

## Examining adaptation using the Message Actor Channel (MAC) model of communicative water practices

F. O. Ajia

### ABSTRACT

Water utilities rely on technological interventions to achieve household water efficiency. This practice is critiqued as seeking to appeal to the financial interests implied by people's role as customers rather than to achieve behavioural change in householders. A policy analysis reveals that although not prominently evidenced by some water utilities, public engagement is key to long-term demand reduction. This paper presents a systematic review of the demand management literature, specifically outlining key theoretical considerations for public engagement in relation to reducing water demand and their translation into practice in utilities. The aim is to demonstrate the use of a framework for examining engagement in utilities. Findings show that demand management interventions need to exploit: (1) effective frames for messages, (2) the diversity of the public, and (3) communication mediums that facilitate feedback. These insights informed the development of the MAC (Message Actor Channel) model of communicative water practices further used in this study to review public engagement plans for household water efficiency in selected UK water utilities based on processes described in their 2014 water resources management plans. Findings will inform the next stages of a doctoral study that will assess utilities' field engagement of households to reduce water use.

**Key words** | adaptation, behavioural change, household demand management, public engagement, water management, water utilities

F. O. Ajia  
Department of Urban Studies and Planning,  
University of Sheffield,  
Western Bank, Sheffield S10 2TN,  
UK  
E-mail: [fajia1@sheffield.ac.uk](mailto:fajia1@sheffield.ac.uk)

### INTRODUCTION

In line with social scientists increasingly calling for changes to traditional water management (Browne *et al.* 2013), this paper starts from the normative position that traditional water management would be enhanced through increasing public engagement to understand and influence people's water behaviours, and hence provide better value for money.

Increasing household water demand and its management is a recognised global issue. With the world population rising by 33% between 2011 and 2050 (UN 2016); and the 5th Intergovernmental Panel on Climate Change (IPCC) warning that for every degree of global warming, an estimated 7% of the global population will be exposed to at least a 20% decrease of renewable water resources (IPCC

2013), increasing water demand has become a pressing challenge. Similarly, increasing water demand is just as significant in the United Kingdom (UK), because while UK industrial water use has decreased, household water use has steadily increased by 1% since the 1930s (Staffell *et al.* 2015). These facts highlight the imperative to manage domestic water demand and are reflected by a rapid increase in the quantity of research and policy experiments using public engagement to influence water values and practices, and thus reduce water use.

The conventional role of public engagement in traditional water management regimes can be contrasted with arguments for public engagement in contemporary

water management. Up until the early 1980s, the UK water supply was managed by state-owned enterprises using engineering expertise and infrastructures such as large dams (Bakker 2013), which provided quick solutions to urgent water issues. The traditional role of public engagement in the water utility typically focussed on minimising water supply disruptions and billing complaints. Pahl-Wostl *et al.* (2007) ascribe such engineering focused approaches as ‘traditional’ because of their heavy reliance on inflexible technical systems for prediction and control.

On the other hand, there is a growing interest in governments’ and public-proxy bodies’ commitment to people and the environment, and water regulatory frameworks and management strategies are positioning public engagement as crucial to linking water utilities with the public. The premise of contemporary demand management is therefore that people must be centred at the heart of water matters, but how this translates into practice varies between two positions that manifest through the collaboration of two key actors that manage and use water – the water utilities and people.

In 1992, the ‘Dublin Statement’ was produced, with its major principle being that water should be managed as an economic good (Muller 2015) through market pricing. This led to the controversial (Franco *et al.* 2013) but wide acceptance of the commodification of water (Bakker 2013). The Dublin Statement is critiqued as flawed due to its lack of consideration for the variations in management approaches across organisations (Muller 2015). Critics of the Dublin Statement present an alternative to the commodification of water by advocating for communal involvement in water management. Two dominant approaches are thus emerging – engaging the public on water issues by appealing to individual interests such as reducing water bills (Schleich & Hillenbrand 2009); and engaging the public on water issues by appealing to people’s communal values such as the desire to protect water resources (Muller 2015). Termed in this study as the ‘individual interest’ and ‘communal interest’ approaches, the former is indicated significantly by economic incentives for customers while the latter is indicated by intrinsic incentives for householders.

