

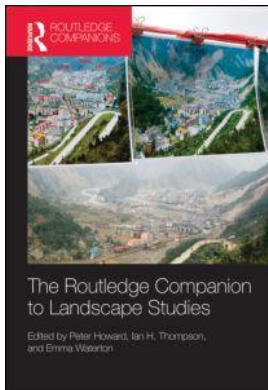
This article was downloaded by: 10.3.97.143

On: 30 Sep 2023

Access details: *subscription number*

Publisher: *Routledge*

Informa Ltd Registered in England and Wales Registered Number: 1072954 Registered office: 5 Howick Place, London SW1P 1WG, UK



The Routledge Companion to Landscape Studies

Peter Howard, Ian Thompson, Emma Waterton

Landscape and climate change

Publication details

<https://www.routledgehandbooks.com/doi/10.4324/9780203096925.ch39>

Catherine Leyshon, Hilary Geoghegan

Published online on: 06 Dec 2012

How to cite :- Catherine Leyshon, Hilary Geoghegan. 06 Dec 2012, *Landscape and climate change* from: The Routledge Companion to Landscape Studies Routledge

Accessed on: 30 Sep 2023

<https://www.routledgehandbooks.com/doi/10.4324/9780203096925.ch39>

PLEASE SCROLL DOWN FOR DOCUMENT

Full terms and conditions of use: <https://www.routledgehandbooks.com/legal-notices/terms>

This Document PDF may be used for research, teaching and private study purposes. Any substantial or systematic reproductions, re-distribution, re-selling, loan or sub-licensing, systematic supply or distribution in any form to anyone is expressly forbidden.

The publisher does not give any warranty express or implied or make any representation that the contents will be complete or accurate or up to date. The publisher shall not be liable for an loss, actions, claims, proceedings, demand or costs or damages whatsoever or howsoever caused arising directly or indirectly in connection with or arising out of the use of this material.

Landscape and climate change

Catherine Leyshon

UNIVERSITY OF EXETER

Hilary Geoghegan

UNIVERSITY OF EXETER

In this chapter we review the current and future trajectories of landscape in the study of climate change across the natural sciences, social sciences and humanities. There are three main challenges of writing such a review. First, as noted elsewhere in this volume, there are multiple and sometimes competing definitions of landscape. The intractability of these definitions is compounded by the fact that they do not always map neatly onto conventional academic disciplines. Landscape is a unit of analysis well understood in the natural sciences as a particular scale of spatial analysis which has featured heavily in the literature on climate change (Brierley 2010). Landscape, in this instance, comprises all the physical, biological and cultural phenomena interacting in a region, exhibiting historical ‘depth’ in the shape of the residues of antecedent landscapes. This landscape is the object of study for geomorphologists, palaeobotanists, ecologists, archaeologists and others interested in examining the interactions between human and biophysical elements. In addition, landscape has also been theorized as explicitly cultural, the product of human agency, imagination and socio-spatial relations. Much depends on the epistemological and ontological status of landscape in any given study.

A second challenge lies in the enormous size and motility of climate change as a topic, which, like landscape, exhibits cross-disciplinary appeal, its study located in everything from physics and biology to sociology and literature. Climate change as a global problem has moved relatively swiftly into high profile political debates over the past twenty years or so, with a concomitant diffusion from the natural sciences into the social sciences (Batterbury 2008). The study of the human dimensions of climate change has been growing in momentum through research which attempts to describe and evaluate perceptions of climate change, understand more about risk and assess the construction of policy. Nevertheless, the work of social scientists in respect of climate change is clearly felt to be incomplete, judging by recent calls that important work still needs to be done to understand how individuals and communities respond to climate change based on ‘their needs, values, cultures, capacities, institutional forms and environmental features’ (Barnett 2010: 314). This offers the possibility of enriching scientific research and policy development, creating improved knowledge of the complexity of human–environment

systems and providing a more nuanced and effective response to global challenges, such as climate change.

