Narrating the UK's adaptation to a changing climate:

Identifying the most prominent adaptation narratives from the public discourse and understanding how engaging they are for UK residents

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The candidate confirms that the work submitted is her own, except where work which has formed part of jointly authored publications has been included. The contribution of the candidate and the other authors to this work has been explicitly indicated below. The candidate confirms that appropriate credit has been given within the thesis where reference has been made to the work of others.

Chapters 2 and 3 are based on work from jointly authored publications. The publications are as follows:

- Harcourt, R., Bruine de Bruin, W., Dessai, S. and Taylor, A. 2019. Investing in a good pair of wellies: How do non-experts interpret the expert terminology of climate change impacts and adaptation? *Climatic Change* **155(**2), pp. 257-272.

- Harcourt, R., Bruine de Bruin, W., Dessai, S. and Taylor, A. 2020. What adaptation stories are UK newspapers telling? A narrative analysis. *Environmental Communication.* **In Press.**

The candidate is the principle researcher and first author of the above cited publications. Additional to the co-authors of the above listed publications, the candidate also acknowledges the work of Dr. Rebecca Pearce and Dr. Matthew Cotton in undertaking the interviewers analysed in Chapter 2.

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Abstract

The UK will experience more frequent and more extreme weather patterns in the coming decades. Climate change adaptation intends to reduce the likelihood that climate change impacts will cause harm and to reduce the severity of unavoidable harm, as well as to take advantage of new opportunities. Engagement in adaptation by UK residents is important as they can take actions which improve their own safety and which contribute to local and national adaptation objectives. However, research so far shows that individual engagement with adaptation is low. There is a need, therefore, to make adaptation a more engaging topic for UK residents. In this thesis I respond to this challenge by firstly analysing the current public discourse of adaptation. I undertook two studies to do this: a secondary analysis of interviews with UK residents and a narrative analysis of UK newspaper articles. Secondly, I evaluated how engaging the current adaptation public discourse is for UK residents and worked with research participants to develop ideas to make it more so. Here I undertook a further two studies: a series of storytelling workshops and a quantitative survey with a national sample. I found that the content and approach used in the newspaper discourse differs from the areas of interest and engagement identified by UK residents, and as such adaptation newspaper coverage is perceived as ineffective in inspiring greater individual involvement. Instead, a clearer sense of the urgency and meaningfulness of the risks for people's everyday lives and more clarity on what roles individuals can play in the adaptation story are suggested as ways to make the discourse more engaging. This thesis provides novel insight into the UK's adaptation discourse which is essential information for those tasked with communicating adaptation. It also develops and tests ways to make engagement more effective which provides useful information for adaptation practitioners and areas of development for further research.

Conference presentations and non-journal publications

Conference presentations

- May 2019, Harcourt, R., Bruine de Bruin, W., Dessai, S. and Taylor, A. *UK newspaper narratives of climate change impacts and adaptation strategies.* Paper presented at the biennial European Climate Change Adaptation conference. Lisbon, Portugal.
- April 2019, Harcourt, R., Bruine de Bruin, W., Dessai, S. and Taylor, A. *Watching helplessly: Newspaper coverage of the roles for individuals as the UK adapts to a changing climate.* Paper presented at the annual American Association of Geographers conference. Washington DC, USA.
- June 2018, Harcourt, R., W., Dessai, S. and Taylor, A. *Were the 2015 UK floods used as an opportunity to communicate climate change risks and response? A case study of UK newspapers.* Paper presented at the annual conference of the Society for Risk Analysis-Europe. Ostersund, Sweden.
- May 2018, Harcourt, R., Bruine de Bruin, W., Dessai, S. and Taylor, A. *Understanding how non-experts talk about climate change impacts, risks and adaptation.* Paper presented at the annual meeting of the Center for Climate and Energy Decision Making, Carnegie Mellon University. Pittsburgh, USA.
- February 2018, Harcourt, R., Bruine de Bruin, W., Dessai, S. and Taylor, A. *Narrating the UK's adaptation to a changing climate: Analysing newspaper coverage of climate change impacts and adaptation.* Poster and paper presented at University of Leeds Student Sustainability Conference. Leeds, UK.
- July 2017, Harcourt, R. & Lock, K. *Have they got news for you? Frame analyses of climate change stories during two key political and weather events in 2010.* Paper presented at Mediating Climate Change. Leeds, UK.
- June 2017, Harcourt, R., Bruine de Bruin, W., Dessai, S. and Taylor, A. *Understanding how non-experts talk about climate change impacts, risks and adaptation.* Paper presented at the annual conference of the Society for Risk Analysis-Europe. Lisbon, Portugal.
- February 2017, Harcourt, R. *What impact does media coverage of climate change and extreme weather events have on people's likelihood of taking climate action?* Poster presented at University of Leeds Student Sustainability Conference. Leeds, UK.

Other dissemination events

- March 2020, Harcourt, R. Dessai, S., Bruine de Bruin, W. and Taylor, A. *Communicating the UK's adaptation to a changing climate.* Presented to the Department for Environment, Food and Rural Affairs (Defra) and the Committee on Climate Change.

Non-journal publications

- 'A hot topic: heat hazards in the media'. (2020). *UK Climate Resilience Programme* blog
- 'Telling tales for adaptation'. (2020) *Priestley International Centre for Climate Change* blog
- 'Why we're hardwired to ignore safety advice during a heatwave'. (2018). *The Conversation*

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Chapter 1 Introduction

1.1 Introduction to the challenge

1.1.1 Climate change impacts in the UK

The Intergovernmental Panel on Climate Change (IPCC) now describes warming of the climate system as "unequivocal" and "unprecedented" (IPCC, 2013, p. 4), warning that it will cause reduced ice cover, rising sea levels, species loss and impaired ecosystems (IPCC, 2018).There is also increasing evidence that more frequent and more extreme weather events can be at least partially attributed to a warming climate (Allen et al., 2004, Pall et al., 2011, Coumou and Rahmstorf, 2012, Trenberth et al., 2015). The average annual temperature of the UK has risen by 1ºC since pre-industrial times and in recent years the UK has experienced hotter and wetter weather (Met Office, 2019). Looking ahead to 2100, the UK is expected to continue to warm with drier summers and wetter, milder winters (Met Office, 2019). The UK's most recent Climate Change Risk Assessment (CCRA) emphasised the present and future seriousness of hotter weather to health, well-being and productivity, and risks from flooding and coastal change to communities, businesses and infrastructure (Committee on Climate Change, 2017). As the climate continues to change over the coming decades the UK is expected to also experience risks to water and food supplies, to natural capital and ecosystems, and from new or invasive pests and diseases, as well as some opportunities such as more productive growing seasons (Committee on Climate Change, 2017).

The experience of climate change impacts will have tangible effects on people's daily lives. Extreme weather events can reduce people's wellbeing and may even cause a threat to life, while physical and mental health impacts can continue long after the immediate threat has passed (Walker-Springett et al., 2017, Paranjothy et al., 2011). Extreme events, such as serious flooding, prolonged drought, or coastal erosion, might also cause things of value to be damaged or lost, both in the immediate term, such as loss of meaningful valuables like photos, (Tschakert et al., 2019), and in the longer term, such as irreversible changes to places and landscapes (Adger et al., 2013a). Some impacts might bring less severe but still disruptive changes to daily

schedules and lifestyles (Toole et al., 2016), and impacts will likely exacerbate pre-existing inequalities and social challenges (Benzie, 2014).

1.1.2 Climate change adaptation

Responding to climate change can be broadly divided into mitigation and adaptation. Mitigation intends to limit the amount of climate change by reducing greenhouse gas emissions and other harmful activities, such as deforestation (IPCC, 2014b). The 2015 Paris Agreement, signed by 197 countries, agreed to pursue "efforts to limit the temperature increase to 1.5 °C" (UNFCCC, 2015, Article 2a). Even if such efforts are successful, inertia in the climate system means that at least some level of unavoidable climate change is already locked in (Smith et al., 2019). It should also be noted that nationally determined contributions submitted by each country as part of the Paris Agreement might be insufficient to keep warming to 1.5°C even in the somewhat unlikely instance that all targets are achieved (Lawrence and Schäfer, 2019). Therefore, alongside ongoing mitigation efforts, there is a need to respond to and prepare for the impacts which will be brought by ongoing climate change. This is referred to as 'adaptation'.

The IPCC, which produces the scientific reports used to inform international climate governance, defines adaptation as "The process of adjustment to actual or expected climate and its effects… adaptation seeks to moderate or avoid harm or exploit beneficial opportunities" (IPCC, 2014a, p.5). A key theme developing from adaptation literature is that in practice the 'process of adjustment' in human systems is not necessarily an autonomous or straightforward response to expected climate effects. Instead, it is an ongoing decision-making process dependent on a range of interacting and changeable factors. For example, adaptation planning will be shaped by what risks are perceived as necessitating an adaptive response. Adaptation strategies may be influenced by the level of intended and/or acceptable change (Pelling et al., 2015), by the values and morals of the society in which it is taking place (Adger et al., 2009), by the governance structure in which it is happening (Biesbroek et al., 2010, Termeer et al., 2012), and by people's willingness to direct resources to adaptation rather than mitigation (Brügger et al., 2015b, Howell et al., 2016). Adaptation will also be very context specific, as different areas and social groups respond to differing risks, and it may also need to change over time in response to changing circumstances (Hinkel and Bisaro, 2015). As climate change risks develop and multiply in the coming decades, adaptation will be unlikely to entirely prevent

harm or unwanted losses and compromises (Tschakert et al., 2017). Therefore, while the concept of 'adaptation' is inclusive of taking actions to reduce risks, such as building flood defences or improving architectural passive cooling, it also more broadly refers to an ongoing and dynamic experience based on what a society wants their future under climate change to look like and the choosing of the optimal ways to get there (Adger et al., 2005, Dilling et al., 2019).

1.1.3 Climate adaptation governance in the UK

In the UK, the national government is legally mandated to lead adaptation planning (HM Government, 2008, Part 4, Provision 58). The British government is required to respond to the 5-yearly Climate Change Risk Assessment (CCRA) with a National Adaptation Programme (NAP) that outlines how the government will respond to each of the identified risks for the UK, with the devolved governments of Scotland, Wales and Northern Ireland also producing national adaptation plans. The NAP, first published in 2013 and again in 2018, has a principle ambition for the UK to become "A society which makes timely, far-sighted and well-informed decisions to address the risks and opportunities posed by a changing climate" (DEFRA, 2018, p. ii). The NAP places socially shared responsibility for achieving this ambition at the centre of its strategy. It argues that "we need the engagement of all from outside the government… as we all work together to strengthen the resilience of our nation" (DEFRA, 2018, p. ii). The national government is presented as having a supporting and enabling role by communicating risks and opportunities so as "to engage ever more people to take action to adapt" (DEFRA, 2018, p. i). It argues that more aware and more informed residents will be "empowered… [by] understanding" and thus more likely to partake in adaptation initiatives (DEFRA, 2018, p. 5). It also argues that a more informed and engaged society will "help inform a more mature debate on how we adapt as a society" (DEFRA, 2018, p. iii). According to the NAP, UK society has a shared responsibility both in taking adaptive actions and in setting the adaptive strategy that will guide those actions.

1.1.4 Summarising the challenge

Climate change will bring a range of serious and often negative impacts to life in the UK. Adapting to these changes offers a means of reducing the harm caused while taking advantage of any opportunities. The current UK adaptation strategy is based on sharing responsibility

across social sectors, making individual engagement with adaptation an essential part of its success. This thesis focuses on that challenge.

1.2 Individual engagement

1.2.1 Individual scale adaptive actions

UK residents can offer at least three significant contributions to the UK's approach of sharing adaptation responsibility across social sectors. Firstly, it has previously been argued that individuals can contribute to climate change efforts by changing their own behaviours (O'Neill and Nicholson-Cole, 2009, Corner and Randall, 2011, Whitmarsh et al., 2011). For adaptation, this will most often mean individuals taking actions which can reduce the likelihood and/or scale of harm they might personally experience from climate change impacts, such as homeowners fitting flood prevention measures or sun shades. There have already been a number of case studies of how residents in a certain area are responding or adapting to a particular risk (e.g. Abrahamson et al., 2008, Dessai and Sims, 2010, Bichard and Kazmierczak, 2012, Thomas et al., 2015). A review of the literature found that so far individual and household scale adaptation to extreme weather is minimal (Porter et al., 2014), which aligns with studies in other developed countries (Elrick-Barr et al., 2016). However, there are also some case studies that find household preparedness for weather hazards can benefit from collective actions, such as the implementation of citizen flood wardens to support residents in Toll Bar (Ping et al., 2016), or the positive influence of community flood action groups on household adaptation in Scotland (Dittrich et al., 2016).

This leads on to the second way in which individuals can engage in adaptation which is by supporting or partnering the actions of other groups, most often local or national governance but also community groups. Adaptation will often take place locally with immediate effects on the resident population and will therefore have more chance of success with their support (Moser and Pike, 2015, Brink and Wamsler, 2019). Adaptation governance at the local or national scale will draw on limited public resources and the government's commitment to the issue will likely be influenced by the extent to which it's perceived as a priority concern for voters. A recent independent review of the current government's adaptation efforts found it is not "taking it sufficiently seriously" (Committee on Climate Change, 2019, p.7), highlighting the necessity of electoral engagement. Compared to research in higher risk

areas such as those near flood hazards or eroding coastlines, there is so far much less understanding available as to what a general UK audience knows and thinks about adaptation (Adger et al., 2017). One large study of UK residents' perceptions of adaptation found broad support for the national government preparing in anticipation of expected climate change impacts (Ipsos MORI, 2013), particularly for those events which would be the most concerning if they did occur (Taylor et al., 2017) and to protect the most vulnerable (Adger et al., 2017). A 2016 survey found more than three quarters of the respondents supported spending public money to prepare for climate change impacts, although in terms of specific policies the question only included 'e.g. building flood defences' (Steentjes et al., 2017). However, a survey which aggregated the support given to a set of specific adaptation policies concluded that less than 50% of the UK sample strongly or moderately supported adaptation policy (Hagen et al., 2016). It should be noted this survey was taken in 2010, so it in unclear whether the specificities of the adaptation policies or the age of the sample is causing the opposing findings. To conclude, available research suggests there is support for the adaptation actions and plans of other groups, but the UK's so far insufficient government-led adaptation progress suggests there is opportunity for much greater citizen engagement in this area.

Thirdly, residents can take part in the decision making regarding what the adaptation objectives for the UK should be and how best to achieve them. As suggested above, while adaptation ultimately aims to reduce the harm caused by climate change impacts, it might also bring unwanted compromises and losses, such as limiting the cost of flood or erosion damage by retreating from coastal areas. There is the additional risk that more vulnerable social groups will also be the most likely to experience climate change harms and to suffer from inadequate or poor adaptation planning (Benzie, 2014). For example, insurance cover might become unattainable to those who can't afford to move away from high risk areas. Stakeholders from all sectors of society, including residents, will therefore need to be engaged in the decision making process if it is to be as informed and democratic as possible (Nisbet, 2009). This might happen at the local scale as residents take part in planning their communities defence to specific risks (e.g. Bond and Barth, 2020) or at the national scale as voters show preference for the adaptation plans of one political party over another (responding to public interest, the 2019 UK general election included a televised leaders debate about climate change policies). Studies have found that adaptation is not a readily familiar concept with UK residents (Reis and

Ballinger, 2020) suggesting so far limited personal and political engagement with the adaptation discourse.

In sum, individuals can take actions to protect their own wellbeing, support the actions of others, and contribute to the decision making process (see Figure 1). However, current research finds that adaptation is not yet a familiar term and that the uptake of individual adaptive actions is low. Therefore, if the UK's adaptation ambitions are to be realised through a shared responsibility approach there is a need to increase the engagement of UK residents with adaptation.

1.2.2 Key decision points in individual engagement

While there will likely be many decision points influencing individual adaptation engagement, some of which will be very context specific, research is starting to identify some commonalities. The following summary focuses specifically on adaptation engagement research due to the recognition that what motivates an individual to respond to often localised climate related risks might differ from what motivates them to help limit global climate change (Howell et al., 2016). However, as noted by a recent meta-analysis of adaptation motivators, research in this area remains patchy with some impact scenarios, such as flooding, much more studied than others, such as heatwaves (van Valkengoed and Steg, 2019).

To start, adaptation engagement will likely be affected by an individual's perception of climate change risks. Research finds that risks need to be perceived as personally serious and relevant to motivate a response (Grothmann and Patt, 2005). Often perception of risk will be increased by personal experience (Spence et al., 2011, Porter et al., 2014, Demski et al., 2017, Power et al., 2020). It can also be influenced by the extent to which individuals psychologically imagine the threats as near or far from themselves, with more distant threats usually seeming less risky (Taylor et al., 2014b, Weber, 2016). Adaptation theory is also developing understanding of how people respond to less-direct threats, such as to places or things of value (Adger, 2016, Bonaiuto et al., 2016). Case studies in the UK (Spence et al., 2018) and US (Moser, 2013) have found that stronger place attachment can lead to greater concern about local risks, for example.

A second emerging theme is that engagement will be affected by how people think about responding to those risks. This includes perceptions of responsibility. One study found

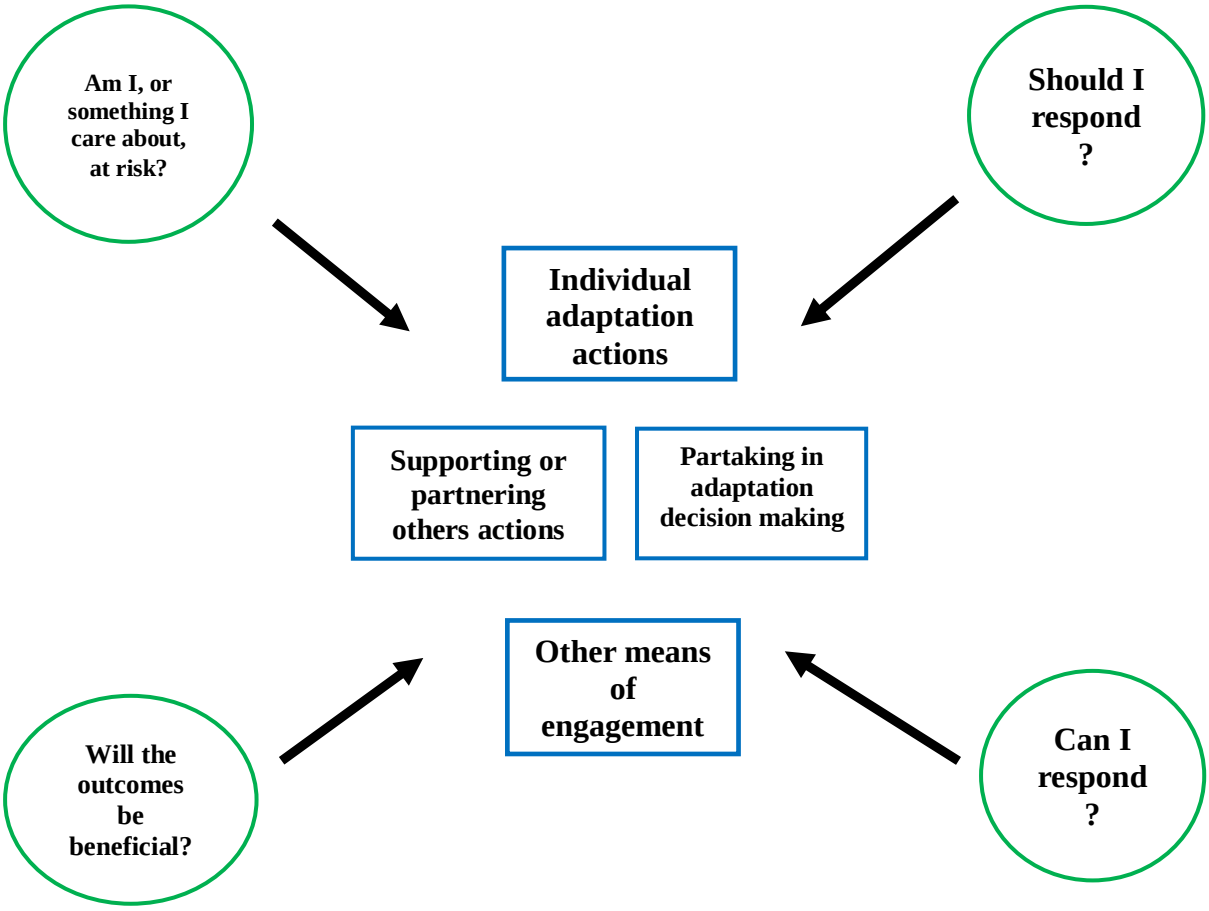
responsibility to be the most prominent point of contention between different adaptation viewpoints held by UK residents, with some arguing that all sectors of society are needed to adequately address the issue and others arguing that the responsibility principally sits with the government (Cotton and Stevens, 2019). In areas which have experienced or are more at risk from experiencing extreme weather events or coastal change, studies have found that a low sense of personal responsibility is acting as a barrier to action (Bichard and Kazmierczak, 2012, Thomas et al., 2015). However, individuals might be motivated to act if they perceive taking action as socially acceptable (Porter et al., 2014, Power et al., 2020), by a sense that others like them are acting similarly (van Valkengoed and Steg, 2019) and if they can see how their actions fit into the larger picture of what's being done (van Kasteren, 2014). An additional part of the response evaluation will be knowing how to act. While some level of access to information and material resources will be necessary, studies find that an individual's perceived self-efficacy in being able to undertake meaningful adaptive actions is an even stronger motivator of engagement (Grothmann and Patt, 2005, van Valkengoed and Steg, 2019).

Finally, adaptation engagement seems to be motivated by the sense that undertaking adaptation will have beneficial outcomes (van Valkengoed and Steg, 2019). Additionally, there is evidence that outcomes need to be perceived as aligning with existing worldviews (Brink and Wamsler, 2019) while adaptation theorists argue that alignment with existing values will be a motivator of action (O'Brien and Wolf, 2010, Corner et al., 2014).

Based on the current research, an individual's decision making regards adaptation engagement is based on the following key decision points: Am I, or something I care about, at risk? Should I respond? Can I respond? Will the outcomes be beneficial? Engagement might not be dependent on all affirmative answers. Someone who is considering investing in flood prevention for their home, for instance, might answer differently than someone who is considering adaptation policies in their local elections. Nor will all these questions be answered consciously or definitively. However, these key questions are being used here, alongside the engagement outcomes outlined in Section 1.2.1 above, to provide a framework for understanding what individual engagement in adaptation means and how it might be achieved. This is summarised in Figure 1 in which the blue rectangles capture the three types of ways individuals can take part in adaptation, plus an 'Other' box recognising the list is not

exhaustive. The green circles summarise the key motivators, identified from the literature, which might influence an individual's engagement.

Figure 1 Summary of key decision points and actions in individual engagement



1.3 Public discourse narratives

1.3.1 Definition of public discourse narratives

This thesis will focus on the relationship between public discourse narratives of adaptation and the adaptation engagement of UK residents. Starting with a definition of 'public discourse', at its most basic it can be described as how society is talking about a topic. Some contributors, such as the government or the media, will likely be more powerful in selecting and framing the content of the discourse, as well as in disseminating it (Fairclough, 1992, Entman, 2007). How

recipients respond to the messages will in turn influence future messaging so that the public discourse becomes an ever evolving process which both influences and comes to reflect socially agreed upon norms and values (Carvalho and Burgess, 2005).

A basic definition of 'narrative' is something which has a beginning, a middle and an end (Moezzi et al., 2017), although narratives are more than a reiteration of the occurrence of sequential events. Rather they are constructed so as to transmit meaning beyond the basic structure of what happened to whom (Bruner, 1991). The ability to both construct and interpret stories seems to be intrinsically human, with evidence throughout human history of societies using storytelling as a means of providing first order and then meaning to experience (Gottschall, 2012). As such, the narratives which become canonised within a society are those which explain where we've come from and where we're going.

'Public discourse narratives', the focus of this thesis, emerge as the many ideas and sub-topics introduced into the public discourse evolve, over time, in to reoccurring and increasingly coherent and developed storylines. As with other types of stories, public discourse narratives order and add meaning to the discourse relating to topics of current social concern.

1.3.2 Narratives and decision making

Narrative theory as developed by Walter Fisher will be used as a tool for exploring the adaptation public discourse and how it might interact with individual engagement. Fisher (1984) argues that, when faced with a new problem, *homo narrans* intrinsically use socially shared narratives, communicated through the public discourse, as a means of first conceptualising the issue and then deciding how to respond to it. During this process a number of narratives may be put forward to be evaluated for the extent to which each seems coherent within itself and to life as it's known in that place and time (Fisher, 1984). He argues that the ultimate decision as to how to move forward is made as individuals and societies positively respond to the narrative(s) which best provide the 'good reasons' justifying the chosen pathway (Fisher, 1984, p.7).

Over the course of the following research chapters I will use the archetypal narrative of problem resolution, i.e. the story of risk recognition and response, to understand the current adaptation public discourse. In this narrative structure, the story begins with the realisation of a disruptive and usually problematic event; in the middle of the story some consciously acting

agents respond to the event in some way; and finally the narrative arc moves towards a resolution which can either reinstate the story world as it was before the initiating event occurred or bring a transition to a changed world (Bruner, 1991, Ryan, 2007). In calling for more narrative based adaptation research, Paschen and Ison argued that "In adaptation… how we 'story' the environment determines how we understand and practice adaptation, how risks are defined, who is authorized as actors in the change debate, and the range of policy options considered" (2014, p. 1083). This reflects very much the trigger points identified above in Section 1.2.2 and Figure 1 regarding an individual's decision making: perception of risk, questions of responsibility and efficacy, and consideration of outcomes.

While using a narrative approach will encourage a focus on these key questions, I will additionally be drawing from other theories to better understand how the public discourse narratives might be interacting with an individual's key points of decision making and thus engagement. These will now be briefly introduced in the following three sections.

1.3.2.1 Perception of risk

As outlined in Table 1, a problem resolution narrative is initiated by the potential or actual occurrence of a risk event. While there are a large number of theories considering how people understand and respond to risk, the underlying focus here on public discourse narratives makes it useful to consider the Social Amplification of Risk Framework (Kasperson et al., 1988). This framework argues for the importance of considering how social and cultural modifiers, such as the public discourse, interact with the original risk signal so shaping how it is conceptualised and responded to (Kasperson et al., 1988). One of the principle learnings of the framework is that the ultimate response might be amplified or attenuated in comparison to the original risk signal (Kasperson et al., 1988). In other words, some risks might evoke a significant public and/or legislative response while others are downplayed. Most non-climate experts are likely to be more familiar with how climate related risks are presented in the public discourse, particularly the media, than with the original risk signals issued by scientists (Dessai et al., 2004, Dahlstrom, 2014). Therefore, understanding the public discourse's presentation of risk is essential to better understanding how personal risk perception might be influencing an individual's engagement with adaptation.

1.3.2.2 Questions of responsibility and efficacy

The middle of a problem resolution narrative is about who responds to the initiating events and how. Social Constructionism Theory argues that social constructions, particularly language, shape social behaviours and norms (Potter, 1996). Individuals, as fundamentally social beings, are attuned to this and tend to align their behaviours with those that are seen as socially acceptable and socially preferable (Burr, 2003). This extends to the construction of identity as individuals select from within the range of options presented as available in the social discourse (Burr, 2003) Therefore, how the public discourse is portraying individuals in adaptation will likely shape their response to questions such as responsibility, social acceptability and efficacy, all of which have been found to be influential on engagement.

1.3.2.3 Consideration of outcomes

The problem resolution narrative ends when the disruptive events which initiated the story have been resolved in some way. As outlined above, when developing narratives as a means to guide social decision making, a number of narratives and outcomes might be considered (Fisher, 1984). Futures work argues that for decision making to lead to optimal outcomes there needs to be consideration of options which might be possible or preferable, as well as those which seem most probable (Miller, 2007). One reason for this is that, under the pressure of decision making, focus on those futures which seem most probable might often occlude consideration of other, ultimately more beneficial, options. As there is evidence that perception of outcomes will be influential on individual engagement, there's a need to understand the range and types currently being debated in the public discourse.

Table 1 Summary of the narrative model applied to the key decision points in individual engagement

	Beginning	Middle	End
Problem resolution narrative	Occurrence of disruptive events which initiate the story	Exploration of who responds and how	Resolution of the disruptive events either by returning to the status quo or changing
Applied to adaptation	Threat or occurrence of climate related impacts such as extreme weather	Individuals or groups take adaptive actions	The likelihood and level of harm is reduced or removed
Presentation in public discourse narratives	What types of climate related risks are amplified and which attenuated?	How are the roles and responsibilities of individuals presented?	What range and types of outcomes are considered?
Key decision points in individual engagement	Am I or something I care about at risk?	Should I respond? Can I respond?	Will the outcomes be beneficial?

1.3.3 Narratives and communication

The communications people receive about a topic will also influence their willingness to engage with it. Often the purpose of communications is to provide the information needed for the recipients to be able to take the suggested actions; for adaptation, this might mean providing information as to how to keep flood waters out of the home, for example. However, studies have found that provision of information alone has been insufficient to secure adaptation engagement and behavior change (van Valkengoed and Steg, 2019). This has led to a re-evaluation of the types of communications which might be most effective in generating increased engagement with climate change (Pearce et al., 2015, Boykoff, 2019), and adaptation specifically (Moser, 2014, Wirth et al., 2014), with many identifying the potential of narrative communications (such as the 2017 Special Issue of *Energy Research and Social Science* and the 2020 Special Issue of *Climatic Change*, both focusing on narratives, as well as others).

Narrative communications can offer a number of advantages additional to provision of information. Bruner (1991) has argued that narrative texts are unique in being able to accommodate a range of equally valid interpretations. In other words, members of the audience may take away differing impressions of the same play while still agreeing on the plot.

Considering that the engagement-influencing decisions summarized in Figure 1 will likely generate a range of responses as the audience and the scenarios change, the flexibility within a narrative approach to storying engagement may be beneficial. Recognising this, Bushell et al (2015) have argued for a government-led national narrative to addressing climate change in the UK, which is not comprehensive in its detailing but provides a unifying sense of direction. Narratives also facilitate space to be imaginative and, at times, fictional. This allows individuals to explore ideas they might not be willing to commit to 'in real-life' (Smith et al., 2017). It also means individuals can 'play' with seeing themselves taking on different roles in differing scenarios (Veland et al., 2018), so providing a vehicle for the process of decision making needed for adaptation engagement.

Therefore, as this thesis develops, I will also use the narrative approach to identify engagement approaches beyond provision of information, and to consider how these might be used in narrative based communications.

1.4 Research objectives

This thesis posits that how society talks about adaptation will be an influential factor in shaping an individual's engagement with it. How the public discourse narrates climate change risks and the opportunity to respond through adaptation will influence whether an individual thinks the issue is relevant to them, the extent to which they consider themselves to be responsible and capable of taking meaningful action, and that the outcomes will be beneficial. I employ a practical application of narrative theory to the adaptation public discourse so as to identify the most prominently narrated stories of climate change adaptation and evaluate their effectiveness in providing the good reasons as to why people should be engaged with adaptation.

The research objectives for this thesis are:

1. To identify and analyse how the public discourse is currently narrating climate change adaptation in the UK
2. To evaluate how engaging the current public discourse adaptation narratives are for UK residents and to develop ideas to make them more engaging

1.5 Overview of thesis

I undertook two studies to address each of these research objectives (see Table 2). For the first research objective, which is to identify how the public discourse is narrating climate change adaptation in the UK, I first did a secondary analysis of interviews with non-expert UK residents about their use and understanding of the terms 'climate change impacts' and 'climate change adaptation' (see Chapter 2). As discussed above, individuals are both receivers and contributors to the public discourse so providing useful insight into the wider discourse which they may be interacting with. Further, previous research has argued that terminology can be particularly influential on perceptions and behaviours (Moser, 2014, Moser and Pike, 2015) making this a particularly useful starting point in understanding the adaptation discourse. In the second study addressing this first research objective, I then undertook a narrative analysis of newspaper articles published in UK national and regional newspapers between 2013 and 2017. As mentioned above, and discussed further in Chapter 3, newspapers continue to be a principle source of people's climate change information (Reis and Ballinger, 2020) and a key contributor to the climate change public discourse (Anderson, 1997, Allan, 2002). I undertook two studies drawing on different sectors of the discourse, i.e. conversations with UK residents and UK newspaper coverage, to address this research objective so as to provide as comprehensive view on the UK discourse as was possible within the limitations of the over-all research project. To address the second research objective, which was to evaluate how engaging the current public discourse adaptation narratives are for UK residents and to develop ideas to make them more engaging, I undertook a further two studies. In the third study I ran storytelling workshops in which participants reviewed adaptation stories based on the discourse identified in the earlier studies. They also wrote their own fictional adaptation stories so as to generate additional ideas as to how adaptation could be made more engaging (see Chapter 4). Finally, in the fourth study, the key findings from the workshops were developed into story based communications and tested in an online survey with a national sample (see Chapter 5).

The collected findings to the two research objectives are discussed in Chapter 6. A summary of the two research objectives and four studies, as well as all the research questions and methods is in Table 2.

1.5.1 Mental models

The design of this thesis draws on the mental models approach to increasing a target audience's engagement with a particular topic. A mental models approach is used when it's necessary to understand what an individual or group already knows and thinks about a topic so as to inform how their perception could be brought more in line with expert advice (Morgan et al., 2002). The approach has four principle steps, as detailed in Bruine de Bruin and Bostrom (2013) and summarised in the following. Firstly, researchers review the relevant literature and, where possible, work with experts from the subject field to identify what people need to know to make more informed decisions. Secondly, research is undertaken with the intended audience of the communications to find out what they already know about the topic, i.e. their familiarity with specific concepts, and how they talk about it, such as their use or otherwise of terminology. Thirdly, communications are developed and then finally, they are tested with the target audience. Steps three and four may be repeated until the communications are considered effective.

Here, because the objective is to develop means of engagement rather than specific communications, I will be using an adapted mental models approach that nevertheless broadly follows the four steps. For Step 1, I have not tried to detail exactly how experts think individuals should be adapting, which is a very complex and personal concept, other than to draw on the literature to argue that there are many benefits to individual engagement in adaptation, as summarised in Section 1.2.1 of this Chapter. Studies 1 and 2, which will analyse interviewee discussion and newspaper coverage of adaptation, will combine to address Step 2, i.e. understanding what people already know about the topic. The conversation in Study 2 will provide insight as to how UK residents are already talking about the topic, while the newspaper analysis will provide a view on a still influential source of non-experts climate change knowledge. The third study, the workshops, will develop means of engagement, which will then be tested for their effectiveness in the final study, the survey, so addressing Steps 3 and 4 of mental models.

Table 2 Summary of research objectives and studies undertaken

Research objective 1: To identify and analyse how the public discourse is currently narrating climate change adaptation in the UK	
Study 1	Chapter 2: Investing in a good pair of wellies: How do non-experts interpret the expert terminology of climate change impacts and adaptation?
Research questions P.20	***1a**: How do UK residents interpret the term climate change impacts?* ***1b**: How do UK residents interpret the concept of climate change adaptation?*
Method P.20	*Secondary analysis of semi-structured interviews*
Study 2	Chapter 3: What adaptation stories are UK newspapers telling? A narrative analysis
Research questions P. 41	***2a**: What are the most prominent narratives in UK newspapers about how the UK is, could and should adapt to a changing climate?*
Method P. 41	*Narrative analysis of adaptation coverage from regional and national newspapers*

Research objective 2: To evaluate how engaging the current public discourse adaptation narratives are for UK residents and to develop ideas to make them more engaging	
Study 3	Chapter 4 "Of course we have to look after ourselves!" Using storytelling workshops to explore how to make adaptation more engaging for UK residents
Research questions P. 64	***3a**: Do UK residents find the current adaptation discourse engaging or disengaging, and why?* ***3b**: Are there ways to make the adaptation discourse more engaging for UK residents?*
Method P.64	*Storytelling workshops*
Study 4	Chapter 5 Does altering the temporal proximity of risks, and the responsibility given to individuals increase engagement with adaptation? Findings from a nationally representative survey
Research questions P.88	***4a** To what extent do story based communications affect the participants' temporal perceptions of climate change?* ***4b** To what extent do story based communications affect the participants' agreement with example roles and responsibilities for individuals?*
Method P.89	*Online quantitative survey*

Chapter 2 Investing in a good pair of wellies: How do non-experts interpret the expert terminology of climate change impacts and adaptation?

Abstract

This first study, along with the newspaper analysis reported in the following chapter, responds to the first research objective of this thesis which is to identify and analyse how the public discourse is currently narrating climate change adaptation. Here I aimed to understand how UK residents, who can be both receivers of and contributors to the public discourse, use and interpret the terms 'climate change impacts' and 'climate change adaptation'. I conducted a secondary analysis of 22 interviews with UK residents, who were recruited for their diverse climate change views. The interviewees expressed a lack of clarity around expected climate change impacts, which did not prevent them from saying that they were already experiencing the effects of a changing climate. Further, threats to cultural norms and values were perceived as serious and emotionally charged. Adaptation was often conflated with mitigation, and responsibility for adaptation was contested. The implications of these findings for developing more engaging adaptation narratives are discussed.

A version of this chapter has been published as: Harcourt, R., Bruine de Bruin, W., Dessai, S. and Taylor, A. 2019. Investing in a good pair of wellies: How do non-experts interpret the expert terminology of climate change impacts and adaptation? *Climatic Change* **155**(2), pp. 257-272.

2.1 Introduction

2.1.1 Communicating climate change in the UK

There is increasing scientific evidence that the effects of climate change are already being felt in the UK and that they will escalate over the coming decades (Change, 2017). Climate change adaptation aims to reduce the scale of harm from climate change impacts and maximize any benefits that arise (IPCC, 2014c). As discussed in Section 1.2.1, individuals can take part in adaptation by taking their own adaptive actions to protect themselves, by supporting or

partnering the actions of others, and by taking part in the UK's adaptation decision making, see Figure 1. However, individuals need to be sufficiently engaged to exert resources in this direction over the many other demands of daily life. According to the mental models approach, understanding how UK residents are talking about impacts and adaptation, and what that signifies in terms of how they are conceptualising and acting upon it, is important information for understanding how to make the discourse more engaging (Morgan et al., 2002). So far, public communications have been borrowing climate experts' terminology for 'impacts' and 'adaptation', such as in the title of the National Adaptation Programme (DEFRA, 2018). Perhaps as a result, this specialized language is starting to creep in to the broader public discourse, such as in this newspaper headline: 'EU announces €9bn in funding for climate action… also pledging $300 million towards climate adaptation' (Harvey, 2017). Therefore, a key starting point is understanding how the terms climate change impacts and climate change adaptation are being used and understood (Moser and Pike, 2015).

2.1.2 Non-expert perception of climate change impacts

There is so far limited research on what UK residents know about climate change impacts that are likely to affect the UK (Taylor et al., 2014b). Available studies found that people were more likely to think of impacts, rather than causes or solutions, when asked to describe their associations of climate change or global warming (Lorenzoni et al., 2006, Smith and Joffe, 2013). Associated impacts most frequently centered on extreme and negative weather patterns, particularly precipitation events and flooding (Lorenzoni et al., 2006, Whitmarsh, 2009, Smith and Joffe, 2013). However, UK residents also seemed to be less concerned about having more hot summers than about increases in flooding and rainfall (Taylor et al., 2014a). While UK residents tended to think of impacts to the UK, they also mentioned more distant impacts, such as melting ice (Smith and Joffe, 2013).

However, there is also some uncertainty as to what impacts in the UK will be. In a large 2016 survey, when asked about the most important effect of climate change in the UK, 'don't know' (21%) was the second most frequent answer after expectations of more rain and flooding (27%) (Steentjes et al., 2017). In a similarly large survey of 1,800 interviewees, 69% were unsure of what climate change impacts will be and 40% questioned whether expert warnings of climate change seriousness have been over-emphasized (Poortinga et al., 2011). Scepticism towards impacts was much higher than scepticism towards warming trends or towards

anthropogenic causes (Poortinga et al., 2011). Similarly, UK participants were unconvinced by attribution science, whereby climate experts try to establish to what extent unusual weather events can be attributed to anthropogenic climate change (Capstick and Pidgeon, 2014b). Studies have also found conflation between climate change and other environmental issues in the UK (Taylor et al., 2014b) and this misperception extended to understanding of impacts. For example, UK residents suggested air pollution and ozone depletion as possible outcomes of climate change (Lorenzoni et al., 2006, Smith and Joffe, 2013).

While previous studies have asked participants about their associations of climate change which has led to the discussion of topics such as extreme weather which might be categorized by experts as 'impacts' (e.g. Lorenzoni et al., 2006, Smith and Joffe, 2013), studies have not previously focused on non-expert use and interpretation of the term 'climate change impacts'.

2.1.3 Non-expert understanding of climate change adaptation

The UK has been taking less adaptive action than its available resources and knowledge can facilitate (Tompkins et al., 2010, Ford et al., 2011). UK households also show a relatively low level of climate change adaptation (Porter et al., 2014). Generally, climate change adaptation remains low even among groups that are at risk of experiencing the negative effects of flooding (Whitmarsh, 2008, Bichard and Kazmierczak, 2012) sea level rise (Thomas et al., 2015, Bunyan et al., 2016), drought (Dessai and Sims, 2010), unusually cold winters (Capstick and Pidgeon, 2014a) and heatwaves (Abrahamson et al., 2008). Often people do not perceive the link between the extreme weather event and climate change (Whitmarsh, 2008, Dessai and Sims, 2010, Hopkins and Warburton, 2015). Some studies have suggested that those who have experienced the negative effects of extreme weather still tend to think they are not at high risk of further threats (Bichard and Kazmierczak, 2012, Thomas et al., 2015). Yet, others have shown that personal experience may increase the likelihood of taking actions to improve resilience to future threats (Spence et al., 2011, Demski et al., 2017, Power et al., 2020).

It remains unclear how UK residents who do not perceive much risk of extreme weather use and interpret the concept of adaptation (Adger et al., 2017). UK residents seem to find it difficult to identify effective climate change adaptation actions. For example, they report short-term 'coping' actions such as changing clothes in response to temperature extremes, rather than long-term adaptation, such as investing in home ventilation or insulation (Porter et al., 2014).

Like Australians (van Kasteren, 2014), UK residents may confuse adaptive actions that aim to protect against impacts, with climate mitigation actions that aim to curb global warming.

