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Translating climate risk assessments into more effective adaptation decision-making: The importance of social and political aspects of place-based climate risk

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ABSTRACT

Climate risk continues to be framed ostensibly in terms of physical, socio-economic and/or ecological risks, as evidenced in the 2012 and 2017 UK Climate Change Risk Assessment (CCRA) evidence reports. This article argues that framing climate risk in this way remains problematic for the science-policy process, particularly in ensuring adequate climate risk assessment information translates into more effective adaptation decision-making. We argue how climate risk assessments need to further consider the social and political aspects of place-based climate risk to ensure more effective adaptation policy outcomes. Using a discourse analysis of the CCRA3 Technical Report methods chapter published in June 2021, we discuss three critical themes around how climate risk is currently framed within the Technical Report methods chapter. These are (i) the over-reliance on reductive methodological framing of assessing climate risk through 'urgency scores'; (ii) the idea of what constitutes 'opportunity'; and (iii) the framing of transformational adaptation discourses through the lens of climate risk. To conclude, we suggest that to move beyond assessing risk solely in terms of biophysical and socio-economic risk, a greater emphasis on the social and political contexts of 'place-based' risk needs to be central to climate change risk assessments.

1. Introduction

The UK Government is required, under the 2008 Climate Change Act, to publish a Climate Change Risk Assessment (hereafter 'CCRA') every five years. The assessment sets out the risks and opportunities facing the UK from climate change (Climate Change Committee, 2022). Through a discourse analysis of the generic methods chapter of the Technical Report for the Third UK CCRA published in June 2021 (Watkiss and Betts, 2021), this article highlights some current limitations in the way that climate risks are evaluated in the CCRA3 process that could have implications for adaptation decision-making.

It has been argued that the international climate regime has experienced a low member state obligation towards adaptation action vis-a-vis mitigation action (Schipper, 2006; Rajamani, 2016; Hall and Persson, 2018). This is significant given that political and policy decisions through the international climate regime (e.g. UNFCCC, COPs) have significant implications for how different nations guide, enforce, and implement adaptation policy both at national and subnational scales (Adger et al., 2005; Valente et al., 2022; Kythreotis et al., 2023). In turn, national and subnational policies need to be underpinned by effective mechanisms for assessing risk and vulnerability accurately (Paterson and Guida, 2022), having subsequent implications for local-level adaptation decision-making, actions and governance (Brown et al., 2018; Howarth et al., 2020).

The latest WGII Summary for Policymakers of the IPCC 6th Assessment Report on impacts, adaptation and vulnerability highlights the important relationship between implementing adaptation between scales and has positioned the need for greater adaptation with extreme urgency whereby "gaps exist between current levels of adaptation and levels needed to respond to impacts and reduce climate risks" (IPCC,

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2022: 21) with adaptation being "unevenly distributed" (IPCC, 2022: 21) where "[M]ost observed adaptation is fragmented, small in scale, incremental, sector-specific, designed to respond to current impacts or near-term risks, and focused more on planning rather than implementation" (IPCC, 2022: 21). This suggests a 'scalar deficit' in current formal policy attention to climate adaptation and the way in which climate risks are assessed and acted upon by governments in the formulation of policy (Di Gregorio et al., 2019), despite the need for governments to use climate evidence in shaping policy (Preston et al., 2015). Given the importance attributed to effective adaptation decisions being contingent upon specific, place-based and granular understandings of climate risk (Opsel et al., 2016; Birchall et al., 2023), the links between how climate risks are assessed through the framing of dominant knowledge discourses (the 'science' domain) and how these translate into placed-based adaptation decisions (the 'policy' domain) warrant further empirical scrutiny. In short, using reductive epistemic knowledges to assess climate risk that subsequently frames adaptation policy discourse matters for creating more resilient communities that can adapt to the impacts of climate change.

Arguably, local (e.g., place-based, urban, city) approaches that focus on mitigation of greenhouse gas emissions (GHGs) continue to take prominence in the broader formal policy narrative of delivering climate action (Sharifi, 2021). Research suggests that adopting place-specific, as opposed to place-agnostic approaches are more cost-effective (UKRI, 2022). Yet climate adaptation continues to be given limited formal policy attention by governments and key policymakers at all scales of governance, particularly at the local scale where place-based approaches offer a more socially and economically effective way of delivering climate action and unlocking adaptation (Measham et al., 2011; Kirby, 2021). Climate change risk assessments remain the dominant framework for enabling adaptation programmes and plans at various scales and across various sectors (Jurgilevich et al., 2017; Connelly et al., 2018). However, it has been argued that such assessments can be quantitatively reductive in the methods used (Howarth et al., 2018, 2020; Adger et al., 2018), as well as presenting challenges around evaluating the efficacy of (local) interventions, and how they can be locally-enabled via (publicly) acceptable levels of local/place-based risk (Brown et al., 2018; Brown and Berry, 2022). It has been argued that knowledge framings and scientific methods used to assess climate risk significantly influence government adaptation decision-making at national and local scales in the UK (Adger et al., 2018). Therefore, this article examines the way in which UK climate risk is assessed through a discourse analysis of the CCRA3 Technical Report generic methods chapter to reveal new insights into how climate risk is currently framed and operationalised for adaptation policy through the CCRA process.

