



Re-thinking the present: The role of a historical focus in climate change adaptation research



George C.D. Adamson^{a,*}, Matthew J. Hannaford^b, Eleonora J. Rohland^c

^a Department of Geography, King's College London, Strand, London WC2R 2LS, UK

^b Department of History, Utrecht University, Drift 6, 3512 BS, Utrecht, Netherlands

^c Department of Iberian and Latin American History, Centre for InterAmerican Studies (CIAS), Faculty of History, Philosophy and Theology, Bielefeld University, Universitätsstraße 25, 33615 Bielefeld, Germany

ARTICLE INFO

Keywords:

Adaptation
History
Path-dependency
Culture
Determinism
Development

ABSTRACT

There is a growing recognition that adaptation to climate change requires an understanding of social processes that unfold across extended temporal trajectories. Yet, despite a move to reconceptualise adaptation as ‘pathways of change and response’ with a deeper temporal dimension, the past generally remains poorly integrated into adaptation studies. This is related to a disavowal of environmental determinism within the academic field of history, which has caused the past to be addressed from other disciplinary perspectives within climate change literature, leading to accusations of over-simplification and neo-determinism. Conversely, whilst a relatively small amount of research within the subdiscipline of historical climatology has engaged with theories from mainstream adaptation to understand societies in the past, there has been little influence in the other direction.

Building on a comprehensive review and critique of existing approaches to historical climate-society research, we argue for three important areas where historians should engage with climate change adaptation. The first area we call *particularizing adaptation*; this is the development of long-term empirical studies that uncover societal relations to climate in a particular place – including climate’s cultural dimensions – which can provide a baseline and contextualisation for climate change adaptation options. The second, *institutional path dependency and memory*, argues for a focus on the evolution of formal institutions with a responsibility for adaptation, to understand how historical events and decisions inform and constrain practices today. Our third argument is for an appreciation of the history of ideas and concepts that underpin climate change adaptation. We call for a *second-order observation* – observation of the observers – within climate change research, to ensure that adaptation does not perpetuate historically-grown power structures.

1. Introduction

There is now a growing recognition that adaptation is constrained by social and cultural factors¹ and requires an understanding of values and knowledges (Adger et al., 2009a; Barnett, 2010; Biesbroek et al., 2013; Head, 2010), as well as of societal processes that unfold across extended temporal trajectories (Bankoff, 2003a; Fiske et al., 2015; Mauelshagen, 2013; Rockström et al., 2014). This has created an impetus for an integrated, humanities-focused approach to understand and inform climate change adaptation, particularly culturally- and historically-informed research (Adger et al., 2013; Allan et al., 2016; Brace and Geoghegan, 2011; Castree et al., 2014; Geoghegan and

Leyshon, 2012; Hulme, 2011a, 2015). Whilst adaptation has a growing focus in the more interdisciplinary field of historical climatology, in historical disaster studies – a field mostly covered by ‘classical’ historians – researchers hardly engage with the concept. Outside of these subfields, ‘historians’ (we use this term loosely to include all humanities researchers with a focus on the past, including historical geographers and anthropologists) have generally seen themselves as dealing with a past that remains separate from the present and have been weary of the determinism that the concepts of ‘adaptation’ and ‘climate’ have conveyed at various points through history. Where historical climate-society interactions have been discussed within climate research, this has therefore largely come from those without historical training.

* Corresponding author.

E-mail address: george.adamson@kcl.ac.uk (G.C.D. Adamson).

¹ We are aware of the issues around defining the word ‘culture’ and a full analysis of its usage in relation to adaptation is beyond the scope of this paper. In climate change adaptation research, it is usually defined as anything that can inform adaptation decisions but is not directly tied to livelihood or wellbeing shocks, e.g. values, beliefs, norms, identity, place-attachment. A fairly representative definition of its current usage within the field is provided in Adger et al. (2013, p. 112): ‘the symbols that express meaning, including beliefs, rituals, art and stories that create collective outlooks and behaviours, and from which strategies to respond to problems are devised and implemented’.