Additionally, UK residents seem to doubt the efficacy of attempting to respond to climate change risks (Capstick and Pidgeon, 2014b), although other studies found support for preparing for a changing climate despite uncertainty about the risks (Ipsos MORI, 2013, Steentjes et al., 2017). A further study found that disagreement as to whether the government or the individual was responsible for adaptation was one of the most divisive issues between the participants (Cotton and Stevens, 2019) while a study with young people found that they were interested in the opportunities adaptation might bring (Reis and Ballinger, 2020). The limited number of studies available and the contrasting findings argue for the need for more research in this area.

2.1.4 Research questions

The above literature review finds that there are still only a few studies which research non-experts' interpretation of climate change impacts and adaptation in the general population, as opposed to populations at high risk. Yet, if the UK government continues to develop an adaptation strategy for the country which promotes participation by all sectors of society, adaptation practitioners will need to consider how to communicate adaptation so that a more diverse non-expert audience will feel that this is a relevant and important topic to address.

Here, I undertook a secondary analysis of interviews with UK residents with diverse climate change views to explore their use and interpretation of the terms impacts and adaptation. Analysis of the data, therefore, focused on two research questions:

1a. How do UK residents interpret the term climate change impacts?

1b. How do UK residents interpret the concept of climate change adaptation?

2.2 Method

2.2.1 Data source

The secondary data analysed in this research were interviews undertaken as part of the DEFRA-funded PREPARE (Programme of research on preparedness, adaptation and risk) project that

examined UK public attitudes towards climate change impacts and preparations for climate risks (Ipsos MORI, 2013). The researchers included a nationally representative survey and a series of participatory workshops in their programme of work. The semi-structured interviews examined in this chapter were conducted as a follow-up with a subset of survey participants with diverse views on climate change. The purpose of the interviews was to provide a further in-depth exploration of how the participants conceptualized adaptation.

Subsequent secondary analysis of the survey data showed that perceived increases in weather extremes were linked to stronger climate change beliefs (Taylor et al., 2014a) and that public adaptation priorities differed from those of experts (Taylor et al., 2017). Secondary analysis of the participatory workshops found that the participants tended to use morality based arguments to support their opinions about adaptation (Adger et al., 2017). The interview data has not yet been analysed in detail (Ipsos MORI, 2013). The original research project was approved by the University of Leeds ethics committee, reference LTEARS-010, and the interviews used here were approved for subsequent analysis.

2.2.2 Sample

The interviews aimed to explore the use and interpretation of the terms impacts and adaptation by individuals with a diverse set of climate change views. To achieve this diversity, the interviewees were selected based on views expressed in the survey completed earlier in the PREPARE project (Ipsos MORI, 2013, Taylor et al., 2014a). Table 3 lists the survey questions used as indicators of climate change views and the bold text shows the range of responses selected for interview. The initial set of interviews (n = 15) was undertaken in March-April 2013. The second set (n=7) was conducted in June-July 2014 with four repeat and three new interviewees. This sample size should be sufficient to uncover the most common ideas about impacts and adaptation, because the identification of new ideas tends to fall away after the first 10-15 interviews (Morgan et al., 2002). A diverse sample, as used here, also increases the likelihood of capturing a fuller range of ideas even when interviewing a relatively small number of people (Bruine de Bruin and Bostrom, 2013). However, the sampling method was not intended to ensure demographic representativeness of the UK population. Demographic information is available in Appendix A1.

Table 3 indicators used for interviewee selection

The 12 survey questions and answers listed in the table were used to indicate diverse climate change views. The responses shown in bold on the table were included in the final interviewee sample. The numbers in brackets show how all interviewees answered the questions.

Indicators	Responses
Is climate change one of the three most important concerns for the UK?	**Yes (1)** No (16)
How convinced are you that climate change is currently affecting the UK?	**Totally convinced (4)** Fairly convinced (9) Not very convinced (1) Not at all convinced (2) Don't know (1)
Do you think humans have the right to modify the natural environment to suit their needs?	Strongly agree (1) Tend to agree (3) Neither agree or disagree (3) Tend to disagree (4) **Strongly disagree (5)** Don't know (1)
When I hear about climate change I feel:	**Worried (8)** **Sad (5)** **Angry (4)** Indifferent (4) Interested (4) Pessimistic (4) **Scared (3)** Happy (1) Optimistic (1)
During your lifetime, have you seen changes in UK weather?	**Yes, definitely (8)** Yes, probably (7) **Definitely not (1)** Don't know (1)
Have you or someone close to use experienced extreme weather events?	Flooding in the home (3) **Flooding in the local area (5)** Water restrictions or shortages (8) **Heatwaves causing physical discomfort (8)** Heatwaves disrupting travel (3) Heatwaves affecting health (2) **No, none (5)**
During your lifetime, do you think the frequency of flooding has increased?	**A lot more frequently (9)** A little more frequently (6)
Do you expect your home to be at increased risk of flooding by 2050?	**Yes, definitely (2)** Yes, probably (2)

	No, probably not (4) No, definitely not (7) Don't know (2)
Do you have household insurance that covers for flooding and other climate change impacts?	**Definitely (8)** I think so (2) I'm not sure (2) No (5)
How likely do you think it is that heatwaves will be more common in the UK by 2050?	Virtually certain (1) Likely (2) About as likely as not (5) Unlikely (7) Very unlikely (1) **Don't know (1)**
Who do you think is responsible for taking action to deal with the consequences of climate change?	**National government (15)** **Individuals and households (15)** Local authorities (12) Industry and business (11) Local communities (8) Environmental charities (3) Insurance companies (2)
What is the most important principle to consider when deciding how to respond to climate change impacts?	Protecting particularly vulnerable people such as the elderly and poor (9) **Minimizing the overall number of people at risk (4)** Avoiding loss of human life (2) Minimizing cost to business (1) Safeguarding our wildlife/landscape (1)

2.2.3 Interview Protocol

The semi-structured interviews built on the mental models approach which aims to characterize interviewee's knowledge, as well as the language they choose to talk about it (Bruine de Bruin and Bostrom, 2013). Mental models interviews provide useful insight for communications development because they can provide guidance on what topics or sub-topics need to be addressed by communications, as well as insight into the language and terminology currently being used to describe the topic by non-experts (Bruine de Bruin and Bostrom, 2013). This information might not be accessible through surveys which necessarily provide some information to the participant in the wording of the questions, while often providing limited space for the participant to raise their own ideas. Mental models interviews have been gainfully

used in previous research which similarly took an exploratory approach to understanding how certain ideas are conceptualized (Downs et al., 2008, Fizer et al., 2018).

Mental models interviews start with open-ended questions that allow interviewees to explain their views in their own words (Morgan et al., 2002). Here, interviews began by asking questions such as 'Which three climate change impacts are you most worried about?' and 'What three words or phrases come to mind when you think about climate change adaptation?', and then encouraged further exploration. Interviewees were also asked questions about the impacts they found most concerning, how the threat of climate change impacts made them feel, who they considered to be responsible for leading adaptation, and their own engagement with adaptation. The interview protocol is available in Appendix A2.

2.2.4 Data Analysis

I undertook a thematic analysis of the interview transcripts to explore the interviewees use and interpretation of the terms 'climate change impacts' and 'climate change adaptation' as they had been used in conversations about preparing for climate change in the UK. To do this, the interviews were coded for expression of ideas associated with those terms, as well as for interpretations, such as what actions the interviewees suggested as adaptation. Additionally, I coded for how the interviewees used the terms in conversation and the extent to which they found them accessible, or not. The codes were developed inductively in line with the explorative approach to using this data (Thomas, 2006); the most frequently occurring ideas, as indicated by the coding, were then developed into themes. The coding was done using the qualitative analysis software Nvivo.

2.3 How do people living in the UK interpret the term climate change impacts?

2.3.1 Climate impacts in the UK

Interviewees' strongest association with the phrase climate impacts was extreme weather. This included heavy rain and flooding, hotter weather and water shortages, and storms, as well as seasons shifting their time through the year and/or becoming less clearly defined. Interviewees also suggested system-scale impacts including loss of wildlife and/or ecosystems, changes to

the coasts through flooding and/or erosion, and impacts to farming and food production. Economic concerns, including the cost of living, more expensive or lack of access to insurance, and negative economic impacts on certain areas and industries such as the coasts and tourism, were mentioned. While the discussion principally focused on the UK, interviewees also showed awareness of global scale impacts including migration, food and water shortages, and global conflict. Climate change impacts were nearly always considered to be negative.

With the exceptions of one interviewee who reported a flooded garden and one who had bought ceiling fans during a hot spell, none of the interviewees had experienced the effects of extreme weather to their homes. Interviewees had a generally low sense of risk to themselves and their homes: "It's not going to affect me personally… but I see it on the news" (female, 22). Justifications for this assessment included individual factors such as geographic location and/or economic position, as well as a sense that really dangerous levels of climate change impacts were a concern for some time in the future. Interviewees viewed the elderly, the very young, and nature as being more vulnerable than themselves.

More extreme dangers were expected to happen sometime in the future. Extreme weather and seasonal unreliability were expected to accelerate:

> we're going to get worse winters… summers, I think, where they alternate drought and flood, and it will be every year… if it isn't flooding, it's snowing, and if it isn't snowing, we'll be plunging down to minus 20…I personally think we're on a slippery slope, climate-wise, unfortunately (male, 21)

There was an expectation that, at their most extreme, impacts would have catastrophic consequences, although this was not expected to occur until much further in the future: "we're going to end up with just one man and an island in a thousand years from now!" (female, 32). However, the general agreement that things were definitely going to get worse was voiced alongside a perception that the future was largely unknowable: "2050, nobody knows! If anybody says they are just guessing" (male, 60). Even the scientists and experts "won't really know what to expect, because they don't know what's happened. It's never happened before" (female, 70).

2.3.2 Experiencing climate change impacts

Nevertheless, interviewees also identified ways in which they felt that they, and the UK, were already experiencing the impacts of climate change. Increased disruption to daily life caused by more frequent and extreme weather was a reoccurring topic, as in the following:

> the amount of times the M62 is gridlocked or snowed in, or closed, or something, which, once a year you can cope with but when it becomes an almost regular event, then it's something else entirely… it just makes 'day to day' living more difficult (male, 35).

Negatively disruptive impacts covered a wide scale: individual dangers such as walking on icy pavements and driving on potholed roads; small scale inconveniences such as unexpected school closures; larger inconveniences such as failures of infrastructure; localized economic concerns such as the financial impact of flooding on homes, local businesses and local industries such as tourism; and nationally shared concerns such as the rising cost of living driven by fuel and/or food costs.

Closely linked to the idea of more frequent disruptions, interviewees also referred to an increased sense of uncertainty. Again, this was usually related to extreme weather, such as this interviewee talking about heavy snow: "Obviously it doesn't seem to be when it's supposed to be… it always seems to be when you're least expecting it" (female, 22). The uncertainty itself threatened to cause further daily disruption as people were unsure of how to adapt to the unexpected events. The interviewee above continued by saying that she works at the bingo where unexpectedly severe weather can negatively impact visitor numbers as customers can't be sure if they will be able to travel home safely afterwards.

Additionally, interviewees thought that seasonal and annual weather patterns were becoming increasingly uncertain:

> I don't know whether it's just the rose-coloured spectacles when you're looking back, but you kind of knew your seasons, and they were always defined, and it was never extreme in any way, if you know what I mean, whereas now… it seems a bit more unpredictable and you never know quite what's going to happen (male, 35)

As with the short but extreme weather events, this sense of seasonal uncertainty caused further disruption to daily life. One interviewee suggested that it might be harder to plan for the school summer holidays which had previously been more reliably warm and sunny.

The use of ‘rose-colored spectacles’ in the above quote suggests that the changes were being compared unfavourably with the way things were, or were remembered as being. It was an expression also used by others, as in this description of perceived seasonal change, “I remember sort of like proper winters and proper summers. Maybe I’m looking at it through rose-tinted glasses” (female, 54), as well as by a keen gardener referring to a recent lack of visiting wildlife compared to earlier years. The idea that climate change impacts in the UK would mean loss of the way things were was expressed in relation to a number of topics. For example, the interviewees mentioned seasonally-based traditions that previous generations had enjoyed but were now unable to pass on to younger ones:

> the girls having young children, and the weather as it is… I want them to be outside, want them to be playing… I can remember being a child and having weeks and weeks and weeks of nice, not changeable weather, but it seems to be changing all the while now (male, 49)

> we certainly used to get the sledge out most years. My grandson has only used the sledge twice and he is four. It is a bit of a worry there isn’t it (female, 59)

Impacts to Britain’s natural scenery was also described in terms of loss. As with seasonal uncertainty, the interviewees commented both on the physical thing being impacted and the consequential loss this would cause to them or others. For instance, changes to the coastlines were perceived as risking the loss of traditional trips to the seaside. Particularly resonant was the idea of wildlife depletion especially as it was being witnessed in the garden. Five interviewees said they felt that they were already suffering from an unwanted depletion of birds:

> We get less birds these days don’t we? Which is a real shame, and that’s a real big loss, because I like that. I like birdsong and you just don’t seem to get as much of it as you used to (female, 54)

The topic of nature loss raised particularly emotional responses with one interviewee even stating “I hate human beings. I hate them with abundance” (female, 59).

2.3.3 Impacts discussion

In summary, the term ‘climate change impacts’ was understood to be closely associated with more extreme weather; of representing low personal risk to the interviewees; likely to get much more serious in the future; but already causing some disruptions and losses to daily life in the UK. Previous studies also found that UK residents associated climate change impacts with extreme weather (Lorenzoni et al., 2006, Smith and Joffe, 2013). Studies of risk perception of extreme weather have found that people tend to perceive themselves as low risk (Bichard and Kazmierczak, 2012). Similarly, the perception that climate change impacts are likely to get much worse for later generations has been noted in previous public opinion research (Thomas et al., 2015).

However, these findings add two key points. Firstly, despite the lack of clarity on what climate impacts might be and how they themselves might be affected, there was general consensus that the UK is already, and will in the future, experience serious climate change impacts. Despite interviewees’ diverse views on climate change, only one was completely sceptical on this point in their interview. Previous research has found that there is a high level of uncertainty regarding expected impacts as well as significant scepticism towards the supposed seriousness of coming climate change impacts (Poortinga et al., 2011). Here, the lack of certainty did not preclude assessment of climate change impacts as serious and of concern.

Secondly, interviewees perceived themselves as already experiencing climate change impacts other than the immediate effects of extreme weather events. Interviewees mentioned disruptions to their daily routines, shifts in the seasons, and a decline in British wildlife, amongst others. When discussing these ideas the responses were often notably emotional. Some responses mentioned the frustration and uncertainty of greater disruption. Others voiced a sense of nostalgia towards unwanted changes from past times, and even loss. This tended to be expressed in relation to cultural values and traditions, such as weather-dependent traditions. Considering that these interviews were taken in 2013 and 2014, since which the UK has experienced a number of notable weather events including the major flooding of 2015 and the unusually hot summer of 2018 (Met Office, 2020), both of these points might reasonably be expected to be at least as strongly felt now. Indeed, a 2019 survey found that 64% of recipients thought the UK was already feeling the effects of climate change, up from 41% in 2010, and that a growing number of UK residents feel very worried about climate change and consider it a priority for the UK (Steentjes et al., 2020).

It has been previously argued that accounting for values is necessary in identifying the motivations and limits of adaptive capacity within different communities (Adger et al., 2009, O'Brien and Wolf, 2010). There is some evidence that the emotional resonance of values loss is already being utilized in some climate communications. Local newspapers tend to use signifiers of British values, such as changes to the local landscape and the quintessential English garden, as a means of increasing relevance and interest in their global climate change coverage (Brown et al., 2011). Further, there have been arguments for wide dissemination of a constructed narrative based on shared national values so as to motivate unified climate action (Bushell et al., 2015). However, so far, work on understanding what the most resonant national narratives might be and how they might be more deliberately utilized in individual engagement has not been developed. This research provides some preliminary ideas, for example, the emotional resonance of climate change impacts to wildlife and the seasons might be because these issues reflect key cultural touch-points within British culture. Gardening is considered the national UK pastime while televised nature programs such as Spring Watch are regularly amongst the most watched (Lawrence, 2009).

Clearly, further targeted work using a larger sample is required and might likely reveal a segmentation of values which could inform the development of a range of communications. The limitations of a one-size-fits-all approach to communications which doesn't sufficiently speak to people's real-life experiences and concerns have been well documented (Bostrom et al., 2013, Whitmarsh and Corner, 2017). Additionally, while there is some evidence that framing climate change messages in terms of loss makes the information more memorable (Spence and Pidgeon, 2010), overly negative messaging can be demotivating (O'Neill and Nicholson-Cole, 2009). Any communications developed on the premise of promoting adaptation as a means to prevent loss of what we value would first need to be tested. But the importance attached to certain elements of British culture identified here offers a good starting point.

2.4 How do people living in the UK interpret the term climate change adaptation?

2.4.1 Conflation with mitigation

Interviewees associated the phrase ‘climate change adaptation’ with ideas such as preparing, readying, and making changes. There was an assumption that the risks from climate change and its impacts made responding in some way inevitable: “the way I see it is that we’re going to have to adapt in terms of the weather’s going to get a lot worse” (female, 22). However, the range of ideas raised as to how this might be done signalled a more general understanding of the term ‘adaptation’. Some actions, such as building flood defences or insulating the home, mostly aligned with the expert definition of adaptation as making adjustments to reduce harm from actual or expected climate. However, interviewees also discussed actions such as driving less, reducing domestic energy use, and recycling more, actions which would be categorized by experts as climate change mitigation and sustainability. Interviewees talked about making lifestyle changes, such as being less materialistic, and attitude changes, such as being more aware of environmental impacts. There was also some mention of coping actions (planning for road closures) and of hazard avoidance (moving away from flood risk areas).

2.4.2 Responsibility for adaptation

Interviewees principally saw instigating adaptation as the responsibility of the government. Reasons for this were the need for leadership, education and information, although challenges such as increased taxes, short election cycles and public unwillingness towards a more controlling state were also raised. Other organized groups that were suggested to lead were charities, private businesses, and international governance bodies such as the United Nations. In all instances, reasons were provided as to why each group might fail to effectively tackle the challenge: it is too much for charities; private businesses are driven by financial interest; and international governance has too many parties and other issues to convene.

Individuals were also identified as having a role to play, although this was nearly always caveated with concerns. For example, individual action was thought to be unlikely due to lack of information or direction:

> We all get told about how we can cut our carbon footprint and all the rest of that malarkey which as you say, just hopefully will stop it getting worse, but there's not really been anything about, well, this is what you need to do. I presume if you live in Cornwall, you get a free supply of sandbags so they can adapt that way! (male, 35)

When asked to consider what they would do in a weather emergency, interviewees described the perceived lack of knowledge as a worrying concern and a barrier to action:

> What me personally? ... I don't really know. A lot of the places where all the flooding happened I have no idea what those poor people are going to do… That would be a big worry (female, 62)

> Wear warmer jackets!.. I don't know what you would do about that but insulate your house properly. If you live in a flood plain I'm not quite sure what you do... You just have to make the best of it (female, 54)

Additionally, the likelihood of individual action being taken was caveated by a suggested lack of willingness of others to do their bit and/or concerns of limited individual impact. Despite this, the interviewees emphasized that they would be willing to undertake adaptive actions. It was not uncommon for concerns about individual capacity to act and personal willingness to be combined, as in the below:

> Interviewee: I'd like to be able to do something about it but I don't know what and I don't know how. It does make me worry, as I think, well, I try and do my bit. What are next door doing?
>
> Interviewer: So, you're ready, able and willing, as it were, but you need direction in what to do?
>
> Interviewee: Yes. (female, 32)

Nearly all interviewees suggested ways they currently were or would in the future take actions to adapt to climate change. As with the general discussion of adaptation, interviewees most frequently mentioned recycling and reduced use of fossil fuels in the home and the car. Interviewees use of the term 'adaptation' suggested it was not necessarily understood as a strategy which could reduce their own risk from weather and climate related harms. Instead, the term was often interpreted more broadly as a way to categorize all actions that respond to

the challenge of climate change. For instance, one interviewee first suggested that he could adapt to climate change by recycling more. When asked if there's anything he could do to adapt to flooding or sea level rise he at first hesitated, saying he didn't think there was a simple solution and that he didn't really know of anything individuals could do. When asked what he would do he replied: "How I use power. Trying to make sure that your home's insulated. Use the energy saving light bulbs, try and make sure your heating's efficient, things like that" (male, 49). The interviewee went on to explain his response by saying that he can only manage how his home is run but he can't control how the country is run. Whereas expert literature tends to categorize climate change action in terms of adaptation and mitigation, here the interviewee's choice of actions seemed to be more influenced by his perception of the divide between individual and government responsibility.

One interviewee was asked if there was anything that they could or should do to adapt to climate change and they replied "Investing in a good pair of wellies!" (female, 22). She then laughed and said she was struggling to think, before suggesting recycling and driving less. The interviewer then asked her about extreme weather and whether there was anything she could do other than buy wellies and she replied: "Oh gosh, I can't think of anything. I would only think in terms of keeping warm and things like that, and safe". This quote exemplifies the willingness to engage with responding to climate change which many of the interviewees expressed. However, it also exemplifies the perceived lack of knowledge frequently raised during the discussions, as well as the tendency to understand the phrase 'adapting to climate change' in more general terms to include mitigation responses. When asked specifically about extreme weather the interviewee knows she wants to stay safe but says she can't think of how she could do that. This suggests that not only the terminology but also the concept that it is possible to take adaptive actions to reduce personal risks from climate related impacts is not yet well known.

2.4.3 Adaptation discussion

To summarise, when asked about adaptation the interviewees suggested a range of ideas and there was a general willingness to make changes in response to climate change. However, when interviewees were pushed on responding to the idea of adapting to extreme weather and other climate impacts responses were much more hesitant and unsure. Specifically, understanding of adaptation as taking preparatory actions so as to reduce harm should climate related events

occur was low. Interviewees generally struggled to think of adaptive actions that they or others could undertake in response to specific risks such as flooding.

These findings raise two important learnings for communicators. Firstly, the term 'adaptation' seems to evoke interpretations that differ from those used by experts. As with earlier research done in other countries (e.g. van Kasteren, 2014), this UK sample frequently conflated adaptation with mitigation. Adaptation is a term in general use and therefore it is understandable that people might transpose their current usage of the word on to this specialist field. For instance, recycling more and driving less were suggested as ways of adapting to climate change. This is a fair response to the question while at the same time focusing on actions which experts would not define as adaptive, and that would not necessarily help someone prepare for climate related impacts. So far, publicly available government messaging is replicating the expert terminology, such as in the UK's National Adaptation Programme. These findings suggest that this terminology assumes a specific definition that is not necessarily shared by the targeted audience.

Secondly, the appropriate location of responsibility for adaptation was a contested question. Interviewees tended to think that individuals were at least partially responsible for adapting. Further, interviewees said that they were themselves currently taking adaptive actions or would be willing to in the future. However, despite this general sense of willingness, both the appropriateness and feasibility of individual responsibility was questioned. Additionally, the issue of not knowing what to do was raised as a significant barrier to taking action. This was particularly the case when the questions focused in on how to respond to extreme weather events, as opposed to how to adapt to climate change. One of the key findings coming through from adaptation research in developed nations so far is the extent to which adaptation taking place is much less than would be possible based on available knowledge and resources (Ford et al., 2011). This is the case even in households which have previously been impacted (Porter et al., 2014) or are at higher risk of imminent negative impacts (Bichard and Kazmierczak, 2012). The reasons for this can be multiple and complex and not entirely dependent on whether the individuals have sufficient information or not (Toole et al., 2016, Bichard and Kazmierczak, 2012). For example, perception of individual adaptive capacity, i.e. that possible adaptive actions are considered to be doable and affordable, can act as a barrier or motivator (Grothmann and Patt, 2005, van Valkengoed and Steg, 2019). The potential gap between intentions

expressed during an interview and actions taken in real life also needs to be noted in relation to these findings. However, these findings suggest that there remains a preliminary information deficit about actions which individuals can take to manage climate change risks.

Since these interviews were conducted in 2013 and 2014, there has been increased attention directed towards adaptation efforts in the UK, additional to on-going mitigation efforts. For example, the national government published the second National Adaptation Programme (DEFRA, 2018) and the Adaptation Communication in advance of the 26th Conference of the Parties (UK Government., 2020). This might suggest that in the intervening years UK residents have become more familiar with the adaptation terminology, as well as how individuals and households can contribute. However, a 2015 study found that the appropriate location of adaptation responsibility remained a key point of contention within public perception of the topic (Cotton and Stevens, 2019). Chapters 4 and 5 of this thesis, which draw on data collected in 2019 and 2020, will also reflect on these topics finding, in brief, that UK residents continue to conflate adaptive and mitigative actions, and that the appropriateness and feasibility of individual responsibility continues to be questioned.

2.5 Conclusion

As a changing climate brings more and wider reaching impacts to the UK there is a need to increase public engagement in developing a 'climate-ready society'. Effective adaptation narratives will need to address a complex and potentially worrying subject while being informative and engaging for those most at risk, as well as those providing support for local and national adaptation planning. Here, I have reported on the findings from a secondary analysis of interviews undertaken with UK residents holding diverse climate change views, to capture their understanding of the terms 'climate change impacts' and 'climate change adaptation'. The principle findings are that expected climate change impacts cover a large range and scale but are nevertheless seen as already happening and likely to increase over the coming decades. This is perceived as concerning, with impacts to cultural values and traditions being particularly emotionally charged. The term adaptation, as it's used by climate change experts, is not a familiar concept and is often conflated with mitigation. Perceived location of responsibility for adaptation is also unclear.

These findings raise both warnings and potential benefits for communicators intending to contribute to the adaptation discourse. The use of expert terminology risks reducing the accuracy and saliency of the messaging. Communicators may need to either choose other language from outside of the expert dialog or more actively communicate what the expert terms mean as a preliminary to further information/engagement messaging. However, these findings also suggest that there are some shared cultural values which might provide a way of increasing the perceived relevance and seriousness of impacts and adaptation, particularly useful when targeting an audience with mixed climate change views and diverse levels of personal risk.

2.5.1 Limitations and future research

Undertaking inductive secondary analysis of existing data will unavoidably mean that the areas identified as of interest will differ from the original intentions of the research (Adger et al., 2017). The focus on the interpretation of expert terminology is well informed by the existing data but would have further benefited from targeted interview topics and questions. For example, it would have been insightful to learn if the interviewees took adaptive actions which they didn't necessarily recognize as such and so didn't talk about in these interviews. The interviews provided rich, in-depth detail and relevant insight regarding the governance of adaptation in the UK. However, the sample was selected based on diverse climate change views rather than demographic representativeness, so the findings of this study should be generalised with caution. A larger, cross-national survey could provide insight into the prevalence of specific interpretations and associations with willingness to act (Bruine de Bruin and Bostrom, 2013). In Chapter 5, a national survey will be undertaken principally to test specific climate communications, but also providing additional insight in to UK resident's understanding of impacts and adaptation.

While this study has provided useful insight into how non-expert UK residents are interacting with the adaptation discourse so far, a more systematic review of the discourse is needed to further understanding of how the topic is being narrated. In the following chapter, I will undertake a narrative analysis of UK newspaper coverage of adaptation so that the findings can be added to this study to provide a more holistic view of the discourse.

Chapter 3 What adaptation stories are UK newspapers telling? A narrative analysis

Abstract

This study, additional to the previous one, addresses the first research objective of this thesis which is to identify and analyse how the public discourse is currently narrating climate change adaptation. The previous chapter analysed how UK residents use and interpret the terms climate change impacts and adaptation, so providing insight into one area contributing to the public discourse. This study provides a second approach by undertaking the first analysis of UK newspaper adaptation coverage. Analysing 282 articles published between 2013 and 2017 in regional and national newspapers, I identified five prominent adaptation narratives: 1) the government should build more flood defences, 2) home owners should buy flood insurance, 3) individuals should become more informed, 4) the farming industry should innovate, 5) and the natural environment should fight for its survival. The analysis found that only some of the more immediate climate change impacts likely to affect the UK are presented as necessitating a response. The government is considered primarily responsible while UK residents are given few and narrow responsibilities. The range of adaptive actions under consideration is limited and unchallenging to the status quo. In summary, newspaper coverage presents a restricted view as to when the UK should adapt and how it could adapt.

A version of this chapter has been published as: Harcourt, R., Bruine de Bruin, W., Dessai, S. and Taylor, A. 2020. What adaptation stories are UK newspapers telling? A narrative analysis. *Environmental Communication.* **In press.**

It was featured as a Research Highlight in the August 2020 edition of *Nature Climate Change* (Richler, 2020).

3.1 Introduction

3.1.1 Adaptation choices

The IPCC definition of 'adaptation' refers to actions that reduce the harm caused by impacts and take advantage of any opportunities that arise (IPCC, 2014c). However, as outlined in

Section 1.1.2, this is a broad definition and adaptation research has started to consider issues of what, who, when and intended outcome. A review of adaptation in several UK industries, for instance, grouped the actions into categories so as to better understand where progress was being made (Tompkins et al., 2010). In terms of who should adapt, some have argued that adequately responding to climate change threats should incorporate as many stakeholders as possible (Fazey et al., 2016). The UK government promotes multi-stakeholder engagement in its National Adaptation Programme (DEFRA, 2018), although a recent review found that in practice public bodies still dominate government-initiated adaptation (Lorenz et al., 2019). UK residents have differing opinions as to whether adaptation is the responsibility of the government or society at large, and there is some evidence that this uncertainty is a barrier to adapting (Bichard and Kazmierczak, 2012, Cotton and Stevens, 2019). Adaptation choices can also be categorised as anticipatory or reactionary (Ford and King, 2015) and as offering short-term relief or long-term preparation (Moser and Ekstrom, 2010). Additionally, there might be different intended outcomes of adaptation. Pelling et al (2015) identify three broad types of adaptation which they summarise as resistant, incremental and transformative which are defined by varying levels of disruption to socio-economic norms. Insurance to protect existing financial interests, for example, would be classed as resistant, while the development of new social contracts of power would count as transformational adaptation (Pelling et al., 2015). Adaptation is also context specific and the decision to adapt or not will differ by time and place (Adger, 2016). For instance, one determining factor might be the extent to which the proposed adaptation strategy is perceived as aligned with social values (Adger et al., 2009, O'Brien and Wolf, 2010). Therefore, choosing to adapt necessitates a series of decisions based on what and who should adapt, when, and for what intended outcome, as well as consideration of how these factors interact with the time and place in which adaptation is being considered. Decision and policy makers need to be aware of these choices if they are to develop adaptation strategies which are generally accepted by the necessary stakeholders and thus successfully implemented (e.g. Adger et al., 2013b).

3.1.2 Narrative theory

Narrative theory offers a means of illuminating and exploring these choices. As outlined in Chapter 1, narrative theory argues that societies use storytelling to debate, evaluate and make decisions about how they should respond to difficult and complex social issues (Fisher, 1984).

The process of storytelling provides a safe space in which to try out possible outcomes, and their ramifications, ahead of time (Smith et al., 2017). As such, it can be used to push the boundaries of the debate and to explore a wider range of options before decisions are made (Veland et al., 2018). However, eventually a narrative emerges as seeming the most probable and the most truthful to how society views itself (Fisher, 1984). In time and through reiteration, this way of framing the topic comes to be seen as the social norm and the preferable way forward on the issue (Bruner, 1991).

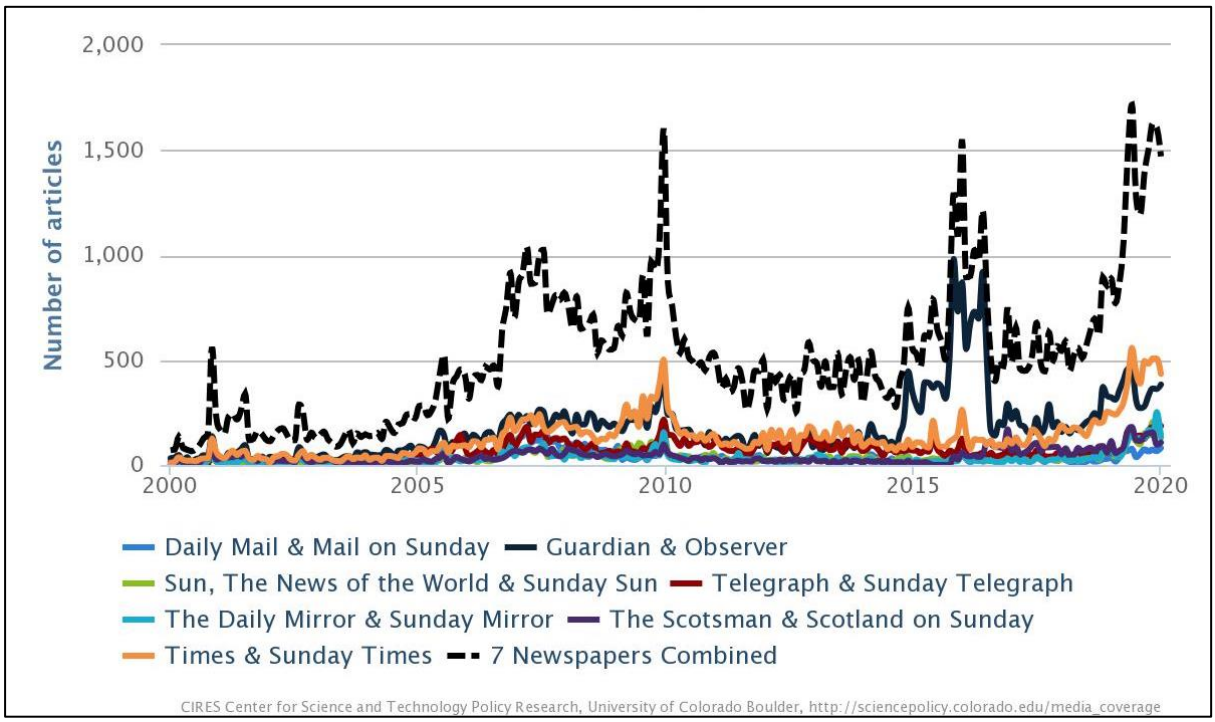
How to best adapt to climate impacts is a relatively new topic within the climate change conversation (Pielke et al., 2007, Cotton and Stevens, 2019). Here, I will use narrative theory to analyse the range of narratives currently being told by UK newspapers. Specifically, I will use the archetypal narrative of problem resolution in which the narrative arc is formed by the initial identification of a problem, followed by a description of individuals or groups responding in some way, and a resolution at the end (Ryan, 2007). This type of narrative model is particularly relevant to the study of adaptation which, at its most basic, is the identification of climate related impacts causing disruption to people or systems, followed by someone taking a response in an attempt to resolve or at least minimise the effects (Paschen and Ison, 2014). Using this analytical approach will facilitate examination of the newspaper coverage to understand how it's interacting with the adaptation choices of what, who, when and intended outcome outlined in Section 3.1.1.

3.1.3 Climate change and adaptation in UK newspapers

In the UK, newspapers continue to be a main source of climate change information for many people (Reis and Ballinger, 2020, O'Neill et al., 2015, Barkemeyer et al., 2016). Newspapers are not an objective reiteration of all available topics and facts. Instead, newspapers first select which topics to include and then point the reader's attention towards specific elements of the story and not others (Entman, 1993). This framing process can influence the public's awareness and perception of social issues (Kasperson et al., 1988). Indeed, people's perceptions of risks are correlated with how often they are mentioned in newspapers (Combs and Slovic, 1979). Additionally, newspaper discourse is perceived as influential in setting the political agenda (Escobar and Demeritt, 2014, Devitt and O'Neill, 2017). Newspaper coverage therefore continues to be a prominent and influential part of the public discourse and will influence society's decisions to adapt or not and if so how (Ford and King, 2015).

Figure 2 shows the volume of coverage about 'climate change' or 'global warming' in UK national newspapers over the last 20 years (Boykoff et al., 2019). Peaks in coverage reflect real-world events, with the 2009 spike driven by COP15 and the 'Climategate' email scandal (Boykoff and Yulsman, 2013), and the late 2015 peak likely driven by the signing of the Paris Agreement and major UK flooding. Key themes emerging from discourse analyses are that climate change coverage can often be alarmist in tone (Ereaut and Segnit, 2006, Hulme, 2007, Boykoff, 2008) despite risks and impacts often being presented as abstract and distanced (O'Neill, 2013). Political figures and messages have a prominent presence (Carvalho, 2005, O'Neill, 2013), while scientific discourse has become increasingly politicised (Carvalho, 2007).

Figure 2 2000-2019 United Kingdom newspaper coverage of climate change or global warming (Boykoff et al, 2019)



One real-world event that attracts newspaper coverage is the publication of IPCC reports, with coverage tending to be more pessimistic and employ more dramatic and emotive language than the source material (Barkemeyer et al., 2016). Media coverage of the most recent IPCC impacts and adaptation report was dominated by disaster framing (O'Neill et al., 2015). Similarly, images accompanying coverage of the IPCC's special report on extreme weather

most often expressed negative emotions such as fear and guilt, as well as passive responses such as helplessness and vulnerability (Nerlich and Jaspal, 2014).

In terms of adaptation coverage specifically, one North American study has examined whether newspapers present adaptation as anticipatory or reactive; something that should happen or is already happening; and whether the coverage focused more on 'hard' approaches, such as built infrastructure, or 'soft' approaches, such as changes in policy or behaviours (Ford and King, 2015). The intention in selecting these categories was to better understand what the coverage might contribute to people's understanding of 'good adaptation' (Ford and King, 2015, p.139). They found that coverage was most often anticipatory until the later years of the period studied when there was greater reaction to extreme weather events; that there were more arguments for adaptation than there were descriptions of adaptation actions happening; and greater coverage of hard approaches.

Despite a lack of research on the UK adaptation discourse per se, there are existing studies of UK flooding coverage. They find that while flood events are increasingly being linked to climate change, it is not yet a principle frame with coverage instead focusing on reporting the events as they unfold and the human interest of the story (Gavin et al., 2011, Escobar and Demeritt, 2014, Cologna et al., 2017, Valencio and Valencio, 2018). Homeowners are increasingly presented as responsible for safeguarding their own home, with financial protection provided by the private insurance industry (Escobar and Demeritt, 2014). There is also growing discussion of the policy response, particularly in regards to flood defences and flood management, but also in regards to acting as part of the global community to mitigate climate change (Escobar and Demeritt, 2014).

3.1.4 Adaptation newspaper narratives

The UK government has a number of legally mandated requirements regarding adaptation. The 2008 Climate Change Act requires the national government to publish regular climate change risk assessments, so far issued in 2012 and 2017; to develop national adaptation programmes published in 2013 and 2018; and to undertake independent progress reviews undertaken by the Committee on Climate Change. Consequently, the UK is regarded as having some of the world's most developed adaptation policies (Massey and Huitema, 2013, Lesnikowski et al., 2015). UK newspapers might therefore present a well-developed and insightful discussion of the adaptation choices being made in the UK. They could, additionally, provide a useful case

study for other countries as they develop their own adaptation programmes and accompanying public discourse.

3.1.5 Research questions

This study forms part of step 2 of the mental models approach which aims to understand what people already know about a topic and how they make decisions (Bruine de Bruin and Bostrom, 2013). This is often undertaken with a sample of the target population, as in Chapter 2. However, as newspapers continue to have significant influence on the climate change topic, understanding the newspaper coverage also contributes to understanding what people likely know and think about the topic. This study will analyse UK newspapers to address the following research question:

> 2a. What are the most prominent narratives in UK newspapers about how the UK is, could and should adapt to a changing climate?

3.2 Methods

3.2.1 Publications and time period

I searched UK national and regional newspapers (see Table 4 for full list). National newspapers included broadsheets which are considered influential on the political agenda (Escobar and Demeritt, 2014), as well as tabloids which generally have higher print circulation (Statista, 2018). I also included the 5 most circulated English regional newspapers (Mayhew, 2017)[1] because climate change coverage in the UK can vary between the regional and national press (Brown et al., 2011, Howarth and Anderson, 2019).

As I wanted to provide the most up-to-date analysis, I looked at the last 5 years of coverage working backwards from 2017 which was the most recent complete year when the analysis was started. Searching for articles from every other year within that period, i.e. 2013, 2015 and 2017, was done to help manage data volume. Such an approach inevitably means that events in non-selected years might be missed. Nevertheless, the three years selected provided

[1] The *London Evening Standard* is not listed as a regional newspaper by Mayhew. However, it has a circulation of approx. 850,000 making it the most highly circulated regional newspaper in the UK so I included it.

a good range of weather events, as 2013 experienced an unusually long, hard winter, a hot summer and winter flooding; 2015 had major flooding; and 2017 had no major weather events (Met Office, 2020).

3.2.2 Criteria for inclusion

To search for relevant articles published in the selected UK newspapers (Table 4) between 2013-2017, I used the Nexis (2018) online newspaper database. I combined search terms referring to climate change and weather events (such as climate, weather, flood, heat, drought) with words referring to making changes (such as adapt, manage, prepare, change, plan for). The full list of search terms are available in Appendix B1. The original search returned nearly 18,000 articles. These were reviewed for adherence to four criteria: (1) relevance to the UK; (2) mention of climate change, global warming, or disruptive events such as flooding or heatwaves; (3) inclusion of at least one individual or group that was or could act in response to those events; and (4) inclusion of at least one action that was or could be taken in response to the events.

Due to extensive coverage of the December 2015 flooding a 25% sample (28 of 109 articles) was randomly selected from the relevant articles, stratified by adaptive response and publication. The final dataset was 282 articles.

3.2.3 Overview of the collected data

Of the 282 articles, 68% came from national newspapers and 32% from local newspapers. *The Guardian* contributed the most articles (39%), followed by the *Yorkshire Post* (20%), *The Times* (11%) and the *Eastern Daily Press* (9%).

Table 4 Number of selected articles by publication, category and year[2]

Publication	Category	2013	2015	2017	Total	Percentage
The Guardian	National Broadsheet	39	51	21	111	39
Yorkshire Post	Regional	22	16	18	56	20
The Times	National Broadsheet	11	11	9	31	11
Eastern Daily Press	Regional	11	8	6	25	9
The Observer	National Broadsheet	5	2	5	12	4
Daily Mail	National Tabloid	1	8	1	10	4
Daily Mirror	National Tabloid	3	3	2	8	3
The Sunday Times	National Broadsheet	6	1	0	7	2
Leicester Mercury	Regional	3	0	1	4	1
Mail on Sunday	National Tabloid	2	1	1	4	1
The Sun	National Tabloid	2	2	0	4	1
London Evening Standard	Regional	1	0	2	3	1
Manchester Evening News	Regional	1	1	0	2	1
Metro	National Tabloid	2	0	0	2	1
The Sun on Sunday	National Tabloid	0	2	0	2	1
Liverpool Echo	Regional	0	0	1	1	< 1
Total		109	106	67	282	

3.2.4 Coding and Analysis

3.2.4.1 Coding

Using pre-defined narrative components to determine the coding structure has precedence in the Narrative Policy Framework (Shanahan et al., 2018), which has been applied to climate change related texts (Fløttum and Gjerstad, 2017, Lazarevic and Valve, 2017). The coding categories used here were based on the required elements of the problem resolution narrative as applied to the topic of adaptation: the impacts or disruptive events which initiate the story; the individuals or groups who respond; and the actions they take to resolve the situation (see Table 1). I didn't code systematically for resolutions, despite this being part of the narrative

[2] *Express & Star*, serving the Birmingham area, was not available on Nexis so the 6th highest was included instead and the *Yorkshire Post* was also included due to its relevance to the 2015 flooding.

