frontiers in Environmental Science

BRIEF RESEARCH REPORT
published: 16 September 2020
doi: 10.3389/fenvs.2020.578423

Water Scarcity Communication in the UK: Learning From Water Company Communications Following the 2018 Heatwave

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When communicating about water scarcity, public water companies in the UK operate within a fine balance. There is a legal obligation on water companies in the UK to promote efficient water use, and pressure on water resources means that water companies need to encourage changes in water consumption behaviors. However, there is a lack of information about the way UK water companies communicate with the public. This paper presents the results of research into UK water company practices and perceptions in engaging consumers around water scarcity and water saving and discusses what this means for water scarcity communication. Interviews with 10 water company communication teams (14 interviewees) following the 2018 UK heatwave explored opportunities, innovations and challenges in public communication. Interviewees recognized the need for an ongoing conversation about water in the UK and identified a number of practices which could support a change in public water consumption. The results highlight the perceived importance of trust, timing and community- or group-scale communications, and the need for a cross-sectoral and intergenerational approach to public communication about water resources. This research examines some of the current underlying assumptions of water companies about what influences public water consumption in the UK and offers insights into some of the key challenges and opportunities for the future.

Keywords: drought, water scarcity, science communication, behavior change, social norms, water companies, social comparison, customer communication

OPEN ACCESS

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Specialty section:
This article was submitted to Science and Environmental Communication, a section of the journal Frontiers in Environmental Science

Received: *30 June 2020*
Accepted: *24 August 2020*
Published: *16 September 2020*

Citation:
Larbey R and Weitkamp E (2020) Water Scarcity Communication in the UK: Learning From Water Company Communications Following the 2018 Heatwave. Front. Environ. Sci. 8:578423. doi: 10.3389/fenvs.2020.578423

INTRODUCTION

Water resources are constrained in many parts of the world and the UK is no exception, with further pressure on water supply expected from both population growth (Office of National Statistics[ONS], 2017) and climate change (Rahiz and New, 2013; Guillod et al., 2018). Globally, by 2050, domestic water use is anticipated to increase by 130% (OECD, 2012). Faced with rising pressure on water supply, water companies use a combination of tools to increase water capacity (e.g., through water reuse schemes) and decrease demand for water (e.g., motivate customers to

change behavior). Orr et al. (2018) show that there is a lack of available information about the way UK water companies communicate to the public and how their communication affects outcomes. This study explores the ways in which UK water companies seek to reduce customer demand, focusing specifically on the role of communication as a strategy for demand reduction.

Household water demand can be reduced through legislation and regulatory approaches (such as temporary use bans); technological innovations (water-efficient appliances); information and education campaigns designed to raise awareness of the need for water conservation or to apply approaches such as social norming to reduce consumption; or through financial measures (including metering) (Inman and Jeffery, 2006). These approaches may be temporary, stimulated by a particular drought event, or designed for longer-term changes in consumption (e.g., technological innovations or some information and education campaigns). Waterwise (2013) emphasized that much of the current information provision on water resources in the UK was passive and recommended more proactive provision of information to create a "baseline of understanding," which would encourage pro-environmental activities through normalized behavior. However, Koop et al. (2019) still highlight the reactive nature of water conservation campaigns (i.e., they occur during drought or near drought conditions) and that such campaigns do not appear to have long-term impacts on water consumption. Furthermore, there is growing recognition that information-based campaigns, which may be underpinned by a tacit assumption of a knowledge deficit (also called "deficit model thinking": see Wilkinson and Weitkamp, 2016) may not be effective by itself (e.g., Lu et al., 2017; Lede and Meleady, 2019). In terms of approaches to changing water consumption behavior, Lu et al. (2017) review both information- and norm-based campaigns, and find key factors affecting consumption include water beliefs and environmental attitudes.

CONCEPTUAL BACKGROUND

The information deficit model is predicated on the idea that providing a linear and unidirectional flow of scientific facts and realities from experts to the public will encourage risk acceptance and result in people changing their beliefs, attitudes and behaviors, leading to positive change (Abunyewah et al., 2020). However, deficit approaches to communication, have been shown to be largely ineffective at stimulating reductions in water consumption (see, e.g., Cary, 2008; Adams et al., 2013) and may even lead to increased consumption as individual seek to assert their "right" to consume water (Seyranian et al., 2015). Broader research in science and risk communication (Wilkinson et al., 2011; Stilgoe et al., 2014; Wilkinson and Weitkamp, 2016; Abunyewah et al., 2020) suggests that either upgrading the deficit model with community participation, or moving away from the deficit model entirely – toward bidirectional, dialogic approaches – would be more effective at engaging consumers around water scarcity and water saving.

