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Interrupting the Flow of Water: Behavioural Interventions and Moments of Change

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Abstract

Climate change in the UK may lead to future droughts that will be longer, more frequent, and more acute than previously thought and, without effective intervention, a corresponding increase in per capita consumption. This article focuses on demand side, water management and the role that habit disruption could play in facilitating behaviour change. While there are many different strategies for changing customer behaviours voluntarily, research suggests that an individual is more likely to alter their everyday habits if we intervene during a period of transition or disruption in that individual's life – a moment of change (e.g., having a baby, retiring, moving house). If water companies/utilities were to target an intervention at this juncture, it could lead to more sustainable, long-lasting water use behaviours. This article provides an overview of current approaches to behaviour change before presenting the *habit discontinuity hypothesis* and its relevance for water use and effective interventions. Drawing on examples and a case study, it illustrates how habit disruption can affect environmental behaviours in general and water use behaviours specifically. The research considers the significance and applications of this approach going forwards.

Introduction

Climate change is expected to decrease available freshwater in countries across the globe, while simultaneously increasing water demand for drinking, cooling and irrigation.ⁱ In the UK, future droughts are likely to be longer, more frequent, and more acute than previously thoughtⁱⁱ and, without effective intervention, may lead to a substantial increase in per capita consumption. This article focuses on resource demand side, water management and the role that habit disruption could play in facilitating behaviour change. While there are many different strategies for changing customer behaviours voluntarily, research suggests that someone is more likely to change their behaviour if we intervene during a period of transition or disruption – also known as a *moment of change* (e.g., having a baby, changing jobs, retiring, or moving house).ⁱⁱⁱ If water companies/utilities were to target an intervention at such junctures, it could lead to more sustainable, long-lasting changes in water-use behaviours.

The article provides an assessment of different interventions that water companies have used to encourage their customers to save water, followed by a discussion of the *habit discontinuity hypothesis* and its relevance to water use. It will provide examples of habit disruption and environmental behaviours in general as well as a case study exploring bathroom water use

behaviours during a significant, exogenous moment of change – the Covid-19 pandemic. The final section will consider the significance and application of this approach going forwards.

Interventions for Behaviour Change

The provision of *information* is one of the most popular approaches with water companies.^{iv} While providing information may be effective for people who are already interested in water conservation^v, it generally does not change behaviour if it is used in isolation.^{vi} Information campaigns have been successful during periods of extreme drought or in locations where drought is a regular occurrence.^{vii} *Incentivisation* may only have a small impact on water use. While some research suggests that incentives can lead to water savings of up to 5%, other studies report smaller effects or none at all.^{viii} Incentivisation is unlikely to work if saving money is not a priority^{ix} or if people are motivated by other concerns, such as the environment.^x The setting of water saving **goals and targets** can work in certain circumstances and communities.^{xi} While this strategy is under-researched in the context of household water use, it has been shown to be effective in reducing energy use.^{xii} Just like the provision of information, the setting of goals and targets is particularly effective during periods of extreme water stress.^{xiii} Another strategy that has been extensively researched is the use of *feedback and social influence*. Encouraging people to compare and adjust their own behaviours against a set standard has the potential to generate savings of between 5% and 10%.^{xiv} This approach may be particularly useful to reduce water use in high-consuming households^{xv} but there is also evidence that it may lead to higher water use among low-consumption households.^{xvi} Finally, addressing contextual factors through changing *infrastructure* and/or introducing new *technology* has led to reported savings of 13% with retrofitting,^{xvii} and as much as 30-50% with the replacement of household appliances.^{xviii} While these are significant savings, there is the risk of compensatory behaviour^{xix} and concerns about the longevity of the effects.^{xx}

Habit, Disruption and Water Use

To maximise the effectiveness and longevity of any intervention, we should consider the point at which an intervention is delivered. Research suggests that habits have a significant effect on whether an individual engages in pro-environmental behaviour in general^{xxi} and water conservation specifically^{xxii}. Pro-environmental behaviour, or lack thereof, can often be explained by an individual's tendency to always act in the same way in the context of a familiar setting, activity or routine.^{xxiii} That is, we develop habits as an acquired 'automatic response to particular, regularly encountered, contexts'.^{xxiv} Despite our good intentions, we may respond to a situation automatically, in a wasteful way (e.g., half filling the washing machine). It is of course also possible

that pro-environmental behaviours are rooted in good habits (e.g., reusing grey water on the garden).