Finally, not only are the scholarly realms in which landscape and climate change come together very diverse, there is also a significant area of policy to consider as governments and agencies strive to manage current landscapes for future change. For example, the publication of *The Natural Choice* Natural Environment White Paper (Defra 2011; see also Lawton et al. (2010) *Making Space for Nature*) in the UK puts landscape-scale working squarely at the heart of a vision of environmental management that uses an ecosystem services approach. A range of institutional strategic documents attempt to both identify how climate change will affect each institution's operations, priorities and mission, and communicate this in a way that attempts to build a consensus around a shared vision of the future, grounded in the management of landscapes. These include the Wildlife Trust's (2008) *A Living Landscape*; Natural England's (2008) *The Natural Environment: Adapting to Climate Change*; the National Trust's (2005) *Shifting Shores*; and the National Association for Areas of Outstanding Natural Beauty's concept of 'Landscapes for Life' which has at its heart 'acceptance of the need to factor climate change resilience into decision making' (AONB 2011).

Fortunately these challenges are offset by some significant gains when thinking about landscape in relation to climate change. Landscape grounds the study of climate change, lending a materiality to the arcane and frequently incomprehensible science of models and predictions. It connects disciplines by operating as the site at which multi-, trans- and inter-disciplinary conversations might be had, drawing in policy makers and landscape management professionals charged with protecting landscapes valued for their productivity, fragility, beauty or habitat. Finally, landscapes feature in the collective imaginaries of people and communities across the planet, for whom senses of place and purpose are located in the familiar surroundings of their everyday lives.

We begin by identifying the definitional problems of climate change, followed by a discussion of how landscape has been used to examine climate change in recent academic research across the natural sciences, applied contexts and the social sciences and humanities. We then examine how a focus on the concept of 'climate and the ways it might change' (Brace and Geoghegan 2011) enables a fuller consideration of the importance of landscape to studies of, and adaptation to, climate change. We conclude with some directions for future research on landscape and climate change.

Defining climate change

Despite the Herculean efforts of the Intergovernmental Panel on Climate Change (IPCC) to 'provide the world with a clear scientific view on the current state of knowledge in climate change and its potential environmental and socio-economic impacts' (IPCC 2011: unpaginated), there is still a lack of:

- international consensus on adaptation and mitigation;
- compelling policy or legislation; and
- strong personal or financial incentives to work or live differently.

Because atmospheric emissions are seen as a problem affecting the climate system of the whole planet (Demeritt 2001), climate change has been decoupled from the social and political contexts of its material production and cognitive understanding (Agrawal and Narain 1991). Even the most sophisticated climate model is a form of abstract reasoning that reduces reality 'to the

terms of its own analytical abstractions' (Demeritt 2001: 314). Indeed, the IPCC define climate change as a 'statistical description' (IPCC 2007: 78). For the majority of people it is the circumstantial, suggestive, remembered and observed changes to weather and seasons that form the basis of an understanding of what is changing, if not why. In the following section, we consider how climate change has been discussed across the full repertoire of research utilizing landscape as its organizing principle.

Landscape in studies of climate change

Landscape has long been understood as both spatial and cultural, the relative importance of these shifting with theoretical fashion (for a review, see Colten (2010)). Given the disciplinary breadth and the various temporal and spatial scales at which both concepts operate, a review of the ways in which landscape has been used in studies relating to climate change will be necessarily partial. Below we focus on examples from:

- the natural sciences;
- applied contexts; and
- social sciences and humanities.

Natural sciences: pattern, scale and time-depth

At the risk of simplifying a diverse field, in the natural sciences landscape is defined as the 'combined, interacting effects of multiple environmental controls and forcings' (Phillips 2007: 160; see also Behringer 2009; Crumley 1994), offering a scale of enquiry over which pattern and processes can be studied (Levin 1992). Although landscape has been mobilized within many different scientific disciplines studying climate change, we review cross disciplinary work on landscape evolution and ecosystems.