To capture the diversity of the public, the term ‘publics’ is defined here as domestic water users in the water utility’s catchment area; whether bill-paying individuals or

otherwise, belonging to a non-exhaustive list of stakeholder groups such as school children, students, residents, local citizens, and household customers; it may also be associated with a variety of intermediary groups including the media, local authorities, non-governmental organisations etc. As a key component that is instrumental to reducing water demand, ‘engagement’ in this study refers to any two-way communicative interaction between the utility and any of these publics targeted towards changing water practices of the public, in the water utility, or of both parties with the goal of reducing total household water demand.

The water utility’s perception of its ‘publics’ and its understanding of its responsibility towards water security is indicative of its adoption of any or both public engagement approaches in practice, albeit the primary goal of both approaches is to reduce per capita daily water consumption despite variations in the motivations and practices that constitute these approaches. For example, in its ‘Save A Little, Save A Lot’ campaign to ‘consume water with care’ in June 2015, Yorkshire Water sought to achieve water efficiency by appealing to its customers’ individual interest in reducing water bills. Here, Yorkshire Water intended to highlight the financial value of water by stating in its 8 June 2015 website article titled ‘Water Conservation Campaign Launched to Mark World Environmental Day’ that ‘an extensive survey in 2014 revealed most customers recognize the importance of water efficiency, with financial savings the biggest driver’. In contrast, Anglian Water’s current ‘Love Every Drop’ campaign continues to significantly target its publics’ communal interests by encouraging people to come together to protect and use water wisely. Although both approaches in Yorkshire Water and Anglian Water involve engagement, two important differences lie in ‘the people engaged’ and ‘the basis of the engagement’ – with the former approach targeting customers interested in making financial savings on water bills and the latter approach targeting residents who desire to collectively protect water.

This study therefore seeks to investigate key policy and literature considerations for public engagement and how these manifest as planned household demand management approaches in UK water utilities. This work uses published documents on water management and represents the preliminary data collection phase of a doctoral study

examining public engagement in relation to reducing water demand undertaken by water utilities in the UK.

### The challenge: making a case for public engagement in demand management

UK water utilities have a responsibility to plan and promote water efficiency, albeit in the long term, the uptake and continuity of water efficiency measures lie with their publics. The public is recognised as capable of actively supporting water utilities to tackle water issues (Sharp *et al.* 2015) and over the past price review periods, Ofwat has continued to increase expectations for water utilities to play a more significant role in household demand management.

Significant challenges are emerging as public engagement becomes increasingly recognised as a pillar of water management. First, the policy governing UK water engagement is not prescriptive, creating a challenge with standardising engagement. Second, some utilities still underestimate the capability of the public to actively reduce water use without the influence of water saving devices. Third, although mostly discussed in isolation, the literature is lacking any holistic considerations for the interdependency of the elements that facilitate engagement. Most studies on water engagement focus on understanding singular elements of public engagement; for example, there are existing studies

on expectations of good engagement in relation to demand management (Kampragou *et al.* 2011) but a comprehensive understanding of ‘who is engaged’ and ‘how engagement is carried out’ is lacking in the literature. Although the literature findings are useful, much remains open for study in relation to how public engagement in water utilities can be examined, and addressing this gap will provide insights that are transferable to various water issues and geographical contexts.

### METHODOLOGY

A coordinated qualitative approach including a literature and systematic documentary review was utilised for this study (see Figure 1).

Analyses were conducted in three phases due to the interest in pulling together elements of public engagement in relation to water efficiency discussed in policy documents, in the literature, and in Water Resources Management Plans (WRMPs) – a statutory document produced by UK utilities to demonstrate management of water resources to balance demand and supply.

