



The right stuff? informing adaptation to climate change in British Local Government



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ABSTRACT

Local government has a crucial role to play in climate change adaptation, both delivering adaptation strategies devised from above and coordinating bottom-up action. This paper draws on a unique longitudinal dataset to measure progress in adaptation by local authorities in Britain, comparing results from a national-scale survey and follow-up interviews conducted in 2003 with a second wave of research completed a decade later. Whereas a decade ago local authority staff were unable to find scientific information that they could understand and use, we find that these technical-cognitive barriers to adaptation are no longer a major problem for local authority respondents. Thanks to considerable Government investment in research and science brokerage to improve the quality and accessibility of climate information, local authorities have developed their adaptive capacity, and their staff are now engaging with the 'right' kind of information in assessing climate change risks and opportunities. However, better knowledge has not translated into tangible adaptation actions. Local authorities face substantial difficulties in implementing adaptation plans. Budget cuts and a lack of political support from central government have sapped institutional capacity and political appetite to address long-term climate vulnerabilities, as local authorities in Britain now struggle even to deliver their immediate statutory responsibilities. Local authority adaptation has progressed farthest where it has been rebranded as resiliency to extreme weather so as to fit with the focus on immediate risks to delivering statutory duties. In the current political environment, adaptation officers need information about the economic costs of weather impacts to local authority services if they are to build the business case for adaptation and gain the leverage to secure resources and institutional license to implement tangible action. Unless these institutional barriers are addressed, local government is likely to struggle to adapt to a changing climate.

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1. Introduction

With some degree of climate change now inevitable, climate policy is shifting away from its once exclusive focus on mitigating climate change to preparing for, and adapting to, the impacts to come. Mainstreaming adaptation is now a major concern for international bodies, while in the United Kingdom the 2008 Climate Change Act requires Government to assess the risks from climate change and to publish updated plans for adapting to them every five years.

Adaptation policy is often framed as depending upon science to inform planning and decision-making (National Research Council,

2009; Preston et al., 2015). Moss et al. (2014) note that meeting these information needs remains 'a major challenge for climate science' internationally. In Britain, however, the Government has worked hard to address such information barriers. To underpin its National Adaptation Programme (NAP), the UK Government commissioned a Climate Change Risk Assessment (CCRA), building on the latest UK Climate Projections (UKCP09) and parallel work done by a national network of regional climate change partnerships 'to set out the main risks and opportunities from climate change for different sectors locally' (DEFRA, 2014). While the Department for the Environment, Food and Rural Affairs (DEFRA) Climate Change Evidence Plan (2013a) emphasizes the importance of 'filling evidence gaps' (p.12) about the likely impacts of future climate change, it also recognizes the challenges of delivering that science 'at a scale decision makers can use for informing adaptation decisions now' (p.9). Such framings remain very much

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alive and well in policy circles across the world, despite academic theorists repeatedly questioning whether such thinking oversimplifies the challenges involved (see Preston et al., 2015; Dessai et al., 2009; Moser and Ekstrom, 2010).

A growing body of social science highlights the practical difficulties of using climate science to inform adaptation (see Kirchoff et al., 2013). Cash et al. (2003, p. 8086) argue that science must 'not only be credible, but also salient and legitimate', if it is to be used for policy making. Climate science is complicated and difficult to communicate to non-experts in ways they can understand and act upon (Pidgeon and Fischhoff, 2011; Stephens et al., 2012). Climate projections are necessarily uncertain and limited in terms of the detail they can provide (Mearns, 2010). These scientific limitations are not always appreciated by policy-makers looking to science for definitive answers on which to base difficult decisions and close off political debate about them (Demeritt, 2006). Research points to other demand-side barriers to using climate science for adaptation, including convenience and accessibility (Demeritt and Langdon, 2004), trust and familiarity (Archie et al., 2014; Kiem and Austin, 2013), limited resources and scientific capacity within organizations (Tribbia and Moser, 2008; Wilby and Keenan, 2012), perceived relevance to institutional mandates and priorities (Archie et al., 2014; Tang and Dessai, 2012), and institutional risk aversion (Kuhlicke and Demeritt, 2014; Rayner et al., 2005). There are also challenges on the supply side in delivering science that is relevant and usable for adaptation (Sarewitz and Piekle, 2007). Scientists have tended to prioritize basic, curiosity-driven research over addressing the sometimes rather different concerns of policymakers (McNie, 2007; Meyer, 2011). Recent studies have highlighted the importance of knowledge brokers (Meyer, 2010), boundary organizations (Agrawala et al., 2001; Miller 2001), and other forms of co-production (Dilling and Lemos, 2011; Lemos and Morehouse, 2005) in bridging the cognitive and institutional divides between science and policy so as to deliver useful climate science in usable forms that is then actually used for decision-making.

To date, much of the empirical research on adaptation planning and decision-making has been case study based (e.g., Engle and Lemos, 2010; Massey et al., 2014). This creates problems for developing adaptation theory, especially over how to generalize findings from the particulars of single cases. While comparative case-study analysis is one solution to that dilemma (Burch 2010; Vogel and Henstra 2015), others have used cross-sectional comparisons to provide larger sample sizes (Berrang-Ford et al., 2014; Engle and Lemos, 2010; Massey et al., 2014). Both approaches, however, are complicated by difficulties in defining clear, consistent, and measurable variables by which to identify more general patterns across individual cases and then test hypotheses to explain them, whether through statistical correlation or small-n size critical case testing of theory. Dupuis and Biesbroek (2013) call this the 'dependent variable problem', and they argue that it has hampered the explanatory power of adaptation research.

This paper responds to those methodological challenges by developing a unique longitudinal dataset to measure progress over time in addressing what Lemos et al. (2012) have termed the 'climate information usability gap'. Empirically we focus on adaptation in British local government, comparing results from a national survey and follow-up interviews with local authority (LA) officers responsible for the climate brief in 2003 (Demeritt & Langdon 2004), with a second wave of survey and interview research completed in 2013 with a comparable group of LA officials. By keeping the broad institutional context constant over time, this longitudinal comparison overcomes the dependent variable problem of comparing apples with orange decried by Dupuis and Biesbroek (2013) and enables us to assess the

effectiveness of different policy interventions in building- or eroding- adaptive capacity.

We focus on adaptation by local government, because of the crucial role it plays in both delivering adaptation strategies devised from above and in coordinating bottom-up action (Adger et al., 2005). In the UK, LAs have statutory responsibilities for climate sensitive functions ranging from local transport, spatial planning, and flood risk management to public housing and social care. Moreover, as the Local Government Association (LGA, 2007: 2) notes their 'democratic mandate for action [and] close proximity to citizens' give them 'a strategic role leading other public, private and voluntary sector partners'. Case study research in a number of countries including Australia, Canada, Mexico, Norway, South Africa, Sweden and the United States has highlighted a variety of challenges faced by local governments in achieving this leadership potential (see Amundsen et al., 2010; Archie et al., 2014; Crabbé and Robin, 2006; Hardoy et al., 2014; Hjerpe et al., 2014; Measham et al., 2011; Roberts, 2010). Likewise in the UK, two large scale surveys of climate adaptation also found relatively little evidence of proactive adaptation by local authorities and significant gaps in their awareness and capacity to use climate information to inform adaptation planning and decision-making (Demeritt and Langdon, 2004; Tompkins et al., 2010).

