference in attitudes between water and energy is a concern. Adeyeye (2014a) builds upon this and notes several UK government incentive schemes for promoting energy efficiency, but no equivalent scheme for water (Robinson & Adeyeye, 2014).

In the context of current UK policy, DEFRA's vision for the future 2030 targets increased consumer knowledge of household water use; the promotion of more sustainable behaviours; and a new average daily consumption figure of 130 litres per person per day (DEFRA, 2008a; DEFRA, 2008b). Therefore, understanding public awareness of and attitudes toward water use and its conservation is vital to achieving these visions, as the success of water initiatives often rely upon public engagement and support (Bell & Aitken, 2008; Dolnicar & Hurlimann, 2011; Knamiller & Sharp, 2009). Understanding how individuals perceive water use is also essential to the success of water demand management strategies (Edwards & Martin, 1995; Jenkins & Pericli, 2014; Jorgensen, Graymore & O'Toole, 2009; Medd & Shove, 2005; Steg & Vlek, 2009).

When seeking to understand water use attitudes, it is important to note the geographical context or location of the such research, which may in turn affect it's with applicability. Australia has been a hotbed for water use research due to pronounced water security issues (Syme, Shao, Po & Campbell, 2004; Rathnayaka *et al*., 2014; Willis, Stewart, Panuwatwanich, Capati &

Giurco, 2009). Also attitudes and awareness to water use will inevitably shift over time, with this thus necessitating the need for research to updated in order to facilitate the development of effective water demand management strategies (Adeyeye, 2014a; DEFRA, 2008a; DEFRA, 2011; Jenkins & Pericli, 2015; Medd & Shove, 2005; NHBC Foundation, 2011; Welte & Anastasio, 2010). Therefore, this study aims to not only update and enhance our knowledge and understandings of public awareness and attitudes toward water use, but to also expand the geographical context upon which from such understandings emerge.

2. METHODOLOGY

From an overarching perspective, the research undertaken for this study adopted a qualitative approach, implemented through the administration of a questionnaire to individuals over the age of 18 living in the county of Buckinghamshire. Questionnaires were administered to individuals in the key population centres of Aylesbury, Milton Keynes and High Wycombe. 20 questionnaires were administered in each location.

60 participants completed questionnaires; 30 males, 30 females. The two most common age groups were 18-30 and 51-60 year olds. Both were overrepresented when compared to the Buckinghamshire's population. Age distribution of participants is acknowledged as being distorted thus limiting the ability to assess the impact of age. However, the heavy weighting of 18-30 year olds is argued as being value particularly as previous research by Consumer Council for Water has identified this group as a priority group for further research (CCW, 2015).

From a general perspective, the questionnaire focused on exploring awareness and attitudes toward water; current consumption behaviours; and potential barriers to increasing domestic water efficiency. To aid data collection, the questionnaire was split in three sections. The first section focused on collecting data relating to gender, age, household size, tenure, engagement with environmental issues, and awareness of water use and its conservation as an issue. Section two subsequently focused on exploring respondent's awareness of water use and saving measures, with questions focusing on whether they had a water meter, how much water their household used, how much water they used per day, what the average per capita consumption in the UK was, what every day domestic activities they thought used the most water, and what water saving or storage devices they had in their household. The final section then sought to explore water use behaviour in relation showering, brushing teeth, and gardening, with attention also focusing on exploring respondents perceptions of water sufficiency in UK, how important they thought water use was in comparison with other environmental issues, whether or not they would be willing to change their behaviour to reduce their water usage, and what broad approaches would motivate them the most to save water i.e. financial, technological, education, and/or regulation.

The majority of questionnaire responses returned quantitative data that was analysed with the aid of Microsoft Excel software. In particular, Chi-squared tests, T-Tests and regression analysis were utilised for statistical analysis (Rogerson, 2011).