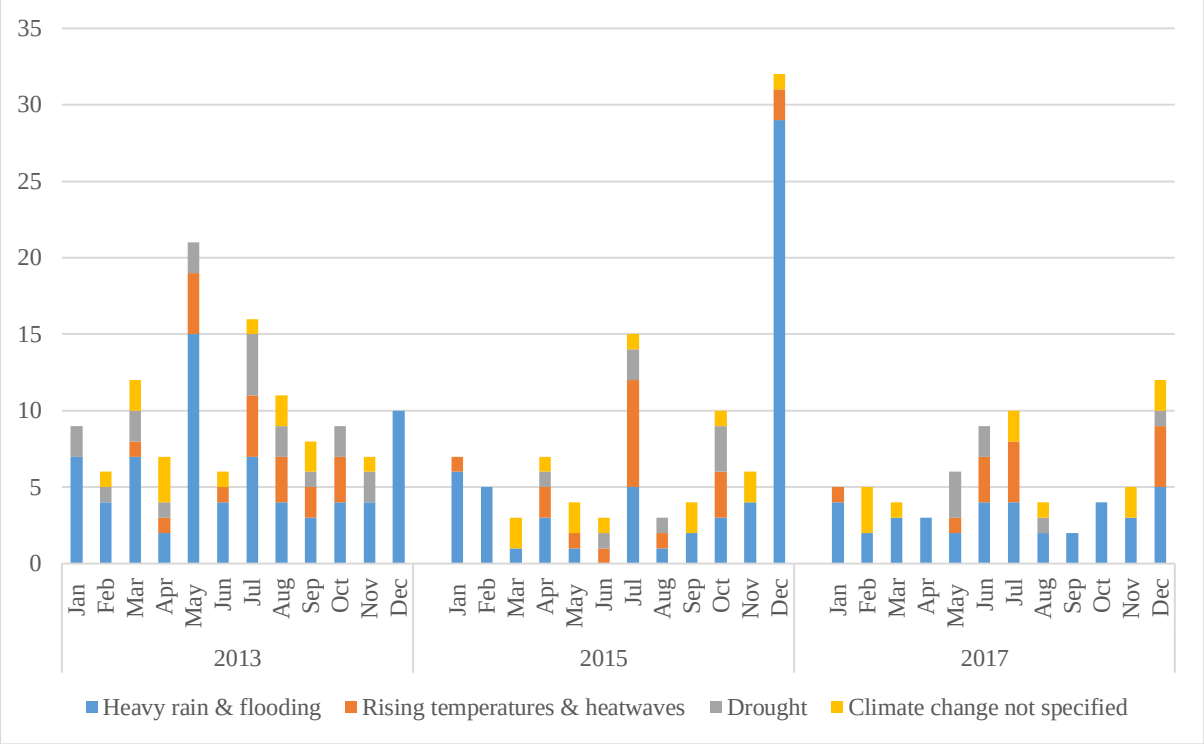
model, as an initial reading of the articles had indicated that most articles were not written as complete narratives and didn't include a defined resolution. Within each coding category inductively developed sets of sub-codes were determined by the content of the articles. An article could receive multiple codes if, for example, it covered flooding and heatwaves. Table 5 lists all the sub-codes that were applied to 10% or more of the articles; the full list of codes is in Appendix B2. The coding was done in Nvivo11.

Table 5 Sub-codes appearing in 10% or more of the articles

Higher level codes	No.	Sub-codes	No. of articles coded
Impacts	1	Heavy rain and flooding	169
	2	Rising temperatures and heatwaves	50
	3	Climate change (impacts not specified)	37
	4	Drought	34
Active Agents	1	National government	119
	2	Individuals	35
	3	Local government and authorities	34
	4	Scientists, experts, technology	29
Adaptive Actions	1	Built flood defences	66
	2	Alternative types of flood management	37
	3	Nature taking action	36
	4	Flood insurance	34
	5	Reviews, reports, consultations	30
	6	Changes to food production	28

Figure 3 shows coverage over time for the four Impacts mentioned in 10% or more of the articles. 'Heavy rain and flooding' articles appeared in all months bar June 2015, and coverage spiked in May 2013 during negotiations between the national government and the insurance industry, and in December 2013 and 2015 when there was flooding in the UK. The UK Met Office recorded unusually warm weather in July 2013, July 2015 and June 2017 which is reflected in increased coverage of 'Rising temperatures and heatwaves' (Met Office, 2020). There were no major extreme weather events in 2017 which may explain why this year had fewer articles overall (67 compared to 109 in 2013 and 106 in 2015). Thus, as in previous studies, coverage appears to be driven by real-world events (Boykoff and Yulsman, 2013).

Figure 3 Number of articles per month for most frequently covered impacts



3.2.4.2 Analysis

Rather than focusing on individual articles, narrative analysis aims to read across texts to 'weave together' storylines and their sub-plots from the topics mentioned (Bergman, 2017, p. 189, see also Hampton, 2004). Narrative analysis prioritises identifying how texts act as social meaning makers rather than as simple conveyers of facts and, therefore, focuses not just on content but also the tone and emphasis of the storytelling (Paschen and Ison, 2014).

Once all articles had been coded and the prominent topics had been identified I then read across the articles more closely to identify the adaptation stories being told about those topics. To do this, I started by looking at which 'Impacts' were most frequently coded (see Table 5 and Figure 3), i.e. what most often initiated the adaptation coverage. I then looked for clustered coding in the 'Active Agents' and 'Adaptive Actions' groups for each of the high frequency impacts, so as to understand the common ideas emerging as to who should respond and how in response to, for example, flooding or heatwaves. At times multiple sub-codes were attached to each impact, for example, articles might identify government, homeowners, or government and homeowners as having roles to play in response to flooding. The narratives detailed below

intended to incorporate as much of the detail from across the coverage studied as possible while also identifying the most prominent arc of each of the 'problem resolution' narratives.

3.3 Results

This section describes the five problem resolution adaptation narratives I identified as most prominent in the dataset of newspaper articles. The description of each narrative will outline the initiating events, and who responds and how (i.e. the beginning and middle of each story). A summary is provided in Table 6. As mentioned above, the narratives do not include definitive resolutions as climate change adaptation is a developing story with as yet unknown endings. However, the narratives do suggest intended or preferred outcomes which will be discussed in Section 3.4. In the following text the numbers in brackets refer to supporting quotes taken from newspaper articles (see Appendix B3).

Table 6 Summary of the five narratives and the principle elements of each story

Narrative Name	Initiating Event	Principle Active Agents	Principle Adaptive Actions
A. Defences against flooding	Flooding	National government	Built flood defences
B. Insuring the home		Individuals, aided by national government and insurance industry	Buying home insurance; making affordable insurance available
C. More informed decision making	Flooding; hotter weather; health risks	Individuals, aided by information providers	Using information to become more informed; making more informed decisions
D. Innovation in food and farming	All types of extreme weather; seasonal change; climate change	Farmers, aided by science and technology experts.	New crops; new technologies
E. Winners and losers in the natural environment	All types of extreme weather; seasonal change; climate change; plus other stressors	Nature, aided by Non-Governmental Organisations and concerned individuals	Fighting to survive, supportive actions

3.3.1 Narrative A: Defences against flooding

The collected articles were dominated by coverage of flooding. Flooding was described as happening with unprecedented frequency and severity (1-3) thus bringing unprecedented disruption to the UK. The coverage emphasised the growing risk to "hundreds of thousands of

homeowners" (4) and local communities (5-7), and the "revolting, traumatising and economically ruinous experience" (8) of being flooded (9-10). Newspapers made it clear that this was an issue that needed to be addressed comprehensively and urgently (11).

The single most discussed adaptation action throughout the coverage studied was more and bigger flood barriers (12-13). According to newspapers, the relationship between flood defences and reduced risk to homeowners was clear and quantifiable. Reports stated that new schemes announced in February 2013 would protect 64,000 homes (5, 12); while other recently built defences would protect 800,000 on the East Coast (14); 16,000 in Nottingham (15); 7,800 in Carlisle (16) and 8,000 in Hull (17). Conversely, during real-world flood events stories about those suffering were accompanied by criticisms of insufficient defences such as the "repeatedly postponed" defences for the currently "submerged" town of Kendal (18, see also 19). Building flood defences was described as the responsibility of the government (20), in part because flood defences are large infrastructure investments that only the government has the means to deliver (21). There was also an assumption that the government was responsible for building flood defences so as to "make adequate provisions to protect its own people" from natural hazards (22) and to prepare for "the biggest threat the UK faces from climate change" (23, see also 24-25). However, newspapers strongly criticised the UK government for the "simple, shameful fact" (26) that it was not making enough money available and had even "slashed" the flood defence budget (27, see also 28-29). The broader government policy of austerity was also criticised for its role in limiting the UK's preparedness for flooding (30). The opposition party made disparaging comparisons with their own record on flood defences (23, 31), while certain members of government were singled out for criticism, including the Prime Minister (10, 32) and the Environment Secretary (33). The relationship between government inaction and flooded homes was made explicit, as in the headline "Tory cuts leave towns to drown" (29, see also 10, 34).

Other ways to manage flood risk were also discussed, in part due to the perceived limitations of flood defences (35). These included the widening and improved management of water ways (36-37), better land drainage (38), more land turned to flood plains (39), and planting more trees (40-41), as well as building residential areas designed to flood (42) and large-scale reintroduction of the beaver to the UK's waterways so as to create more natural dams (43). Nevertheless, the narrative for built flood defences remained dominant, particularly

during moments of high pressure. When covering the December 2015 floods, newspapers engaged in an extensive and often emotional discussion of the "heartbreaking" events (44) and how the UK could better manage flood risk, including revising "idiotic fiscal policy decisions" (45) and no longer "disregarding climate change" (46, see also 47). There were some attempts to move the conversation beyond built flood defences, particularly by *The Guardian* which called for a more holistic approach and "a leap of the imagination, not just a bit more money" (48). However, the more pervasive mood was summed up by the *Daily Mail* in its headline "Britain Needs Bigger Barriers" (13).

3.3.2 Narrative B: Insuring the home

Narrative B also responded only to the flood threat to people's homes and similarly emphasised the serious and negative impacts of the growing risk (7, 49), particularly focusing on the "millions of pounds worth of damage" homeowners could face (50, see also 51-52). In this narrative, however, the responsibility was with homeowners to manage their own exposure by buying home insurance (53-54). That homeowners could and should do this was emphasised: articles provided advice on how people could secure the best insurance for them (53, 55) and how to contact their insurance company after being flooded (54). Home insurance was championed as providing a financial safety net to homeowners should they be flooded (56). Further, because home insurance is a requirement of a mortgage agreement (57), the insurance narrative also mentioned the benefit of preventing a growing percentage of UK properties from becoming "uninsurable, unmortgageable and unsellable" (52) as this would negatively affect the personal financial assets of those affected (58-59), and the total value of the UK property market (60-61).

This narrative was purportedly supportive of using home insurance as a means of managing an individual's exposure to flood risk. However, sub-stories within the narrative simultaneously questioned the supposed agency of individuals. While covering the 2013 insurance policy renegotiations between the government and insurance industry, newspapers presented access to available and affordable insurance as a standard right for homeowners (62). However, the negotiations over-ran and threatened to collapse with the "Government under fire over failure to help flood victims… unless someone blinks soon" (63). According to newspapers, UK residents were to imminently lose their access to affordable insurance, leaving homeowners at higher flood risk on their own (64-65). Although the negotiations ultimately

produced the Flood Re scheme, the helplessness of homeowners during this process was emphasised, such as a report that "insurance fears drive rise in calls for advice" (66). Additionally, articles from all years told of homeowners who were no longer able to secure affordable insurance due to being considered too high risk (67-69).

The coverage also exposed the limitations of insurance as a flood management strategy. It was noted that, while insurance provides a level of financial protection, "no insurance product or scheme can prevent floods or the widespread devastation and destruction they cause" (70). Indeed, there were reports of homes and communities that had experienced multiple floods in recent years (71-72). The long-term financial viability of the insurance industry was also questioned. During the 2013 renegotiations, the insurance industry argued that a "lack of flood defence spending by the government meant that covering high-risk homes was no longer viable for the industry" (73, see also 74). Therefore, while this narrative promoted home insurance as a beneficial response to flooding, it also revealed that, if flooding in the UK increased as expected, more and more people would find themselves at risk and without insurance.

3.3.3 Narrative C: More informed decision making

Narrative C also responded to homeowners' flood risk (75), as well as other emerging risks, such as hotter weather (76), health hazards including Lyme disease (77-78) and changing financial markets (79). This made it a less straight forward narrative than those promoting either built flood defences or home insurance but notable for the range of different risk topics it included.

The emphasis was on the individual to become more informed about these risks so as to make better decisions about managing them. In regards to flooding, there was a variety of ways that individuals could do this. Over the 5-year study period, higher resolution flood maps became available (80-81), as did maps showing surface water flood risk for the first time (82). This meant that house buyers could check flooding risks much more accurately than before (82-83), although there were further calls for flood risk to become standardised in the information packs given to potential house buyers (84). Existing homeowners were also urged to make use of the "vital service" provided by flood maps (85) and to join the "more than a million households [who] have signed up to the Government's flood warning service" (86), the benefits of which had been proven during previous flood events when early action had "saved

lives and properties" (87). Newspapers also suggested changes that residents could make to their own homes to increase resilience to flooding (88-89). In summary, "educat[ing] people to help themselves" (90) was advocated as part of an effective, holistic flood management strategy (91-92).

Occasionally newspapers provided information about other risks, such as how extreme weather might affect health "and what you can do about it" (77) and "10 tips on how to prepare for an apocalyptic future" (93). For financial investments, readers were encouraged to access the available specialist information (94). However, often the lack of available information about risks other than flooding was noted and criticised. According to newspapers, "Heatwaves are national emergencies and the public need to know [but] Lethal risks of extreme weather are under-reported and government must stop cutting public awareness funds" (95). Heatwave warning systems (96) and clearer guidelines on maximum working temperatures (97) were suggested. Similarly, it was noted that information about increased risks of skin cancer (98) and Lyme disease (99) was not yet available. While the focus of this narrative was the empowerment of individuals to manage their own exposure, the information first needed to be provided by other agents, including the national government, local government, the Met Office, the Environment Agency, health authorities and estate agents. When that wasn't done then an individual's ability to make good decisions was impeded "causing preventable deaths" (95).

Within this narrative, therefore, the possibility of informed decision making was presented as limited. For flooding, there were a number of ways individuals could learn to manage their own exposure; for other risks, options were presented as minimal. There was an underlying assumption of the benefits of having all sectors of society working together to become better prepared for climate change, for instance, more informed home buyers would be less likely to buy in flood risk areas thus reducing the costs of flooding in that area. However, according to the coverage, often these opportunities were, thus far, under-utilised.

3.3.4 Narrative D: Innovation in food and farming

Narrative D described the susceptibility of food production to more extreme weather, seasonal shifts and a warming climate (100-103). The unpredictability of recent weather patterns was presented as particularly difficult for farmers to manage, with commentators noting that "Under one scenario, Yorkshire will be the new Tuscany, under the other, it will be the new Tomsk" (104, see also 105-106), while extreme weather events caused losses in revenue (107) and

livestock (108). Concerns were expressed about popular fish dishes being threatened by warming and acidifying oceans (109-110). Weather and climate events in other regions were also mentioned as risking UK food imports (111-112). Increased risks of poor harvests in the UK and elsewhere, were seen as "the biggest threat to UK farming and its ability to feed the nation's growing population" (100, see also 113).

The adaptive actions in this narrative were based on accepting change and innovating. It was noted that some current foods might no longer be suitable to UK farming and fishing conditions (109, 114), so forcing a change. But there was also an argument made for capitalising on new opportunities, such as growing crops "farmers only ever dreamed about" (115) including wine (116), grains (103) and fruit (115-117), as well as types of seafood now in UK waters (118). Additionally, there was coverage of technological innovations that might make UK farming more resilient, including new seed varieties (119, 120). Newspapers debated whether the UK should farm genetically modified crops which are currently banned under EU law but, some argued, might be more resilient to weather extremes and new pests (121-123).

Farmers were the main characters in this narrative. The President of the National Farmers Union, Peter Kendall, was frequently quoted (121, 124-125) and individual farmers were also interviewed about their extreme weather experiences (126-127). The farming industry used its coverage to present itself as proactive in responding to changing conditions, saying "We're a resilient lot, we'll work it out" (128). The most celebrated example of this were those who had pursued wine making in the UK, drawing on "deep pockets, a vision, and nerve", and were now reaping the benefits (129, see also 130-131). This narrative also suggested that farmers would not be able to do it on their own but would need help from science and technology (119-120, 132-133) as well as financial (107, 132) and legislative (134-135) support from the national government. Additionally, they might need to manage resistance from environmental groups (136-137) and to secure consumer support for changing how their food was produced (138-139).

Of all the narratives presented in this chapter, this one was most engaged with planning for the future. Indeed, there was explicit mention of the need to plan now for food demands in 20 years' time (125), as well as reports of industry strategizing "for a climate where 'abnormal' weather becomes 'normal'" (140). There were also arguments made for pre-emptively

preparing for developments in adaptation strategies, such as policies to support the use of anticipated technological breakthroughs in seed production and pesticides (122, 134).

3.3.5 Narrative E: Winners and losers in the natural environment

Narrative E described the UK's wildlife as being impacted by extreme weather (141-142), warming on land and at sea (143-145), and additional stress factors, such as depleting habitats (144, 146). There was also discussion of perceived changes in the UK's seasonal patterns (147-148). Further, the threats to nature were framed as risking losses of emotional and cultural importance to the UK. Nature impact stories often focused on familiar garden species such as birds, bees and butterflies (144, 146, 149-152), and those symbolic of the UK coasts, such as puffins and terns (153-156). An article about the barn owl, described it as "one of Britain's most popular" birds and an "icon of the countryside", but noted the "catastrophic fall in numbers" due to unusually cold and wet springs (157). According to the articles, events "Nature lovers" (158) could themselves participate in, including bird watching (155) and observing the first day of spring (158), might also be under-threat as the climate changes.

Nature was cast as the active agent making best possible adaptive actions so as to survive, with reports of some species adapting to warmer temperatures by moving further north (143, 145, 159). But there were also other reports of species struggling to survive (160), with some not having any available habitat to migrate to (146, 159) and others suffering from forced dietary changes (161). Consequently, nature's position was summarised as "a list of winners and losers" (162, also 163-164). In this version of the narrative, the role for humans was to observe and record the changes happening, an action in which newspapers themselves played a role as they reported on "The Birds and the Bees Confused" (149, see also 165), "a freak year for nature" (150 & 166), "The highs and lows of British wildlife" (164), and "one of the most unusual [years] on record" (167). Readers were also encouraged to get involved with citizen science projects which could help experts achieve a better understanding of how the natural environment was adapting to climate change (168-169). This adaptation narrative was uniquely defeatist in terms of its acceptance of inevitable losses, and it was uniquely passive in its role for humans.

However, some of the coverage focused on what homeowners and gardeners could do to help. Readers were "urged to help save" birds and animals by putting out food during extremely cold weather (170), and homeowners were "urged to create rooftop gardens" for

insects (171). They were also encouraged to replace hard surfaces on their properties, such as paving, with grass or planted areas (172), and to choose plants that attract bees and insects (173). The 'urging' was done by NGOs, usually Matthew Oates from The National Trust, who provided both the authoritative voice on the current state of nature (162, 174) and the call for greater citizen engagement with the natural environment (158, 168, 175). The Royal Horticultural Society backed the campaign to 'green grey Britain' (1732, 176-177), while the Natural History Museum and the Royal Society for the Protection of Birds also encouraged people to do what they could to help (169-170). Nevertheless, the promoted actions tended to be short-term, with small-scale benefits.

3.3.6 Other Narratives

As with previous newspaper studies, the corpus of articles contained more topics and ideas than can be discussed here (Brown et al., 2011). Some articles also responded to other disruptive events including drought, storms, cold weather, coastal erosion, warming and rising seas, shifting seasons, and wildfires. There was also at least some mention of the following adaptation actions: changes to infrastructure such as rail lines and housing, adapted business models, policy interventions, moving away from hazards, socio-economic system transformation, UK funding of overseas adaptation projects, water use and storage, as well as arguments that adaptation was not yet happening and alternatively that it wasn't needed. However, these topics were mentioned less frequently and hadn't yet developed into more established problem resolution narratives.

3.4 Discussion

This Chapter presents the first analysis of newspaper coverage of climate change adaptation in the UK drawing on 282 articles published in 14 national and regional newspapers during 2013, 2015 and 2017. I used narrative analysis based on the archetypal narrative model of problem resolution to identify which events initiate an adaptation story and who responds and how. I identified five prominent adaptation narratives: 1) due to flooding the government should build more flood defences and 2) homeowners should buy insurance. Due to flooding and other risks 3) individuals should make more informed decisions to limit their own exposure. And due to a

combination of weather and climate impacts 4) the farming industry should innovate while 5) the natural environment should strive to adapt as best as possible.

The premise of this research was that the stories societies tell about disruptive events influence how they're conceptualised and, ultimately, the response and resolution taken. Reading across these narratives I found that newspapers present adaptation as principally a response to flooding and much less so to other climate risks likely to affect the UK now and in the future; as still largely dependent on the actions and support of the national government; and as intending to maintain the current way of life while trying to protect those most at risk from acute weather impacts. The following will discuss each of these points in turn.

3.4.1 Adaptation to immediate threats

The single most pervasive message from across the coverage was that the UK should be better responding to the growing flood risks. Two of the five narratives were initiated solely by flooding, one was initiated by emerging risks to individual wellbeing from flooding and other causes, and the remaining two involved a combination of weather and climate events including flooding. To some extent this was driven by newsworthy events which happened during the period studied. The major floods of December 2015 received so much coverage that only a 25% sample of it was included in the analysis, plus there was significant commentary on the wet weather events of 2012 and the storm surge in 2013. Newspapers are more likely to cover stories which are dramatic, novel and have a strong human interest, a brief which flooding fits (Boykoff and Boykoff, 2007). There is also a long-running narrative of the UK as a flood prone nation which pre-dates climate change adaptation discussions (Gavin et al., 2011, Escobar and Demeritt, 2014). But flooding also fits well into the existing 'disaster' narrative which earlier studies have found both dominates climate change coverage (Boykoff, 2008) and, more specifically, the impacts and adaptation discourse (O'Neill et al., 2015). There was evidence of this here through the use of dramatic and emotional language, as well as the 'victimhood' of at-risk homeowners. Climate change framing which is strongly negative or fear inducing has been found to be disengaging (O'Neill and Nicholson-Cole, 2009). Consequently, while newspaper flooding stories might be providing useful risk communication about climate change impacts, the current approach to the coverage might be unlikely to encourage greater engagement with adaptation decision making.

Hot weather was the second most mentioned impact in the coverage, although in only 50 articles compared with the 169 of flooding. Further, none of the five adaptation narratives centred only on heat risks. Unlike flooding, heat risks are not yet a well-established topic in the UK. In fact, previous research into public perceptions of climate risks found that UK residents thought hot summers and heatwaves had become less common (Taylor et al., 2014a). Further, they might consider hotter weather to be a positive thing to be enjoyed rather than a risk to be managed (Bruine de Bruin et al., 2016). The limited coverage of heat risks in newspapers did not challenge this perception. However, experts categorise rising temperatures in the UK as a risk of the same severity and immediacy as flooding (Change, 2017). There are some initial findings that people will follow heat risk information (Lefevre et al., 2015), but that it's not yet being sufficiently provided (Howarth et al., 2019). The decision making narrative referenced this as it criticised the lack of hot weather adaptation information available. Unlike for flooding, though, newspapers were also not yet providing this advice to readers.

According to the latest UK Climate Change Risk Assessment, in coming decades the UK is also likely to be effected by risks to the water supply, natural capital, and food production, and risks from new and invasive pests and diseases (Change, 2017). There were at least some articles on all of these issues, although only some were sufficiently discussed to be included in the most prominent narratives.

Newspapers are influential in how people perceive what's risky and what's not (Kasperson et al., 1988, Combs and Slovic, 1979). In relation to climate change impacts, newspapers can influence which current or probable future events people are aware of, and the extent to which they perceive them as of concern. This will, therefore, influence which types of events are seen as deserving of adaptation investment. Adaptation coverage is so far focusing on familiar and dramatic current events and is not yet debating the full range of emerging risks likely to affect the UK. Linking adaptation so closely to mainly one event, i.e. flooding, also risks presenting a limited interpretation of when and for whom taking adaptive actions might be possible and beneficial. A recent critique of measuring adaptation argued that rather than focusing on adherence to specific actions it would be more useful to evaluate the capabilities of societies to live well under a range of possible futures (Dilling et al., 2019). It might therefore be useful for newspapers, and other sources of public information, to present adaptation as a

long-term strategy to managing unavoidable change rather than as principally a set of flood response actions.

3.4.2 Adaptation dependent on government

The national government was the main active agent only in the narrative about building flood defences. However, it was also presented as playing indispensable supporting roles in regards to insurance, individual decision making and farming. It was not mentioned in the nature narrative which was also the most doubtful as to the success of adaptation. This presentation risks giving the perception that adapting to climate change is principally the responsibility of the national government. Nevertheless, as with previous studies, this study found that newspapers were often critical of the government, especially in regards to flood management (Escobar and Demeritt, 2014). Blame directed at the government and key political figures escalated during actual flood events, and newspapers also covered policy disputes between the two main political parties. As such, politicisation of the issues became a central theme of the coverage. Further, because newspapers demanded a political response to managing the issues this in large part set the boundaries of the debate. For example, there was voluminous coverage of the flood defence budget, the spending policies of the two main political parties, and the publications' own stance on spending. In comparison, there was much less room given to debating non-government led solutions to flooding. This type of agenda setting is often cited as a principle influence of newspapers (Entman, 1993), although, as government messaging tends to be a primary source of climate change coverage, it can also influence the scope of policy ideas newspapers cover and critique (Carvalho, 2005). Here, it is likely a cyclical process with government figures dominating the coverage while also responding to the demands of the media. This creates a closed discourse with limited space available for other voices. It also fails to robustly interrogate government leadership and centralised governance as the best means of approaching adaptation. Perhaps most importantly, it gives a false impression that debate and decision making are taking place while obfuscating the need for greater social engagement in deciding how best the UK might adapt.

Individuals were the main characters in the insurance and decision making narratives, and had supporting roles in the nature narrative and, to a lesser extent, food and farming narrative. Focusing on those narratives in which individuals were the main active agent, the principle drivers for individual adaptation were protection of personal wellbeing and of

immediate self-interests. Most often individuals were reframed as homeowners responsible for protecting their financial assets. This consequently influenced the type of adaptive actions individuals were encouraged to take, namely, buying home insurance and becoming more informed about the flood risk to their house, themes which had already developed in earlier periods of flooding coverage (Escobar and Demeritt, 2014). However, the narratives also made clear the limitations to individual agency, such as homeowners being dependent on affordable insurance and risk information being made available to them. Additionally, individuals were very rarely presented in other less individualistic roles such as citizens, voters or community members. Media can be very influential in projecting ideas about appropriate social identities and responsibilities (Fairclough, 1995, Burr, 2003). Media and other climate change communications have been criticised for the extent to which they promote individual behaviour change, rather than political engagement in the socio-economic practices driving climate change (Pepermans and Maeseele, 2014, Carvalho et al., 2017). This study draws comparable conclusions, finding that so far newspaper coverage of adaptation includes discussion of actions individuals might take to protect their own interests, but that questions beyond this immediate sphere of personal interest are being framed as a political issue and the responsibility of the government. To the extent to which newspaper coverage is an influencing factor in shaping our understanding and response to an issue, this coverage might lead to perceptions of limited responsibility of non-government actors which might therefore limit their willingness to act. This, therefore, also risks undermining the announced adaptation strategy of the government which calls for all sectors of society to engage in managing their own risks (DEFRA, 2018).

3.4.3 Adaptation to maintain the status quo

Adaptive actions can be categorised by intended outcomes: some are resistant and reinforce existing pathways; some are incremental causing non-threatening adjustments; and some are transformational causing fundamental changes (Pelling et al., 2015). Newspaper coverage of flooding, the dominating topic, was principally resistant in tone. The two most discussed adaptive actions to flooding, flood defences and home insurance, can both be categorised as resistant as they encourage at risk communities to stay in place. Focusing on government funded infrastructure further contradicts government strategy which emphasises individual engagement in decreasing personal risk, and cross-sector collaborations to increase community

resilience (DEFRA, 2018). A study of North American newspapers also found greater coverage of 'hard' adaptation approaches, arguing that this might limit the scope of what is understood or valued as adaptation, and also fails to consider situations in which soft adaptation approaches which can build resilience might be more feasible and more beneficial (Ford and King, 2015). While several of the narratives might be described as soft approaches, including insurance and more informed decision making, from a volume perspective built flood defences dominated the coverage especially during periods of high interest. However, if flooding increases as expected then the UK will need to move beyond traditional hazard management strategies (HM Government, 2017, Howard Boyd, 2019)

The decision making and nature narratives suggested incremental changes to provide immediate benefits to people's health and wellbeing or to that of nature. However, the food and farming narrative was more transformational in approach as it promoted the uptake of new opportunities and practices. This might have been influenced by the dominating voice of the NFU President, Peter Kendall, who explicitly positioned himself, and therefore the industry he represented, as willing to change. The wine story, the only good news story from across the coverage, also provided a positive example of embracing change. However, this narrative also highlighted the need to secure broad support if change is to be socially accepted and successfully implemented (Tschakert et al., 2016). This was shown in the debate about GM crops which was polarised towards those who viewed them as a necessary part of the future and those who saw them as "Frankenfood" (139).

Adaptive actions might be either reactive or proactive. Reviewing newspapers provides some view into real-world events and, here, there were reports on proactive developments in flood management and in the farming industry. However, this analysis focused on how newspapers were choosing to narrate adaptation and often their tone was much more reactive. A key example was the escalated demand for more flood barriers during December 2015 when many homes and communities were under-water. Additionally, newspapers tended to prioritise alleviating immediate concerns over preparation for the long-term. This emerged especially in the insurance narrative, in which newspaper demands for home insurance for all didn't adequately engage with the long-term challenges of funding the rising cost of flood damage or providing long-term security to the most at risk communities. This is not unusual as newspapers tend to focus on the most newsworthy events and to emphasise the dramatic and human interest

elements (Boykoff and Boykoff, 2007). However, newspaper framing can influence political priorities therefore shaping policies (Escobar and Demeritt, 2014). A study of flooding coverage in Irish newspapers supports this thesis, arguing that the newspapers response during times of flooding was influencing the short-termism of government flooding policy (Devitt and O'Neill, 2017). Therefore, this suggests that the focus on immediate relief for dramatic real life situations further supports an adaptation approach which focuses on current risks and prioritises maintaining the current status quo but which risks failing to plan sufficiently for future developments.

3.5 Conclusion

As outlined in Chapter 1, the British government is promoting uptake of adaptation in all sectors of society so as to increase the UK's resilience to the uncertain impacts of potentially high levels of warming (DEFRA, 2018). This includes individuals whose engagement in climate change adaptation can bring benefits to their own wellbeing and to the progress of local and national adaptation plans. It is important to reiterate, therefore, the extent to which newspaper coverage is focusing on government leadership and hard adaptation approaches, which might undermine individuals' agency. Earlier it was noted that, in practice, adaptation is a series of choices and, at times, compromises. Society's ability to best navigate this decision making process will be dependent on access to an informative and robust debate, in which newspapers will play a key part. As has been found in other studies regarding flooding in the UK (Escobar and Demeritt, 2014) and adaptation in other territories (Boykoff et al., 2013), so far this is not yet happening in UK adaptation newspaper coverage despite the UK's relatively advanced adaptation planning. The coverage presented a narrow view of when taking adaptive actions might be beneficial, and of how it might be done. Additionally, newspapers minimised discussion about the longer-term challenges and compromises adaptation will likely cause. The clear boundary setting as to what adaptation is and should be is likely to affect the range of policies under consideration (Entman, 1993). Additionally, it might be disengaging to those who don't consider themselves at imminent risk of climate change impacts, particularly flooding. There is a disconnect, therefore, between the announced ambitions of adaptation in

the UK and newspaper discourse on the topic. This is a challenge that other contributors to the discourse, such as public communicators, need to be aware of.

3.5.1 Limitations and further research

It is useful to study newspapers due to their continued wide readership (Statista, 2018), their influence on the political agenda (Escobar and Demeritt, 2014) and their continued influence on TV news content (Boykoff and Yulsman, 2013) as well as on newer forms of media such as twitter (Kirilenko and Stepchenkova, 2014). However, a newspaper analysis can only provide a partial view on the public discourse regarding a topic. Further, while newspaper coverage, as a main source of non-experts climate change information, might be an influencing factor on public opinion it by no means directly determines what people think (Carvalho and Burgess, 2005, Olausson, 2011). Therefore, Chapters 4 and 5 will test people's responses to these narratives to see if they find them informing and engaging. Additionally, the following chapters will work with UK residents to develop and then test additional ideas as to how to make climate change adaptation a more engaging topic.

Chapter 4 “Of course we have to look after ourselves!” Using storytelling workshops to explore how to make adaptation more engaging for UK residents

Abstract

The previous two chapters focused on the first research objective of identifying and analysing the current adaptation discourse in the UK, firstly amongst non-expert residents, and secondly in newspapers. This chapter, and the one following, respond to the second research objective of evaluating how engaging the adaptation narratives identified by the previous two studies are for UK residents and developing ideas to make adaptation narratives more engaging. Here, drawing on the mental models approach of eliciting participant knowledge by using in-depth, explorative research methods, I undertook three storytelling workshops in which participants: 1) wrote their own fictional adaptation stories, and 2) reviewed pre-prepared adaptation stories. I found that the perceived personal relevance of impacts was low which was preventing participants from becoming more engaged in adaptation immediately. This might be countered by presentations of impacts that focus less on their unprecedented scale and more on their immediate relevance to daily life. Participants also highlighted not knowing what they should or could be doing or where to find out more information as major barriers to greater engagement. However, they also highlighted sense of community as a possible motivator to greater engagement. Both of these learnings could be developed by making more examples of individual and community action visible in the adaptation discourse.

4.1 Introduction

As outlined in Section 1.2.1, as the UK experiences more serious and more frequent climate change impacts, there are at least three benefits of securing public engagement in the UK’s efforts to adapt. Individuals can lower the harm caused from extreme weather events and other climate change related impacts by taking preventative and protective measures, such as installing flood gates or by avoiding the hottest part of the day (Public Health England, 2015, Public Health England, 2018); they can support the adaptation plans of national and local government; and they can take part in the decision-making process as to how best the UK

should adapt. A large majority of UK residents now consider climate change and extreme weather to be priority concerns (Steentjes et al., 2020). However, individual engagement in taking adaptive actions is still generally low (Porter et al., 2014). The next challenge for adaptation experts and communicators will be to transform concern about impacts in to active engagement in adaptation (Corner et al., 2020).

4.1.1 Why use storytelling in adaptation engagement research?

In the two studies to address the second research objective of this thesis I use steps three and four from the mental models approach (see Section 1.4) by first undertaking explorative, in-depth research to generate a wide range of ideas (see this Chapter), and then developing and testing key themes with a lager sample (see next Chapter). Here, I wanted to explore responses to the existing adaptation public discourse narratives and to develop new ideas to make the discourse more engaging. To do this I used storytelling workshops.

4.1.1.1 Accessibility

One of the challenges of discussing climate change with non-subject experts is that it can often seem dominated by science and other specialist discourses which might be off-putting (Lejano et al., 2013). In comparison, storytelling is an intrinsic human behaviour making it a commonly shared area of expertise (Fisher, 1984, Gottschall, 2012). The process of hearing or telling a story is one that is part of daily life so framing adaptation in this format will likely make it much more approachable. Stories also tend to take place in specific and imaginable settings, with characters who have emotions and intentions (Ryan, 2007). If those settings or characters seem familiar to the research participants it might help them engage with the subject much more personally.

4.1.1.2 Decision making

In practice adaptation will be a series of decisions that will need to balance risk management against other unwanted compromises and losses (Tschakert et al., 2017). Decision making in favour of adaptation will need to be perceived as sufficiently compatible with people's other priorities and values to be considered over-all beneficial (Adger et al., 2009, O'Brien and Wolf, 2010, Corner et al., 2014). Therefore, one of the key challenges for adaptation research is understanding what other factors people take in to consideration when thinking about adaptation and how they prioritise between them. While it can be hard to work through the

intricacies of these decisions in a hypothetical research setting, stories can provide example situations to be discussed and explored. Specifically because stories tend to be complex and have emotional depth they can go some way to mirroring the challenges of decision making in real life so helping participants to think through their own priorities and values (Fisher, 1984).

4.1.1.3 Writing the future

A further challenge of adaptation engagement, is that climate change can often seem very pre-determined in terms of what will happen and what the outcomes will be. For example, Hulme (2011) argues that public understanding of climate change has been influenced by climate modelling which, by focusing on earth systems, obscures the ability of humans to determine the future. Similarly, Swyngedouw (2013) argues that the climate change discourse is based on the assumption that it is a management problem for existing economic and government structures to address. In recent times, some of the most publicised climate change narratives have presented an apocalyptic future, such as the Hollywood movie *The Day After Tomorrow* (Emmerich, 2004) or *New York* magazine's 'The Uninhabitable Earth' (Wallace-Wells, 2017). There is a risk that these types of disaster narratives can be very disengaging (O'Neill and Nicholson-Cole, 2009, Mangalagiu et al., 2020). Futures theory argues that a deliberative consideration of futures can be used to illuminate or invent additional possible and preferable outcomes beyond those which seem initially most probable (Miller, 2007, Gidley, 2016). One way of generating these ideas is through creative processes and outputs, such as the arts (Yusoff and Gabrys, 2011, Veland et al., 2018). Narratives, in particular, have been suggested as a means of exploring a wider range of futures and the transformations needed to get there (Van Der Leeuw, 2019, Mangalagiu et al., 2020).

4.1.2 Why use workshops in adaptation engagement research?

Workshops offer a number of advantages to explorative research: they usually include a small number of participants for a relatively long period of time so giving the participants an opportunity to explore their knowledge and opinions in detail, while also facilitating discussion between participants (Gameiro et al., 2018). As adaptation is still fairly unfamiliar for most people this will allow participants to pool their knowledge and experiences and so deepen the conversations. Adaptation will also require some level of social agreement as how best to move forward which will be shaped, in part, by the public discussion, and workshops can to some extent simulate this larger social debate. Narrative workshops have previously been used in

other areas of climate change engagement research such as mitigation, particularly by Climate Outreach, a charity focusing on public understanding and engagement of climate change, and their academic partners (e.g. Marshall, 2014, Shaw and Corner, 2017, Whitmarsh and Corner, 2017). Climate Outreach argue that achieving climate change objectives will be dependent on finding stories that effectively connect them to people's pre-existing values (Corner, 2012) and that narrative workshops can help develop understanding of what both those values and stories are (Shaw and Corner, 2017).

4.2 Research questions

The research reported here is the first of two stages addressing the second research objective of this thesis which is evaluating how engaging the adaptation narratives identified by the previous two studies are for UK residents and developing ideas to make adaptation narratives more engaging. As per the mental models approach to eliciting information, in this study I wanted to develop, in-depth, explorative data which I could then test with a larger, more representative sample (see next Chapter).

The research questions for this explorative study were:

> 3a. Do UK residents find the current adaptation discourse engaging or disengaging, and why?
>
> 3b. Are there ways to make the adaptation discourse more engaging for UK residents?

4.3 Methods

4.3.1 Participants

The study had 12 participants in total. When undertaking research to generate ideas sampling can stop once new ideas have levelled off. Experience from using in-depth interviews, a similarly explorative and qualitative research method, suggests this usually happens after 10-15 participants (Bruine de Bruin and Bostrom, 2013). Having a small number per workshop also ensured that all members had an opportunity to fully take part and that the activities were less rushed. The participants were recruited using the Leeds University Testing Organisation

(LUTO) who specialise in developing and testing public communications. The workshops took place at LUTO's facilities in the Greater Leeds area over a 3-week period in August 2019. The final sample had an even number of people aged 18-30, 31-50 and 51+, and had 7 women and 5 men (see Appendix C1). During a brief screening call all participants said they were at least quite interested in climate change. Seven of the 12 participants said they thought about having to adapt to climate change at least fairly often, with the remaining five thinking about it less frequently. Eleven of the 12 participants said they did not currently consider themselves to be living in a high risk flood area. The participants were also screened for their willingness to take part in group discussions and creative activities, so to ensure a sample that would fully engage in the quite long and strenuous workshop. However, they were not screened for their sociodemographic or geographical characteristics. As such, this small sample cannot be described as representative of the UK population. Ethical approval was provided by the University of Leeds, reference LTLUBS-274.