In this paper, we seek to elaborate on the important contribution that history should make to climate change adaptation research. Our narrative (written by two geographers and one historian) should be seen as a call both to adaptation researchers and historians to meaningfully engage with the contributions that studies of the past can make to climate change adaptation. We argue that a historical focus is vital; history has much to contribute by grounding adaptation strategies in long-term place-specific studies of climate-society interactions, by uncovering path-dependent processes, by ensuring that adaptations are equitable and do not reproduce historical power structures, and by exploring the role of social and institutional memory in informing or preventing adaptation. Our argument builds both on calls within ‘mainstream’ climate change adaptation literature (i.e. that included within the IPCC Working Group II reports) as well as experience from a range of disciplinary fields that have expressly analysed climate change in the past. We suggest three domains within which historical research could contribute innovatively to adaptation debates: particularizing adaptation, a focus on path dependency, and what we refer to as ‘second-order observation’. Our analysis begins with a review of historical approaches in mainstream adaptation literature, before reviewing explicitly historical approaches to adaptation within historical climatology and elsewhere, and finally, elucidating our three new domains.

2. Historical analysis in climate change adaptation research

2.1. Diverse approaches – shallow time depths

In recent years climate change adaptation research has shifted its focus away from model-based ‘predict-and-provide’ framings towards social science-led approaches. The majority of insights within this domain have derived from development studies, qualitative social research, policy studies and economics. In particular, social scientists have attempted to assess vulnerability and adaptive capacity to climate change (Füssel, 2007), identify barriers and limits to adaptation implementation (Adger et al., 2009b; Dow et al., 2013; Moser and Ekstrom, 2010), monitor climate change adaptation action (Brooks et al., 2011), uncover examples of ‘maladaptation’ (Barnett and O’Neill, 2010), examine traditional, indigenous or local knowledge (Berkes, 2012), and explore past and future adaptation pathways (Haasnoot et al., 2013; Haasnoot and Middelkoop, 2012; Wise et al., 2014). This has resulted in a loose coalition of foci and studies that have drawn insights from ‘the past’ to highly varying degrees (Table 1).

Recent arguments for a greater historical focus have derived partly from a critique of traditional indicator-based approaches, which tended to focus only on symptoms, rather than the more deep-rooted factors that develop over longer time periods (Hinkel, 2011; Pelling, 2011), and generally have yet to fully incorporate subjective factors that influence vulnerability (e.g. how climate knowledge is perceived and constructed) (O’Brien and Wolf, 2010). In a similar vein, few empirical studies that seek to identify barriers to adaptation have meaningfully engaged with the historical contexts out of which these constraints emerged. Although some theoretical contributions recognise that an actor’s ability to overcome a barrier depends as much on its temporal origin as the actor’s current capabilities (Brace and Geoghegan, 2011; Grothmann and Patt, 2005; Moser and Ekstrom, 2010; Shackleton et al., 2015), the majority of studies have instead focussed on asking ‘if’ and ‘which’ barriers exist (Biesbroek et al., 2013). Conventional conceptualisations of vulnerability have therefore been criticised as narrow, ahistorical, and as reinforcing the framing of adaptation as a set of ‘no regrets’ actions which reproduce existing modes of unsustainable or inequitable development (O’Brien, 2012; Pelling, 2011). The empirical literature has also been of limited value in uncovering and tackling deep-rooted problems such as path dependency (David, 1985; Pierson, 2000a), inertia and memory embedded within institutions and policy processes.

A more general criticism of adaptation research has been that it has tended to focus on problems rather than solutions (Ford et al., 2011; Maru and Stafford Smith, 2014). More recently, greater emphasis has been placed on ‘solution-oriented’ research, which is underpinned by the view that there is much to learn from adaptation that has already been implemented, and from monitoring and measuring its consequences (Arnell, 2010; Berrang-Ford et al., 2011; Engle, 2011). This includes efforts to uncover examples of ‘maladaptation’ (Barnett and O’Neill, 2010; Brooks et al., 2011). Yet, such assessments have still tended to measure adaptation practices against supposedly universal metrics, which has led to simplistic uses of the concept (Agrawal and Perrin, 2009). A lack of temporal depth in studies of maladaptation (e.g. Fazey et al., 2011; Heyd and Brooks, 2009) also makes it unclear as to how so-called maladaptive practices arose in the first place. Furthermore, the ability to monitor the outcomes of adaptation to climate change is limited, as many of these policies have been implemented relatively recently and thus offer few examples of what might be considered as ‘fully fledged’ implementation (Wise et al., 2014).

One area of adaptation research that has included a more unambiguously historical dimension is the literature on traditional knowledge (also local, indigenous or lay knowledge) (Berkes, 2012; Berkes et al., 2000; Brace and Geoghegan, 2011; Crate, 2011). This includes knowledge from decades and often centuries of ‘adaptation’ practices (Orlove et al., 2010), as well as cognitive aspects such as cultural memory of historical weather, climate and responses, and the way in which these memories shape perceptions of the future (Endfield and Veale, 2017; Thomas et al., 2007). Traditional knowledge has generally been poorly integrated into adaptation planning, while many cite the challenges of developing ‘shared narratives’ of future adaptation choices against the backdrop of uneven power dynamics and differing perceptions of weather, climate and its changes (Roncoli et al., 2010). Many studies have similarly cautioned against uncritical acceptance of the utility of traditional knowledge in the face of the “nonlinear and stepped changes” associated with climate change (Adger et al., 2011, p. 764; Wittrock et al., 2010). A mounting body of research within this field has nonetheless suggested that the integration and co-production of traditional and scientific knowledge can be a valuable mechanism in raising awareness of, and dealing with, climate-related uncertainty, and for reconciling the global scale of climate change with local-scale entanglements of weather and place (Brace and Geoghegan, 2011; Flint et al., 2011; Matless, 2016; Nakashima et al., 2012).

2.2. Adaptation pathways

Whilst a body of adaptation research has begun to recognise the importance of deeper temporal perspectives, this has mostly been driven by theoretical advances rather than systematic, empirically tested research. One exception is the emergent literature on adaptation pathways, or ‘pathways of change and response’, which has in part grown out of ‘pathways thinking’ in the sustainability science and development studies domains (Leach et al., 2010; Westley et al., 2011). Pathways thinking emphasises the need for radical approaches to understand and address the causes of vulnerability and to develop strategies for sustainability, underpinned by the view that the uncertainty of climate change projections over long timeframes may remain incompletely understood well into the future. In this respect, adaptation pathways takes the view that climate change adaptation is an ongoing process that is managed over time by committing to shorter-term actions embedded within clear long-term visions. The use of adaptation pathways in practice has largely drawn upon the use of ‘route maps’ as a means of conceptualising future adaptation options (Haasnoot et al., 2013; Rosenzweig et al., 2011; Yohe and Leichenko, 2010). This has been questioned in certain decision contexts, particularly those where the trajectory of the system is heavily influenced by the past, where goals for adaptation are contested, or where prevailing governance

Table 1
Temporal scope of approaches to climate change adaptation research and some implications.

Approach	Temporal scope	Implications
Hazard and impact modelling	Given points in future	<ul style="list-style-type: none"> Adaptation conceptualised as a technical problem of managing quantifiable risks through increased environmental control (Barnett, 2010) Little consideration of normative context in which adaptation is being implemented (O'Brien and Wolf, 2010)
Vulnerability and adaptive capacity assessment	Present or given points in future	<ul style="list-style-type: none"> Focus on static measures directs attention to symptoms and proximate causes of vulnerability (Hinkel, 2011) Limited use in informing need for transformation to address the root-causes of vulnerability (Pelling, 2011) Cultural factors that influence vulnerability are rarely considered
Barriers and limits	Recent past (multi-annual) to present	<ul style="list-style-type: none"> Proposed interventions are of limited use in overcoming deep-rooted barriers embedded within institutions and policy processes (Biesbroek et al., 2013) Overlooks the role of deeply-embedded values, beliefs, preferences and norms in barriers and limits (O'Brien, 2012)
Monitoring and maladaptation	Recent past (multi-annual) to present	<ul style="list-style-type: none"> Short-term, multi-annual timeframes are insufficient to evaluate 'fully fledged' adaptation implementation (Wise et al., 2014) Instances of maladaptation may be subjectively or simplistically defined as they may overlook long-standing responses and norms in different contexts (Agrawal and Perrin, 2009)
Traditional, Local or Indigenous Knowledge	Deep past (multi-centennial) to present	<ul style="list-style-type: none"> Unclear how effective traditional knowledge might be in the face of projected changes outside the realm of experience (Adger et al., 2011)
Adaptation pathways	Present to various points in the future	<ul style="list-style-type: none"> Assumes prevailing governance systems are conducive for adaptation (Maru and Stafford Smith, 2014) Focuses on proximate causes and incremental adaptation; needs for transformation overlooked (Wise et al., 2014)
Pathways of change and response	Medium-term past (multi-decadal) to future	<ul style="list-style-type: none"> Positioned predominantly as a retrospective tool; potential insights into future decision-making are loosely defined

regimes are not conducive for the implementation of new adaptation policies (Maru and Stafford Smith, 2014; Wise et al., 2014).

In light of these critical perspectives, Wise et al. (2014) present a broader conceptualisation of adaptation as 'pathways of change and response'. This view sees uncertainties in institutions and values as more significant constraints to adaptation than uncertainties in climate knowledge and therefore places greater focus on the past and present trajectories of systems in order to inform consideration of how future trajectories might unfold. This 'system diagnosis' engages more explicitly with the social and cultural aspects of adaptation in practice, while it emphasises the importance of historical context and temporality by attempting to illuminate processes such as path dependency. Fazey et al. (2015) concentrate further on the historical dimension using what they term a 'pathways lens'. This takes an overtly retrospective view of pathways to understand how people have responded to environmental, social and political change in the recent past, and to explore why different groups navigated this change in different ways. Analysis of trajectories of change and response over multiple decades in the Solomon Islands (Fazey et al., 2011, 2015) and Transylvania (Câmpeanu and Fazey, 2014) show how, in the absence of transformation, present and future responses to change can have a high degree of predetermination insofar as they are strongly conditioned by memories of what was considered to be normal, desirable and successful in the past. These case studies also reveal the crucial role of deep-rooted and often hidden power relations in the emergence of differential trajectories for certain socio-ethnic groups (Câmpeanu and Fazey, 2014).

The emerging concept of pathways of change and response has done much to raise awareness of the importance of historical context, values, power relations and the inter-temporal implications of decision-making. The concept nevertheless remains relatively untested – particularly in its engagement with responses to climate variability and change – raising important questions as to how studies of 'antecedent' pathways can inform decision-making and future pathways. For example, it is unclear whether its insights are limited to problem diagnosis, or whether this approach can go further and help prescribe or design possible adaptation actions. As well as its capability to link up with practice, there are questions as to what extent disciplines such as historical climatology and disaster history can engage with pathways approaches, which are at present dominated by qualitative and

participatory social research. Indeed, although pathways of change and response has gone further than any other strand of climate change research in engaging with history – at least its consideration of longer timeframes, if not in its sources and methods – this research agenda has not been driven by historians, which raises the question of how the insights that historical data can offer might engage with climate change adaptation discourses. The point of interface between adaptation pathways' and historians' interests appears to be a genuine opportunity for innovative research and for developing a new interdisciplinary approach to researching climate change adaptation.

3. Review of existing approaches to historical climate-society research

The following section reviews the existing disciplinary engagements with climate adaptation in the past that have been undertaken by historians and other researchers operating outside of mainstream climate adaptation research. We loosely categorise these engagements as having taken place within three fields: *longue-durée* approaches (associated with the subdiscipline of historical climatology), forecasting by analogy (originally developed by social scientists but now often undertaken by paleoclimatologists and archaeologists) and social-ecological systems analysis (deriving from ecology with some engagement from historians). Note that our focus here is primarily on research since the latter decades of the twentieth century, i.e. the period during which anthropogenic climate change has been a major field of study. It is important to recognise that this follows a long backdrop of deterministic thinking that derived from Classical Greece (Hippocrates, fifth century BC Dove, 2013) and dominated Eurasian writings on climate until the twentieth century (Adamson, 2012; Cohler et al., 1989; Harrison, 1996, 1999; Hume, 2004; Khaldûn and Lawrence, 2004; Livingstone, 2002). Such approaches became a justification for African slavery (Long, 1774; Rohland, 2014a) and an important colonial narrative (Livingstone, 2002; Osborne, 2000). They were developed in the early twentieth century by scholars such as Ellsworth Huntington (2001, 2009); Huntington and Cushing (1922) and Griffith Taylor (1936) into complex theories of historical human dispersal with the conclusion that Western European societies represented the peak of civilization due to the temperate climates in which they had evolved.

These deterministic writings were influential in political movements during the early twentieth century; in particular, the German geographer Friedrich Ratzel's "Anthropogeography" became the basis for National-socialist-ideas about the dependence of a *Volk* (people) on *Raum*, or *Lebensraum* (space, or literally "living space"). This association of climatic determinism with Nazi ideology was one reason for the disavowal of Hippocratic remnants in climatological research after the Second World War and has affected much historical scholarship since, as we will show below.

3.1. Historical climatology and (historical) climate impact studies ('longue-durée')

The primary way that historians have engaged with climate adaptation since the 1970s is through 'climate impact studies'. The interdisciplinary journal *Annales d'histoire économique et sociale*, founded in 1929 by Lucien Febvre, became the cornerstone of what is known today as the "Annales School" of history (Burke, 1990). This school led to the germination of the historical subdiscipline known as 'historical climatology' (Febvre and Bataillon, 1922). Two currents within the *Annales* School influenced the inception of historical climatology. The first was Fernand Braudel's concept of historical time, divided into *longue durée* (geographical and environmental change), *moyenne durée* (economic cycles and social movements) and *histoire événementielle* (the fast-paced time of political history) (Braudel, 1987), with the idea of looking at historical processes over the long-term (i.e. several centuries) a precondition to studying climate and climatic changes historically. The second current was a quantitative approach to history (also called "the quantitative revolution"), that is, the collection of masses of historical data (e.g. information on grain prices, birth-, death- and marriage dates, or, in the case of climate history, grape harvest dates) which could be transformed into statistics (Burke, 1990).

The pioneer of historical climatology is considered to be Emmanuel Le Roy Ladurie, a third generation *Annales* historian. Ladurie devised a reading of history 'without human beings' (Le Roy Ladurie, 1967; Mauelshagen and Pfister, 2010), whereby written sources were used to create a history of the climate with humans viewed only as observers. The French historian's conclusion to his 1971's *Times of Feast Times of Famine* that "in the long term the human consequences of climate seem to be slight, perhaps negligible, and certainly difficult to detect" (Le Roy Ladurie, 1971) was to influence the field of historical climatology for several decades (Mauelshagen and Pfister, 2010). Two post-war British climatologists, Gordon Manley and Hubert Lamb, also heavily influenced the subdiscipline. Both wrote climate histories that, in contrast to Ladurie, made some allowance for the influence of climate on human cultures (Lamb, 1990, 1995; Manley, 1972) whilst also being critical of the generalisations and lack of evidence displayed in previous deterministic writings. Lamb's work was built upon by researchers at the Climatic Research Unit (CRU), which he founded in 1972 at the University of East Anglia (Ingram et al., 1978; Rotberg and Rabb, 2014; Wigley et al., 1985). This period saw the formalisation of historical climatology into a discipline that addressed 'climate reconstruction; the identification and measurement of impact; adaptation and perception' (Wigley et al., 1985).

During the early years of its existence, 'climate impact' analyses were a key component of historical climatology. These predominantly involved the comparison of climatic with demographic data to examine the relationship of climatic variability with social and economic changes at a broad scale (Mauelshagen, 2014). During the 1980s, climate impact studies declined whilst the focus at CRU moved to statistical climatology and climate modelling. During this time climate impact studies became primarily associated with a small number of central European historians who occupied a niche in their discipline (Mauelshagen, 2014; Mauelshagen and Pfister, 2010). Historical climate impact research migrated into historical disaster research in the late 1990s as (social scientific) disaster studies increasingly concerned

itself with anthropogenic climate change using the established concepts of vulnerability, resilience and adaptation. Historical climate impact studies and historical disaster research surged during the early 2000s in the wake of the International Decade for Natural Disaster Reduction (Groh et al., 2003; Jakubowski-Tiessen and Lehmann, 2003; Steinberg, 2006). Yet due to the ongoing spectre of climatic determinism the research remained largely detached from the discourse on present-day and future climate change and adaptation, with a handful of exceptions (Bankoff, 2001, 2003a, 2003b; