

# 1                    **Locating climate adaptation in urban and regional studies\***

2  
3                    Kythreotis, Andrew P.

4                    (University of Lincoln)

5                    Jonas, Andrew E.G.

6                    (University of Hull)

7                    &

8                    Howarth, Candice

9                    (London School of Economics)

10  
11    **\*This is the author pre-proof version of an article accepted for publication in *Regional***  
12    ***Studies* (Urban and Regional Horizons section). Date of acceptance by journal: 03**  
13    **October 2019. DOI: <https://doi.org/10.1080/00343404.2019.1678744>**

## 14 15    **Abstract (submitted version only)**

16    This paper aims to add new empirical and theoretical insights to the debate on climate change  
17    adaptation and regional and urban studies by linking the analysis of UK climate adaptation  
18    policy to the city-regionalist political processes and state structures. We argue, firstly, that  
19    UK climate adaptation policy has not adjusted to the rise of city-regionalism, and accordingly  
20    underplays the role of sub-national political interests and agendas in demarcating specific  
21    sectors and scales of adaptation. Secondly, climate adaptation policy has not only been slow  
22    to adjust to the rising significance of city-regionalism but also raises strategic policy  
23    questions about the longer-term trajectory of climate change adaptation in light of the  
24    territorial logic of the national competition state which currently frames effective adaptation  
25    planning, action and policy at subnational political scales. The paper argues that future  
26    research on climate adaptation governance needs to address the uneasy relationship between

27 the rise of city-regionalism, on the one hand, and the sector-led priorities of the competition  
28 state, on the other.

29

## 30 **Introduction**

31 This paper aims to add new empirical and theoretical insights to the debate on climate  
32 change adaptation and regional and urban studies by linking the analysis of UK climate  
33 adaptation policy to the city-regionalist political processes and state structures. We argue,  
34 firstly, that UK climate adaptation policy has not adjusted to the rise of city-regionalism, and  
35 accordingly underplays the role of sub-national political interests and agendas in demarcating  
36 specific sectors and scales of adaptation. Secondly, climate adaptation policy has not only been  
37 slow to adjust to the rising significance of city-regionalism but also raises strategic policy  
38 questions about the longer-term trajectory of climate change adaptation in light of the territorial  
39 logic of the national competition state which currently frames effective adaptation planning,  
40 action and policy at subnational political scales.

41

42 Drawing upon a study of UK adaptation policy and governance, this article challenges  
43 current orthodoxy that uncritically locates effective climate adaptation exclusively within  
44 national economic sectors but ignores subnational political interests, processes and state  
45 structures especially those coalescing around city-regionalist agendas. Although climate  
46 adaptation policy is rapidly being adopted by many nations (Massey, Biesbroek, Huitema, &  
47 Jordan, 2014), the UK state has arguably been ahead of the curve on climate adaptation policy  
48 since the 2008 Climate Change Act (Biesbroek et al., 2010). Nonetheless, UK climate  
49 adaptation policy has hitherto been delivered at the national scale through the UK National  
50 Adaptation Programme (England) (DEFRA, 2013), the Adaptation Delivery Plan: Climate  
51 Change Strategy for Wales (2010), Sector Action Plans (Scotland) (2009), Scottish Climate

52 Change Adaptation Programme (2013), and more recently the UK Climate Change Risk  
53 Assessment Evidence Report (Committee on Climate Change, 2017b). Whilst this positioning  
54 corresponds with the internationalisation agenda of the UK ‘competition state’, defined here as  
55 the state moving away from a welfare orientation by promoting increased marketisation  
56 through the liberalisation of cross-border trade and capital flows, re-commodifying labour, and  
57 privatizing public services (Genschel & Seelkopf, 2015), it fails to acknowledge other politico-  
58 spatial pressures that contribute to the devolved and politically fragmented character of climate  
59 adaptation governance, including the rise of city-regionalism as a discrete space of state  
60 policymaking and the re-assertion of ‘national’ political agendas in climate change adaptation  
61 governance across UK regions. Based upon evidence from the UK, it is suggested that  
62 adaptation is being sub-nationally reconstituted within a one-size fits all international  
63 competition state framework that fails to recognise how effective adaptation action needs to be  
64 move beyond dominant competitiveness discourses and engage with a range of local public,  
65 private and third sector stakeholders especially those engaged in city-regional processes.

66

67 We are cognizant that adaptation research in other countries, particularly in the Global  
68 South, have shown how different mapping techniques for adaptation and resilience planning at  
69 the city scale are heterogeneous, producing diverse understandings of resilience (Borie et al.,  
70 2019). Likewise, in the global North climate policy is increasingly led by regions and cities  
71 rather than national government, especially in the United States where the federal government  
72 is no longer committed to recent international climate agreements. However, the UK climate  
73 policy experience has tended to be more state-led, with national policy often dictating what  
74 local authorities (e.g. city councils) should be doing. The UK developmental context is  
75 certainly different from countries and cities of the Global South, yet regardless of  
76 developmental contexts, if countries need to formally legislate for climate change adaptation

77 *all* need to be more cognizant of respective place-based attributes and experiences to ensure  
78 climate adaptation policy is locally fit-for-purpose and takes into account the co-production  
79 roles of different urban and regional stakeholders (Howarth, Morse-Jones, Brooks, &  
80 Kythreotis, 2018).

81

82 Drawing upon findings of research conducted in three UK devolved regions (England,  
83 Scotland and Wales) between 2014 and 2017, this paper identifies three distinct processes  
84 shaping the strategic position of climate adaptation policy in the UK: (1) sector-driven  
85 territorial logic of the national competition state; (2) emergence of city-regionalism as an  
86 adaptation governance response to increased competition; and (3) the distinctive role that  
87 ‘national’ political priorities play in implementing climate adaptation across regions. The  
88 empirical research involved 28 interviews with national and subnational climate adaptation  
89 governance and policy stakeholders in: Cardiff (Wales); Glasgow (Scotland); and the  
90 Yorkshire and Humber sub-region (comprising Leeds, York and Hull) (England). These city-  
91 regions were selected to capture (a) the increasing importance of the city-region scale in  
92 national and subnational territorial policymaking in the UK (and hence also more widely) and  
93 (b) differences in how devolved national administrations within each region have dealt with  
94 the challenges of climate adaptation. The interviews reveal how climate adaptation policy has  
95 been slow to adjust to the rising significance of city-regionalism and national political interests  
96 in demarcating specific sectors *and* scales of adaptation planning in the devolved regions. At a  
97 practical level, the single-minded pursuit of ‘sectoral adaptation’ as a central plank of state  
98 competitiveness agendas hinders the communication of adaptation best-practice between  
99 policymakers and communities across different subnational jurisdictional policy spaces. This  
100 contradicts much of the adaptation planning literature which argues developing long-term  
101 adaptive capacity should be primarily through state rescaling and polycentric governance (e.g.

102 Adger, Arnell, & Tompkins, 2005; Amundsen, Berglund, & Westskog, 2010; Juhola &  
103 Westerhoff, 2011; Kythreotis & Bristow, 2017; Waters & Barnett, 2018). Despite recent  
104 attempts to align sectors and borders in climate risk research (Challinor et al., 2018), there  
105 remains significant differences in how these are epistemologically constituted. So, their  
106 conflation can be analytically dangerous given that sectors and borders frame specific types of  
107 adaptation response. Hence, we argue that future research and evidence that informs climate  
108 adaptation policy should pay greater attention to the role of territorial politics and governance  
109 in shaping how sector-based strategies are implemented in different national and subnational  
110 (regional and urban) contexts.

111

112 Section two briefly discusses the significance of climate adaptation in the UK since the  
113 accession of the 2008 Climate Change Act, with reference both to how the devolved regions  
114 address climate adaptation and to the emergence of city-regions as new spaces of the state  
115 charged with drawing together local authority climate action measures. Section three discusses  
116 how the spatial reconfiguration of climate adaptation in the UK has been influenced by the  
117 sectoral and territorial imperatives of the competition state in the UK. Section four utilises the  
118 interview data to illustrate how this spatial reconfiguration is shaped by discourses of  
119 international competitiveness, city-regionalism and changing subnational political priorities.  
120 We conclude by suggesting that future research on climate adaptation governance more  
121 generally, must address the uneasy relationship between the potential rise of city-regionalism  
122 as a distinct characteristic of the competition state, on one hand, and the sector-led priorities of  
123 the competition state, on the other.