After this brief introduction, section two critically examines the way national governments have used climate risk assessments for decision-making and how this has created a dominant policy discourse of 'reductive adaptation'. Section three then critically describes the evolution of the CCRA process in the UK. Section four describes the discourse analysis methodology of the article. The fourth section critically examines the three major themes within the CCRA3 generic methods picked up by our discourse analysis: (i) the use of urgency scoring; (ii) defining opportunities/risks; and (iii) the framing of transformation. Our discourse analysis/critique of the generic methods will in turn allow for future specific examination of how this feeds into (or not) CCRA implementation chapters. Our analyses bring to the fore some key issues with how climate risk is currently framed and assessed using generic knowledge discourses that can potentially epistemologically blunt more effective, place-based adaptation decision-making as part of the (risk)science-(adaptation)policy process. The article then suggests how future climate risk assessments might be improved to inform future adaptation policy decision-making in the next CCRA cycle, allowing for a deeper analytical engagement with what works and what doesn't for adaptation policy decision-making, particularly in terms of allying more equitable place-based adaptation policy framings.

2. The state of government policy responses to climate risk assessments: Reifying 'reductive adaptation' measurement?

It has been argued that enhancing adaptation capacity must come from place-based understandings of climate adaptation, given the specific, diverse, and contextual ways in which people and institutions respond to climate impacts at the local scale (Fresque-Baxter and Armitage, 2012; Köpsel et al., 2017; Klenk et al., 2017). National governments have a key role in facilitating adaptation decision-making at subnational scales through nationally administered climate risk assessments (Hedger et al., 2011; Howarth et al., 2018; Adger et al., 2018). Thus, the power to frame what constitutes effective scientific knowledge and methods in risk assessments is not just the remit of scientists alone – there is a multi-directional flow of knowledge and power between scientists and governments within the science-policy process (Howarth and Painter, 2016; Sundqvist et al., 2017; Kythreotis et al., 2019). Certain institutions, actors and processes have the power to determine the type of knowledge discourses that dominate scientific assessments, which lead to 'institutional epistemologies' that heavily influence the science-policy process (Borie et al., 2021). The (risk)science-(adaptation)policy process in the UK is not immune from this, with the UK Climate Change Committee (CCC) and the CCRA process playing a dominant role in how certain knowledge(s) are used to inform adaptation decision-making by government. Within the 'science' domain of the science-policy process, information use is key; what types of knowledge are deemed appropriate for use in climate policy formulation and are such knowledge(s) 'usable' (Arnott and Lemos, 2021; Porter and Clark, 2023)? In terms of the 'policy' domain within the science-policy process, the effectiveness of adaptation decision-making is the most pertinent. Yet research related to climate adaptation decision-making has shown how UK national and local government often lack the capacity to take the lead in assigning adaptation responsibility to other sectors (Porter et al., 2015; Lorenz et al., 2019), showing a weakness in adaptation policy outcomes. So, for climate adaptation in the UK, there are prevalent issues on both sides of the science-policy process, despite the UK government having an international reputation as an innovative leader in national policy on climate change through the 2008 Climate Change Act (Gillard, 2016; Averchenkova et al., 2020).

Under the 2008 UK Climate Change Act, the UK government established the Climate Change Committee, an independent, statutory body whose purpose was to advise UK and devolved governments on climate mitigation targets, report to Parliament on greenhouse gas reductions and preparing for and adapting to climate risks. The UKCCC is an influential model for the role of climate change advisory bodies in climate governance, and its advice is used by all political parties across the UK and informs issues both within its political remit (e.g. carbon budgeting) and beyond (e.g., flood defence expenditure) (Averchenkova et al., 2021). The UKCCC has a devoted Adaptation Committee that has two statutory roles. Firstly, to give advice to government on climate risks and opportunities for the UK, and secondly to evaluate progress in delivering the Government's National Adaptation Programme in England (Climate Change Committee, 2022). An integral part of advising the UK Government on climate risks and opportunities, is the Adaptation Committee's role in leading the development of the Evidence Report that feeds into the statutory UK Climate Change Risk Assessment and its reports on progress to adapting to climate change in England, published every two years. These are supplemented by progress reports for Scotland (Climate Change Committee 2023a), Wales (Climate Change Committee 2023b) and Northern Ireland (Climate Change Committee 2023c). The UK Government's strategy on adaptation is outlined in its National Adaptation Plan (NAP), produced every five years, and setting out actions it and others will take to address the impacts and risks caused by climate change. The NAP is informed by the CCRA but has in recent years been criticised for failure to adequately, comprehensively and completely outline actions to address all risks outlined in the CCRA (Climate Change Committee 2023d). Hence, the UKCCC and the CCRA

process which they have overseen, have a significant role in influencing adaptation decision-making by the government, providing an important example of how such advisory bodies and the evidence and assessments they produce incorporates and informs place-based approaches to adaptation.