Research has identified a positive relationship between habit and water conservation behaviours (e.g., turning the tap off when brushing teeth)^{xxv} as well as behaviours that increase water demand within the home (e.g., taking long showers).^{xxvi} Not only are water conservation habits the single strongest predictor of water conservation intentions, they also mediate other variables. For example, while there is a strong correlation between water conservation and water metering, habits negate the effects of water metering completely. Individuals can be informed and concerned about water scarcity, influenced by the actions of their neighbours, or motivated by the installation of new technology but if they are habitually wasteful with water, they will find it challenging to implement and maintain any sort of behaviour change.

It is therefore possible that 'interventions to change behaviour might be more effective...if they capitalize on moments of change'.^{xxvii} This **Habit Discontinuity Hypothesis** posits that an individual is more likely to change their everyday habits (e.g., using lots of water in the shower) if we intervene during a period of transition or disruption in that individual's life (e.g., moving house). Under these circumstances, old contexts and situational cues have fundamentally changed and are therefore less likely to prompt a return to the previous habitual behaviour. Many studies support this hypothesis in the context of environmental behaviours. For example, one study found that the distribution of free travel passes was an effective way to promote the use of public transport but only if the recipient had moved home or workplace in the three months preceding the intervention. The disruption of these life events made people more likely to develop new sustainable travel behaviours.^{xxviii} Similarly, individuals who had recently purchased an electric vehicle (in the three months preceding the intervention) were more likely to respond to prompts to charge their vehicles during off-peak hours than those who had purchased their vehicles at an earlier point in time. The intervention was more effective immediately after the purchase of an EV when new driving habits were not yet established.^{xxix}

There is currently little research on water use interventions and habit disruption but there is evidence to suggest this may be a promising area to test further interventions. Information provision and the setting of goals and targets have both proven to be more effective strategies when lives are disrupted by external events (e.g., a heatwave – see above). Moreover, research from the Centre for Change and Social Transformations (CAST) found that bathroom water use habits (showering and bathing) were changed in the context of the Covid-19 pandemic. Individuals had fewer baths and showers as well as reducing the amount of time they spent in the shower (see Case Study). Habits

were successfully disrupted, and these changes were maintained over time. Using a predictable disruptive event (e.g., moving house, having a baby, retirement) as a point of intervention will presumably have a similar effect on household water use behaviours.

Conclusion

In England and Wales, the average person consumes approximately 142 litres of water per day,^{xxx} which could increase dramatically as a result of climate change. In response to hotter, drier weather people may irrigate their gardens more regularly and engage in a range of cooling behaviours more often (e.g., additional showering, filling paddling pools). Future research could usefully test the effect of various moments of change on a range of different interventions (e.g., the introduction of new technology when a customer moves house or the communication of social norms when a customer has a baby). In addition, it is important to understand the impact of unpredictable, exogenous events (e.g., flooding, periods of extreme heat) on customer water use behaviours more generally. As we face the reality of climate change, we are presented with a unique opportunity to understand more about the impact of habit disruption on water use behaviours and, crucially, to intervene before the formation of new climate responsive water use habits.

End Notes

ⁱ Finley, S.L. and Basu, N.B., 2020. Curbing the summer surge: Permanent outdoor water use restrictions in humid and semiarid cities. *Water Resources Research* 55, 1-19.