Science is also a mediated reality within a political context (Scheufele, 2014) and therefore pre-established beliefs about water may affect the efficacy of strategies to reduce water consumption (Jorgensen et al., 2009). In this context, it may be particularly challenging to reduce water consumption in Britain (Weitkamp et al., in review[1]), which is perceived to be relatively wet. Weitkamp et al. (in review) identify groups within the public that may be more amenable to communication about water risks, arguing that those with greater connection to water could act as trusted messengers for water risk messages. Adams et al. (2013) identify a number of factors that positively affected people's willingness to conserve water. In relation to outdoor water use these included: environmental values (e.g., valuing clean water); perception of efficacy (viewing water saving as beneficial to the environment); source of information; interest in community and personal water issues. Regarding reductions in indoor water use, source of information remained important, highlighting the role of trust in the information source. Lu et al. (2017, p. 33) suggest that "norm-based and social comparative feedback are good information-based intervention tools." However, Lu et al. (2017) also point out that social comparative feedback can lead to increases in water use amongst low water users. These studies suggest that approaches which target attitudes and social identity may offer a route to behavior change through prosocial messaging.

Socially comparative feedback may offer means of encouraging reductions in water use. The approach works on the presumption that people want to do better than others, so if they are doing worse than average they will seek to improve their behavior. It can backfire though when people are doing better than the average – so there is a tendency to converge on the norm. Lede and Meleady (2019) suggest that the power of this approach is underestimated. They argue that "Rather than tell people *what to do,* it was more effective to tell them *what other people are doing*" (Lede and Meleady, 2019; p. 2 italics original). Caldiani et al. (2006) suggest two ways of framing messages aimed at encouraging normative conduct: messages that comprise descriptive norms (what is done) and those which comprise injunctive norms (what is approved by society).

We also draw on social identity theory which suggests that attitudes, emotions and behaviors are shaped by the social groups to which you belong. This theory suggests that segmenting people through social categorization relies on a normative cognitive process that exaggerates similarities within a group, and differences between groups (Tajfel and Turner, 1979); social identity arises where these categorizations are used to self-reference. This tendency suggests that ingroup sources are likely to be seen as more trustworthy messengers than those whose group identity is different or unknown. This approach is most salient when the desired behavior forms part of self-identity (i.e., with people who identify strongly with that ingroup norm) (Lede et al., 2019). In the context of water consumers, such social

[1]Weitkamp, E., McEwen, L., Ramirez, P. Communicating the Hidden: towards a framework for drought risk communication in maritime climates. Climatic Change (in review).

identities could include demographic characteristics (e.g., age, family status, race, income level) or behavioral predilections (e.g., money-saving behavior, environmentalism).

Trust is argued to be important for message acceptance. Trust is thought to be composed of a willingness to become vulnerable to another and a belief that others are doing their part (Jorgensen et al., 2009). As we have discussed with regard to social identity theory, trust may be more likely between perceived ingroup sources. In the context of water companies, trust, then, not only involves believing that the water company accurately assesses and reports water related risks (the vulnerability component), but also a belief that the water company is also doing its part in the community to reduce water consumption (e.g., fixing leaks). The need to build trust suggests that water companies need to move beyond communication approaches framed around public knowledge deficits, toward two-way, dialogic and relationship-building approaches (see L'Etang, 2008; Cornelissen, 2017; Autzen and Weitkamp, 2019). In addition, to trusting the water company, when it comes to demand management, individuals also need to trust that their wider community is engaging in water-saving measures (a social component to trust).

METHODS

Publics may be more willing to attempt to reduce water consumption during periods of extreme (dry) weather. However, as extreme weather events go, drought onset is gradual; in fact, droughts may appear so slowly that they "go unnoticed by the public at large" (Weitkamp et al., in review). The summer of 2018, which was declared one of the driest on record (Met Office, 2018), thus provided an opportunity to explore with water companies the strategies they used to communicate with customers about water conservation. Interviews were conducted with 14 water company staff, representing 10 water companies from England (7), Northern Ireland (1), and Scotland (1). The 17 main water companies in the UK were contacted, and the 14 interviewees were those who responded positively to say they would like to be interviewed. Three interviews comprised a group of two or three staff (including both Northern Ireland and Scottish Water suppliers). Interviews were semi-structured, allowing the interviewees to explore issues on their own terms, while ensuring that the broad topics pertinent to this research were covered. Interviews lasted an average of 41 min (ranging from 22 to 71 min). Interviews were conducted by one researcher, via phone call, using a semi-structured interview schedule (see **Table 1** and **Supplementary Material**), and were recorded with the consent of the interviewees.