4.3.2 Use of narratives

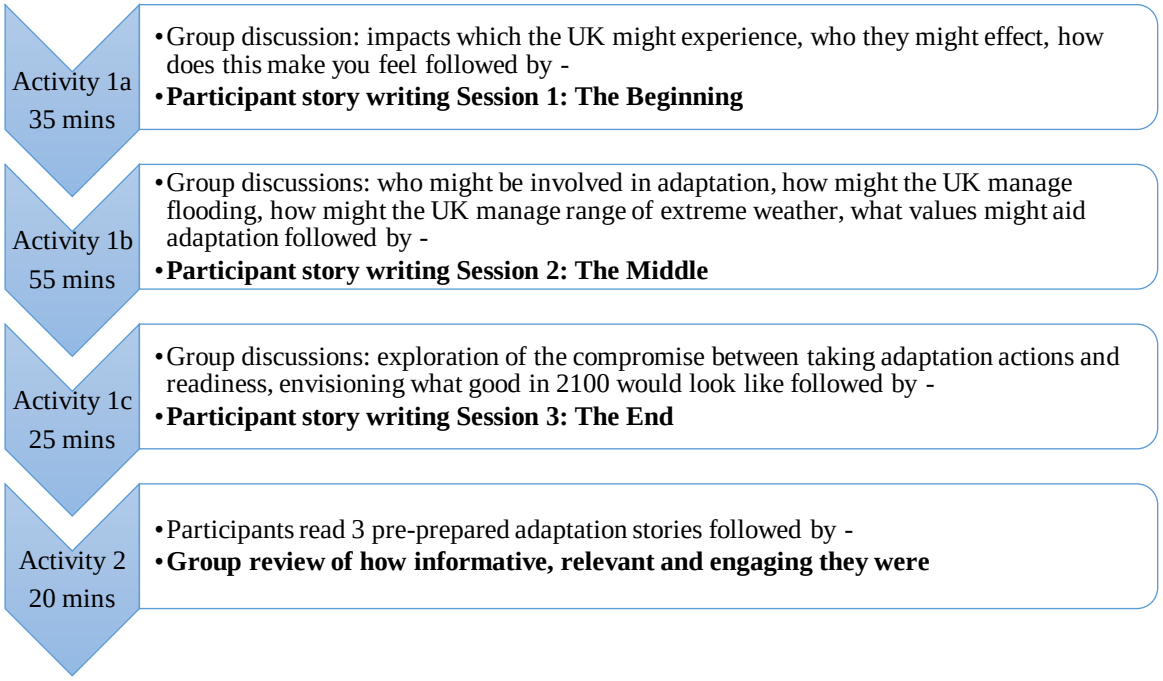
One of the simplest definitions of a story is that it is something that has a beginning, a middle and an end (Moezzi et al., 2017). Throughout the workshop design this very familiar structure was used to clearly signify to the participants that they were working with stories (see next Section for detail of activities). As per Table 1, this basic problem resolution story structure was then overlaid with the key events within an adaptation experience i.e. the story begins due to the occurrence of a climate related impact, someone responds in some way in the middle, and the story arcs towards a resolution at the end (Paschen and Ison, 2014). To further emphasise the story approach, participants were asked (see Table 7) to think about elements that tend to be unique to stories compared to other texts, e.g. detailed story worlds, intentions-driven characters, and values and emotions (Bruner, 1991, Ryan, 2007).

4.3.3 Workshops

Each participant took part in one of the three workshops, with three in the first workshop, four in the second and five in the third (the inconsistency being due to a no show for the first workshop). I used a script (see Appendix C2) to lead the participants through the activities and to prompt discussion of relevant sub-topics (although digression to other related topics was welcomed due to the explorative nature of the research questions). There were two activities:

first, the participants wrote their own fictional adaptation stories and then they read and reviewed some pre-prepared adaptation stories.

Figure 4 Order of workshop activities



4.3.3.1 Workshop Activity 1: Participant story writing

The participant story writing was divided into three sessions, with each writing session being proceeded by group discussions (see Figure 4). The discussions supported the story writing by introducing and exploring relevant topics which the participants could then develop in their own stories. For the writing the participants were given a story book with eight boxes to complete, each with a header and some instructions and space for the participant to write, see Table 7. The 'Section Headers' were based on those previously used by Rottman (2017) in her work on developing energy narratives and the additional instructions, shown under 'Please' and 'Think About' in Table 7, were added by me. Additionally, participants were asked to set their stories in the UK at some point in the future. The participants were informed that they would not be asked to share their stories with the group.

Table 7 The writing instructions given to the participants

Box Number:	Section Header:	Please:	Think About:
Session 1: The Beginning			
1	Once upon a time…	Describe the world of your story	Where in the UK is your story happening? Is the UK like it is in real life or do you want to make some changes? When in the future is your story happening? Who lives in your story?
2	Every day…	Describe what makes this story world good to live in	What do the characters in your story world like doing? What is considered important and valuable?
3	But one day…	Describe a climate related event(s) that disrupts the everyday life of this world	Is the event a surprise or has it happened before? Is it a good or bad event? How does it affect those who live there? How do they feel?
Session 2: The Middle			
4	But then…!	Describe an individual or group who decide to respond to the events	How many characters get involved? Who are they? Why do they decide to act? Is there a leader?
5	So they…	Describe the actions they take	Is it a small or big action? Will it help immediately or in the future or both?
6	Because of that…	Describe the immediate outcomes of the actions	Did the planned actions go well or were there some problems?
Session 3: The End			
7	So finally…	Describe what happens at the end of the story	Are the disruptive events solved? Could they happen again?
8	And ever since then…	Describe any changes to the future	Has the world of the story changed? Have the things that made the world good to live in changed or stayed the same? Have any of the characters changed? Have they learnt anything?

Box 1: Defences against flooding
Flooding is a serious and growing risk in the UK because of climate change. In recent years, homes in some areas of the country have experienced major flooding and are at high risk from doing so again. In the coming decades, scientists expect periods of heavy rainfall to become more common in the UK as the climate changes. This will likely mean that more homes will be flooded more often in the future. Flooding in the home is a very difficult and upsetting experience. It can also cause costly damage. In response to this, the UK should build more and bigger flood defences. Flood defences are often large and expensive projects so the government needs to lead. It is also the responsibility of the government to protect its citizens. Flood defences can protect homes during heavy rainfalls or high tides. But they might not be able to stop all flooding now or in the future as the weather gets more extreme. There are other ways that the UK could manage flood waters such as planting more trees and making more land available as flood plains. However, the UK should continue to prioritise building flood defences as the best way of managing the risk of flooding.

4.3.3.2 Workshop Activity 2: Reviewing pre-prepared stories

In the second activity the participants read and reviewed pre-prepared adaptation stories which I developed out of my earlier analysis of UK newspaper adaptation coverage between 2013 and 2017 (see Chapter 3). The newspaper analysis had identified five prominent adaptation narratives: 1) Defences against flooding, 2) Insuring the home, 3) More informed decision making, 4) Innovations in food and farming, and 5) Winners and losers in the natural environment. I rewrote the identified newspaper narratives into 200-word stories with consistent readability, structure and tone. Each group read three of the five stories; each story was read by two groups apart from 'Defences against flooding' which was read by one. The groups were asked to respond to questions intended to elicit the extent to which they found the stories informative, relevant and engaging. One of the stories is shown in Box 1 and all stories are in Appendix C3.

4.3.4 Analysis

The workshops were audio recorded and transcribed and the story workbooks were copied into Microsoft Word. All data was then added to Nvivo 11 for analysis. I used Applied Thematic Analysis to code and analyse the data (Guest et al., 2011). As with other approaches to close text analysis, Applied Thematic Analysis requires the researcher to draw out key words, themes

and ideas by reading and rereading the text, although it particularly intends to identify expressions of emotions, perceptions and experience (Guest et al., 2011). This approach is useful when taking an explorative approach to a specific research problem for which understanding people's likely complex responses is required.

Each of the three sets of data were intended to contribute different insights to the research questions (see Section 4.2). The group discussions which preceded the writing sessions had not originally been intended for analysis as their purpose was to prepare participants for writing their own stories. However, as the participants had raised a number of topics explaining why they, and others like them, weren't more engaged in adaptation, I reviewed these texts for ideas as to what people find engaging and disengaging about the current adaptation discourse. For the participants' own stories, I was interested in the choices the participants had made when adding the detail to the basic structure what had been set (see Table 7), i.e. which impacts started the stories in Box 3, who was described as responding in Box 4 etc. The participants were instructed to write about a story world that was "good to live in", to describe responsive actions that would "help immediately or in the future", and to consider whether by the end of the stories what made life good "had changed or stayed the same". As such, I encouraged the participants to write positive adaptation stories and so explore what adaptation could and should look like in the UK. These could then be analysed for suggestions of how to make the topic more engaging. Finally, for the group review of the pre-prepared stories, I wanted to analyse how the participants responded to the different topics and adaptation options the stories described. I especially wanted to focus on the extent to which they found them engaging, or not, and why. The findings from each of these three sections of the data will now be presented below.

4.4 Results

4.4.1 Group discussions: barriers to engagement

Participants generally said that they thought everyone, including individuals, should be engaged in adaptation (although it should be noted that the discussions often expanded to include mitigation and sustainability as well). Over the course of the discussions participants described themselves as angry, frustrated, helpless, clueless and worried. They did not consider

themselves to be very engaged or as engaged as they should be. A number of barriers to engagement were raised.

4.4.1.1 Not imminently at risk

Firstly, participants did not see themselves or those close to them as being imminently at risk (see Table 8). Parts of the UK were perceived as already at risk from flooding but other impacts were viewed as future concerns while all groups mentioned that hotter weather would likely be seen as a positive, rather than as a risk, in the UK. Participants mentioned low personal risk to explain some of their own actions such as prioritising other daily concerns over climate change and struggling to make sacrifices or changes now that had no immediate personal gain. Several participants suggested that change would happen once the scale of risk demanded it, and that something catastrophic would need to happen before people were willing to make real changes.

Table 8 Example quotes of barriers to adaptation engagement

Barriers to Engagement	Examples Quote
Didn't perceive themselves as imminently at risk	"since I've not experienced many negative symptoms myself it's difficult for me to be like super worried about it and super pro-active cause if it doesn't really affect me, there's like, there's a bit of a disconnect" (P2) "I think something sort of brings it to the surface every now and again but then everyday life takes over, you know, your bills, your family, whatever." (P12) "I think I will start to worry if it's a life and death situation but again I know I need to be eco-friendly and think about climate change but at-, now? I'm not worrying too much." (P5)
More information about individual actions	"You can't always get empathy until you're aware of the issues are so it's more that there's not enough out there in the public domain for you to know what to do and what impact you can have as an individual." (P1) "I feel quite helpless and quite clueless to how much I can help as an individual, because you can recycle and whatnot but how much difference is that actually making" (P8) "Yea, I think you need information that's tailored to you… if you could fill out a few things, like a form, and then based on that, you could be given advice" (P12)
Values	"I think for me I want a collective to be involved so a sense of community is massively important, I want to know everyone's doing their bit not just an individual. Cause you all kind of bolster each other then." (P1) "Just to go back to sort of what's being discussed as we went round the room, I think the answer absolutely lies in community. My worry is that it will never ever be reformed the way that a community should be." (P11)

4.4.1.2 More information about individual actions

Secondly, there was continuous mention of the need for more information. Specifically, participants wanted clear, straightforward guidance on what they could do to help. Information would ideally be targeted to their individual circumstances, such as location of their homes, and be as specific as possible, such as lists of top five things to do. Participants suggested information could be made available on TV, in books and online. Although there was general support for individual engagement, the effectiveness of individual action was questioned and participants also raised the importance of everyone doing their bit, including other individuals, business and government.

4.4.1.3 Values

Finally, there was also discussion of values and the effect they might have on climate change action. Modern life was perceived as being shaped by self-interest and short-termism which was preventing attention being given to the environment or to communities. A couple of participants even suggested that it was their own selfishness that was preventing them from living more sustainably. In comparison, values that were identified as likely to increase climate change engagement were empathy, valuing of the natural world, community, and a sense of shared endeavour.

4.4.2 Participant stories: good adaptation approaches for the UK

The majority of the stories were set by 2050 and often within the next 20 years (see Table 9 for a summary of each story). Most of the stories were set in nearby locations, including Bradford, Leeds or other unnamed northern towns and villages. They also tended to be familiar and somewhat quintessential British settings, such as a mining village, a coastal fishing village, and a northern farming town. When asked to describe what made their story world good to live in, participants wrote about spending time with family and friends, being part of a community, good locally grown food, reliable weather and seasons, spending time outdoors, living sustainably with nature, and being able to enjoy life. Two stories were set in more dystopian, futuristic visions of the UK and a third was set beyond Earth.

Four of the stories described a flooding event and a further two described storm surges and/or sea level rise causing flooding. Two participants wrote about heatwaves. The following impacts were mentioned in one story each: complete ecological collapse; unpredictable weather; sub-freezing conditions; earthquakes; and impacts to the UK from weather events overseas. Often the things that had been identified as things of value in the opening description were disrupted by the events. For example, drought prevented the community growing local, sustainable crops; one happy family was left arguing when they were forced to move to a hotel after their home flooded; and local jobs and industries were lost when impacts struck effecting the overall viability and wellbeing of the community. More than half of the stories mentioned secondary impacts to food, fishing and farming.

In terms of who led the response actions and how, the stories divided into three groups. In the first group, the national or local government was in charge, leading the immediate clean

up and issuing legislation to prevent similar future events. In the second group, the community led and tended to focus on making the local community more sustainable, such as planting local crops and installing renewable energy sources. Communities also issued public information campaigns and lobbied the government for support. The final group didn't mention government or community. Three of these stories were led by rebel groups who initiated war or revolution to deliver the necessary changes, while in a fourth story a single magnanimous individual organised and funded the village's recovery.

The resolutions at the end of the stories tended to focus on the story worlds being better prepared to face similar events in the future. They were also now more informed about the causes of climate change and how to mitigate it. Additional benefits included a stronger community, a more reliable locally grown food supply, and a shift of values towards simpler and more sustainable lifestyles. What was valued at the end of the stories tended to strongly reflect what was valued at the beginning but the story worlds had learnt how precarious these things were and thus the need to take better care of them. For example, several stories narrated improvements in domestic food production. There were frequent suggestions that the events had made the communities stronger and better to live in. Nevertheless, a number of stories suggested that there would be a few individuals who would not be happy with the changes being made and would need to be coerced or forced into adapting. Society was further tested in the 'rebel' stories in which splinter groups became so disillusioned with the status quo that they initiated war or revolution to remake society.

As suggested above, the story writing process was intended to facilitate an imaginative exploration of what climate change adaptation in the UK could and should look like. Only one of the stories was ultimately pessimistic about the likelihood of positive change. By all other story endings sizeable improvements had been made and/or the citizens were better equipped to protect existing things of value. Some of the stories (positively) presented what might be considered a traditional approach to risk management, i.e. an extreme event occurs and a government led response tidies up the damage, and/or puts new legislation in place to prevent a reoccurrence. However, a number of stories sought to explore more transformational forms of response, and did so by developing adaptation approaches based on community collaboration and a reconsideration of social values.

Table 9 Summary of the principle plot points of the 12 stories

Participant	Set when	Set where	Disruptive events	Who responds and how	Outcomes
P1	In 50 years' time	UK	Drought destroys locally grow crops	Local councils put water saving regulations in place.	Greater sense of community and awareness of conservation. Less exposed to drought and loss of crops.
P2	2025	Large Yorkshire town	A heatwave forces people to stay indoors	The local community campaigns for the government to impose mitigation measures.	Low carbon lifestyles normalised and less exposed to extreme weather. Stronger community relationship.
P3	Not specified	The Complex and Earth	Complete ecological breakdown of Earth	Some survivors are forced to live in the Complex until a rebel group leads the re-habitation of Earth.	Earth has healed. Humans have learnt to live in harmony with nature.
P4	2035	Leeds	Flooding of the family home forcing them to move to a hotel	The government, the emergency services and charities help those in immediate need and put policies in place to reduce flood risk in the future	Dangers of flooding decreased and people more conscious about climate change. But otherwise minimal change.
P5	2020	Leeds	Flooding severely damages farming and food	The government leads the response to clean up the immediate impacts and better prepare for flooding in the future	Communities more prepared for future flooding and people more willing to live eco-friendly
P6	Not specified	Coastal community	Flooding affects local fishing and farming and makes homes uninhabitable	The government decides it is more economical to move the affected residents to a new, in-land development and to turn the abandoned land into a nature reserve	The community accepts the changes but further coastal erosion and flooding are expected
P7	Next week	North of England village	Extreme weather forces the local farm shop to close	The community grows their own food and changes their diet; also initiates a public information campaign as to why and how people can live more sustainably	Community is much happier with its new lifestyle and likes to promote how wonderful it is. Measures in place to manage extreme weather.
P8	2040	Fishing & tourist	Flooding damages the local fishing and	The community works together to put a range of mitigation actions in	Community still struggling with impacts and how best to stop

		community	tourism industries	place and lobbies government and business to help.	climate change. Greater awareness of dangers of prioritising profit.
P9	2050	Bradford	Flooding affects local farms and the community	The community works together to learn from the experience and to become more resilient for future floods, e.g. having less houses in high risk areas	Measures in places to manage extreme weather and reduce climate change. Community has learnt to work together.
P10	Not specified	Welsh village	Flooding to a mining town affecting the industry and forcing workers and their families to move away	A gentlemen from out of town rebuilds the town so it can again be a buzzing hub of happy family life	The problems are solved and will never happen again. Community life has been restored.
P11	2050	London	Subfreezing temperatures and regular earthquakes have made living above ground impossible	A group of rebels defy the orders of the rich so as to redirect resources towards the masses leading to war	War rages, breaking down society. Elsewhere in space a new planet is forming.
P12	2050	The UK as one large city state	Overseas impacts damages UK food imports	A rebel group leads a militarised campaign to move the country away from high-tech living towards sustainability including locally growing crops	Society and the rule of law are re-established under new leadership. Farming becomes an enjoyable, community activity.

4.4.3 Group review of pre-prepared stories: explanations of disengagement

The speedy and accurate summaries offered suggested that the pre-prepared adaptation stories were easy for the participants to understand. Most of the topics were familiar, although not necessarily in a climate change context, such as possible food shortages which was seen as relating more to Brexit. Considering each in turn (see Table 10), the ‘Defences against flooding’ story was liked for the specificity and confidence in using built defences to manage flooding but participants also worried this might disengage readers from taking their own flood preventative actions. ‘Insuring the home’ was the most disliked story as it was perceived as ignoring the reality that not everyone can access affordable insurance, for presenting regular flooding as fine providing you have insurance, and for ignoring the commercial gain insurance

industries make from homeowners. ‘More informed decision making’ was one of the most debated stories as participants generally responded well to its central message of encouraging people to use information to manage their own risks but criticised it for not detailing where that information could be accessed. Some participants also questioned the extent to which individuals are at liberty to make their own decisions, for instance, choosing to leave an over-heated workplace. ‘Innovations in food and farming’ was considered an interesting story but participants felt that any reaction they were likely to have to it, such as buying more British farm products, they were already doing. ‘Winners and losers in the natural environment’ was the preferred story, in part because participants liked the topic and in part because they thought it gave the clearest instructions as to what individuals could do to help.

Table 10 Example quotes of participants' response to the pre-prepared narratives

Narrative	Example Quote
Defences against flooding	“Cause you can be over-reliant on this, so you can think oh yea we’ve got flood defences in our area, we’re safe, absolutely ok, start getting cocky, and then a flood comes in, the flood defences don’t help, so what you’re gonna do, you’re just left alone, and your entire worldview is just diminished” (P2)
Insuring the home	“ you’ve accepted that your house is gonna get flooded, just get insurance, and when it floods you’ll get paid out and you’ll just keep going round the cycle but it’s not really like that” (P7)
More informed decision making	“I like [it] because it was trying to put the responsibility back in our hands but it wasn’t actually telling me how I need to keep myself safe and where can I become informed, so it was good in a sense but then I felt disempowered cause I was like I don’t how to get more info” (P1)
Innovations in food and farming	“I support the idea of-, it’s not just about what we can grow here, but of being less reliant on shipping vegetables and fruit from abroad and people going back to how it used to be, we have seasonal vegetables, and you just accept what’s in season as what we can buy.” (P6)
Winners and losers in the natural environment	“I think it’s one of those where you feel like you’re making a direct impact… you’re actually physically doing something, you can see it, you can see birds come and eat something, it’s just satisfaction” (P12)

I asked the participants a series of questions that were intended to measure the extent to which reading these stories might encourage active engagement (see Table 11). A number of participants suggested they would want to find out more, either about some of the story topics covered or about climate change issues more generally. Participants didn’t think the stories would encourage them to talk to others about climate change any more than they already did, which did differ among participants. Participants suggested a list of activities which individuals

could take themselves or support others in, although it was not always clear whether these were hypothetical suggestions or things the participants were likely to do themselves. The list included: being more involved in the community, caring for wildlife, checking local flood risk and insurance policies, buying more UK grown food, talking to your MP, and voting. When asked if, based on these stories, the participants felt confident that the UK was preparing well for climate change impacts all groups responded negatively.

Overall the participants did not respond positively to the stories and criticised them for two main reasons. Firstly, they were perceived as not adequately communicating the seriousness of the risks of climate change impacts. One participant argued that they were too 'soft' in their presentation of the risks and, when I suggested that a harder approach might scare people, she replied "I think people should be afraid! I don't think that's a bad thing necessarily" (P1). Others suggested that the events, such as flooding, were presented as one offs rather than as part of a growing trend of climate change impacts. Had this link been made more explicit it would "make it more personal… [you'd know] that you're probably doing stuff" (P7) which was contributing to climate change and thus flooding. Secondly, they did not provide the reader with enough information about what they could be doing to prepare for climate change impacts in the UK. As one participant summarised, they're "not really telling you to do anything except insure your house which I'm sure we've all done anyway and put a few seeds out for the birds" (P8).

Table 11 Example quotes of how participants said readers might respond to the stories

Having read these stories would you…	Example Quote
Want to find out more information	"Yea, I'd like maybe yea, a little bit more about where to actually-what websites to look at or what books to read or maybe 5 things you can do right now that you can actually do to help benefit the environment rather than just saying people are worrying about their wellbeing, and it's like yea of course we are! I just think maybe, it goes back to not having enough direction." (P8)
Talk to someone about what you'd read	"I think I talk about it regularly with friends, and bring it up in general conversation. I wouldn't say I'm sat there and it's keeping me awake at night but it is a concern yea." (P1) "I guess it depends on the sort of the people they hang out with as well. I know that I probably wouldn't sit down with my friends to talk about climate change!" (P2)
Take any actions of your own	"The bottom one maybe to actually look after animals in the garden and stuff. Cause there has noticeably been less butterflies and stuff and obviously they're pretty to see, it's nice to see them, and see bees pollinating and stuff." (P7) "the value of a house and the decision where to buy a house, that's majorly gonna impact me, so maybe I need to think further ahead so if I'm thinking of leaving a house to kids and things like that, is that house even gonna be worth anything when I leave it to them in the future" (P12)
Support others actions	"Think I'd be more likely to vote in the people who were more environment focused, that's more of a concern for me than a child getting a good education." (P1) "I suppose if there was some building about to be undertaken in an area which I knew was prone to flooding… I might want to go and talk to my councillor… wanting to go and vent my anger somewhere." (P6)

4.5 Discussion: How to make adaptation more engaging?

Throughout these workshops the participants expressed that they thought individuals, including themselves, should be engaged in adaptation and sustainability issues more generally. As one participant put it "Of course we have to look after ourselves!" (P8). At the same time the participants stated that they, and UK residents generally, were not as engaged as they should be. Reviewing the different workshop outputs for insight in to motivators or barriers to

engagement, two principle themes stood out: personal relevance of impacts, and knowing how individuals can take meaningful action. I will now discuss these in turn and consider how they might be addressed or developed for adaptation engagement.

4.5.1 Personal relevance of impacts

During the group discussions none of the participants identified themselves as being at imminent risk from climate change impacts. The pre-prepared stories were criticised for not making the seriousness, relevance and urgency of the issues sufficiently clear; instead, the stories seemed to support the participants' pre-existing impressions that climate related risks were still a future issue for most that would be taken more seriously when escalating levels of risk demanded it. Nevertheless, most of the participants' stories described climate change impacts happening in story worlds which were fairly temporally and very geographically close to the time and setting in which the workshops took place. Further, the stories were often very socially close to familiar daily life, focusing on family, community, food and leisure activities. That participants distanced themselves from the risks being discussed aligns with other studies finding that people tend to think of climate change as happening to others in another time or place (Pidgeon, 2012, Taylor et al., 2014b). This might be a problem for adaptation if perceiving risks as personally serious and relevant is a precursor to action, as was suggested by the literature reviewed in Section 1.2.2. Therefore, a key challenge for adaptation engagement is finding ways to make climate change impacts seem more relevant to those who say they are not yet experiencing them.

4.5.1.1 Reducing psychological distance

Psychological distancing occurs when individuals perceive risks as being spatially, temporally or socially distanced from themselves, or as unlikely to happen (Trope and Liberman, 2010). Here, participants particularly tended to temporally distance the risks of climate change and they felt supported in this view by the pre-prepared narratives they reviewed. One immediate means of addressing this might be to simply emphasise the immediacy of those climate change impacts the UK is already experiencing, particularly increased flooding and longer periods of hotter weather (Committee on Climate Change, 2017). Additionally, it might be beneficial to reconsider what scale of impact constitutes something being categorised as a risk so to reframe what 'immediate personal relevance' refers to. In Chapter 3, I found that newspaper coverage of climate change impacts often emphasised their unprecedented largeness by reiterating the

number of homes now at risk from flooding or providing lists of species now struggling. The participants' response to these stories suggest that while this more dramatic framing may provoke reader interest, it is less effective in terms of encouraging individual engagement in adaptation. In their own stories participants focused on secondary impacts that were almost mundane, such as the local farm shop running out of locally grown food due to extreme weather or friends not being able to socialise during a heatwave, but which were nevertheless considered sufficiently meaningful and valued to form the basis of an adaptation story. (This draws similarities with Chapter 2 in which interviewees were concerned about climate change interrupting daily routines and changing seasonal customs). The stories' exploration of how impacts will interact with daily routines perhaps better reflects how many in developed countries will, for now at least, experience climate change than do more dramatic narratives (Toole et al., 2016). Therefore, there is an opportunity within the public discourse to include greater discussion of the small scale but meaningful day to day impacts and changes that people are already experiencing.

4.5.2 Roles and responsibilities

During the group discussions, participants debated the viability and responsibility of individual action. Local and national government, private business and communities were all identified as groups which also needed to play their part. This was usually framed as 'as well as', as opposed to 'instead of', individual action but in several of the participants' own stories most if not all the responsibility was placed with either communities or government. As with earlier studies therefore, including the interviews reported in Chapter 2, the question of who should lead and undertake adaptation in the UK is one of the most debated issues within public perceptions of adaptation (Cotton and Stevens, 2019). Additional to the question of responsibility, not knowing what individuals could do even if they wanted to was also identified as a key barrier to engagement. This was discussed throughout the workshops and when participants reviewed the pre-prepared stories as their final task, they strongly criticised them for failing to provide the type of information they had already identified as missing from the public discourse.

Uncertainty about responsibility and a perceived lack of knowledge have already been identified as barriers to individuals taking adaptive actions in areas which have experienced or are more likely to experience extreme weather events (Porter et al., 2014, Thomas et al., 2015).

There is so far much less research available exploring adaptation with a general audience, to which this study contributes. Based on these findings feeling responsible and knowing what to do are likewise important engagement factors for a general audience.

4.5.2.1 Roles and responsibilities for individuals

One way that that this could be addressed is by increasing the visibility of individual adaptation within the public discourse. As discussed in Chapter 1, Social Constructionism Theory argues that people's individual identities are shaped by selecting from options presented as available and socially acceptable (Burr, 2003). If individuals can't see examples of people like them taking action they are unlikely to create those roles for themselves (Burr, 2003). Often the media is influential in shaping and disseminating what are considered socially acceptable roles and responsibilities (Fairclough, 1995, Brown, 2017). This can be seen playing out here as participants looked to the pre-prepared stories for information and, finding limited roles for individuals, said they found the stories disengaging. If media recipients repeatedly have that experience they might over time conclude that individuals are not part of the adaptation story.

This seems to provide a potentially very beneficial area to be developed in adaptation engagement. Some types of facts-led communications can provide information and these should be pursued as part of the adaptation discourse. A number of studies have already highlighted the need for better publicly available guidance about what people can do to manage their exposure to flooding (EA, 2015) and hot weather (Lefevre et al., 2015, Howarth et al., 2019). Other types of communications, particularly those developed by the arts and humanities, are able to display examples of individuals acting in response to climate change impacts and so providing role models (Veland et al., 2018). This in time can re-establish what is considered acceptable and normal as to how the UK is approaching adaptation and the roles and responsibilities for individuals within that. The participants noted how much they appreciated the opportunity to talk about adaptation but, with a couple of exceptions, most felt it wasn't something they felt comfortable doing with their social groups. Including examples of this in popular formats such as soap operas might help address this stigma.

4.5.2.2 Roles and responsibilities for community

The importance of community was discussed as something that had been lost in modern times. Participants suggested this might be acting as a barrier to climate change as individuals and

UK society in general were more likely to act in line with more self-interested and materialistic priorities. In the participants' own stories the importance of community was emphasised in three ways. Firstly, in several of the stories it was communities working together that led the response to creating more climate resilient societies. Secondly, in some of the stories an improved sense of community was mentioned as a positive outcome of the mostly negative experience of the climate impact(s). Finally, several stories mentioned the need to ensure everyone was willing to act as part of the community, ideally due to shared goals but if not through force. This was most explicit in the rebel stories in which the breakdown of society was as much a challenge to resolve as were the climate impacts themselves.

The importance of a strong sense of community in addressing social problems had been recognised for some time (Putnam, 1995), and it has been suggested as an area in need of further exploration in relation to adaptation (Pelling and High, 2005). Studies suggest that individuals are more likely to be willing to take action if they think others are doing the same (Mildenberger and Tingley, 2017) and that other sectors of society are fulfilling their responsibilities (Adger et al., 2013b). A story writing exercise in Sweden, found that individuals were more willing to appear in the adaptation story as part of a collective, than as individuals (Hendersson and Wamsler, 2020). Case study research also finds that adaptation strategies can benefit from community involvement during planning and implementation (Dittrich et al., 2016, Ping et al., 2016). Despite this there is so far little focus on community action within official communications (e.g. DEFRA, 2018). This suggests at a further opportunity to increase the visibility of UK residents within the adaptation discourse, but this time in their roles as community members. As with the above point, this could act as a means of providing information and examples but also of normalising the idea of community level adaptation.

4.6 Conclusion

In this study I ran a series of storytelling workshops to elicit ideas as to how to make adaptation more engaging for UK residents. Although supportive of individual engagement, participants thought that they, and others like them, were not yet very engaged. Participants did not yet perceive climate change risks as personally relevant, they supported individual responsibility

but also deferred to the responsibilities of other groups, and they said they didn't know what they could or should do, all of which were acting as barriers to their greater engagement. However, the study also identified a number of ways in which adaptation might be made more engaging for individuals. Focusing on the small but meaningful changes people are already experiencing in the UK might make climate change risks seem closer even to those who don't feel personally threatened by large events. There is also an opportunity to make individuals much more visible within the UK's adaptation story and discourse. Finally, due to the importance accorded to community by the participants, greater visibility of community level adaptation might also be a useful approach to increasing engagement.

These findings also contribute to understanding of public perceptions of adaptation which remains a developing field. The storytelling format facilitated unique consideration of what adaptation might be beyond a more narrow focus on what is perceived as currently possible or likely to happen. For example, although a strong sense of community was perceived as largely gone from modern British life it was reprioritised as a positive force for change in the fictional stories, an insight which might not have emerged had the discussions been limited to real world settings.

4.6.1 Limitations and further research

The findings presented here are limited by the small number of participants drawn from one area of the UK. Additionally, participants were recruited for their willingness to discuss climate change for three hours, suggesting they might already be more interested and/or more concerned about the topic than a general audience. As such, the sample cannot be said to be representative of the UK population. Therefore, while the workshops provided useful in-depth, detailed data, for the findings to be confidently employed by other researchers or practitioners they need to be tested with a larger more representative sample. Therefore, in the following Chapter the key engagement ideas emerging here will be developed for testing with a larger national sample.

Chapter 5 Does altering the temporal proximity of risks, and the roles given to individuals increase engagement with adaptation? Findings from a national survey

Abstract

Additional to the workshops reported in the previous chapter, this study responds to the second research objective of evaluating how engaging the current public discourse adaptation narratives are for UK residents and developing ideas to make them more engaging. Two key opportunities for making adaptation more engaging emerged from the workshops: presenting climate change impacts as more personally relevant, and increasing the visibility of roles for individuals. Here, these themes were used to develop story based communications which were then tested in a quantitative survey with a national sample. The study used a 2x3 between subject design by randomly assigning participants to one of six short stories that varied whether 1) the risks and adaptation response were framed as happening now or in the future and 2) whether adaptation was framed as something to be done by the government and other organisations or by individuals or by communities. Participants were then asked a series of questions intended to test their adaptation engagement which was measured as temporal perceptions of climate change risks, their agreement with example roles and responsibilities for individuals, perceptions of when adaptation should happen, and perceptions of location of responsibility for adaptation. I found that the stories had minimal effect on the measures of engagement. However, participants across conditions perceived a range of extreme weather events, including hotter weather, as being of immediate concern for the UK. Despite this the participants' agreement with the suggested roles and responsibilities for individuals was modest. These findings suggest that the extent to which concern about climate change impacts is now shared by a large majority of the population could be better communicated. They also provide initial evidence that individuals might be more willing to engage as part of a collective, such as with their community or in partnership with government initiatives, than to be individually responsible.

5.1 Introduction

This study, combined with the previous chapter, addresses the second research objective of this thesis, which is to evaluate how engaging the current public discourse adaptation narratives are for UK residents and to develop ideas to make them more engaging. The explorative workshops, detailed in Chapter 4, found that the current public discourse failed to engage participants by presenting climate change impacts as a distant threat, and at times even discouraged individual engagement by focusing so heavily on government responsibility. This study, therefore, focused on testing new engagement opportunities emerging from the workshops with a larger sample. Testing the robustness of new communication strategies before they are adopted for use is a key step in the mental models approach to developing more effective engagement and communications (Morgan et al., 2002, Bruine de Bruin and Bostrom, 2013). The workshops highlighted two key engagement opportunities: making climate change impacts seem more personally relevant, and increasing the visibility of roles and responsibilities for individuals.

5.1.1 Personal relevance of impacts

As detailed in Chapter 4, the workshop participants thought of climate change as a serious and worrying issue for the UK but they did not feel themselves to be imminently at risk. They agreed that individuals, including themselves, should be involved in adaptation but they also felt that their own engagement could be delayed until climate change impacts became a greater personal priority. Other studies have similarly found a tendency for UK residents to think of climate risks as of more concern for others (Lorenzoni et al., 2007, Pidgeon, 2012). However, perceiving risks as serious and relevant to yourself is likely a necessary precursor to taking responsive actions (Grothmann and Patt, 2005). Therefore, the first engagement opportunity this study addressed was developing and testing ways to make this a sufficiently serious and relevant topic to inspire engagement even in those who aren't yet, or don't yet perceive themselves as, experiencing climate change risks and impacts.

Previous research has addressed this challenge by considering the effect of psychological distancing, which is when individuals think of a phenomenon as far away whether that be temporally, geographically, socially or in terms of likelihood (Trope and Liberman, 2010). Perceived psychological distance of risks can influence how individuals respond (Brügger et al., 2015a), as was seen in the workshops when participants said they might

be less willing to allocate immediate resources to manage seemingly distant risks. As such this study questions whether finding ways to reposition climate change risks as psychologically closer might trigger a greater and/or more immediate response in terms of adaptation engagement. There is some related evidence of this approach being effective. One US study found increased support for management of climate change impacts when they were framed as happening more geographically near to the participants (Singh et al., 2017). A second German study found that reducing the perceived temporal distance of climate change impacts, by encouraging participants to adopt the perspective of someone living in 2105, increased participants' engagement with the information made available about current risks and impacts (Pahl and Bauer, 2013).

However, other studies find that simply reducing the temporal or geographical distance of climate change won't necessarily increase people's active engagement with the topic (McDonald et al., 2015, Brügger et al., 2016, Schuldt et al., 2018). Therefore, research has further considered under what conditions reducing psychological distance can be made more effective (e.g. Brügger et al., 2015a, Zaval et al., 2015, Sacchi et al., 2016). One of the most robust findings from climate adaptation studies so far is that if people are to be engaged in managing the risks they need to perceive that there are credible means of responding available (Grothmann and Patt, 2005, O'Neill et al., 2013, Fisher, 2015). Studies of psychological distance support this, finding that if climate change risks are brought too close, without inclusion of response options, this can initiate strongly negative emotions such as fear which can lead to avoidance or denial of the risks (McDonald et al., 2015, Brügger et al., 2016). Consequently, including a range of solutions alongside the problem is now considered best practice in adaptation communications (Moser, 2014, Wirth et al., 2014, Climate Outreach, 2019). Additionally, for psychological proximity to be effective it needs to be applied to things of value, such as specific places (Brügger et al., 2015a), or, as suggested by the workshops, daily norms and activities.

5.1.2 Increasing the visibility of roles and responsibilities for individuals

During the workshops, as in previous studies, participants generally favoured sharing the responsibility for adaptation between government, individuals and other sectors of society (Ipsos MORI, 2013, Cotton and Stevens, 2019). At the same time, participants strongly voiced their frustrations that they didn't know what they could do to be more engaged and involved,

and that this information wasn't being made available. Pre-prepared adaptation stories based on UK newspaper coverage (see Chapter 3) were strongly criticised for failing to provide any personally useful information and, further, for presenting individuals in very limited roles, such as buying home insurance and feeding the birds. Therefore, the second engagement opportunity this study addressed was developing and testing ways to increase the visibility of roles and responsibilities for individuals.

Social Constructionism Theory argues that individual identities and behaviours are formed and validated by their social surroundings (Berger and Luckmann, 1991, Burr, 2003). When applied to adaptation it means the focus is less on the material capabilities or personal attributes influencing adaptation, although these elements will also be important, and instead on the socialisation of adaptation engagement. This approach has been used fruitfully elsewhere in sustainability research. For example, research has repeatedly found that presenting pro-environmental behaviours as the social norm is an effective way to generate individual behaviour change (e.g. Goldstein et al., 2008, Nolan et al., 2011, Thomas and Sharp, 2013). However, these studies usually tested specific, singular behaviours, such as whether to recycle or not, or whether to re-use hotel towels or not. What is less clear from the literature is the extent to which social normalisation can be applied to generating engagement, which combines cognitive, emotional and behavioural responses and is therefore a much more complex experience than is taking single actions (Lorenzoni et al., 2007). In response, Veland et al (2018) have suggested that greater inclusion of climate issues in fictional formats could provide character types, and even role models, through which audiences can vicariously explore the new and complex circumstances. Drawing on this literature, this study is based on the hypothesis that providing more examples of individuals taking part in adaptation will increase people's willingness to engage.

Additionally, this study will question whether this might be further benefited by increasing the visibility of individuals acting as community members. Social groups working together towards a common goal inherently implies social acceptability and normalisation. Further, social groups were highly valued by the workshop participants and considered to be influential in shaping behaviour. Nevertheless, participants also thought that in modern times most UK residents now prioritise materialistic and egoistic ambitions over community values and they suggested the lack of social consensus about prioritising environmental and social

values was stymieing their own levels of engagement. A large UK survey found comparable results, as 74% of respondents said they prioritised compassionate over selfish values but 77% said that they didn't think others would do the same (Common Cause Foundation, 2016). Those who thought this about others were less willing to take part in citizen activities, such as joining meetings, voting or volunteering. The influence of shared norms has also been found in relation to climate change, in which a US sample was found to underestimate others pro-climate concerns but said they were more willing to take part once they had learnt others were as concerned as they were (Mildenberger and Tingley, 2017).

5.2 Research Questions

This study used story based communications to test the two key engagement opportunities developed from the preceding workshops. Firstly, to test the effect of altering the temporal proximity of climate change risks and the response actions taken, I randomly assigned participants to stories that were set as either already happening or in the future. Secondly, to test the engagement effects of providing participants with examples of individuals taking part in adaptation, I randomly assigned participants to stories in which all adaptive actions were done either by the government and other organisations or by individuals or by communities. This created a 2x3 between subject design as summarised in Table 12.

The principle research question of this study was to understand how the two conditions, as presented to participants through the stories, affected their engagement with adaptation, operationalised in two ways:

> 4a. To what extent do the stories affect participants' temporal perceptions of climate change risks?
>
> 4b. To what extent do the stories affect participants' agreement with example roles and responsibilities for individuals?

I also took the opportunity to examine the following auxiliary questions:

> 4c. To what extent do the stories affect participants' perceptions of when adaptation should happen?
>
> 4d. To what extent do the stories affect participants' perceptions of location of responsibility?

5.3 Methods

5.3.1 Participants

Participants for the online survey were recruited using Qualtrics who financially compensated participants for their time. The final sample of 1,044 participants had a mean age of 45 (*SD*=16), with 504 men, 536 women and 4 other. The sample aligned with the 2017 UK census data on age and gender, as well as population split between the four countries and the nine English regions (see Appendix D1).

Before learning the topic of the survey or seeing a story, participants were asked to select their top three most important issues for the UK from a list of 15 options, including the national health service, crime, poverty and inequality, the economy, and terrorism, amongst others, as well as climate change, protecting the environment, and extreme weather events, plus other and don't know options. When asked to think about 'today', 33% of participants included climate change in the top three which grew slightly to 36% when asked to consider 'in the future'. In both timeframes this made climate change the second most selected answer after 'the National Health Service/ health care'.

Later in the survey participants were asked about their own experience of changing weather over their lifetime which, as an experience question, was not expected to depend on the stories they'd been shown. Participants thought snow (61%) and cold winters (42%) had got a lot or a little less frequent. A majority of participants said that flooding (81%), periods of heavy rain (74%), coastal erosion (63%) and mild winters (62%) had become a little or a lot more frequent. This was also the case with heatwaves (60%) and hotter weather (59%) and, to a lesser extent, for dry periods without rain (43%). In sum, the sample considered climate change to be an important issue for the UK and had experience of changing weather patterns.

This research received ethical approval from the University of Leeds, reference LTLUBS-274.

5.3.2 Developing the story variants

The six story variants were developed by varying two conditions using a 3x2 design, see Table 12. The 'When' (already happening, in the future) condition had two levels. Half of the stories framed both the climate change impacts and the responsive actions as 'already happening',

while the other half framed them as 'in the future'. The 'Who' (government and other organisations, individuals, communities) condition had three levels. In the first level the government and other organisations, such as building companies and water companies, were described as undertaking the responsive actions; there was no mention of what individuals could do in these stories. In the second level individuals were described as taking actions to protect themselves in their immediate environment, such as making the home more habitable in hot weather and managing their own access to water and food. The reader was encouraged to imagine themselves in the story, as the story protagonists were described as "individuals like you". In the third level the focus was on communities responding. Again the reader was encouraged to place themselves in the story which was about "your community" and "you and other volunteers from the community". Research has shown that if the reader is encouraged to identify with the central protagonists they are more likely to agree with the messaging of the story (de Graaf et al., 2012).