3. RESULTS AND DISCUSSION

To aid discussion of the results, the study findings have been split into nine sub-sections. Initially, the focus is on exploring a range of issues that serve to shape perceptions of and attitudes towards the importance of water use and its conservation. In particular, the first two sections focus on the exploring the impact of gender, households size, tenure. Following sections then focus on exploring the knowledge and uptake of water saving technologies and devices, awareness of water use, and engagement with water meters. Following these sections attention then turns to discussing that public awareness of environmental issues and its association with awareness. The final two sections focus on exploring the impact of financial concerns and the relative importance of water usage in comparison to the consumption of other utilities.

3.1 The impact of gender and household size

Previous research identifies priority groups to be the target of water usage and efficiency campaigns, with common variables and their impact worthy of research (Hurlimann, Dolnicar & Meyer, 2009; Jenkins & Pericli, 2015; Spinks *et al*., 2011). One such variable is gender. In a 2015 by CCW, young males were subsequently identified as a priority group for awareness campaigns. Study results support this finding, with it being found that twice as many females than males were interested in learning more about personal water consumption, but with equal numbers in each group feeling they could save more. This suggests awareness campaigns should seek to think carefully about how gender potentially influences engagement with water efficiency initiatives.

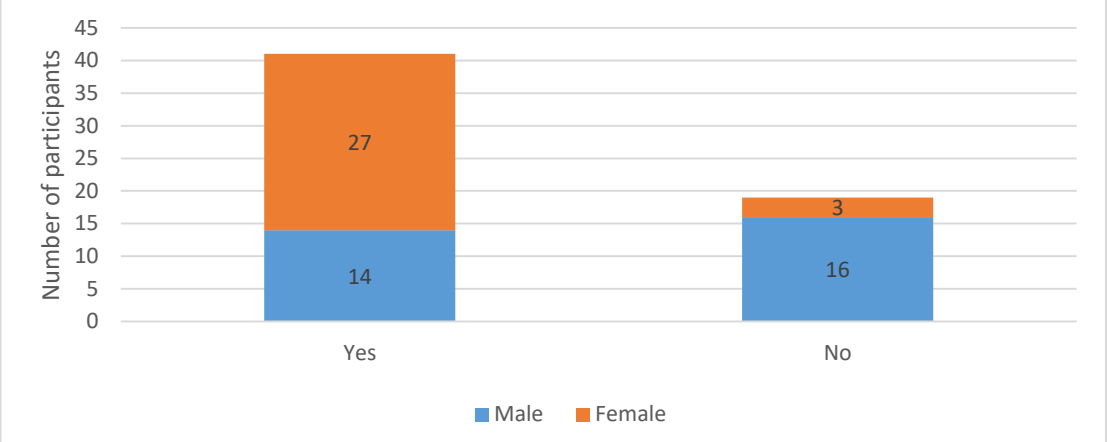

Fig. 1. Interest in learning more about personal water consumption

Household size (number of occupants) was another variable tested, with it being found that this variable did not have an impact on responses. This counters previous research in Australia and South Korea by Willis *et al*.. (2009) and Lee, Park and Jeong (2012) respectively. Subsequently this finding is argued to underscore the importance of not only treating this result with caution because it differs to that of previous research but the continued need to ensure research takes place in many national and geographical contexts so as to afford us the opportunity to construct as detailed understanding of the variables that effect water use and attitudes to its conservation in different national contexts.

3.2 The impact of tenure on water use

Tenure was tested for influence on responses due to importance in previous research (Randolph & Troy, 2008; Willis *et al*., 2009). Results suggest tenure didn't impact responses, perhaps a counter-intuitive finding. Tenants in rented properties for example, will have less say in household fittings and will not be in a position to invest in water-saving technologies – a point supported by one participant's comments.

However, one question where tenure was found to statistically significant was for ownership of water butts, as 'owned outright' (59.1%) and 'owned mortgage' properties (50%) had considerably higher ownership than rented properties (13.3%). This could impact external water consumption, and further research into the role of tenure is recommended to clarify influence.