In *Phase 1*, a documentary analysis of the customer engagement policy designed by the UK water sector’s economic regulator Ofwat in 2011 and 2016 was undertaken,

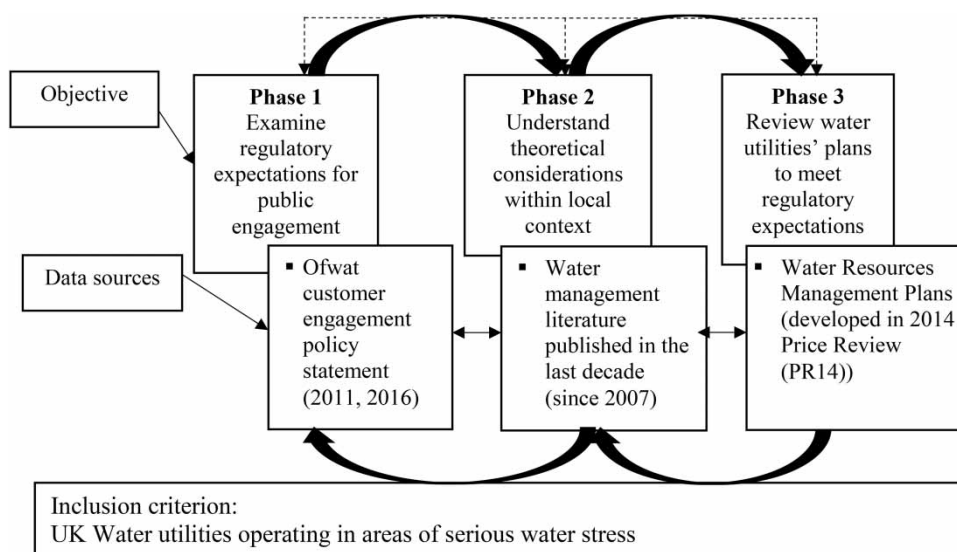


Figure 1 | Framework for analysing considerations for public engagement policy and practice.

with the aim of understanding regulatory expectations for public engagement.

In *Phase 2*, a review of the literature on water management mostly published in the past decade was conducted, with an objective of drawing together recent theoretical and practice considerations for public engagement in relation to reducing water demand. In examining these understandings, I developed themes from literature discussions around the construct of demand management messages, stakeholder roles, and channels of communication. Drawing from Phases 1 and 2, this study took a novel approach to develop the Message Actor Channel (MAC) model of communicative water practices, which synthesises key elements of public engagement and positions as the framework for examining WRMPs as questions emerged in Phase 3.

In *Phase 3*, using the MAC model as an analytical lens, I systematically and iteratively reviewed WRMPs with a focus on public engagement plans in relation to household water efficiency developed by seven selected UK water utilities during PR14. Under the regulatory guidance of Ofwat, the Environment Agency, and the Department for Environment, Food and Rural Affairs (Defra), each UK water utility is required to produce and maintain a WRMP setting out how it will manage and develop water resources to balance demand and supply over the next 25 years; and revise this plan every five years as part of the price review process. Utilities were purposely selected from the pool of 24 UK water and sewerage utilities operating in England, Scotland and Wales to solely include those identified by the UK Environment Agency and Natural Resources as facing the issue of increasing water demand. These utilities are namely Affinity Water, Anglian Water, Essex and Suffolk Water, South East Water, Southern Water, Sutton and East Surrey Water, and Thames Water.

## RESULTS AND DISCUSSION

### Public engagement policy: emerging expectations for UK water utilities

A central assumption underlying the regulation of any commodity is that markets are imperfect, thus requiring control

from a regulatory organisation. One theme of policy that has been gaining traction in the water sector since the 1990s is customer engagement (UKWIR 2015). In August 2011, Ofwat published its customer engagement policy statement for water companies introducing the concept of forming Customer Challenge Groups (CCG) to increase customer involvement in water governance and foster engagement through various pathways.

Regarding expectations for increasing customer engagement, Ofwat adopts a ‘transfer-of-disposition’ approach by giving water utilities considerable discretion to implement engagement. The regulator steers clear of providing hard rules for engagement as suggested in its statement:

*‘We have designed a framework that is intended to be non-prescriptive, while holding the companies accountable for managing and shaping customer engagement...’* (Ofwat 2011).

To shape engagement, Ofwat highlights key principles that emphasise customer involvement and recognise a variation in customer priorities, thus stating the following:

*‘Different customers in different areas have different concerns and priorities...while some groups may favour work to enhance the local environment...others want help managing water use...some people may need help communicating with their company’* (Ofwat 2011).