Geomorphic responses to climate change can be understood via a process-oriented focus on landscape evolution, wherein the geological record preserves the nature and variability of erosion processes over different temporal and spatial scales, ranging from a few decades to millions of years and a few metres to entire landscape assemblages. Field observation and lab analysis contribute to evermore sophisticated modelling techniques in which the interactions between surface processes, climate and tectonics can be understood (Gallagher et al. 2008). One lasting question for this group of scientists – which includes geologists, geomorphologists and sedimentologists – surrounds the relative roles of catastrophic versus continuous processes of land-form evolution, an issue which echoes the concern of climatologists with the identification and likely outcomes of crucial 'tipping points' in the climate system.

Landscape ecology also promotes working across disciplinary boundaries to understand the interactions, across space and time, between the structure and function of the physical, biological and cultural components of landscapes. Indeed, one of the key challenges in predicting the ecological causes and consequences of global climate change is understanding phenomena that occur on very different scales of space, time and ecological organization (Levin 1992). This is addressed through the concept of spatial resilience which 'focuses on the importance of location, connectivity, and context for resilience, based on the idea that spatial variation in patterns and processes at different scales both impacts and is impacted by local system resilience' (Cumming 2011: 899). For example, it is now widely recognized that one of the main threats to biodiversity rests in the conjoined effects of a changing climate and habitat fragmentation, largely from human modifications to land-cover (Opdam and Wascher 2004). Pearson and Dawson

(2005) argue that, as species will be required to disperse rapidly through fragmented landscapes in order to keep pace with the changing climate, an important challenge for conservation will be to manage landscapes so as to assist species in tracking the optimum environmental conditions. Landscape ecology draws on various types of computational ecological modelling to simulate the likely effects on soil, climate and species of a changing climate, but these struggle to visualize change over large spatial extents. Combined with landscape models, ecological models can, however, examine ecological processes that occur over much larger spatial extents and are influenced by landscape heterogeneity, such as wind and fire, or seed dispersal (He et al. 1999).

As these examples suggest, the study of climate change and landscape within the natural sciences remains frustrated by the internal dynamics of ecological and geomorphic systems. The response of non-linear systems to a change in landscape dynamics is likely to be complex, inhibiting our ability to predict how landscapes may respond to climatic perturbation (Reinhardt et al. 2010). What is required is the explicit modelling of the coupling between physical and biological processes at the *appropriate* spatial scale, rather than the finest possible scale. Notwithstanding these problems, modelling and prediction remain at the heart of many policy and management decisions on the ground. It is to these applied contexts that we now turn.

Applied contexts: visualization and landscape management

The management of, *inter alia*, habitats, ecosystems, agriculture and renewable energy production is undertaken at the scale of the landscape and is frequently driven by the need for climate change adaptation. At that scale, many different stakeholders, agencies and levels of government may be involved in navigating competing demands and priorities whilst at the same time seeking consensus for management plans or developments. Landscape offers planners and decision-makers a medium and scale through which publics can grasp future or invisible ‘changes’ that are ‘embedded into territories and local communities’ (Nadai and Van Der Horst 2010: 148). In this section we highlight some of the ways in which landscape has been used to communicate and define the risks and consequences associated with climate change to planners, policy makers and the public.

Landscape visualization techniques are widely used by planners and decision-makers in a variety of settings, from building design to landscape management. For example, physical and virtual models are used to visualize future landscapes or undertake scenario-planning, as at Mullion Harbour in Cornwall, UK, where technical drawings of likely future damage to the harbour wall were used during the public consultation on managed retreat (DeSilvey 2012). Meanwhile, Dockerty et al. (2005) use photorealistic image rendering software to visualize ‘futurescapes’, or impressions of potential future landscapes, in Norfolk, UK, based on a synthesis of current policy and scientific research. Communicating with and engaging the public in the problem of climate change is likely to involve a movement away from the traditional icons of climate change, including polar bears and melting polar icecaps, towards landscape-scale visualizations relevant to local people. Work has begun to examine how climate change is framed in communication strategies, such as the National Trust’s (2005) *Shifting Shores*, through images of gain and loss, both distant and local (Geoghegan and Leyshon 2012a). The effect of such images of cliff top erosion and severe storm events utilized by the National Trust to gain support for their strategies cannot be guaranteed, for ‘whilst making climate change personally relevant may help to situate it in people’s everyday lives, it might also lessen the extent to which impacts are viewed as severe and requiring action’ (Spence and Pidgeon 2010: 663). Crucial

