Public engagement with climate change: what do we know, and where do we go from here?

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Abstract

Climate change is an issue with fundamental implications for societies and individuals. These implications range from our everyday choices about resource use and lifestyles, through how we adjust to an unprecedented rate of environmental change, to our role in debating and enacting accompanying social transitions. This article outlines the various ways in which members of society ('publics') may be engaged in efforts to mitigate and adapt to climate change, and then provides a synthesis of lessons about public engagement which span both theoretical and practical insights. These include the diverse drivers of, and barriers to, engagement; the importance of multiple forms of engagement and messages; and a critical need to evaluate and identify successful examples of engagement. We conclude by outlining priorities for future research, policy and practice.

Keywords

climate change perceptions
public engagement
behaviour change
climate change communication

Introduction

In recent years, there has been growing international acceptance that climate change (both human induced and natural) poses a serious threat to human wellbeing and ecological stability. The urgent need for a societal response to climate change has been reinforced by the Intergovernmental Panel on Climate Change's assessment of the most up-to-date science on climate change stating that global warming is 'unequivocal' (IPCC, 2007a). Governments, businesses and other organisations are beginning to respond to the dual challenge of mitigating climate change – through reduction of greenhouse gas emissions (GHGs) – and adapting to the its impacts. The United Kingdom, for example, was the first nation to develop a policy response to climate change, through the implementation of the Climate Change Act (HM Government, 2008). The Act sets an ambitious target of (at least) an 80 per cent reduction in GHGs by 2050 with respect to a 1990 baseline, and aims to enhance the UK's ability to adapt to the impact of climate change.

Such responses to climate change have profound implications for individual choices and behaviour, as well as for the social contexts and governance structures within which these take place. Timescales of technological innovation and implementation, or large-scale shifts in energy supply, also indicate that reliance on technology alone is insufficient to substantially mitigate emissions of GHGs (e.g., Bows et al, 2006). Significant reductions in carbon-intensive energy demand amongst developed countries are required, along with redistribution of energy consumption to address global inequity and injustice which are deeply embedded in the issue of climate change. With over one-third of many developed nations' carbon emissions coming from private travel and domestic energy use (DEFRA, 2005; UKERC, 2009), and most of the remainder attributed to embodied emissions associated with consumption (i.e., from transport and manufacture of goods; Druckman and Jackson, 2010), individuals and communities clearly have a key role to play in any potential shift towards a low-carbon society.

Policy attention has primarily focussed on mitigation, while adaptation to climate change is a more embryonic policy issue. Nevertheless, it is clear that even with a strong mitigation agenda, impacts from climate change will be unavoidable. For example, it is estimated that there were around 35,000 excess deaths from the European heatwave in 2003 (IPCC, 2007b), an extreme weather event of the type likely to increase with climate change (IPCC, 2007a). Again, there are major implications for individuals. Understanding and evaluating the risks associated with climate change are prerequisites for informed decisions about where and how to live.

This article answers calls for the mobilisation of society to help address climate change, and examines the interaction between climate change and diverse publics. First we outline what is meant by public engagement, and briefly review the literature on public engagement with climate change. We then summarize key lessons from research on communicating and stimulating behavioural and social change in relation to climate change (drawing particularly on our recent

edited volume; Whitmarsh et al., 2010), and offer a typology of forms of engagement and a conceptual framework for understanding and promoting public engagement with climate change. Finally, we conclude by outlining priorities for future research, policy and practice.

Public engagement with climate change

'Public engagement with climate change' may be defined broadly as individuals' evaluation of and response to climate change, which comprises cognitive, emotional and behavioural components (Lorenzoni et al., 2007). That is, engagement involves what people think, feel and do about climate change. The relationships between these three facets of engagement are complex – for example, behaviour change may precede, as well as follow, attitude change (e.g., Bem, 1967). In terms of engagement, the public may adopt a number of different roles in respect of climate change mitigation, ranging from active engagement to passive compliance. These roles include: low-carbon consumers (e.g. using energy-efficient appliances, switching to a 'green' electricity tariff); low-carbon citizens (e.g. voting for a party because of its climate policy, or joining a campaigning group to promote a low-carbon society); or low-carbon champions (e.g. advocating organisational change or education in their role as an employee, parent, friend or community member, see Stern, 2000; Whitmarsh et al., 2010).

