Towards a sustainable use of water at home: understanding how much, where and why?

Elizondo, G.M. & Lofthouse, V., 2010. Towards A Sustainable Use of Water at Home: Understanding How Much, Where and Why? *Journal of Sustainable Development*, 3**,** 3-10.

Towards a sustainable use of water at home: understanding how much, where and why?

Gloria María Elizondo-Elizondo (Corresponding author)
Department of Design and Technology, Loughborough University
Loughborough, Leicestershire, LE11 3TU, UK
Tel: (+44) 7884 322857 E-mail: G.M.Elizondo@lboro.ac.uk

Vicky Lofthouse
Department of Design and Technology, Loughborough University
Tel: (+44) 1509 222777 E-mail: V.A.Lofthouse@lboro.ac.uk

The research is financed by CONACYT, Consejo Nacional de ciencia y la tecnología (Mexico)

To cite this article:
Elizondo, G.M. & Lofthouse, V., 2010. Towards A Sustainable Use of Water at Home: Understanding How Much, Where and Why? *Journal of Sustainable Development*, 3**,** 3-10.

Abstract

It is becoming more widely recognised that understanding user behaviour can help improve the environmental impact of products and services. In light of this, this paper presents the findings of a literature review to investigate water-related activities in the home. This work is part of a three year doctoral study to investigate the influence of cultural background on domestic water use habits, specifically house cleaning and personal hygiene. The paper reflects on how habits and routines emerge, and how perceptions of consumption and hygiene influence domestic water use. It then considers how social, psychological and technological issues influence residential water use, and draws on existing products intended to reduce in-house water consumption. The paper concludes that further empirical data collection is needed in order to better understand this area. A study which combines questionnaires, cultural probes and interviews in both Mexico and the UK is proposed.

Keywords: Water consumption; Household; User behaviour; sustainable behaviour

1. Introduction

Clean, unpolluted water is essential to all kinds of life, and even though it is a renewable resource, pollution and over-usage are threatening the world supplies of this precious liquid (Butler, 2006). In many regions of the world groundwater has been extracted at a rate that exceeds natural precipitation back into the water cycle; this combined with pollution jeopardizes the availability and easy reuse of it (see Figure 1).

Water extracted from the ground has three main uses: agriculture (70%), industry (23%) and urban consumption (Wales, 2008). While domestic water use accounts for only 7% of overall water use (Dworak et al., 2007; Wales, 2008), it is an issue that every person can relate to –and act upon. It is therefore important for research to be carried out to investigate water usage behaviour at home so that we can better understand how savings can be made and people can be educated.

This review summarises a critical analysis of issues relevant to domestic water consumption, obtained through an extensive research in the appropriate sources of literature. Relevant topics were included, such as: in-house consumption (particularly water and energy), user behaviour, sustainability and people's commitment to it, and specific case studies of water-saving products and technologies in residential situations. The literature showed a gap in knowledge regarding the influences of cultural background on sustainable behaviour while performing habits and routines at home, specifically with regards to housecleaning and personal hygiene. Understanding such influences can potentially help in the design and development of products, spaces, services and policies which can lead to more sustainable behaviour.

The research presented in this paper is the first part of a doctoral study to explore the potential influence of cultural background on domestic water use. It will study the domestic water consumption patterns of two countries: UK and Mexico, one developed and one developing. Both countries have regions of moderate and serious water stress, and present large differences in groundwater abstraction rates and water consumption per capita: Mexico, though is the more water stressed, abstracting more than double the water used in the UK per inhabitant (OECD, 2009).

2. Factors behind water consumption in the home

Findings indicate that in some countries, such as the UK and USA people have, in general, a sound awareness of the environmental issues going on in the world (Barr, 2004). When asked in surveys, they tend to respond in favour of environmental actions. However, even when people express commitment or excitement about conservation plans, often changes in behaviour are not evident (De Oliver, 1999; Jensen, 2008). Expressing support to conservation policies is often regarded as socially correct, as it adds on to the social capital (Medd & Shove, 2005b) and it adheres to the social norms (Victor Corral-Verdugo & Frías-Armenta, 2006). For one reason or another, this '*aesthetic*' rightness struggles to go beyond the attitude into a real sustainable behaviour. Behavioural intentions (Barr, 2004), also referred to as attitudes, are just one of the aspects of actual behaviour. Situational and psychological circumstances also play a role and they all interrelate and act to finally produce one's actions (see Figure 2).