here is the use of visualizations to predict and manage the public acceptance or denial of change. As Devine-Wright (2011: 341) suggests in relation to tidal energy developments, ‘by capturing the symbolic meanings associated with places proposed for development, a better understanding can be obtained of public responses’.

The explicitly political use of photographs to visualize the effects of climate change on landscapes is explored by Doyle (2007) in work on Greenpeace. She argues that the visualization of climate change through photography creates a canonical set of images of melting glaciers and she calls attention to the problems associated with trying to ‘communicate environmental issues that are both temporal (long term and developmental) and unseen (not always visible), through a medium that privileges the ‘here and now’ of the visual’ (Doyle 2007: 129). Nevertheless, as Hansen (2000: 55) argues, climate change has to be made visible in the public sphere or in public arenas before it can attain the status of a ‘social problem’ of concern to the public.

Alongside the recognition of how powerful visual images can be is a new concern with other, more visceral, encounters with landscape and what they can bring to the study of climate change. It is to the work on landscape as presence, made through physical, tactile and sensory encounters, that this chapter now turns.

Social sciences and humanities: embodiment and everyday life

Despite recent assertions that it is important ‘to understand and evaluate scientific and cultural discourses of climate change’ (Nerlich et al. 2010: 98, see also Hulme 2009 and Moser 2009), descriptive, functional and quantitative approaches, which locate themselves within the social sciences, remain the dominant epistemic approach to the study of the human dimensions of climate change. An explicit appeal has been issued to consider what might be generalized as ‘cultural landscapes’. Adger et al. (2009: 348) recognize landscapes as ‘dynamic social constructions which reflect process and change through historical and contextual experience’, the symbolic meanings of which have cultural implications. They note that climate change discussions which focus on biophysical transformations and economic implications measured through utilitarian metrics ‘frequently fail to recognize that the experienced worlds of individuals and communities are bound up in local places and that the physical changes will have profound cultural and symbolic impacts’ (Adger et al. 2009: 347). Some of this work is already ongoing; for example, Batterbury (2008) has made the case for the way anthropologists have used local fieldwork to assess indigenous climate and environmental knowledge (see also Strauss and Orlove 2003). We argue here that landscape and associated concerns with the construction of knowledge, the workings of social relations in space and the politics and poetics of place-based identities provide a lens through which personal, collective and institutional responses to climate change can be evaluated. As Adger et al. (2009: 339, emphasis added) further speculate: ‘many [climate change] impacts result in loss of assets sometimes irreversible that individuals value’ and that such values ‘are largely independent of material assets, but rather rely on *perceptions and representations of the world around us*’. It is by moving beyond the statistical, quantifiable indicators and impacts of climate change that a new culture of climate change emerges, drawing on cultural and psychological understandings and interpretations, revealing a new set of climate imaginaries and narratives.

Within the discipline of human geography the retheorization of landscape has been ongoing for about eighty years. The multifarious ways in which ‘cultural landscapes’ have been imagined by geographers have focused on landscape as, *inter alia*, an object, a repository of meaning and

value, and a way of seeing (Rose 2002). Added to these is a further theoretical pathway which emphasizes what Wylie calls ‘the mutual embeddedness and interconnectivity of self, body and land – landscape as the world we live in, a constantly emergent perceptual and material milieu’ (Wylie 2007: 1–2). This conceptualization of landscape can be used to explore the lived experience of climate change. For Rose and Wylie (2006: 477), landscape can:

insinuate itself into vitalist, relational, and topological geographies: landscape reintroduces perspective and contour; texture and feeling; perception and imagination. It is the synthesis of elements, so elegantly traced by topologies, with something added: lightless chasms, passing clouds, airless summits, sweeping sands.