124

125 **2. Climate adaptation policy and the spatial reconfiguration of the state**

126           Climate adaptation has evolved into an important climate policy imperative at  
127 international, national and, increasingly, subnational scales (e.g. Adger et al., 2005). Much has  
128 been written about the complexities of implementing state-led climate adaptation policy in the  
129 context of economic globalisation (e.g. Eakin & Lemos, 2006) and the various systemic  
130 competition pressures that are put on national states through the global neoliberal project that  
131 commodifies natural capital (Clark & York, 2005; Fieldman, 2011). The emergence of  
132 resilience as a central policy discourse that justifies this continued global neoliberal paradigm  
133 has been well documented (e.g. Welsh, 2014), and more recent work has attempted to highlight  
134 the importance of resilience in uniting different social, political and economic priorities in  
135 managing urban climate adaptation responses sub-nationally in the UK (Kythreotis, 2018;  
136 Kythreotis & Bristow, 2017).

137

138           Whilst we are cognisant that higher scale international pressures inevitably encroach  
139 upon the abilities of national and local states to implement more effective adaptation responses,  
140 there is a need to investigate specific examples of how national states have dealt with  
141 ‘downscale’ adaptation policy pressures that materialise sub-nationally. Governments in many  
142 countries accept that there will be a need to adjust to the impacts of current warming trends and  
143 that impacts will increase in magnitude and severity over the coming years (IPCC, 2014).  
144 Moreover, national climate adaptation strategies (as compared to mitigation strategies) have  
145 been viewed as constitutive of successfully tackling climate change (Berrang-Ford, Ford, &  
146 Paterson, 2011), arguably as a result of failed global mitigation efforts (Bassett & Fogelman,  
147 2013).

148

149           National climate adaptation policy in more developed countries is part of a wider  
150 process of ‘eco-state restructuring’ whereby national states, including the UK, have responded

151 to growing international environmental legislation by selectively establishing new institutional  
152 and governance structures for managing economy-environment tensions at national and  
153 subnational scales (While, Jonas, & Gibbs, 2010). However, in contrast to the forms of eco-  
154 state restructuring experienced in low carbon mitigation projects, climate adaptation  
155 governance across the UK opens up the possibility of challenging the ‘top down’ territorial  
156 logic underlying environmental policymaking in the competition state by exposing emerging  
157 national spaces of climate adaptation to subnational pressures of democratic accountability.  
158 This could be viewed as a positive step given the attributes of successful climate adaptation  
159 being based upon more locally and place-specific forms of cultural, social and political  
160 sensibilities (Adger, Barnett, Brown, Marshall, & O’Brien, 2013; Measham et al., 2011; Vogel  
161 & Henstra, 2015). However, any devolved governance agendas are still subjugated by the  
162 sectoral approach that overarches UK state adaptation policy (Hjerpe, Storbjörk, & Alberth,  
163 2015).

164

165 Sub-national climate adaptation responsibility has been highly structured and  
166 orchestrated at the UK national policy scale (Coaffee, 2013). Policy has principally evolved  
167 out of the 2008 Climate Change Act, which established national strategies on climate  
168 mitigation and adaptation. The Act set out a procedure for Climate Change Risk Assessments  
169 (CCRA) every five years (two CCRA’s so far in 2012 and 2017) and led to the creation of a  
170 new independent advisory body, the UK Committee on Climate Change (UKCCC), which  
171 established an Adaptation Sub-Committee (ASC) to provide expert advice and scrutiny on  
172 adaptation. The Act also gave the UK Government an Adaptation Reporting Power (ARP) to  
173 direct other organisations (‘Reporting Authorities’) to report on current and future impacts of  
174 climate change on such organisations and outline proposals for adaptation.

175

176           The evidence-base of climate risks through the first CCRA in 2012 led to the statutory  
177 implementation of the UK National Adaptation Programme (NAP) in 2013, principally devised  
178 for England, with the devolved regions having to implement their own adaptation programmes:  
179 Scottish Adaptation Programme (2013), Welsh Sectoral Adaptation Plans (built on the Wales  
180 Climate Strategy 2010) and a cross departmental Northern Ireland Adaptation Programme  
181 (2013). Locally-led adaptation action through increased state *and* non-state governance are  
182 highly important (DEFRA, 2013), whereby the Local Adaptation Advisory Panel (LAAP) and  
183 the network ‘Climate UK’ provided links between central and local governments. Yet whilst  
184 such programmes enabled respective local authorities to work with other public and non-public  
185 stakeholders in local adaptation planning, it is not statutory for all UK local authorities to report  
186 on adaptation actions; stakeholder organisations involved in the first CCRA did so on a  
187 voluntary basis. This confirms critiques of such adaptation programmes for their lack of co-  
188 ordination, stakeholder involvement and unclear divisions of responsibilities (Biesbroek et al.,  
189 2010).

190

191           The 2012 UK Climate Change Risk Assessment (CCRA) assessed sectoral risks of  
192 climate impacts to the UK up to the year 2100, involving consultation with over 500  
193 stakeholders from eleven different sectors (DEFRA, 2012: 17-18). This was to be used to  
194 inform future adaptation planning in the devolved regions, although both Scotland and Wales  
195 had already produced specific adaptation plans for various sectors because of their own  
196 respective devolved government’s environmental assessments and public consultations. The  
197 Climate Change Act of 2008 also enabled government ministers to direct certain bodies to  
198 prepare reports on adaptation. The sectoral approach to adaptation was taken up by all the  
199 devolved regions in some form, although each approach was allied through a risk-based  
200 sectoral approach to managing climate adaptation across the UK state (Figure 1). The shaded



201 area illustrates the most important sectors as defined through each devolved sectoral plan.  
202 Northern Ireland is included for devolved sectoral comparison purposes but was not part of the  
203 research. Getting cross-sectional responses was important because England, Scotland and  
204 Wales have approached adaptation policy in different ways because devolution has given each  
205 country certain policy autonomies, despite being statutorily bounded by the Climate Change  
206 Act (2008). This overarching legislation required a UK policy framework for national risk  
207 assessments every five years, a UK Committee on Climate Change (which comprises an  
208 adaptation sub-committee), the National Adaptation Programme (NAP) and the UK Adaptation  
209 Reporting Power (Committee on Climate Change, 2017a).

210

211           What is important for examining the sectoral focus of each devolved region, though  
212 bounded by the UK Climate Act, also enabled the researchers to ascertain how seriously  
213 adaptation is taken by each devolved nation. For example, the Climate Change (Scotland) Act  
214 of 2009 requires all public bodies (including local authorities) in Scotland to report on  
215 adaptation if required by Scottish Ministers. Additionally, Scottish Government funded  
216 ‘Adaptation Scotland’ through its own adaptation programme (The Scottish Government,  
217 2013) which introduced an array of different adaptation and resilience community-based  
218 project initiatives. At the time of the research, Wales was already disbanding the Climate  
219 Commission for Wales, which had a specific adaptation sub-board to monitor Welsh  
220 Government progress on sectoral adaptation plans and were replacing this with other legally-  
221 binding legislation via the 2015 Well-being of Future Generations Act (Future Generations  
222 Commissioner for Wales, 2019) which set up seven long-term well-being goals that included  
223 a ‘Resilient Wales’. Additionally, the 2016 Wales Environment Act (Legislation.Gov.UK,  
224 2016) attempted to legally marry up Welsh carbon emissions targets with UK 2050 emission  
225 targets (e.g. was mitigation focussed), although this Act did not really introduce anything

226 specific related to climate adaptation policy in Wales. England's adaptation policy progress  
227 had been rather stunted at the national scale although the Local Adaptation Advisory Panel  
228 (LAAP) was designed to promote adaptation in local councils and draw other non-state  
229 governance actors into promoting bespoke local adaptation initiatives across England.  
230 However, local council adaptation plans in England has been found to be wanting in certain  
231 sectors like transport (Walker, Adger, & Russel, 2015). Hence, interviewing different  
232 governance actors in each devolved region of England, Scotland and Wales might reveal  
233 something more nuanced about devolved sectoral policy attention to climate adaptation across  
234 the UK, as well as telling us how such devolved adaptation plans were strategically aligning  
235 sub-national jurisdictional spaces, particularly city-regions, with upscale devolved and UK  
236 adaptation policies.

237

238           INSERT TABLE HERE

239

240           Table 1 shows firstly the devolved regions' sectoral focus included in respective  
241 adaptation strategies which could be seen to act as proxies for how seriously each devolved  
242 region was committed towards climate adaptation. Secondly, the timings in how each devolved  
243 administration were focusing on developing sectoral adaptation plans is significant. Scotland  
244 appeared more progressive than other devolved regions in formalising adaptation plans for  
245 certain sectors in tandem with the 2009 Climate Change Act (Scotland), Scotland's statutory  
246 response to tackling climate change. In comparison to other countries, it is important to note  
247 that other devolved UK regions, like England, also developed climate adaptation as a distinct  
248 policy strategy through substantive authority (e.g. a legal framework), institutional order (e.g.  
249 ministerial responsibilities and mechanisms) and substantive expertise (policy documents and  
250 a cross-cutting governance structure that involves state and non-state actors) (Massey &

251 Huitema, 2012). In this sense, the UK state could be normatively seen as an international leader  
252 in climate adaptation policy (Massey et al., 2014; Tangney & Howes, 2016), but there were  
253 (are) important differences within the UK state that distinguish each devolved regions' urgency  
254 and attention towards promoting a governance and policy agenda for climate adaptation.  
255 Indeed, the current 2017 CCRA reflects the urgency of climate adaptation assessment by  
256 bestowing a range of urgency scores (confidence levels) for environmental risks across  
257 different sectoral areas that encompass natural environments and natural assets (Committee on  
258 Climate Change, 2017b, p. 9).