The rationale, then, for public engagement with climate change is multi-faceted. From the perspective of policy, effective and democratic climate change governance involves societal engagement. Public support for, and enactment of, climate change policies is a key concern of political organisations and world leaders. Such policies may directly call for public action – such as information campaigns and economic policies designed to encourage individual behaviour change (e.g., conserving energy in the home); but even policies which focus on developing technologies and adapting infrastructures require public support (e.g., Devine-Wright, 2009). Meaningful engagement over issues of technology choice and use is crucial in developing low-carbon technologies and resilient infrastructures. More fundamentally, democratically elected governments have an interest in engaging the public in debate about the type of society they want to live in and empowering communities to bring about change to that effect. Here, the focus is on public participation in policy-making, community decision-making, and grassroots innovation. Climate change offers new ways and new vocabularies for challenging assumptions about quality of life, economic development and consumption, and can be approached as much as a cultural issue as a scientific one (Hulme, 2009). Contestation – which often reflects divergent beliefs, values and interests – over climate change and attendant social, economic and technological responses implies a role for deliberative as well as analytic input to policy (e.g., Dietz & Stern, 2008).

For other groups there may be different reasons for being interested in the public's understanding of and responses to climate change. Businesses may be involved with formal climate change communication as part of a corporate social responsibility or a product marketing agenda (and

often both); and non-governmental organisations may do so because climate change intersects with their existing environmental and social concerns and interests (e.g., biodiversity loss, social justice, development, health). However, communication is not restricted to formal communication campaigns aimed to achieve some pre-defined end. Climate change has become common parlance within print, broadcast and new media and in everyday conversation. A range of interests, discourses, frames, and languages influence how climate change is communicated and understood, and whether (and how) it is responded to; and the methods and media used to communicate the issue are no less diverse than the range of communicators or audiences (e.g., Nerlich et al, 2010). The heterogeneity of audiences – or 'publics' – and of messages, media and contexts of communication undermine any presumption that communicating climate change is a simple task, or indeed that communication will lead to any (or predictable) outcomes in terms of understandings or behaviours.

Despite clear roles for the public in addressing climate change, achieving public engagement has proven difficult. Although a large majority of the public now recognizes terms such as 'climate change', understanding and emotional buy-in are far lower (DEFRA, 2007; Lorenzoni et al, 2007). Pro-environmental behavioural responses to climate change are even more limited. Emissions from most countries have changed little or are rising (Olivier, et al., 2012); and few people are prepared to take actions beyond recycling or domestic energy conservation (Bord et al., 2000; Whitmarsh, 2009b; O'Neill and Hulme, 2009; Maibach et al, 2009). At the same time, few are taking actions to adapt to climate change; indeed, awareness of the need for adaptation is very low (Whitmarsh, 2009b). Even flood victims rarely associate flooding with climate change, and those affected by flood and drought may be no more concerned about or likely to take action to tackle climate change than other people (Whitmarsh, 2008; Dessai and Sims, 2010; though see Spence et al., 2011, whose work suggests that experience of flooding can translate into increased willingness to mitigate through energy saving). In respect of both mitigation and adaptation, then, there is generally a lack of meaningful engagement with the issue of climate change.

Barriers to public engagement with climate change exist at multiple levels (Lorenzoni et al., 2007; Emmert et al., 2010). Many exist at the level of individuals' understanding and perceptions. For example, there is low public awareness of the relative contribution to causing climate change of different activities (e.g., food choices versus travel; Whitmarsh et al., 2011; Attari et al., 2010), and low awareness of the extent of expert consensus on human-induced climate change (e.g., Whitmarsh, 2011). Furthermore, climate change is seen as an irrelevant and distant issue (Spence et al 2012; Whitmarsh et al., 2011) and the responsibility of government and industry rather than of individuals (e.g., Lorenzoni et al., 2007). For example, O'Neill and Nicholson-Cole (2009) asked UK participants to rate the severity of climate change risks for themselves, others in their community, and others in their country, and found ratings increased significantly with distance (in line with a tendency towards spatial optimism with environmental risks; Gifford et al., 2009). In contrast to many risks, which the public tends to over-estimate (Poortinga & Pidgeon, 2003), climate change risk is under-estimated by the public compared to expert risk assessment (Weber,

2010). Concern about climate change appears to be volatile and relatively superficial, partly responding to media coverage of the issue and competing concerns (e.g., Ipsos-MORI, 2009). Indeed, scepticism about climate change appears to have increased in recent years (e.g., Whitmarsh, 2011; Leiserowitz et al., 2012), likely associated with the economic downturn (Scruggs & Benegal, 2012) and associated decline in media coverage about climate change (Brulle et al., 2012)[1].