People's choices of action concerning water usage are attached to many drivers, such as: comfort, convenience, cleanness, economy and design, with environmental issues generally ranking lower amongst the drivers for one's actions (Jensen, 2008; Wiese, 2001). People, even when they feel they are responsible for their own actions (either pro or anti-environmental), may assume that their actions have little or no weight on the whole global environment picture (Barr, 2004; Eden, 2000) resulting in a dismissal of the intention of behaving sustainably. This relates to

Askew and McGuirk's (2004) conclusions that people think about conservation in an impersonal way, disconnected to their own water practices. The often inconspicuous consequences of environmentally damaging behaviours are beaten by the immediate results in comfort and convenience of many antisocial and unsustainable behaviours (Lehman & Geller, 2004). Lilley *et al*. (2005) refer to the fact that people think in large scale, rather than at a local scale, causing them not to relate to the larger consequences of their actions.

A large amount of the water consumed in the home happens in the bathroom, with showering and bathing accounting for 20-30% (Hand, Southerton, & Shove, 2003). Kitchen activities, mainly represented by dishwashing, appear to have high water consumption rates (see Figure 3). The use of dishwashers is becoming more and more common in western societies. Technologies are evolving, appliances in different sizes are being created to accommodate smaller households and prices are dropping, making them affordable to many. Some studies indicate that current electrical dishwashers are more efficient than manual dishwashing in terms of time, cleanness and water consumption (Stamminger, Elschenbroich, Rummler, & Broil, 2007); yet, surveys have shown that in the UK only 28% of the population owns a dishwasher (DEFRA, 2007), this number is likely to be lower in developing countries such as Mexico.

People tend to use water unconsciously, not referring to the use of water it as an activity by itself, but as a tool to accomplish other activities (Gram-Hanssen, 2008; Medd & Shove, 2005a), whether related to hygiene (brushing teeth or washing clothes), home care (gardening or mopping the floor), pampering and relaxation (a nice bath after a long day of work) or daily practices (the morning shower to '*feel fresh and awake*'). Water consumption is usually not striking to the eye: most of the time with today's busy lifestyles, people are not fully aware of the amounts of water consumed (Randolph & Patrick, 2008), nor in which activities they consume the most. Since water-related actions present no particular personal significance, with the acceleration in modern life, referred to by some as *'time squeeze'* (Hand et al., 2003), people often opt for the most convenient solution in terms of time and ease, rather than the best solution regarding performance or environmental consequences. Population growth and change in lifestyle are two of the many factors that contribute in the rise of water use in households. Studies have shown that people living in individual households (DEFRA, 2006), a growing trend today, increases the water consumption per capita by up to 40%. One two-person household consumes 300 litres of water per day, whereas a single occupancy household consumes 210 litres (DEFRA, 2006; DEFRA, 2007; Memon, Ton-That, & Butler, 2007). A study by Memon *et al*., (2007) based on UK population, showed that indeed single occupancy homes have 'the highest consumption from taps and those with high occupancies have the lowest'. Cultural background, comprehending ethnicity, word of mouth and even religion are also influential factors towards actions and consumption patterns (Smith & Ali, 2006), this though, has been less researched.

3. Everyday practices

The majority of domestic water related activities such as laundering, washing dishes or working in the garden are often performed in time-space coordination with other activities: watching the children, rushing off for a social engagement, or trying to finish before the 3pm football match. Most of the water related actions at home are continuously performed as part of habits or routines that are more complex than one simple action. They are divided into little practices (Schatzky, 1996) that people do in '*auto-pilot*' most of the time.