3.3 Knowledge and uptake of water saving technologies and devices

Study results also highlighted areas for increased household water efficiency, which are essential to uncover (Jorgensen, Graymore & O'Toole 2009). 36.7% of participants were found to be unaware of internal water-saving technologies in their household, suggesting that household water audits could play a key role in identifying those properties where water efficiency could be achieved though the fitting of low cost water efficiency devices such as tap aerators (Tam & Brohier, 2014). Support this argument is that the study found that 30% of

participants thought they didn't have them in their home, and had never considered installation. One participant explicitly concluded that they had *"never heard of them"*.

Personal washing habits offer an opportunity to reduce consumption, with regular baths and long showers prevalent amongst respondents. The majority of participants stated water power was more important than time spent showering, and this could be important when trying to reduce water consumption. If modern aerators were installed that reduced flow volume but not the power 'feel', individuals could reduce shower time (NHBC Foundation, 2009; NHBC Foundation 2015). The introduction of 'eco-baths' would also assist in reducing water consumption from bathing habits.

The study also identified the potential to reduce external water usage by improving the uptake and fitting of water butts, as 70% of participants never used one. One in four participants regularly watered a garden during dry periods, and one in ten did so without using a water butt.

3.4 Public awareness and understandings of water use

Arguably the most critical finding from this study was that participants knew where they consumed the most water, but had little idea of actual consumption rates. Bathroom activities and white goods were considered the heaviest users (The Water Calculator, 2016; Waterwise, 2016). Actual water consumption showed no consensus in responses, and many estimates were surprisingly low (see Figure 2). If people don't know their real consumption rate and associated impacts, their motivation to adjust behaviours will be limited. This point highlights the need for awareness campaigns. This finding supports, and is supported by, the work of Randolph and Troy (2008) who identified that water demand management strategies would benefit from increased consumer understanding of usage (see Adeyeye, 2014a; De Franca Doria, 2010; Dolnicar & Hurlimann, 2011).

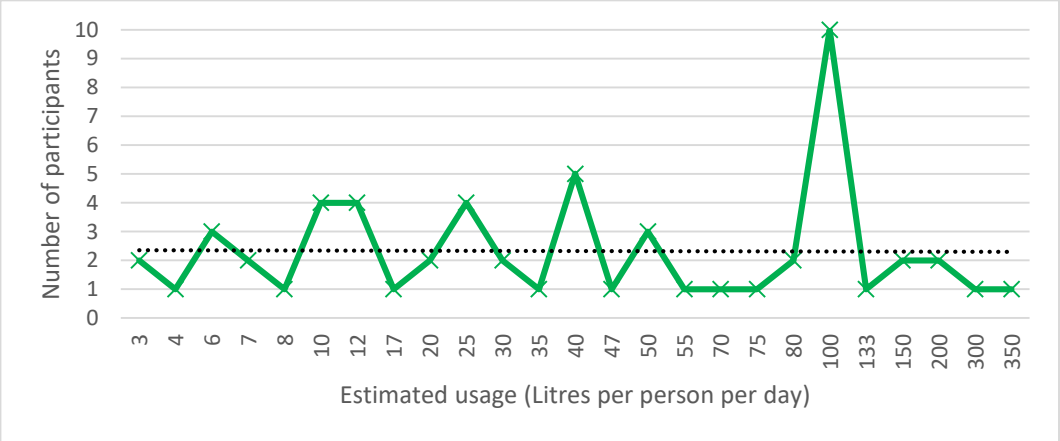

Fig. 2. Respondent estimation of household water consumption

When the influence of social norms was explored, in particular the influence of family and friends in altering consumption patterns, it was found that 45% of participants responded that this would affect their behaviour to some extent, providing support for the power of social influence on behaviours.