ⁱⁱ Water UK, 2016. Water resources long term planning framework (2015-2065): Technical Report. Available at: [Water-UK-WRLTPF_Summary-Report_FINAL-PUBLISHED-min.pdf](#)

ⁱⁱⁱ Verplanken, B., Roy, D. and Whitmarsh, L., 2018. Cracks in the Wall: Habit Discontinuities as Vehicles for Behaviour Change. In: B. Verplanken (ed.) *The Psychology of Habit: Theory, Mechanisms, Change and Contexts*. Springer, p.189-206.

^{iv} Defra, 2018b. Water efficiency and behaviour change rapid evidence assessment (REA) final report. Available at: [WT1562p8-Water-Efficiency-and-Behaviour-Change-REA-FINAL.docx \(live.com\)](#); Kamat, J., Meleady, R. and Turocy, T., 2020. Analysis of AMP 6 Anglian Water Behaviour Change Interventions. Unpublished report for Anglian Water.

^v Trumbo, C. W., & O'Keefe, G. J. (2005). Intention to conserve water: Environmental values, reasoned action, and information effects across time. *Society and Natural Resources*, 18(6), 573–585.

^{vi} Grilli G. and Curtis, J., 2021. Encouraging pro-environmental behaviours: A review of methods and approaches. *Renewable and Sustainable Energy Reviews* 135, 1-14.

^{vii} Fielding, K.S., et al., 2013. An experimental test of voluntary strategies to promote urban water demand management. *Journal of Environmental Management* 114, 343-351; Nieswiadomy, M.L., 1992. Estimating urban residential water demand: effects of price structure, conservation, and education. *Water Resources Research* 28, 609-615.

^{viii} Goette, L., Leong, C. and Qian, N., 2019. Motivating household water conservation: A field experiment in Singapore. *PLOS ONE* 14 (3), 1-15; Tijds, M.S., et al., 2017. Saving water to save the environment: contrasting the effectiveness of environmental and monetary appeals in a residential water saving intervention. *Social Influence* 12 (2-3), 69-79.

^{ix} Tijds, M.S., et al., 2017. Saving water to save the environment: contrasting the effectiveness of environmental and monetary appeals in a residential water saving intervention. *Social Influence* 12 (2-3), 69-79.