Table 12 Summary of the 3x2 story conditions

		Condition 'Who'		
		Government and other organisations	**Individuals**	**Communities**
Condition 'When'	**Already happening**	Climate change impacts are already happening and these organisations are already acting to protect the UK.	Climate change impacts are already happening and individuals like you are already acting to protect themselves.	Climate change impacts are already happening and your community is already acting to protect itself.
	In the future	Climate change impacts will happen in the future and these organisations will act in the future to protect the UK.	Climate change impacts will happen in the future and individuals like you will act in the future to protect yourself.	Climate change impacts will happen in the future and your community will act in the future to protect itself.

Box 2: Individuals already happening story

The impacts of climate change are already happening. Last winter lots of homes in the UK were flooded again. Summers are now much hotter for longer. The sunny weather is nice but the higher temperatures are making day-to-day living and working harder. They're also causing most of the country to have several months of drought every year. The landscape is much browner than it used to be and some wild birds and animals are losing their habitats. The more extreme weather means British farmers are struggling.

Individuals like you have already taken actions to protect themselves. Individuals are using expert information to decide what they will prioritise. **They** are making adjustments to their homes to stop floodwater getting in. **They** have bought sun shades for their windows and **they** are working from home more to manage the heat. **They** are collecting their domestic waste water in storage butts and using it to water the garden. **They** are leaving out food for birds and other wildlife. **They** are starting to grow their own food in the garden or in an allotment.

Climate change impacts **are already happening** and **individuals like you are already acting** to protect themselves.

The texts followed the basic definition of 'story' by having a beginning, middle, end structure (Moezzi et al., 2017). Each story began by describing impacts that were already affecting or would affect the UK in the future. The impacts were described as affecting things that had resonated as valuable in the workshop sessions including disruptions to day to day living, British food and farming, and nature. Then the stories described the featured group taking actions now or in the future. The actions were kept as similar as possible across all stories differing only in terms of the group undertaking them. For example, when responding to the threat of drought the water companies built facilities to reuse domestic waste water on the land; individuals captured their domestic waste water in butts to water their garden; communities collected domestic waste water from homes to water the local greenery. The over-all tone of the stories was pro-active and they ended with a generally positive final statement, as quoted for each story in Table 12. This was done as pervious research has found that communicating impacts without also including ways people can respond and manage the risks can be disengaging (Moser, 2014, Wirth et al., 2014). The stories had an average word count of 219 and Flesch-Kincade reading grade 8, which is the equivalent of age 13-14 (Kincaid et al., 1975). One of the stories is shown in Box 2 and all stories are in Appendix D2. The participants were

randomly allocated to one of the six stories, resulting in an average of 174 readers per story (see Appendix D3 for exact number of participants per story). The story text was on the screen for a minimum of 30 seconds, after which participants were asked a series of questions intended to measure their engagement with adaptation.

5.3.3 Measures

5.3.3.1 Temporal perceptions of climate change risks

Participants were asked when, if at all, they thought the UK would start feeling climate change impacts, with the options ranging from 'We are already feeling the impacts' to 'Never'; the question included a 'Don't know' option which was removed from the analysis. They were then shown a list of eight climate related impacts, including flooding, coastal erosion and new pests and diseases, and were asked if each of these were a concern for the UK using a continuous scale from '1. Now', '2. In the future' and '3. Not at all'.

5.3.3.2 Agreement with example roles and responsibilities for individuals

Participants were presented with nine examples of actions individuals can take in their homes or daily lives to help manage their own exposure to climate change impacts, such as 'Install guards or covers to prevent flood waters from entering my home' (see Table 13 for full list). They were asked to what extent they disagreed or agreed with the statements and answered using a 5-point Likert scale, from '1. Strongly disagree' to '5. Strongly agree', with the interim points not labelled. The statements were based on a question asked in the earlier PREPARE survey (Ipsos MORI, 2013) with additional items added to capture more of the actions that had been mentioned in the stories.

Participants were also presented with eleven statements about participating in adaptation efforts, such as 'I will take part in community actions to prepare my local area for climate change impacts' (see Table 14 for full list). Participants were asked to what extent they disagreed or agreed with the statements using the same 5-point Likert scale as above. As participation has not been asked before the statements were written for this survey but drew on participation ideas mentioned during the workshops.

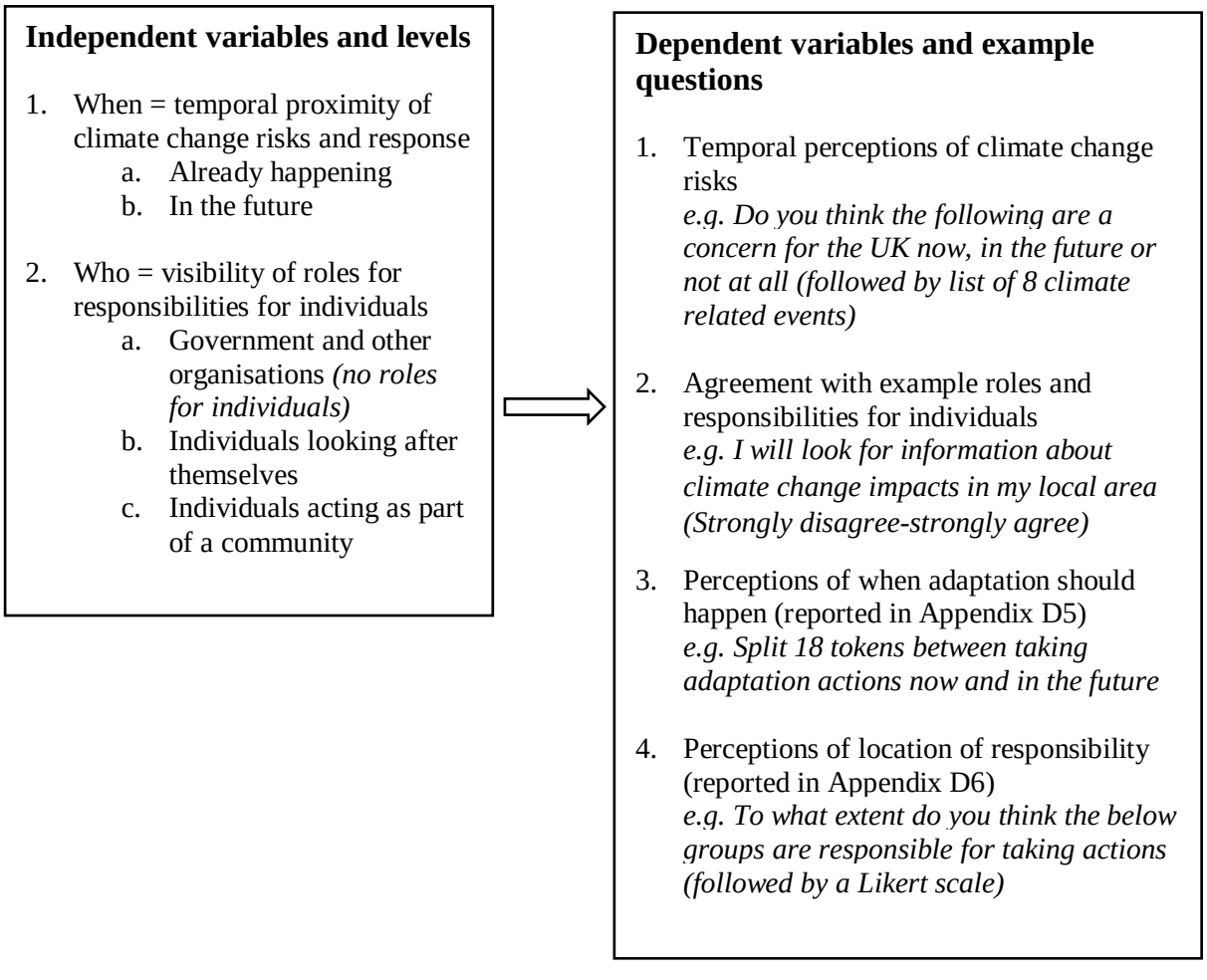
5.3.3.3 Perceptions of when adaptation should happen

Participants were allocated 18 tokens intended to represent the UK's adaptation budget. They were asked to split these as preferred between actions taken now to protect against current impacts, and actions taken in the future to protect against future impacts. Budget allocation questions had been used in the PREPARE study (Ipsos MORI, 2013, Taylor et al., 2017) and were replicated here as they offer an interactive question format, additional to matrix questions. The participants were given 18 tokens so that they could choose to evenly divide them among the response options, here and in the following section.

5.3.3.4 Perceptions of location of responsibility

Due to wanting to test the effect of the stories, both of the location of responsibility questions limited their choices to the three groups mentioned in the stories. The first question asked participants to rate each group from '1. Not responsible at all' to '5. Very responsible' with the interim numbers unlabelled. The second question was intended to measure portioning of responsibility by issuing participants with 18 tokens, intended to represent the UK's adaptation budget, which they could divide as preferred between the three groups.

Figure 5 Summary of independent and dependent variables



5.3.4 Contribution of Defra and the CCC

The survey and stories were sent to representatives from the Department for Environment, Food and Rural Affairs, a department of the national government, and from the Committee on Climate Change, an independent advisory committee to the government, for their builds. Due to their feedback the informational accuracy of the content compared to the latest available official information was improved. After the survey was completed, the key findings were shared with Defra and the CCC in an online presentation.

Following a soft launch, I strengthened some of the conditions in the story texts and added in additional attention checks to the survey. The data collected during soft launch is not included in the final sample analysed here.

5.3.5 Data analysis

The data was analysed using SPSS Statistics 24. The first two variables (see Figure 5), which directly relate to the engagement opportunities identified during the earlier workshops, are presented in this chapter. For the first dependent variable, I first present the descriptive statistics and then the findings from analysis of variance tests (ANOVA). For the second variable I show the descriptive statistics and the results from one-sample t tests. I then present the findings from principle component analyses of the lists of roles and responsibilities participants were shown and finally ANOVAs on the components identified.

While issuing a survey I also took the opportunity to test additional variables which did not directly relate to the engagement opportunities, see variables three and four in Figure 5. Both of these measures were analysed using two-way ANOVAs. The results are reported in Appendix D6 and 7.

5.4 Results

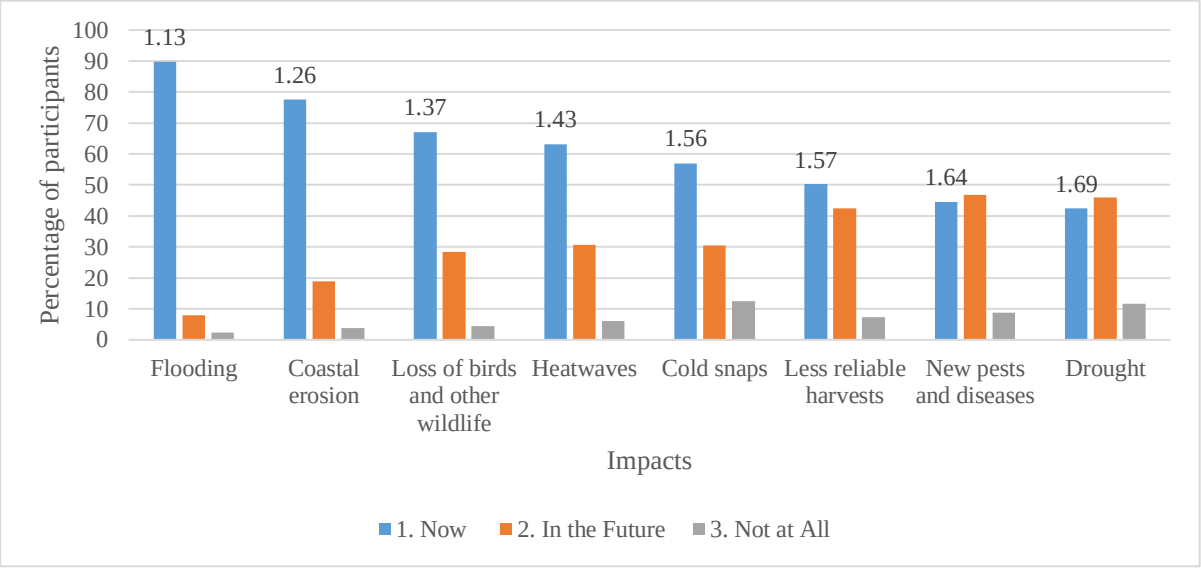
5.4.1 Temporal perceptions of climate change risks

When asked when if at all, the UK would start feeling climate change impacts 59 participants responded ‘Don’t know’. Of the remaining sample, 75% of participants selected ‘We already are’ and 91% of participants said the UK would be feeling climate change impacts within the

next 10 years. The responses were coded on a continuous scale ranging from '1. We already are' to '9. Never', giving a total sample mean of 1.84. A two-way ANOVA found no significant differences depending on who the story they read was about (F=(2,979) =1.84, p=0.16) or the interaction of the conditions (F=2,979) =1.24, p=0.29). However, there was a small effect of the when condition (F=(1,979) =5.89, p=0.02, partial η2=0.01). Those who has read stories set as already happening thought the UK would start feeling climate change impacts sooner (M=1.70) than those who had read stories set in the future (M=1.98), although both of the means were at the low end of the scale.

When asked to consider if and when a list of impacts would be of concern on a continuous scale in which lower numbers represented more immediate concern (see Figure 6), more participants thought flooding (90%), coastal erosion (78%), loss of birds and other wildlife (67%), heatwaves (63%), cold snaps (57%) and less reliable harvests (50%) were happening now, than did those who thought they were future or non-existent concerns. Only new pests and diseases (45%) and drought (43%) were more often seen as concerns for the future rather than for now. The number of participants who selected 'not at all' was very low across the range of impacts.

Figure 6 Total sample response to: Select whether each of the following are a concern for the UK now, in the future or not at all



Key: The data labels show the means for the total sample using the coding shown in the legend

Two-way ANOVAs found no significant differences in the perception of when seven of the eight impacts would be a concern for the UK depending on which story participants had read, see Appendix D4 for the full results. The exception was drought which was more likely not to be considered a concern for now by those who had read stories set in the future (F=(1,1038) =6.24, p=0.01, partial η2=0.01).

5.4.2 Agreement with example roles and responsibilities for individuals

For the first set of nine statements about actions individuals could take in their homes or daily lives, the total sample mean across all statements was 3.34 (SD=0.82). A one sample t-test found that agreement with eight of the nine statements was significantly above the point of indifference (=3), with the ninth statement being exactly on the mid-point (see Table 13). Actions that participants most agreed they might take were providing food or re-wilded spaces for birds and other wildlife, and making sure they have insurance cover for flooding or other extreme weather events. Those they least agreed they were likely to take were growing their own food, and installing guards or covers to prevent flood waters from entering their home.

Table 13 Results of the one sample t-test showing whether levels of agreement were significantly above or below the mid-point of reference

Component	Individual action statements	Mean
Sustainability	Provide food or re-wilded spaces for birds and other wildlife	3.76**
Extreme weather	Make sure I have insurance cover for flooding or other extreme weather events	3.58**
Sustainability	Collect domestic waste water or rainwater to re-use	3.50**
Extreme weather	Buy sun shades or blinds for my windows	3.41**
Extreme weather	Change my daily schedule to avoid the hottest part of the day during hot periods	3.27**
Sustainability	Plant trees or re-landscape my garden to provide more shade	3.22**
Sustainability	Replace hard surfaces with grass or other water absorbing surfaces	3.22**
Sustainability	Grow my own food	3.09*
Extreme weather	Install guards or covers to prevent flood waters from entering my home	3.00

*Key: * significant at p<0.05, ** significant at p<0.0001*

A principle component analysis of the nine statements found two components, one centred around sustainability actions (Cronbach's Alpha 0.83, loadings equal to or greater than 0.68) and the second on extreme weather actions (Cronbach's Alpha 0.64, loadings equal to or greater than 0.43), see Table 13. Two-way ANOVAs found that participants' agreement with the sustainability component was not effected by who the story they read was about (F=(2,

1038) =0.27, p=0.76) or the interaction of the conditions (F=2,1038) =2.21, p=0.11), but participants were more likely to agree they might take the actions if they had read a story set in the future (F=(1,1038) =10.59, p=0.001, partial η2=0.01). Levels of agreements with the extreme weather component was not effected by which story participants read (when F=(1,1038) =2.50, p=0.12, who F=(2,1038) =2.77, p=0.06, interaction F=(2,1038) =0.63, p=0.54).

For the second set of eleven statements about participating in adaptation efforts, the total sample mean across all statements was 3.12 (SD=0.93). A one sample t-test found that agreement with six of the eleven statements was statistically above the point of indifference, (=3) and disagreement with three of them was statistically below the point of indifference (see Table 14). Adaptation efforts that participants said they most agreed they might partake in were supporting the national government issuing new laws, policies or investments, and looking for information about protecting themselves and their home. Those they least agreed with were talking about preparing for climate change impacts in their workplace, and speaking to their council and/or Member of Parliament about how their area is preparing for impacts.

Table 14 Results of the one sample t-test showing whether levels of agreement were significantly above or below the mid-point of indifference

Participation statements	**Mean**
I would support the national government issuing new laws, polices or investments to guide the UK's preparation for climate change impacts	3.50**
I will look for information about how I could protect myself and my home	3.49**
I will consider the issue of preparing for climate change impacts when deciding who to vote for in local or national elections	3.43**
I will look for information about climate change impacts in my area	3.40**
I will support planning and investment in preparing the local area for climate change impacts	3.35**
I will talk about preparing for climate change impacts with my family and friends	3.22**
I will spend money on making my home more resilient to climate change impacts	3.02
I will take part in community actions to prepare my local area for climate change impacts	2.96
I would be willing to pay more tax to fund the UK's preparation for climate change impacts	2.79**
I will talk about preparing for climate change impacts in my workplace	2.73**
I will speak to my council and/or Member of Parliament about how my area is preparing for climate change impacts	2.42**

*Key: * significant at p<0.05, ** significant at p<0.0001*

A principle component analysis found all eleven statements loading on to one factor (Cronbach's Alpha 0.94, all loadings equal to or greater than 0.71). A Two-Way ANOVA

found small but significant effects of the Who (F=(2,1038) =3.97, p=0.02, partial η2=0.01) and When (F=(1,1038) =5.04, p=0.03, partial η2=0.01) conditions. Participants were more likely to agree with the participation statements if they had read stories that were about individuals rather than the government and other organisations, and which were set in the future rather than now. There was no significant effect of the interaction between the two conditions (F=(2,1038) =1.67, p=0.19).

The results for the third and fourth dependent variables (see Figure 5) are reported in Appendix D6 and 7.

5.4.3 Summary of the effects of the conditions

Table 15 Summary of the effects of the conditions on the measures of engagement

	Temporal perception of UK climate change risks	**Agreement with example roles and responsibilities for individuals**
When (Already happening, in the future)	• 'Already happening' readers thought the UK would feel the impacts of climate change sooner than 'In the future' readers. • In term of specific impacts, 'In the future' readers were more likely to see drought as a temporally distant risk.	• 'In the future' readers were more likely to agree to individual actions relating to sustainability and participation, but no effect on individual actions relating to extreme weather.
Who (Government and other organisations, individuals, communities)	• No effect	• 'Individuals' story readers were more likely to agree with individual actions relating to participation than 'Government and other organisations' readers. No effect on actions relating to sustainability or extreme weather.

5.5 Discussion

This study responded to the challenge of making adaptation a more engaging topic for individuals. I asked a national sample representative on age, gender and region to read one of six adaptation stories which varied according to two conditions. Under the 'when' condition stories were either set as already happening or in the future and under the 'who' condition the stories featured adaptation actions being undertaken by either the government and other

organisations or individuals or communities. In the following, I will first discuss the key finding from the effects of the conditions which was that overall they had minimal effect on the participants' responses. I will then discuss additional key findings independent of which story participants read which were that UK residents now perceive a range of climate change impacts as already a concern for the UK, and that there are still limitations to the roles and responsibilities UK residents give to individuals. Finally, I will discuss how these findings can contribute to the challenge of making adaptation a more engaging topic.

5.5.1 Addressing the research questions on the effect of the conditions

As summarised in Table 15, the effects of the conditions on the two measures of engagement reported in this chapter were minimal. In terms of temporal perceptions of climate change risks, those who had read stories set as already happening responded that the UK would feel the effects of climate change sooner than did those who had read stories set in the future, although this was in the context of a very high percentage of the total sample reporting that the UK is already feeling the effects, discussed further below. Additionally, those who had read stories set in the future were more likely to see drought as a future rather than current problem. For the second measure, agreement with the example roles and responsibilities for individuals were partially effected by both conditions, with those participants who had read stories set in the future or which featured individuals showing greater agreement with some of the example actions.

For the additional two measures reported in the Appendix, the conditions had no effect on perceptions of when adaptation should happen. For perceived location of responsibility, there were some small effects, with those reading 'In the future' stories perceiving the government as more responsible than those who had read 'Already happening' stories and those who had read 'Community' stories allocating more of the adaptation budget to communities than did those who had read stories about other groups.

5.5.2 Additional findings

Analysing the survey responses across the total sample found some interesting additional findings which were not dependent on which story participants read.

5.5.2.1 Perceived immediacy of a range of climate change impacts to the UK

Climate change was the second most frequently selected priority for the UK today and in the future, with a third of participants selecting it as one of their top three important issues for the UK. When the same question was asked in 2013, climate change was considered the 13th most important priority for the UK, with only 5% selecting it as a top 3 issue for 'today' (Ipsos MORI, 2013). It should also be reiterated that, in this survey, this question was asked before the principle topic of the questions had been revealed so providing unprompted results. While this represents a significant change compared to research undertaken in previous years, the findings align with those from a second large survey taken in late 2019 (Steentjes et al., 2020) suggesting that the combined findings from these two large surveys are robust: UK residents now consider climate change impacts to be of immediate concern for the UK.

As participants moved through the survey questions, the issue of 'climate change' was narrowed to 'climate change impacts the UK will feel', and then narrowed again to consideration of specific impacts, e.g. flooding or coastal erosion. In all instances there were high levels of agreement that these issues were already of relevance and concern to the UK. Similarly, when asked about personal experience of changing weather, participants had experienced changes in a range of weather types. Of particular note here is the changing perceptions and experiences of hotter weather and heatwaves, which the majority of participants saw as becoming more frequent and already of concern. When asked in 2013 the majority of participants thought hotter summers had become less common in the UK (Taylor et al., 2014a). Research has also found that UK residents often perceive hotter weather as enjoyable and therefore might not think of it as a concern, although of course it's possible to be both (Lefevre et al., 2015, Bruine de Bruin et al., 2016). It should be noted that in recent years the UK has experienced several periods of hot weather, most notably the summer of 2018 which was the warmest and sunniest since 2006 (Met Office, 2018), as well as record breaking temperatures in February and July of 2019 (Met Office, 2020).

5.5.2.2 Still limited roles and responsibilities for individuals

When presented with example roles and responsibilities for individuals, participant agreement that these are things they might do was moderate, with the mean responses slightly higher than the mid-point of the agreement scale. Across the two lists of statements participants were asked to consider 20 actions and efforts, including personal and political questions such as talking to

family and voting. Previous research into climate change behaviours and identity has found that continuity of identity is important, i.e. that behaviours are presented in a way that doesn't challenge existing identity principles (Jaspal et al., 2014). Therefore, it might be that participants felt overwhelmed by the range and types of actions they were being asked to consider undertaking. There was greater agreement with statements in which the individual was not required to take a leadership role, such as supporting government policies and considering adaptation when deciding who to vote for, than for those that did, such as talking to an MP or councillor.

5.5.3 Learnings for engagement

In the Introduction I referred to the earlier workshops (see Chapter 4) to identify two engagement opportunities for climate change adaptation, which were presenting climate change impacts as personally relevant and making roles and responsibilities for individuals more visible. I will now consider what can be learnt from the findings in terms of substantiating and developing those two opportunities.

Starting with the findings from the research questions, perception of risk has previously been found to be a key motivator of adaptation engagement. The findings reported here suggest that while risk perception might be necessary it is also insufficient on its own, as the perceived immediacy of climate change risks was not matched by a willingness to take individual action. While communications and other forms of engagement have previously tried to make climate change risks seem more psychologically proximal as a means of increasing engagement, it may now be time to develop new approaches and/or develop means of addressing barriers additional to risk perception. Existing literature also suggests that individuals need to feel like they should and can act (van Valkengoed and Steg, 2019), and this was tested using the who condition. However, it had little effect on participants' responses. I am not aware of any other study which has presented individuals with such a long and defined list of individual adaptation ideas. Therefore, it might be that the information was too new for participants to strongly commit to. Future research could test other ways of presenting examples of individual roles and responsibilities, ideally in a range of formats and channels. It would also be interesting to learn if and how attitudes change as the idea of personal responsibility for adapting to climate related risks becomes more familiar to people.

The additional findings suggest a number of ways that climate change risks might be made to feel more relevant even for those who don't yet perceive themselves as personally at risk. Firstly, there is an opportunity to emphasise the extent to which concern about climate change impacts in the UK is now widely shared by UK residents. This is important because the (mis-)perception that society has lower levels of climate change concern can negatively affect an individual's willingness to commit themselves to pro-climate positions (Mildenberger and Tingley, 2017). Therefore, communications should emphasise the message of shared concern and in time aim to have it perceived as an established norm. Secondly, due to the range of changing weather that participants said they were already experiencing and the range of impacts they already considered to be of concern, there is an opportunity to extend understanding of adaptation beyond principally a response to flooding. The tendency to link adaptation with flooding has been found, for example, in newspaper coverage of adaptation (see Chapter 3). There are also much more established adaptation communications available on flooding (EA, 2015) than there are on heatwaves (Howarth et al., 2019) and other extreme weather events. This could be particularly important for targeting those who don't live in flood risk areas and therefore don't yet perceive adaptation to extreme weather events as something they need to be planning for.

The additional findings also offer some suggestions as to how to present individuals as more visible in the UK's adaptation story. Above I suggested that UK residents' commonly shared concerns could be better communicated. This could be further built on by emphasising that response actions need to happen as a collective effort across and between sectors of society. While these results do not find strong agreement with example individual actions, despite the significantly increased sense of immediate risk to the UK, they do hint that individuals might be more willing to engage in partnership actions with the government or with their local community (and possibly other groups not tested here such as private business).

5.6 Conclusion

The findings from this study provide some good news for adaptation engagement. Based on a national survey with 1,044 participants it finds that there are now high levels of concern about a range of immediate climate change impacts. This claim is supported by other recent surveys

(Steentjes et al., 2020), including one in which people's climate change concerns remained high even when considered in the context of the Covid-19 pandemic (IpsosMORI, 2020). This suggests that some of the earlier barriers to greater climate change engagement, such as geographical and temporal distancing of the risks, are becoming less obstructive. Nevertheless, these findings also present new challenges, specifically in terms of how these now high levels of awareness and concern can be transformed in to greater active engagement with adaptation. Two possible ways of doing that, based on these findings, would be to better communicate the extent to which climate change concerns are now broadly shared across society and to better communicate how individuals can work in partnership with other groups, such as government and local organisations.

5.6.1 Limitations and further research

One limitation of this study was that the sample was recruited through a market research company rather than randomly selected. Participants who volunteer to fill in surveys may be more socially minded than the average population and therefore report stronger preferences for actions seen as responding to a social problem, although this effect is likely less than if a convenience sample had been used. Additionally, I used age, gender and region quotas in line with the 2017 consensus to make the sample as representative and reliable as possible. This survey focused on only three groups: government and other organisations, individuals and communities. Future research could extend this to consider the extent to which individuals would be willing to partner with other groups including local government and private business. Additionally, the closed question, quantitative format of the survey does not provide opportunity to explore the responses, particularly those which seem to contradict the findings from the workshops such as the greater visibility of individual roles being less effective than expected. This likely requires further qualitative research to narrow down the explanations behind this.

These findings indicate a number of other avenues which could be beneficially explored in more detail. There needs to be greater understanding as to why UK residents seem more willing to participate in some types of climate actions than others. While I have made some inferences from the results available here, i.e. that individuals perhaps prefer working in partnership than taking leadership roles, this requires much more work. In sum, the findings indicate that engagement research now needs to move beyond questions of climate change

belief and concern, both of which are now high in the UK as indicated here and in other recent studies. The work which follows will likely involve more context specific, fine grained explorations of localised adaptation options and how to increase the participation of local communities and residents. Nevertheless, this would provide an exciting opportunity to develop applied individual and community adaptation engagement.

Chapter 6 Discussion, contributions, limitations and further research

6.1 Thesis objectives

Adaptation enables the management of new threats and opportunities that the UK will experience as the climate changes. Individuals can contribute to adaptation in at least three meaningful ways: they can take actions to limit their own exposure to harm, they can support or partner the actions of others, and they can partake in the UK's adaptation decision making. Although recent research has found significantly increased levels of concern regarding climate change impacts, personal engagement with adaptation remains low. How adaptation is narrated in the UK's public discourse likely influences an individual's willingness to engage. The two research objectives and four studies of this thesis were:

1. To identify and analyse how the public discourse is currently narrating climate change adaptation in the UK

To respond to this objective I first provided a secondary analysis of twenty-two interviews taken with non-expert UK residents to understand how they use and interpret the terms 'climate change impacts' and 'climate change adaptation' (see Chapter 2). I then undertook a narrative analysis of 282 newspaper articles published between 2013 and 2017 from sixteen regional and national newspapers (see Chapter 3).

2. To evaluate how engaging the current public discourse adaptation narratives are for UK residents and to develop ideas to make them more engaging

Here, I first ran three storytelling workshops in which the 12 participants reviewed narratives based on the earlier analysis of the public discourse, and wrote their own fictional adaptation stories (see Chapter 4). Finally, I developed new engagement ideas generated by the workshops into story based communications and tested them in a quantitative survey with a national sample (see Chapter 5).

In the following, I will first respond to each of the research objectives, drawing on findings from across all studies as appropriate, and will then summarise the contributions, limitations, and opportunities for future research.

6.2 How is the public discourse currently narrating climate change adaptation in the UK?

6.2.1 Key learnings from across the two studies

I undertook two studies, summarised in the Section above, to address this research question so as to provide as comprehensive a view of the discourse as possible within the limitations of the PhD project. Both studies provided evidence that there is a developing adaptation discourse in the UK. Although the interviewees were not familiar with the expert terminology, the topic of climate change impacts in the UK and how best to respond to them was familiar. Concerns regarding impacts on daily routines, such as disruptions to work and school patterns, were particularly prevalent, as were concerns about unwanted losses to cultural norms, such as seaside holidays. The newspaper coverage captured from the five year period was sufficient to identify five distinct adaptation narratives which were about the government building more flood defences, homeowners buying flood insurance, individuals managing flooding and other risks by becoming more informed about their own exposure, the farming industry innovating to manage weather and climate impacts, and the natural environment striving to adapt as best as possible. While both the interviewees and the newspaper articles discussed a wide range of climate change impacts, both focused most heavily on extreme weather, especially periods of flooding. They also shared a focus on the role of government, with much less consideration of the roles for individuals, discussed further below.

A key difference between the two studies was the use of expert terminology, including 'adaptation', which the newspapers replicated, especially in more left-wing titles such as *The Guardian,* but the interviewees did not. Additionally, the newspaper coverage often focused on large scale concerns, such as the UK property market and the agricultural industry. In comparison, the interviewees (and later workshop participants) considered climate change impacts as they would affect more mundane but meaningful aspects of their lives, such as how they use their leisure time. As such, there was some disjointedness between the reasoning being made for adaptation in the newspapers and the issues and concerns of their intended audience.

6.2.2 Adaptation narratives and decision making

As outlined in Section 1.1.2, in practice adaptation will be an ongoing process of decision making, involving questions such as when to adapt, how and who by, and with what intended

outcomes, dependent on existing values, morals and governance structures. The demands of adaptation will be context specific and likely to change over time (Hinkel and Bisaro, 2015), and even then some unwanted changes and compromises will likely have to be made (Tschakert et al., 2017). Clearly, then is it a complicated decision making process that also needs to be as inclusive and equitable as possible. Fisher (1984) argues that societies use public discourse narratives as a means of trialling and ultimately deciding how best to respond to a socially challenging problem. In this thesis, I wanted to understand what the adaptation narratives identified from the public discourse could reveal about how the adaptation decision making process in the UK was progressing.

In this regard, I found that the discourse is currently limited. Both the interviewees (and later workshop participants) were often not able to think what they might be able to do to manage their own exposure to climate change impacts and questioned their own responsibility, suggesting they were not yet active participants within adaptation decision making. As discussed in Chapter 3, the newspaper discourse focused particularly on adaptation as a response to flooding and much less so to other events, on the government as being principally responsible with infrequent mention of other groups acting, and on adaptation as a means of maintaining the status quo. Arguably this is an accurate description of the current situation, insomuch as there have been several major flood events in recent years (Met Office, 2020) and the government so far leads the UK's adaptation initiatives (Lorenz et al., 2019). However, newspapers are also influential in framing the conversation beyond objective reporting of recent events (Entman, 1993). This study found that the current frames were restricted, trialling only a narrow set of narratives from which decisions as to how to progress adaptation in the UK could be made.

6.2.3 Adaptation in the future

One reason for studying the public discourse is that it provides a view on the future as well as the present as, generally, discussion will take place in advance of decision making and action. However, in the analysis of public discourse narratives undertaken for this thesis there was a notable lack of discussion of future challenges. For example, scientists consider heatwaves to be of immediate and serious concern for the UK (Committee on Climate Change, 2017). The interviewees didn't consider hotter weather to be an imminent concern (although this changed somewhat in the workshops and considerably in the final survey). There was also much less

newspaper coverage of hot weather than there was flooding and with much less defined adaptation strategies being narrated. Similarly, the government advises that it alone will not be able to address all the challenges that climate change will bring to the various sectors of society over the coming decades (DEFRA, 2018). However, again, so far UK residents showed a preference for government leadership, alongside actions from other groups, while newspaper coverage more explicitly advocated for government responsibility. These, amongst others, are issues that the UK will need to address if it is to adequately prepare for a changing climate, and which the discourse suggests it is not yet doing.

6.3 How engaging are the current public discourse adaptation narratives for UK residents and are there ideas to make them more engaging?

This thesis found that the current public discourse narratives regarding adaptation are not engaging. The disconnect between the priorities mentioned by the interviewees in Chapter 2 and the newspaper coverage in Chapter 3 already suggested that the public discourse was not presenting effective messaging as to why individuals should be engaged in adaptation. When stories based on the newspaper coverage were shown to the workshop participants in Chapter 4 they concluded that they were at best unengaging, and at times disengaging. In fact, the response by the workshop participants had been sufficiently strong that the stories shown to the survey participants in Chapter 5 focused on testing the new ideas from the workshops rather than the newspaper narratives.

6.3.1 Motivators for adaptation engagement

In Chapter 1 I reviewed the literature to understand what is currently known about motivators of adaptation engagement. While the literature in this area remains underdeveloped (van Valkengoed and Steg, 2019) the key themes coming through (as summarised in Figure 1) were that engagement is influenced by perception of personal risk, the extent to which individuals feel that they should and can respond, and perception that the outcomes of adaptation will be beneficial. In the following I will consider how the public discourse narratives responded to each of these engagement motivators.

6.3.1.1 Am I or something I care about at risk?

Starting with perception of risk, the literature review in Section 1.2.2 had suggested that risk needs to be perceived as personally serious and relevant if an individual is to take a responsive action. Previous studies had found that personal experience, perceiving the risks as psychologically close, or that something of value was at risk were all likely to increase an individual's risk perception. The discussions of risk during the studies undertaken for this thesis concurred: both the interviewees and the workshop participants evaluated risks in terms of how personally endangered they felt but also raised concerns about risks to other things of value such as cultural norms or wildlife.

In Chapter 1, I introduced the Social Amplification of Risk Framework as a means of better understanding how risk was being narrated in the public discourse (Kasperson et al., 1988). This framework considers how the original risk signal can be amplified or ameliorated by social and cultural modifiers thus effecting the social response. Applying the framework to this issue meant understanding how scientific expectations of climate change impacts to the UK, as they're communicated via the public discourse, influenced the extent to which individuals engage with adaptation. The newspaper analysis found that the risk signal was being communicated, albeit somewhat selectively with some impacts receiving far more coverage than others. Further, as I discussed in Chapter 4, the analysis found evidence of the risk messaging being shaped by existing cultural norms about British weather i.e. that flooding is a known problem whereas heatwaves are sufficiently rare as to not be a concern, as well as existing tropes within the climate change discourse, i.e. a tendency towards those events which best fit disaster framing. Additionally, the newspapers determined what was meaningful about the risks. For example, flooding was presented as meaningful as it risked devaluing the UK property market, and unpredictable weather as meaningful as it disrupted the UK food and farming sector. Focusing on systemic impacts might be an effective way of amplifying the argument that the national government needs to respond, which the newspapers strongly advocated for. However, this approach did not align well with the more personal and day to day concerns of individuals.

Adaptation communications and other forms of engagement need to find ways to make risk more personally relevant to individuals. In Chapter 5 I tested bringing the risks temporally closer but found this to be mostly ineffective perhaps due to the fact that a large majority of the

participants saw climate change impacts as already of concern and changing weather as already being experienced. Another approach could be to develop adaptation messaging which incorporates the small but nevertheless meaningful impacts to daily routines and cultural norms, as raised in the interviews and workshops.

6.3.1.2 Should I and can I respond?

The literature review in Chapter 1 found that people are more likely to be motivated to undertake adaptation if they see it as their responsibility, as socially acceptable, and as something they are capable of doing. Again, these points were reflected in the data collected during my studies. Both the interviewees and the workshop participants thought that individuals have a responsibility to protect themselves from climate related hazards but also that the government was principally responsible for preparing the UK for climate change. Both groups argued that they wanted to see other people like them as well as other sectors of society doing their bit, while a lack of knowing what more individuals could be doing was a frequently raised issue.

Social Constructionism Theory argues that people build their identities from those they see as available and acceptable within the public discourse (Burr, 2003). I found that the newspapers strongly promoted government action with little mention of what individuals or communities could do. Consequently, the coverage not only failed to provide individuals with useful information, it also normalised the perception of adaptation as principally the responsibility of the government. The discussion, or lack of, as to what individuals should and could do was considered a key reason as to why the adaptation public discourse, as communicated by the newspapers, was so unengaging.

In Chapter 5 I tested making the adaptation narratives more engaging by increasing the visibility of individuals adapting either to protect themselves or as part of a community effort. While this was less effective than expected, the survey results nevertheless reiterated that UK residents think individuals and communities (as well as the government) do have adaptation responsibilities. The findings also suggested that individuals might prefer working in partnership with other groups, providing an opportunity to develop narratives which make these options more visible for individuals. I have suggested earlier in the thesis that this could be done through art and entertainment formats. Another option would be to draw on the workshop

format used here to develop stories with residents in local settings which cast the individuals and their communities as the central active agents.

6.3.1.3 Will the outcomes be beneficial?

Finally, the literature reviewed in Chapter 1 had suggested that adaptation outcomes need to be seen as both beneficial and as aligned with existing values and worldviews. Outcomes were less frequently mentioned in the newspapers, perhaps because news coverage tends to focus on events and decisions as they're happening rather than after they've been concluded. However, as discussed in Chapter 3, the newspaper narratives did tend to promote adaptation strategies that could maintain the status quo of life in the UK. My studies did not find that this element of the public discourse was necessarily unengaging for UK residents. Indeed both the interviewees and the workshop participants also expressed a desire for things to stay the same. The interviewees expressed nostalgia for a better and more certain past time, while the endings of the participant-written stories often described how the societies had learnt to protect and maintain the things they valued.

Futures thinking argues that optimal decision making needs to include consideration of the possible and preferable options as well as what seems most probable (Miller, 2007). Here, it is unclear whether the focus on the status quo was simply because this seems the most probable or because it is also the most preferable outcome. Although maintaining current norms was often considered preferable, as described above, this was in the context of the alternative being assumed to be worse in some ways, such as people experiencing harm or things of value being lost. During a workshop exercise to think about what a considerably climate altered but over-all good 2100 might look like, the participants found it challenging to reconcile the two ideas. Climate change will bring significant impacts and thus at least some unwanted change to the UK in the coming decades but the extent to which this will be ultimately 'good' or 'bad' will depend on the human response (Hulme, 2011). Although this thesis did not find that talking about the intended outcomes of climate change adaptation is particularly engaging for UK residents, it does suggest there is a need to engage people in futures decision making and that the process of developing narratives provide a means of doing so.

6.4 Summary of contributions

6.4.1 Theoretical contributions

In his outline of narrative theory, Fisher (1984) argues that when a society detects a new problem, it develops and debates a range of possible ways forward before the preferred narrative, and therefore real world response, is selected. Climate change impacts present a number of novel problems for society and, as indicated by this thesis, there is growing debate as how best to respond. However, being able to unpick the complexity of the discourse to understand which adaptation options are being considered and promoted, and which ignored or rejected, is challenging. Therefore, in this thesis I combined the principle tenets of Fisher's narrative theory for decision making with the specific narrative structure of problem resolution. In doing so I was able to draw on existing work regarding isolating and identifying the defining moments in the progression of a problem resolution story, i.e. the disruptive events that initiate the story, the selection of who responds and how, and the actual or intended resolution (Bruner, 1991, Ryan, 2007). This provided a means of applying narrative theory in a manner which focused on the key questions that society needs to ask itself when deciding how to respond to climate change impacts (Paschen and Ison, 2014).

Further, this narrative structure closely relates to the key decision points in individual engagement, as outlined in Section 1.2.2, namely that personal engagement with adaptation is influenced by perception of personal risk, perceptions of responsibility and capability to act, and perceptions of the outcomes. As such, the problem resolution narrative provided a framework for interrogating the relationship between the adaptation public discourse and individual engagement. I then drew on additional theories to further elucidate how the content of those key decision points in the narrative might be influencing individual engagement. Specifically, the Social Amplification of Risk Framework was used to consider the influence of some climate change impacts being amplified while others are ameliorated; Social Constructionism Theory to consider the influence of the public discourse presentation of roles and responsibilities on individual engagement; and learnings from the futures domain to consider the influence of the range and type of outcomes being considered. While there are no doubt other theories which could be used, here I provide an example of the applied use of narrative theory for adaptation research.

6.4.2 Methodological contributions

Combining narrative theory with the structure provided by the mental models approach, I also developed the application of a series of methods to address my specific research objectives.

For the first research objective of identifying and analysing how the UK public discourse is currently narrating climate change adaptation, I used narrative analysis. This method was originally developed in literary criticism but is increasingly being used to understand climate change related texts, be that informal verbal texts such as individuals' own climate change stories (Hards, 2012, Phillips and Dickie, 2015, Köpsel et al., 2017) or formal written texts such as policy documents (Urhammer and Røpke, 2013, Fløttum and Gjerstad, 2017, Lazarevic and Valve, 2017). However, as expected of a relatively new field, this work contains a number of different understandings of what a narrative is and, at times, lacks robustness in detailing how the findings are drawn from the source texts. Here, I employed the problem resolution narrative to develop a systematic methodology for identifying and analysing texts. For example, in the newspaper study, both the criteria for inclusion and the coding scheme were designed to ensure that the main points of the problem resolution narrative were the focus of analysis for each article. This additionally provides a means of managing the often overwhelming volume and detail of discourse study.