Human behaviour is often composed of several habits and routines that develop over time from childhood, with the influence of parents and the environment (Gram-Hanssen, 2008), evolving along with the circumstances that come along (Medd & Shove, 2005b). People stick to those routines to create a feel-safe environment (Guiddens, 1990). Krantz (2006) refers to this '*safe environment*' as '*matter in place*', which when disturbed changes into '*matter out of place*' (i.e. dirty dishes in sink). This triggers a (re)action to re-establish the original state (wash, and put away). Many routines we learn and carry out without consciously thinking about them: we have a preconceived convenient technical arrangement of resources to revert the '*out of place*' in short notice. People's perception of a matter out of place, along with the personal arrangement of available resources are individual and unique; while one might not mind the pile of dishes in the sink until it interferes with other activities; others might like to have the sink empty and clean at all times. That is one of the reasons for which activities carried out at different times, have different actions in the processes.

Behavioural psychologists consider that the process of changing habits and routines into more sustainable (or unsustainable) ones happens in different stages (Pelletier, Lavergne, & Sharp, 2008): being aware of the problem, identifying the different possible solutions; choosing one and initiating a behaviour, and making the behaviour a long term habit, or in the worst case scenario, reverting to the original behaviour. Different approaches must be

taken for each stage in order to succeed, as people will process the information in a more paused way and in the right time to make the best out of it. It is important to assess attitudes and behaviours and their evolution throughout time, since people tend to react favourably to sustainable or green campaigns in the beginning, but the interest seems to decline over time, as '*behaviour returns to baseline if the source of motivation is withdrawn*' (Lehman & Geller, 2004).

4. Evolution of water routines

Shifting routines to make true long term changes is a long lasting process. New-more-sustainable habits might be well embraced in the beginning, but with time they tend to decline allowing the old routine to retake its place (Pelletier et al., 2008). This attitude-behaviour evolution occurs alongside with a change of one's perception, lifestyle, social acceptance, and also with the introduction of new technologies and the appropriate infrastructure. Once people become comfortable and act almost automatically, it is harder to go back to previous behaviours. An example of this transformation can be seen by looking at changing habits in bathing and showering (Hand et al., 2003). During the Roman times bathing was seen as something luxurious and social; then in the middle ages it was seen to be dangerous; and later, as part of cleaning and personal hygiene habits, it became a status symbol, differentiating upper and lower classes (Ger & Yenicioglu, 2004). Nowadays daily showering has become part of most people's routine, probably due to changes in cleanness perception or to the '*time-squeeze*' phenomenon. Thirty years ago, a weekly bath was regarded as normal, sometimes even a bath a month. With time, hygiene perceptions changed, technology emerged and infrastructure became available to a majority of the population; these factors, along with the change in lifestyle towards a more rushed one, lead to the evermore common practice of daily showering (Hand et al., 2003).

Another transformation of common habits, related to changes in time and hygiene standards, happened in laundering activities. Clothes used to be regarded as protection of the body from dirt; whereas now, it is the body that seems to soil the clothes, as they are washed even if used only once and for a brief period of time and show no dirt, simply to get rid of the '*impurities*' of the body (Shove, 2003). A curious fact related to convenience and '*time squeeze*' appears when even if clothes are not really dirty, many people conveniently wash *all* clothes worn, from *all* members of the family, rather than separate dirty from clean (Randolph & Troy, 2008); increasing the number of washes and resources wasted. This implies that asking what? (is washed), when? and how? is not enough to understand the washing practice. The reasons behind it (why?) might have a strong influence on one's performance, which illustrates the importance of studying the activities in a wider context rather than in isolation.

Changing peoples' mindsets is not enough; changes to infrastructures and technologies are also required. In an effort to reduce electricity consumption at home with little changes in behaviour, food and clothing superstores such as *Marks and Spencer* (UK) both launched campaigns for lowering garment washing temperatures from 40°C to 30°C in early 2007. '*Think climate'* was Marks and Spencer's attempt (2007), displaying in most clothing labels a maximum washing temperature of 30°C (see Figure 4). In late 2008, a new campaign in the UK '*cold is the new hot*' (Ariel, 2008) was launched by the *Ariel* laundry detergent brand (Proctor and Gamble), promoting the use of 15°C with a new washing media in the form of gel. This would bring reasonable savings in energy, being better for the environment and for the pocket of consumers. Nevertheless most washing machines in current homes do not have the option of such a low temperature, and many of them go only as low as 40°C. So even if people truly want to engage to the 15°C washing, there is a technological barrier that prevents them from doing so.