Landscape enables us to consider ourselves as ‘being ‘of’, ‘in’ and ‘on’ the world all at the same time’ (Rose and Wylie 2006: 477) and allows us to explore ‘that which is elemental and affective, with landscape’. Geoghegan and Leyshon (2012b) use these theorizations to explore decisions made by farmers and land managers on the Lizard, Cornwall, UK, about the use and management of land in changed climatic conditions, showing that these are informed by embodiment and emotion, memory and sense of place as much as policy or regulation. One outcome of these retheorizations of landscape is a new critical conception of climate change, to which we now turn.

Landscape and ‘climate and the ways it might change’

Climate change is at once a reality, an agenda, a problem, a context, a narrative and a discourse and it is for this reason that in this final section we explore a more open and inclusive formulation: ‘climate and the ways it might change’. This allows different ways of knowing to play a legitimate part in framing our personal, social and institutional responses (Brace and Geoghegan 2011). Thus, using ‘climate and the ways it might change’ in preference to ‘climate change’ enables a relational approach to emerge which:

- does not insist on research participants being able to disentangle anthropogenic causes from natural causes of climate change;
- acknowledges the way an understanding of climate change is conjoined with other kinds of knowledge about the local environment; and
- allows different ways of knowing to play a legitimate part in framing a culture of climate change.

This shifts the attention of scholarly enquiry from the ontology of climate change, in which proof of its existence is the goal, to epistemologies of climate change which prioritize not only what is known but how it is known, remembered, experienced, embodied and practiced. Echoing Lorimer (2006), by focusing on ordinary lives, climate and the ways it might change can be explored as a ‘knowledge-in-practice’ and ‘on-the-ground’.

As a conceptualization, climate and the ways it might change acknowledges people’s understandings of themselves in relation to landscape, remembered past weather and climate, the experience of present climate and imagined futures that they may or may not live to see, or that may or may not come to pass. It draws on landscape as constitutive of what Ingold (2000) describes as the processes of dwelling, through which familiarity with place is the result of a daily encounter with it (Ingold 2004). However, our interest here is not only in ‘the texture of the surface’, whereby ‘our life histories are woven, along with life–cycles of plants and animals’

(Ingold 2000: 198), but also with Ingold's notion of the 'weather world', comprised of sky, earth and ground:

to feel the wind is not to make external, tactile contact with our surroundings but to mingle with them. In this mingling, as we live and breathe, the wind, light, and moisture of the sky bind with the substances of the earth in the continual forging of a way through the tangle of life-lines that comprise the land.

(Ingold 2007: S19)

'Placing' climate change in the familiar landscapes of everyday life provides a way of imagining the past, present and future and enables a conversation about climate and the ways it may change that draws on local structures of feeling and lay knowledges. One outcome of such a place-based approach is a greater attention to the specificities of people's experience of climate and place, a re-evaluation of lay knowledges, and a fresh understanding of the ways in which different actors and interest groups negotiate the future in terms of responsibility for and custodianship of local landscapes. Climate and the ways it might change is an approach that emphasizes the relational qualities of human-environment systems and questions the personal politics of local action in responding to and making sense of climate change. Whilst Nerlich et al. (2010: 98) note that 'knowledge and action emerge from ideas, practices, discourses and perceived risks as much as from technological assessments of environmental quality', this focus on landscape in studies of climate change highlights how meaning is made through affective, embodied, imaginative encounters in place.