259

260 Therefore, the UK approach regarding adaptation since the 2008 Climate Change Act  
261 is becoming more normatively attuned to both devolved regions and local needs and risks with  
262 respect to adaptation. However, whilst there are policy examples and institutional support  
263 mechanisms of 'joined-up' governance between national and subnational jurisdictions, like the  
264 LAAP and Climate UK, much of the evidence-base of risks regarding adaptation have been  
265 developed through the CCRA that took a sectoral approach to analysing climate risks. Hence,  
266 we argue that, on one hand, the UK state programme of adaptation has rescaled adaptation as  
267 an extra-territorial governance project across all the devolved regions. Yet on the other hand,  
268 the way in which sectoral risks have become a cornerstone of the very same UK state policy  
269 on adaptation points to a more nuanced tension in the territorial governance logics of climate  
270 adaptation in the UK today; one that positions the UK central state as maintaining ultimate  
271 control over how adaptation is discursively framed as a subnational political governance  
272 project. Hence, climate risk assessments are inevitably constrained by underlying normative  
273 values and goals that can constrain successful adaptation response (Adger, Brown, &  
274 Surminski, 2018). Such values and goals will inevitably be exacerbated and influenced by the  
275 Brexit process as the UK government moves to transpose European Union (EU) environmental

276 legislation into UK law through the Great Repeal Bill. Early indications at the time of writing  
277 suggest that climate-related legislation and subsequent planning may suffer (Cowell, 2017;  
278 Hepburn & Teytelboym, 2017) and climate targets previously driven through EU membership  
279 may be under-prioritised as the UK seeks to cement new free trade agreements around the  
280 world (Rayner & Jordan, 2016; Scott, 2016). At the UK national level, DEFRA's launch of the  
281 2017 CCRA Evidence Report was given little publicity by DEFRA in comparison to the 2012  
282 CCRA Evidence Report, and the 2017 CCRA was significantly under-resourced compared to  
283 the 2012 CCRA (Howarth et al., under review). The 2017 CCRA is based upon economic  
284 urgency and the effects of adaptation and socio-economic change on risk, whereas the 2012  
285 CCRA did not include the effects of planned adaptation or socio-economic effects beyond  
286 population control (Humphrey, 2015). These recent UK climate policy horizons show how the  
287 governance of climate adaptation will undergo significant spatial reconfigurations as the UK  
288 state attempts to discursively frame, strategically-steer and align future climate adaptation  
289 policy with more pressing extra-economic priorities through adopting a sectoral risk-based  
290 approach.

291

### 292 **3 Climate change adaptation and the rise of city-regionalism**

293         Whilst there has been growing academic interest in describing and explaining the scalar  
294 politics of climate change governance (see Bulkeley, 2005), the emergence of city-regionalism  
295 as a 'new state space' (Brenner, 2004) with potential responsibility for climate adaptation  
296 remains under-researched.<sup>1</sup> Whilst we recognise that effective urban adaptation policy and  
297 practice is highly contingent on the 'activity space' of the particular country in question

---

<sup>1</sup> This situation is not helped by efforts to 'flatten' scale as an ontological construct (Marston, Jones, & Woodward, 2005), which in turn encourage a mistaken view that (sub-national) territorial politics are causally insignificant if not downright antediluvian features in the landscape of state spatial reconfiguration (Jonas, 2012; Morgan, 2007).

298 (Pelling, O'Brien, & Matyas, 2015), hitherto research on city-regionalism has prioritised  
299 analysis of a possible causal relationship between the rise of competitive forms of city-regional  
300 governance and administration, on the one hand, and the internationalisation of the competition  
301 state, on the other (e.g. Jonas, 2013; Wachsmuth, 2017). However recent work suggests that  
302 the rise of city-regionalism as a domestic policy agenda further reflects how the state has sought  
303 to reconfigure territory in response to a host of pressing national political problems and tensions  
304 linked with globalisation, climate change and security (Harrison, 2010; Jonas & Moisisio, 2018).  
305 For example, city response to climate change can benefit from a range of performance  
306 management criteria to better allocate resources and make more accountable streamlined  
307 decisions regarding climate change strategies (Jones, 2018). So, although climate change is  
308 increasingly recognised and framed as a source of ongoing tensions in the competition state,  
309 little has been written on its role in shaping contemporary territorial politics of city-regionalism  
310 within an economically developed national context where overarching statutory legislation is  
311 highly developed (e.g. UK at large) yet can be politically (re)constituted and (re)framed  
312 through certain institutionalised devolved powers of regions (e.g. Scotland, Wales, Northern  
313 Ireland).

314

315         There is growing evidence that city-regionalism is not solely framed by discourses of  
316 international competitiveness but also a variety of other social, political and environmental  
317 agendas, including sustainable development (Krueger & Gibbs, 2010). As cities around the  
318 world plan for both climate mitigation and adaptation (Bulkeley, 2013), city-regionalism is  
319 associated with new forms of collective action around social and environmental provision. Yet  
320 at the same time city-regions have 'omnipresent institutional legacies' (see Peck, 2016) that  
321 either enable or disable their ability to promote climate adaptation. For example, climate  
322 adaptation is being framed as a governance discourse across the devolved regions of the UK

323 through the emergence of a more economically-centric resilience agenda for climate change  
324 policy and planning sub-nationally in the UK (Howarth & Brooks, 2017; Kythreotis & Bristow,  
325 2017). The focus on sectoral risks in the CCRA for each devolved region could illustrate the  
326 emergence of a UK state-wide adaptation policy agenda governed by competition state  
327 territorial logics (that economically manage adaptation responses in the short-term), rather than  
328 adaptation being seen as a subjective socio-political and cultural process that requires more  
329 transformative, long-term anticipatory pathways of policy response (Adger et al., 2013;  
330 Eriksen, Nightingale, & Eakin, 2015; Kythreotis & Bristow, 2017).

331

332 As is the case for other aspects of urban and regional governance, climate-related  
333 policies and capacities increasingly draw on social relations and political structures extending  
334 well beyond the jurisdictional limits of the city-region, which in turn bring national and  
335 international economic and political priorities into the analytical frame of the region (Allen &  
336 Cochrane, 2007; Kythreotis, 2018; Prytherch, 2010). Climate governance in the UK has been  
337 shaped by more than forty years of international and national environmental regulation, the  
338 scale, scope and reach of which has broadened and deepened over time in response to rapidly-  
339 changing global and national political circumstances (While et al., 2010). Until recently,  
340 climate change initiatives in the UK were developed mainly as a response to measures  
341 undertaken at international and European Union (EU) levels. These include the 1997 Kyoto  
342 Protocol, the EU's 2008 effort to allocate territorially-based greenhouse gas emissions (GHGE)  
343 reduction targets to its member states and the 2015 Paris Agreement. Under the EU's 2008  
344 effort sharing decision the UK was allocated a target of 14% CO<sub>2</sub> emission reduction by 2020  
345 (Wurzel, Connelly, & Liefferink, 2016). Although the UK government has since ratified the  
346 2015 Paris Agreement, the outcome of UK's EU membership referendum in favour of leaving  
347 the EU has thrown into doubt Britain's continued commitment to EU climate policies (Rayner

348 & Jordan, 2016). Some argued that UK commitments under the Paris Agreement are unlikely  
349 to change after Brexit, and whether its carbon reduction commitments will remain joint with  
350 the EU or as a single party remains uncertain (Scott, 2016), but there are calls for the UK to  
351 include a target for achieving 'net-zero' emissions target in its Climate Change Act  
352 (Fankhauser, Averchenkova, & Finnegan, 2018). The UK government has recently announced  
353 plans to be carbon emission neutral by 2050 (Harrabin, 2019), but this inevitably requires  
354 bottom-up action (e.g. increased citizen pro-environmental behaviour) in addition to more  
355 strengthened policy action from government.