While educational interventions may address gaps in knowledge or misperceptions (e.g., carbon impact of different activities), research suggests there are limits to what information can achieve in changing attitudes and behaviour in respect of climate change. In one experiment, Corner et al (2012) found information making competing claims about climate change was interpreted according to participants' existing beliefs: people who were less sceptical about climate change evaluated the convincingness of the information very differently to people who were more sceptical, while neither group reported changing their attitudes. This evidence, and the well-established phenomenon of 'biased assimilation' (i.e., interpreting information in accordance with prior attitudes; Lord et al., 1979), undermines any assumption that simply giving more or 'better' climate change information to sceptics may convince them to change their mind (see also Kahan et al, 2012). Other research shows clearly that scepticism is rooted in values and worldviews (Whitmarsh, 2011; Poortinga et al., 2011), and is in part a psychological defence mechanism against threatening information (Whitmarsh et al., 2012).

Moreover, the efficacy of communication approaches in fostering behaviour change is often hampered by broader structural constraints and disincentives to adopting a low-carbon lifestyle, which reduce individuals' motivation and ability to change their behaviour. These include perceived social inaction and the 'free rider effect' (i.e., excessive consumption of a common resource resulting from individual or group use of the resource beyond their fair share), inadequate or unattractive alternatives to energy intensive activities such as driving (Lorenzoni et al, 2007), as well as the broader 'systems of provision' which feed and respond to consumption and ultimately shape lifestyles (Spaargaren, 2003). Individuals differ in respect of their perceived ability to influence these systems, but there are also cultural differences in norms and opportunities for individuals to influence the structural context in which they live. Furthermore, as Hargreaves (2010) shows in relation to smart energy meters in the home, information provision may even be counter-productive if it results in individuals feeling guilty about consumption they feel unable to reduce, or otherwise disempowered, disinterested or cynical about such attempts by government to 'educate' the public by locating responsibility for climate action with individuals.

[1] The impact of individual events, such as the hacking of the Climatic Research Unit's email server, dubbed 'Climategate', or the misreporting by the IPCC of glacier retreat, and their media coverage, is likely to have been overstated by many within the scientific community and beyond (e.g., Gray, 2009). This is evidenced by (a) growing scepticism/uncertainty since 2007 (i.e., prior to Climategate); and (b) differential impact of Climategate on different publics (i.e., attitudes in the US were likely to be reinforced rather than changed by the issue; Leiserowitz et al, 2010).

Despite these limitations of information-based approaches, they remain a central plank of many nations' current climate and energy policies. Although many governments acknowledge the important role that consumers and citizens play in addressing climate change, governments are reluctant to regulate consumption due to fear of political backlash and bureaucratic costs associated with new regulation (Ockwell, et al., 2009). Consequently there has tended to be a policy focus on voluntary lifestyle change encouraged through information (and supporting economic) approaches or through subtle changes to physical or marketing environments that 'nudge' consumers towards more benign choices (e.g., Thaler and Sunstein, 2008). These informational approaches have tended to focus on mitigation messages (e.g., energy saving), while there has been little attempt to incorporate adaptation messages into public communication initiatives on climate change or to consider more fundamental, moral dimensions of climate change, such as intra- and inter-generational injustice and inequity, within these initiatives.

The linear and information-centric 'deficit model' (which assumes that the public is 'empty vessels' waiting to be filled with information which will propel them into rational action) underpinning much public policy, has been widely criticized as underestimating the complexity of both learning and behaviour change (e.g., Irwin and Wynne, 1996). Not least, this model ignores the heterogeneous nature of the public, as there are multiple publics with diverse resources and values rather than one monolithic public; and these diverse publics interpret and use (or ignore) information in diverse ways. Furthermore, small-scale nudges by policy or other interventions do little to address the scale of behaviour change required to mitigate climate change or the need to encourage public debate about policy responses (e.g. House of Lords Science and Technology Select Committee, 2011).