It can therefore be inferred that Ofwat’s customer engagement policy does not provide a definite framework for the documentation and evaluation of public engagement processes in water utilities, but the policy mandates utilities to collaborate with the public on water issues; and the subsequent refresh of this policy every Price Review period after PR14 will create spaces for innovative utilities to refine public engagement on short and long-term priorities.

### Theorising public engagement: the MAC model of communicative water practices

Interpreting theories that emphasise the understanding of elements underlying public engagement in the context of

water demand management (see Table 1) is key to deducing the implications of dominant practices in water utilities.

Whilst the identity of the public is contested in and across various research fields, the need to understand the specific and diverse identities of actors in public engagement is emerging in response to the research community promoting people (Dean *et al.* 2016) and institutions (Michelsen 2014) as actors in engagement. The literature relating to communicating about water often uses the term 'public' interchangeably with 'customers', 'bill-payers' and 'the general public'. For example, in a field study conducted in an anonymous US water utility, Goetz (2014) emphasised the general public as bill-paying customers.

Selecting communication channels in public engagement is important; with its relevance grounded in the ability of mediums to facilitate or impede engagement. Browne *et al.* (2013) note that household demand is influenced by the interaction between people, nature and technology, and communication channels serve to (re) shape these interactions. There is more specific literature that embodies how water efficiency programmes position the 'customer' and how water acts in households (Sofoulis 2015). Of equal significance is the literature that expands on promoting water efficiency using multiple communication channels and how water systems such as rain water tanks and cistern displacement devices can cause people to change water habits, sometimes unconsciously (Sharp 2006). Although devices such as meters are technological, they transmit implicit messages that consciously and sub-consciously (re)shape publics during use. I thus consider technological interventions as channels of communication in their own rights. It must however be highlighted that when a conscious behavioural change is not the focus of demand management interventions, a displaced water demand may unfold when there is a change in household dynamic such as economic status, water system, or physical space. For instance, whilst a water user may spend less time in the shower due to using a low-flow shower head in the home, this *quick-fix* outcome may not be sustained when the water user uses a high-pressure shower head in a different environment, such as a hotel. If people's values are consciously reshaped using behavioural change messages on the other hand, it is more likely that regardless of water system and physical space, users will be water efficient.

Table 1 | Conventional versus contemporary approaches to public engagement in relation to reducing water demand

Component	Approach	Contemporary demand management approaches		
		Conventional demand management approach (see Pahl-Wostl <i>et al.</i> 2007)	Public engagement appealing to individual interests of the publics	Public engagement appealing to communal interests of the publics
<i>Message</i>	<b>Implied identity of water</b> <b>Frame/ rhetoric</b> <b>Primary focus</b>	Infinite resource Operational cost Water pricing	Economic commodity (Franco <i>et al.</i> 2013) Monetary savings (see Michelsen 2014) Water demand and supply	Communal resource (advocated for in Pahl-Wostl <i>et al.</i> 2007) Collective/social action (see Mirza & Mustafa 2016) Water efficiency (see Kampragou <i>et al.</i> 2011)
<i>Actor</i>	<b>Domestic public composition</b> <b>Public identity</b> <b>Implicit assumption about the public</b>	Disengaged and <i>less-aware</i> publics User of water Non-participatory	Passive individual bill-payer (see Sharp 2006) Purchaser of water i.e. bill-payer (see Goetz 2014) May not make informed water-wise decisions	Aware household dwellers (see Dean <i>et al.</i> 2016) Citizen of the community who owns water Capable of conscious social awakening
<i>Channel</i>	<b>Dominant instruments</b>  <b>Indicator of impact of public engagement</b>	Fine prints on water bill Availability of water (implied by Muller 2015)	Technological e.g. meters, water saving kits such as water butt, tank, trigger hose, low-flow shower head, and washing machine subsidy (discussed in Sofoulis 2015) Quantifiable econometric evidence e.g. per capita consumption (Schleich & Hillenbrand 2009)	Non-physical tools e.g. water consultation and education (see Kampragou <i>et al.</i> 2011) Microcomponent/qualitative/'abstractive' evidence of behavioural change (championed by social scientists such as Browne <i>et al.</i> 2013)



Having examined policy and literature discussions relating to public engagement in the context of water management, the insights are understood around three major elements – actor, message and channel of communication. I thus juxtapose insights that authors and the regulator draw up to argue for the factors that re(shape) the outcomes of public engagement, forming the MAC model of communicative water practices (see Figure 2).