However, assessing the types of climate risk and opportunities to inform future adaptation policy has proved a messy process for governments given there are inherent social and institutional complexities (Biesbroek et al., 2013; Adger et al., 2018; Brown et al., 2018) including an ability to understand the conflicting temporal dimensions of adaptation (Brace and Geoghegan, 2011; Bierbaum et al., 2013; Fincher et al., 2015) and the difficulties of implementing adaptation responses between geographical territories that have different physical characteristics, sectorial drivers and economic infrastructures (Lindley et al., 2006; McGranahan et al., 2007; van Aalst et al., 2008; Christenson et al., 2014; Kythreotis et al., 2020; Zommers et al., 2020). Likewise, there have been policy attempts to present certain specific components like leadership, institutional organisation, wider stakeholder involvement, robust decision analysis techniques and appropriate climate information as key areas that governments must consider to constitute effective government adaptation policy response (Smith et al., 2009). Yet given adaptation is a social issue as much as an environmental one (Adger et al., 2009), implementing all these components effectively involves understanding the interaction of non-climatic factors as well as the climatic, in specific temporal, political, social and cultural contexts (Biesbroek et al., 2013). Therefore, attributing effective adaptation policy response cannot be reduced to any specific component *per se*, making it difficult for national governments to implement specific adaptation policy recommendations to sub-national state (and non-state) actors and institutions because there is a failure to adapt adequately to existing and unforeseen climate risks. Governments are currently dependent on climate risk analyses as the dominant form of knowledge and evidence to inform adaptation policy outcomes and decision-making processes (Warren et al., 2018; Adger et al., 2018). The CCRA2 and CCRA3 processes have been led by the UKCCC but conducted outside of government by independent researchers from academia, the private sector and/or consultants, who each bring their own scientific norms, practices, and discourses to measure climate risk. Such scientific framings then become the dominant epistemology that informs decision-making. Yet within the paradigm of climate risk assessment there is a need to adopt specific strategies for assessing climate risk to create adaptation policy that mitigates the known low-medium risks (planned adaptation), rather than ostensibly focus on some of the unforeseen high-level risks that require a greater degree of anticipatory adaptation and foresight thinking. This is largely because the financial costs often outweigh the benefits (Watkiss et al., 2015) and there is often a reluctance for policymakers to see adaptation as a non-linear process (Tschakert and Dietrich, 2010). Added to this is the lack of planning for equity dimensions in future adaptation scenario assessment (Markanday et al., 2019), and translating assessments into effective adaptation policy becomes a fuzzy black box for government policymakers.

Due to such complexity in understanding the nature and processes of climate risk assessment in relation to various typologies, actors and institutional norms and practices, there has been the adoption of a variety of adaptation strategies based on specific assessment criteria. Termeer et al. (2012) evaluated national adaptation strategies from four European nations and identified five institutional weaknesses including the lack of openness to learning, an over-reliance on scientific experts, tensions between top-down policy development and bottom-up implementation, distrust in the problem-solving capacity of civil society and reluctance to reserve funding for long-term action. Most of these tensions were directly or indirectly related to the way in which initially determining what constitutes climate risk; how it is understood as a specific linear, value-free and ethically neutral knowledge discourse that requires the precedence of optimal decision-making by governments (Thompson et al., 2016). This has led governments to commonly frame adaptation assessments using probabilistic confidence statements that are derived from standardised metrics and subjective likelihoods (see Zommers et al., 2020). Resulting adaptation policy actions are therefore limited and conditionally contingent on the subjective goals of the government and/or policymaker (Dessai and Hulme, 2004; Lempert et al., 2004).

To this day, the need to enumerate climate risk, as consistently seen in consecutive IPCC Assessment Reports, has been firmly underpinned through the use of reductive forms of scientific knowledge based on future climate projections i.e. temperature targets, 'burning embers' and the physical properties of greenhouse gases (Demeritt, 2001; Hulme, 2011; Howarth et al., 2018). The use of such reductive forms of knowledge like a nominal temperature target (e.g. 2°C) is useful for assessing the potential degree of effects of different future climate risks (Randalls, 2010), much like the infamous 'burning embers' diagram based on the IPCCs Reasons For Concern (RFC) framework is useful for depicting climate risk hotspots for end-users, particularly government policymakers (O'Neill et al., 2017; Zommers et al., 2020). The downside is that the institutionalised use of such reductive knowledge also stunts alternative forms of knowledge being used for decision-making (Oppenheimer, 2005) and constructs further adaptation risk (Wissman Weber et al., 2020), particularly those forms underpinned by the social and political, being used to measure climate risk at a more spatially granular level (Conway et al., 2019; Howarth et al., 2020).

Hence the reductive way in which climate risk is initially framed and measured becomes institutionalised and translated into the policy decision-making domain whereby the science bleeds into the policy domain and vice-versa (Borie et al., 2021). For example, framing climate mitigation through the scientific discourse of future projections of temperature leads to a particular policy response – a coordinative discourse – that becomes institutionalised, and then normalised within society and the institutions that make policy decisions (i.e., governments) through a process of communicative discourse. Schmidt (2008), (2010) described this as the transformation of (scientific) discourse into 'discursive institutionalism'. This has led to dominant policy discourses of green governmentality and ecological modernisation after the first IPCC Assessment Report in 1990 whereby planting trees was seen as a policy panacea for lowering global temperatures in the Kyoto phase of global climate policy (Bäckstrand and Lövbrand, 2006). These dominant policy discourses arguably continued in the lead up to the 2015 UNFCCC Paris Agreement, but have also produced strong civic opposition to inequitable power arrangements in current climate policy in the form of civic environmentalism (Bäckstrand and Lövbrand, 2019). This illustrates how measuring and framing climate change in a certain way within the science domain of the science-policy process has significant knock-on effects to the way in which all of society, let alone governments, responds to climate change. The reductive way in which the UK Government has created adaptation policy in response to climate risk assessments underpinned by dominant knowledge discourses and methods through the CCRA process has been no different, as the next section alludes to.