3.5 Water meter engagement

Engagement with water meters can influence awareness of water consumption (see CCW, 2015; DEFRA, 2008; DEFRA, 2011; Edwards & Martin, 1995; Knamiller & Sharp, 2009; Van Vliet, Chappells & Shove, 2005). However, this study found that 83.3% of participants either didn't have or had never checked their water meter. Despite this finding indicating a level of disengagement, and thus a possible explanation of poor understanding of water use, it is important to acknowledge that not all research supports the ability of metering to reduce consumption (Gadbury & Hall, 1989; Macleod, 1979; Staddon, 2010a).

3.6 Public awareness of water use and water conservation

Participant's engagement with current environmental affairs was found to be poor, with only 28.3% saying they regularly thought about with environmental issues. 30% of respondents were also found to never have encountered the topics of water use and water conservation prior to this study. This suggests awareness could be acting as a barrier to increased water efficiency, which is a particular issue that influences the success of water demand management strategies (see Ajzen & Fishbein, 1980; DEFRA, 2008b; DEFRA, 2011; Jenkins & Pericli, 2014). This is also a concern when considering the apparent influence engagement with current environmental affairs had on responses.

Participants were asked whether information on water usage was widely accessible and easy to understand. 41.7% believed information was inaccessible, highlighting a further barrier to raising awareness (Steg & Vlek, 2009). Interestingly, a separate finding countered the perceived importance of public awareness, as participant's ranked 'increased awareness' as the lowest motivator for saving water. This could be explained by adapting Burch's model of conscious competence for skill acquisition, where participants were 'unconsciously incompetent' (GTI, 2016). Awareness was ironically not seen as an issue because individuals were unaware of any knowledge deficiency.

Personal experiences were touted as one potential influence of consumption rates, and one in five participants had experienced at least 24 hours without water (Campbell, Johnson & Larson, 2004; Jenkins & Pericli, 2014; Medd & Chappells, 2008). Results showed personal experiences had some influence on responses, and further research is recommended as a result.

The study also found that only 31.6% of participants indicated that they were currently concerned about water use and water conservation, suggesting water wasn't a priority issue for many. This was supported by 45% of participants feeling hat the UK had an abundant water supply (DEFRA, 2008b; DEFRA, 2011; Environment Agency, 2008; Juniper; 2013). One quarter of participants strongly agreed that they had the right to access as much clean water as desired, and a further one in three agreed. These attitudes are potential barrier to improving water efficiency, but were found to be contradicted by 71.6% of participants being open to the idea of changing water use behaviour.

A question originally posed by Randolph and Troy (2008) was replicated for this study, and results provided further empirical support for positive attitudes towards water efficient behaviours. 21.7% of participants believed they could do 'a lot more' to save water, 55% 'some more' and 20% 'a little more'. Only 3.3% thought they could do nothing more, highlighting scope to improve household water efficiency.

3.8 Financial disincentives and behaviour

Alongside the influence of social norms on water efficiency, financial motivations were explored. Of the four scenarios provided to participants, financial constraint was considered the greatest motivator for reducing consumption. In further questioning, 21.7% strongly agreed and 46.6% agreed that increasing water bills would increase awareness of water consumption. It is concluded that finances play an important role in consumption behaviours, supporting existing research (DEFRA, 2008a; Jenkins & Pericli; 2014; Jenkins & Pericli, 2015; Zetland, 2011). Hassel and Cary's (2007) rational-economic model is further supported by above findings, and suggests awareness campaigns should concentrate on financial and (where applicable) performance benefits (or parity) when attempting to reduce household water consumption. However, it is important to acknowledge that price increases alone are unlikely to effectively manage domestic water demand (Randolph & Troy, 2008).

3.9 Water, the poor relative!

41.7% of participants believed the UK had more important environmental issues than water, and a further 36.7% were undecided. Many participants were found to be more concerned about their energy consumption, believing energy efficiency was easier to achieve than water efficiency. A large number of participants were also undecided or equally concerned. This partially supports previous research by DEFRA (2007). Part of the attitude gap between energy

and water could be due to the passive nature of many water-saving technologies. For example, click taps and flow restrictors may be installed prior to occupancy and new tenants may be unaware of their presence and purpose. The NHBC Foundation (2015) found water efficiency measures were installed four times more often than energy equivalents in affordable new homes, providing some evidence for awareness issues of water efficient fittings. Adeyeye (2014a) noted a lack of promotional schemes for water efficiency products when compared to energy, and this offers further explanation for findings.