Conclusion

Climate change is a high-stakes, high-profile and highly-politicized issue that relates – often in messy, non-linear and diffuse ways – to people's everyday lives, lifestyles and livelihoods. It is no longer thought of merely as an environmental and/or scientific issue; rather, the 'climate question' is considered one that now more than ever, permeates our individual, as well as shared, economic, political, cultural and social lives.

(Boykoff et al. 2009: 1)

In this chapter we have reviewed work on landscape in studies of climate change, as they are pursued in the natural sciences, applied contexts and the social sciences and humanities. We have also set out an emergent field of landscape research on climate and the ways it might change, and examined how it might be grounded and localized through the concept of familiar – embodied, practised and lived – landscapes of everyday life. In this final section, we draw out three important conclusions.

First, as a richly theorized concept, landscape enables us to study present-day and future questions of citizenship and responsibility, cultural histories, contested imaginaries, scientific interpretations and physical manifestations of climate change. Thus, landscape provides a way of making climate change relevant both as a physical and intellectual artefact and an embodied and experiential process. It does the work of 'allowing climate to travel and cross scales without losing ... essential anchors and narratives' (Hulme 2008: 8).

Second, because landscape – in all its multifarious definitions and theorizations – grounds an understanding of climate and the ways it might change in a fundamental way, landscape researchers need to think more creatively about how they might contribute to environmental policy. As Henderson (2003: 196) argues,

the study of landscape, that thing which so often evokes the plane on which normal, everyday life is lived – precisely because of the premium it places on the everyday – must stand up to the facts of a world in crisis.

Finally, new landscapes of climate change are emerging, providing fertile opportunities for researchers from many disciplines interested in landscape. Examples include: new landscapes of energy; threatened coastal zones; the biogeography and management of invasive species; the geomorphology of glacial retreat; the changed cultural landscapes of a thawed Arctic; agri-food systems and food security; and the impact upon industries, livelihoods and landscapes. In sum, because landscape has spatial scale, temporal depth and emotional resonance, it is an effective, challenging and versatile medium through which to look at climate change and its effects on everything from urban, rural, productive, designed, managed and imagined landscapes.

Further reading

- Adger, W.N., Dessai, S., Goulden, M., Hulme, M., Lorenzoni, I., and Nelson, D.R. (2009) 'Are There Social Limits to Adaptation to Climate Change?' *Climatic Change* 93, 335–54. (Argues limits to adaptation are endogenous to society and hence contingent on ethics, knowledge, attitudes to risk and culture.)
- Aspinall, R. (2010) 'Geographical Perspectives on Climate Change', *Annals of the Association of American Geographers* (special issue: Climate Change) 100, 715–18. (Overview of environmental, human, social, political, and methodological issues of the geographical dimensions of climate change.)
- Brace, C. and Geoghegan, H. (2011) 'Human Geographies of Climate Change: Landscape, Temporality, Lay Knowledge', *Progress in Human Geography* 35, 284–302. (Advocates a focus on familiar landscapes to understandings of climate and the ways it might change.)
- Ingold, T. (2007) 'Earth, Sky, Wind, and Weather', *Journal of the Royal Anthropological Institute* 13, S19–S38. (Uses concept of dwelling to problematize our relationship with weather.)