356

357 Simultaneously, UK climate change policy has always emphasized a strong national  
358 and regional orientation, particularly around GHGE (mitigation) targets as they are directly  
359 linked to wider economic policies that emphasise the importance of subnational contributions  
360 to a national low carbon economy agenda. The two main strategies of climate policy (mitigation  
361 and adaptation) are fragmented: whilst intrinsically related through practical implementation  
362 and management of risks and vulnerabilities at regional and urban scales (Laukkonen et al.,  
363 2009), mitigation has been the main focal point of international and national state policies on  
364 climate change because of the need to lower GHGE (Klein, Schipper, & Dessai, 2005). This  
365 wider territorial climate policy logic of prioritising lowering emissions first has trickled down  
366 to subnational climate policy agendas, (see Bulkeley, Broto, & Edwards, 2012), resulting in  
367 UK local government treating adaptation in an ad-hoc limited fashion because there lacks  
368 political and institutional support from central government. (Porter, Demeritt, & Dessai, 2015)

369

370 In summary, whilst climate adaptation is developing as subnational territorial  
371 governance in the UK, an adaptation agenda has been overtly top-down in policy focus (Adger  
372 et al., 2018), with little evidence of coherent responses to adaptation as a long-term issue within

373 the devolved regions (e.g. Flynn, Kythreotis, & Netherwood, 2016) and at local authority/city-  
374 regional levels (Kythreotis & Bristow, 2017; Porter et al., 2015). Whereas in developed  
375 countries climate actions are coalescing at municipal or subnational scales (Ford, Berrang-  
376 Ford, & Paterson, 2011), in the UK such actions are matched and framed within state  
377 competition logics through alignment with different economic sectors (see Table 1) since the  
378 UK 2008 Climate Change Act. The 2012 and 2017 CCRA's show continued evidence of  
379 adaptation being viewed solely in terms of the risks and opportunities that can emerge out of  
380 the physical climatic impacts that are, and will be, experienced across the UK up to 2100  
381 (Committee on Climate Change, 2017b). This is also reflected in the language of policymakers,  
382 which points to subnational political discourse regarding climate adaptation being spatially  
383 reconfigured within blanket neoliberal resilience thinking to incorporate the private sector  
384 within such urban territorial logics (Kythreotis & Bristow, 2017; Romsdahl, Kirilenko, Wood,  
385 & Hultquist, 2017), where in fact there needs to be greater individual citizen engagement with  
386 both the science and policy domains in order to meet top-down international emission and  
387 temperature targets (Kythreotis et al., 2019). This sub-national adaptation policy 'deficit' will  
388 only be exacerbated by the UK leaving the EU as international legislation protects UK  
389 mitigation, but not adaptation commitments (Farstad, Carter, & Burns, 2018). This only creates  
390 a clearer pathway for future sub-national adaptation policy responses to be framed within the  
391 bias of national economic sectors that perpetuate the competition state, as the next section  
392 illustrates.

393

#### 394 **4. Climate adaptation and reconfiguring the UK state**

395 The remainder of the paper reports the findings of empirical research conducted in three  
396 UK regions (England, Scotland and Wales) between 2015 and 2017. Our analysis is organised  
397 around three quite distinctive, yet at the same time potentially conflictual, processes shaping



398 the strategic position of climate adaptation policy in the UK state: (1) the sector-driven  
399 territorial logic of the national competition state; (2) the emergence of city-regionalism as an  
400 adaptation governance response to increased competition; and (3) the distinctive role that  
401 'national' political priorities play in the implementation of climate adaptation across the UK  
402 regions. The findings are based on interviews conducted with 28 national and subnational  
403 climate adaption governance and policy stakeholders in Cardiff city-region (Wales), Glasgow  
404 city-region (Scotland), and the Yorkshire and Humber sub-region (comprising Leeds, York and  
405 Hull city-regions) (England).

406

#### 407 *4.1 Sectoral climate adaptation and state competitiveness*

408 Although not explicitly referred to in these terms in the interviews, the territorial logic  
409 underpinning the competition state emerged as an important issue amongst adaptation  
410 governance and policymaking stakeholders working across different state jurisdictional scales  
411 in the UK. One interviewee who worked at the local authority level and on the Local Adaptation  
412 Advisory Panel (LAAP), pointed out tensions between emerging UK state discourses of  
413 competitiveness (and austerity) and how this was affecting and shaping UK climate adaptation  
414 policy:

415

416 *[W]e want to have a prosperous economy... affordable houses... people with the*  
417 *right skills and training...jobs availability, we want inward investment. We want to*  
418 *increase exports. And I think there is a very clear impact on business if they ignore*  
419 *adaptation measures. It will ultimately impact on their bottom line whether that is*  
420 *because their premises are flooded, the infrastructure network is flooded, and they*  
421 *can't get stuff moving... I think we need to do a little bit more to help businesses*

422            *understand that by taking resilience and adaptation seriously it can have an impact*  
423            *on their bottom line.*

424

425            Climate adaptation is treated by the UK state and major financial sectors as a normative  
426            economic policy issue that has not progressed into firmer social and political action at the  
427            subnational scale – climate adaptation is framed by a discourse of international  
428            competitiveness, which in turn chimes with the low carbon city agenda approach by the UK  
429            state. Indeed, other work has highlighted how, in spite of the UK Climate Change Act, climate  
430            policy has not gained complete political traction and investor confidence because of the  
431            immediate costs to the state in having to react to uncertain risks and there has not been clear  
432            evidence of climate policy reform which need to involve changing (subnational) governance  
433            structures and alter existing economic monopolies if to initiate deeper structural political  
434            change (Lockwood, 2013).

435

436            Although the city-region has unlimited potential as an urban fix for such governance  
437            working (Carter et al., 2015; Kythreotis & Bristow, 2017), the UK state gives priority to climate  
438            mitigation over climate adaptation within this climate agenda, as the outcomes are intrinsically  
439            related to a more competitive UK state approach:

440

441            *[T]here's still very much a focus particularly in tough economic times on mitigation*  
442            *because you can see that you're going to save money on mitigation. You know it's a*  
443            *no brainer. You're going to reduce your emissions. ... But other things for adaptation*  
444            *it's difficult to quantify what you're going to say because it might not be saving*  
445            *money.*

446

447 The overriding attention to mitigation in subnational climate policy discourse is  
448 reflected in how local adaptation is approached by the UK state and the devolved regions. One  
449 environmental consultant in Wales pointed out how Welsh Government, through the Climate  
450 Change Commission of Wales, was pursuing an agenda for adaptation that focused specifically  
451 on sectoral opportunities that aligned with wider UK state economic policy agendas, rather  
452 than viewing adaptation as a more spatially discursive political governance construct:

453

454 *[T]hat is down to the Climate Change Commission as well. They're putting all their*  
455 *bags into this sectoral action plan thing because it fits well with government. It fits the*  
456 *shape of the organisation... So tackling stuff by sector, if you take agriculture, who*  
457 *are the key factors there on agriculture? NFU, FUW, some of the big agricultural*  
458 *companies, some of the bigger landowners might take some notice, sectoral action plan*  
459 *on the shelf, yes that's very interesting...*

460

461 This shows how the drive towards widened subnational adaptation governance has to  
462 contend with a variety of state infrastructural and managerial interferences, which have the  
463 power to subvert how adaptation tackles urban and regional vulnerability (Bassett & Fogelman,  
464 2013; Eriksen et al., 2015).

465

#### 466 4.2 *Climate adaptation and city-regionalism*

467 Nonetheless, city-regionalism is not exclusively driven by competitiveness at the  
468 expense of issues of social provision (Halbert & Rouanet, 2014; Jonas & Ward, 2007). This  
469 sub-section demonstrates how UK climate adaptation policymakers have encountered a range  
470 of ongoing infrastructural and collective provision challenges as climate policy has come to  
471 ground in UK city-regions. These challenges include issues related to housing, energy, fiscal

472 distribution, planning and the allocation of land uses. For example, one interviewee working  
473 for Natural Resources Wales highlighted how housing and transport issues in the Cardiff city-  
474 region needed to directly address future climate change:

475

476 *I[ff] you look at this issue of housing targets... or air debate about, well where are*  
477 *45,000 houses going to be built in Cardiff... if you just look at the city meeting*  
478 *arbitrary targets, then you may not arrive at what is essentially the best solution in*  
479 *terms of a sustainable or best climate change adapted solution... I'd like to see far*  
480 *more explicit recognition in the city region at that scale of planning for housing,*  
481 *transport.*

482 In a similar vein, a local council officer from Cardiff highlighted the importance of city  
483 regionalism to wider environmental and climate policy agenda, “[I]n particular, looking at  
484 things like public transport and waste is being considered at the city region level when you  
485 look at project worth and how they’re coming together on that. Maybe the local authorities  
486 need to be even bigger...” This comment was interesting in that the forms of adaptation  
487 governance and policy recommended for the city-region actually originate and are influenced  
488 by stakeholders beyond the proximity of that specific urban area (Bulkeley & Betsill, 2005), to  
489 meet the burgeoning economic priorities of UK city-regions. For example, in Greater  
490 Manchester, urban political leaders embed strategic adaptation governance measures within  
491 urban spatial planning and policy frameworks by involving different stakeholders above and  
492 beyond councillors in Manchester Town Hall in strategies to reduce citizen vulnerability to  
493 climate impacts. They simultaneously indirectly meet infrastructural and collective provision  
494 challenges like housing development and greater access to sustainable transport (Carter et al.,  
495 2015). The Greater Manchester city-regional partnership have recognised the importance of  
496 shifting from blanket sectoral adaptation plans that do not take account of the

497 physical/topographical, cultural, economic and political diversities of the surrounding city-  
498 region to deal with a variety of climatic impacts, especially flooding (Carter et al., 2015).