Data were analyzed using phronetic iterative analysis (Tracy, 2019), which combined close reading of the data with theory-driven models, to uncover the practices and approaches evident in the data. Interview transcripts were first read and discussed between the authors to identify emerging themes. This was followed by review of literature to identify relevant theoretical models that could inform further analysis. Descriptive codes based on these theoretical models were created and formed the initial code book, with broad themes defined from the data through examples and linked to theory. Data were extracted into these broad codes and a sample of coded transcripts were reviewed by the second coder. Following this initial layer of coding, theory was consulted again to identify more nuanced aspects (e.g., within the overall category of trust, data could be subdivided into building trust and trusted sources) and the researchers conferred to agree final codes. Data were then reviewed against these analytical codes, with new emergent codes added as needed and relevant to the research questions. The second researcher again reviewed a sample of transcripts to ensure agreement with coding.

TABLE 1 | Main interview themes.

Question themes	Sub-themes
Past communications with a demonstrable impact on customer behavior	• Type of communication • Evidence or data available to show impact • Future trends
Timing of drought/water scarcity communications	• Effects of timing • Short-term/long-term approaches • Interaction with the media
Groups of customers that are easier/more challenging to communicate with	• Rationale for groups being easier/more challenging • Customer segmentation strategies • Themes, messages, formats and approaches for particular groups
Overcoming communication barriers with customers	• Communications strategies • Use of data/scientific information • Cooperation with partners • UK water risk discourse in general

RESULTS

Timing

All water companies interviewed deployed regular communications about water saving, rather than just focusing on responsive drought-oriented communications. Short-term campaigns around drought events were seen as challenging, and ineffective over the mid-long term, with Respondent (R) 5 reporting "As soon as you stop doing that [a short-term campaign] the intended behavior has gone or the intended awareness has gone." In this context, preparatory communications were seen as very important, and continual preparedness was a consistent theme. Furthermore, water companies also reported that customers wanted this continual communication:

> "*So what we found was that actually a lot of people said most of the time we hear nothing about water resources and then all of a sudden you tell us there is a drought, in terms of, we suddenly need to do something. So what people were saying to us was actually they want that kind of year-round communication about where our reservoir levels are.*" (R10)

Although interviewees reported that they should be communicating about water scarcity issues even if "we are

in flood" (R5), there was a recognition that messages might not be well-received at these times. Water-saving messages were perceived to work better when there was a "hook" (e.g., a period of dry weather) and that in the winter "it's really hard to talk about dry weather and there not being enough water." (R4) A further challenge of continuous communications was customer fatigue:

> "*if every year we were to say the same messages about using water wisely. . . people get to the point where they become quite insensitive to the messaging*" (R8)

In terms of messaging, several interviewees felt that science-led or fact-based messaging was an effective way of overcoming the challenge of finding a "hook" for stories, suggesting that the media like "things like rainfall data, rain charts and anything we can show visually" (R3). This respondent also felt that the public in general "like the stats, they do like the facts, they don't tend to believe us if we don't back it up with facts" (R3).

Trusting the Messenger

Trust was seen as important for effective communication. In England there were concerns that water companies were not sufficiently trusted messengers: "From the eyes of the customers. . . we might not be the most trusted voice for that message to land" (R5). These concerns were less evident in Northern Ireland and Scotland, as public (governmental) messaging and water company messaging were seen to be better aligned: "we are trusted to deliver a fantastic service" (R1). Companies cited a number of ways in which they could build trust with customers, including communicating about other topics such as plastic pollution, climate change and health. These topics could also be used to engage customers with water scarcity, as explained by this respondent:

> "*We have talked a lot over the last few years around plastic pollution. . . [to] locally build the trust. . . that actually we are a decent company, we are doing the right thing so that hopefully when we start to hit messages like we are at the moment around water saving, they are actually being listened to.*" (R11)

Companies also engaged with intermediaries to help deliver messages about water saving and scarcity. Some examples include charities, NGOs or environmental partners (such as river or canal groups) and umbrella organizations, such as race courses as a means of influencing individual horse owners. Four companies felt that the Government, as a trusted messenger, should do more to promote water-saving behaviors. Working together across different sectors came up several times.