3. The CCRA process in UK

In the UK, the Climate Change Risk Assessment (CCRA) is used to determine and shape future UK policy on climate adaptation, notably the UK National Adaptation Programme. With previous CCRAs being published in 2012 and 2017, the UK completed its third CCRA phase (CCRA3) in 2022, with technical, summary and advice (to government) reports already published (UK Climate Risk, 2022). The second climate change risk assessment (CCRA2) published in 2017 was presented to UK Parliament to enable it to frame its objectives, policies and proposals to address the risks opportunities outlined in the CCRA, through the second National Adaptation Programme (NAP), published in July 2018. A review of the Government's progress in response to CCRA2 concluded that

England was not prepared for even a 2°C rise in temperatures as the NAP had not gone far enough to increase ambition and implementation of adaptation policy, and that it had failed to address all of the risks and opportunities outlined in CCRA2 (Climate Change Committee, 2019). This reflects back some of the earlier critiques of CCRA1 that it did not provide a prioritised list of risks to be used by government nor did it take consideration of planned or current adaptation thereby limiting its ability to assess government progress (Brown et al., 2018). This demonstrates the challenges between aligning climate adaptation (policy) needs with the 'evolving science of risk and across the many academic disciplines contributing to climate change science' (Adger et al., 2018) and the overly physical and socio-economic representation of risks. Indeed, CCRA1 assessed sectoral risks with less exploration of cross-sectoral risks, an issue addressed in CCRA2 by adopting a whole systems approach to identify risk relationships and opportunities (Brown, 2018).

Warren et al.'s (2018) critical reflections of how the methodology adopted for CCRA2 evolved compared to that of CCRA1 highlight an evolution to a policy-first approach (focusing on 'systems of receptors' rather than sectors) as opposed to a science-first assessment, an attempt to enable better integration (Brown, 2018) and move away from a climate reductionist approach. Yet reviews of the CCRA process and context of both the 2012 and 2017 reports criticise the reductive scientific approach adopted and the science upon which they are written due to their lack of relevance and granularity to support the design and implementation of climate adaptation policies (Howarth et al., 2018). Indeed, a gap in CCRA2 was found to be the limited information available on the extent to which adaptation policies in place were actually moderating climate risk, and where this fitted into the UK's broader reporting requirements on adaptation (Brown, 2018). In the context of business and industry, for example, Surminski et al. (2018) discuss how CCRA2 focused mainly on assessing existing evidence (compared to CCRA1's larger budget which allowed the commissioning of individual specific research projects to populate the Assessment) through a business function approach which considered climate risks as multi-faceted and affecting different aspects of business operations, allowing a broader range of business and industry sectors to be considered and better capturing of the nuances of climate risks and adaptation these sectors face.

This shows how the production of climate change risk assessments is often 'framed by subjective decisions and a host of underlying assumptions, albeit often introduced by experts who may be perceived as objective by the decision-makers' (also see Smith et al., 2017; McDermott and Surminski, 2018, p.4) and requires an understanding of the level of acceptable risk of individuals, organisations and nationally (Brown et al., 2018). Reliance on a larger and growing evidence base is required to provide a fuller picture of the risks faced by different sectors and to better align with their operational needs and urgency of required actions, considering the diversity and complexity of cascading risks and interdependencies (Surminski et al., 2018). This means that evidence produced by those sectors (Neely et al., 2021), stakeholders (Viner and Howarth, 2014), and considerations for the international perspective (Kythreotis et al., 2020), enriches the presentation of risks and opportunities in the CCRAs, and can better equip government policymakers with a list of urgency of actions required to adapt to the climate risks highlighted in the assessment process.

The most recent CCRA3 process has attempted to accommodate this and the CCRA3 Technical Report was designed to inform planned adaptation and create an enabling environment to help a variety of end-users from government, agencies, regulators, the private sector, and households adapt to climate change by identifying where action is needed over the next five years, and what opportunities might arise in relation to these assessed climate risks (Watkiss and Betts, 2021). Using a 'synthesis approach' that draws from peer-reviewed and quality assured literature on climate change, risks and adaptation, the main objective of the CCRA3 Technical process was to prioritise risk and opportunity through the lens of urgency, with "risk descriptors further refined as a joint science-policy exercise" (Brown and Berry, 2022, p. 6). The use of urgency scoring to frame the outputs of CCRA technical reports was derived from CCRA2, where the decision to use 'urgency' as an analytical tool was decided upon by the expert judgement of the Adaptation Sub Committee (ASC) in conjunction with the CCRA2 authors and reviewers. Following CCRA2, the CCC produced a lessons report concluding that the urgency score framework "was an effective way to communicate the results in a meaningful way for Government" and hence should be retained for CCRA3 (Watkiss and Betts, 2021, p. 11). Taking an iterative risk management approach adopted from Jones et al. (2014), the CCRA3 approach involved prioritising risks and opportunities using three questions: "1. What is the current and future level of risk/opportunity? 2. Is the risk/opportunity being managed, based on government commitments and other adaptation actions? 3. Are there any benefits to further action in the next five years, over and above that already planned" (Watkiss and Betts, 2021, p. 2). Each risk or opportunity was then ranked into one of four urgency scores: (i) "more action needed"; (ii) "further investigation"; (iii) "sustain current action"; or (iv) watching brief" (Watkiss and Betts, 2021:3). The second question is certainly pragmatic in that it refers to government commitments, not what forms of adaptation policy are necessary to ensure the environmental and social well-being of those communities that are affected by climate impacts most. In this sense, the methodological process adopted by the CCRA team certainly circumvents many external stakeholders from being involved in the climate risk assessment process (Tangney, 2017; Howarth et al., 2018), although co-production does not necessarily equate with usable information for policymakers (Porter and Clark, 2023).