499 The issue of using sectoral adaptation plans in dealing with various infrastructural  
500 challenges was also raised by another climate consultant interviewee working in the Cardiff  
501 city-region:

502

503 *[T]ake it down to a local level [where], you get a clear kind of idea of the impacts*  
504 *given the topography, the nature of the rural economy, the number of farms, where*  
505 *they are, where they are related to the water catchments, what the transport*  
506 *infrastructure is like. You get a far more detailed and resonant picture... thinking a*  
507 *bit more long-term in our business planning, to adapt... [W]hat I am trying to*  
508 *illustrate is you can get into the detail of adaptation with a locally proximate picture.*  
509 *Whereas a sectoral action plan, what's that going to achieve? It might nudge*  
510 *government departments which is essential. But we shouldn't be putting all of our*  
511 *eggs in a sectoral action plan basket.*

512

513 This demonstrates that whilst strategically using the city-region to muster adaptation  
514 governance support and build widened capacity is an important political tactic, there remains  
515 a paradoxical need to practically address local adaptation challenges to prevent maladaptation.  
516 This highlights a tension between city-region adaptation being considered by policymakers as  
517 a strategic economic tool versus the practical action of adaptation implementation to reduce  
518 citizen vulnerability. North et al. (2017) highlighted in the context of urban austerity the  
519 conflict between effective climate (mitigation) policy implementation and green growth  
520 strategies in the post-industrial city of Liverpool. They argue that co-production governance  
521 can challenge the pre-existing neoliberal consensus of green growth as a framework for

522 implementing and justifying effective climate policy. Future adaptation policy in the UK  
523 therefore will continue to be governed by a trade-off between strategy and practical action with  
524 respect to climate adaptation.

525

526 Other interviewees in the Glasgow city-region swiftly pointed out how a new City Deal,  
527 like that in Manchester, could attend to this tension by solving infrastructural economic  
528 challenges that take account of future climate impacts:

529

530 *[C]ritical infrastructure doesn't begin and end with the boundaries of the city or*  
531 *local government. We also link to the recently announced 'city deal', which is the*  
532 *first one in Scotland... similar to the ones in Manchester and elsewhere... it is an*  
533 *infrastructural development ... it is often about economic development, roads, rails*  
534 *and so on, we are also looking at an infrastructure that protects, preserves and*  
535 *adapts other forms what is aging and crumbling infrastructure, so key walls along the*  
536 *river, we would also like to issue a green infrastructure that is a key part of that.*

537

538 Another interviewee from Glasgow city-region supported the idea of City Deals  
539 (agreement between central government and a city to enable the city to take greater  
540 responsibility of local decisions regarding economic growth and public spending) that  
541 encompass the city-region to embed adaptation into infrastructural provision:

542

543 *In terms of adaptation action and the governance of it and the relevance of city*  
544 *regions because of those economic realities of the city region, I would have said yes,*  
545 *it [a city deal] makes most sense and because of the interaction between things like*  
546 *catchment, river catchments and cities, you know the boundary of the city isn't the*

547           *relevant place to stop or to start your kind of governance arrangements or your*  
548           *decision-making processes.*

549

550           Our findings illustrate how future infrastructural challenges of UK cities will play a  
551 significant role in how adaptation policy is embedded within city-regions. Importantly, it shows  
552 how planning adaptation through sectoral-based approaches may not be successful given that  
553 effective adaptation action and reducing urban and regional vulnerability relies on a need for  
554 policymakers to embrace the idea that city-regions are socially diverse geographical spaces  
555 where a ‘one-size fits all’ national adaptation policy framework does not work. Measuring  
556 adaptation responses in a more comparable conceptual way has is difficult given the  
557 heterogeneity of how different jurisdictional territories respond to climate impacts (Dupuis &  
558 Biesbroek, 2013). Nonetheless, city-regions have adopted different climate leadership  
559 strategies to deal with infrastructural and collective provision challenges, especially in  
560 traditionally structurally disadvantaged cities, but remain dependent on higher political scales  
561 to ensure that such leadership can be resourced and supported (Wurzel et al., n.d.). Hence, we  
562 find that adaptation governance in UK city-regions rely heavily on polycentric systems of  
563 policy and governance to ensure that specific city-regional economic and environmental  
564 challenges are met.

565

#### 566 *4.3 Climate adaptation and the national question*

567           Our interviews also highlighted the emergent importance of subnational priorities,  
568 which are increasingly articulated in relation to UK climate adaptation policy. For example,  
569 one interviewee from Natural Resources Wales argued how national priorities at the UK level  
570 regarding climate change has enabled the Welsh Government to designate other subnational  
571 actors more power in shaping local and regional adaptation policy responses:

572

573 *[T]he Climate Change Act 2008... gave the Welsh Government a power to issue*  
574 *guidance to bodies in Wales on how to adapt to climate change... to designate certain*  
575 *key organisations as reporting authorities, and then to direct them to produce a report*  
576 *showing how they were adapting to climate change.*

577

578 In Scotland, a more developed relationship between national and subnational  
579 stakeholders was in evidence because of national legislation, as mentioned by a Glasgow City  
580 Council climate officer:

581

582 *Scottish Government sit on sustainable Glasgow, ahead of climate change... so [we*  
583 *are] very closely linked to them and whatever political aspects within Scotland, why is*  
584 *lay administration and the Scottish Government, we get on well with the civil service*  
585 *on a practical basis, particularly what works in Glasgow works for Scotland... In terms*  
586 *of other partners, we have got a lot of public sector partners. I mentioned to you it*  
587 *includes the NHS, Strathclyde partnership with transport, a public sector planning*  
588 *organisation, public transport. Universities and so on.*

589

590 Our interviews found evidence of the devolved regions making links with subnational  
591 adaptation stakeholders where non-state groups were integral to this new adaptation  
592 governance emanating out of national legislation. However, the types of governance promoted  
593 tends to coalesce around the idea of sectors as forming the major response to climate  
594 adaptation: *“The sectoral adaptation plans are part of Welsh Government’s wider adaptation*  
595 *strategy for bringing action across the five sectors in those plans.”* However, he goes on to  
596 explain how some major issues remain the remit of national adaptation policy:



597

598 *In terms of the reserved issues then... DEFRA's National Adaptation Programme would*  
599 *pick up things like major infrastructure, but that's really more or less [of] it. In terms*  
600 *of most everything else, then it's down to Welsh Government to draw up its own*  
601 *adaptation programme.*

602

603 This caveat illustrates how transitions from national to subnational independence on  
604 determining the types of adaptation policy responses that are locally implemented remain  
605 influenced by national policy priorities that 'sectoralise' adaptation responses. This has come  
606 under scrutiny from third-sector groups working on environmental issues who felt adaptation  
607 was more about the spaces in which people lived rather than sectors. As one climate officer  
608 from a third sector organisation working across Wales argued:

609

610 *People don't really know where to start to think about it [climate adaptation]. We did*  
611 *some work with the third sector partnership council... that involved talking to third*  
612 *sector organisations and saying what do you need? ... [B]ut they just really didn't know*  
613 *what's the next step... So we've come to a bit of a block there on it ... there is interest*  
614 *but people need signposting and they need some specialist guidance on what to do,*  
615 *because people aren't experts in these fields and it's such a potentially significant field*  
616 *people think well I can't just take advice from anyone, it has to be somebody that we*  
617 *respect and we trust.*

618

619 Ad-hoc subnational adaptation policy responses were also suggested by another climate  
620 consultant working with several Welsh local authorities on local climate adaptation issues:

621

622 *Well the question is, is it going to influence action on the ground? If we have a climate,*  
623 *well we do have a Climate Change Act. We have an adaptation plan which that's a*  
624 *national framework. And we have local authorities there just bumbling along doing*  
625 *what they've always done. Where's the connect? The connect is in the guideline, the*  
626 *missive, the remit, kind of carrots and sticks to push local authorities to think about this*  
627 *more. And when they think about it more and start developing that local narrative you*  
628 *can get to practical stuff very, very quickly rather than motional, sectoral and*  
629 *abstract...*

630

631 So, whilst national adaptation policy has given subnational stakeholders the policy tools  
632 to actually implement a form of subnational adaptation governance, this largely depends on  
633 local authority will to invoke policy change. Changes to national policy priorities considering  
634 Brexit will inevitably have an influence on the way adaptation is positioned and rolled out  
635 across the devolved UK regions. The fact that major infrastructure decisions in the context of  
636 adaptation remain in the hands of the NAP, and therefore, this sectoral approach, illustrates an  
637 ongoing national-subnational governance tension. As the same climate consultant continued:

638

639 *Well the regional is action as well because you have key actors in adaptation working*  
640 *at regional level. So that's definitely about action. I think developing at a regional*  
641 *picture is very, very important. I'll give you an example. We were doing some work in*  
642 *Powys. It was around futures. But involved climate adaptation. We had maps out.*  
643 *And people were there from Ceredigion... and all of a sudden the penny dropped. How*  
644 *reliant Ceredigion was on Powys getting its climate adaptation right because of*  
645 *transport networks. So I think there is a role particularly around infrastructure which*  
646 *is regional and catchment which is regional. So in a sense the local and regional should*

647 *be about narrative, capturing the risks and opportunities and working on those shared*  
648 *risks and opportunities. But you can't kind of put a fudge in this uniform kind of frame*  
649 *on Wales and say there's five regions where climate adaptation should work."*

650

651 Overall, the 'national' question in respect of climate adaptation is a focus of ongoing tension,  
652 political debate and negotiations, which are only likely to intensify as the Brexit process  
653 unfolds.