Reaching Customers

Building trust locally was seen to be beneficial, and for most interviewees this involved some level of customer segmentation. Customers were often grouped by demographic data such as age, though there were several companies also starting (or wanting to start) to focus on grouping by other factors:

> "*we have very much gone, here is our generic message, this is what everybody should be doing rather than looking and maybe targeting it either to interest groups or to local areas where there is a particular demographic. So we haven't really tried that yet. But again that's something that we want to do.*" (R10)

Understanding customers' cultural background was seen to give insights into their water use context, but one challenge cited was "understanding your customer base well enough to segment them properly" (R5). Identifying customer groups was seen as valuable because different people needed help with particular habits: segmentation allowed messages and services to be tailored to each group. Four interviewees mentioned that it was easier to engage a segment that is concerned about environment, sustainability, or climate. Seven interviewees indicated that it was easier to engage people with money saving messages than other types of messages. However, a couple also mentioned money saving or financial reward being less effective than other messages (e.g., environment) – perhaps because the low costs of water means the financial gains are relatively modest. The low cost of water, therefore, came up several times as a barrier to effective messaging about money saving, as explained by this interviewee:

> "*if you put out a little bit of messaging on gas and electric bills because they are that much higher you have got that much more attention straight away.*" (R4)

Attitudes toward waste or maximizing efficiency came up in several interviews, with older people seen as more likely to hold these attitudes. Older people were generally seen as having more water-saving attitudes, whereas younger people, especially teenagers were seen as less water-conscious. However, this was balanced in part in one case by younger generations being seen as more likely to use water-saving technologies and devices, and one trial where young people responded more to messages involving scientific information than those involving humor or calls to action. Age was seen as a greater factor than cultural diversity in determining water use:

> "*ethnic background and cultural differences lead to different water use, we know that. People use water differently. For a number of reasons, ethnicity, culture or how they cook food and how they use water varies the total consumption or per capita consumption of that particular demographic however when it comes to teenagers we found they all use too much!*" (R4)

Several other segments were also more difficult to reach: time-poor families; people with low digital literacy; and, for three companies, a group who say "why do I care?" (R1) or who "feel aggrieved at being asked to save anything, you know, its water, it falls from the sky, why do I have to pay for it?" (R3). Such customer attitudes were also explored in the context of intergenerational equity. For example, this interviewee considered who should be responsible for paying for increasing water security in the UK:

> "*if you are talking to a retired person, is it fair for them to have their bill go up by £10, £20, £30 to pay for a reservoir or a transfer that they will never see the benefit of?*" (R4)

In terms of reaching customers, interviewees mentioned providing personalized information, using meter readings to tell people how much water they were using. However, it was noted that such information needed to be accompanied by

information that would support changes to behavior, whether at the level of personal behaviors or adoption of water-saving technologies. This approach could be extended to provide socially comparative feedback, where customers were told how their water use compared with others in the same area. Eight of the 11 companies represented reported using this approach, which was clearly seen as an effective tool to encourage water saving. A city league table and competitions between families attending a school were other suggestions embedding socially comparative feedback. Funding for communications was also cited as a challenge for reaching customers: "most water companies aren't particularly well-resourced on marketing compared to your typical commercial organizations" (R3). One company mentioned using an AI-supported online facility to help it to become more responsive to customers.

Community-Scale Interventions

Four interviews mentioned conducting community-scale experiments trialing communication approaches to reduce consumption. These approaches focused on specific locations, such as a town served by the water company and were seen as a way of testing "how innovations work together" (R3). In one particularly water-stressed region, a trial was underway to see whether it was possible to reduce average daily water consumption to under 80 l. This trial combined a range of approaches, including personalized reports on water usage; reports on water usage compared to neighbors; and communications about local water resources. The company offered to pay people £50 to read their meter twice during a 2-week trial, to try to stimulate greater engagement with water savings. As the interviewee observed:

> "*We thought that they might really save initially in the first few days and really go for gold and then actually it [water consumption] would rise back up a little bit as they got bored. But actually we found that the savings increased over time. So there was a little bit of getting to grips with it but then once they found the tips that worked for their family and got into their own groove with it, then their savings increased. So it was actually counter to what we thought the outcome would be.*" (R3)

Test communities were also used to assess the impact of the way that socially comparative feedback is provided to customers, for example: "we have called it 'your neighbors,' 'similar properties,' 'properties in your region,' we have put some different language to see what strikes a good cord with customers. What they don't like." (R8) These "testbeds" either fed back personal results or socially comparative information, or produced information the companies were using to inform future communication. Results were mainly measured through metering, though one company used a survey to assess satisfaction. The stated aim was to use a "blueprint" created from the smaller testbeds to roll out well-informed communications over a larger area.

DISCUSSION

In contrast to previous research (e.g., Koop et al., 2019), we found evidence that UK water companies recognized the importance of proactive communication with customers to reduce demand. However, as in previous research with other types of stakeholders, interviewees noted that it was hard to discuss drought and water scarcity issues in the absence of dry weather and particularly in the winter (Weitkamp et al., in review). In this context, our interviewees reported a number of approaches designed to reduce demand and were actively innovating and testing approaches to identify those leading to changes in water-use behaviors. While there was recognition of the challenge of achieving sustained behavior change, examples involving personal feedback and socially comparative data were viewed as the most promising.