Over the period since those studies were completed, successive governments in the UK have taken a number of steps to promote adaptation and develop the capacity of LAs and other public and private sector organizations to use climate science for adaptation planning and decision-making. On the supply side the UK Government and devolved administrations funded a multi-million pound CCRA underpinned by two rounds of successively more detailed climate scenarios for the UK, UKCIP02 and UKCIP09 (Hulme et al., 2002; Jenkins et al., 2009). To support the use of that science, the UK Government created the Climate Ready service and a network of 12 regional Climate Change Partnerships to extend the knowledge brokerage work long undertaken by independent but largely government-funded organizations like the UK Climate Impact Programme (UKCIP) and the LGA's Climate Local initiative in support of adaptation decision-making by LAs. On the demand side, there have also been changes to the wider statutory (i.e. 2008 Climate Change Act) and regulatory (i.e., National Indicator 188; adaptation reporting powers; National Adaptation Programme; EU Adaptation Strategy) framework in which LAs undertake adaptation. At the same time LAs have also faced wrenching cuts to their budgets, with a 26% real terms reduction in local government spending planned over the life of the 2010–2015 Parliament (NAO, 2014), alongside wider reforms of local government, such as the elimination of central planning policy guidance and many LA performance targets (LGA, 2012), to make public service delivery more locally responsive (Lowndes and Pratchett, 2012).

This paper assesses the effects of these institutional developments on the ability and appetite of LAs in Britain for adaptation. While a 2010 study by the LGA (2010) paints a fairly rosy picture of LAs moving forward, with 65% having completed an action plan and 80% designating a climate portfolio holder responsible for its delivery, another report warned of a loss of adaptive capacity in the face of budget cuts and agenda overload (Green Alliance, 2011). Adaptive capacity has been defined as 'the ability of a system to adjust to climate change, to moderate potential damages, to take advantage of opportunities, or to cope with the consequences' (IPCC, 2001; see also Smit et al., 2001; Yohe and Tol, 2002), but in this paper we focus on the capacity of LAs to access and use climate science, because this usability gap continues to be framed as a key barrier for adaptation by local government in policy circles (Adger et al., 2005; Archie et al., 2014; Kuhlicke and Demeritt, 2014; Moss et al., 2013; Preston et al., 2015). After discussing our data and methods, we explore how Government efforts to improve the

usefulness and usability of climate information have affected the sources used by LA officials over the last decade, and how as a result LAs now perceive the risks posed by climate change. We then discuss whether and how LAs have responded to those risks with tangible adaptation actions. We identify a series of barriers to moving from assessing climate risks to taking adaptation actions in the context of ongoing austerity and government restructuring. The paper closes by focusing on why usable climate information might not always be useful or used and how institutional imperatives shape adaptation in practice.

2. Data and methods

Our research involved longitudinal comparison of two datasets collected a decade apart. The first was a survey ($n=184$) and follow-up interviews ($n=21$) conducted in 2003–2004 with LA environmental officers in England and Wales and detailed in Demeritt and Langdon (2004). These were compared against a second round of survey and interview data collected in 2012–2013 and reported here for the first time (see the Supplemental methods appendix for further details).

The new survey was conducted in November 2012, using an online instrument and repeating the same open and closed Likert-scale questions as Demeritt and Langdon (2004), to allow for a longitudinal comparison. It was addressed to chief environmental officers in all 407 LAs in England, Scotland and Wales, who were individually identified from GovEval’s national and local government database and asked to pass it on to the person in charge of climate change adaptation in the LA. In all 116 responses were received for a 28.3% response rate (see Table 1), which compares favourably with other official government surveys of LAs on the same topic (LGA, 2010). Apart from a slightly lower return in the northeast of England, breakdown of responses by region and LA type shows little evidence of systematic non-respondent bias.

Responses were entered into SPSS for statistical analysis with nominal coding also used to quantify responses to several open-ended questions. The majority of respondents (41%) were from LA officers working in environment departments, though we also had substantial numbers from planning (19%), policy (15%), housing/built environment (13%) departments along with a smattering of others based in energy (7%), regeneration (4%) and transport (1%). This broad range within LAs speaks to the heterogeneity with which adaptation responsibilities are organized. Respondents’ job titles were also classified by level of seniority into ‘officer’ level (48%), ‘middle management’ (e.g. senior/manager) level (36%), or executives (e.g. head, chief and director) level (16%). Other, typically lengthier open-ended survey responses were exported to NVivo for coding and comparative qualitative analysis with interview data.

Preliminary analysis of the survey findings informed a round of follow-up interviews conducted over the winter of 2012–2013 with a purposeful sample of 20 respondents from different regions and

LA types, who had volunteered further contact details in their survey returns. Efforts were also made to capture a range of job roles and levels of seniority and recruitment continued until analytical saturation was reached. In contrast to our large-scale survey, the open-ended nature of these semi-structured interviews allowed respondents more scope to communicate the everyday experiences of doing adaptation using their own words and framings. Interviews were recorded and transcribed.

Interview transcripts were manually coded in NVivo with thematic codes identified and elaborated iteratively through successive engagements with the corpus of qualitative data from the interviews and the open-ended survey responses. To introduce greater rigor and validity to our interpretation of these findings, analysis involved source, method, and investigator triangulation (Baxter and Eyles, 1997). The 2003 dataset collected by Demeritt and Langdon (2004) provided a baseline from which changes over the last decade in the perceptions, practices, and adaptive capacity of British LAs could be measured.

3. Results

3.1. How are local authorities informed about climate change?

In 2003, LAs failed to access, or at times were even unaware of, the latest official climate scenario, UKCIP02, prepared for DEFRA by the Tyndall Centre for Climate Change Research and Met Office Hadley Centre to inform adaptation planning in Britain (Demeritt and Langdon, 2004). Instead, they were heavily reliant on unofficial sources, especially the media, which LA staff acknowledged to be less reliable and accurate than what was provided by official science agencies, like the Met Office and UKCIP, but were more accessible, easier to understand, and thus much more frequently

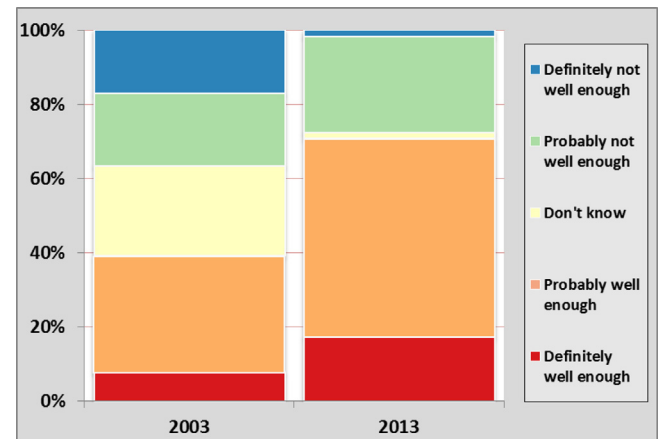


Fig. 1. Proportion of respondents reporting their Local Authority has enough information to decide whether to change its plans or policies in relation to climate change: 2003 ($n = 169$) vs. 2013 ($n = 116$).

Table 1
2012 Survey respondents by LA type ($n = 116$).

LA type	Number of LAs in sample universe	Number of LAs responding	%
Non-metropolitan districts	203	52	25.6
Metropolitan districts	36	9	25
County councils	27	11	40.7
London boroughs	32	6	18.8
English Unitary Authorities	55	17	30.9
Scottish Unitary Authorities	32	15	46.9
Welsh Unitary Authorities	22	6	27.3
All types	407	116	28.5

used. As a consequence, only a fifth of respondents in 2003 believed that their LA had 'access to the best local estimates of climate change', while just 39% reported feeling personally well informed 'about current global climate change research and findings'.