It is possible that energy receives more attention than water because of the cost differences in accessing each resource. As noted previously, money had the greatest perceived influence on behaviour, with energy tending to be more expensive (Adeyeye, 2014b). Water pricing does not accurately reflect its true value. To tackle this issue, public awareness campaigns should target the role of water efficient fittings and clarify their performance parity, alongside environmental benefit. Passive technologies are currently at risk of being undervalued, under-installed and misunderstood, with 36.7% of participants without (or unaware of) internal water-saving technologies.

The connection between water use and other environmental impacts should be more clearly communicated (Adeyeye, 2014b; Staddon, 2010b). The NHBC Foundation (2011) found *"For every pound the household paid for its water use (comprising water bill and energy bill for hot water), almost 2kg of CO_2 was emitted".* If energy is considered more important by the general public (as results suggest), then the connection between hot water use and energy consumption offers a way to utilise this sensitisation.

4. CONCLUSIONS

A key finding of this study was that awareness rather than attitudes are potentially the key barrier to improving household water efficiency. As such, it is recommended that awareness campaigns are enhanced, and concentrate on water use in 'real terms' to assist information transfer to the general public. Quick wins identified should be central to future campaigns, alongside the financial and performance benefits (or parity) of water-saving technologies. Clear communication from water providers as identified in The Water Act (DEFRA, 2014) will be paramount in efforts to increase household water efficiency.

It is further recommended that educational campaigns are introduced, and efforts to inform individuals should receive greater attention. For example, the EU water label and other similar information schemes should be explored (Orgill, Woolliscroft & Brindley, 2014; The Water Label Company Ltd, 2016). Shedding light on social norms and average consumption levels could mitigate some of the heaviest consumers, but also risks alienating efficient individuals. People are generally open to learning more about water consumption, and this pro-environmental spirit should be utilised in efforts to increase efficiency.

The availability of water efficiency information is currently a problem that needs to be addressed by the water industry. When designing new water demand management strategies, information dispersal should be central to discussions. Additionally, promotional campaigns for water-saving technologies should be considered (Adeyeye, 2014b).

Finally, caution should be exercised when applying international research to the UK. The economic, climatic and demographic differences between nations limits the wider validity of research. It is therefore argued that further research is urgently needed within the UK to assist water conservation efforts.

REFERENCES

Adeyeye, K. (2014a). *Water efficiency in buildings: Theory and practice*. United Kingdom: Wiley Blackwell.

Adeyeye, K. (2014b). Water policy and regulations: A UK perspective. In Adeyeye.K (Ed.), *Water efficiency in buildings: Theory and practice*. (pp. 5-22). United Kingdom: Wiley Blackwell.

Ajzen, I. & Fishbein, M. (1980). *Understanding attitudes and predicting social behaviour*. New Jersey: Prentice-Hall.

Allan, T. (2011). *Virtual Water: Tackling the threat to our planet's most precious resource.* I.B Tauris: London.

Beal, C. & Stewart, R. (2011). *South east Queensland residential end-use study: final report.* Urban water security research alliance, Technical report No. 47.

Bell, S. & Aitken, V. (2008). The Socio-Technology of indirect potable water reuse. Water science and technology: *Water supply, 8*(4), 441-448.

Campbell, H. Johnson, R. & Larson, E. (2004). Prices, devices, people or rules: the relative effectiveness of policy instruments in water conservation. *Review of policy research, 21*(1), 637-662.

CCW [Consumer Council for Water] (2015). *Using water wisely and attitudes to tap water: Key findings report.* London: CCWater.

DEFRA (2007). *Survey of public attitudes and behaviours toward the environment*. London: H.M Government.

DEFRA (2008a). *Future Water – The Governments water strategy for England.* London: H.M Government.