However, placing greater emphasis on urgency through a policy lens was sensible and understandable given that previous CCRAs had been critiqued for institutionalising reductive scientific methods that led to less flexible adaptation policy mechanisms for a variety of end-users operating at subnational scales of policy and governance (Howarth et al., 2018). The intention of the CCRA3 process – and this has been driven by DEFRA requirements (Watkiss and Betts, 2021, p. 2) – was therefore to continue the move away from the prioritisation of reductive forms of scientific assessments to a more policy-oriented approach that could be better utilised by policymakers (Warren et al., 2018).

The methodological approach of the CCRA3 process suggests that there would be less emphasis on adopting a specific 'one size fits all' methodology to measure climate risks. Rather, methods will be used 'generically' and 'iteratively' by individual chapter authors because, quite rightly, "natural system complexity generally invalidates utility of simple cause-effect risk metrics" (Brown and Berry, 2022, p. 10). Despite subsequent UKCCC direct criticism of the UK government's failure to address climate risk adequately based on the CCRA3 findings (Climate Change Committee, 2021) and admissions that the CCRA3 methods used were "a focus for collective learning… [and] had challenges because they had implications across the full suite of risks" (Brown and Berry, 2022, p. 10), our analysis (Section 5) has also found that the (over) articulation of generic methods in the CCRA3 Methods chapter analytically blunts how the CCRA3 process is undertaken, as well as how it is perceived by external users not part of the process (also see Howarth et al., 2018). The methods chapter states that urgency scoring framework was useful in providing a policy-first approach that could inform adaptation policy, rather than a science-first approach that focuses on climate projections and impacts (Watkiss and Betts, 2021, p. 12). However, we would argue that assessing climate risk through 'urgency scores', still represents a somewhat reductive and myopic view of what constitutes 'opportunity' in climate risks, and discursive limitations in the way that transformational adaptation is normalised through CCRA3 methods discourse. We argue that underpinning the development and production of future CCRAs going forward requires the CCRA process to adopt a more broader interdisciplinary evidence base which further considers behavioural, political and social aspects, and their

interlinkages, with a wider stakeholder engagement process to complement scientific expertise with practitioner and practical evidence and expertise (Howarth et al., 2017; Surminski et al., 2018; Neely et al., 2021) above and beyond the expertise of the Climate Change (Adaptation) Committee, CCRA authors and reviewers, who have had carte blanche in deciding who is involved in producing CCRAs what types of 'knowledge' (and data) can be used, and even 'what' to focus on and 'how' to report on the findings. Porter and Clark (2023) have argued how there is a usability gap of climate information, which varies depending on the needs of decision-makers, and that the types of climate information produced and used is contingent upon institutional-political contexts. In the case of assessing climate risk to produce more effective adaptation policy, the process remains quite closed and incestuous, with the Climate Change Committee taking the lead from consultations with DEFRA and other government departments to improve the CCRA method. Whilst this is a political reality of the science-policy process, which is supposed to be linear, more thought should be given on respectively, the end-users of climate risk information and the actual adaptation policy derived from that information, not the producers i.e. CCRA team and government. This has also been supported by others (e.g. Tangney and Howes, 2016; Tangney, 2017), where the dangers of framing climate risk assessments as a legitimate scientific process can actually lead to policy-based evidence. This then raises a number of important questions. Firstly, regarding the efficacy of methods used for the UK CCRA process and whether the methods currently legitimised by this process reinforce epistemic communities of climate risk science and adaptation policy to the chosen few; and secondly whether such methods produce fit-for-purpose place-based adaptation policies for those citizens and communities that are most adversely affected by climate impacts across the UK. We argue there is currently a disconnect between the CCRA methods process of climate risk assessment and whether the use of these methods provide the right kind of evidence for engendering more inclusive forms of place-based adaptation policy.

4. Methodological approach

The focus of this article is to examine how climate risk is currently framed in the Methods chapter (Chapter 2) for the CCRA3 Technical Report published in June 2021 (Watkiss and Betts, 2021) to add new insights into how a more socially inclusive, place-based and equitable politics of assessing risk can be adopted by the UK government when they make decisions on adaptation policy. The generic methods chapter was selected as it provides an overarching framework for the CCRA3 assessment. Focusing on the methods chapter alone does not describe fully how the various methods, particularly urgency scores, were applied to each of the CCRA3 individual assessment chapters, which would be far beyond the scope of the article; however, its aim to "set out a harmonised approach to: gather evidence from the wide range of source material; to analyse this evidence consistently; and to present it in ways that make it easier for the UK Government and the devolved administrations to respond" render it the most relevant object of analysis (Watkiss and Betts, 2021, p. 6).