A decade later things are now very different (see Fig. 1). Just over 70% of LA respondents in 2013 perceived their LA to be 'probably' or 'definitely well informed about climate change' with the percentage feeling 'definitely not well enough informed' falling from 17% in 2003 to just 2% in 2013. Pearson's χ^2 testing showed no statistically significant relationship between how well informed about climate change the LA was reported to be and either the LA region, type, population, local party in power, or the department of the respondent. This suggests a general increase in LA knowledge rather than one dependent on particular features like LA size, internal structure, or political control. LA informants were also more confident about their own personal knowledge than a decade ago. Whereas 2003 survey respondents and interviewees were anxious about their knowledge and often unaware of how to access key sources of information to improve it, in 2013 almost all (96.6%) respondents reported having 'a great deal' or 'fair amount' of personal knowledge about climate change. This suggests a more confident workforce. Not surprisingly, Pearson's χ^2 testing showed respondents with 'climate' in their job title were very significantly more likely than other respondents to report higher levels of personal knowledge (2, $n = 116$, $p < 0.001$), with 91.3% knowing 'a great deal about climate change' compared with 35.5% of those without climate in their job title. Otherwise levels of personal knowledge did not vary in statistically significant ways by LA region, type, and population, or by respondent seniority and job role.

This confidence is underpinned by much more frequent engagement with official scientific sources of climate information from DEFRA, the Environment Agency, and Met Office (see Fig. 2). Whereas in 2003 the Met Office was the least used source, with just under half of all respondents 'never' referring directly to it, over 80% of LAs surveyed in 2013 reported 'always' or 'sometimes' using climate information from the Met Office. Compared to 2003, when over 40% of respondents had not heard of UKCIP02 there is now near universal (91.5%) awareness of the latest UKCIP09 projections. A strong upswing was also recorded in the use of other official sources as well. Calculation of Spearman's rank order correlation showed strong and statistically very significant associations between the frequency with which different official sources of information were used, with particularly strong relationships between the use of UKCIP09 and the CCRA ($r = 0.690$, $p < 0.001$) and

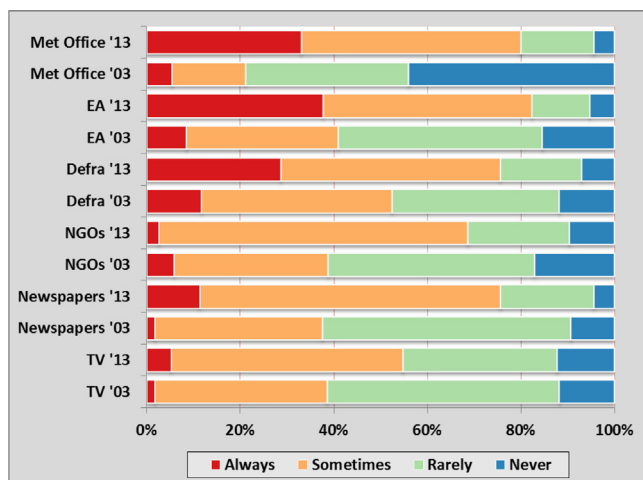


Fig. 2. Frequency of climate information source usage reported by Local Authority staff, 2003 ($n = 169$) vs. 2013 ($n = 116$).

between use of DEFRA and Environment Agency as sources of information ($r = 0.613$, $p < 0.001$). In other words, LAs using one official source were also more likely to consult other official sources as well.

Patterns of information usage did not vary significantly by LA region, type, population, or local party in power, or by the LA department and seniority of the respondent. The only factor we found to be associated with any statistically significant variation in the types of climate information being used was if the respondent had climate in their job title, which Pearson's χ^2 test showed to be associated with a statistically significant increase in frequency with which UKCIP09 was used (3, $n = 116$, $p = 0.034$). Whereas 69% of these respondents reported always using UKCIP09, only 38.7% of other respondents did. While this finding seems to confirm LGA (2010) suggestions about the value of LAs investing in specialist staff to help deliver on adaptation, we found no differences in the frequency with which other sources of information or external consultants were used. There were only small, statistically insignificant differences between these specialist climate staff and other respondents in whether they perceived their LA to have 'enough information to decide whether they should change any of their plans or policies because of climate change'.

Rather than LA-specific factors, frequency of usage was more strongly associated with the perceived reliability and ease of understanding of a given source. These relationships are shown in Fig. 3, which graphs the average of the ordinal scores given by respondents to each source for its relative 'frequency of use', 'reliability' and 'ease of understanding'. Whereas Demeritt and Langdon (2004) found that the frequency with which individual sources were used related more strongly to their ease of understanding than to their perceived credibility or appropriateness for LA needs, a decade later frequency was more closely associated with perceived reliability whilst ease of understanding was generally less important.

The strength of these relationships between frequency, reliability and ease of understanding can be assessed by

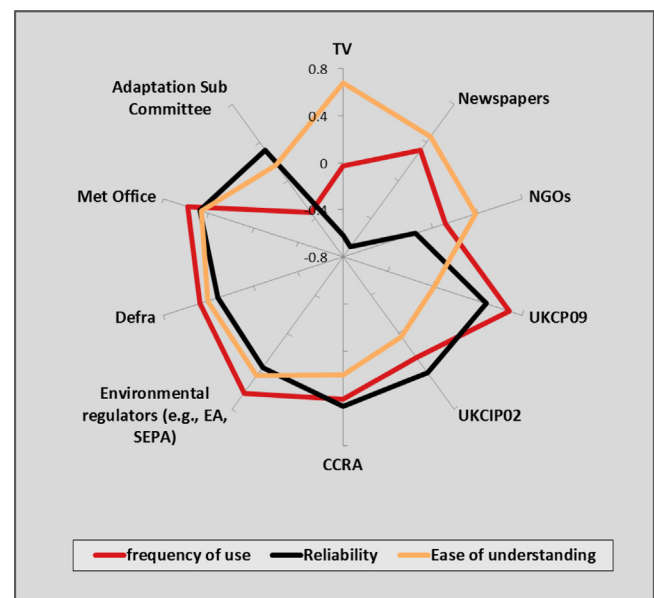


Fig. 3. Mean ranking of relative frequency of use, reliability, and ease of understanding, for different sources of climate information (2013 survey). For each source, the colored line shows the mean of the ordinal scores from all respondents for a given source characteristic, expressed as a departure from the mid-point of the linear scale for that characteristic. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

Spearman's rank correlations. As suggested by the proximity of the lines in Fig. 3, these three source dimensions are strongly co-varying for the government agencies. The Spearman's rank correlation, and thus the strength of the linear relationship, for perceived reliability and frequency of use was highest for the UK's previous climate scenarios, UKCIP02, ($r=0.667, p<0.001$), followed closely by the CCRA ($r=0.603, p<0.001$). UKCIP09, however, was perceived somewhat differently, with 37.6% describing it as 'difficult' and another 6% saying they do not understand it at all. A weak, albeit still statistically very significant correlation, was found between the use of UKCIP09 and its perceived accessibility ($r=0.279, p<0.001$). Yet the use of UKCIP09 was strongly correlated with perceptions of its reliability ($r=0.573, p<0.001$). This suggests that it is used somewhat begrudgingly as a difficult but 'correct' source of information. For example, research by Tang and Dessai (2012) found that usability of the tool was bound up with ideas about its credibility, and legitimacy, because of the organizations involved in its development, yet it scored poorly on its relevance for decision-making.