### A systematic review of demand management plans using the MAC model of communicative water practices

To illustrate the MAC model's application, and as a starting point for understanding engagement approaches in water utilities, this study used the three elements of the MAC model as a tri-focal analytical lens to systematically review public engagement plans and practices set out in WRMPs of UK water utilities operating in areas of serious water stress. Findings are discussed subsequently.

#### Message

There is a high degree of commonality in the way water utilities plan to construct and present water efficiency messages to their publics. Although some utilities indicated that some publics contest the validity of climate change, it is still a powerful frame for water efficiency messages especially when attempting to appeal to the people's communal interests. This is apparent in WRMP consultations conducted by Affinity Water, Anglian Water, Essex and

Suffolk Water, South East Water, and Sutton and East Surrey Water, who all highlighted the impact of climate change on the level of rainfall in their regions of operation, thus attempting to awaken local interest and motivate collective action.

#### Actor

As can be inferred from the literature, the disparity between how stakeholders are identified theoretically and the role they assume in relation to water begs the question about who water utilities envision when they imagine the 'customer'. Thus, understanding semantics in public engagement planning is key to identifying water utilities' target audience for water efficiency initiatives.

The frequency of reference to publics in relation to demand management in WRMPs across all water utilities was examined (see Figure 3). I found a high degree of reference to 'customers' and 'bill-payers', which implies that most water engagement initiatives such as metering were economically and significantly planned to appeal to the individual interests of publics. On the other hand, public-proxies such as environmental and social groups and CCGs were more referenced than publics such as citizens, residents, and students; and this can be attributed to some water utilities' zeal to engage with intermediaries in order to fulfill Ofwat's statutory requirement for the WRMP consultation process. This pattern thus begs three questions: (1) Are intermediaries a realistic representation of citizens? (2) Can lessons from water efficiency programmes be

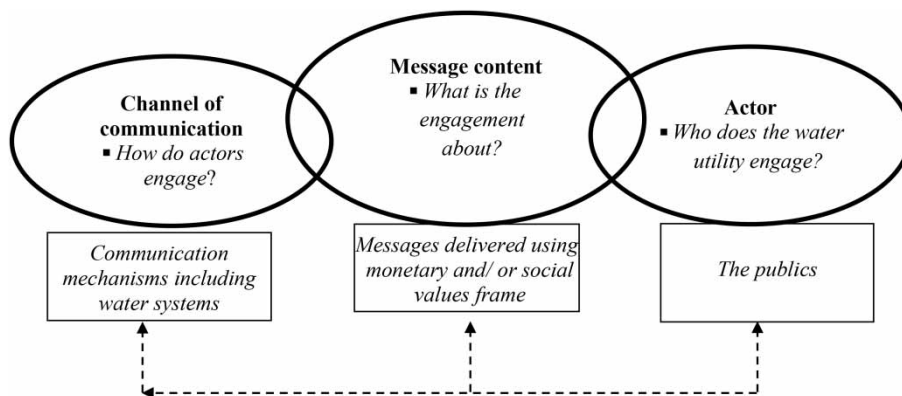


Figure 2 | The MAC (Message Actor Channel) model of communicative water practices.