654

655

## 656 **6. Conclusions**

657 This paper has examined how climate adaptation governance fits within the UK state  
658 during a period of profound political tensions and uncertainties which are changing the balance  
659 of power between the national UK state, the regions and their constituent city-regions. The  
660 question of whether and in what form a discrete 'national' policy on climate adaptation exists  
661 is rendered increasingly problematic by recent devolutionary trends and the rise of city-  
662 regionalist agendas. Considering this, the UK currently offers a unique and timely platform to  
663 examine the emerging urban and regional policy horizons with respect to climate adaptation.  
664 However, we argue that further research progress on climate governance is hampered by a  
665 failure to recognise the rise of city-regionalism as a distinct and causally significant new space  
666 of politics and policymaking inside the state.

667

668 Drawing upon the findings of interviews with climate adaptation stakeholders, the  
669 paper has provided new insights into the way regions have responded to climate adaptation by  
670 incorporating it into sub-national political priorities. Many interviewees paint a positive picture  
671 of how emergent national adaptation priorities have catalysed a more inclusive governance

672 project sub-nationally. However, deeper analysis of interviews reveals interlinked nuanced  
673 points regarding sectoral governance of adaptation across regions. In concluding, we highlight  
674 two themes that warrant further theoretically-informed empirical research.

675

676         Firstly, we find that current studies of climate adaptation policy are not sufficiently  
677 equipped to recognise the rise of city-regionalism and therefore underplay the role of sub-  
678 national political interests and agendas in demarcating specific sectors and scales of adaptation  
679 planning across regions. The pursuit of ‘sectoral adaptation’ as a central plank of state  
680 competitiveness agendas obscures the subtle ways in which adaptation best practice is  
681 communicated between policymakers and communities across different sub-national political  
682 jurisdictions and policy spaces. Consequently, research on national climate adaptation policy  
683 often fails to acknowledge the role of territorial politics in shaping how sector-based strategies  
684 are implemented in different national and subnational (regional and urban) contexts. On the  
685 one hand, this sectoral approach enables the state to reign over devolved and subnational  
686 governance adaptation responses and has been influenced by discourses of international  
687 competitiveness, city-regionalism and changing subnational political priorities. On the other  
688 hand, city-regionalism has opened up a strategic space for other material interests and  
689 rationalities to shape climate adaptation policy from below. Since city-regions are inherently  
690 socially diverse spaces where interests in collective social provision often override those  
691 relating to economic growth and competition, there is further scope for climate adaptation  
692 policy to deviate significantly from the national norm.

693

694         Secondly, and focussing more directly on the UK context, climate adaptation policy has  
695 not only been slow to adjust to the rising significance of city-regionalism but also raises  
696 strategic policy questions about the longer-term trajectory of change as the UK prepares to exit

697 the EU. Notably, there are serious questions raised about the future role of climate governance  
698 in the devolved regions of Scotland and Wales and their relation to the rest of the UK as the  
699 terms of EU exit are negotiated. Will regions want to renegotiate existing climate agreements  
700 with UK government? How will national and sub-national climate adaptation policy feed into  
701 other policy debates such as future trade agreements with the EU and non-EU partners? How  
702 does climate adaptation policy influence the internationalisation of the UK competition state  
703 in the medium to long term? Similar questions could likewise inform future research on climate  
704 adaptation governance across different national settings and, in so doing, shed further light on  
705 the complex and evolving relationships between the rise of city-regionalism, on the one hand,  
706 and the sector-led priorities of the competition state, on the other.

707

708

709

710

711

712

713

714

715

716

717

718

719

720

721

722

723

724

725

726

727

728

729

730 REFERENCES

731 Adger, W. N., Arnell, N. W., & Tompkins, E. L. (2005). Successful adaptation to climate  
732 change across scales. *Global Environmental Change, 15*(2), 77–86.

733 <https://doi.org/10.1016/j.gloenvcha.2004.12.005>

734 Adger, W. N., Barnett, J., Brown, K., Marshall, N., & O'Brien, K. (2013). Cultural  
735 dimensions of climate change impacts and adaptation. *Nature Climate Change, 3*(2),

736 112–117. <https://doi.org/10.1038/nclimate1666>

737 Adger, W. N., Brown, I., & Surminski, S. (2018). Advances in risk assessment for climate  
738 change adaptation policy Subject Areas : *Philosophical Transactions. Series A,*

739 *Mathematical, Physical, and Engineering Sciences, 376*(2121), 1–13.

740 <https://doi.org/10.1098/rsta.2018.0106>

741 Allen, J., & Cochrane, A. (2007). Beyond the Territorial Fix: Regional Assemblages, Politics  
742 and Power. *Regional Studies, 41*(9), 1161–1175.

743 <https://doi.org/10.1080/00343400701543348>

744 Amundsen, H., Berglund, F., & Westskog, H. (2010). Overcoming barriers to climate change  
745 adaptation - a question of multilevel governance? *Environment and Planning C:*

746 *Government and Policy, 28*(2), 276–289. Retrieved from

747 <http://www.envplan.com/abstract.cgi?id=c0941>

748 Bassett, T. J., & Fogelman, C. (2013). Déjà vu or something new? The adaptation concept in  
749 the climate change literature. *Geoforum*, 48, 42–53.  
750 <https://doi.org/10.1016/j.geoforum.2013.04.010>

751 Berrang-Ford, L., Ford, J. D., & Paterson, J. (2011). Are we adapting to climate change?  
752 *Global Environmental Change*, 21(1), 25–33.  
753 <https://doi.org/http://dx.doi.org/10.1016/j.gloenvcha.2010.09.012>

754 Biesbroek, G. R., Swart, R. J., Carter, T. R., Cowan, C., Henrichs, T., Mela, H., ... Rey, D.  
755 (2010). Europe adapts to climate change: Comparing National Adaptation Strategies.  
756 *Global Environmental Change*, 20(3), 440–450.  
757 <https://doi.org/10.1016/j.gloenvcha.2010.03.005>

758 Borie, M., Ziervogel, G., Taylor, F. E., Millington, J. D. A., Sitas, R., & Pelling, M. (2019).  
759 Mapping (for) resilience across city scales: An opportunity to open-up conversations for  
760 more inclusive resilience policy? *Environmental Science & Policy*, 99, 1–9.  
761 <https://doi.org/10.1016/J.ENVSCI.2019.05.014>

762 Bulkeley, H. (2013). *Cities and climate change*. Routledge.

763 Bulkeley, H., & Betsill, M. M. (2005). Rethinking sustainable cities: Multilevel governance  
764 and the “urban” politics of climate change. *Environmental Politics*, 14(1), 42–63.  
765 <https://doi.org/10.1080/0964401042000310178>

766 Bulkeley, H., Broto, V. C., & Edwards, G. (2012). Bringing climate change to the city:  
767 towards low carbon urbanism? *Local Environment*, 17(5), 545–551.  
768 <https://doi.org/10.1080/13549839.2012.681464>

769 Carter, J. G., Cavan, G., Connelly, A., Guy, S., Handley, J., & Kazmierczak, A. (2015).  
770 Climate change and the city: Building capacity for urban adaptation. *Progress in*  
771 *Planning*, 95, 1–66. <https://doi.org/10.1016/j.progress.2013.08.001>

772 Challinor, A. J., Adger, W. N., Benton, T. G., Conway, D., Joshi, M., & Frame, D. (2018).  
773 Transmission of climate risks across sectors and borders. *Philosophical Transactions.*  
774 *Series A, Mathematical, Physical, and Engineering Sciences*, 376(2121), 20170301.  
775 <https://doi.org/10.1098/rsta.2017.0301>