These findings suggest a more substantial engagement by LAs with the 'right' kind of climate information. Whereas a decade ago, LA officers reported difficulties in accessing scientific information that they could understand and therefore use, they now report engaging with the most reliable, official sources of climate science more frequently. Overcoming this informational barrier is a necessary, but by no means sufficient condition for improved understanding of, and adaptation to, climate change, however.

3.2. Which climate impacts concern local authorities?

While LAs may now be making more frequent use of official sources, this may not necessarily translate into improved understanding of climate change. To assess LA perceptions of climate change, we asked them to rank their level of concern about a variety of climate impacts highlighted in the CCRA (see Fig. 4). Far and away the issue of greatest concern to LA staff is flooding. Heat waves were also a consistent concern. By contrast, the prospect of warmer and drier summers was seen more ambivalently as a potential opportunity as well as a risk, while warmer winters was the climate change impact most often seen as an opportunity.

This ranking of climate risks and opportunities broadly mirrored those articulated in the CCRA (see DEFRA, 2012). LA perceptions sometimes differed from the CCRA in their relative ranking of threats, but these differences tend to reflect the ability of LA respondents to distinguish between the national-scale focus of

the CCRA and local priorities. Thus coastal flooding is listed in the National Risk Register of Civil Emergencies as a greater threat to the UK as a whole than inland flooding from rainfall-runoff into rivers or from storms and gales leading to localized surface water flooding (Cabinet Office, 2013). But LA respondents put these risks in a different rank order. Some 29% of LAs said the impacts of climate change on sea level rise and coastal flooding were not applicable to them, because they were located away from the coast and had no immediate responsibilities for dealing with it. By contrast, with the 2010 Flood and Water Management Act giving LAs responsibility as Lead Local Flood Authorities for surface water flooding, the prospect of more frequent and severe localized flooding from intense rainfall was almost universally regarded as a risk (81% large; 16% small). Apart from the spatiality of risk perceptions already noted, whereby LAs in the Midlands tended to regard coastal flood risk as not locally applicable, these perceptions of climate risk did not vary significantly by LA region, type, population, local party in power, or by respondent-specific factors like the department of the respondent, seniority, or whether climate was in their job title. Pearson's χ^2 test did show a weak (Cramer's $V=0.326$) but statistically very significant ($10, n=116, p=0.006$) association between the respondent's level of self-described knowledge about climate change and the perceived risk from heat waves, with 56% of those having 'a great deal of knowledge' about climate change also perceiving a large risk, as against 35% of those having just 'a fair amount'.

LA perceptions of future climate risks were not particularly affected by any recent experience with climate-related hazards. For example, 82.9% of respondents had experienced disruption from heavy snowfall in the last three years yet only 35% regarded it as a large risk in years to come. Even more telling is the perception of heat waves, which, in keeping with the advice from the CCRA, 43.6% of respondents regarded as a large risk, despite just 6% having had any recent experience with one. To test the relationship between risk perception and recent experience of climate-related hazard events, we asked respondents if their LA had been affected any time in the last three years by each hazard and cross-tabulated those respondents ('yes', 'no', 'don't know', 'not applicable') against their perceptions of the future risk posed with climate change. Pearson's χ^2 test showed a moderate (Cramer's $V=0.416$) and statistically very significant ($10, n=116, p<0.001$) association between recent experience of especially wet summers and the respondent's perception of the risk posed by climate change from wet summers in future. Otherwise, there were no statistically significant associations between recent experience of a climate-

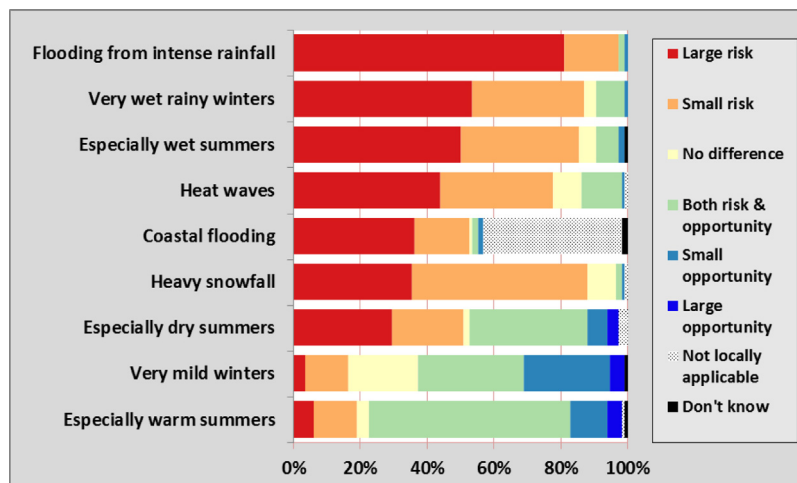


Fig. 4. Local Authority staff perceptions of the risks/opportunities posed by different climate change impacts for their locality.

related hazard and the perception of the risk that it will pose in future. This suggests that LA assessment of future climate risk is shaped more by expert scientific advice rather than responding to local experiences.

Qualitative data from interviews and open-ended survey responses lend further support to this conclusion that LA staff now have a good understanding of the latest official science advice on climate change. Many, for instance, could identify its limitations. Of the 36 open-ended responses to the question are there ‘any risks or opportunities not listed’, a third wanted more information in the UK climate projections on the ‘risk of higher intensity and frequency of storms’ (Q7, Respondent 41), a quarter called for information on ‘high winds affecting tree fall, building damage and road transport, especially over bridges and exposed roadways’ (Q7, Respondent 112), and a sixth felt they needed more information on ‘unpredictable seasonal variability’ (Q7, Respondent 52). Wanting more detail about certain aspects of the climate projections, LA staff also showed the technical ability to distil the key highlights and present them in ways that were meaningful to and usable by frontline staff they were responsible for advising within their LAs when designing heatwave plans or cold weather policies in care homes, for instance. As one interviewee explained: ‘So we took the projections from UKCP09 and drilled them down . . . to produce our corporate climate risk assessment . . . With particular steps for different departments, factsheets, guides, etc. for different audiences . . . We use that assessment because it gives us very specific information about [us] as a county . . . so we use [it] rather than the original [UKCP09] data, because it gives us a concrete, ‘yes this is the implication for your service’ (LA Official 9 – Interview).

These findings suggest that LA staff are not only accessing the ‘right’ sources of information about climate change, but they have also developed a technically accurate and institutionally nuanced appreciation of the risks and opportunities that future climate change will hold for their particular LA.

3.3. What adaptation actions have local authorities taken?

LA understanding of climate change has clearly improved over the last decade, but translating that understanding into adaptation plans and tangible actions has proven more challenging for LAs in Britain. With devolution, the institutional context in which LA adaptation is conducted and measured has become increasingly

differentiated. While the devolved administrations in Wales and Scotland have set out their own strategies and statutory duties and guidance for LAs (i.e. [Welsh Assembly Government, 2010; 2014; Scottish Government 2009, 2013](#)), the last Labour Government required LAs in England to report on adaptation activities as part of a suite of centralized reporting requirements and targets. Introduced in 2007, National Indicator 188 (NI-188) ‘*Planning to Adapt to Climate Change*’, ranked the performance of English LAs on a five-point scale, from Level 0 (yet to assess climate risks) to Level 4 (adaptation plan implemented and progress being monitored). Although the Coalition Government abolished NI-188 in 2010 as part of its own ‘localist’ reform of local government, data from the first two rounds of reporting provides a broad overview of progress made by English LAs in using climate information to inform adaptation planning and action.