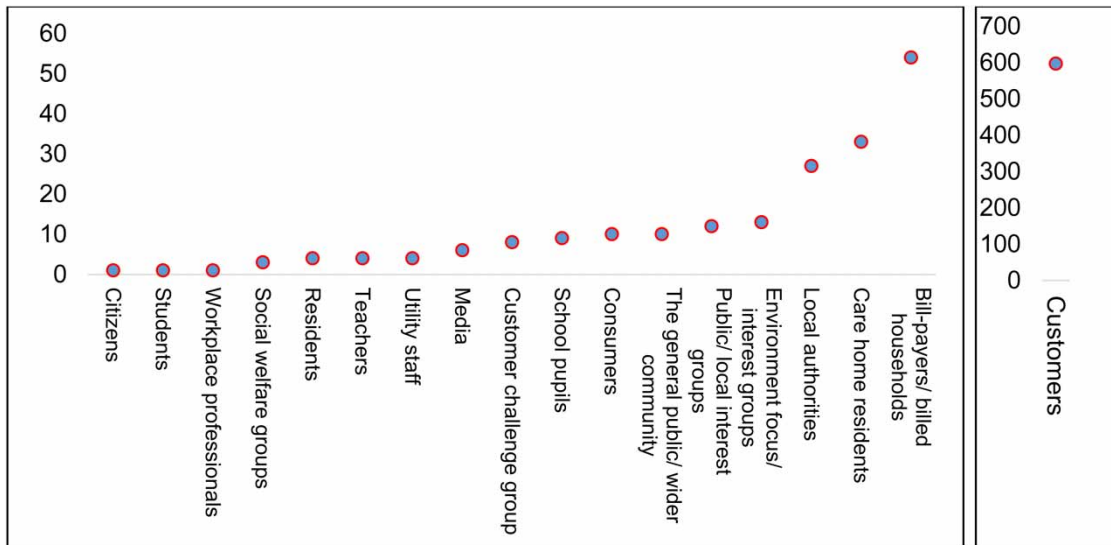


Figure 3 | Dominance of reference of public actors in relation to domestic demand management.

efficiently transferred from intermediaries to various publics? (3) From a policy perspective, what more can the regulator do to mandate water utilities to engage publics other than bill-payers?

### Channel of communication

Across water utilities, different mediums were planned to be used to communicate water efficiency messages to publics, some of which were more direct than others. On this basis, this study groups the dominant mediums into interactive and linear channels (see Table 2) depending on whether the mediums have a pathway that facilitate feedback.

Metering and water saving kits were visibly championed in Southern Water, Thames Water, and Affinity Water as instruments for promoting domestic water efficiency. It is noteworthy that in all water utilities examined, increased metering, distribution of water saving devices to households, and the promotion of water efficiency programmes to achieve behavioural change were planned although there was a higher level of specificity around plans for metering than there was for behavioural change programmes.

Interactive engagement channels are those mechanisms which enable two-way engagement between the water utility and its publics wherein information and feedback can be exchanged within the same medium without either of the

primary actors having to move out of that communication environment. In water utilities studied, engagement-oriented utilities planned for water efficiency programmes using interactive engagement channels that involved public mobilisation and participation. For example, Affinity Water planned to engage the younger generation in schools about water by visiting 7,000 students annually, and teaching them about the importance of water and the environment. Similarly, Affinity Water planned a 'Let's Talk Water' survey to gather insight on water use and behaviours, metering and water efficiency devices. Anglian Water planned to maintain its 'Discover Discuss and Decide' online discussion platform for water issues and solutions; and Essex and Suffolk Water planned to continue its retrofit project which includes measuring of water savings, the sharing of feedback, and the drawing up of lessons with the publics' input.

On the other hand, linear engagement channels by design and condition of implementation facilitate a one-way communication between the water utility and its publics wherein information and feedback cannot be easily exchanged without the actors moving out of the primary communication environment. Whilst linear channels can reach an extensive audience, publics cannot instantly communicate feedback to their water utilities through same channels. Exemplars of the use of linear engagement channels include the reliance on metering, water efficiency

**Table 2** | Interactive and linear water engagement channels

Interactive engagement channels	Linear engagement channels
<b><i>Mobilisation medium</i></b>	<b><i>Technological medium</i></b>
Drop-in events	Metering
Focus groups	water saving kits
Deliberative forums	<b><i>Resource materials</i></b>
Home visits and water audits	Letters, newsletters and magazines
Interviews	Information with water bills
One-on-one phone discussions	Local advertising e.g. on buses
Media centres	Media activities – radio and newspapers
Water efficiency campaigns	Websites
Workshops	
Public exhibitions	
Surveys, tailored emails and researches	
School visits	
<b><i>Participatory medium</i></b>	
Online discussions	
Social media campaigns	
Interactive web channels	
<b><i>Initiatives</i></b>	
Community outreach programmes	
Publicity campaigns	
Water education programmes	
Workplace events	

devices and resource materials to communicate implicit water efficiency messages to the customers in utilities such as Southern Water, Thames Water and Affinity Water; the advertisement of retrofit projects on bus shelters and van decals, on the radio, in magazines and newspapers, leaflet drops, and on posters in washrooms at shopping centres which Essex and Suffolk Water stated as having explored in previous years; plans to circulate messages on water bills to households by South East Water; and the distribution of automatically generated letters to customers with high usage by Sutton and East Surrey Water.