DEFRA (2008b). *A framework for pro-environmental behaviours*. London: H.M Government.

DEFRA (2011). *Water for life*. London: H.M Government.United Kingdom. Department for Environment, Food & Rural Affairs

[DEFRA]. (2014). *The Water act*. London: TSO.

De Franca Doria, M. (2010). Factors influencing public perception of drinking water quality. *Water policy, 12,* 1-19.

Dolnicar, S. & Hurlimann, A. (2011). Water alternatives – who and what influences public acceptance? *Journal of Public Affairs, 11*(1), 49-59.

Edwards, K. & Martin, L. (1995). A methodology for surveying domestic water consumption. Water and environmental management. *Journal of the institution of water and environmental management, 9*(5), 477.

Environment Agency (2008). *Water resources in England and Wales – current state and future pressures*. Bristol: Environment Agency.

Environment Agency (2011). *Case for change – current and future water availability*. Bristol: Environment Agency.

Gadbury, D. & Hall, M. (1989). Metering trials for water supply. *Institution of water and environmental management, 3*(2), 182-187.

Ginis, E. (2005). Water. The use, abuse and future of our most precious asset. *Australian Geographic.*

GTI [Gordon Training International]. 2016. *Learning a new skill is easier said than done.* Retrieved March 24th, 2016 from http://www.gordontraining.com/free-workplace-articles/learning-a-new-skill-is-easier-said-than-done/

Hassell, T. & Cary, J. (2007*). Promoting behavioural change in household water consumption: Literature review*. Victoria: Smart water.

Herrington, P. (1999). *Household water pricing in OECD countries.* Organization for Economic Co-operation and development. Environment Directorate document: ENV/EPOC/GEEI (98)12/FINAL.

Hurlimann, A., Dolnicar, S. & Meyer, P. (2009). Understanding behaviour to inform water supply management in developed nations – a review of literature, conceptual model and research agenda. *Journal of environmental management, 91*(1), 47-56.

Jenkins, J. & Pericli, A. (2014). Understanding consumer response to water efficiency strategies. In Adeyeye.K (Ed.), *Water efficiency in buildings: Theory and practice*. (pp. 61-70). United Kingdom: Wiley Blackwell.

Jenkins, J. & Pericli, A. (2015). *A review of current knowledge: Smart meters and domestic water usage.* Buckinghamshire: Foundation for Water Research.

Jorgensen, B., Graymore, M. & O'Toole, K. (2009). Household water use behaviour: an integrated model. *Journal of environmental management, 91*(1), 227-236.

Juniper, T. (2013). *What has nature ever done for us?* London: Profile Books.

Knamiller, C. & Sharp, L. (2009). Issues of trust, fairness and efficacy: A Qualitative study of information provison for newly metered households in England. *Water science and technology: water supply, 9*(3), 311-319.

Kumar, R. (2011). *Research methodology: A step-by-step guide for beginners*. London: Sage.

Lee, D., Park, N. & Jeong, W. (2012). End-use analysis of household water by metering: the case study in Korea. *Water and Environment journal, 26*(1), 455-464

Macleod, D. (1979). The effect of metering on urban water consumption (Durban, South Africa). *Municipal Engineer (Johannesburg), 10*(3), 23-26.

McKie, R. (2015, March 12). Why fresh water shortages will cause the next global crisis. *The Guardian* (website). Date retrieved 22/09/2015.

Medd, W. & Chappells, H. (2008). *Drought and demand in 2006: consumer, water companies and regulators.* Final report. Lancaster: Lancaster University.

Medd, W. & Shove, E. (2005). *Perspectives on the water consumer. Workshop report for the 1st workshop, Traces of Water Seminar*. Lancaster: University of Lancaster.

NHBC Foundation (2009). *Water efficiency in new homes: An introductory guide for housebuilders.* IHS BRE Press.

NHBC Foundation (2011). *Water consumption in sustainable new homes.* IHS BRE Press.