References

- Adger, W.N., Dessai, S., Goulden, M., Hulme, M., Lorenzoni, I., and Nelson, D.R. (2009) 'Are There Social Limits to Adaptation to Climate Change?' *Climatic Change* 93, 335–54
- Agrawal, A. and Narain, S. (1991) *Global Warming in an Unequal World*, Delhi: Centre for Science and the Environment
- AONB (2011) *The Association of Areas of Outstanding Natural Beauty Draft Strategic Plan 2011–2014*, Northleach: AONB
- Barnett, J. (2010) 'Adapting to Climate Change: Three Key Challenges for Research and Policy – an Editorial Essay', *WIREs Climate Change* 1, 314–17
- Batterbury, S.P.J. (2008) 'Anthropology and Global Warming: The Need for Environmental Engagement', *Australian Journal of Anthropology* 19, 62–8
- Behringer, W. (2009) *A Cultural History of Climate*, Cambridge: Polity
- Boykoff, M., Goodman, M. and Curtis, I. (2009) 'Cultural Politics of Climate Change: Interactions in the Spaces of the Everyday, Environment, Politics and Development', Working Paper Series: Department of Geography, King's College London
- Brace, C. and Geoghegan, H. (2011) 'Human Geographies of Climate Change: Landscape, Temporality, Lay Knowledge', *Progress in Human Geography* 35, 284–302
- Brierley, G. (2010) 'Landscape Memory: The Imprint of the Past on Contemporary Landscape Forms and Processes', *Area* 42, 76–85
- Colten, C.E. (2010) 'Landscape and Place in the *Geographical Review*', *Geographical Review* 100, 1–5
- Crumley, C.L. (ed.) (1994) *Historical Ecology: Cultural Knowledge and Changing Landscapes*, Santa Fe, NM: School of American Research
- Cumming, G.S. (2011) 'Spatial Resilience: Integrating Landscape Ecology, Resilience and Sustainability', *Landscape Ecology* 26, 899–909
- Defra (2011) *The Natural Choice: Securing the Value of Nature*. Natural Environment White Paper, London: The Stationery Office

- Demeritt, D. (2001) 'The Construction of Global Warming and the Politics of Science', *Annals of the Association of American Geographers* 91, 307–37
- DeSilvey, C. (2012) 'Making Sense of Transience: An Anticipatory History', *Cultural Geographies* 19, 31–54
- Devine-Wright, P. (2011) 'Place Attachment and Public Acceptance of Renewable Energy: A Tidal Energy Case Study', *Journal of Environmental Psychology* 31: 336–43
- Dockerty, T., Lovett, A., Sünnenberg, G., Appleton, K. and Parry, M. (2005) 'Visualizing the Potential Impacts of Climate Change on Rural Landscapes', *Computers, Environment and Urban Systems* 29, 297–320
- Doyle, J. (2007) 'Picturing the Clima(c)tic: Greenpeace and the Representational Politics of Climate Change Communication', *Science as Culture* 16, 129–50
- Gallagher, K., Jones, S.J. and Wainwright, J. (eds) (2008) *Landscape Evolution: Constraining the Roles of Denudation, Climate and Tectonics Over Different Time and Space Scales*, London: Geological Society
- Geoghegan, H. and Leyshon, C.S. (2012a), Shifting Shores: Managing challenge and change on the Lizard Peninsula, Cornwall, UK, *Landscape Research*, Forthcoming. Available at DOI:10.1080/01426397.2012.697137
- (2012b) 'On Climate Change and Cultural Geography: Farming on the Lizard Peninsula, Cornwall, UK', *Climatic Change* 113(1), 55–66, DOI: 10.1007/s10584-012-0417-5
- Hansen, A. (2000) 'Claims-Making and Framing in British Newspaper Coverage of the Brent Spar Controversy', in Allan, S., Adam, B. and Carter, C. (eds) *Environmental Risks and the Media*, London: Routledge, pp. 55–72
- He, H.S., Mladenoff, D.J. and Crow, T.R. (1999) 'Linking an Ecosystem Model and a Landscape Model to Study Forest Species Response to Climate Warming', *Ecological Modelling* 114: 213–33
- Henderson, G. (2003) 'What (else) We Talk about When We Talk about Landscape: For a Return to the Social Imagination', in Wilson, C. and Groth, P. (eds) *Everyday America: Cultural Landscape Studies after JB Jackson*, Berkeley, CA: University of California Press, pp. 178–98
- Hulme, M. (2008) 'Geographical Work at the Boundaries of Climate Change', *Transactions of the Institute of British Geographers* 33, 5–11
- (2009) *Why We Disagree about Climate Change*, Cambridge: Cambridge University Press
- Ingold, T. (2000) *The Perception of the Environment: Essays in Livelihood, Dwelling and Skill*, London: Routledge
- (2004) 'Culture on the Ground: The World Perceived through the Feet', *Journal of Material Culture* 9, 315–40
- (2007) 'Earth, Sky, Wind, and Weather'. *Journal of the Royal Anthropological Institute* 13, S19–S38
- IPCC (2007) *Glossary*, Intergovernmental Panel on Climate Change, available at http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_appendix.pdf (accessed 20 June 2012)
- (2011) 'Organization', Intergovernmental Panel on Climate Change, available at <http://www.ipcc.ch/organization/organization.shtml> (accessed 20 June 2012)
- Lawton, J.H., Brotherton, P.N.M., Brown, V.K., Elphick, C., Fitter, A.H., Forshaw, J., Haddow, R.W., Hilborne, S., Leafé, R.N., Mace, G.M., Southgate, M.P., Sutherland, W.J., Tew, T.E., Varley, J., and Wynne, G.R. (2010) 'Making Space for Nature: a review of England's wildlife sites and ecological network', Report to Defra, available at <http://www.defra.gov.uk/news/2010/09/24/nature-news/> (accessed 27 June 2012)
- Levin, S.A. (1992) 'The Problem of Pattern and Scale in Ecology', *Ecology* 73, 1943–67
- Lorimer, H. (2006) 'Herding Memories of Humans and Animals', *Environment and Planning D: Society and Space* 24, 497–518
- Moser, S.C. (2009) 'Now More than Ever: The Need for More Societally Relevant Research on Vulnerability and Adaptation to Climate Change', *Applied Geography* 30, 464–74
- Nadai, A. and Van Der Horst, D. (2010) 'Introduction: Landscapes of Energies' *Landscape Research*, 35, 143–55
- National Trust (2005) *Shifting Shores: Living with a Changing Coastline*, available at <http://www.nationaltrust.org.uk/servlet/file/store5/item349170/version2/NI%20shifting%20shores.pdf> (accessed 27 June 2012)
- Natural England (2008) *The Natural Environment: Adapting to Climate Change*, London: Natural England
- Nerlich, B., Koteyko, N., and Brown, B. (2010) 'Theory and Language of Climate Change Communication', *WIREs Climate Change* 1, 97–110
- Opdam, P. and Wascher, D. (2004) 'Climate Change Meets Habitat Fragmentation: Linking Landscape and Biogeographical Scale Level in Research and Conservation', *Biological Conservation* 117, 285–97