776 Clark, B., & York, R. (2005). Carbon metabolism: Global capitalism, climate change, and the  
777 biospheric rift. *Theory and Society*, 34(4), 391–428. [https://doi.org/10.1007/s11186-005-](https://doi.org/10.1007/s11186-005-1993-4)  
778 1993-4

779 Coaffee, J. (2013). Rescaling and Responsibilising the Politics of Urban Resilience: From  
780 National Security to Local Place-Making. *Politics*, 33(4), 240–252.  
781 <https://doi.org/10.1111/1467-9256.12011>

782 Committee on Climate Change. (2017a). UK adaptation policy – Committee on Climate  
783 Change. Retrieved July 13, 2017, from [https://www.theccc.org.uk/tackling-climate-](https://www.theccc.org.uk/tackling-climate-change/preparing-for-climate-change/uk-adaptation-policy/)  
784 [change/preparing-for-climate-change/uk-adaptation-policy/](https://www.theccc.org.uk/tackling-climate-change/preparing-for-climate-change/uk-adaptation-policy/)

785 Committee on Climate Change. (2017b). *UK Climate Change Risk Assessment Evidence*  
786 *Report*. Retrieved from  
787 [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/584281/uk-climate-change-risk-assess-2017.pdf)  
788 [\\_data/file/584281/uk-climate-change-risk-assess-2017.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/584281/uk-climate-change-risk-assess-2017.pdf)

789 Cowell, R. (2017). Policy and practice: the EU referendum, planning and the environment:  
790 where now for the UK? *Town Planning Review*, 88(2), 153–171.

791 DEFRA. (2012). *Adapting to Climate Change: Ensuring Progress in Key Sectors. A*  
792 *Consultation on the Government's proposed approach to the second round of the*  
793 *Adaptation Reporting Power*. London. Retrieved from [www.defra.gov.uk](http://www.defra.gov.uk)

794 DEFRA. (2013). *The National Adaptation Programme: making the country resilient to a*  
795 *changing climate*. London.

796 Dupuis, J., & Biesbroek, R. (2013). Comparing apples and oranges: The dependent variable



797 problem in comparing and evaluating climate change adaptation policies. *Global*  
798 *Environmental Change*, 23(6), 1476–1487.  
799 <https://doi.org/10.1016/j.gloenvcha.2013.07.022>

800 Eakin, H., & Lemos, M. C. (2006). Adaptation and the state: Latin America and the challenge  
801 of capacity-building under globalization. *Global Environmental Change*, 16(1), 7–18.  
802 <https://doi.org/10.1016/J.GLOENVCHA.2005.10.004>

803 Eriksen, S. H., Nightingale, A. J., & Eakin, H. (2015). Reframing adaptation: The political  
804 nature of climate change adaptation. *Global Environmental Change*, 35, 523–533.  
805 <https://doi.org/10.1016/j.gloenvcha.2015.09.014>

806 Fankhauser, S., Averchenkova, A., & Finnegan, J. (2018). *10 years of the UK Climate*  
807 *Change Act*. Retrieved from [www.cccep.ac.uk](http://www.cccep.ac.uk)

808 Farstad, F., Carter, N., & Burns, C. (2018). What does Brexit Mean for the UK's Climate  
809 Change Act? *The Political Quarterly*, 89(2), 291–297. [https://doi.org/10.1111/1467-](https://doi.org/10.1111/1467-923X.12486)  
810 [923X.12486](https://doi.org/10.1111/1467-923X.12486)

811 Fieldman, G. (2011). Neoliberalism, the production of vulnerability and the hobbled state:  
812 Systemic barriers to climate adaptation. *Climate and Development*, 3(2), 159–174.  
813 <https://doi.org/10.1080/17565529.2011.582278>

814 Flynn, A., Kythreotis, A., & Netherwood, A. (2016). Climate change adaptation in Wales:  
815 much ado about nothing? *Environmental Scientist*, 25(3), 32–39.

816 Ford, J. D., Berrang-Ford, L., & Paterson, J. (2011). A systematic review of observed climate  
817 change adaptation in developed nations. *Climatic Change*, 106(2), 327–336.  
818 <https://doi.org/10.1007/s10584-011-0045-5>

819 Future Generations Commissioner for Wales. (2019). Well-being of Future Generations  
820 (Wales) Act 2015. Retrieved June 19, 2019, from [https://futuregenerations.wales/about-](https://futuregenerations.wales/about-us/future-generations-act/)  
821 [us/future-generations-act/](https://futuregenerations.wales/about-us/future-generations-act/)

822 Genschel, P., & Seelkopf, L. (2015). The Competition State: The Modern State in a Global  
823 Economy. In S. Leibfried, E. Huber, M. Lange, J. D. Levy, J. D. Stephens, P. Genschel,  
824 & L. Seelkopf (Eds.), *The Oxford Handbook of Transformations of the State*. Oxford  
825 University Press. <https://doi.org/10.1093/oxfordhb/9780199691586.013.12>

826 Halbert, L., & Rouanet, H. (2014). Filtering Risk Away: Global Finance Capital, Transcalar  
827 Territorial Networks and the (Un)Making of City-Regions: An Analysis of Business  
828 Property Development in Bangalore, India. *Regional Studies*, 48(3), 471–484.  
829 <https://doi.org/10.1080/00343404.2013.779658>

830 Harrabin, R. (2019). Climate change: UK government to commit to 2050 target. Retrieved  
831 June 12, 2019, from <https://www.bbc.co.uk/news/science-environment-48596775>

832 Harrison, J. (2010). Networks of connectivity, territorial fragmentation, uneven development:  
833 The new politics of city-regionalism. *Political Geography*, 29(1), 17–27.  
834 <https://doi.org/10.1016/J.POLGEO.2009.12.002>

835 Hepburn, C., & Teytelboym, A. (2017). Climate change policy after Brexit. *Oxford Review of*  
836 *Economic Policy*, 33(suppl\_1), S144–S154. <https://doi.org/10.1093/oxrep/grx004>

837 Hjerpe, M., Storbjörk, S., & Alberth, J. (2015). “There is nothing political in it”: triggers of  
838 local political leaders’ engagement in climate adaptation. *Local Environment*, 20(8),  
839 855–873. <https://doi.org/10.1080/13549839.2013.872092>

840 Howarth, C., & Brooks, K. (2017). Decision-Making and Building Resilience to Nexus  
841 Shocks Locally: Exploring Flooding and Heatwaves in the UK. *Sustainability*, 9(5), 838.  
842 <https://doi.org/10.3390/su9050838>

843 Howarth, C., Morse-Jones, S., Brooks, K., & Kythreotis, A. (2018). Co-producing UK  
844 climate change adaptation policy: An analysis of the 2012 and 2017 UK Climate Change  
845 Risk Assessments. *Environmental Science & Policy*, 89, 412–420.  
846 <https://doi.org/10.1016/j.envsci.2018.09.010>

847 Humphrey, K. (2015). *UK Climate Change Risk Assessment 2017, Second Stakeholder*  
848 *Workshop: The CCRA Evidence Report*. Retrieved from  
849 [https://www.slideshare.net/theCCCuk/climate-change-risk-assessment-second-](https://www.slideshare.net/theCCCuk/climate-change-risk-assessment-second-stakeholder-event)  
850 [stakeholder-event](https://www.slideshare.net/theCCCuk/climate-change-risk-assessment-second-stakeholder-event)

851 IPCC. (2014). *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II*  
852 *and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate*  
853 *Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]*. Geneva,  
854 Switzerland. Retrieved from <https://www.ipcc.ch/report/ar5/syr/>

855 Jonas, A. (2013). City-Regionalism as a Contingent ‘Geopolitics of Capitalism.’ *Geopolitics*,  
856 *18*(2), 284–298. <https://doi.org/10.1080/14650045.2012.723290>

857 Jonas, A., & Moisisio, S. (2018). City regionalism as geopolitical processes: A new framework  
858 for analysis. *Progress in Human Geography*, *42*(3), 350–370.  
859 <https://doi.org/10.1177/0309132516679897>

860 Jonas, A., & Ward, K. (2007). Introduction to a Debate on City-Regions: New Geographies  
861 of Governance, Democracy and Social Reproduction. *International Journal of Urban*  
862 *and Regional Research*, *31*(1), 169–178. [https://doi.org/10.1111/j.1468-](https://doi.org/10.1111/j.1468-2427.2007.00711.x)  
863 [2427.2007.00711.x](https://doi.org/10.1111/j.1468-2427.2007.00711.x)

864 Jones, S. (2018). City governments measuring their response to climate change. *Regional*  
865 *Studies*, 1–10. <https://doi.org/10.1080/00343404.2018.1463517>

866 Juhola, S., & Westerhoff, L. (2011). Challenges of adaptation to climate change across  
867 multiple scales: a case study of network governance in two European countries.  
868 *Environmental Science & Policy*, *14*(3), 239–247.  
869 <https://doi.org/10.1016/J.ENVSCL.2010.12.006>

870 Klein, R. J. T., Schipper, E. L. F., & Dessai, S. (2005). Integrating mitigation and adaptation  
871 into climate and development policy: three research questions. *Environmental Science &*

872 *Policy*, 8(6), 579–588. <https://doi.org/10.1016/j.envsci.2005.06.010>

873 Krueger, R., & Gibbs, D. (2010). Competitive Global City Regions and ‘Sustainable  
874 Development’: An Interpretive Institutional Account in the South East of England.  
875 *Environment and Planning A*, 42(4), 821–837. <https://doi.org/10.1068/a42111>

876 Kythreotis, A. (2018). Reimagining the urban as dystopic resilient spaces: scalar materialities  
877 in climate knowledge, planning and politics. In K. Ward, A. Jonas, B. Miller, & D.  
878 Wilson (Eds.), *The Routledge Handbook on Spaces of Urban Politics* (p. 612). London:  
879 Routledge.