Thus, where education is used to engage the public with climate change, it should be based on an understanding of individuals' existing knowledge, their concerns and abilities, and broader institutional relationships, and should be accompanied by efforts to provide greater opportunities for public participation in democratic policy-making (Whitmarsh et al, 2011)[2]. Further, given the complexity and uncertainty (both informational and moral) associated with climate change (Hulme, 2009), educational interventions should foster capacity to evaluate the reliability (bias, agenda, uncertainty, etc.) of different information sources about how to achieve a low-carbon lifestyle. For example, media representation of climate change as controversial and uncertain may be more reflective of journalistic norms (of balance, dramatisation, politicisation, etc.) than of schism within mainstream scientific opinion (Boykoff and Boykoff, 2004). Currently, however, much of the public is poorly equipped to deal with scientific uncertainty and tend to be confused by expert disagreement (e.g., Poortinga and Pidgeon, 2003).

[2] We note here that public participation in policy-making does not necessarily lead to more environmentally sustainable outcomes; but that it can lead to better quality and more acceptable decisions, and can improve institutional relationships and trust (e.g., Dietz and Stern, 2008).

However, as we now discuss, public engagement is not only about mobilising individuals and households; community-based engagement is also vital and indeed already evident. Frustrated by a perceived lack of political action to adequately tackle climate change, grassroots movements, such as Transition Towns and Carbon Reduction Action Groups, are emerging to pioneer social innovations for addressing climate change and demonstrate real-world experiments in low-carbon living at the community level (e.g., Ockwell et al, 2009). Indeed, some political leaders have expressed support for this grassroots change, perhaps because it provides a mandate for more concerted and ambitious policy response to meet the climate challenge (e.g., Adam and Jowit, 2008). The following section elaborates on this role of the public in the public-sphere through political and community engagement.

Lessons for engaging the public with climate change

1. Diverse forms of engagement

One of the messages emerging from the public engagement literature has been that 'public engagement' can (and should) be manifested in multiple forms. The traditional role for individuals, advocated by government and business, has been primarily as 'consumers' acting within various contexts (home, travel, leisure, and so on) to make informed choices about buying and using low-carbon products and services. This is an important role, which some sections of the public have embraced, albeit to different degrees (e.g., Whitmarsh, 2009). As and when this role moves from the primarily *voluntary* (low-carbon living as a 'lifestyle choice') to the increasingly *required* (by government policy), individuals may be faced with making difficult decisions and considering trade-offs between different high-carbon choices and, under certain arrangements such as Personal Carbon Trading proposals, may need to have the economic skills to manage carbon budgets (Whitmarsh et al., 2011). Or under less flexible policy arrangements, such as legislation and taxes, the public may simply see the relative attractiveness of high-carbon options diminish and be unconsciously steered in the direction of more sustainable choices.

On the other hand, there may be a more creative and pro-active role for the public through 'public-sphere' (e.g., political) engagement. As noted earlier, public roles in respect of climate change mitigation may include low-carbon consumers (i.e., 'private-sphere'), citizens and/or champions ('public-sphere'; Stern, 2000). Several case studies in Whitmarsh et al (2010) demonstrate that, beyond consumer and economic engagement, civic and community forms of engagement offer an *expanded* role for individuals in respect of defining climate change responses and shaping social change, and also conferring potential benefits in terms of fostering self-efficacy, democracy, community cohesion and social inclusion. Furthermore, the public (in their professional capacities) also constitute the decision-makers within government, schools, businesses, and other workplaces. Considering these different public- and private- sphere contexts for public action, the need for public engagement with climate change becomes yet more evident.

2. Multiple motivations for and barriers to individual engagement

In view of this expanded role for the public in responding to climate change, the literature on public engagement also highlights the multiple motivations for individuals' engagement with mitigative or adaptive action. While certain sections of the public, particularly those with strong pro-environmental values, choose to reduce their carbon emissions explicitly because they are concerned about climate change, far more who act to reduce their emissions do so for proximal, personal or social reasons, such as convenience, saving money, or improving health (e.g., Whitmarsh, 2009; Nye et al., 2010). Most often, the motivations for action are many such considerations, and even the most environmentally conscious individuals need to have other reasons to act before changing their lifestyle. Similarly, involvement with community groups may be as much about meeting like-minded people and improving the local environment as about addressing global climate change (Höppner and Whitmarsh, 2010). Yet, behaviour is often not consciously motivated at all; rather, much of our behaviour is habitual (i.e., automatic, frequent, responses to contextual cues; Verplanken and Wood, 2006). The habitual nature of behaviour perhaps poses one of the most fundamental challenges to fostering more sustainable lifestyles.