To address the second research objective of evaluating how engaging the current public discourse adaptation narratives are for UK residents and to develop ideas to make them more engaging, I used narrative as a research method for working with participants who are not experts in the topic. I built on Rotmann's (2017) work in which she used a fairy tale structure to ask participants to imagine energy futures, by asking my participants to write imaginative, future focused adaptation stories. I developed a series of group exercises intended to support the participants in thinking and talking about adaptation, prior to having to write about it (see Appendix C2). I adapted Rotmann's story structure to fit the series of events leading to and from adaptive action, and added detailed questions to each step of the story to encourage the participants to further explore the experience of adapting to climate change impacts. As with Rotman's study, participants found this an accessible and engaging way to think about adaptation. The workshops highlighted the potential of this approach to get people more engaged and thinking about the future. It also provided a comprehensive means of capturing participant responses to the key decision points in individual engagement as identified by

previous research (see Section 1.2.2). As suggested earlier, this could be replicated either for future research purposes and/or as a means to develop adaptation engagement, and ultimately resilience to climate change impacts, in local communities.

In total, I used four diverse research methods to answer the research objectives, combining very qualitative and in-depth approaches with more robust, quantitative methods. This allowed me to first identify and then develop new ideas for adaptation engagement. It also makes the key findings from this thesis more reliable.

6.4.3 Practical contributions and recommendations

This research presents new insight into key areas of the adaptation literature. Firstly, it provides the first analysis of UK newspaper coverage of adaptation. Despite the growth of other media and social platforms, newspapers continue to inform public opinion (Reis and Ballinger, 2020) and the policy agenda (Escobar and Demeritt, 2014), in part because newspaper content is replicated and shared in other media channels (Boykoff and Yulsman, 2013). Those working in adaptation, whether that be as public communicators or in policy development, would benefit from an awareness of the adaptation messages being transmitted by newspapers. I found that adaptation coverage is focusing on only some of the more immediate climate change impacts likely to affect the UK, on the responsibility of the national government, and on adaptation approaches that are unchallenging to the status quo. In sum, newspaper adaptation coverage is narrow in comparison to the range of impacts, actors and outcomes that it could be discussing. Adaptation practitioners may need to challenge this presentation at times, such as when encouraging adaptation to those impacts not well covered by newspapers or when promoting adaptation initiatives for non-government actors.

Additionally, it develops ideas as to how to make narrative-based communications more engaging for UK residents. Communications are an essential element of achieving the level of public engagement necessary to deliver sufficient, or even optimal, adaptation (Moser, 2014, Moser and Pike, 2015). In response to this, a principle idea emerging from climate change communications research is the potential of using narratives (e.g. Daniels and Endfield, 2009, Climate Outreach, 2017, Moezzi et al., 2017, Howarth et al., 2020, and a 2020 special issue of *Climatic Change*). Unsurprisingly, therefore, in recent years there have been a number of studies in the UK (with similar work being done elsewhere) developing narrative based communications. For example, Marshall held workshops with Welsh residents to develop more

engaging government issued climate change communications (2014); Smith et al ran a range of story based exercises with the intent of making changing energy systems more engaging (2017); and Howarth (2017) interviewed a range of experts to identify more engaging ways to communicate the UK's low carbon energy transition, amongst others. However, this iterative, bottom-up development of engaging narratives based on input and feedback from the target audience hasn't yet been done for adaptation. The key communication learnings from this thesis are that there is an opportunity to emphasise the high level of concern about climate change impacts now widely shared by the British public so as to reframe climate change action as an agreed national priority, rather than a decisive issue as it has been in previous decades (Hulme, 2009). There is also an opportunity for citizen participation to be framed as a collaboration with other groups, additional to the more individualistic actions people can take to manage their own exposure to risks.

6.5 Limitations

There are a number of limitations to this thesis. It focused on the concept of 'individual engagement' which I operationalised for use in this thesis by identifying a set of specific individual adaptation actions, as well as the key decision points influencing willingness to engage (see Figure 1). Nevertheless, 'engagement' is an unavoidably slippery term that will mean different things for different people at different times in different scenarios. Consequently, a thesis focusing on engagement will be unable to provide definitive answers. However, this is arguably also one of its strengths as the findings detailed here provide many new ideas and opportunities to be built on in further research.

The public discourse of climate change adaptation is rapidly developing meaning that some of the findings detailed here may already be in need of updating. Over the course of this thesis a number of events have occurred likely to affect its findings: the UK had unusually hot weather in 2018 and 2019, the IPCC released a well-publicised Special Report on Global Warming of 1.5ºC, the School Strike and Extinction Rebellion movements emerged and there was a series of major wildfires across the globe. Currently, the world is living through a global pandemic with no immediate end in sight and huge social and economic consequences which will inevitably change the conversation again. Despite the pressing nature of Covid-19 risking

the prioritisation of national and international climate change governance, nevertheless mitigation and adaptation objectives are being co-opted as central ambitions of the 'build back better' movement (Build Back Better, 2020) and being realised in policy such as the 'green strings' attached to the EU's coronavirus recovery fund (Simon, 2020). Consequently, the study of a live public discourse is intrinsically an ongoing endeavour. While that may seem unmanageable, this thesis has also contributed to developing ways to manage the volume and multiplicity within the discourse so as to focus on the key decision-influencing elements, see Contributions above.

This thesis aimed to provide a view of the UK's current adaptation public discourse and did so by drawing on interviews with UK residents and regional and national newspapers. However, there are other sources contributing to the public discourse including other media channels, government messages, scientific messaging and educational texts amongst many others, a study of which would create at least some alterations to the findings presented here. Further, this study assumed that it was possible to talk broadly about a public discourse that all residents have equal access to. This might be to some extent true as major media outlets in the UK still have wide coverage. Nevertheless, in reality the public discourse is also likely more fractured than fully addressed in this thesis, depending on country, region, demographics and other social and cultural influencers.

6.6 Further research

Above I detailed that one of the key findings from this thesis is that the discourse analysed here was restrictive in its presentation of what adaptation is and should be in the UK, and that it was so far failing to adequately engage with the questions of the future. This is not the case in all areas of the discourse. Much adaptation academic literature now includes consideration of what optimal adaptation outcomes might be and the transformational pathways needed to get there (e.g. Pelling, 2011, O'Brien, 2012, Gillard et al., 2016 amongst others). The arts are increasingly imagining alternative futures, with clifi (climate fiction) being a particularly rapidly growing area in both output and popularity (Johns-Putra, 2016, Abraham, 2017). There are also grass-roots movements pushing for future pathways that challenge the socio-economic status quo, at the national scale such as Extinction Rebellion and more locally such as the Our Future Leeds collective. All of these areas have smaller audiences than do the national

newspapers analysed here, and their more explorative and transformational view of adaptation has not yet been established in the more mainstream public discourse.

An immediate follow up to this thesis, therefore, would be to extend the analysis of the public discourse to include this more diverse range of contributors. One advantage of studying newspaper discourse is that it is very accessible from online databases. While some of the above mentioned groups may not be as immediately accessible, all could nevertheless be studied. For example, academic work on climate change futures is available as published, peer-reviewed papers. This increasingly vast and inter-disciplinary work could be subject to a systematic literature review that intends to summarise discussions of the future. It might also be interesting to understand the extent to which this work is determined by discipline. Art and entertainment is also published but across many platforms which are not always readily accessible, such as past TV shows. However, there have already been attempts to collate instances of climate change as a topic in the visual arts (Miles, 2010), theatre (Bottoms, 2012), books (Johns-Putra, 2016) and film (Svoboda, 2016), which could provide a starting point. Grass-roots movements also produce publicly available materials and it is likely they could be engaged in research which intends to better understand their contribution to the adaptation discourse. As discussed in the above Limitations section, it is not possible to provide a complete view of the discourse but all of these approaches would contribute to a much more comprehensive view.

As with this thesis, the objectives would be two-fold: firstly, to improve our understanding of the discourse, and secondly, to explore how it might interact with people's willingness to engage with adaptation. This second objective would be intended to further the work started in this thesis in terms of identifying and developing ideas which could be used in communications and other means of engagement. To do this, I would broadly follow the two-step approach of studies 3 and 4, i.e. first undertaking explorative, detailed research with a small group of participants in workshops or similar, and then testing the findings with a larger

and more representative sample in a survey. Based on the learnings from this thesis, it would be ideal to undertake several rounds of explorative research before developing the survey.

References

ABRAHAM, J. 2017. *CliFi – A new way to talk about climate change* [Online]. Available: https://www.theguardian.com/environment/climate-consensus-97-per-cent/2017/oct/18/clifi-a-new-way-to-talk-about-climate-change [Accessed 10th January 2020].

ABRAHAMSON, V., WOLF, J., LORENZONI, I., FENN, B., KOVATS, S., WILKINSON, P., ADGER, W. N. & RAINE, R. 2008. Perceptions of heatwave risks to health: interview-based study of older people in London and Norwich, UK. *Journal of Public Health,* 31**,** 119-126.

ADGER, W. N. 2016. Place, well-being, and fairness shape priorities for adaptation to climate change. *Global Environmental Change-Human and Policy Dimensions,* 38**,** A1-A3.

ADGER, W. N., ARNELL, N. W. & TOMPKINS, E. L. 2005. Successful adaptation to climate change across scales. *Global environmental change,* 15**,** 77-86.

ADGER, W. N., BARNETT, J., BROWN, K., MARSHALL, N. & O'BRIEN, K. 2013a. Cultural dimensions of climate change impacts and adaptation. *Nature Climate Change,* 3**,** 112-117.

ADGER, W. N., BUTLER, C. & WALKER-SPRINGETT, K. 2017. Moral reasoning in adaptation to climate change. *Environmental Politics,* 26**,** 371 - 390.

ADGER, W. N., DESSAI, S., GOULDEN, M., HULME, M., LORENZONI, I., NELSON, D. R., NAESS, L. O., WOLF, J. & WREFORD, A. 2009. Are there social limits to adaptation to climate change? *Climatic Change,* 93**,** 335-354.

ADGER, W. N., QUINN, T., LORENZONI, I., MURPHY, C. & SWEENEY, J. 2013b. Changing social contracts in climate-change adaptation. *Nature Climate Change,* 3**,** 330-333.

ALLAN, S. 2002. *Media, Risk & Science,* Buckingham, Open University Press.

ALLEN, M. R., STOTT, P. A. & STONE, D. A. 2004. Human contribution to the European heatwave of 2003. *Nature,* 432**,** 610-614.

ANDERSON, A. 1997. *Media, Culture, and the Environment,* London, Routledge.

BARKEMEYER, R., DESSAI, S., MONGE-SANZ, B., GABRIELLA RENZI, B. & NAPOLITANO, G. 2016. Linguistic analysis of IPCC summaries for policymakers and associated coverage. *Nature Climate Change,* 6**,** 311 -316.

BENZIE, M. 2014. Social Justice and Adaptation in the UK. *Ecology and Society,* 19.

BERGER, P. L. & LUCKMANN, T. 1991. *The Social Construction of Reality: A Treatise in the Sociology of Knowledge,* Penguin.

BERGMAN, N. 2017. Stories of the future: Personal mobility innovation in the United Kingdom. *Energy research & social science,* 31**,** 184-193.

BICHARD, E. & KAZMIERCZAK, A. 2012. Are homeowners willing to adapt to and mitigate the effects of climate change? *Climatic Change,* 112**,** 633-654.

BIESBROEK, G. R., SWART, R. J., CARTER, T. R., COWAN, C., HENRICHS, T., MELA, H., MORECROFT, M. D. & REY, D. 2010. Europe adapts to climate change: Comparing National Adaptation Strategies. *Global Environmental Change,* 20**,** 440-450.

BONAIUTO, M., ALVES, S., DE DOMINICIS, S. & PETRUCCELLI, I. 2016. Place attachment and natural hazard risk: Research review and agenda. *Journal of Environmental Psychology,* 48**,** 33-53.

BOND, S. & BARTH, J. 2020. Care-full and just: Making a difference through climate change adaptation. *Cities,* 102**,** 102734.

BOSTROM, A., BOHM, G. & O'CONNOR, R. E. 2013. Targeting and tailoring climate change communications. *Wiley Interdisciplinary Reviews-Climate Change,* 4**,** 447-455.

BOTTOMS, S. 2012. Climate change 'science'on the London stage. *Wiley Interdisciplinary Reviews: Climate Change,* 3**,** 339-348.

BOYKOFF, M. 2019. *Creative (Climate) Communications,* Cambridge University Press.

BOYKOFF, M., CHANDLER, P., DALY, M., MCALLISTER, L., MCNATT, M., A., N.-S., OONK, D. & PEARMAN, O. 2019. *2000-2019 United Kingdom Newspaper Coverage of Climate Change on Global Warming* [Online]. Available: https://sciencepolicy.colorado.edu/icecaps/research/media_coverage/uk/index.html [Accessed 31st Jaunary 2020].

BOYKOFF, M. T. 2008. The cultural politics of climate change discourse in UK tabloids. *Political Geography,* 27**,** 549-569.

BOYKOFF, M. T. & BOYKOFF, J. M. 2007. Climate change and journalistic norms: A case-study of US mass-media coverage. *Geoforum,* 38**,** 1190-1204.

BOYKOFF, M. T., GHOSH, A. & VENKATESWARAN, K. 2013. Media coverage of discourse on adaptation: competing visions of "success" in the Indian context. *In:* MOSER, S. C. & BOYKOFF, M. T. (eds.) *Successful Adaptation to Climate Change.* Routledge.

BOYKOFF, M. T. & YULSMAN, T. 2013. Political economy, media, and climate change: sinews of modern life. *WIREs Climate Change,* 4**,** 359-371.

BRINK, E. & WAMSLER, C. 2019. Citizen engagement in climate adaptation surveyed: The role of values, worldviews, gender and place. *Journal of cleaner production,* 209**,** 1342-1353.

BROWN, P. 2017. Narrative: An ontology, epistemology and methodology for pro-environmental psychology research. *Energy Research & Social Science,* 31**,** 215-222.

BROWN, T., BUDD, L., BELL, M. & RENDELL, H. 2011. The local impact of global climate change: reporting on landscape transformation and threatened identity in the English regional newspaper press. *Public Understanding of Science,* 20**,** 658-673.

BRÜGGER, A., DESSAI, S., DEVINE-WRIGHT, P., MORTON, T. A. & PIDGEON, N. F. 2015a. Psychological responses to the proximity of climate change. *Nature Climate Change,* 5**,** 1031.

BRÜGGER, A., MORTON, T. A. & DESSAI, S. 2016. "Proximising" climate change reconsidered: A construal level theory perspective. *Journal of Environmental Psychology,* 46**,** 125-142.

BRÜGGER, A., MORTON, T. A. & RAUTO DESSAI, S. 2015b. Hand in hand: Public endorsement of climate change mitigation and adaptation. *PLOS One,* 10.

BRUINE DE BRUIN, W. & BOSTROM, A. 2013. Assessing what to address in science communication. *PNAS,* 110**,** 14062-14068.

BRUINE DE BRUIN, W., LEFEVRE, C. E., TAYLOR, A. L., DESSAI, S., FISCHHOFF, B. & KOVATS, S. 2016. Promoting protection against a threat that evokes positive affect: The case of heat waves in the United Kingdom. *Journal of experimental psychology. Applied,* 22**,** 261-271.

BRUNER, J. 1991. The Narrative Construction of Reality. *Critical Inquiry,* 18**,** 1-21.

BUILD BACK BETTER. 2020. *Build back better: what we want* [Online]. Available: https://www.buildbackbetteruk.org/what-we-want [Accessed 10th August 2020].

BUNYAN, S., COLLINS, A. & DUFFY, D. 2016. Concern and Helplessness: Citizens' Assessments of Individual and Collective Action on the Provision of Environmental Public Goods in a Coastal City at Risk of Inundation. *Environmental Management,* 58**,** 431-445.

BURR, V. 2003. *Social Constructionism,* London, Routledge.

BUSHELL, S., COLLEY, T. & WORKMAN, M. 2015. A unified narrative for climate change. *Nature Climate Change,* 5**,** 971-973.

CAPSTICK, S. B. & PIDGEON, N. F. 2014a. Public perception of cold weather events as evidence for and against climate change. *Climatic Change,* 122**,** 695-708.

CAPSTICK, S. B. & PIDGEON, N. F. 2014b. What is climate change scepticism? Examination of the concept using a mixed methods study of the UK public. *Global Environmental Change-Human and Policy Dimensions,* 24**,** 389-401.

CARVALHO, A. 2005. Representing the politics of the greenhouse effect: Discursive strategies in the British media. *Critical Discourse Studies,* 2**,** 1-29.

CARVALHO, A. 2007. Ideological cultures and media discourses on scientific knowledge: re-reading news on climate change. *Public Understanding of Science,* 16**,** 223-243.

CARVALHO, A. & BURGESS, J. 2005. Cultural Circuits of Climate Change in U.K. Broadsheet Newspapers, 1985-2003. *Risk Analysis,* 25**,** 1457-1469.

CARVALHO, A., VAN WESSEL, M. & MAESEELE, P. 2017. Communication practices and political engagement with climate change: A research agenda. *J Environmental Communication,* 11**,** 122-135.

CHANGE, C. O. C. 2017. *UK Climate Change Risk Assessment 2017 Evidence Report Key Messages from the Synthesis Report* [Online]. Available: https://www.theccc.org.uk/wp-content/uploads/2016/07/CCRA-Synthesis-Report-Key-Messages-fact-sheet-1.pdf [Accessed 6th February 2017].

CLIMATE OUTREACH. 2017. *The Global Climate Narratives Project* [Online]. Available: https://climateoutreach.org/resources/global-narratives-project/ [Accessed 13th June 2019].

CLIMATE OUTREACH. 2019. *Communicating Climate Impacts Through Adaptation: Tips and activities for Women's Institute Climate Ambassadors* [Online]. Available: https://climateoutreach.org/resources/guide-communicating-climate-impacts-through-adaptation-wi/ [Accessed 26th June 2019].

COLOGNA, V., BARK, R. H. & PAAVOLA, J. 2017. Flood risk perceptions and the UK media: Moving beyond “once in a lifetime” to “Be Prepared” reporting. *Climate Risk Management,* 17**,** 1-10.

COMBS, B. & SLOVIC, P. 1979. Newspaper coverage of causes of death. *Journalism Quarterly,* 56**,** 837-843.

COMMITTEE ON CLIMATE CHANGE. 2017. *UK Climate Change Risk Assessment 2017 Synthesis report: priorities for the next five years* [Online]. Available: https://www.theccc.org.uk/wp-content/uploads/2016/07/UK-CCRA-2017-Synthesis-Report-Committee-on-Climate-Change.pdf [Accessed 15th June 2018].

COMMITTEE ON CLIMATE CHANGE. 2019. *Progress in preparing for climate change 2019 Report to Parliament* [Online]. Available: https://www.theccc.org.uk/publication/progress-in-preparing-for-climate-change-2019-progress-report-to-parliament/ [Accessed 10th July 2019].

COMMON CAUSE FOUNDATION. 2016. *Perceptions Matter: The Common Cause UK Values Survey,* [Online]. Available: http://valuesandframes.org/survey/ [Accessed 25th April 2017].

CORNER, A. 2012. *Climate silence, and how to break it* [Online]. Available: http://climateoutreach.org/resources/climate-silence-and-how-to-break-it/ [Accessed 20th November 2019].

CORNER, A., DEMSKI, C., STEENTJES, K. & PIDGEON, N. 2020. *Engaging the public on climate risks and adaptation: A briefing for UK communicators* [Online]. Available: https://www.ukclimateresilience.org/wp-content/uploads/2020/03/resilrisk-briefing-ONLINE.pdf [Accessed 20th April 2020].

CORNER, A., MARKOWITZ, E. & PIDGEON, N. 2014. Public engagement with climate change: the role of human values. *Wiley Interdisciplinary Reviews: Climate Change,* 5**,** 411-422.

CORNER, A. & RANDALL, A. 2011. Selling climate change? The limitations of social marketing as a strategy for climate change public engagement. *Global Environmental Change,* 21**,** 1005-1014.

COTTON, M. & STEVENS, E. 2019. Mapping discourses of climate change adaptation in the United Kingdom. *Weather, Climate, and Society,* 11**,** 17-32

COUMOU, D. & RAHMSTORF, S. 2012. A decade of weather extremes. *Nature Climate Change,* 2**,** 491-496.

DAHLSTROM, M. F. 2014. Using narratives and storytelling to communicate science with nonexpert audiences. *Proceedings of the National Academy of Sciences of the United States of America,* 111**,** 13614-13620.

DANIELS, S. & ENDFIELD, G. H. 2009. Narratives of climate change: introduction. *Journal of Historical Geography,* 35**,** 215-222.

DE GRAAF, A., HOEKEN, H., SANDERS, J. & BEENTJES, J. W. J. 2012. Identification as a mechanism of narrative persuasion. *Communication Research,* 39**,** 802-823.

DEFRA. 2018. *The National Adaptation Programme and the Third Strategy for Climate Adaptation Reporting: Making the country resilient to a changing climate* [Online]. Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/727252/national-adaptation-programme-2018.pdf [Accessed 23rd July 2018].

DEMSKI, C., CAPSTICK, S., PIDGEON, N., GENNARO SPOSATO, R. & SPENCE, A. 2017. Experience of extreme weather affects climate change mitigation and adaptation responses. *Climatic Change,* 140**,** 149 -164.

DESSAI, S., ADGER, W. N., HULME, M., TURNPENNY, J., KÖHLER, J. & WARREN, R. 2004. Defining and experiencing dangerous climate change. *Climatic Change,* 64**,** 11-25.

DESSAI, S. & SIMS, C. 2010. Public perception of drought and climate change in southeast England. *Environmental Hazards,* 9**,** 340-357.

DEVITT, C. & O'NEILL, E. 2017. The framing of two major flood episodes in the Irish print news media: Implications for societal adaptation to living with flood risk. *Public Understanding of Science,* 26**,** 872-888.

DILLING, L., PRAKASH, A., ZOMMERS, Z., AHMAD, F., SINGH, N., DE WIT, S., NALAU, J., DALY, M. & BOWMAN, K. 2019. Is adaptation success a flawed concept? *Nature Climate Change,* 9**,** 572-574.

DITTRICH, R., WREFORD, A., BUTLER, A. & MORAN, D. 2016. The impact of flood action groups on the uptake of flood management measures. *Climatic Change,* 138**,** 471-489.

DOWNS, J. S., DE BRUIN, W. B. & FISCHHOFF, B. 2008. Parents' vaccination comprehension and decisions. *Vaccine,* 26**,** 1595-1607.

EA. 2015. *Public dialogues on flood risk communication - Literature Review* [Online]. Available: https://www.gov.uk/government/publications/public-dialogues-on-flood-risk-communication [Accessed 1st April 2017].

ELRICK-BARR, C. E., SMITH, T. F., PRESTON, B. L., THOMSEN, D. C. & BAUM, S. 2016. How are coastal households responding to climate change? *Environmental Science & Policy,* 63**,** 177-186.

The Day After Tomorrow, 2004. Motion Picture. Directed by EMMERICH, R. United States: 20th Century Fox.

ENTMAN, R. M. 1993. Framing: Toward clarification of a fractured paradigm. *Journal of Communication,* 43**,** 51-58.

ENTMAN, R. M. 2007. Framing bias: Media in the distribution of power. *Journal of communication,* 57**,** 163-173.

EREAUT, G. & SEGNIT, N. 2006. *Warm words: how are we telling the climate story and can we tell it better?* [Online]. Institute for Public Policy Research. Available: http://www.ippr.org/publications/warm-wordshow-are-we-telling-the-climate-story-and-can-we-tell-it-better [Accessed 26th November 2016].

ESCOBAR, M. P. & DEMERITT, D. 2014. Flooding and the framing of risk in British broadsheets, 1985–2010. *Public Understanding of Science,* 23**,** 454-471.

FAIRCLOUGH, N. 1992. *Discourse and social change,* Cambridge, Polity Press.

FAIRCLOUGH, N. 1995. *Media discourse,* London, E. Arnold.

FAZEY, I., MOUG, P., ALLEN, S., BECKMANN, K., BLACKWOOD, D., BONAVENTURA, M., BURNETT, K., DANSON, M., FALCONER, R. & GAGNON, A. 2016. Transformation In A Changing Climate: A Research Agenda. *Climate and Development,* 39**,** 351- 362.

FISHER. 2015. *Public dialogues on flood risk communication - Final Report* [Online]. Available: https://www.gov.uk/government/publications/public-dialogues-on-flood-risk-communication [Accessed 1st April 2017].

FISHER, W. R. 1984. Narration as a Human Communication Paradigm: The Case of Public Moral Argument. *Communication Monographs,* 51**,** 1-22.

FIZER, C., BRUINE DE BRUIN, W. & STILLO, F. 2018. Barriers to Managing Private Wells and Septic Systems in Underserved Communities: Mental Models of Homeowner Decision Making. *Journal of Environmental Health,* 81**,** 8-15.

FLØTTUM, K. & GJERSTAD, Ø. 2017. Narratives in climate change discourse. *Wiley Interdisciplinary Reviews: Climate Change,* 8**,** 1-15.

FORD, J. D., BERRANG-FORD, L. & PATERSON, J. 2011. A systematic review of observed climate change adaptation in developed nations: A letter. *Climatic Change,* 106**,** 327-336.

FORD, J. D. & KING, D. 2015. Coverage and framing of climate change adaptation in the media: A review of influential North American newspapers during 1993–2013. *Environmental Science and Policy,* 48**,** 137-146.

GAMEIRO, S., DE GUEVARA, B. B., EL REFAIE, E. & PAYSON, A. 2018. DrawingOut–An innovative drawing workshop method to support the generation and dissemination of research findings. *PLOS One,* 13**,** e0203197.

GAVIN, N. T., LEONARD-MILSOM, L. & MONTGOMERY, J. 2011. Climate change, flooding and the media in Britain. *Public Understanding of Science,* 20**,** 422-438.

GIDLEY, J. M. 2016. Understanding the Breadth of Futures Studies through a Dialogue with Climate Change. *World Future Review,* 8**,** 24-38.

GILLARD, R., GOULDSON, A., PAAVOLA, J. & VAN ALSTINE, J. 2016. Transformational responses to climate change: beyond a systems perspective of social change in mitigation and adaptation. *WIRES Clim Change,* 7**,** 251-265.

GOLDSTEIN, N. J., CIALDINI, R. B. & GRISKEVICIUS, V. 2008. A Room with a Viewpoint: Using Social Norms to Motivate Environmental Conservation in Hotel. *Journal of Consumer Research,* 35**,** 472-482.

GOTTSCHALL, J. 2012. *The storytelling animal: How stories make us human,* Houghton Mifflin Harcourt.

GROTHMANN, T. & PATT, A. 2005. Adaptive capacity and human cognition: The process of individual adaptation to climate change. *Global Environmental Change,* 15**,** 199-213.

GUEST, G., MACQUEEN, K. M. & NAMEY, E. E. 2011. *Applied thematic analysis,* Sage Publications.

HAGEN, B., MIDDEL, A. & PIJAWKA, D. 2016. European climate change perceptions: Public support for mitigation and adaptation policies. *Environmental Policy Governance,* 26**,** 170-183.

HAMPTON, G. 2004. Enhancing Public Participation through Narrative Analysis. *Policy Sciences,* 37**,** 261-276.

HARDS, S. 2012. Tales of transformation: The potential of a narrative approach to pro-environmental practices. *Geoforum,* 43**,** 760-771.

HARVEY, F. 2017. *EU announces €9bn in funding for climate action* [Online]. Available: https://www.theguardian.com/environment/2017/dec/12/eu-announces-9bn-in-funding-for-climate-action [Accessed 10th May 2018].

HENDERSSON, H. & WAMSLER, C. 2020. New stories for a more conscious, sustainable society: claiming authorship of the climate story. *Climatic Change,* 158**,** 345-359.

HINKEL, J. & BISARO, A. 2015. A review and classification of analytical methods for climate change adaptation. *Wiley Interdisciplinary Reviews: Climate Change,* 6**,** 171-188.

HM GOVERNMENT. 2008. *Climate Change Act* [Online]. Available: http://www.legislation.gov.uk/ukpga/2008/27/contents [Accessed 24th July 2019].

HM GOVERNMENT. 2017. *UK Climate Change Risk Assessment 2017 Government Report* [Online]. UK. Available: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/584281/uk-climate-change-risk-assess-2017.pdf [Accessed 11th July 2018].

HOPKINS, J. & WARBURTON, J. 2015. Local perception of infrequent, extreme upland flash flooding: prisoners of experience? *Disasters,* 39**,** 546-569.

HOWARD BOYD, E. 2019. *A different philosophy: why our thinking on flooding needs to change faster than the climate* [Online]. gov.uk. Available: https://www.gov.uk/government/speeches/a-different-philosophy-why-our-thinking-on-flooding-needs-to-change-faster-than-the-climate [Accessed 12th September 2019].

HOWARTH, C. 2017. Informing decision making on climate change and low carbon futures: Framing narratives around the United Kingdom's fifth carbon budget. *Energy Research & Social Science,* 31**,** 295-302.

HOWARTH, C. & ANDERSON, A. 2019. Increasing local salience of climate change: The un-tapped impact of the media-science interface. *Environmental Communication,* 13**,** 713-722.

HOWARTH, C., KANTENBACHER, J., GUIDA, K., ROBERTS, T. & ROHSE, M. 2019. Improving resilience to hot weather in the UK: The role of communication, behaviour and social insights in policy interventions. *J Environmental Science Policy,* 94**,** 258-261.

HOWARTH, C., PARSONS, L. & THEW, H. 2020. Effectively Communicating Climate Science beyond Academia: Harnessing the Heterogeneity of Climate Knowledge. *One Earth,* 2**,** 320-324.

HOWELL, R. A., CAPSTICK, S. & WHITMARSH, L. 2016. Impacts of adaptation and responsibility framings on attitudes towards climate change mitigation. *Climatic Change,* 136**,** 445-461.

HULME, M. 2007. Newspaper scare headlines can be counter-productive. *Nature,* 445**,** 818.

HULME, M. 2009. *Why we disagree about climate change: understanding controversy, inaction and opportunity,* Cambridge, Cambridge University Press.

HULME, M. 2011. Reducing the Future to Climate: A Story of Climate Determinism and Reductionism. *Osiris,* 26**,** 245-266.

IPCC. 2013. *Fifth Assessment Report Work Group 1: Summary for Policymakers* [Online]. Available: http://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_SPM_FINAL.pdf [Accessed 24th November 2016 2016].

IPCC. 2014a. *Climate Change 2014 Impacts, Adaptation and Vulnerability Summary for Policymakers* [Online]. Available: http://www.ipcc.ch/pdf/assessment-report/ar5/wg2/ar5_wgII_spm_en.pdf [Accessed 6th November 2018].

IPCC. 2014b. *Climate Change 2014 Mitigation of Climate Change: Summary for Policymakers* [Online]. Available: https://archive.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_summary-for-policymakers.pdf [Accessed 28th June 2019].

IPCC. 2014c. *IPCC Fifth Assessment Report Working Group II Contribution: Glossary* [Online]. Available: http://www.ipcc.ch/report/ar5/wg2/ [Accessed 11th September 2017].

IPCC. 2018. *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty: Summary for policymakers* [Online]. Available: https://www.ipcc.ch/site/assets/uploads/sites/2/2019/05/SR15_SPM_version_report_LR.pdf [Accessed 28th June 2019].

IPSOS MORI. 2013. *PREPARE - Climate risk acceptability Findings from a series of deliberative workshops and online survey* [Online]. Available: http://randd.defra.gov.uk/Document.aspx?Document=11261_PREPARECA0513Publicclimateriskacceptability-Finalreport.pdf [Accessed 15th October 2017].

IPSOSMORI. 2020. *Two thirds of Britons believe Climate Change as serious as Coronavirus and majority want Climate prioritised in economic recovery* [Online]. Available: https://www.ipsos.com/ipsos-mori/en-uk/two-thirds-britons-believe-climate-change-serious-coronavirus-and-majority-want-climate-prioritised [Accessed 18th May 2020].

JASPAL, R., NERLICH, B. & CINNIRELLA, M. 2014. Human responses to climate change: Social representation, identity and socio-psychological action. *Environmental Communication,* 8**,** 110-130.

JOHNS-PUTRA, A. 2016. Climate change in literature and literary studies: From cli-fi, climate change theater and ecopoetry to ecocriticism and climate change criticism. *Wiley Interdisciplinary Reviews: Climate Change,* 7**,** 266-282.

KASPERSON, R. E., RENN, O., SLOVIC, P., BROWN, H. S., EMEL, J., GOBLE, R., KASPERSON, J. X. & RATICK, S. 1988. The social amplification of risk: A conceptual framework. *Risk Analysis,* 8**,** 177-187.

KINCAID, J. P., FISHBURNE JR, R. P., ROGERS, R. L. & CHISSOM, B. S. 1975. Derivation of new readability formulas (automated readability index, fog count and flesch reading ease formula) for navy enlisted personnel.

KIRILENKO, A. P. & STEPCHENKOVA, S. O. 2014. Public microblogging on climate change: One year of Twitter worldwide. *Global Environmental Change-Human and Policy Dimensions,* 26**,** 171-182.

KÖPSEL, V., WALSH, C. & LEYSHON, C. 2017. Landscape narratives in practice: implications for climate change adaptation. *The Geographical Journal,* 183**,** 175-186.

LAWRENCE, A. 2009. The first cuckoo in winter: Phenology, recording, credibility and meaning in Britain. *Global Environmental Change,* 19**,** 173-179.

LAWRENCE, M. G. & SCHÄFER, S. 2019. Promises and perils of the Paris Agreement. *Science,* 364**,** 829-830.

LAZAREVIC, D. & VALVE, H. 2017. Narrating expectations for the circular economy: Towards a common and contested European transition. *Energy Research & Social Science,* 31**,** 60-69.

LEFEVRE, C. E., BRUINE DE BRUIN, W., TAYLOR, A. L., DESSAI, S., KOVATS, S. & FISCHHOFF, B. 2015. Heat protection behaviors and positive affect about heat during the 2013 heat wave in the United Kingdom. *Social Science & Medicine,* 128**,** 282-289.

LEJANO, R. P., TAVARES-REAGER, J. & BERKES, F. 2013. Climate and narrative: Environmental knowledge in everyday life. *Environmental Science & Policy,* 31**,** 61-70.

LESNIKOWSKI, A., FORD, J., BIESBROEK, R., BERRANG-FORD, L. & HEYMANN, S. J. 2015. National-level progress on adaptation. *Nature Climate Change,* 6**,** 261-265.

LORENZ, S., PORTER, J. & DESSAI, S. 2019. Identifying and tracking key climate adaptation actors in the United Kingdom. *Regional Enviromental Change* 19**,** 2125-2138.

LORENZONI, I., LEISEROWITZ, A., DE FRANCA DORIA, M., POORTINGA, W. & PIDGEON, N. F. 2006. Cross-National Comparisons of Image Associations with "Global Warming" and "Climate Change" Among Laypeople in the United States of America and Great Britain. *Journal of Risk Research,* 9**,** 265-281.

LORENZONI, I., NICHOLSON-COLE, S. & WHITMARSH, L. 2007. Barriers perceived to engaging with climate change among the UK public and their policy implications. *Global Environmental Change,* 17**,** 445-459.

MANGALAGIU, D., BISARO, A., HINKEL, J. & TÀBARAL, J. D. 2020. Transformative narratives for climate action. *Climatic Change,* 160**,** 495-506.

MARSHALL, G. 2014. *Hearth & Hiraeth: Constructing climate change narratives around national identity.* [Online]. Available: https://climateoutreach.org/resources/climate-and-national-identity/ [Accessed 13th May 2019].

MASSEY, E. & HUITEMA, D. 2013. The emergence of climate change adaptation as a policy field: the case of England. *Regional Environmental Change* 13**,** 341-352.

MAYHEW, F. 2017. *Regional ABCs: Circulation growth for Scotsman and Irish News but many record double-digit decline* [Online]. Available:

https://www.pressgazette.co.uk/regional-abcs-circulation-growth-for-scotsman-and-irish-news-as-many-record-double-digit-decline/ [Accessed 27th November 2018].

MCDONALD, R. I., CHAI, H. Y. & NEWELL, B. R. 2015. Personal experience and the 'psychological distance' of climate change: An integrative review. *Journal of Environmental Psychology,* 44**,** 109-118.

MET OFFICE. 2018. *Summer 2018* [Online]. Available: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/interesting/2018/summer-2018---met-office.pdf [Accessed 13th June 2020].

MET OFFICE. 2019. *UK Climate Projections: Headline Findings* [Online]. Available: https://www.metoffice.gov.uk/research/collaboration/ukcp [Accessed 27th June 2020].

MET OFFICE. 2020. *Past weather events* [Online]. Available: http://www.metoffice.gov.uk/climate/uk/interesting [Accessed 11th September 2017].

MILDENBERGER, M. & TINGLEY, D. 2017. Beliefs about Climate Beliefs: The Importance of Second-Order Opinions for Climate Politics. *British Journal of Political Science,* 49**,** 1279-1307.

MILES, M. 2010. Representing nature: art and climate change. *Cultural Geographies,* 17**,** 19-35.

MILLER, R. 2007. Futures literacy: A hybrid strategic scenario method. *Futures,* 39**,** 341-362.

MINISTRY OF HOUSING, C. A. L. G. 2019. *English Housing Survey. Home ownership, 2017-18* [Online]. Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/817623/EHS_2017-18_Home_ownership_report.pdf [Accessed 8th May 2020].

MOEZZI, M., JANDA, K. B. & ROTMANN, S. 2017. Using stories, narratives, and storytelling in energy and climate change research. *Energy Research & Social Science,* 31**,** 1-10.

MORGAN, M. G., FISCHOFF, B., BOSTROM, A. & ATMAN, C. 2002. *Risk communication: a mental models approach,* Cambridge, Cambridge University Press.

MOSER, S. C. 2013. Navigating the political and emotional terrain of adaptation: Community engagement when climate change comes home. *In:* MOSER, S. C. & BOYKOFF, M. T. (eds.) *Successful Adaptation to Climate Change: Linking science and policy in a rapidly changing world.* London & New York: Routledge.

MOSER, S. C. 2014. Communicating adaptation to climate change: the art and science of public engagement when climate change comes home. *WIRES Climate Change,* 5**,** 337-358.

MOSER, S. C. & EKSTROM, J. A. 2010. A framework to diagnose barriers to climate change adaptation. *PNAS,* 107**,** 22026-22031.

MOSER, S. C. & PIKE, C. 2015. Community engagement on adaptation: Meeting a growing capacity need. *Urban Climate,* 14**,** 111-115.

NERLICH, B. & JASPAL, R. 2014. Images of Extreme Weather: Symbolising Human Responses to Climate Change. *Science As Culture,* 23**,** 253-276.

NEXIS. 2018. *Nexis Newspaper Database* [Online]. Available: https://www.nexis.com/home/home.do?randomNum=0.9708025118379766 [Accessed 12th February 2019].

NISBET, M. C. 2009. Communicating Climate Change: Why Frames Matter for Public Engagement. *Environment: Science and Policy for Sustainable Development,* 51**,** 12-23.

NOLAN, J. M., KENEFICK, J. & SCHULTZ, P. W. 2011. Normative messages promoting energy conservation will be underestimated by experts… unless you show them the data. *Social Influence,* 6**,** 169-180.

O'BRIEN, K. L. & WOLF, J. 2010. A values-based approach to vulnerability and adaptation to climate change. *Wiley Interdisciplinary Reviews: Climate Change,* 1**,** 232-242.

O'NEILL, S. & NICHOLSON-COLE, S. 2009. "Fear Won't Do It" Promoting Positive Engagement With Climate Change Through Visual and Iconic Representations. *Science Communication,* 30**,** 355-379.

O'NEILL, S., WILLIAMS, H. T. P., KURZ, T., WIERSMA, B. & BOYKOFF, M. 2015. Dominant frames in legacy and social media coverage of the IPCC Fifth Assessment Report. *Nature Climate Change,* 5**,** 380-380.

O'NEILL, S. J. 2013. Image matters: Climate change imagery in US, UK and Australian newspapers. *Geoforum,* 49**,** 10-19.

O'NEILL, S. J., BOYKOFF, M., NIEMEYER, S. & DAY, S. A. 2013. On the use of imagery for climate change engagement. *Global Environmental Change-Human and Policy Dimensions,* 23**,** 413-421.

O'BRIEN, K. 2012. Global environmental change II: From adaptation to deliberate transformation. *Progress in Human Geography,* 36**,** 667-676.

OLAUSSON, U. 2011. "We're the Ones to Blame": Citizens' Representations of Climate Change and the Role of the Media. *Environmental Communication-a Journal of Nature and Culture,* 5**,** 281-299.

PAHL, S. & BAUER, J. 2013. Overcoming the distance: Perspective taking with future humans improves environmental engagement. *Environment Behavior,* 45**,** 155-169.

PALL, P., AINA, T., STONE, D. A., STOTT, P. A., NOZAWA, T., HILBERTS, A. G. J., LOHMANN, D. & ALLEN, M. R. 2011. Anthropogenic greenhouse gas contribution to flood risk in England and Wales in autumn 2000. *Nature,* 470**,** 382-385.

PARANJOTHY, S., GALLACHER, J., AMLOT, R., RUBIN, G. J., PAGE, L., BAXTER, T., WIGHT, J., KIRRAGE, D., MCNAUGHT, R. & PALMER, S. R. 2011. Psychosocial impact of the summer 2007 floods in England. *BMC Public Health,* 11**,** 145-145.

PASCHEN, J. A. & ISON, R. 2014. Narrative research in climate change adaptation-Exploring a complementary paradigm for research and governance. *Research Policy,* 43**,** 1083-1092.

PEARCE, W., BROWN, B., NERLICH, B. & KOTEYKO, N. 2015. Communicating climate change: conduits, content, and consensus. *Wiley Interdisciplinary Reviews-Climate Change,* 6**,** 613-626.

PELLING, M. 2011. *Adaptation to climate change: from resilience to transformation,* London, Routledge.

PELLING, M. & HIGH, C. 2005. Understanding adaptation: What can social capital offer assessments of adaptive capacity? *Global Environmental Change,* 15**,** 308-319.

PELLING, M., O'BRIEN, K. & MATYAS, D. 2015. Adaptation and transformation. *Climatic Change,* 133**,** 113-127.