5. Encouraging water saving

Of all of the activities at home that require water use, some of them can be considered as necessary and some as not-essential. Trying to change people's behaviour into a more sustainable one, through the use of new technologies, through a conscious change of routines from the part of the user, or by changing behaviour through product design, has to take into account the situation-context of the activity in question. In terms of water, demand can be elastic or inelastic for different purposes (Martinez-Espineira & Nauges, 2004). There is a baseline of consumption or '*subsistence level*' that satisfies essential needs such as personal hygiene, cooking and drinking, which appear to be inelastic to variations in pricing or to water reduction campaigns. Such essential uses should be targeted with the aim of conservation, whereas water used in recreational or non-vital activities (the *unnecessary* uses of water), where use is elastic and therefore sensitive to context, should be tackled towards reduction or even avoidance of use.

Geller *et al.*, (1983) carried out a study on three different approaches for reducing domestic water consumption: educational (pamphlets and handbooks), behavioural (written feedback of daily/weekly consumption and

recommendations) and engineering (installation of water saving devices). The investigation indicated that with the installation of water conservation devices (aerators, cistern displacement units, shut off shower control) the expected savings of water and energy were not achieved. The findings suggest this was because it was done along with the distribution of information regarding the savings, and people could justify using the toilet more times, or taking more time in the shower. This phenomenon is known as the '*rebound effect*' (Herring & Roy, 2006) in which energy efficient appliances and new technologies do not always achieve lower energy consumption. Psychologically, people justify the over-use of the resource (energy, water, etc.) and end up consuming the same or even higher amounts. Another example, is that the fitting of energy saving bulbs outside the house could allow the consumer to justify leaving them on all night to improve '*security*' (Herring & Roy, 2006). In the Geller *et al.*, (1983) study only the users unaware of the water devices being installed in their homes achieved the savings predicted from the laboratory testing on the water devices.

6. Reducing water consumption at home

Different opinions have arisen regarding diverse approaches to promote actions towards a better and more sustainable behaviour. Barr (2004) states a perfect question for this: *'what transforms aspiration to reality, or indeed if such aspirations have anything to do with reality?'*. The answer to this question has been researched in various fields: alcohol abuse, drugs, energy (Barr, 2004; Herring & Roy, 2006), and water (Víctor Corral-Verdugo et al., 2008; De Oliver, 1999). Setting out from a recycling-behaviour study, Barr (2004) recognized three main categories of factors that are related to the way people act:

- Environmental values: weak or strong sustainability, *eco*centrism or apathy towards the environment
- Situational factors: facilities, demographics, knowledge and awareness
- Psychological variables: personal perceptions: altruistic, intrinsic motivation, influence of significant others (e.g. *'if others do it, it is good to show that me too'*), believe that their actions matter, do good in order to avoid harm (self interest – do good so they can enjoy good)

In the field of water, different possible solutions to decrease water consumption exist: changing behaviour, applying efficient technologies (water saving devices) and using alternative water sources –recycling or reusing grey waters– (Dworak et al., 2007). Such solutions can be applied through legal methods, educational approaches and through product design:

- Legal methods: metering, technology rating, building (technologies) regulations, fiscal incentives

  People carry out environmental actions either when they are made easily accessible and convenient (i.e. technology) or if they find themselves obliged to behave in a certain way by law or fines –*'carrots and sticks'*– (Barr, 2004). Research has found that in certain cases, people disregard bans and restrictions and end up using more water than authorized: in a study based in Australia (Randolph & Troy, 2008), 30% of the sample users used forbidden watering methods for their gardens (hoses and sprinklers). Looking at the pricing and restriction of water supply, it has been found that *'one-hour restriction of supply per day is found to have a similar impact on consumption as a 9% increase in price'* (Martínez-Espiñeira & Nauges, 2004).