Similarly, as discussed, there are multiple barriers which individuals may perceive to making low-carbon, sustainable choices. At the individual level, these include a lack of knowledge of the most effective action, and psychological biases or a lack of appropriate (e.g., economic) skills in decision-making. At the social, institutional and structural levels, barriers include a lack of prior experience of civic/community engagement, lack of political efficacy, prevailing social norms to consume, and structural impediments (e.g., distance from workplace; Lorenzoni et al., 2007). Accordingly, a single approach to engagement will be insufficient to addressing the range of drivers and barriers to action.

3. Diverse methods, facilitators and scales of engagement

There is a range of approaches to engaging the public with climate change (Whitmarsh et al., 2010). These include informational, social, technological, institutional and infrastructural approaches, such as mass media campaigns, product marketing, new media communication, advice centres, 'open' (demonstration) eco-homes, community action and social processes (e.g., 'foot-in-the-door' technique), technology and infrastructure (e.g., smart meters), economic and regulation (e.g., Personal Carbon Trading). All are important in their own way to help address the diverse motivations for and barriers to engagement. Indeed, the need for multiple methods for promoting behaviour change has been noted previously (e.g., Gardner and Stern, 2002).

At the same time, effective public engagement requires collaboration and partnering of various social actors. Such partnering includes leveraging resources from the private sector and government to support (and upscale) grassroots organisations, who offer innovative approaches and context-specific knowledge, whilst also changing structures and production/supply systems to provide low-carbon, sustainable alternatives (Whitmarsh et al., 2010).

This multi-method, multi-stakeholder model enables engagement to take place across different temporal and spatial scales, something that is particularly important for climate change as a long-term global issue which also demands short-term and local action. Different organisations offer distinct capabilities for engaging with people at these different levels; for example, a long-term and pan-societal mass media information campaign can generate widespread and sustained awareness, while new media deliberative methods can involve large proportions of the public in national or even international decision-making; and these large-scale approaches can reinforce more locally-specific, intensive and focussed approaches which target particular motivations and barriers, and link to local concerns, issues, and decision contexts. Crucially, though, the challenge remains to ensuring this collaboration is coordinated and essentially consistent, rather than piecemeal or (as is often experienced) undermined by conflicting political, economic, or social messages and influences (e.g., airport expansion, low-cost flights, and growing popularity – and normalisation – of air travel; Moser, 2010). Here, though, there is a (thus-far) unresolved tension between recognising and incorporating the plurality of views and values, and the need to provide clear, credible and usable information which can support individual decision-making about how to tackle (and live with) climate change. As we return to below, in identifying areas for future work, this tension may partly be resolved by public participation in defining the direction of societal development – and thus what constitutes 'valid' advice about how to respond to climate change. At the same time, so that this information may reflect an agreed goal (e.g., to cut carbon emissions), its effective delivery should reflect the plurality of publics, and of their particular contexts and interests.

4. Messages for engagement

This diversity of forms and modes of communication should be underpinned by a broadly consistent, common understanding of the importance of public responses to climate change and the valuable roles that individuals and communities can play in mitigation and adaptation. Furthermore, while particular audiences will need their own, tailored messages (and methods of communication) – which reflect their values and concerns (e.g., environmental, social, health, financial), identities and roles (consumer, citizen, community member, etc.), and are sensitive to local contexts (e.g., opportunities, barriers, norms) – there are general lessons for communication which we can draw out from the wealth of experience and knowledge reflected in the literature (e.g., Whitmarsh et al., 2010).