880 Kythreotis, A., & Bristow, G. (2017). The ‘resilience trap’: exploring the practical utility of  
881 resilience for climate change adaptation in UK city-regions. *Regional Studies*, 51(10),  
882 1530–1541. <https://doi.org/10.1080/00343404.2016.1200719>

883 Kythreotis, A., Mantyka-Pringle, C., Mercer, T. G., Whitmarsh, L. E., Corner, A., Paavola, J.,  
884 ... Castree, N. (2019). Citizen Social Science for More Integrative and Effective Climate  
885 Action: A Science-Policy Perspective. *Frontiers in Environmental Science*, 7, 10.  
886 <https://doi.org/10.3389/fenvs.2019.00010>

887 Laukkonen, J., Blanco, P. K., Lenhart, J., Keiner, M., Cavric, B., & Kinuthia-Njenga, C.  
888 (2009). Combining climate change adaptation and mitigation measures at the local level.  
889 *Habitat International*, 33(3), 287–292.  
890 <https://doi.org/10.1016/J.HABITATINT.2008.10.003>

891 Legislation.Gov.UK. Environment (Wales) Act 2016 (2016). Queen’s Printer of Acts of  
892 Parliament. Retrieved from <http://www.legislation.gov.uk/anaw/2016/3/contents/enacted>

893 Lockwood, M. (2013). The political sustainability of climate policy: The case of the UK  
894 Climate Change Act. *Global Environmental Change*, 23(5), 1339–1348.  
895 <https://doi.org/10.1016/J.GLOENVCHA.2013.07.001>

896 Marston, S. A., Jones, J. P., & Woodward, K. (2005). Human geography without scale.

897 *Transactions of the Institute of British Geographers*, 30(4), 416–432.  
898 <https://doi.org/10.1111/j.1475-5661.2005.00180.x>

899 Massey, E., Biesbroek, R., Huiteima, D., & Jordan, A. (2014). Climate policy innovation: The  
900 adoption and diffusion of adaptation policies across Europe. *Global Environmental*  
901 *Change*, 29, 434–443. <https://doi.org/10.1016/J.GLOENVCHA.2014.09.002>

902 Massey, E., & Huiteima, D. (2012). The emergence of climate change adaptation as a policy  
903 field: the case of England. *Regional Environmental Change*, 1–12.  
904 <https://doi.org/10.1007/s10113-012-0341-2>

905 Measham, T., Preston, B., Smith, T., Brooke, C., Gorddard, R., Withycombe, G., &  
906 Morrison, C. (2011). Adapting to climate change through local municipal planning:  
907 barriers and challenges. *Mitigation and Adaptation Strategies for Global Change*, 16(8),  
908 889–909. <https://doi.org/10.1007/s11027-011-9301-2>

909 North, P., Nurse, A., & Barker, T. (2017). The neoliberalisation of climate? Progressing  
910 climate policy under austerity urbanism. *Environment and Planning A*, 49(8), 1797–  
911 1815. <https://doi.org/10.1177/0308518X16686353>

912 Peck, J. (2016). Macroeconomic geographies. *Area Development and Policy*, 1(3), 305–322.  
913 <https://doi.org/10.1080/23792949.2016.1237263>

914 Pelling, M., O'Brien, K., & Matyas, D. (2015). Adaptation and transformation. *Climatic*  
915 *Change*, 133(1), 113–127. <https://doi.org/10.1007/s10584-014-1303-0>

916 Porter, J. J., Demeritt, D., & Dessai, S. (2015). The right stuff? informing adaptation to  
917 climate change in British Local Government. *Global Environmental Change*, 35, 411–  
918 422. <https://doi.org/10.1016/j.gloenvcha.2015.10.004>

919 Prytherch, D. L. (2010). ‘Vertebrating’ the Region as Networked Space of Flows: Learning  
920 from the Spatial Grammar of Catalanist Territoriality. *Environment and Planning A*,  
921 42(7), 1537–1554. <https://doi.org/10.1068/a42430>

922 Rayner, T., & Jordan, A. (2016). The United Kingdom: A Record of Leadership under  
923 Threat. In R. Wurzel, J. Connelly, & D. Liefferink (Eds.), *The European Union in*  
924 *International Climate Change Politics : Still Taking a Lead?* (pp. 173–188). Oxon and  
925 New York: Routledge.

926 Romsdahl, R. J., Kirilenko, A., Wood, R. S., & Hultquist, A. (2017). Assessing National  
927 Discourse and Local Governance Framing of Climate Change for Adaptation in the  
928 United Kingdom. *Environmental Communication*, 11(4), 515–536.  
929 <https://doi.org/10.1080/17524032.2016.1275732>

930 Scott, A. (2016). Briefing Shaping policy for development Brexit: implications for climate  
931 change commitments Key messages. Retrieved from  
932 <https://www.odi.org/sites/odi.org.uk/files/resource-documents/10907.pdf>

933 Tangney, P., & Howes, M. (2016). The politics of evidence-based policy: A comparative  
934 analysis of climate adaptation in Australia and the UK. *Environment and Planning C:*  
935 *Government and Policy*, 34(6), 1115–1134. <https://doi.org/10.1177/0263774X15602023>

936 The Scottish Government. (2009). *Summaries of climate change adaptation in key sectors.*  
937 Retrieved from <http://www.gov.scot/Resource/Doc/295170/0091323.pdf>

938 The Scottish Government. (2013). *Scottish Climate Change Adaptation Programme.*

939 Vogel, B., & Henstra, D. (2015). Studying local climate adaptation: A heuristic research  
940 framework for comparative policy analysis. *Global Environmental Change*, 31, 110–  
941 120. <https://doi.org/10.1016/j.gloenvcha.2015.01.001>

942 Wachsmuth, D. (2017). Competitive multi-city regionalism: growth politics beyond the  
943 growth machine. *Regional Studies*, 51(4), 643–653.  
944 <https://doi.org/10.1080/00343404.2016.1223840>

945 Walker, B. J., Adger, W. N., & Russel, D. (2015). Institutional barriers to climate change  
946 adaptation in decentralised governance structures: Transport planning in England. *Urban*

947 *Studies*, 52(12), 2250–2266. <https://doi.org/10.1177/0042098014544759>

948 Waters, E., & Barnett, J. (2018). Spatial imaginaries of adaptation governance: A public  
949 perspective. *Environment and Planning C: Politics and Space*, 36(4), 708–725.  
950 <https://doi.org/10.1177/2399654417719557>

951 Welsh Assembly Government. (2010). *Adaptation Delivery Plan: Climate Change Strategy*  
952 *for Wales*. Cardiff. Retrieved from  
953 <https://gov.wales/docs/desh/publications/101006ccstratdeliveryadaptationen.pdf>

954 Welsh, M. (2014). Resilience and responsibility: governing uncertainty in a complex world.  
955 *The Geographical Journal*, 180(1), 15–26. <https://doi.org/10.1111/geoj.12012>

956 While, A., Jonas, A., & Gibbs, D. (2010). From sustainable development to carbon control:  
957 eco-state restructuring and the politics of urban and regional development. *Transactions*  
958 *of the Institute of British Geographers*, 35(1), 76–93. [https://doi.org/10.1111/j.1475-](https://doi.org/10.1111/j.1475-5661.2009.00362.x)  
959 [5661.2009.00362.x](https://doi.org/10.1111/j.1475-5661.2009.00362.x)

960 Wurzel, R., Connelly, J., & Liefferink, D. (2016). *The European Union in International*  
961 *Climate Change Politics: Still Taking a Lead?* Taylor & Francis. Retrieved from  
962 <https://books.google.co.uk/books?id=VdKVDQAAQBAJ>

963 Wurzel, R., Moulton, J., Mederake, L., Osthorst, W., Deutz, P., & Jonas, A. (n.d.). Climate  
964 leadership and pioneership in structurally disadvantaged maritime port cities.  
965 Forthcoming. *Environmental Politics*.

966