- Educational approaches: pamphlets, handbooks and campaigns (Geller et al., 1983)

  Voluntary water saving campaigns have an impact only in certain socio-economical groups of society, whereas when the actions are made compulsory –and punished if not carried out– *all* people commit to the cause (Victor Corral-Verdugo & Frías-Armenta, 2006).

- Product Design: steering the user's behaviour by encouraging (or forcing) the user to behave in a certain way.
- Introducing new and more efficient products is one of the choices to reduce water consumption in the household. Some products aim to replace other appliances keeping the old routines while using less energy and water, while others are meant to push the user to behave more sustainable by giving no option but to change behaviour. Products on the market that are specifically designed for the bathroom, include systems that connect the hand basin or shower/bathtub with the toilet cistern, which accounts for a major part in water consumption in the bathroom; and shower systems that have the option of cycling the water to have a longer shower without unnecessary water waste (see Figure 5). Simpler solutions which are cheaper and can be retrofitted to existing equipment include feedback gadgets (see Figure 6) and shower timers that help keeping track of the water used, leaving the user the choice of changing or maintaining behaviour. New products and technologies are only effective if the consumer embraces them and uses them in the way they

were designed to be used. That is a great challenge for designers.

7. Conclusions and further research

Water is an important issue in many regions of the world, and as with energy consumption, it can be tackled by starting on a small scale (person/household) and then spreading via a ripple effect to bigger contexts. It is with this intent that the focus of this research on the domestic water consumption was chosen above the industry or agriculture sectors. As the literature indicates, most water-related activities in the home happen as routines that are shaped by a series of circumstantial factors that, even when always different, can be perceived as *'similar'* within groups of people –and thus, their routines are alike–.

Concerning reducing water consumption at home, it appears that it must be tackled by changing user behaviour. In order to do so, approaches must focus on the factors behind the various water-related activities that take place in the household. Policies, methods and campaigns must be designed in view of the local cultural and social background, alongside financial and technological availability (current or possible in the near future). In addition, the approaches must be multi-staged, in the sense that they must intend to change behaviour in a gradual manner integrating various means, from informing the user (educational campaigns) and providing feedback (of used resources), to making the use of new products be embraced by users and updating legislation accordingly –not necessarily in that order.

Everything in life, both actions and things, take time and occupy space. Projects in life are formed by several little activities that interrelate in the '*time-geography*' (Krantz, 2006) and at certain time coexist in a particular context. Water and humans interact when one takes a shower, then their link diverts again as the water and the person move on from that activity. Constraints and resources available at the time of the activity are unique for each occasion, and it is those along with the individual's aims that indicate what practices are within reach and how they will be carried out (Krantz, 2006). Therefore activities and routines must be studied within a bigger context and not as isolated activities. In order to achieve a more sustainable level of water consumption there has to be a merge of the technologies available, product design and consumer demands, which all have a strong influence in behavioural evolution from traditional patterns towards sustainable practices (Nash, 2009).

The next stage of this project will focus on assessing water consumption practices in households in both Anglo and Hispanic communities (focusing on the UK and Mexico), with a special focus on the dishwashing practices of each country. A questionnaire will first be distributed to 130 people in each country in order to understand how people use and perceive water. These findings will be built upon by studying a more specific sample of 6 households per country. Each will be given a cultural probe pack (consisting of a semi-structured diary, a disposable camera and a fridge magnet) and will be videoed interacting with their kitchen sink area for a 24 hour period. Interviews will be carried out in order to complement the understanding of these cultural probes, searching to achieve triangulation of methods to give validity and reliability to the research findings.

The study intends to develop knowledge and experience with regards to how different methodologies may or may not apply in distinct cultures, and in how they are best applied. It will also enable the development of a more detailed understanding of user behaviour in terms of water use in two distinct cultural contexts. The study will aim to identify similar patterns and analyse the differences in terms of cultural background; perceived value of water; perception of hygiene and comfort; technologies available; and infrastructure. A cross-cultural comparative analysis will be carried out in order to produce a series of conclusions on factors that influence peoples' attitudes and trigger sustainable behaviours on water usage at home.

References

Ariel. (2008). Cold is the new hot. Retrieved 2008, from http://www.coldisthenewhot.com/

Askew, L. E., & McGuirk, P. M. (2004). Watering the suburbs: distinction, conformity and the suburban garden. *Australian Geographer, 35*(1).