PEPERMANS, Y. & MAESEELE, P. 2014. Democratic Debate and Mediated Discourses on Climate Change: From Consensus to De/politicization. *Environmental Communication,* 8**,** 216-232.

PHILLIPS, M. & DICKIE, J. 2015. Climate change, carbon dependency and narratives of transition and stasis in four English rural communities. *Geoforum,* 67**,** 93-109.

PIDGEON, N. 2012. Public understanding of, and attitudes to, climate change: UK and international perspectives and policy. *Climate Policy,* 12**,** S85-S106.

PIELKE, R., PRINS, G., RAYNER, S. & SAREWITZ, D. 2007. Lifting the taboo on adaptation. *Nature,* 445**,** 597-598.

PING, N. S., WEHN, U., ZEVENBERGEN, C. & VAN DER ZAAG, P. 2016. Towards two-way flood risk communication: current practice in a community in the UK. *Journal of Water and Climate Change,* 7**,** 651 - 664.

POORTINGA, W., SPENCE, A., WHITMARSH, L., CAPSTICK, S. & PIDGEON, N. F. 2011. Uncertain climate: An investigation into public scepticism about anthropogenic climate change. *Global Environmental Change-Human and Policy Dimensions,* 21**,** 1015-1024.

PORTER, J. J., DESSAI, S. & TOMPKINS, E. L. 2014. What do we know about UK household adaptation to climate change? A systematic review. *Climatic Change,* 127**,** 371-379.

POTTER, J. 1996. *Representing reality: Discourse, rhetoric and social construction*, Sage.

POWER, K., LANG, A., WOOD, J., GUBBELS, F., MCCULLOUGH, J., CARR, A., ENGLAND, K. & GUIDA, K. 2020. Understanding how behaviour can influence climate change risks AECOM and Sniffer.

PUBLIC HEALTH ENGLAND. 2015. *Flooding: advice for the public* [Online]. Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/401980/flood_leaflet_2015_final.pdf [Accessed 6th June 2019].

PUBLIC HEALTH ENGLAND. 2018. *Heatwave plan for England: Protecting health and reducing harm from severe heat and heatwaves* [Online]. Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/888668/Heatwave_plan_for_England_2020.pdf [Accessed 6th June 2019].

PUTNAM, R. D. 1995. Tuning in, tuning out: The strange disappearance of social capital in America. *PS: Political science & politics,* 28**,** 664-683.

REIS, J. & BALLINGER, R. C. 2020. Creating a climate for learning-experiences of educating existing and future decision-makers about climate change. *Marine Policy,* 111**,** 103204.

ROTMANN, S. 2017. "Once upon a time…" Eliciting energy and behaviour change stories using a fairy tale story spine. *Energy Research & Social Science,* 31**,** 303-310.

RYAN, M.-L. 2007. Toward a definition of narrative. *In:* HERMAN, D. (ed.) *The Cambridge companion to narrative.* Cambridge: Cambridge UP.

SACCHI, S., RIVA, P. & ACETO, A. 2016. Myopic about climate change: Cognitive style, psychological distance, and environmentalism. *Journal of Experimental Social Psychology,* 65**,** 68-73.

SCHULDT, J. P., RICKARD, L. N. & YANG, Z. J. 2018. Does reduced psychological distance increase climate engagement? On the limits of localizing climate change. *Journal of Environmental Psychology,* 55**,** 147-153.

SHANAHAN, E. A., JONES, M. D. & MCBETH, M. K. 2018. How to conduct a Narrative Policy Framework study. *The Social Science Journal,* 55**,** 332-345.

SHAW, C. & CORNER, A. 2017. Using Narrative Workshops to socialise the climate debate: Lessons from two case studies–centre-right audiences and the Scottish public. *Energy research & social science,* 31**,** 273-283.

SIMON, F. 2020. *EU €750 billion Covid recovery fund comes with green conditions* [Online]. Available: https://www.euractiv.com/section/energy-environment/news/do-no-harm-eu-recovery-fund-has-green-strings-attached/ [Accessed 20th August 2020].

SINGH, A. S., ZWICKLE, A., BRUSKOTTER, J. T. & WILSON, R. 2017. The perceived psychological distance of climate change impacts and its influence on support for adaptation policy. *Enviromental Science & Policy,* 73**,** 93-99.

SMITH, C. J., FORSTER, P. M., ALLEN, M., FUGLESTVEDT, J., MILLAR, R. J., ROGELJ, J. & ZICKFELD, K. 2019. Current fossil fuel infrastructure does not yet commit us to 1.5 C warming. *Nature Communications,* 10**,** 1-10.

SMITH, J., BUTLER, R., DAY, R. J., GOODBODY, A. H., LLEWELLYN, D. H., ROHSE, M. H., SMITH, B. T., TYSZCZUK, R. A., UDALL, J. & WHYTE, N. M. 2017. Gathering around stories: Interdisciplinary experiments in support of energy system transitions. *Energy Research & Social Science,* 31**,** 284-294.

SMITH, N. & JOFFE, H. 2013. How the public engages with global warming: A social representations approach. *Public Understanding of Science,* 22**,** 16-32.

SPENCE, A. & PIDGEON, N. 2010. Framing and communicating climate change: The effects of distance and outcome frame manipulations. *Global Enviromental Change,* 20**,** 656 - 667.

SPENCE, A., POORTINGA, W., BUTLER, C. & PIDGEON, N. F. 2011. Perceptions of climate change and willingness to save energy related to flood experience. *Nature Climate Change,* 1**,** 46-49.

SPENCE, E., PIDGEON, N. & PEARSON, P. 2018. UK public perceptions of Ocean Acidification–The importance of place and environmental identity. *Marine Policy,* 97.

STATISTA. 2018. *Circulation of newspapers in the United Kingdom (UK) as of June 2018 (in 1,000 copies)* [Online]. Available: https://www.statista.com/statistics/529060/uk-newspaper-market-by-circulation/ [Accessed 27th November 2018].

STATISTA. 2019. *Size of the urban and rural populations of the United Kingdom (UK) from 2000 to 2018* [Online]. Available: https://www.statista.com/statistics/984702/urban-and-rural-population-of-the-uk/ [Accessed 1st June 2020].

STEENTJES, K., DEMSKI, C., SEABROOK, A., CORNER, A. & PIDGEON, N. 2020. *British public perceptions of climate risk, adaptation options and resilience (RESiL RISK): Topline findings of a GB survey conducted in October 2019* [Online]. Available: http://orca.cf.ac.uk/129452/ [Accessed 20th April 2020].

STEENTJES, K., PIDGEON, N. F., POORTINGA, W., CORNER, A. J., ARNOLD, A., BÖHM, G., MAYS, C., POUMADÈRE, M., RUDDAT, M. & SCHEER, D. 2017. *European Perceptions of Climate Change (EPCC): Topline findings of a survey conducted in four European countries in 2016* [Online]. Available: http://orca.cf.ac.uk/98660/7/EPCC.pdf [Accessed 10th October 2017].

SVOBODA, M. 2016. Cli-fi on the screen (s): patterns in the representations of climate change in fictional films. *Wiley Interdisciplinary Reviews: Climate Change,* 7**,** 43-64.

SWYNGEDOUW, E. 2013. Apocalypse Now! Fear and Doomsday Pleasures. *Capitalism, Nature, Socialism,* 24**,** 9-18.

TAYLOR, A., BRUINE DE BRUIN, W. & DESSAI, S. 2014a. Climate change beliefs and perceptions of weather-related changes in the United Kingdom. *Risk Analysis,* 34**,** 1995-2004.

TAYLOR, A., BRUINE DE BRUIN, W. & DESSAI, S. 2017. Public priorities and expectations of climate change impacts in the United Kingdom. *Journal of Risk Research,* 22**,** 150-160.

TAYLOR, A. L., DESSAI, S. & BRUINE DE BRUIN, W. 2014b. Public perception of climate risk and adaptation in the UK: A review of the literature. *Climate Risk Management,* 4-5**,** 1-16.

TERMEER, C., BIESBROEK, R. & VAN DEN BRINK, M. 2012. Institutions for adaptation to climate change: comparing national adaptation strategies in Europe. *European Political Science,* 11**,** 41-53.

THOMAS, C. & SHARP, V. 2013. Understanding the normalisation of recycling behaviour and its implications for other pro-environmental behaviours: A review of social norms and recycling. *Resources, Conservation and Recycling,* 79**,** 11-20.

THOMAS, D. R. 2006. A general inductive approach for analyzing qualitative evaluation data. *American Journal of Evaluation,* 27**,** 237-246.

THOMAS, M., PIDGEON, N., WHITMARSH, L. & BALLINGER, R. 2015. Mental models of sea-level change: A mixed methods analysis on the Severn Estuary, UK. *Global Environmental Change,* 33**,** 71-82.

TOMPKINS, E. L., ADGER, W. N., BOYD, E., NICHOLSON-COLE, S., WEATHERHEAD, K. & ARNELL, N. 2010. Observed adaptation to climate change: UK evidence of transition to a well-adapting society. *Global Environmental Change,* 20**,** 627-635.

TOOLE, S., KLOCKER, N. & HEAD, L. 2016. Re-thinking climate change adaptation and capacities at the household scale. *Climatic Change,* 135**,** 203-209.

TRENBERTH, K. E., FASULLO, J. T. & SHEPHERD, T. G. 2015. Attribution of climate extreme events. *Nature Climate Change,* 5**,** 725-730.

TROPE, Y. & LIBERMAN, N. 2010. Construal-level theory of psychological distance. *Psychological Review,* 117**,** 440.

TSCHAKERT, P., BARNETT, J., ELLIS, N., LAWRENCE, C., TUANA, N., NEW, M., ELRICK-BARR, C., PANDIT, R. & PANNELL, D. 2017. Climate change and loss, as if people mattered: values, places, and experiences. *Wiley Interdisciplinary Reviews: Climate Change,* 8e476.

TSCHAKERT, P., ELLIS, N. R., ANDERSON, C., KELLY, A. & OBENG, J. 2019. One thousand ways to experience loss: A systematic analysis of climate-related intangible harm from around the world. *Global Environmental Change,* 55**,** 58-72.

TSCHAKERT, P., TUANA, N., WESTSKOG, H., KOELLE, B. & AFRIKA, A. 2016. T CHANGE: the role of values and visioning in transformation science. *Current Opinion in Environmental Sustainability,* 20**,** 21-25.

UK GOVERNMENT. 2020. *United Kingdom of Great Britain and Northern Ireland's Adaptation Communication to the United Nations Framework Convention on Climate Change* [Online]. Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/943713/uk-adaptation-communication-to-unfccc.pdf [Accessed 15th December 2020].

UNFCCC. 2015. *Paris Agreement* [Online]. Available: https://unfccc.int/files/meetings/paris_nov_2015/application/pdf/paris_agreement_english_.pdf [Accessed 31st October 2016].

URHAMMER, E. & RØPKE, I. 2013. Macroeconomic narratives in a world of crises: An analysis of stories about solving the system crisis. *Ecological Economics,* 96**,** 62-70.

VALENCIO, N. & VALENCIO, A. 2018. Media coverage of the 'UK flooding crisis': A social panorama. *Disasters,* 42**,** 407-431.

VAN DER LEEUW, S. 2019. The role of narratives in human-environmental relations: an essay on elaborating win-win solutions to climate change and sustainability. *Climatic Change***,** 1-11.

VAN KASTEREN, Y. 2014. How are householders talking about climate change adaptation? *Journal of Environmental Psychology,* 40**,** 339-350.

VAN VALKENGOED, A. M. & STEG, L. 2019. Meta-analyses of factors motivating climate change adaptation behaviour. *Nature Climate Change,* 9**,** 158-163.

VELAND, S., SCOVILLE-SIMONDS, M., GRAM-HANSSEN, I., SCHORRE, A., EL KHOURY, A., NORDBØ, M., LYNCH, A., HOCHACHKA, G. & BJØRKAN, M. 2018. Narrative matters for sustainability: the transformative role of storytelling in realizing 1.5° C futures. *Current Opinion in Environmental Sustainability,* 31**,** 41-47.

WALKER-SPRINGETT, K., BUTLER, C. & ADGER, W. N. 2017. Wellbeing in the aftermath of floods. *Health & Place,* 43**,** 66-74.

WALLACE-WELLS, D. 2017. *The Uninhabitable Earth* [Online]. New York magazine. Available: https://nymag.com/intelligencer/2017/07/climate-change-earth-too-hot-for-humans.html [Accessed 4th May 2020].

WEBER, E. U. 2016. What shapes perceptions of climate change? New research since 2010. *Wiley Interdisciplinary Reviews-Climate Change,* 7**,** 125-134.

WHITMARSH, L. 2008. Are flood victims more concerned about climate change than other people? The role of direct experience in risk perception and behavioural response. *Journal of Risk Research,* 11**,** 351-374.

WHITMARSH, L. 2009. What's in a name? Commonalities and differences in public understanding of "climate change" and "global warming". *Public Understanding of Science,* 18**,** 401-420.

WHITMARSH, L. & CORNER, A. 2017. Tools for a new climate conversation: A mixed-methods study of language for public engagement across the political spectrum. *Global Enviromental Change-Humans and Policy Dimensions,* 42**,** 122-135.

WHITMARSH, L., SEYFANG, G. & O'NEILL, S. 2011. Public engagement with carbon and climate change: To what extent is the public 'carbon capable'? *Global Environmental Change,* 21**,** 56-65.

WIRTH, V., PRUTSH, A. & GROTHMANN, T. 2014. Communicating Climate Change Adaptation State of the Art and Lessons Learned from Ten OECD Countries. *GAIA - Ecological Perspectives for Science and Society,* 23**,** 30-39.

YUSOFF, K. & GABRYS, J. 2011. Climate Change and the Imagination. *WIRES Clim Change,* 2**,** 516-534.

ZAVAL, L., MARKOWITZ, E. M. & WEBER, E. U. 2015. How Will I Be Remembered? Conserving the Environment for the Sake of One's Legacy. *Psychological Science,* 26**,** 231-236

Appendices

Appendix A: for Chapter 2

Appendix A1 - Table of Demographic Information

Interviewee Number	Gender	Age	Region
1	Female	22	North West
2	Female	32	Wales
3	Female	48	North East
4	Female	54	Yorkshire & Humberside
5	Female	59	Yorkshire & Humberside
6	Female	62	Northern Ireland
7	Female	70	Wales
8	Male	21	Greater London
9	Male	21	North West
10	Male	32	North East
11	Male	35	North West
12	Male	41	South West
13	Male	44	Wales
14	Male	49	West Midlands
15	Male	50	West Midlands
16	Male	60	Scotland
17	Male	66	South East
18	Male	70	South East

Appendix A2 - Interview Protocol

Note this was developed by the original interviewing team, not the author of this thesis

I would like you to think for a moment about the impacts of climate change in the UK. Could you tell me which are the three impacts you are most concerned about?

Prompt - Can you explain why these three are of particular concern to you?

Are there more impacts that concern you that we haven't talked about?

(I can note these down and if we have time left at the end we can talk about them.) – use in question 4.

Now I would like you to think for a moment about adapting to climate change in the UK. What are the first three words or phrases that come into your mind?

Prompt - Can you explain why you mentioned those three things in particular?

Generally when I'm talking with someone about climate change, one of the main issues that always pops up in the conversation, is how individuals, businesses, organisations, and the Government, respond to extreme weather events, such as heavy rain or snow, gales, floods, heat waves, droughts, extremely low temperatures, etc. I am going to ask you your opinion on that later but firstly, can you describe to me your experiences of extreme weather?

Prompt - I can make a list and then ask for each one mentioned:

When was this?

What affect did it have on you?

What did you do?

Thinking back over your life in the UK, do you personally feel that over the long term you have seen any notable changes in the weather the UK experiences?

Earlier I asked you about the impacts of climate change in the UK.

Prompt - I can refer to the top three plus any others mentioned by the respondent

Are there any impacts of climate change that you think are particularly significant?

Prompt - To whom are they significant, you, your family and friends, specific organisations, everybody? What about wildlife and natural habitats?

Do any of these people, groups or habitats need extra protection from specific impacts?

Prompt – Are there groups that are more vulnerable such as the elderly, businesses, endangered species, others?

Which of the impacts you have expressed concern for do you think we will experience in the UK by 2050? (Repeat the list if necessary)

How does this make you feel?

Prompt - Perhaps you could describe for me any overall positive or negative outcomes you can foresee.

I mentioned earlier that we would have an opportunity to discuss responses to extreme weather events. If this is something we have to do as part of our adaptation to climate change, who do you think is responsible for leading on this?

Prompt - Are there different types of organisation or individual that should be involved?

Is there anything you can or should be doing to adapt to climate change?

Prompt – I can use the lists of impacts to probe for specific actions.

Appendix B: for Chapter 3

Appendix B1 - Search terms used in Nexis

Search terms	Search where in text?
climate change OR climate OR global warming OR weather OR flood! OR drought OR heat OR rain*** OR cold	In headlines and lead paragraphs
AND	
adapt! OR cop*** OR manag*** OR resilien** OR adjust! OR modif! OR react****"OR plan**** OR prepar*** OR acclimat! OR transform! OR future OR change OR intervene! OR action* OR groundwork OR innovation* OR participatory OR plan for OR polic*** OR capacity building	Anywhere in the text
NOT	
foot! OR sport	anywhere in the text

Appendix B2 - Coding categories with number of articles coded in each

Higher Level Codes	Sub-Codes	No. of articles code appears in
Impacts		*282*
	Climate change not specified	37
	Extreme weather – drought	34
	Extreme weather – not specified	5
	Extreme weather – flooding, heavy rain, tidal	169
	Extreme weather – rising temperatures & heatwaves	50
	Extreme weather – storms	22
	Extreme weather – very cold and snow	13
	Other – coastal erosion	4
	Other – financial	6
	Other – international effecting UK	9
	Other – new animals, diseases	4
	Other- rising seas	12

	Other – seasonal shifts	10
	Other – warming seas, ocean acidification	5
	Other - wildfires	2
Active Agents		*282*
	Business & finance	15
	Consumers	8
	EA & other government agencies	24
	Everyone implied	8
	Farmers, National Farmers Union, food retailers	25
	Individuals	35
	Individuals – for nature	11
	Individuals – lack of agency	12
	Insurance industry	17
	International governance	12
	Local communities	8
	Local government & authorities	31
	Military	1
	National government	71
	National government – not doing things	48
	Nature	20
	NGOs & campaigners	1
	None needed	9
	None specified /disputed	14
	Scientists, experts, technology	29
	Utilities & infrastructure inc. housing	18
Adaptive Actions		*282*
	Advance prepping	24
	Alternative types of flood defences	37
	Built flood defences	66
	Changes to food production	28
	Changes to infrastructure	22
	Changes to the home and garden	23
	Changing business model	5
	Education & information for individuals	23

	Individual behaviour change	11
	Insurance	34
	Leadership behaviours	15
	Legal action / policy change	12
	Moving away from hazard	14
	Nature	36
	None being taken	23
	None needed	8
	None specified	11
	Reviews, reports, consultations	30
	System transformation	4
	UK funding adaptation overseas	14
	Water use & storage	15

Appendix B3 - Quotes taken from the newspapers to support the Results

The numbers in brackets in the Results section, e.g. (1), refers to the numbering below.

Supporting Quotes

1. Days of extreme rainfall - downpours expected once every 100 days - occurred every 70 days in 2012… with four of the top five wettest years occurring since [2000] *The Guardian* January 2013 No. 3
2. Truss highlighted the unprecedented nature of the rainfall that has caused the flooding *The Guardian* December 2015 No. 17
3. Mr Cameron said the flooding was unprecedented *The Sun* December 2015 No.101
4. Flood-defence funding has been cut almost in half despite warnings that hundreds of thousands of homeowners are at risk from increasingly extreme weather *The Times* March 2013 No. 7
5. Environment Secretary Owen Paterson announced yesterday that construction work will begin on almost 100 new defences schemes across the country this year, to better protect more than 64,000 homes from flooding *Yorkshire Post* February 2013 No. 3
6. Flooding threatens £250bn worth of homes as cutbacks weaken defences: Quarter of homes in London at risk *The Guardian* May 2013 No. 12
7. one in six homes are at risk of flooding and that flooding is the number one risk posed by climate change in the UK *The Guardian* February 2013 No. 2
8. Being flooded is a revolting, traumatising and economically ruinous experience, so the list of flood defences produced by the government on Thursday is good news for all those that will benefit from them *The Guardian* February 2013, No. 2
9. Residents have described how they watched helplessly as heavy rain caused flooding “devastation” in their street, with water bursting through flood defences and into their homes. *Eastern Daily Press* July 2015 No. 18

10. Great barrier grief… Flood victims blasted David Cameron yesterday for failing to protect their communities as the deluge wrecked more havoc *The Sun* December 2015 No. 101
11. Act now to avert further floods of misery in future… We are calling for £1bn per year to be spent on managing flood risk by 2025 *Yorkshire Post* February 2015, No. 5
12. the list of flood defences produced by the government on Thursday is good news for all those that will benefit from them… Over 64,000 homes will be better protected *The Guardian* February 2013 No. 2
13. Britain needs bigger barriers *Daily Mail* December 2015 No. 25
14. Overall, about 1,400 properties across the country were flooded, but government agencies said yesterday that it could have been far worse. Jason Wakeford, a spokesman for the Environment Agency, said: "Some 800,000 properties have been protected by the defences put in place in the last six years." *The Times* December 2013 No. 7
15. Although anti-flooding defences were installed last year in Nottingham, protecting 16,000 properties and Keswick protecting nearly 200 properties; and 93 defences are due to start construction this year, Smith said far more measures would be needed. *The Observer* March 2013 No. 1
16. "We have constructed more than 10km of raised flood defences and installed more than 30 flood gates that reduce the risk of flooding to 7,800 properties in Carlisle. You can see the city has recovered. *Sunday Sun* January 2015 No. 3
17. It came as a £14m flood alleviation scheme, which was half paid for by the European Regional Development Fund, and will cut the flood risk to around 8,000 homes in Hull and the East Riding, was officially launched. *Yorkshire Post* June 2017 No. 7
18. A major flood defence scheme for the Cumbrian town of Kendal, which was submerged in up to 5ft (1.5m) of water by Storm Desmond, was repeatedly postponed, the Guardian can reveal. *The Guardian* December 2015 No. 34
19. Hundreds of planned flood defence schemes have been scrapped while spending on protection work this year has been cut by 14 per cent, it emerged yesterday. The abandoned schemes included work on the River Kent in Kendal where a man was swept to his death on Sunday and dozens of homes were evacuated. *The Times* December 2015 No. 28
20. Aviva will be looking for assurance that the Government's existing commitment to capital spending on flood defences remains in place. *Eastern Daily Press* November 2015 No. 6
21. Action at last on flood threat: After the cuts comes the investment – with £100bn to be poured into roads, railways, construction and energy in a long overdue bid to kick-start Britain’s stalled economic growth *Yorkshire Post* June 2013 No. 8
22. It is an utter disgrace that a country which boasts of having the fastest growing economy in Europe can't make adequate provision to protect its own people from being flooded out *Daily Mail* December 2015 No. 115
23. Flooding is the biggest threat the UK faces from climate change, yet the Government will spend less on flood defences next year than Labour invested in 2008 *Yorkshire Post* February 2013 No. 3

24. As temperatures rise, up to 3.6 million people in the UK are expected to be at risk of flooding by 2050 if there is no investment to lessen the threat *The Guardian* September 2013, No.11
25. 'Floods could 'overwhelm Thames Barrier by end of century': Sea-level rises could send storm floods over the barrier if nothing is done to bolster the UK's flood defences *The Guardian* May 2013 No. 7
26. But all of this is undermined by a simple, shameful fact: the risk of flooding is rising and the funding for flood defences has fallen *The Guardian* February 2013 No. 2
27. Homeowners 'at risk' as spending on flood defence work is slashed *The Times* March 2013 No.7
28. Government spending on flood defences is "insufficient" to cope with the extreme weather conditions Britain now faces on a regular basis, a cross-party group of MPs has warned in a damning assessment of coalition investment plans *Yorkshire Post* July 2013 No. 4
29. Tory cuts leave towns to drown *Daily Mirror* December 2015 No. 42
30. Cut now, pay later: the floods show what happens when you strip back the state…austerity has left Britain dangerously exposed *The Guardian* December 2015 No. 127
31. Yet even with that extra money the Government will still spend less on flood defences in 2013/14 than the Labour government spent in 2008. *Yorkshire Post* May 2013, No. 16
32. But he [PM David Cameron] was slammed for failing to lessen the impact of the flooding – the fourth crisis in his time as PM and inadequate barriers are again being blamed *The Sun* December 2015 No. 101
33. Out of her depth Truss sunk by floods criticism *Yorkshire Post* December 2015 No. 143
34. We need leadership to stem flood of misery for blighted victims of deluge *Yorkshire Post* May 2013 No. 16
35. £3m works will not end valley's floods torment… "We are drawing up detailed designs for a variety of flood alleviations measures across the Calder Valley" *Yorkshire Post* August 2013 No. 9
36. In response, the London Rivers Action Plan, supported by the mayor, has been restoring rivers previously constrained in artificial channels, giving them greater width and a safety margin for flooding into surrounding green space, improving habitats for plants and wildlife in the process. *The Guardian* February 2015 No. 4
37. There's been very little maintenance done on those watercourses in the past 20 years. Water levels have risen, they flood on the first instance of heavy rains and it is putting in jeopardy a lot of that under-drainage that has been done 30 or 40 years ago. *Eastern Daily Press* January 2013 No. 19
38. We may not be able to do much about the record levels of rainfall in places such as Cornwall this year but one cause of flooding can be improved: farm drainage. Field drains divert water into streams and rivers, which in turn carry it as quickly as possible out to sea. *The Times* July 2017 No.12
39. A clay bund round an area of rough pasture two miles above Pickering, which can store 120,000 cubic metres of floodwater, is now proving protection for the town. *Yorkshire Post* September 2015 No. 7

40. The new scheme includes the building of earth mounds and creating wood debris dams, tree planting and farm management action to restrict the flow of flood water from the moors into Pickering Beck. *Yorkshire Post* May 2013 No. 6
41. Pioneering project launched to reduce flood risk in West Yorkshire… The first of up to 200,000 trees have been planted as one of a series of measures planned that will help slow the flow of flood water in Calderdale *Yorkshire Post* October 2017 No. 7
42. How do you tackle Britain's rising tide? Let the water flow, say the experts… the scheme proposes homes around marshes, squares that are designed to become ponds, and parks that became small lakes *The Guardian* January 2013 No.11
43. UK to bring back beavers in first government flood reduction scheme of its kind *The Guardian* December 2017 No. 5
44. It's heartbreaking for all of us who know and love Yorkshire to witness the devastation caused across so much of the country by the floods *Yorkshire Post* December 2015, No. 134
45. The sight of David Cameron in wellies and a hard hat will have done little to cheer up Lancaster's flood stricken residents (haven't they suffered enough?) but it may be a sight we'll have to get used to, thanks to idiotic fiscal policy decisions. *The Guardian* December 2015, No. 55
46. But it is now us who will also pay for decades of disregarding climate change, of short-termism in flood defences and austerity cuts, of refusing to accept that nature has the power to harm us, because we have harmed it. We thought we were safe, but we were just lucky. *The Guardian* December 2015, No. 135
47. My heart goes out to people who've had to endure floods yet again. Hearing about insurance excesses - pricing people out of cover - makes my blood boil. Why doesn't the Government offer cheap insurance to those affected *Daily Mirror* December 2015, No. 82
48. It requires a leap of the imagination, not just a bit more money… the past is no longer a sufficient guide. Today, future vision and enduring principle matter as much *The Guardian* December 2015 No. 138
49. Three million properties shown to be at risk of flash flooding in England *The Guardian* December 2013 No.11
50. Pickering is one of North Yorkshire's worst flooding blackspots and has been hit by severe floods four times in eight years, with millions of pounds worth of damage done to homes and shops *Yorkshire Post* May 2013 No. 19
51. But just days before the exchange of contracts, a devastating flood engulfed the town and washed Sally's dreams away. Her converted basement was wrecked, the buyer pulled out and now, less than a year later, the detached home is languishing on the market at offers of about £350,000 after losing almost £200,000 of its value. *Yorkshire Post* February 2013 No. 6
52. Shadow Defra Minister Gavin Shuker said 96 days stood between "today's near universal coverage for flood damage, and an unfettered free market which would leave tens of thousands with homes that are uninsurable, unmortgageable, and unsellable". *Yorkshire Post* March 2013 No. 9
53. Money made easy: Your five-minute guide to flood insurance *The Times* June 2013 No.09 and December 2013 No. 15

54. My property has been flooded. Where do I start? The first thing to do is contact your insurer who can offer advice and get your claim moving. *The Times* December 2015 No. 29
55. Flood proof your home… Check your home insurance… check out the latest deals *Mail on Sunday* February 2017 No. 300
56. Hundreds of thousands of households in flood-prone areas of the UK will be guaranteed affordable flood insurance after the government and insurance industry agreed a deal… this announcement means that people no longer need to live in fear of being uninsurable and that those at most risk can get protection, now and in the future. *Manchester Evening News* July 2013 No. 9
57. Flood-hit homeowners could experience more problems when the time comes to sell their property… The main issue, according to Sally, is that insurers are no longer willing to insure the property against flooding and lenders won't give buyers a mortgage without it. *Yorkshire Post* February 2013 No. 6
58. Under the agreement, any flood-risk homeowner who already has cover should be able to renew policies with an existing insurer and, crucially, pass on the cover to future buyers of the property… Failure to come up with a solution could mean that homeowners are unable to sell their properties as building cover is required for a mortgage. *The Sunday Times* May 2013 No. 14
59. Without a new agreement, hundreds of thousands of properties could become uninsurable, threatening their saleability. Aidan Kerr, head of property at the Association of British Insurers (ABI), said: “With flooding the biggest natural risk the UK faces, it is important we have consensus on managing the risk going forward, which includes sustained, targeted flood defence investment and sensible planning decisions.” *The Guardian* May 2013 No. 12
60. "I am sure everyone agrees that it is not government's business to support house prices, but you cannot ignore the likelihood of a significant markdown in value for perhaps 200,000 properties across the country," NFF chief executive Paul Cobbing said. *The Guardian* May 2013, No. 4
61. She said: "There are some very very real economic impacts from this Government's approach which has totally failed. "Lenders could impose very high rates on mortgages on properties in flood risk areas or lenders could hold more money against the risk of default, taking the money out of the economy at a time when the Government has actually been printing money and trying to pump it into the economy." *Yorkshire Post* May 2013, No. 5
62. The vital agreement that allows people in flood-risk areas to insure their homes has been extended by a further month as Ministers insist a comprehensive new deal with the insurance industry is now “very close”. *Yorkshire Post* May 2013 No. 10
63. Government under fire over failure to help flood victims: Insurance costs set to rocket unless someone blinks soon. *The Observer* March 2013, No. 14
64. MPs from all parties expressed their concern in the Commons at the Government’s failure to agree deal with the insurance industry to guarantee hundreds of thousands of people in flood-risk areas can continue to get insurance cover beyond this summer *Yorkshire Post* March 2013 No. 9
65. Government under fire over failure to help flood victims: insurance costs set to rocket unless someone blinks soon *The Observer* March 2013 No. 14

66. Flood insurance fears drive rise in calls for advice. An impasse between the insurance industry and the government over affordable home insurance for victims of flooding… The National Flood Forum (NFF) charity said the number of calls to its helpline trebled *The Guardian* May 2013 No. 4
67. Flooding leaves property owners blighted by a lack of insurance *Yorkshire Post* February 2013 No. 6
68. Households in flood-stricken areas of Cumbria could see their already expensive insurance bills increase again following Storm Desmond *The Times* Dec 2015 No. 29
69. So Direct Line, why has my home insurance gone up by 442%?; The firm's new tool for assessing flood risk could see home premiums soar, as one reader with a £1,000 policy discovered *The Guardian* September 2017 No. 7
70. However, no insurance product or scheme can prevent floods or the widespread devastation and destruction they cause. Improved flood protection schemes, such as the recently-announced £50m flood alleviation scheme in Leeds, are vital to protecting communities and a robust programme of investment and planning is needed. *Yorkshire Post* April 2017 No. 4 (article authored by Aviva CEO Colin Holmes)
71. She said it was the third time her house had flooded, the previous occasion happening in 2002. “We get scared if it rains really hard and we get near misses,” she said. “I know we don’t get it bad but even a little bit of water is devastating.” *Eastern Daily Press* July 2015 No. 18
72. “I always say to myself, the water’s not going to come in, it’s really not going to come in,” said Ms Sloan. “Today I think it is”… But if flooding is not unknown, yesterday’s torrent was a novel phenomenon for many of the locals, the worst conditions for more than 30 years. *The Times* December 2015 No. 146
73. HUNDREDS of thousands of homeowners in flood risk areas will have to wait another month before they know whether they can insure their properties… A lack of flood defence spending by the government meant that covering high-risk homes was no longer viable for the industry, according to insurers. *The Sunday Times* May 2013 No. 14
74. INSURANCE companies have warned they will not extend a deal with the Government that has guaranteed thousands of households can buy cover against flooding unless Ministers show they are serious about talks over a new agreement… the last deal committed the Government to investing in flood defences in return for insurers continuing to cover high risk homes. *Yorkshire Post* May 2013 No. 5
75. Nationally, one in six homes are at risk of flooding and in flood prone areas *Yorkshire Post* November 2015 No. 1
76. The report identifies a wide range of other risks, such as increased food poisoning in warmer weather. It says information is lacking on the impact of more severe and frequent heatwaves on cities and the impact of greater UV sunlight exposure on cancer rates. *The Guardian* July 2013, No. 1
77. sudden temperature changes, cold snaps, heat waves and even thunderstorms can have a direct effect on certain medical conditions. Here's why, and what you can do about it. *Daily Mirror* May 2013 No. 9

78. Experts fear that our changing climate… is increasing the proliferation of the tiny ticks that transmit the Lyme disease infection… "You should check yourself for ticks every time you return from visiting urban spaces in Britain during summer." *The Times* July 2017, No. 15
79. Investors have been paying close attention this week to the COP 21 climate change summit in Paris. The talks have implications not only for the environment, but also for returns on investment. *The Time* December 2015, No. 8
80. Flash flood forecasts just for your street. The Met Office is planning to install Britain's most powerful supercomputer to help it produce weather forecasts tailored to every locality, and to predict how the nation's climate is likely to change with global warming. *The Sunday Times* September 2013 No. 2
81. Lasers to map all of England to tackle flooding… The new data will be better quality than ever before, the Environment Agency said, with the whole country mapped at a one meter resolution *Yorkshire Post* December 2017 No. 15
82. Flood maps may hit house prices…Anyone will be able to check the surface-water flood risk for an area by typing in its postcode. At present, it is possible to search only for flood risk posed by rivers and the sea." *The Times* November 2013 No. 7
83. Check the flood risk of any home you are thinking of buying (see the EA's website), have a survey done, plus you can pay a small fee for a report from a specialist company such as Landmark Homecheck - or you could look at a new-build scheme with extra defences… If you do live on a floodplain, there are measures you can take, from signing up to free flood warnings and investing in a flood alarm to adapting your home and knowing what to do when a flood occurs. *The Times* December 2015 No. 56
84. Home buyers need flood risk details up front. Simple traffic light-style warnings should accompany property listings on websites and in adverts to make clear the risk of flooding to house hunters, a prominent group of insurers has said. *Yorkshire Post* December 2015 No. 1
85. New maps from Environment Agency reveal level of risk to properties… The maps, the first of their kind to be made available to the public, were described by the agency as a "vital service", enabling homeowners to check their level of risk… With one in six homes in England at risk of flooding we urge people to check if they are at risk. Accessing accurate, up-to-date information on surface water flood risk will help homeowners and businesses take steps to reduce the often devastating, and expensive impact of flooding," said Aidan Kerr, at the Association of British Insurers. *The Guardian* December 2013 No.11
86. Then there was little many could do to protect their properties. Now more than a million households have signed up to the Government's flood warning service to buy time to take evasive action if history repeats itself… Through Floodline Warnings Direct households can receive alerts by text, email or phone of imminent flooding after heavy rain or a tidal surge. *Mail on Sunday* January 2015 No. 10
87. flood warnings that led to thousands of people leaving their homes … [which] saved lives and property *The Guardian* December 2013 No.3
88. What you can do to keep water at bay; As flooding causes devastation yet again, Liz Rowlinson lists ways to protect your home from damage *The Times* December 2015, No. 56

89. FLOOD PROOF YOUR HOME…Some effective steps post-flood damage cost little, such as raising electric sockets to a higher level or attaching a television to a wall. *Mail on Sunday* February 2017, No. 300
90. The resilience forum and district council will work with businesses to develop flood plans, improve communications when it floods and educate people to help themselves. *Leicester Mercury* October 2013 No. 5
91. Calderdale Council's cabinet member… said investigations were needed to make the area better prepared for future downpours and flooding incidents… "It's really important that residents and businesses know what to do to prepare for future flooding and what to do after a flood. The council and the Environment Agency have useful information, advice and guidance on their websites" *Yorkshire Post* August 2013 No. 9
92. He says local flood strategies have an important role to play. "People need to understand what to do when there's a flood warning, so communication is crucial." *Yorkshire Post* September 2017 No. 2
93. The climate change survivor's guide: As warnings of climate change grow ever more dire, John Vidal offers 10 tips on how to prepare for an apocalyptic future. *The Guardian* October 2013, No. 7
94. If you are self-selecting funds, check the fund's holdings. The top ten are usually listed on platforms such as Hargreaves Lansdown and enable you to see the companies most exposed. If you aren't sure what the companies do, visit their websites. You can find out how they are dealing with climate change risks in their corporate social responsibility documents. *The Times* December 2015, No. 8
95. Heatwaves are national emergencies and the public need to know; Lethal risks of extreme weather are under-reported and government must stop cutting public awareness funds… The heatwave conditions are causing preventable deaths partly because large swaths of the population wrongly believe that extremely hot days are becoming less common…The last few environment secretaries have largely ignored the importance of climate change adaptation. Will Michael Gove break with the dismal record of his predecessors and try to save lives by raising public awareness about the growing risks of heatwaves and other impacts of climate change? *The Guardian* June 2017 No. 6
96. Weather alerts across western Europe as heatwave sets in; Spell of sweltering weather expected to last several days as temperatures hit 40C and UN urges countries to develop better warning systems… The main recommendation was to create heatwave warning systems that highlight the health hazards and inform people what they should do to protect themselves. *The Guardian* July 2015 No. 5
97. Employees aren't expected to work in temperatures below 16C, but there's no legal maximum temperature… There should be guidelines; employers need to know exactly what they must do to improve the workplace for staff. *The Guardian* July 2917 No. 7
98. The report identifies a wide range of other risks, such as increased food poisoning in warmer weather. It says information is lacking on the impact of more severe and frequent heatwaves on cities and the impact of greater UV sunlight exposure on cancer rates. *The Guardian* July 2013, No. 1
99. The French health ministry is set to launch a summer media campaign to raise aware-ness of the risks of the disease. Should our authorities follow suit? No one

knows for sure the extent of the threat in Britain because of a dearth of data. *The Times* July 2017 No. 15

100. Extreme weather being driven by climate change is the biggest threat to UK farming and its ability to feed the nation's growing population. *The Guardian* July 2013 No. 18
101. Erratic swings from floods to heatwaves and drought caused by climate change is devastating harvests, says NFU president *The Guardian* July 2013 No. 18
102. From drought to deluge, and from snowfalls to floods - even by its own fickle standards, the British weather set a new benchmark for unpredictability during 2012, making life extremely difficult for East Anglia's farmers. *Eastern Daily Press* February 2013 No. 4
103. Crops normally seen growing in the south of Europe will be able to be grown further north. This would allow more sweetcorn, grapes, sunflowers, soya and maize to be grown in Britain… But more CO2 and a major temperature rise could cut yields by around 10% later in the century *The Observer* April 2013, No. 6
104. Under one scenario, Yorkshire will be the new Tuscany, under the other, it will be the new Tomsk. *Yorkshire Post* December 2015 No. 76
105. All that climate change really promises is chaos and instability, which are not conditions that are beneficial for grapes or any other crop *The Guardian* May 2013 No. 3
106. Any of you holidaying in France this summer will have seen for yourself how catastrophic the damage from weird seasonal weather can be [French vineyards battered by hail]… Yet England's heatwave could result in one of the greatest vintages ever *The Times* August 2013 No. 5
107. Farmers urge minister to provide insurance for extreme weather: Last year's downpour cost sector £1.3bn, says NFU *The Guardian* January 2013 No. 2
108. How should we - not just the farmers but all of us, in Britain and worldwide - respond to the report from Wales that sheep are dying by the hundreds in snowdrifts up to 20 feet deep? *The Guardian* April 2013 No. 2
109. Out of plaice: popular UK fish at risk from rising temperatures *The Guardian* April 2015 No. 7
110. In addition to overfishing and warming sea temperatures, marine creatures face a further danger: ocean acidification. *The Observer* January 2017 No. 79
111. The UK's clock has been set to Permanent Global Summer Time once more after a temporary blip. Courgettes, spinach and iceberg lettuce are back on the shelves, and the panic over the lack of imported fruit and vegetables has been contained. *The Guardian* February 2017 No. 112
112. It is a fact that crop losses are becoming more commonplace due to severe weather events, as anyone who tried to buy courgettes or iceberg lettuce at the beginning of the year will already know. Unusually dull, wet and cold conditions in Europe, particularly in the growing regions of Spain and Italy, caused devastating crop losses for growers, resulting in shortages of their produce for export to the UK market. Such shortages are of great concern given our reliance on imports here in the UK; we source around 50 per cent of our vegetables and 90 per cent of our fruit from overseas. *Yorkshire Post* June 2017 No. 5
113. Report says failure to protect valuable agricultural land from floods poses long-term risk to security of UK food production *The Guardian* July 2013 No. 6