While there may be a role in climate change communication campaigns for fear messaging, most studies highlight the importance of positive, motivational messaging. Researchers stress the need for caution in using fear to communicate risk without a clear action strategy to reduce risk (e.g., O'Neill and Nicholson-Cole, 2009), and many argue that the various non-climate benefits (health, money saving, social interaction, etc.) of responding to climate change and adopting more sustainable lifestyles should be the focus of communication efforts (Whitmarsh et al., 2010). Recent research has particularly stressed the need for these efforts to appeal to, and foster, intrinsic motivations (e.g., community engagement, family) than extrinsic ones (e.g., financial

benefits; Thøgersen and Crompton, 2009; Chilton et al., 2012) as the latter may ultimately lead to more unsustainable outcomes.

Similarly, there is a need to use trusted sources of information – for many these may include local/known sources (e.g., friends, neighbours) but (independent) experts continue to be important, credible sources for communicating the findings from climate change research (Moser, 2010). With new media, there is potential for more selective information acquisition compared to mass media reception methods (Whitmarsh et al., 2010); this innovation may act to restrict learning potential and polarize opinions, while also potentially democratising climate change knowledge production and decision-making.

5. Measuring success in engagement

Despite a range of measures to educate the public, change behaviours, and foster support for policy change, there is little consensus on what constitutes effective public engagement and where scarce resources should be allocated to ensure cost-effective and politically acceptable outcomes. In part, this is due to (and a result of) a failure of evaluation to adequately measure intervention outcomes (such as learning or behaviour change) or evaluate process efficiency and effectiveness. Yet evaluation is key to a fuller understanding of the success, or otherwise, of such activities (Lorenzoni et al., submitted).

In evaluating engagement with climate change, there is much scope to learn from the detailed research undertaken to date on evaluations of participatory public engagement exercises. These are 'forums for exchange that are organized for the purposes of facilitating communication between government, citizens, stakeholder and interest groups, and businesses regarding a specific decision or problem' (Renn et al, 1995, p2). Although the definition of engagement with climate change as used in this article is much broader than that used in participatory public engagement exercises, assessments of the latter can nonetheless provide a fertile ground for systematically considering how evaluations of engagement with climate change may be undertaken. These literatures underline the importance of evaluating the engagement process, the outcome(s) and the context (see Burgess and Chilvers, 2006; Rowe et al, 2008, all of whom reflect upon large-scale public engagement exercises on national policy issues including GM foods and nuclear waste). These point to considering evaluation as an essential component of any activity, enabling deeper and longer-term learning in both the promoters as well as the participants of these events, as emphasized also from a different theoretical perspective by Pawson and Tilley (1997). Drawing upon these, we propose the following typology of climate change engagement activities (see Table 1) might be a useful starting point in 'measuring' the success or otherwise of these.

[Table 1 about here]

Towards a conceptual framework for engagement

O'Neill et al. (2010) argue that carrying out more physical science – and framing climate change as an awaited future catastrophe – will not enable large-scale, transformative social change. Instead, we need to recognize the essential, and diverse, roles other disciplines, knowledges and framings, besides those offered by the physical sciences, can play in engaging the public with climate change. The literature on public engagement and the lessons outlined above draw upon a range of disciplines and pertinent theories, including insights from sociology, psychology, media and communication studies, political science, neuroscience, and science and technology studies.

Earlier, we specified engagement is a state, comprising three dimensions of knowledge, emotion and behaviour. This definition has been useful and used in many studies of engagement (e.g., Whitmarsh et al., 2010). These studies emphasize the need for both promoting engagement (based upon research stemming from relevant theories and applying appropriate tools and methods) and measuring engagement (some provide examples of existing indicators and evaluations). Importantly, various researchers point out the existing limitations of the current engagement activities which are based on simple rational choice models, thus ignoring the persistent influence on behaviours of habits (e.g. Verplanken and Wood, 2006) and emotions, of social context in terms of norms and expectations (Whitmarsh et al., 2010), of the political and institutional settings which can help facilitate or constrain individual action (Höppner and Whitmarsh, 2010; Whitmarsh et al., 2011), and methods or tools that can enhance engagement (Whitmarsh et al., 2010). This points to the need for a more in-depth understanding of the variety of influences on engagement. We have summarized these in Figure 1 below.

[Figure 1 about here]

Conclusion

Climate change is an issue with fundamental implications for societies and individuals. These implications range from our everyday choices about resource use and lifestyles, through how we adjust to an unprecedented rate of environmental change, to our role in debating and enacting accompanying social transitions. The role for individuals and communities in responding to climate change has been emphasized in this article, and we have discussed the various ways in which the public may be engaged in efforts to mitigate and adapt to climate change.