Regarding the discourse analysis component of our methods, the two lead authors read the CCRA3 Technical Report Methods chapter independently and each identified a series of main themes using the discourse analysis technique. This was deemed the most appropriate approach because it enables the researcher to ascertain patterns of knowledge and certain words that have become institutionalised into policy, which then reify climate policy structures, welding a connection between knowledge and power (Foucault, 1970; Zaman, 2021). In the case of this Methods chapter, we specifically wanted to analyse the text in relation to the framing of the socio-political dimensions of risk as conceptualised and operationalised in the CCRA3 writing process. Three critical themes emerged from our analysis of the chapter that arguably delimit a more socially inclusive politics when anticipating climate risk: (1) the continued reductionist framing of risk, particularly in relation to the urgency scores; (2) the idea of 'opportunity' in climate risk; and (3) the definition and application of transformational adaptation. In the section that follows we critically elaborate on these three themes, before highlighting a number of points and recommendations in the conclusion in relation to engendering a more socially inclusive, place-based politics of assessing adaptation risk in the post- climate emergency era.

5. A socio-political critique of the Third CCRA process

5.1. The continued reductionist framing of risk and adaptation

The social element of climate risk as conceptualised in CCRA3 is largely determined through an economic framing (e.g., Table 2.2 in Watkiss and Betts, 2021), in part because one of the key requests from DEFRA and the devolved administrations after CCRA2 was the assessment of risks and opportunities in monetary terms in order to provide consistent and comparable indicators. While greater attention to the socio-economic components of risk is welcomed, particularly in the context of the UK Net Zero target, adaptation pathways, interacting and cross-cutting risks and equity/distributional impacts (p. 26), this should be nested within, and emerge from, a wider set of questions, including at the most basic level "what is valued?" and "how do we value it?", particularly in the most climatically vulnerable communities (as noted for the US National Climate Assessment on impacts, risk and adaptation, (see Reidmiller et al., 2018)). Dilling et al. (2019), for example, observe that most efforts to track adaptation have been indicator- or data-driven, and while the resultant quantitative measures of risk and urgency may appear 'apolitical' or 'objective', they can instead mask the worldviews and systems of power through which they are shaped. This is particularly important given that CCRA authors were asked to document the relative importance (where evidence exists) between climate versus socio-economic drivers of risk. This is also important considering impacts of climate change are felt at, within and across *places* where progress on adaptation is driven, where partnerships enable collaboration and translation of knowledge into action (Howarth et al., 2023), and hence the way the place experiences those impacts and acts on it will greatly embody values-based and contextually-driven progress.

The need to improve methods for synthesising different forms of evidence when assessing adaptation decision-making has been highlighted by Berrang-Ford et al. (2021). Yet while the CCRA Methods chapter notes that the synthesis approach of the Technical Report "requires a harmonised and consistent approach to consider and collate evidence from different sectors and source material" (Watkiss and Betts, 2021, p. 2), this does reify a reductionist framing that exists because it is the 'go to' pragmatic solution for climate adaptation practitioners and experts, which can also be driven by government budgets and ideologies (Tangney, 2017). A lack of consistency in the quality and quantity of underlying evidence on the diversity of processes that determine climate risk is recognised as a significant challenge to obtaining comparable results (as noted on, p. 58 of the Chapter). Moreover, the CCRA3 Methods acknowledges that much of the data on the cost effectiveness of adaptation, for example, is skewed towards technical (engineering) adaptation options for long-term climate change (p. 76), which can lead to unintended consequences such as the funding of the easiest projects to measure (Reguero et al., 2018; Broderick et al., 2019; Dilling et al., 2019). While this challenge is recognised by the CCRA3 Methods chapter, it is only partly addressed using confidence levels to communicate the quality of assessment. Such difficulties in consistency of measurement and quantification can create levels of abstraction that reduce the meaningfulness of the scores as a reflection of reality (see the more general criticisms highlighted in Barnett et al. 2008).

While not disputing the need for forms of measurement to engender normative policy response by governments, the use of a broader diversity of knowledge sources from the assessment onset (including qualitative – as partly incorporated into Chapter 5: Health, Communities and the Built Environment) would strengthen, rather than weaken, the

synthesis and identification of priorities for adaptation, especially where major gaps exist in tracking existing adaptation in specific contexts or sectors (Berrang-Ford et al., 2019). Any risk assessment worth its salt needs to pre-emptively address the qualitative and spatial sensitivities of maladaptation risk (Magnan et al., 2016) whilst contextually adjusting for adaptation options that take account of social distributional justice and equity (Markanday et al., 2019; Owen, 2020), especially at the local scale (e.g., see Campos et al., 2016). However, we are cognisant that national adaptation assessment frameworks are limited in terms of incorporating contextual subnational strategic adaptation options (Adger et al., 2018), although one rudimentary solution could be to identify the places most at risk across the UK and target funding at those very places to reduce environmental and social vulnerability within the next CCRA(4) programme of work. This then sets up the climate risk assessment process to be useful to its end users ex ante, rather than producing a policy that may appear to have usability value for government but may be useless to communities bearing the brunt of climate impacts (Porter and Clark, 2023).