- ^x Rajapaksa, D. *et al.*, 2019. Do monetary and non-monetary incentives influence environmental attitudes and behavior? Evidence from an experimental analysis. *Resources, Conservation, Recycling* 149, 168-176.
- ^{xi} Walton, A. and Hume, M., 2011. Creating positive habits in water conservation: the case of the Queensland Water Commission and the Target 140 campaign. *International Journal of Nonprofit and Voluntary Sector Marketing* 16, 215-224.
- ^{xii} Harding, M and Hsiaw, A., 2014. Goal setting and energy consumption. *Journal of Economic Behavior and Organization* 107, 209-227.
- ^{xiii} Kohlin, G., Whittington, D., Visser, M., 2018. Beyond Day Zero in Cape Town Economic Instruments for Water-scarce Cities. Available at: <http://www.efdinitiative.org/blog/beyond-day-zero-cape-town-economic-instruments-water-scarce-cities>; Walton, A. and Hume, M., 2011. Creating positive habits in water conservation: the case of the Queensland Water Commission and the Target 140 campaign. *International Journal of Nonprofit and Voluntary Sector Marketing* 16, 215-224.
- ^{xiv} Schultz, P.W., Javey, S. and Sorokina, A., 2019. Social comparison as a tool to promote residential water conservation. *Frontiers in Water* 1 (2), 1-9; Torres, M.M.J. and Carlsson, F., 2018. Direct and spillover effects of a social information campaign on residential water-savings. *Journal of Environmental Economics and Management* 92, 222-243.
- ^{xv} Ferraro, P.J. and Miranda, J.J., 2013. Heterogeneous treatment effects and mechanisms in information-based environmental policies: Evidence from a large-scale field experiment. *Resource and Energy Economics* 35, 356–37.
- ^{xvi} Ramli, U., 2021. Social norms based eco-feedback for household water consumption. *Sustainability* 13, 1-13.
- ^{xvii} Ashton, V., Lawson, R., Marshallsay, D., & Ponsonby, K. (2015) Water efficiency evidence base statistical analysis final report. Artesia Consulting, UK.
- ^{xviii} Inman, D. and Jeffrey, P., 2006. A review of residential water conservation tool performance and influences on implementation effectiveness. *Urban Water Journal* 3 (3), 127-143.
- ^{xix} Campbell, H.E., Johnson, R.M. and Larson, E.H., 2004. Prices, Devices, People, or Rules: The Relative Effectiveness of Policy Instruments in Water Conservation. *Review of Policy Research* 21 (5), 637-662; Geller, E.S., Erickson, J.B. and Buttram, B.A., 1983. Attempts to promote residential water conservation with educational, behavioral and engineering strategies. *Population and Environment* 6 (2), 96-112.
- ^{xx} Kappel, K. and Grechenig, T., 2009. 'Show-me': Water consumption at a glance to promote water conservation in the shower. Proceedings of the 4th international conference on persuasive technology, ACM; Sönderlund, A.L., *et al.*, 2016. Effectiveness of smart meter-based consumption feedback in curbing household water use: Knowns and unknowns. *Journal of Water Resources, Planning and Management* 142 (12), 1-13; Stewart, R.A., *et al.*, 2013. Showering behavioural response to alarming visual display monitors: longitudinal mixed method study. *Behaviour and Information Technology* 32 (7), 695-711.
- ^{xxi} Bamberg, S. and Schmidt, P., 2003. Incentives, morality or habit? Predicting students' car use for university routes with the models of Ajzen, Schwartz, and Triandis. *Environment and Behavior* 35 (2), 264-285; Thomas, C. and Sharp, V., 2013. Understanding the normalisation of recycling behaviour and its implications for other pro-environmental behaviours: A review of social norms and recycling. *Resources, Conservation, Recycling* 79, 11-20.
- ^{xxii} (Garcia-Valinas, M.A., *et al.*, 2013. Nondiscretionary residential water use: the impact of habits and water-efficient technologies. *The Australian Journal of Agricultural and Resource Economics* 58, 185-204; March, H., Hernandez, M. and Sauri, D., 2015. Assessing domestic water use habits for more effective water awareness campaigns during drought periods: a case study in Alicante, eastern Spain. *Natural Hazards and Earth System Sciences* 15, 963-972.
- ^{xxiii} Verplanken, B., 2018. Introduction. In: B. Verplanken (ed.) *The Psychology of Habit: Theory, Mechanisms, Change and Contexts*. Springer, pp.1-11.
- ^{xxiv} Kurz, T. *et al.*, 2015. Habitual behaviors or patterns of practice? Explaining and changing repetitive climate-relevant actions. *WIREs Climate Change* 6, 113-128.
- ^{xxv} Gregory, G.D. and Di Leo, M., 2003. Repeated behavior and environmental psychology: The role of personal involvement and habit formation in explaining water consumption. *Journal of Applied Social Psychology* 33 (6), 1261 -1296.

^{xxvi} Fielding, K.S., *et al.*, 2012. Determinants of household water conservation : The role of demographic, infrastructure, behavior, and psychosocial variables. *Water Resources Research* 48, 1-12.

^{xxvii} Verplanken, B., 2018. Introduction. In: B. Verplanken (ed.) *The Psychology of Habit: Theory, Mechanisms, Change and Contexts*. Springer, pp.1-11.

^{xxviii} Thøgersen, J., 2012. The importance of timing for breaking commuters' car driving habits. In A. Warde and D. Southerton (eds), *The Habits of Consumption*, Helsinki: Helsinki Collegium for Advances Studies, pp.130-140.

^{xxix} Nicolson, M., *et al.*, 2017. Tailored emails prompt electric vehicle owners to engage with tariff switching information. *Nature Energy* 2, 1-6.

^{xxx} This figure is slightly higher in Scotland with PCC at 165 litres per day - Waterwise, 2023. Water Facts. Available at: [Save Water – Waterwise](#).

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