Barr, S. (2004). Are we all environmentalists now? Rhetoric and reality in environmental action. *Geoforum, 35*(2), 231-249.

Butler, D. (2006). Water infrastructure and the consumer. Retrieved October 2008, from http://www.lec.lancs.ac.uk/cswm/dwcworkshop3.php

Corral-Verdugo, V., Bonnes, M., Tapia-Fonllem, C., Fraijo-Sing, B., Frias-Armenta, M., & Carrus, G. (2008). Correlates of pro-sustainability orientation: The affinity towards diversity. *Journal of Environmental Psychology, 29*, 34-43.

Corral-Verdugo, V., & Frías-Armenta, M. (2006). Personal normative beliefs, antisocial behavior and residential water conservation. *Environment and Behavior, 38*(3), 406-421.

De Oliver, M. (1999). Attitudes and inaction: a case study of the manifest demographics of urban water conservation. *Environment and Behavior, 31*(3), 372-394.

DEFRA. (2007, 31/01/2008). A comparison of manual washing-up with a domestic dishwasher. Retrieved July 2008, from www.mtprog.com

www.mtprog.com/spm/download/document/id/598

DEFRA, D. f. t. E. F. a. R. A. (2006). *Water efficiency in new buildings*. Retrieved. from http://www.communities.gov.uk/documents/planningandbuilding/pdf/152813.pdf.

Dworak, T., Berglund, M., Laaser, C., Strosser, P., Roussard, J., Grandmougin, B., et al. (2007). EU Water savings potential. Retrieved January 2009, from http://ec.europa.eu/environment/water/quantity/pdf/water_saving_1.pdf

Eden, S. (2000). Environmental issues: sustainable progress? *Progress in Human Geography, 24*(1), 111-118.

Geller, E. S., Erickson, J. B., & Buttram, B. A. (1983). Attempts to promote residential water conservation with educational, behavioral and engineering strategies. *Population and Environment, 6*(2), 96-112.

Ger, G., & Yenicioglu, B. (2004). Clean and dirty: playing with boundaries of consumer´s safe havens. *Advances in Consumer Research, 31*.

Gram-Hanssen, K. (2008). Consuming technologies - developing routines. *Journal of Cleaner Production, 16*, 1181-1189.

Guiddens, A. (1990). The consequences of modernity. *Cambridge: Polity Press*.

Hand, M., Southerton, D., & Shove, E. (2003). Explaining Daily Showering: A discussion of policy and practice. Retrieved November 2008, from http://www.lec.lancs.ac.uk/cswm/dwcworkshop2.php

Herring, H., & Roy, R. (2006). Technological innovation, energy efficient design and the rebound effect. *Technovation*.

Jensen, J. (2008). Measuring consumption in households: interpretations and strategies. *Ecological Economics, 68*, 353-361.

Krantz, H. (2006). Household routines - A time-space issue: A theoretical approach applied on the case of water and sanitation. *Applied Geography, 26*, 227-241.

Lehman, P. K., & Geller, E. S. (2004). Behavior analysis and environmental protection: accomplishments and potential for more. *Behavior and Social Issues, 13*, 13-22.

Lilley, D., Lofthouse, V., & Bhamra, T. (2005). *Towards instinctive sustainable product use.* Paper presented at the 2nd International Conference: Sustainability Creating the Culture, Aberdeen.

Mark and Spencer's. (2007). Think Climate - Wash at 30°C. Retrieved November 2008, from http://plana.marksandspencer.com/index.php?action=PublicPillarStoryDetailDisplay&pillar_id=1&story_id=35

Martinez-Espineira, R., & Nauges, C. (2004). Is all domestic water consumption sensitive to price control? *Applied Economics, 36*, 1697-1703.

Martínez-Espiñeira, R., & Nauges, C. (2004). Is all domestic water consumption sensitive to price control? *Applied*

Economics, 36, 1697-1703.