By 2010, at least 82% of English LAs had completed the comprehensive local assessment of climate change risks and opportunities to reach Level 1 (see [Fig. 5](#)). Rates of progress were generally slow. Although some 40 LAs moved up two levels over the two years for which data is available and one (London Borough of Merton) even managed to move up three levels, 82 LAs made no demonstrable progress. Moreover as [Fig. 5](#) shows, moving beyond risk assessment to identifying adaptation responses (Level 2) and developing a plan to deliver them (Level 3) was limited, with less than 40% of LAs reaching those levels of adaptation, and no English LA going so far as to actually implement their adaptation plan so as to achieve Level 4 (see [Committee on Climate Change, 2010, 2012](#)).

With the abolition of NI188, it is more difficult to assess progress since 2010, but several studies have found that LAs in England are still struggling to develop and implement adaptation plans ([Brisley et al., 2012; Green Alliance, 2011; UKCIP, 2011](#)). Our findings confirm these claims about a lack of progress, or even a reversal in adaptation activities by LAs. Some 90% (18 of 20) of the LA staff interviewed told us that adaptation was being deprioritised in their LA. Half of our interviewees (10 of 20) reported ‘climate change officers [being] made redundant’ or ‘reductions in staffing levels’ (Q16, Respondents 19, 41). Others reported policies explicitly designed to address climate change being retracted:

‘There was a period when climate change adaptation was in our corporate plan and strategic plans. But when it was reviewed last year, the powers that be decided that, due to financial constraints, that we should reduce [that] commitment’ (LA Official 11 – Interview).

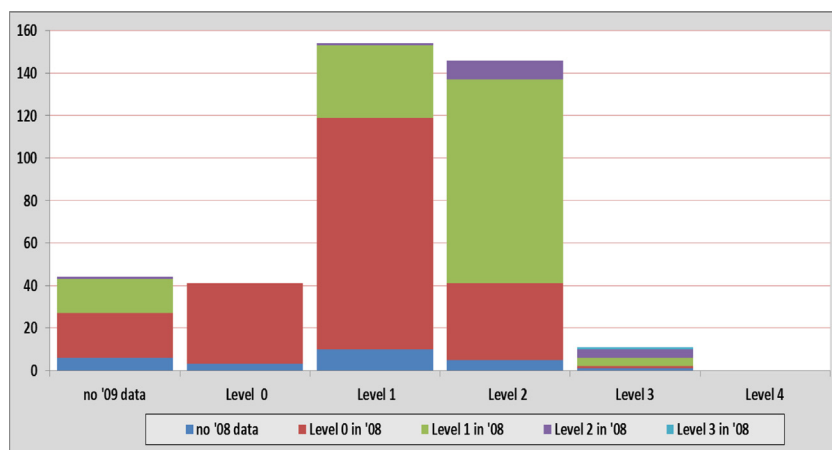


Fig. 5. Number of English Local Authorities achieving each National Indicator 188 Level of Adaptation in 2009/10 by their reported level of adaptation in 2008/09 ([Department of Communities and Local Government, 2010](#)). Level 0: LA has not assessed climate risks or incorporated them into strategic planning; Level 1: LA has undertaken a comprehensive, local risk-based assessment of current vulnerabilities to weather and climate; Level 2: LA has identified adaptation responses to address the risks to other council strategies, plans and operations; Level 3: LA has developed an adaptation action plan to deliver LA objectives in light of projected climate change; and Level 4: LA has implemented an adaptation action plan and is monitoring to ensure progress with each measure.

Where adaptation activities have survived, they were tied to statutory duties, such as the formulation of strategic policies on flood risk management or spatial planning. Outside of these statutory requirements ‘the short answer is almost nothing is happening’ among English LAs (LA Official 18 – Interview).

The evidence about LA adaptation elsewhere in Britain is less clear-cut. On the one hand Scottish respondents were unanimous in highlighting the distinctiveness of the Scottish situation. Under the Climate Change (Scotland) Act 2009, Scottish LAs have various ‘Public Bodies Duties’, including responsibility to act in ways ‘best calculated to deliver any adaptation programme’ (Scottish Government, 2009: 27). Furthermore, Scotland’s smaller, more centralised political system, with a powerful Scottish Executive based in Edinburgh and 32 unitary LAs, makes it easier to monitor compliance and provide support in meeting Government objectives. As one respondent explained:

‘north of the border our targets are much tighter and the government support for development of adaptation and mitigation are stronger, and I think there is a better recognition of the economic benefits of tackling climate change than evidenced by the knee jerk anti-wind and anti-renewables seen in the south’ (Q15, Respondent 45).

Responses from Scottish informants suggested somewhat higher levels of awareness of and support for adaptation, both from LA senior managers and from the devolved Scottish Government, than enjoyed by LAs in England. On the other hand, Scottish responses also suggested rather limited progress in actual delivery of adaptation actions. One respondent questioned whether Scottish ‘LAs were making the best use of resources’ like Adaptation Scotland (Q16, Respondent 48); another suggested that ‘the discussions we have had so far with Adaptation Scotland have not led to a change of approach from that which would have been developed through other policy routes’ (Q16, Respondent 56). Echoing sentiments expressed by LA respondents in England, Scottish interviewees noted that whilst adaptation ‘was on the agenda it remained very much on the back-burner compared to mitigation’ (LA Official 8 – Interview). These findings about the rather halting progress on adaptation in Scotland replicate those of the Committee on Climate Change. Its progress review of adaptation in Scotland raised concerns that critical sectors, such as planning and infrastructure development, were not properly incorporating adaptation into long-term decision-making (Committee on Climate Change, 2011). Although our small sample size makes it difficult to offer definitive conclusions about the state of adaptation in Scotland, the evidence we collected does not suggest radically greater progress among Scottish LAs than among their English counterparts.

The situation in Wales does not look much different. Although the Welsh Assembly Government has formulated an Adaptation Delivery Plan and sought to support local authorities with a bespoke adaptation resource, there are no statutory adaptation duties as such, and progress in moving from assessment to action has been slow, as the Welsh Assembly Government itself concedes. Its latest annual progress report on climate change notes, ‘For the Welsh public sector, planning for the long term risks of climate change is particularly challenging in a short and medium term environment of financial constraints and austerity’ (Welsh Assembly Government, 2013: 43). As one interviewee explained:

‘I know that there’s a lot of work going on around the Climate Change Act and guidance and whatever from the Welsh Assembly. Although at the moment we’re not a statutory reporting authority. We’re waiting for the Minister to actually set it up. The Minister is saying, ‘I’m waiting to see what you do,’ and we’re saying, ‘We’re waiting for you to tell us.’ Because of all the other priorities, we’re told that it won’t happen’ (LA Official 18).

Despite some differences among the constituent nations of Britain, the more general picture that emerges from these findings is one of LAs struggling to move, as one survey respondent put it, ‘from the research to the delivery phase’ of adaptation (Q15, Respondent 34).

3.4. What are the perceived barriers to adaptation for local authorities?

While LA staff are now much better-informed than a decade ago and believe climate change to pose a number of serious risks, LAs continue to struggle to implement tangible adaptation actions, despite having overcome the awareness and attitudinal barriers highlighted by Ekstrom and Moser (2014) as endemic in local adaptation. To understand the various institutional barriers facing LAs, we asked them to assess the importance of various measures for promoting adaptation highlighted in the literature (e.g. Adger et al., 2005; Dilling and Lemos, 2011; Hjerpe et al., 2014; Measham et al., 2011).