Ultimately, a water utility decides what channels to use considering many factors including aim, target audience and cost effectiveness. However, across water utilities studied,

several channels were planned to be used for household demand management although it is unclear in most cases if channels were tailored to publics.

### Developed typology based on public engagement approaches in water utilities

To understand the positioning of public engagement as a component of water demand management that can influence water behaviours on a long-term basis, all public engagement approaches in the seven utilities examined in this study were synthesised into a typology (see Figure 4) described below.

*Type 1 – Indirect interventions* are technology (e.g. metering) oriented. They implicitly position publics as buyers of water, and significantly involve the use of linear channels and the money rhetoric to achieve household water efficiency e.g. including water efficiency information on water bills, distributing water saving kits, and installing meters without the inclusion of public mobilisation and/or participation. Indirect interventions do not aid active dialogue between actors but sets out to appeal to the individual interests of publics. The conceptualisation of indirect intervention was shared in Southern Water's 2010–2035 WRMP published in October 2009:

*'metering is the fairest way to pay for water...; it enables customers to influence their own bills...; it is consistent with sending out economic signals which will assist in the development of competition...'* (pp. 3–7).

*Type 2 – Direct interventions* are engagement oriented, evident in practices which position publics as owners of water and significantly involve the use of interactive mediums and the 'collective' rhetoric to achieve household water efficiency. Direct interventions aid dialogue between actors although it is imperative to note that it is impossible for any water utility to rely solely on direct or indirect interventions for demand management because of the magnitude of the issue of water demand and the need to provide immediate solutions pending when gradual behavioural change builds up. Still, through some practices, some examined water utilities were more engagement-oriented. Exemplars include the following:



- (i) South East Water planned demand management via retrofitting devices but also stated in its WRMP that its customers perceived water saving as a civic duty and it is the water utility’s social and environmental responsibility to manage demand through education and awareness activities designed to change water behaviours and reduce customers’ water use.
- (ii) Essex and Suffolk Water attributed its consistent reduction of water demand to its water efficiency initiatives, leakage control and metering programme but noted that water efficiency is the key strand of its demand management strategy. The utility has a history of complementing social measures with technological solutions to water issues having conducted behavioural change projects such as the H<sub>2</sub>eco and ecoFIT annually since 2006 (current phase is branded as the ‘Every Drop Counts’ programme).

*Type 3 - Flexible interventions* are engagements driven by water utilities which set out to engage in ways different from the norm by complementarily using both direct and indirect demand management interventions such as mobilisation programmes and metering, and propagating both the ‘collective’ and monetary rhetoric to promote water efficiency. Exemplars of practices indicative of flexible intervention include the following:

- (i) Through the Love Every Drop campaign, Anglian Water continues to educate its publics about local water issues and the value of water including how to modify household practices such as gardening and showering; and distributes with water saving kits to supplement this behavioural change campaign.
- (ii) Adopting a different approach, Affinity Water used its metering trial run in the Southeast region to understand