Medd, W., & Shove, E. (2005a). Traces of water workshop report 1: Perspectives on the water consumer. from http://www.lec.lancs.ac.uk/cswm/dwcworkshops.htm

Medd, W., & Shove, E. (2005b). *Traces of water workshop report 2: Water practices and everyday life*: Lancaster Universityo. Document Number)

Memon, F. A., Ton-That, L., & Butler, D. (2007). An investigation of domestic water consumption through taps and its impact on urban water flows. *Water Science & Technology: Water Supply, 7*(5-6), 69-76.

Nash, H. (2009). The European Commission's sustainable consumption and production and sustainable industrial policy action plan. *Journal of Cleaner Production, 17*, 496-498.

O'Brien, C. (2008). Sustainable Happiness: How Happiness Studies Can Contribute to a More Sustainable Future *Canadian Psychology, 49*(4), 289-295.

OECD. (2009). OECD Factbook: Economic, Environmental and Social Statistics. Retrieved May 2009, from http://stats.oecd.org/WBOS/ViewHTML.aspx?QueryName=191&QueryType=View&Lang=en

Pelletier, L., Lavergne, K., & Sharp, E. (2008). Environmental Psychology and Sustainability: Comments on Topics Important for Our Future. *Canadian Psychology, 49*(4), 304-308.

Randolph, B., & Patrick, T. (2008). Attitudes to conservation and water consumption. *Environmental Science & Policy, 2*, 441-455.

Randolph, B., & Troy, P. (2008). Attitudes to conservation and water consumption. *Environmental Science & Policy, 2*, 441-455.

Schatzky, T. (1996). Social practices. A Wittgensteinian approach to human activity and the social. *Cambridge University Press*.

Shove, E. (2003). Converging conventions of comfort, cleanliness and convenience. *Journal of Consumer Policy, 26*, 395-418.

Smith, A., & Ali, M. (2006). Understanding the impact of cultural and religious water use. *Water and Environment Journal, 20*, 203-209.

Stamminger, R., Elschenbroich, A., Rummler, B., & Broil, G. (2007). Washing-up behaviour and techniques in Europe. *Wissenschaftlicher Beitrag* Retrieved March 2009, from http://www.landtechnik.uni-bonn.de/ifl_research/ht_1/HuWI2007WashingUpBehaviour.pdf

Wales, A. (2008, November 2008). *Plenary 1*. Paper presented at the Green Supply Chain Summit, London.

Wiese, B. S. (2001). The ecological non-seller? On the market acceptance of environmentally sound products. *Paper for the International Summer Academy on Technological Studies*.

Figures

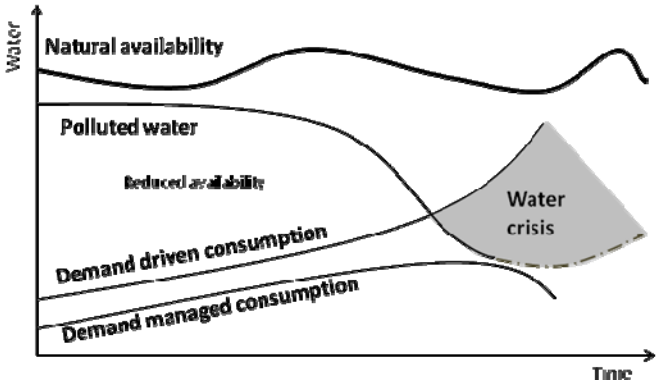

Figure 1. Water availability according to management. Adapted from (Butler, 2006)