Far and away the leading barrier to adaptation was funding (see Fig. 6), which over 96% of survey respondents ranked as a ‘very important’ or ‘fairly important’ way ‘for the Government to help Local Authorities adapt to a changing climate’. ‘Funding has to be top of the list’, emphasized one respondent in a free text response (Q15, Respondent 48). Concerns about the kinds of climate information available to inform LA adaptation were much less important. Instead, survey respondents insisted that without ‘more funding’, ring-fenced specifically for adaptation, very little is likely to happen now

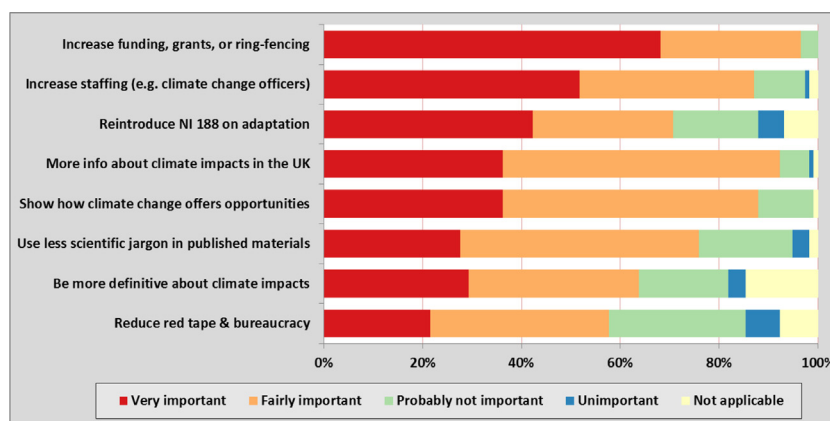


Fig. 6. Relative importance accorded by 2013 survey respondents to different measures for overcoming barriers to adaptation by LAs.

or any time in the immediate future (Q15, Respondent 13). LAs across Britain are under intense financial strain, having endured the steepest budget cuts for more than half a century (NAO, 2014) and now facing even more stringent cuts over the next parliament with fiscal retrenchment forecast to continue for another half decade or more (Harris, 2014). Indeed, the National Audit Office recently reported that it was growing ‘increasingly concerned about the future financial sustainability of some authorities and their capacity to make further savings’ (NAO, 2014: 7). LAs told us they had scaled back their adaptation activities, as their budgets have been slashed and climate-related staff made redundant (cf. Green Alliance, 2011). Concerns about staffing levels, which LA respondents flagged as the second most important barrier to adaptation, are thus tightly coupled to concerns about funding. Cross-tabulation analysis showed that 72% of those who regarded funding as ‘very important’ also said that that staffing was ‘very important’. Pearson’s χ^2 test showed this association to be strong (Cramer’s $V=0.553$) and statistically very significant (8, $n=116$, $p<0.001$). This connection between funding and staffing was explained at length by a survey respondent, who wrote:

‘Reductions in staffing levels in the last two years have meant an inevitable reduction in the time devoted to coordinated action on climate change. Looking ahead the impact of central government imposed cuts on our local authority’s funding (a reduction in the remaining budget by a third over three years) makes it harder to envisage any capacity for non-statutory work and difficulties meeting statutory obligations! *The best information in the world will matter very little if there’s no-one left to respond to it!*’ (Q15, Respondent 41, emphasis added).

Unlike ‘core services such as children’s social care’ (LA Official 19 – Interview), adaptation planning is not a statutory requirement outside of Scotland. As a result it is ‘an easy cut in an era of cuts’ (Q15, Respondent 38) as LAs have looked to protect statutory services by cutting non-statutory ones, like adaptation (Asenova et al., 2015). As one interviewee explained, whilst adaptation is still a ‘priority, it’s just not a priority priority’ anymore (LA Official 19 – Interview). That sentiment was echoed in the majority of our interviews, with some 80% (16 of 20) of LA staff telling us that their LA faces ‘more immediate and bigger problems’ than climate change (LA Official 19 – Interview).

To assess the relative priority given to adaptation activities relative to other demands on LA resources, we asked survey respondents to rate the level of concern shown by their LA to a number of societal threats, including the economic downturn,

disruptions to the transport network, large-scale industrial accidents, health-related emergencies, extreme weather events, climate change, and terrorist attacks (see Fig. 7). Pearson’s χ^2 testing showed no statistically significant variation in responses by LA type, region, and population or by respondent-specific factors such as respondent’s LA department, level of seniority, or whether climate was in the job role. By far the most pressing concern facing LAs is the economic downturn. By contrast, climate change sat somewhere in the middle of the pack, seen as a ‘more distant and less immediate’ societal threat than extreme weather, health-related emergencies, or travel disruption, which are given a higher priority in the allocation of limited LA resources and attention (LA Official 18 – Interview).

Of the 45 open-ended comments about barriers, nearly half (48.9%) highlighted the need for ‘the profile and priority of adaptation’ to be raised if institutional buy-in amongst senior managers and elected council members was to be secured (Q15, Respondents 19). Several respondents attributed the low priority given by LAs to adaptation to ‘mixed messages’ from Coalition Government Ministers about their commitment to tackling climate change, where they ‘say one thing and do the exact opposite’, for instance, appointing ‘climate change sceptics [to] key ministerial positions responsible for climate change policy’ (Q15, Respondents 31, 72). Some 75% (15 of 20) of LA staff interviewed agreed that this political uncertainty played into the hands of ‘climate sceptics’ in their councils ‘who are keen to block any spending on climate-related projects’ (LA Official 14 – Interview).

However, respondents from the different home nations of Britain were divided about the importance of statutory duties and targets like NI-188 in overcoming these institutional barriers to adaptation. Nearly half (44.8%) of English respondents said this would be ‘very important’, with a further 28% saying it would be ‘fairly important’ and just 7.2% regarding it as ‘unimportant’ or ‘not applicable’. For English respondents, top-down requirements and monitoring from central Government were seen as a way to ‘ensure funding is available to adequately resource adaptation work’ (Q15, Respondents 29). Even if it no longer directly tied to Best Value funding from central Government, the existence of an indicator gave proponents of adaptation action important leverage in debates within their LAs about resource allocation (Clifford and Tewdwr-Jones, 2013). LAs ‘don’t want the reputational risk . . .’, as one of our interviewees noted, ‘of being named and shamed . . . for being at the bottom of the league table’ (LA Official 14 – Interview). But with performance on adaptation no longer

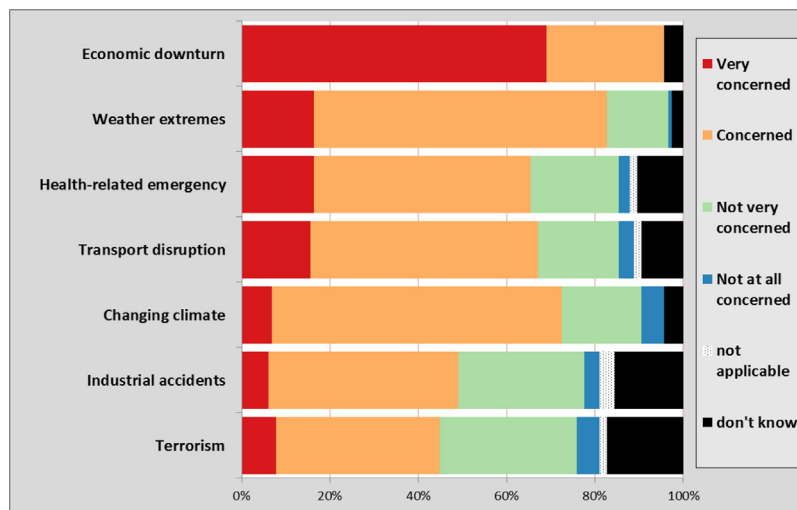


Fig. 7. 2013 survey respondent’s perceptions of their LA’s level of concern about different societal risk.

measured, it was harder for advocates of adaptation to win internal battles for LA resources with those from other departments where performance was measured and where the LA might look bad if the budget were cut. As another respondent explained:

'the loss of NI 188 and lack of guidance or demand from central Government means that local authorities are under no pressure to plan or take action. If Chief Execs were required to report on what action their authority was taking awareness would rise and the issue would be taken more seriously' (Q15, Respondent 29).