So where to go with climate engagement henceforth? The authors find in their personal and mediated interactions that a frequent question regarding climate change and public engagement is the 'doom' question, as in: 'are we doomed'? Indeed, it is easy to feel despondent. International climate policy is a huge challenge for international diplomacy involving a myriad of actors; and local actions can feel insignificant in relation to this global phenomenon. However, this is not to say we should not engage with climate change mitigation and adaptation: but instead to ask – 'how we can refocus the debate in climate engagement?'

The authors conclude that perhaps international climate negotiations are just too large, messy and complex a challenge. In considering mitigation, Patt (2009) has written of how regional energy policy could be a solution to what we see as international deadlock on climate mitigation. He writes memorably of the difference between regulating ozone (an oft-compared 'environmental' policy problem) and regulating energy production and use. 'Unlike air conditioning and ice cold Fanta,' Patt argues, 'a country's energy security is central to its economic growth, employment, and quality of life, and national governments are extremely risk averse when signing away accountability'. He instead outlines how regional energy governance may be far more successful in promoting mitigation, with energy security being just one of the reasons why regions may want to consolidate their energy supplies.

There are other reasons why individuals might engage with climate change beyond the discourse of reducing carbon emissions. Researchers have demonstrated that improving community connectedness, considering health issues, questions of fairness, or becoming involved in the regeneration of individuals' civic role, for example, offer ample chances to 'piggyback' climate change onto other more approachable issues (e.g., Whitmarsh et al., 2010). Several authors have illustrated how positive leadership and visioning of the future can lead to enhanced climate engagement: so for example, rather than seeing the global financial crisis as a challenge to engagement with climate, it is instead an opportunity to re-envisage how communities could be shaped in the future. Already mayors, cities, communities, religious leaders and others around the world are engaging with climate change in new and meaningful ways (e.g., Whitmarsh et al., 2010).

Engaging with climate adaptation means engaging with case-based studies: whilst international agreements flounder, nations, states, local governments and individuals find many reasons to adapt to living in a changing climate. Whilst adaptation has been seen as a technical problem, requiring a technical solution, we echo the emerging climate resilience literature (e.g., Nelson et al, 2007; Adger et al., 2009; Marshall, 2010) in viewing climate change as just one aspect of individuals' vulnerability. Instead of working from the top-down to quantify climate vulnerabilities, a bottom-up approach focussing on broader (and more tangible) goals – acting on the Millennium Development Goals (such as to end poverty and hunger, and to promote gender equality) would provide a potent start – could enable learning and increase resilience to the challenges communities and individuals already face (although emerging paradoxes deserve attention; see Armitage et al., 2008).

Finally, our analysis of the public engagement literature exposes some key research gaps. Addressing these would broaden our understanding of climate engagement:

1. Geographical coverage

Perceptions, understandings of and responses to climate change in developing countries are less well researched, for a variety of reasons, than those in developed nations. Although increasingly more work is being undertaken, due to historical, socio-economic and political legacies of particular locations, mitigation of climate change is subservient to interests in adaptation. Much of the legacy of this work is from development considerations (rather than citizen-based engagement), although it is clear that community-based adaptation initiatives, and their capacity to foster long term engagement and significant prospects for change, are in some cases limited (Dumaru, 2010; Coulthard, 2009; Goulden et al., 2009).

2. Adaptation

Responses to climate change (at least in developed countries) have focussed predominantly on mitigation. There is very little work on how individuals and communities interpret, understand and engage with various forms and facets of adaptation, in terms of its meanings, significance to their daily lives, and to the wider community. Broader-scale approaches are also missing in understanding engagement with adaptation. Opinion polling on climate change issues (for example, the DEFRA tracker surveys in the UK; see Thornton, 2009) examine individual-level mitigation issues, but are yet to explore interpretations and understandings of adaptation.

3. Measuring engagement

As outlined above, initiatives incorporating measurements of the success (or otherwise) of engagement are increasingly being valued by individuals and promoters of those activities alike, given the importance of learning from past and present events, with a view to improving engagement, through more efficient resource use, new techniques and tools. The need to increase individual and community resilience and response capacity to climate change is politically and socially paramount. Thus it is important to identify the limitations and pitfalls of the activities, processes and procedures we have undertaken to date, through honest, systematic and coherent evaluation, in order to learn from past initiatives and improve future engagement approaches.