NHBC Foundation (2015). *Sustainable technologies: The experience of housing associations.* IHS BRE Press.

ONS [Office for National Statistics]. (2012). *National population projections, 2012-based reference volume: Series PP2 Release*. Office for National Statistics.

Orgill, Y., Woolliscroft, T. & Brindley, D. (2014). Water-Efficient products and the Water label. In Adeyeye.K (Ed*.), Water efficiency in buildings: Theory and practice*. (pp. 263-272). United Kingdom: Wiley Blackwell.

Randolph, B. & Troy, P. (2008). Attitudes to conservation and water consumption. *Environmental science and policy, 11*(5), 441-455

Rathnayaka, K., Maheepala, S., Nawarathna, B., George, B., Malano, H., Arora, M. & Roberts, P. (2014). Factors affecting the variability of household water use in Melbourne, Australia. *Resources, conservation and recycling, 92*(1), 85-94.

Robinson, D. & Adeyeye, K. (2014). Assessment methodologies for water efficiency in buildings. In Adeyeye.K (Ed.), *Water efficiency in buildings: Theory and practice*. (pp. 113-127). United Kingdom: Wiley Blackwell.

Rogerson, P. (2011). *Statistical methods for geography: A student's guide.* (3rd ed.). London: Sage.

Sharp, L., McDonald, A., Sim, P., Knamiller, C., Sefton, C. & Wong, S. (2011). Positivism, post-positivism and domestic water demand: interrelating science across the paradigmatic divide. *Transactions of the institute of British geographers, 36*(4), 501-515.

Spinks, A., Fielding, K., Russell, S., Mankad, A. & Price, J. (2011). *Water demand management study: Baseline survey of household water use (Part A)*. Urban water security research alliance, Technical report No. 40.

Staddon, C. (2010a). *Do water meters reduce domestic consumption?: A summary of available literature*. Bristol: University of the West of England.

Staddon, C. (2010b). *Managing Europe's water resources: Twenty-first century challenges.* England: Ashgate Publishing Limited.

Steg, L. & Vlek, C. (2009). Encouraging pro-environmental behaviour: an integrative review and research agenda. *Journal of environmental psychology, 29*(3), 309-317.

Syme, G., Shao, Q., Po, M. & Campbell, E. (2004). Predicting and understanding home garden water use. *Landscape and urban planning, 68*(1), 121-128.

Tam, V. & Brohier, A. (2014). Lifecycle benefits of domestic water-efficient fittings and products. In Adeyeye.K (Ed.), *Water efficiency in buildings: Theory and practice*. (pp. 233-240). United Kingdom: Wiley Blackwell.

The Water Calculator. (2016). *Example specifications.* Retrieved February 15th, 2016 from http://www.thewatercalculator.org.uk/examples.asp.

The Water Label Company Ltd. (2016). *A simple effective industry backed voluntary initiative.* Retrieved March 23rd, 2016 from http://www.europeanwaterlabel.eu/home.asp.

Van Vliet, B., Chappells, H. & Shove, E. (2005). *Infrastructures of consumption – Environmental Innovation in the Utility Industries*. London: Earthscan.

Waterwise. (2016). *Save water: Indoors.* Retrieved February 15th, 2016 from http://www.waterwise.org.uk/pages/indoors.html

Welte, T. & Anastasio, P. (2010). To conserve or not to conserve: is status the question? *Environmental behaviours, 42*(6), 845-863.

Willis, R., Stewart, R., Panuwatwanich, K., Capati, B. & Giurco, D. (2009). Gold coast domestic water end use study. *Journal of Australian water association, 36*(6), 79-85.

Willis, R., Stewart, R., Panuwatwanich, K., Williams, P. & Holingsworth, A. (2011). Quantifying the influence of environmental and water conservation attitudes on household end use water consumption. *Journal of environmental management, 92*(8), 1996-2009.

Zetland, D. (2011). *The end of abundance: Economic solutions to water scarcity.* Amsterdam: Aguanomics Press.