5.2. The idea of 'opportunity' in climate change and climate risk

The second area of our critique relates to the idea of 'opportunity' in relation to climate change and climate risk. As might be expected, opportunity features slightly less in the Methods chapter than risk (although still prominently), but what constitutes an opportunity is narrowly defined relative to risk. The CCRA definition of opportunity is in line with that of the IPCC AR5 definition that places opportunity in the context of how a changing climate can produce beneficial opportunities for exploitation: "The potential for a beneficial consequence, as a result of a changing climate (the propensity to be beneficially affected)" (Watkiss and Betts, 2021, p.9). Even where subjectivity in expert perception of risk and opportunity is acknowledged, such a definition is underpinned by the assumption that the adjustments which moderate harm or exploit beneficial opportunities are 'rationally' or unambiguously identifiable. Indeed, while this assumption has been critiqued in its application to identifying climate risk (Willows et al., 2003; Leiserowitz, 2006; Paavola, 2008), its application is perhaps more questionable in the case of exploiting beneficial consequences, which in any given society are the outcome of power relations, social bargaining and conflicting interests (Rohland, 2018; Adamson et al., 2018). More broadly conceptualised, opportunities are shaped by a range of social, spatial and institutional contexts (e.g., Welter, 2011; Welter et al., 2019), and while is this recognised in multiple CCRA chapters (e.g., Chapter 5 outlines how adaptation opportunities are unlikely to be evenly distributed across the UK due to structural inequalities), there is scope to expand such contextual richness in future CCRAs, particularly through targeting the most climatically vulnerable communities for further social and political funding that will strengthen that communities' resilience, as suggested in the previous sub-section. Different regions and different types of organisations will each have their own opportunities to contribute to both climate mitigation and adaptation, but this requires effective communication and empowerment of actors at the sub-national policy level in this newly dawned post- climate emergency era – something that the latest IPCC AR6 has changed with its emphasis on a regional focus throughout the report, with strong place-based climate impact studies being used as examples.

In a similar vein to the arguments in our first point of critique, then, consideration of beneficial opportunities needs to be divorced from the assumption of linearity in human action inherent in CCRA definitions of current risk and opportunity, and refocussed into questions of what places are most adversely affected, how opportunities are valued there, who will benefit, and who specifically has a voice in defining and realising opportunity. The CCRA3 goes some way towards acknowledging distributional effects and potential inequalities associated with risks and opportunities (e.g., Section 2.6.2.5 of the Methods), but thin detail is provided on how this is integrated into the urgency score framework at the beginning of the methods life cycle. Having this evidence in place will mean subsequent CCRA cycles are continually and iteratively improved upon, leading to greater end-user satisfaction.

5.3. The definition and application of transformational adaptation

The third theme in our critique relates to the way that transformational adaptation is used as a normative term. The Methods chapter poses a final question for each individual risk and opportunity that is identified: "where might transformational adaptation be needed?" (Watkiss and Betts, 2021, p. 77). Defined in CCRA3 as "adaptation that changes the fundamental attributes of a system in response to climate and its effects" (Watkiss and Betts, 2021, p. 10) (in line with the IPCC 6AR definition), the need for transformational adaptation is conceptualised primarily in relation to climate projections and their consequences, with less methodological context on non-climate factors (Watkiss and Betts, 2021). These include global warming of 2°C and 4° C by the end of the century (and related pathways) relative to pre-industrial temperatures, but importantly also extend to encompass climate tipping points, threshold studies, and insights from climate modelling on the possible occurrence of 'unprecedented' extreme weather events (Watkiss and Betts, 2021). While clearly vital in informing the need for transformational adaptation, some of the most critical adaptation-related needs may not directly relate to climate. For example, issues of social inequality, poverty, and other distributional aspects of vulnerability may act as barriers or limits to adaptation in the absence of transformation (Pelling, 2010). Recent research has also (re)emphasised the importance of building and measuring capabilities that empower communities in the face of climate change, such as building diversified livelihoods, providing better access to healthcare necessary to respond to new health risks, and improving access to technology (Clay, 2018; Dilling et al., 2019), many of which are only indirectly related to climate but still shape community and social vulnerability. Adaptation goals, targets and progress will inevitably evolve with changing vulnerabilities (Berrang-Ford et al., 2019), not just more sophisticated climate science, and if these are not considered in equal weight with changing climate risks then this may lead to the underestimation in vulnerability and resultant maladaptation.

The updated conceptualisation of the term 'lock-in' in CCRA3, on the other hand, recognises that lock-in can arise from "early actions or decisions that involve long lifetimes or path dependency, which will potentially increase future risk or vulnerability and that are difficult or costly to reverse later (irreversibility)", but crucially recognises that this can also result from actions or decisions that are "business as usual" or from a "lack of action or decision" itself (Watkiss and Betts, 2021, p.10). Indeed, lock-ins that already constrain adaptation options and affect future climate risk as a result of past or current adaptation decisions or wider policy framings (Wise et al., 2014; Adamson et al., 2018) may ultimately require transformational adaptation in terms of political support to break existing path dependent sequences that can track towards maladaptive outcomes (Hanger-Kopp et al., 2022; Morrison et al., 2022). These underlying lock-ins need to be balanced alongside the need to anticipate the risks of lock-in arising from adaptation action in the coming five-year period. A wider temporal reconceptualisation of lock-in, more deeply rooted in the concept of path dependence and social and political contingencies, therefore strengthens the longitudinal component of adaptation risk assessments, to which the CCRA3 should be commended.

An example of how such a socially distributional approach that is sympathetic to path dependency has been embedded in practice, is through the UK Place-based Climate Action Network (PCAN). Through the bottom-up design, implementation and support of City and Regional Climate Commissions (Creasy et al., 2021; Howarth et al., 2022; Kythreotis et al., 2022), PCAN has emphasised the importance of building and measuring capabilities that empower local communities, going beyond expert climate scientific knowledge and judgement, and

addressing questions of power and inequality (both political and social) in addressing local climate change action, and in the case of adaptation. Hence, prospectively, addressing adaptation more wholly to include all end-users, has to be built as a social mandate from the ground up - using a place-based approach that is also sympathetic to local politics - which more adequately frames climate adaptation efforts through a more socially and politically inclusive consensus-based approach.