These concerns were much less prevalent among Scottish and Welsh respondents, where just 30% of respondents regarded targets as 'very important', as against 35% who regarded them as 'unimportant' or 'not applicable'. Pearson's χ^2 test showed a moderate (Cramer's $V=0.391$) and statistically very significant ($8, n=116, p<0.001$) association between the respondent's nation and the perceived importance of statutory duties. While English respondents tended to welcome stronger central Government oversight and stringent targets to drive LA adaptation, if only to strengthen their hand in the internal struggle for resources, LAs in Wales and Scotland were never subject to NI 188 and so felt that adding an 'extra layer of bureaucracy' would do very little to promote tangible adaptation action (LA Official 15 – Interview). Scottish LAs already had a statutory duty and so did not need the threat of external monitoring to shore up their position in internal resource allocation arguments with other LA departments. Rather than empowering adaptation officers in Scotland, external monitoring might expose any failures to deliver on statutory duties imposed by the Scottish Government. In Wales, LAs suggested it was still 'too early to judge the best way to push adaptation', as at the time of our research they were waiting for guidance to be published (LA Official 11 – Interview).

Compared to funding issues, the quantity, kind, and relative certainty of climate information were regarded by LA staff as much less of a barrier (see Fig. 6). As we noted above, LA staff are now generally confident both about their own personal knowledge of climate change and about the ability of their LA to access and use the 'right' kind of climate science to inform adaptation planning and implementation. In this context, concerns about technical jargon and scientific uncertainty so often emphasised in the literature (Biesbroek et al., 2011; Dessai et al., 2009; Lemos and Rood, 2010; Tribbia and Moser, 2008) were regarded by LA officers as secondary issues, which only arose from a perceived need to 'raise awareness' within the 'local community' and amongst 'chief execs' about the 'risks of climate change', rather than any cognitive challenges they themselves in understanding the technicalities of climate science itself (Q15, Respondents 22, 29). In contrast to uncertainty and jargon, LA officers tended to perceive the lack of more precise projections of future climate impacts and opportunities as a somewhat bigger barrier, although still a secondary one relative to funding and staffing.

Qualitative data from our interviews and open-ended survey responses suggest that what LAs want is not simply more information about climate impacts and opportunities, such as greater spatial resolution or more detail about particular processes, but also different *kinds* of impact information, particularly about costs and the monetary implications of climate impacts. While 80% (16 of 20) of LA respondents reported that completing their Local Climate Impact Profile (LCLIP) helped them identify weather vulnerable services, the resulting data 'wasn't clean data . . . and the actual costs weren't being collected as much as they could' (LA Official 17 – Interview). We were repeatedly told about the need for 'sound, but easy to understand, economic evidence that is locally relevant' or 'information on cost-benefits', which can be applied to their business functions (Q15,

Respondents 21, 34). Indeed, several LAs told us that they had paid consultants to build them a bespoke corporate risk assessment tool to 'work out the specific business implications' and relay that information in a way that 'speaks to different department audiences' (LA Official 9 – Interview). Others developed their own systems to provide evidence and costings to enable them to make the business case for adaptation:

'If we have a severe weather event, emergency planning log it, and an alert goes out to all of our service partners to say an event has been logged and where it's occurred. Then the partners log in and basically input . . . how they've been affected, how much it's cost them, staff days lost, whether flooding has occurred . . . [and] how we've been impacted reputationally as well, we capture media information . . . positive or negative reputational hits' (LA Official 17 – Interview).

Translating impacts into costs is important because DEFRA (2013b) guidance now says LAs should only commit money to adaptation when it makes business sense to do so. As one official explained, 'if you want a business case [for adaptation] you need the costs' (LA Official 17 – Interview). Thus if an informational barrier to climate adaptation exists it is about its economic costs and benefits. In this context, climate adaptation has enjoyed the greatest traction when it has been rebranded as resiliency to extreme weather. Some 80% (16 of 20) of the LA staff we interviewed told us that they try to talk more about weather resiliency than climate adaptation. The language of weather resiliency has two advantages over a climate adaptation framing (cf. Dewulf, 2013). First, it avoids antagonising climate sceptics who might otherwise block initiatives.

'I think politically with [council] members, if you invite them to a climate change seminar . . . no one will turn up, but if you call it 'making your community more resilient', 'protecting your community', [or] 'protecting lives and livelihoods', all those phrases we'll have a far better buy-in. Now the subject matter is the same, the objectives are the same, and the outcomes are the same, we're just using a different language . . .' (LA Official 14 – Interview).

Second, resiliency also had better buy-in because it promised to deliver immediate benefits here-and-now. Adapting to future climate change, by contrast, seemed more remote and thus less salient. Whereas Dupuis and Knoepfel (2013) attribute the lack of local saliency of climate adaptation framings to the spatial distance between local realities and the international bodies who offer them; our findings highlight the importance of temporal immediacy to the appeal of a weather resiliency framing against a climate adaptation one, a point also made by Bierbaum et al. (2013) who identified conflicting timescales as one of seven key barriers to adaptation.

But even promoting weather resiliency still requires assembling a business case to show the savings from any investment will outweigh the costs. For Kent County Council, with its SWIMS system, the headline figure that 'severe weather events were costing [the LA] £44 million a year to deal with', really helped to get everyone 'together in a room and talk about what kinds of things we can do to manage it and plan better. So that's where the adaptation plan came from' (LA Official 17 – Interview). Without that same focus on the costs of weather impacts and the associated data to make the case about their importance, other LAs have struggled to do as well.

4. Discussion: informing adaptation and assessing barriers to action

In past studies, the paucity of concrete adaptation action has often been attributed to knowledge deficits (see Measham et al.,

2011; Moser and Ekstrom, 2010; Preston et al., 2015), for which the solution is assumed to be more scientific research to reduce uncertainties and provide policy-makers with a firmer evidence base to inform planning and prioritization. In place of that implicitly linear model of one-way communication to dispel the ignorance (Demeritt and Nobert, 2014), recent work in social science increasingly frames the challenges of bridging the science-policy as a two-way problem. Policy paralysis can arise from both supply-side failures to deliver climate science that is policy-relevant and usable for adaptation (Hanger et al., 2013), and from demand-side failures by policy-makers to understand the science or to specify what would be usable and thus what actually gets used to inform adaptation (Dilling & Lemos 2011; Lemos et al., 2012).

A decade ago, there was clear evidence in Britain for what Lemos et al. (2012) termed the 'climate information usability gap'. LA staff struggled to find scientific information that they could understand, and they lacked much in the way of a planning framework in which they could use climate science to identify risks or prioritize measures for dealing with them (Demeritt and Langdon, 2004). In response, the UK Government invested in new, more policy-focused adaptation science, such as new finer resolution and uncertainty explicit climate projections (UKCP09) and a national risk assessment (CCRA), as well as in knowledge brokerage including UKCIP, the Environment Agency's Climate Ready Programme, and the regional climate partnerships, to deliver climate science that is more accessible to, and understandable by, LAs. The findings presented in this paper show that these investments have largely overcome the informational access and cognitive understanding barriers identified a decade ago (Demeritt and Langdon, 2004). LA staff now engage more frequently with the 'right' kind of climate information and are both more confident and competent in understanding the risks that climate change holds for them. While some questions still remain about how widely that knowledge is distributed within LAs beyond the small cadre of officers with immediate responsibility for adaptation planning that we studied, it is clear that climate information is no longer a major barrier to adaptation in British LAs.