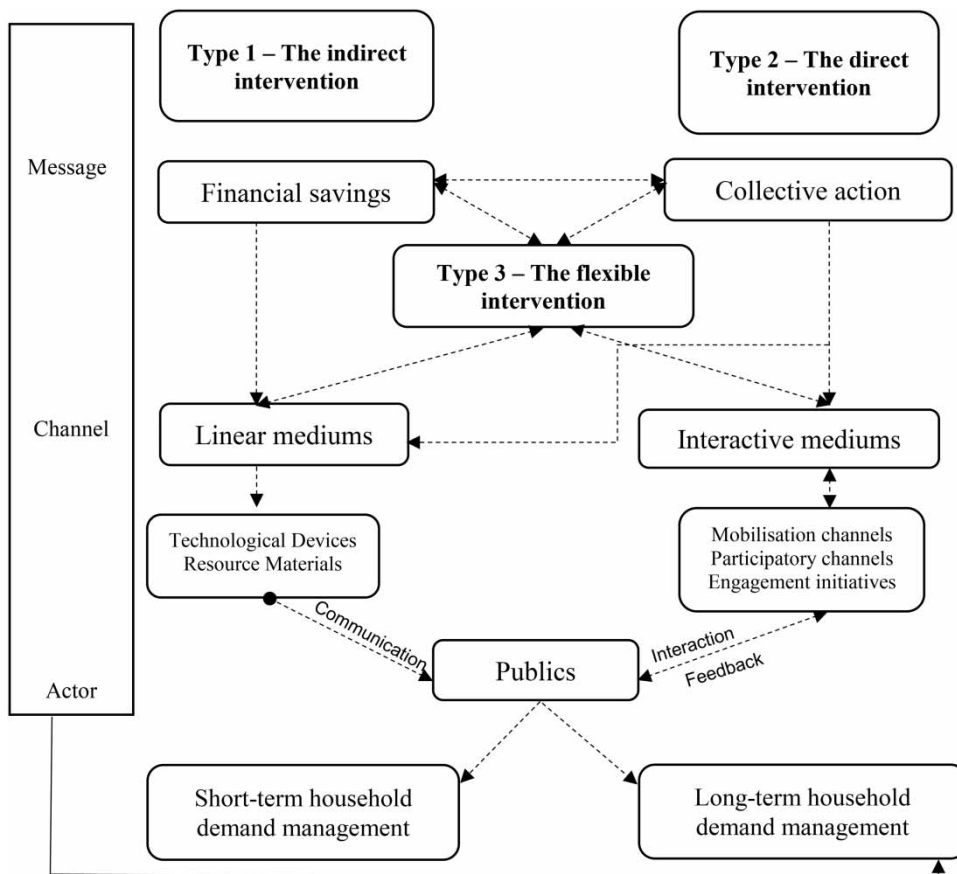


Figure 4 | Typology of demand management approach in water utilities.

its customers' water behaviours by incorporating smart communications on water use and social comparison into the programme.

- (iii) South and East Surrey Water's approach in its final WRMP published in June 2014 was to use water efficiency schemes to help customers reduce bills and reduce abstraction, but also recognised that there is an immeasurable social benefit of saving water, stating that its focus was to make 'changes to behaviours in water use the norm' (p. 251).

## CONCLUSIONS

Water management is of global significance and engaging the water user in relation to reducing water demand is increasingly recognised as a key part of this. Over the last decade, emerging research and regulatory guidelines have been instrumental to defining public engagement expectations and positioning it as part of a package of adaptation measures to achieve water efficiency. The newness of the role of public engagement in water demand management means that methods of examining it are still developing and are likely to be important in this emerging field of scholarship.

Recognising the 'individual interest' and 'communal interest' contemporary approaches to household demand management implied through theoretical and practical translations in the perspectives in the literature and practices adopted in the industry, this paper introduces a novel approach to examining public engagement in relation to reducing water demand by developing a conceptual framework called the MAC model of communicative water practices. This model synthesises the message, actor, and channel of communication components of engagement which this study uses as a tri-focal lens in the review of water resources management plans developed by UK utilities.

The results of this paper demonstrate the link between policy, regulatory processes and institutional practices as instruments that can help achieve household water efficiency. Findings show an ambiguity in the 'customisation' of publics and an unclear rationale for the use of multiple channels of communication to engage several actors. This paper identifies a typology of 'interventions' along which

demand management may vary depending on whether the intervention: is indirect and technology oriented; direct and engagement oriented; and flexible. Although demand management messages were found to be explicitly framed around technological solutions and individual customer interests such as reducing water bills, the comparatively subtle call for collective action to protect water is gaining traction. Effective engagement thus requires detailed planning and involves a multiplicity of factors and processes. In this context, whilst the MAC model does not currently address the processual aspects of engagement, it presents a succinct structure for defining the breadth within which water efficiency plans and programmes can be examined.

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