4. The role of participation

Proponents of public participation in science and policy-making argue that involving the public in knowledge production and decision-making can lead to better quality and more acceptable decisions, improve relationships, and build trust (e.g., Dietz and Stern, 2008). Critics point out that the manipulation of participation may be used in the unjust and illegitimate exercise of power (Cooke and Kothari, 2001), or that involving groups of non-experts in complex, technical decisions is inappropriate, inefficient or produces less environmentally sustainable outcomes (e.g., Hajer and Kesselring, 1999; Harries and Penning-Rowsell, 2011). There remains an oft-unspoken tension between the democratic ideals underpinning participation and the pragmatic and pressing need to address the risks posed to society by climate change (and related sustainability challenges) which may be at odds with individuals' self-interest. Developing an equitable and flexible yet effective (target-driven) framework for societal action is a major political challenge. We have not fully

resolved this tension here, and hope it will be more explicitly reflected on in future research, policy and practice.

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Table 1: Typology of climate change engagement activities (adapted from Whitmarsh et al., 2010: 276).

Aim of activity*	Format**	Strategy	Description	(Possible) Evaluation***
Awareness raising at the public level, focussing on individuals	a) Top-down b) Bottom-up (e.g. 10:10, community energy projects)	Information provision and education	At-a-distance approaches (communication through mass or social media, e.g. leaflets, TV/radio advertisements, web promotion)	Post-hoc measurement or (ideally) assessment of change over time with respect to pre-intervention baseline. Interviews with individuals; surveys
Behaviour change at individual and / or at community level(s), plus awareness raising	a) Top-down (e.g. UK government's 'Act on CO_2' or 'Are you Doing Your Bit' campaigns) b) Hybrid (e.g. EcoTeams; M&S Plan A; personal carbon trading) c) Bottom-up (e.g. community energy projects; Transition Towns)	Information provision, education, interactive involvement, data collection, monitoring, measurement and feedback	a) At-a-distance approaches (communication through mass media, online and press, e.g. leaflets, advertisements, web promotion); b and c) involvement with groups enabling their empowerment and fostering long term change	Assessment of change over time with respect to pre-intervention baseline. Interviews with individuals; surveys; focus groups; 'objective' behaviour measures (e.g., reading meters; weighing waste). May include assessment of process / participation.
Increased public involvement in climate change policy and decision-making	Mainly top-down participatory exercises (e.g., UK Climate Change Citizens' Summit; some grassroots initiatives (such as networks e.g. UK Low-Carbon Communities Network)	Support for individuals and community groups; consultation; dialogue; deliberation	Targeting and engaging citizens and stakeholders through a variety of methods, including, e.g., citizen panels and juries, deliberative mapping (see Burgess and Chilvers, 2006, for more details)	Systematic, based on assessment of process and outcome (short- and long- term) according to predefined agreed criteria (see Rowe and Frewer, 2000; also Burgess and Chilvers, 2006).

* Most of the aims of engagement activities can be combined (e.g. usually behaviour change activities imply awareness raising), in other words, they are not mutually exclusive.

** We use the broad terms 'top-down' and 'bottom-up' to refer to governmental and non-governmental (particularly community-led) initiatives. This distinction is broad and certainly not absolute; for example, community-led initiatives may have government funding. In addition, the media may be identified with either top-down or bottom-up initiatives as both governmental and non-governmental actors may use mass media (or other communication channels) for their respective purposes. Where media organisations themselves (co-)organise a campaign (e.g., 10-10), we categorise

this as a 'bottom-up' initiative because it is not driven by government. Thus, the distinction drawn here relates to whether it is primarily government or some other social actor(s) who is designing and coordinating the initiative.

*** Most evaluations are carried out during or shortly after the formal conclusion of an activity or strategy. However it is often recognized informally that the impacts can be much longer lasting. Thus, an evaluation beyond the direct duration of the campaign in the form of a longitudinal study might capture the longer-term effects. Resource constraints often limit evaluations to immediate or short timescales.

Figure 1: Positive influences on (dimensions) of engagement (from Whitmarsh et al., 2010: 277).