6. Conclusion

This article makes an important contribution to climate risk assessment critiques by exploring how adaptation is framed in assessments of climate evidence through an analysis of the Method chapter for the Technical Report underpinning the UK's Third Climate Change Risk Assessment. We identified three principal themes in the way climate risk is methodologically framed and assessed that require more critical thought and development. Firstly, that climate risk continues to be framed in a reductionist way with the social element conceptualised through an economic framing, and the problematic use of 'urgency scores' with a lack of tangible clarity as to what this means for climatically impacted UK communities in the future - an approach better suited to mitigation and net zero than adaptation to climate risks. Secondly, the 'opportunity' framing of climate risks requires deeper consideration of questions such as how such opportunities are valued, who will benefit, and who defines them. Thirdly, the definition and application of transformational adaptation proves a complex concept to assess in the CCRA as many of the factors that exacerbate adaptation cross multiple boundaries, such as inequality, poverty, vulnerabilities which continuously evolve and affect adaptation efforts. With these in mind, we discuss where the development and production of the CCRA3 Methods chapter lacks depth and breadth in its consideration of evidence of behavioural, political and social perspectives, as well as their interlinkages. However, although it should be acknowledged that CCRA3 represents marked progress from previous versions in terms of greater acknowledgement of path dependencies and socially just distributional outcomes for communities, and this could be more intrinsically linked to evaluating the opportunities in addressing climate risk within the CCRA4 process.

Bringing socio-political issues to the centre of the climate risk and adaptation debate has highlighted the need to design future (e.g. CCRA4) climate risk assessment processes and subsequent adaptation policies that recognise distributional effects and potential inequalities. Arguably the most important practical recommendation that can be applied at different levels of government (and is spatially indiscriminate) is to not overly rely on technical data as a 'be all and end all' for understanding climate risk and basing adaptation policy decisions responses solely on this. However, we sympathise and understand that at all levels of government, policymakers may not feel able to critically assess technical scientific evidence because of limitations on their background knowledge (Kythreotis et al., 2019), and therefore key assumptions remain unchallenged which can further encourage over-reliance on such technical data and data providers external to the sphere of policymaking (e.g., scientists/academics). However, if the social and political contexts to risk and adaptation are tailored more to local contexts and earlier on in the CCRA life cycle, then they could become more beneficial to those end-users. This is an issue for not just the UK government to take heed of, but all national governments.

Regardless of nation, uncertainty remains a blight to evaluating climate risks (van der Sluijs, 2012; Brown and Berry, 2022), pointing to a need to integrate top-down and bottom-up methods of risk assessment to get more accurate representations of climate risks needed to inform adaptation decisions (Conway et al., 2019). Governments do need more robust evidence – both quantitative and qualitative – to make well-informed policy decisions, and even if such evidence is deemed robust there still remains the issue of spatial implementation given how adaptation policy and governance decisions extend over different geographical spaces and timescales, pre-empting a 'resilience trap' in adaptation policy formulation (Kythreotis and Bristow, 2017). Hence, national governments are often caught between a rock and a hard place when faced with having to create and implement adaptation policies where the assumption is that such policies must take account of a complexity of temporal (e.g., see Walker et al., 2013), as well as economic, cultural and political circumstances when deciding how to adapt to climate risks.

Whilst both researchers and government decision-makers advocate the need for stronger evidence-based policymaking of increasingly complex societal issues (Lawrence et al., 2017; Walker et al., 2019), communication risks and opportunities that are context-specific (e.g. climate adaptation) and relate more directly to 'place', can stimulate wider positive action. But this must emerge more equitably from the social sphere, particularly from those that are marginalised and suffer climate impacts more disproportionately (Shi et al., 2016; Porter et al., 2020), and not as a diktat from scientists or government policymakers, giving climate policy decisions greater legitimacy (Kythreotis et al., 2019). The post- climate emergency era now requires more socially inclusive and equitable research and policy processes in assessing climate risks and this article has highlighted some key weaknesses in how climate risk assessments are currently framed through an over reliance on 'generic' methods that appear scientifically reductive. Thus, we suggest new insights into how a more consensus-based, spatially-targeted approach can help shape future assessments of climate risk which are then adopted by the governments in their adaptation decision-making processes. There is a need to move beyond assessing risk solely in terms of biophysical and socio-economic risk – but to incorporate 'place-based' risk too. This will go some way to alleviating the currently institutionalised epistemic knowledge discourses in climate risk assessment that render physical sciences and normative ideas of transformation and opportunity, as the dominant science-policy discourses in framing future adaptation decision-making at both national and subnational (local) scales.

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CRediT authorship contribution statement

Hannaford Matthew: Data curation, Formal analysis, Methodology, Writing – original draft, Writing – review & editing. **Kythreotis Andrew Paul:** Conceptualization, Data curation, Formal analysis, Funding acquisition, Methodology, Project administration, Supervision, Writing – original draft, Writing – review & editing. **Bosworth Gary:** Writing – original draft. **Howarth Candice:** Formal analysis, Funding acquisition, Writing – original draft, Writing – review & editing.

Declaration of Competing Interest

The authors have no relevant financial or non-financial interests to disclose.

Data availability

Data will be made available on request.

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