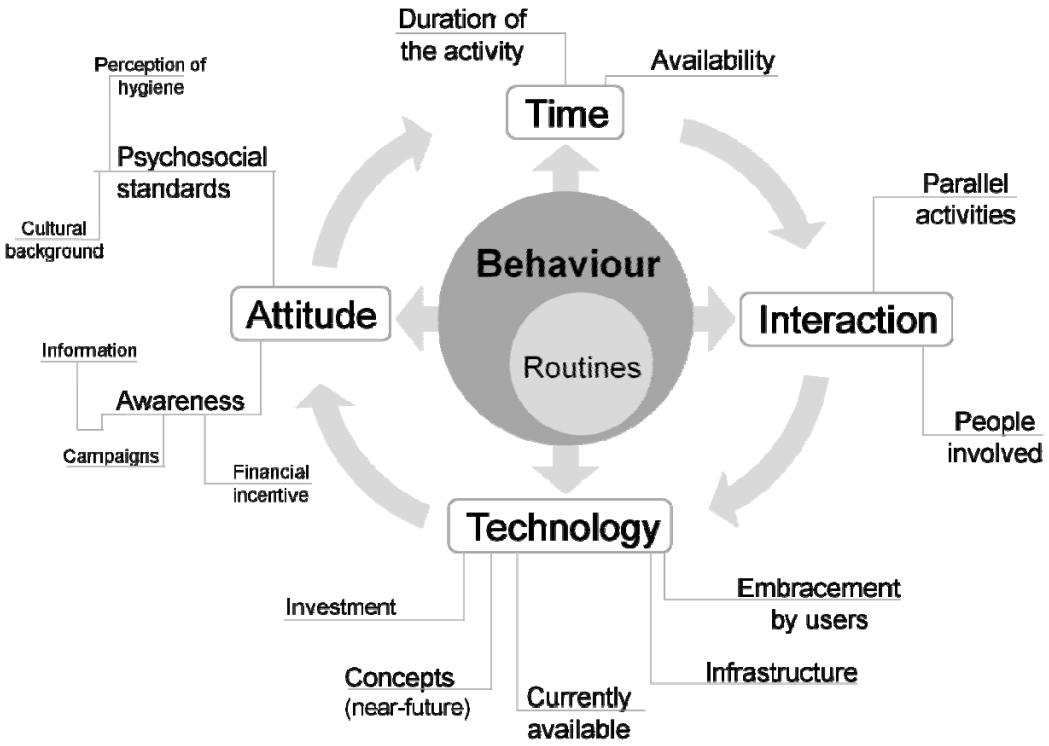

Figure 2. Factors influencing the creation of patterns and routines

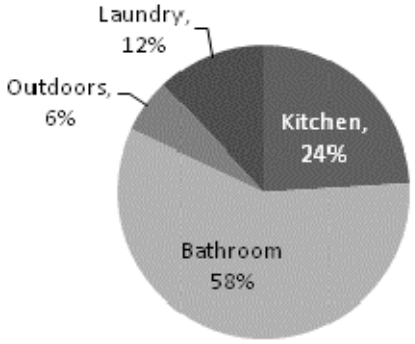

Figure 3. Domestic water use distribution by house-area. Adapted from (Butler, 2005)

Figure 4. Marks and Spencer's labelling– *Think Climate* - Wash at 30°C

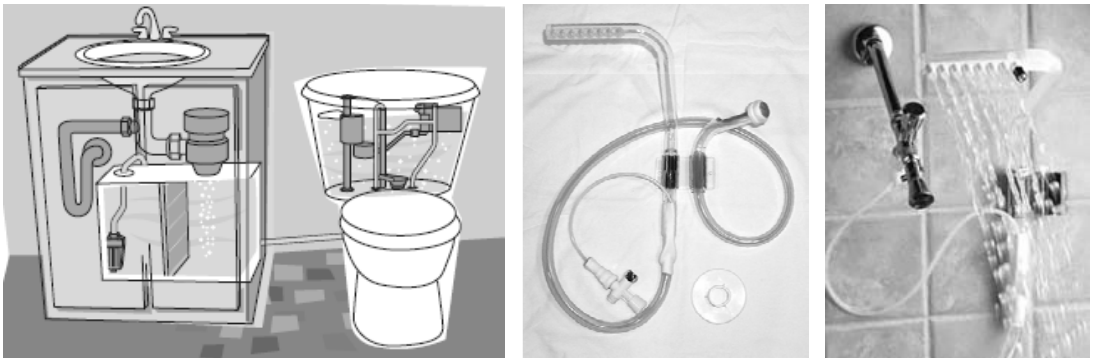

Figure 5. *Aqus* connects sink with toilet. *Wow shower* cycles the water.

Figure 6. Products in the market: *Sinkpositive,* Autotaps'retrofit infrared sensor and faucet buddy