artesia

MANCHESTER 1824
The University of Manchester

Peak Demands

1) What are the challenges and the key insights Social Practice Theories (SPT) offers?

Water demands peak at certain times of the day, week and year. Peak water demand is influenced by our everyday routines of work and leisure, practices such as commuting and mobilities, and seasonal changes to water demand practices such as gardening, outdoor cleaning, or spring/summer leisure. Negotiating increasingly hot and variable weather patterns also influences, and often increases, peoples' water demand profiles. This is becoming increasingly important in the context of climate change.

We know that anticipating peak demands is a key pressure on water supply systems in both normal and drought periods. Peak demands can also be quite difficult to intentionally change, as they are often not linear but have subtle and varied differences shaped by a range of factors and practices not immediately or obviously connected to water demand (e.g., work, leisure, remote work, commuting patterns). The challenge lies in understanding existing patterns of diverse peak demands; and how they are influenced by a range of interconnected everyday practices not always related to just 'water'.

2) What is the key study and what does it show?

2018 was one of the warmest summers ever in the UK due to a combination of high temperature and low rainfall (Artesia Consulting, 2019). Despite this, no water companies enforced restrictions on use, as most water resources were in a good position prior to the summer (due to a wet winter and spring). Artesia undertook a collaborative industry study that aimed to quantify the impact extreme weather had on demand and identify what factors impacted and dampened peak demand.

The graph below shows a single property's consumption for each day of the first week of every month in 2018. Consumption is categorised as internal (coloured blue) and external (in orange) revealing regular morning peaks with sporadic evening peaks. We see a consistent consumption pattern of internal use, with daily peaks in use. From an SPT perspective we would begin to question how everyday life shapes the daily peaks that were observed. SPT enables an analysis of what factors could be driving these routine peaks (commuting practices, cleanliness habits, or evening food routines). We could explore what social norms and expectations might be coming into play here (cleanliness expectations) and how different factors inter-connect to produce such extreme daily peaks.

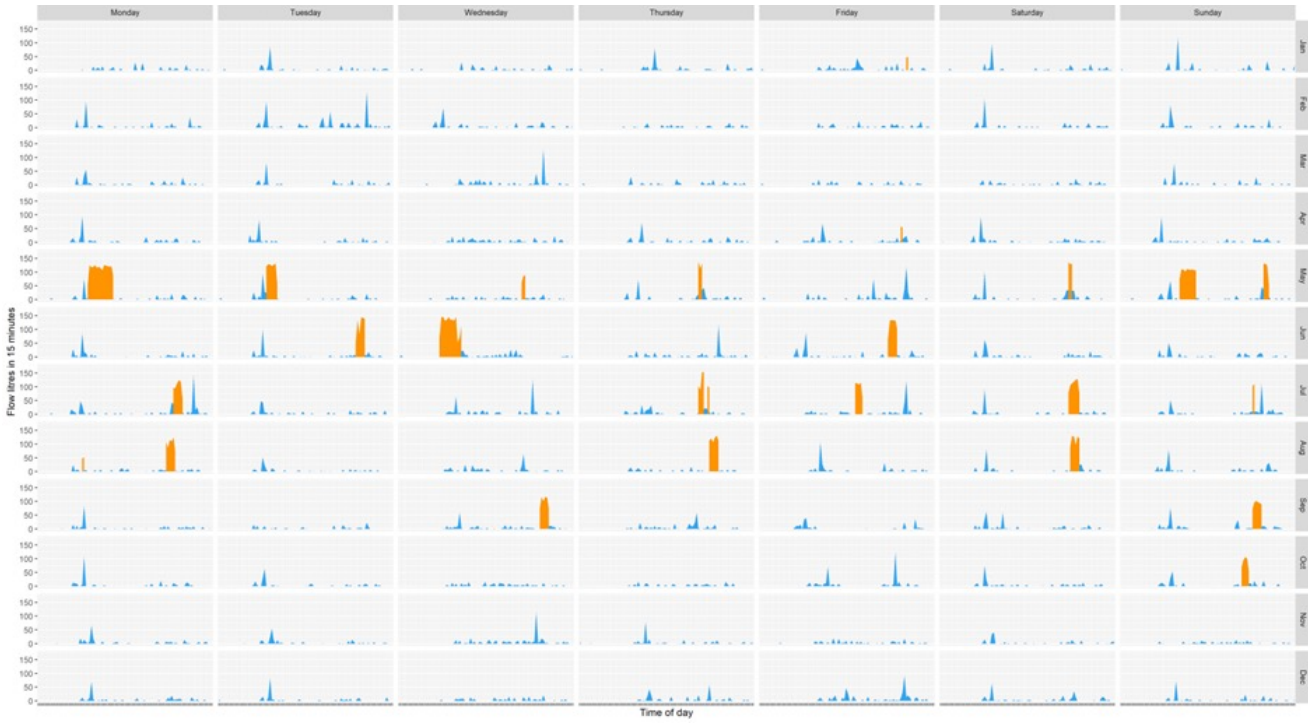

Figure 1 An example of an individual unmeasured household's consumption showing internal and external use across 2018 (Artesia Consulting, 2019)