- Pearson, R.G. and Dawson, T.P. (2005) 'Long-Distance Plant Dispersal and Habitat Fragmentation: Identifying Conservation Targets for Spatial Landscape Planning under Climate Change', *Biological Conservation* 123: 389–401
- Phillips, J.D. (2007) 'The Perfect Landscape', *Geomorphology* 84, 159–69
- Reinhardt, L., Jerolmack, D., Cardinale, B.J., Vanacker, V. and Wright, J. (2010) 'Dynamic Interactions of Life and Its Landscape: Feedbacks at the Interface of Geomorphology and Ecology', *Earth Surface Processes and Landforms* 35, 78–101
- Rose, M. (2002) 'Landscapes and Labyrinths', *Geoforum* 33, 455–67
- and Wylie, J. (2006) 'Animating Landscape', *Environment and Planning D: Society and Space* 24, 475–9
- Spence, A. and Pidgeon, N.F. (2010) 'Framing and Communicating Climate Change: The Effects of Distance and Outcome Frame Manipulations', *Global Environmental Change* 20, 656–67
- Strauss, S. and Orlove, B.S. (2003) *Weather, Climate, Culture*, Oxford: Berg
- Wildlife Trusts (2008) *A Living Landscape: A Call to Restore the UK's Battered Ecosystems, for Wildlife and People*, available at <http://www.wildlifetrusts.org/alivinglandscape> (accessed 27 June 2012)
- Wylie, J. (2007) *Landscape*, London: Routledge.