Nevertheless, better information has not led to much tangible adaptation action. Compared to a decade ago, when very few British LAs were even making adaptation plans (Demeritt and Langdon, 2004; Tompkins et al., 2010), there has been progress in planning, spurred on by top-down targets and close monitoring of LA performance under the last Labour Government. However, our research shows that LAs in Britain are struggling to move beyond planning to implementation. These findings challenge the current Government's expectation that adaptation 'should occur naturally and without the government's intervention' (para 11), once it has overcome the informational barriers that 'make it hard for [organizations & individuals] to plan rationally' (DEFRA, 2013c: 6–7). Like the wider literature on the usability of climate science more generally (Dilling and Lemos, 2011; Kirchoff et al., 2013; Lemos et al., 2012), the UK Government's National Adaptation Programme is focused on the supply and delivery of climate information, treating its usability and relevance as fixed characteristics of the science itself (DEFRA, 2013b), rather than as the institutionally situated outcome of political struggles over its meaning and local application.

The difficulties we document with adaptation by local government are not unique to Britain. Studies of municipal-level adaptation in a variety of countries have identified similar failings, which have been attributed to a variety of different barriers including weak or inconsistent, political leadership (Amunsden et al., 2010; Burch 2010; Hardoy et al., 2014; Hjerpe et al., 2014); institutional fragmentation or limitations (Biesbroek et al., 2011; Ekstrom & Moser 2014; Measham et al., 2011; Mukheibir et al.,

2013) and inadequate, or unreliable, funding (Barnett et al., 2015; Crabbé & Robin 2006; Eisenack et al., 2014; Moser & Ekstrom 2010).

What our longitudinal approach contributes is a controlled analytical framework for testing the importance of these barriers over time and the impacts upon them of different policy interventions. Case study research often points to the importance of political leadership in the success of adaptation initiatives (Amunsden et al., 2010; Burch 2010; Hardoy et al., 2014; Hjerpe et al., 2014). Whereas some studies bemoan the absence of leadership by locally elected officials as an explanation for the failure of municipal-level adaptation (Amunsden et al., 2010; Measham et al., 2011), others have noted how top-down mandates from regional and national levels of government can impede local initiative (Burch 2010; Crabbé & Robin 2006). Our research offers evidence for both effects. LA officers frequently complained of a 'lack of vision' (Q16, Respondent 67) and 'leadership in tackling climate change' (Q16, Respondent 33) and of elected members and chief executives 'burying their head in the sand re climate change' (Q15, Respondent 73). Despite insisting that local adaptation 'very much depends on having a 'champion' to promote these issues as a corporate priority' (Q16, Respondent 38), LA officers often looked to the national level for leadership rather than expecting it to arise locally. While this tendency to look for top-down support was reinforced by LA disappointment about 'central government imposed cuts on our local authority's funding' (Q16, Respondent 39) and the removal of NI-188 in England, it also reflects a longstanding sense about where the locus of responsibility lies. In the 2003 LA survey, 56% of respondents had agreed that central Government has primary responsibility for managing climate risks with the rest seeing it as somehow shared (Demeritt & Langdon 2004). By 2013, the percentage of respondents seeing it as a shared responsibility had grown to 73%, but a quarter still attributed 'total responsibility' to central Government. These attitudes reflect the centralized structure of the British state, which limits the scope for LAs to set the political agenda or exercise leadership in other ways.

Institutional fragmentation is another often-cited barrier where the responsibility for adaptation planning is separated from its delivery (Ekstrom & Moser 2014; Measham et al., 2011) or poor coordination between different levels of government impedes adaptation action (Biesbroek et al., 2011; Mukheibir et al., 2013). Again our research provides evidence for both these problems. With devolution, the pattern of LA adaptation across Britain has become more heterogeneous and complex. Whereas the devolved administrations in Scotland and Wales are asserting more central control to steer LA adaptation in line with their different national strategies, central Government is now pursuing a localist agenda for England. The Coalition-led Government has been much less involved in centrally overseeing LA adaptation than the previous Labour administrations. The desire of LA officers in England for more statutory duties and performance targets from central Government is less puzzling if understood as a response to this de-coupling and fragmentation at both the national and local levels. English LA respondents felt that local momentum for adaptation was lost with the removal of NI-188. With the dismantling of the audit and accountability regime by which the Labour Government had sought to ensure local delivery of its policy goals, LAs in England are now free to do whatever they want on adaptation. The problem is: many are choosing to do nothing at all. Top-down targets are one way to address this de-coupling of local practice from the goals of the national strategy. But they are also popular with LA climate officers because they can help to address institutional fragmentation within their own LAs. A statutory adaptation duty would provide climate officers with leverage in internal struggles over resource allocation.

A lack of funding is another major barrier to adaptation at the municipal-level (Amunsden et al., 2010; Barnett et al., 2015;

Crabbé and Robin, 2006; Eisenack et al., 2014; Moser and Ekstrom, 2010). In Britain, after five years of budget cuts by the Coalition Government (2010–2015), LAs have few resources and struggling to even deliver the immediate services required of them by law. Their outlook has become more reactive and short-term. Without ‘more funding’ (Q15, Respondent 13) specifically ring-fenced for adaptation, longer-term investment aimed at adapting to future climate change will remain a much lower priority compared to more immediate risks faced here and now. Our research does show the potential mileage, in era of fiscal restraint and climate skepticism, of overcoming these barriers to adaptation by reframing it as resiliency to extreme weather (see Dewulf, 2013). For this vulnerability assessments of critical thresholds and costs of near-term strategies are more relevant than probabilistic futures of the climate in 2080s (Dessai et al., 2009). If our LA respondents are keen to have more information about the economic costs of severe weather, it is not simply because their LAs need ‘to account for the full costs and benefits of all adaptation options’ (DEFRA, 2013c: 2); information about costs is a crucial resource for them in the internal battles within LAs to secure the resources and institutional license to do adaptation.

5. Conclusion

We provide fresh empirical evidence that adaptation barriers are not fixed but change over time. Answering Eisenack et al. (2014) rallying call, we show how adaptation barriers evolve so that we can better understand why they emerge, how they can be overcome, and why some become endemic (see Ekstrom and Moser 2014; Vogel and Henstra, 2015). Whereas access to, and understanding of, climate information was a major stumbling block in building the wider capacity necessary to adapt to climate change in Britain in 2003 (Demeritt and Langdon 2004), now the adaptive capacity of LAs is vulnerable to budget cuts. As climate posts, and the expertise they offer to LA services on care, housing and schooling, is lost. How these barriers come to affect and offset each other, goes beyond early work on adaptive capacity (Smit et al., 2001; Yohe and Tol, 2002); and instead draws on more social science inspired work on the wider institutional, political, attitudinal and financial barriers (Moser and Ekstrom, 2010), and different kinds of adaptive capacity: ‘generic’ human development capacities such as financial and human resources, and those ‘specific’ to climate adaptation including disaster planning, insurance funds, and scenario development (see Eakin et al., 2014). In this context, the ability of municipal-level officials to develop the specific capacity necessary to understand and use the ‘right’ kind of climate information will be of little benefit as long as the generic capacity to fund adaptation is lacking.

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at <http://dx.doi.org/10.1016/j.gloenvcha.2015.10.004>.

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