114. Science steps into defeat the weather: after a washout year for most vegetable growers the seed companies are offering plenty of new weatherproof options. *London Evening Standard* January 2013 No. 17
115. Countries such as Britain, which depend heavily on food grown abroad, may be able to grow fruit that farmers only ever dreamed about, but there will be less land on which to grow. *The Guardian* October 2013 No. 7
116. Until relatively recently, the English wine industry tended to rely on high-yield, cold climate Germanic vines… Mark is taking a lead from his Sussex neighbours and planting the classic "champagne" grapes *The Guardian* May 2013 No. 3
117. Founder Neil Macdonald said apple growers were thinking carefully about what varieties they would be cultivating in years to come because of climate change. "We'll have to concentrate on varieties that can cope with long cold winters and wet summers" *The Guardian* September 2013 No. 9
118. The Exeter team has previously found that sardine, anchovy, squid and cuttlefish are likely to become staples of the UK fishing industry *The Guardian* April 2015 No. 7
119. Scientists find gene that makes plants more carefree under climate stress… Plant cell biologists at the University of Oxford have discovered a gene that can be harnessed to give plants in a laboratory setting more resilience *The Guardian* October 2015 No. 7
120. "Our agriculture continues to innovate, using advanced breeding techniques to produce new crops that can thrive even when the weather seems to be against us. Looking ahead, genetic modification has the potential to make further crop improvements," said Paterson. "Managing our natural resources in innovative ways, is backed by the kind of world class science and engineering skills that we can be proud equip the UK to succeed in the global race." *The Guardian* July 2013 No. 1
121. Bad weather prompting more farmers to consider GM use…with calls from farming leaders to start using the technology [GM] as a way to help combat the effects of climate change… "If the UK sets itself outside the global market in which many countries are pursuing GM crops then we would become fossilized into an old-fashioned way of farming," Peter Kendall, president of the National Farmers Union, told the Guardian. "The majority of our members are aware of the real risk of becoming globally uncompetitive because of avoiding using GM." *The Guardian* January 2013 No. 4
122. Expect more innovation once we've left Europe, as "possible future arrangements" for regulating GM (as the farming minister George Eustice put it last autumn) enable us to experiment with crops in ways that membership of the European Union prevented. *The Times* July 2017 No.12
123. If the changing climate brings more drought, pests and plant diseases to East Anglia, farming leaders claim genetically-modified (GM) crops could hold the answers to some of these challenges. *Eastern Daily Press* October 2015 No. 17
124. The National Farmers Union (NFU) estimates the extreme levels of rainfall in 2012 has cost the industry…The NFU president, Peter Kendall, said they would be used to press Paterson to soften his desire to axe European "Pillar 1" subsidies, which pay farmers a set amount for owning land in production. The UK gets about

euros 3.65bn (£2.97bn) a year under the EU scheme. *The Guardian* January 2013 No. 2

125. "This is provocative, but if our wildlife is where it is today in 20 years time, I think that will be a pretty good achievement," he said. "If we are producing the same amount of food as we are now in 20 years time, I think that we'll have a crisis." *The Guardian* July 2013 No. 18

126. Bonfire night always reminds Jonathan Coate, whose family has grown and harvested willow on the Somerset Levels for almost 200 years, of the changing climate all around him. *The Guardian* September 2013 No. 9

127. Farmers have borne the brunt of what the Germans are calling the "100-year winter". Gareth Wyn Jones farms 3,500 sheep with his father, three uncles and three cousins in the Carneddau Mountains of north Wales. Has he ever known weather like it? "Never. Never," he says. "I'm not exaggerating, it's a bloody disaster." *The Guardian* March 2013 No. 13

128. Jonathan Coate, who this week was to be found mending a hot air balloon basket in his workshop, said he was convinced that the willow growers and the other farmers would find new ways of working. "We're a resilient lot, we'll work it out," he said. *The Guardian* September 2013 No. 9

129. "I can see southern England turning into a major grape-growing region," says White. "All you need are deep pockets, a vision and nerve." *The Guardian* August 2013 No. 2

130. There are various reasons why ex-fund manager Mark Driver chose Rathfinny to plant what will be, when it's finished in 2020, one of the biggest single-site vineyards in Europe. Perhaps the most important, though, is that, according to the weather station at nearby Eastbourne, average temperatures in this area have been climbing since the 1980s to, in 2011, almost a degree higher than they were for most of the 20th century. *The Guardian* May 2013 No. 3

131. "It's slightly harder than teaching chemistry to kids who don't want to learn - which I've done," laughs George Bowden, owner of Yorkshire's oldest commercial wine producer, Leventhorpe Vineyard, near Leeds… Things are certainly improving, though, thanks to climate change. *Yorkshire Post* December 2015 No. 76

132. the National Farmers' Union's regional crops board chairman…. Mr Askew said: "A reverse in the decline of spend for agricultural R&D is crucial if we are to increase production and impact less on the environment in years to come, particularly if extreme weather events become more frequent…. The last thing we want is for legislators to regulate the UK and EU out of arable production by undermining access to pesticides and products that will be vital to protect the crops of the future *Yorkshire Post* September 2013 No. 10

133. Encouragingly, there may be ways to bolster our food security by producing more of it at home. Extending the season of certain UK crops is one way to achieve this. It is something that Dr Phillip Davis has been exploring with glasshouse tomatoes here at Stockbridge Technology Centre. *Yorkshire Post* June 2017 No. 5

134. But Kendall said that further risks lie in Europe cutting itself off from the technologies needed to deal with extreme heatwaves, floods and storms by banning pesticides and genetically modified crops, and he argued that land should not be taken out of production to help wildlife. *The Guardian* July 2013 No. 18

135. The government view, under the current Conservative administration and previous coalition and Labour ones, has been that the market will provide. In a new era of protectionism and with the UK heading out of the EU, that looks increasingly complacent… Leaving the EU could be an opportunity for a radical rethink of the food system, but the government shows little sign of grasping it. *The Guardian* February 2017 No.112

136. But many environmental groups oppose the use of GM technology. Peter Melchett, policy director at the Soil Association, said that there was no evidence, after 20 years of research and development into GM crops, that they could be reliably produced to cope with drought or flood conditions *The Guardian* January 2013 No. 4

137. Peter Melchett, a Norfolk organic farmer and the Soil Association's policy director, said growing different crops, such as barley and peas, and giving land a chance to recover was the eco-friendly alternative to intensive wheat growing… He said: "Technologies involving manufactured fertiliser and pesticides - that includes GM crops and now genome-editing, which is another form of GM - all rely on a vision of farming which is moving in an opposite direction from the markets and people's wishes *London Evening Standard* March 2017 No. 240

138. But retailers and supermarkets said they did not envisage consumer enthusiasm increasing in the same way as farmers. Andrew Opie, food director of the British Retail Consortium, said: "Consumers drive the supply chain so unless there is a change in consumer demand there are no implications apart from ensuring there is sufficient supply of non-GM commodities around the world. If retailers did ever stock GM products they would need to be labelled, allowing shoppers to make a clear choice." *The Guardian* January 2013 No. 4

139. Given the growing demand of cities for food, Syngenta and others in the sector are hoping consumers will understand and embrace the benefits of these new approaches. But food production continues to illicit strong opinion with many sceptics. Over the past decade anti-GM activists have continued to protest against what they dub "Frankenfood" crops trials in British fields *London Evening Standard* March 2017 No. 240

140. Coping strategies for a climate where "abnormal" weather becomes "normal' was one theme at the Cambridge Arable Technologies' winter conference." *Eastern Daily Press* January 2013 No. 14

141. This long and bitter winter has tested the resilience of life all across the land, from lambing ewes to hatching birds and buds. *The Guardian* March 2013 No. 13

142. Trust nature expert Matthew Oates said: "Looking at the bigger picture, 2017 has been one of - if not the hottest - years ever, and that's led to more unusual occurrences in the natural world, globally and here in the UK *The Guardian* December 2017 No. 13

143. Migrant bird numbers on the decline; Survey suggests climate change is forcing swallows and cuckoos ever further north *The Sunday Times* August 2013 No. 13

144. One in three bumbles species in decline… Climate change and habitat loss has led to a declines in an alarming third of the 260 existing types *Yorkshire Post* July 2017 No. 9

145. How warming seas are forcing fish to seek new waters; Rising sea temperatures are pushing shoals hundreds of miles from native grounds *The Observer* January 2017 No. 79
146. Climate change has already led to the vanishing of some bird species in parts of England, where intensively farmed land gives them no room to adapt to warming temperatures. *The Guardian* January 2017 No.10
147. I consulted Nature's Calendar, the record of the timing of natural events compiled by the Woodland Trust, and found that it received its first report of frogspawn in November, the earliest for a decade. Now it has a dozen reports of snowdrops flowering. In the West Country ladybirds are buzzing about. There are 13 records of hazel flowering and eight of elder buds bursting. Spring did not usually come this early 40 years ago, as we know from records made by naturalists - which date all the way back to the 1700s. But it does now. *The Sunday Time* January 2015, No. 4
148. THERE WAS a time when the seasons seemed to be clearly defined by reliable weather conditions but if anything illustrated that this no longer appears to be the case, it was the sight of daffodils blooming in Yorkshire this month. Concerns are rife for how the kind of unseasonal weather experienced this year is affecting native wildlife, and a new end of year report published today by The National Trust shows that it has been a decidedly mixed year for countryside species. *Yorkshire Post* December 2015, No. 119
149. The Birds and the Bees Confused *Daily Mail* December 2017 No. 11
150. Spring flowers in autumn, birdsong in winter: what a freak year for nature *The Observer* December 2017 No. 16
151. Nearly one in 10 of Europe's wild bee species face extinction, says study *The Guardian* March 2015 No. 5
152. Butterflies up against wind of change; Once thriving species are disappearing from the countryside at an alarming rate *The Times* August 2013 No.4
153. Puffins, terns and butterflies are among the key species in the UK being put at risk from global warming *The Guardian* August 2013 No.11
154. Little Terns under threat *Eastern Daily Press* August 2013 No.12
155. For several months of the year they attract scores of nature lovers to our coast who watch from afar as they make a home among the shingle to raise their young. But Norfolk's colonies of Littler Terns are under threat from the country's shifting coastline, borught about by erosions and climate change *Eastern Daily Press* August 2013 No.12
156. Climate change is threatening the seabirds of St Kilda; Puffins and kittiwakes on Unesco world heritage site are at risk from warming seas, National Trust for Scotland findings show *The Guardian* December 2015 No. 7
157. The barn owl, an icon of the countryside and one of Britain's most popular farmland birds, has suffered a catastrophic fall in numbers after a series of cold and wet springs *The Guardian* August 2013 No. 1
158. Nature-lovers on lookout for spring as warm weather arrives in UK… National Trust naturalist Matthew Oates urged the public to get outdoors to witness the joys of spring. "Saturday is going to be an especially exciting day, do not waste it shopping and cleaning the car, get out and enjoy the countryside because it will all be happening.. Hickman pointed out long-term records showed spring was

arriving sooner. “In the last few decades, spring events like flowering are arriving two weeks earlier,” he said. *The Guardian* March 2015 No. 3

159. Southerly species that prefer warmer conditions, such as the dartford warbler and emperor dragonfly, will be able to spread north but those inhabiting northern areas may have nowhere to go. *The Times* July 2015 No. 15

160. Climate change causing bumblebee habitat loss, say scientists; Scientists shocked at bees failure to relocate north to cooler areas *The Guardian* July 2015 No. 7

161. their preferred meal of sand eels is disappearing… a new fish has moved into UK waters that the chicks find indigestible… with devastating effects for puffins… Some chicks have been found dead *The Guardian* August 2013 No. 11

162. Climate change, loss of habitat, intensive agriculture and urban sprawl are all culprits, according to Matthew Oates, the National Trust's leading butterfly expert. Mr Oates was given his first butterfly net 50 years ago and has been chasing them ever since. To mark the occasion, he has drawn up a list of winners and losers in the butterfly race *The Times* August 2013 No. 4

163. they are adaptable, but it's a question of limits, and which species will be the winners and which will be the losers *The Guardian* March 2013 No. 13

164. The highs and lows of British wildlife; Battle to survive in nature… So check our guide to find the wildlife success stories and the nature fails of 2015 *Daily Mirror* December 2015 No. 129

165. Warmer weather has confused wildlife, warns National Trust *The Times,* December 2017 No. 14

166. 'Haywire' seasons lead to freak year for nature, says National Trust *The Guardian* December 2017 No. 13

167. Swarms of potentially deadly Portuguese man o'war, unprecedented numbers of rare hawfinches and spring flowers that bloomed in autumn helped to make the year one of the most unusual on record. *The Times* December 2017 No.14

168. Mr Oates urged people to sign up to citizen science projects monitoring nature *Daily Mail* December 2017 No. 11

169. Orchid Observers: a citizen science project; Scientists at London's Natural History Museum recently launched a citizen science project that will document how wild British orchids are responding to climate change *The Guardian* July 2015 No. 14

170. as freezing weather brings fresh perils: Public urged to help save mammals, birds and insects…Experts stress that the public can help. The RSPB has urged householders to keep bird feeders regularly topped up with high-energy, high-fat food and to keep water dishes filled. Similarly, the Hedgehog Preservation Society recommends leaving plentiful water supplies and also food *The Observer* March 2013 No. 15

171. Homeowners are being urged to create rooftop gardens to help reverse a devastating decline in the insects that pollinate plants *The Times* July 2017 No. 13

172. The Royal Horticultural Society (RHS) is launching its "greening grey Britain" campaign to encourage people to plant trees, shrubs, climbers, hedges or flowers to attract wildlife, improve air quality and reduce urban temperatures and the risk of flooding *Yorkshire Post* April 2015 No. 4

173. We are calling on readers to help save the bee… Coles is giving readers the chance to buy buddleia plants – loved by bees and other insects – for less than half price. *Leicester Mercury* May 2013 No. 18

174. "Certain species are good at adapting, which is great, whereas others are struggling – some of them badly," Mr. Oates said. "We need to give wildlife the space, time and where necessary, the support it needs, not only to survive, but to thrive." *Daily Mail* December 2017 No. 11

175. Mr. Oates added… "If the work of dedicated and passionate conservationists continues and butterflies keep growing in importance within British culture, the challenges of the next 50 years can be overcome. A big social revolution is taking place: old-fashioned butterfly collecting has died out and been replaced by photography and more people are growing butterfly-friendly plants in their gardens. Butterflies need friends and are gaining converts". *The Times* August 2013 No. 4

176. But one of the biggest differences can be made by the public… the RHS Greening Grey Britain campaign to reverse the trend of paving over gardens *Manchester Evening News* October 2015, No. 16

177. The RHS urges homeowners who want to park their car on their drive to plant hedges, trees and tubs of flowers to help soak up water *Daily Mail* November 2015, No. 7

Appendix C: for Chapter 4

Appendix C1 - Participant Demographics

Participant No.	Focus group no.	Female / Male	Age Group	High-risk flood zone	How often think about having to adapt to climate change	How interested in climate change
1	1	Female	31 - 50	No	Fairly often	Very interested
2	1	Female	18 - 30	No	Sometimes	Interested
3	1	Male	51+	Yes	Fairly often	Very interested
4	2	Male	31 - 50	No	Sometimes	Interested
5	2	Female	18 - 30	Yes (non-UK)	A lot of the time	Very interested
6	2	Male	51+	No	Fairly often	Very interested
7	2	Female	18 - 30	No	Sometimes	Quite interested
8	3	Female	18 - 30	No	Fairly often	Extremely interested
9	3	Female	51+	No	Sometimes	Interested
10	3	Female	51+	No	Never	Very interested
11	3	Male	31 - 50	No	A lot of the time	Very interested
12	3	Male	31 - 50	No	Fairly often	Very interested
Summary		Female (7)	18 - 30 (4)	Yes (2)	Never (1)	Extremely interested (1)
		Male (5)	31 - 50 (4)	No (10)	Sometimes (4)	Very interested (7)
			51+ (4)		Fairly often (5)	Interested (3)
					A lot of the time (2)	Quite interested (1)

Appendix C2 – Script used for workshops

Detailed Agenda (for facilitators)

Introduction (15m)

- Introduction to the session, rules etc. – 10
- Introduction to the main topics – 5

Section 1: Story Writing (2h 15m)

Beginning (35m)

- Exercise 1: Impact ideas - 10
- Exercise 2: Who gets effected and how- 10
- Exercise 3: How does it make you feel - 5
- STORY WRITING 1 - 10

Break – 10 minutes

Middle (55m)

- Exercise 4 : Who's involved in responding- 10
- Exercise 5: Values & skills needed - 10
- Exercise 6: What can certain groups do - 10
- Exercise 7: What can we do about flooding/hotter weather- 10
- STORY WRITING 2 – 15

Break – 10 minutes

End (25m)

- Exercise 8: Level of acceptable change - 5
- Exercise 9: What does being well prepared mean- 10
- STORY WRITING 3 - 10

Timings for focus group 1:

Start at: 5 pm

First Break: 5.50 – 6

Second Break: 6.55-7.05

Start pre-written narratives: 7.30

Section 2: Survey (20 m)

Closing (10 m)

ON THIS SCRIPT GREEN SIGNIFIES CHANGES MADE BETWEEN THE SCRIPTS FOR FOCUS GROUPS 1 AND 2

PLAN FOR THE FOCUS GROUPS			**3 HOURS inc. BREAKS**		
Summary	**Description**	**Script**	**Discussion Questions**	**Resources needed**	**Duration**
INTRODUCTION					
		START RECORDING!!!			15 mins
	Group members introduce themselves.				
Introduction to main topics of the discussions: 'things that might happen in the UK as the climate changes' and 'things we might be able to do to manage the effects of climate related changes'.	Brief talk by demonstrator introducing 2 main topics. The facilitator will not explain the terms, only that these are the ideas we'll be talking about.	I'm Rachel and I'm a PhD candidate from the University of Leeds. ~~My research is about how climate change might affect the UK.~~ Scientists say some level of climate change is now unavoidable and that it will likely cause significant changes to our weather systems.			

		For the next 3 hours or so we're going to be sharing ideas about things we think might happen in the UK because of climate change and how these might affect people's lives. We'll also be talking about things the UK might be able to do to limit any harm these changes might cause and to take advantage of any opportunities. So, we'll be talking about how we can adapt so as to best live with the impacts of climate change. We won't be focusing on ways we might be able to stop the climate from warming, such as driving less or recycling more, although it might come up in conversation and that's fine. We will be doing a series of group exercises which will allow you to explore what you and the rest of the group think about these topics. We will also be writing our own stories about a changing climate in			

		the UK. In these stories you will be asked to describe a climate related event that happens. The story will then be about what the characters in your story do in response to these events. We will talk more about the stories later before our first writing session.			
Rules for the session	Guidelines	There's a few guidelines for our discussions: Our conversations will be based on the UK The focus groups are to discuss your ideas about the topics. There are no right or wrong answers. The aim of the exercises are to help you think about ideas before we write our stories. We aren't trying to list as many ideas as possible and the conversations might focus on certain topics of particular interest to the group which is fine. We will hopefully have some interesting conversations between group members. Please be respectful of others and give people time to talk.			

		Once you leave the focus groups please respect the confidentiality of the other participants. The focus group will take about 3 hours. We'll be taking a couple of short breaks.			
		Does anyone have any questions or comments before we start? Would anyone else like to add anything to the guidelines for the session?			
PART 1	**Writing own adaptation stories**				
First story element: how and why does the story begin?	Exercise 1: Working individually list at least 3 things which might happen as the climate changes in the UK.	Please turn to you workbooks. First box is just for any notes. First, I'd like you to take a couple of moments by yourself to jot down some things that you think that might happen as the climate changes in the UK. You can include things like weather changes but also what happen because of those weather changes.	PROMPTS: You could think about weather, changes to habits, ways it might change your job, ways it might affect how you spend your free time, things that might get easier or harder such as growing food.	Paper & pens for participants	10 mins 5.15.5.25

	Feedback to the group. Group discussion of any other ideas not yet included in participant's lists.		How about changes to our lifestyles? Changes to what we eat or wear or buy? Do you expect any good things to happen?		
	Exercise 2: Group discussion on how a changing climate might affect our lives, the lives of others and our societies.	Now as a group we're going to spend a few minutes thinking about who you think climate change might affect in the UK?	Are there any groups you think are more at risk? Any sectors of society? Any difference in levels of risk between rural and urban communities? Do you feel at risk? Why?		10 mins 5.25 – 5.35
	Exercise 3: Take a moment to reflect and note down how talking about climate change impacts has made you feel so far.	On your papers jot down a couple of thoughts about how talking about climate changes in the UK makes you feel. Would anyone like to share?			5 mins 5.35-5.40

	Participants can volunteer to share their thoughts with the group (but not mandatory).				
	STORY WRITING 1: Completing section 1 of the story writing sheet.	Over the next couple of hours we'll be writing short stories about things that might happen in the UK as the climate changes and what we might do about it. For the next 10 minutes we're just going to be writing the beginnings of the stories. On your story sheets you will see the section called Introduction and we'll be filling in the first three boxes (go over boxes). The stories should be based in the UK but that can be a UK of your imagination. They should be set in the future but you can design how far into the future – tomorrow or in a 100 years.		Participants will be given a story sheet to fill in it which has sections to fill in to guide the writing of the story. Based on structure used by Rotmann, 2017	10 mins 5.40 – 5.50

		You can make the stories about you or someone else. The stories are fiction and about your ideas so you don't need to worry about climate facts. If you would prefer to list your ideas in bullet points or make some notes in each of the boxes that's fine. You will not be asked to share your stories with the group at any time, although you can talk with other participants if you would like to.			
		Refreshment break – 10 mins			
Second story element: who responds and how?	Exercise 4: Working individually list at least 3 individuals or groups who might be involved in preparing the UK.	Summary of what we've done so far – what happen in the UK because of climate change, who this might affect most, and how that makes us feel. Reminder that we're focusing on how best to live with climate change rather than stop it. Now we're going to spend some time thinking about who might be	Why have you suggested them? What roles and responsibilities do they have in society?		10 mins 6 – 6.10

	Feedback to the group.	involved in responding to the impacts of climate change and what they might be able to do. First, I'd like you to spend a couple of minutes making a list of all the people, individuals and groups, who you think might be involved in responding to the disruptive events, and then we're going to feedback to the group.	National government, local government, individuals, business		
	Exercise 5: Group discussion on what values and which characteristics would make someone good or bad at preparing for climate change and why?	Now, as a group I'd like us to spend a few minutes thinking about values and which values might be more likely to motivate preparing for a climate change and those which might not. For example, some people argue that to prepare for a changing climate we need to start valuing our local communities more. Would you agree with this or not?	Are there any values or characteristics that might prevent someone form adapting, for example, self-interest?		10 mins 6.10 – 6.20
	Exercise 6: Consideration of 'Adaptation to a specific event'. Group discussion	We'll now think about a specific climate related event. Imagine if the UK was regularly getting longer, hotter summers like in 2018.	Start with an open question but then move through consideration of specific groups: government,		10 mins 6.20 – 6.30

	on what actions people suggest as a way to respond to xx impact (discuss flooding in 2 groups and hot weather in 2)	What impacts might this have? What actions could the UK take to limit harm from this event and/or take advantage of opportunities? If we had to put a plan together what might we include in it? NB: In FG 1 we discussed flooding	individuals, and communities. Who provides the information? Who makes the decisions? Who pays for it? Is there anything you could do? Is there anything you should do? How about health concerns?		
	Exercise 7: When we consider the idea 'Preparing the UK for a changing climate' who can do what? Considering each of these groups (government, individuals, communities,	We've just thought about a specific event happening at a specific time but earlier in the focus group we listed lots of things that might happen as the climate changes, some of which might happen at the same time and might make serious changes to our lives. So, if we think about the idea of 'Preparing the UK for a changing	Consider jobs for different groups? Does there need to be a leader? Would any of our social systems need to change? Would out lifestyles change?		10 mins 6.30 – 6.40

	other) list under each header things they could do.	climate' more generally what sorts of things might we do?	When do you think we should be doing these things?		
	STORY WRITING 2: Let's go back to the stories and fill in the boxes under Section 2.	We will now continue with our stories. You should have already introduced your story world and the disruptive event that's happened. Now, please have a look at the boxes under Section 2.			15 mins 6.40 – 6.55
		Refreshment break – 10 mins			
Third story element: who does the story end?	Exercise 8: Display a quadrant based on levels of change and levels of readiness. Ask the participants where on the quadrant the best place for the UK is and why?	Summary of what we've done so far. Reminder that while we should keep trying to stop climate change some changes are now inevitable so we need to think about how we might best live with them. In the earlier sections, we thought about things individuals or groups could do in response to climate-related disruptive events. Some of	If you think the UK should be more prepared does that mean you are willing to accept changes?	Prepared diagram showing the two continuums of change and preparation.	5 mins 7.05-7.10

		the things we can do are likely to have consequences. For example, some coastal communities are already being asked to relocate further inland in anticipation of rising sea levels and more frequent flooding which means abandoning their homes and communities. But preparing the water system for drought might make it more efficient and reduce water bills. On this grid you can see two axis – one for level of preparedness and one for level of change in our lives and societies. It might be that to be more ready to manage disruptive events we need to accept more changes. Or we might decide that the changes are not worth being ready for events that might not happen as expected. Looking at this where do you think the UK is at the moment? Where do you think it should be?	How would you feel if your community was one of the ones being asked to relocate? Might there be other positive outcomes?		
	Exercise 9: Open ideas – if we said	For this let's pretend that we are in the future, let's say 2100. Life in	Consider:		10 mins

	the UK had prepared well for a changing climate what would the country look like in the future?	the UK is good and we are managing climate change impacts well. What do you think this means? What might good in 2100 look like? What did we do so that we were well prepared to manage the changes of the 21st century?	levels of change- have our societies changed? leadership and responsibility types of actions timelines		7.10.- 7.20
	STORY WRITING 3: How does the story end?	We're now going to finish our stories by filling in the last set of boxes on the sheet.			10 mins 7.20 – 7.30
PART 2	**Responding to pre-prepared narratives**				**20 mins**
Responding to existing narratives	Exercise 10: Participants are provided with three of the newspaper narratives to read. Group discussion about the three texts.	Here are three stories about responding to disruptive events which are similar to those which appear in UK newspapers. Please read the three stories.	Do these stories seem familiar to you? – Have you seen them in the media, or experienced them in real life? Do you prefer any of the stories and why? Would you want to find out more?	Pre-prepared narratives	7.30 – 7.50

			Would you talk to others about these stories? Would the stories encourage you to take any particular actions, if so what? Would they encourage you to support others actions, e.g. by the government? Do these stories make you think that the UK is managing climate related changes well or not?		
CLOSE	Closing				**10 mins**

Feedback form / Any questions or comments Hand out necessary paperwork e.g. consent forms. Thanks and hand out any agreed incentives for participation.		Any questions? There is a feedback from in your packs. Please leave your papers behind. Thanks.		Feedback form	

Appendix C3: The stories presented to the participants during the workshops

Note the titles in brackets were not included on the participant copies.

Story 1 (Defences against flooding)

Flooding is a serious and growing risk in the UK because of climate change. In recent years, homes in some areas of the country have experienced major flooding and are at high risk from doing so again. In the coming decades, scientists expect periods of heavy rainfall to become more common in the UK as the climate changes. This will likely mean that more homes will be flooded more often in the future. Flooding in the home is a very difficult and upsetting experience. It can also cause costly damage. In response to this, the UK should build more and bigger flood defences. Flood defences are often large and expensive projects so the government needs to lead. It is also the responsibility of the government to protect its citizens. Flood defences can protect homes during heavy rainfalls or high tides. But they might not be able to stop all flooding now or in the future as the weather gets more extreme. There are other ways that the UK could manage flood waters such as planting more trees and making more land available as flood plains. However, the UK should continue to prioritise building flood defences as the best way of managing the risk of flooding.

Story 2 (Insuring the home)

Flooding is a serious and growing risk in the UK because of climate change. In recent years, homes in some areas of the country have experienced major flooding and are at high risk from doing so again. In the coming decades, scientists expect periods of heavy rainfall to become more common in the UK as the climate changes. This will likely mean that more homes will be flooded more often in the future. Flooding in the home is a very difficult and upsetting experience. It can also cause costly damage. In response to this, homes should be insured against flood risk. Homeowners are responsible for making sure their house is insured. They can search insurance deals to find the one right for them. Insurance gives financial protection to people’s homes and belongings. But if flooding becomes more common and more serious it might not be possible for the insurance industry to offer affordable insurance to everyone. Homeowners can also take actions to make flood waters less likely to come into their homes.

For example, they can buy flood gates for their doors. However, buying flood insurance is the first action homeowners should take to protect their homes from flooding.

Story 3 (More informed decision making)

Harm to citizens is a serious and growing risk in the UK because of climate change. Some people have already experienced flooding in the home. Others are at risk from unusually warm weather and from new health concerns. In the coming decades, scientists expect more extreme weather and a warmer climate in the UK. This will likely mean that UK citizens will experience more disruptions to their daily lives more often. This might also cause a lower sense of wellbeing. In response to this, more information about risks and what to do should be available. It is the responsibility of the individual to make sure they have the information they need. For example, home buyers should look for local flood risk information. Being more informed will help people make better decisions which will mean they are more likely to avoid harms. But information about some risks might not yet be available. The government can also take actions to keep people safe. For instance, the UK might need new laws about managing hot weather in the work place. However, principally individuals need to keep themselves safe by making sure they are well informed.

Story 4 (Innovation in food & farming)

Food availability is a serious and growing risk in the UK because of climate change. Already some foods are less plentiful, such as some types of fish. Others are less reliable, such as some seasonal fruits. In the coming decades, scientists expect more extreme weather and a warmer climate in the UK. This will likely mean that farmers will find it increasingly difficult to produce enough food for everyone. UK citizens might find that they can choose from less types of food. It might also become more expensive. In response to this, the farming industry should use more scientific innovations. For example, farmers can plant different types of seeds and genetically modified crops. Farmers will need to take the lead on making changes. Scientists should work closely with farmers to develop new ideas. This will help the UK's food production become more resilient. However, the government will need to spend money on scientific research. Consumers will also need to accept changes to their diet and to how their food is produced. Another option would be organic farming methods to grow more resilient

crops. However, scientific innovations are the best way to make sure the UK food industry is ready for climate change.

Story 5 (Winners & losers in the natural environment)

Harms to nature is a serious and growing risk in the UK because of climate change. Already some species are struggling to survive under the changing conditions. In the coming decades, scientists expect the weather and seasons to become more extreme and less predictable. This will likely mean further loss of wildlife and some species might die out completely. Nature lovers might see less birds and butterflies in the garden and have less chances to enjoy the UK's wildlife. In response to this, nature needs to adapt to the changing conditions. This will vary by species, for example, some species might be able to change their diet or move where they live. Some species may benefit from changes to the weather and climate. For instance, some non-native species might migrate to the UK as it gets warmer. But other species might find that there isn't enough land or food available to allow them to make changes. There are some things humans can do to help. People can put food out for garden wildlife or add more greenery to their properties to attract insects. However, ultimately the future wellbeing of nature in the UK is a gamble and there will be some winners and some losers.

Appendix D: for Chapter 5

Appendix D1: Age, gender and regional splits of the sample

	Target based on 2017 census %	**Achieved %**
Age		
18-24	12.0	12.5
25-34	19.3	19.5
35-44	18.1	17.9
45-54	20.0	19.0
55-64	16.5	17.1
65+	14.0	14.0
Gender		
Male	48.8	48.3
Female	51.2	51.3
Region		
North East	4.1	4.1
North West	11.0	11.4
Yorkshire & the Humber	8.3	8.1
East Midlands	7.2	7.2
West Midlands	8.7	8.9
East of England	9.3	9.3
London	13.2	12.0
South East	13.7	14.3
South West	8.5	8.5
Wales	4.8	4.8
Scotland	8.4	8.5
Northern Ireland	2.8	2.9

Participants were also asked questions about their homes, local area and sense of belonging for which representativeness quotas were not applied. 54% of the sample owned their own home which is lower than the 64% recorded nationally (Ministry of Housing, 2019). Most respondents said they lived in urban areas (65%), while 28% described themselves as living in rural areas and 7% in coastal areas, therefore, this sample under-represents urban dwellers (Statista, 2019). 84% said they were not living on a flood plain, while 7% said they were and 9% didn't know. Participants said they more strongly felt they belonged to UK society (M=

3.69 on a 5 point Likert scale from Strongly disagree to Strongly agree) than they did their local community (M=3.24).

6.6.1 Appendix D2: Story Manipulations

A: Organisations are preparing now for climate change that is already happening

The impacts of climate change are already happening. Last winter lots of homes in the UK were flooded again. Summers are now much hotter for longer. The sunny weather is nice but the higher temperatures are making day-to-day living and working harder. They're also causing most of the country to have several months of drought every year. The landscape is much browner than it used to be and some wild birds and animals are losing their habitats. The more extreme weather means British farmers are struggling.

The government and other organisations are already taking actions to protect the country. The **government** is using expert reports to decide what to prioritise. **The government** is building flood defences to stop floodwater getting into people's homes. **Building companies** are designing new houses that are better at keeping cool. The government is introducing maximum temperature laws for the workplace. The **water companies** are building facilitates to capture and reuse domestic waste water on the land. The **government** is developing feeding programmes for birds and other wildlife. **Government** subsidies are helping farmers grow more crop varieties in the UK.

Climate change impacts **are already happening** and **these organisations are already acting** to protect the UK.

B: Organisations will prepare in the future for climate change that is going to happen

Climate change impacts will happen in the future. Lots of homes in the UK will be regularly flooded. Summers will be much hotter for longer. The sunny weather will be nice but higher temperatures will make day-to-day living and working harder. They'll also cause most of the country to have several months of drought every year. The landscape will be much browner than it is now and some wild birds and animals will lose their habitats. The more extreme weather will mean British farmers will struggle.

The government and other organisations will take actions in the future to protect the country. The **government** will use expert reports to decide what to prioritise. **The government** will build flood defences to stop floodwater getting into people's homes. **Building companies** will design new houses that are better at keeping cool. The government will introduce maximum temperature laws for the workplace. The **water companies** will build facilitates to capture and reuse domestic waste water on the land. The **government** will develop feeding programmes for birds and other wildlife. **Government** subsidies will help farmers grow more crop varieties in the UK.

Climate change impacts **will happen in the future** and **these organisations will act in the future** to protect the UK.

C: Individuals like you are preparing now for climate change that is already happening

The impacts of climate change are already happening. Last winter lots of homes in the UK were flooded again. Summers are now much hotter for longer. The sunny weather is nice but the higher temperatures are making day-to-day living and working harder. They're also causing most of the country to have several months of drought every year. The landscape is much browner than it used to be and some wild birds and animals are losing their habitats. The more extreme weather means British farmers are struggling.

Individuals like you have already taken actions to protect themselves. Individuals are using expert information to decide what they will prioritise. **They** are making adjustments to their homes to stop floodwater getting in. **They** have bought sun shades for their windows and they are working from home more to manage the heat. **They** are collecting their domestic waste water in storage butts and using it to water the garden. **They** are leaving out food for birds and other wildlife. They are starting to grow their own food in the garden or in an allotment.

Climate change impacts **are already happening** and **individuals like you are already acting** to protect themselves.

D: Individuals like you will prepare in the future for climate change that is going to happen

Climate change impacts will happen in the future. Lots of homes in the UK will be regularly flooded. Summers will be much hotter for longer. The sunny weather will be nice but higher temperatures will make day-to-day living and working harder. They'll also cause most of the country to have several months of drought every year. The landscape will be much browner than it is now and some wild birds and animals will lose their habitats. The more extreme weather will mean British farmers will struggle.

Individuals like you will take actions in the future to protect themselves. They will use expert information to decide what they will prioritise. **They** will make adjustments to their homes to stop floodwater getting in. **They** will buy sun shades for their windows and will start working from home more to manage the heat. **They** will collect their domestic waste water in storage butts and use it to water their garden. **They** will start leaving out food for birds and other wildlife. They will also start to grow their own food in the garden or in an allotment.

Climate change impacts **will happen in the future** and **individuals like you will act** in the future to protect themselves.

E: Communities are preparing now for climate change that is already happening

The impacts of climate change are already happening. Last winter lots of homes in the UK were flooded again. Summers are now much hotter for longer. The sunny weather is nice but the higher temperatures are making day-to-day living and working harder. They're also causing most of the country to have several months of drought every year. The landscape is much browner than it used to be and some wild birds and animals are losing their habitats. The more extreme weather means British farmers are struggling.

Your community is taking actions to protect your local area. As a group, you are using expert information to decide what to prioritise**. Your community** is funding local flood defences to stop floodwater getting into people's homes. **Your community** is opening up public spaces for people to visit when their homes get too hot. It is also using donations to put cooling systems in local businesses. **All local homes** are now capturing their domestic waste

water and reusing it to water the local greenery. **The community** is developing food stations for birds and other wildlife. **You, and other volunteers from the community** are working allotments to grow fruit and vegetables for local residents.

Climate change impacts **are already happening** and **your community is already acting** to protect itself.

F: Communities will prepare in the future for climate change that is going to happen

Climate change impacts will happen in the future. Lots of homes in the UK will be regularly flooded. Summers will be much hotter for longer. The sunny weather will be nice but higher temperatures will make day-to-day living and working harder. They'll also cause most of the country to have several months of drought every year. The landscape will be much browner than it is now and some wild birds and animals will lose their habitats. The more extreme weather will mean British farmers will struggle.

Your community will take actions to protect your local area. As a group, you will use expert information to decide what to prioritise. **Your community** will fund local flood defences to stop floodwater getting into people's homes. **Your community** will open up public spaces for people to visit when their homes get too hot. It will also use donations to put cooling systems in local businesses. **All local homes** will capture their domestic waste water and reuse it to water the local greenery. **The community** will develop food stations for birds and other wildlife. **You, and other volunteers from the community** will work allotments to grow fruit and vegetables for local residents.

Climate change impacts **will happen in the future** and **your community will act in the future** to protect itself.

D3: Number of survey participants per story

Story	No. of readers
A	170
B	168
C	177
D	176
E	176
F	177
Total	**1,044**

Appendix D4: Full results for 'Temporal perceptions of climate change risks'

Table 16 *F* values for each of the conditions in response to: Select whether each of the following are a concern for the UK now, in the future or not at all

	Flooding	Coastal erosion	Loss of birds and other wildlife	Heat-waves	Cold snaps	Less reliable harvests	New pests and diseases	Drought
When	0.84	0.90	0.93	2.19	0.67	3.08	0.32	6.24*
Who	1.23	0.85	0.36	0.81	0.53	1.05	1.10	0.15
Interaction	1.79	1.14	0.15	0.34	0.34	1.72	2.69	1.34

*Key: * significant at p<0.05, ** significant at p<0.0001*

Appendix D5: Full results for 'Agreement with example roles and responsibilities for individuals'

Table 17 Results of the one sample t-test showing whether levels of agreement were significantly above or below the mid-point of reference

Individual action statements	Mean	T value	Sig.
Provide food or re-wilded spaces for birds and other wildlife	3.76	21.47	0.000
Make sure I have insurance cover for flooding or other extreme weather events	3.58	15.20	0.000
Collect domestic waste water or rainwater to re-use	3.50	12.83	0.000
Buy sun shades or blinds for my windows	3.41	11.35	0.000
Change my daily schedule to avoid the hottest part of the day during hot periods	3.2	7.13	0.000
Plant trees or re-landscape my garden to provide more shade	3.22	5.60	0.000
Replace hard surfaces with grass or other water absorbing surfaces	3.22	5.95	0.000
Grow my own food	3.09	2.26	0.02
Install guards or covers to prevent flood waters from entering my home	3.00	0.00	1.00

Table 18 Results of the one sample t-test showing whether levels of agreement were significantly above or below the mid-point of indifference

Participation statements	Mean	T value	Sig.
I would support the national government issuing new laws, polices or investments to guide the UK's preparation for climate change impacts	3.50	14.52	0.000
I will look for information about how I could protect myself and my home	3.49	13.95	0.000
I will consider the issue of preparing for climate change impacts when deciding who to vote for in local or national elections	3.43	11.41	0.000
I will look for information about climate change impacts in my area	3.40	11.77	0.000
I will support planning and investment in preparing the local area for climate change impacts	3.35	10.21	0.000
I will talk about preparing for climate change impacts with my family and friends	3.22	6.19	0.000
I will spend money on making my home more resilient to climate change impacts	3.02	0.43	0.67
I will take part in community actions to prepare my local area for climate change impacts	2.96	-1.01	0.31
I would be willing to pay more tax to fund the UK's preparation for climate change impacts	2.79	-5.37	0.000
I will talk about preparing for climate change impacts in my workplace	2.73	-7.05	0.000
I will speak to my council and/or Member of Parliament about how my area is preparing for climate change impacts	2.42	-16.12	0.000

Reduced versions of the above two tables are included in Section 5.4.2.

Appendix D6: Full results for 'Perceptions of when adaptation should happen'

The participants had 18 tokens to divide between 'Actions taken now to protect against current impacts' (M=9.60, SD=3.63, 53% of total tokens) and 'Actions taken in the future to protect against future impacts' (M=8.40, SD=3.63, 47%). Two-way ANOVAs found no significant differences depending on which story the participants had read (when F=(1,1038) =0.50, p=0.48, who F=(2,1038) =0.03, p=0.97, interaction F=(2,1038) =0.25, p=0.78).

Appendix D7: Full results for 'Perceptions of location of responsibility'

As measured on a 5-point Likert scale, all groups were considered responsible but with the government most so (individuals M=4.02, SD=1.02, communities M=4.06, SD=0.97, government and other organisations M=4.48, SD=0.87). Which story was read had no effect on the level of responsibility given to individuals (when F=(1,1038) =0.94, p=0.33, who F=(2, 1038) =1.91, p=0.15, interaction F=(2,1038) =1.06, p=0.35) or communities (when F= (1,1038) =0.11, p=0.74, who F=(2,1038) =0.35, p=0.70, interaction F=(2,1038) =1.15, p=0.32). The who (F=(2,1038) =1.00, p= 0.37) and interaction (F= (2,1038) =1.54, p= 0.21)

conditions also had no effect on the responsibility given to government but those who had read stories set in the future said the government were more responsible than those who had read stories set in the present (F=(1,1038) =6.50, p=0.01, partial η 2=0.01).

Participants were asked to allocate 18 tokens to show proportional responsibility between 'Actions that individuals can take to protect themselves and their homes' (M=5.02, SD=2.80, 28% of total tokens), 'Actions that communities can take to protect themselves and their area' (M=5.05, SD=2.09, 28% of total tokens), and 'Actions the government can take to protect the country' (M=7.93, SD=3.39, 44% of total tokens). Which story was read did not significantly affect the number of tokens allocated to individuals (when F=(1,1038) =1.97, p=0.16, who F=(2,1038) =0.31, p=0.74, interaction F=(2,1038) =0.26, p=0.77) or government and other organisations (when F=(1,1038) =0.84, p=0.36, who F=(2,1038) =1.32, p=0.27, interaction F=(2,1038) =0.07, p=0.93). In terms of tokens allocated to communities, the when (F=(1,2038) =0.16, p=0.69*)* and interaction (F=(2,1038) =0.93, p=0.40) conditions had no effect. However, those who had read stories which featured communities allocated more tokens to communities than did those who had read stories about individuals or government and other organisations (F=(2,1038) =4.32, p=0.01, partial η 2=0.01).