From interviewees' perspectives, trust emerged as a major factor affecting their communication and they were acutely aware that as water-selling businesses they were not always the most trusted source to communicate about water scarcity or saving. This need to build trust was a major factor in their recognition of the need for sustained communication about water use and water scarcity and led companies to work with intermediaries that they perceive to be more trusted by the public. It also underpinned the call for a more joined-up approach to water communication, in which government and non-governmental organizations had a significant role to play (see also Waterwise, 2013). Most companies interviewed were at least partially invested in a communications model involving closing informational deficits. Many of the approaches mentioned by water companies were about broadcasting messages to customers and there were relatively few examples of approaches that might be viewed as dialogic or designed to build relationships (L'Etang, 2008; Autzen and Weitkamp, 2019). Where dialogic approaches were mentioned, they were seen as effective but time-consuming, with cause-and-effect impacts on water resources that are very challenging to measure. Therefore, these potentially effective approaches were seen as harder to justify.

Funding for communications was also cited as a challenge for communicating with customers, and one interviewee pointed toward a report showing that the percentage of total water company spending used on water resources and efficiency communications in the UK (0.2%) was much lower than in the EU (1%), the US (1%), or Australia (6%) (Lewis et al., 2018). Public understanding of water resources issues – "how water gets from the sky to your taps" (R3) – and related water risks, was still seen as a general issue, but one that was being addressed with the provision of more scientific or fact-based information in some cases. A lack of recognition for intergenerational fairness in the funding of water infrastructure was cited as an outstanding issue around the communication of risk management; this is a topic the authors recommend for further exploration.

Previous research (Jorgensen et al., 2009; Adams et al., 2013; Weitkamp et al., in review) has suggested that some members of the public are more willing to engage with water savings than others. Our research with water company representatives suggests that many of these businesses rely on more traditional approaches, segmenting customer groups by demographic characteristics (such as age), although there is an

emerging trend for segmentation by other types of social identity, such as attitude or underlying values.

There was a mixed response regarding the perceived effectiveness of cost-saving messages. Those who doubted their effectiveness attributed this to the low cost of water, but water companies should also bear in mind Corner and Randall's (2011) research, showing that appealing to cost-saving behaviors does not necessarily make pro-environmental behaviors more likely. Although appealing to cultural and environmental values was perceived as effective, most of the approaches discussed focused on place – e.g., community-based initiatives. Place-based focus may relate to the ways in which water companies typically assess interventions (which could be through comparison of consumption data by postcode). The emphasis on attitude and place aligns with communications approaches that focus on social norms and socially comparative feedback; further work to assess the efficacy of these approaches is needed.

This research sheds further light on the way UK water companies communicate with the public and brings clarity to some of the perceived underlying assumptions in the sector about what influences public water consumption.

Methodologically, combining dialogic, culturally informed approaches with community-scale testbeds could produce a more rigorous understanding of the way that various communications interventions affect outcomes. For policy, our results signal a call for help in building and maintaining an environment of greater trust to discuss water supply issues and risks in the UK: an environment in which long-held beliefs about water may need to be unpicked and challenged, and which creates space and resources for more bidirectional flows of information between consumers and water companies.

DATA AVAILABILITY STATEMENT

The datasets for this article are not publicly available because the nature of the interviews means that it is not possible to provide anonymity to the participants if the full or partially redacted transcripts are made available publicly. As anonymity was a condition of the ethics approval full transcripts cannot be made available. Substantially redacted transcripts can be provided on request to the corresponding author. Requests to access the datasets should be directed to RL, ruth.larbey@uwe.ac.uk.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Faculty of Health and Applied Sciences Research Ethics Committee, UWE. The participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

RL piloted and amended the interview schedule, carried out the interviews, conducted primary analysis of the data, wrote sections of the manuscript, contributed to revisions, and read and approved the submitted version. EW designed the interview schedule, secured institutional ethics approval, supported data analysis, wrote sections of the manuscript, contributed to revisions, and read and approved the submitted version. Both authors contributed to the article and approved the submitted version.

FUNDING

This research was conducted as part of the ENDOWS project which was funded through the UK Natural Environmental Research Council (Grant No: NE/L01033X/1).

ACKNOWLEDGMENTS

We would like to acknowledge the time and generous support of the interviewees.

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fenvs.2020.578423/full#supplementary-material

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.