In this graph we see high-volume external use peaks throughout the summer months. While this quantitative data does not allow for the direct exploration of how and why these seasonal peaks emerge, we can apply SPT ideas to this data and generate a series of hypotheses and then conduct some data analysis to interrogate these seasonal peaks. We see prolonged periods of intense outdoor use.

SPT would question what these practices are (garden watering? outdoor leisure use? outdoor cleaning?); why do these practices appear (hot dry conditions, combined with no restrictions and shared expectations of water supply and outdoor use leading to intense periods of use?); Why do these practices present as blocks of intense peak use occurring across days in the week? (intense peaks could be attributed to intense methods of garden watering e.g. hose pipe use)? Are these activities being slotted around wider household routines? Are certain performance of practices enabled through infrastructure arrangements? (outdoor taps and hose pipes). SPT ideas and analysis can facilitate a deeper interrogation of the 'what and why' behind such graphs.

3) What does our Knowledge Transfer Partnership (KTP) primary research reveal?

Our primary KTP research ran across summer 2022 and we were able to explore how people negotiated water use in response to drought conditions and extreme temperatures. For this example, we will discuss demand peaks observed during the July 2022 extreme temperatures.

Across the 17-19th and 25th of July 2022 the UK experienced daily temperatures above 35°C. For this period, we observed spikes in daily water use, particularly in the evening, in some quantitative data samples in our data set. The qualitative data we collected revealed the emergence of temporary evening wash (shower) routines, often in addition to usual daily hygiene practices. Some participants discussed how extra showers were tools to cool the body, after a day's activity in the heat and were framed as a 'necessity'. Often people thought of these extra showers as 'just what you do' or normal responses to a heatwave.

In interviews participants were asked to consider the weather (and differences when it is hotter and colder) and if it had any effect on their routine. Below is a snippet of one participant's response:

"Hmmm well one day I showered more, when we had those really hot temperatures, those 40 degrees ones. After a bit of work indoors, I would sit in the garden. I would get hot just sitting outside. I thought I can't go to bed like this [hot, sweaty] so I would need to shower and freshen up. I can't remember if this happened before. I needed it [extra showering] to freshen up." Tim

Future planning could learn from this by building in a level of expectation that people will adopt extra bodily washing practices (showers) which they frame as an adaptive response to 'extreme temperatures'. This anticipated peak demand during heatwaves in the UK, creates a level of preparedness in water resource management in the context of Climate Change and the increased likelihood of extreme temperatures.

4) How could you plan to take these ideas forward in your work

By including a social practice approach in how you plan for and manage demand peaks you are creating tools that enhance your understanding of how and why people use water and what factors and practices lead to certain high consumption levels. As a drought, hot and dry period or extreme temperatures occur or are predicted you are able to trigger and prepare certain mechanisms/programmes/interventions which are responsive and designed to take into account the wider context of demand.

We recommend a recognition that everyday practices might and will change in the future is built into policy, planning and interventions. This might seem small, but an acknowledgement that there may be future behaviours we are unaware of creates an ethos of preparedness, a readiness to deal with evolving trends. Artesia's Summer 2018 Report found that there is no single representative dry year, each one is different, our primary research also found variations in people's responses to drought and extreme temperatures (with some enrolling in extra wash practices and others not). The certain conditions and practice arrangements which lead to demand peaks are often unique.

However, while a lot of this may be unpredictable we can see warning signs now of how people may change practices to deal with extreme temperatures and new climates (e.g. how people responded to the July 2022 extreme temperatures) and by building SPT ideas into planning and management strategies we begin to identify the range of emerging practices and routines which may become the norm in water futures.

References

Artesia Consulting (2019) *Water demand insights from summer 2018 – Final Technical Report*. Available at: **Understanding changes in household water consumption associated with Covid-19 — Research Explorer The University of Manchester**

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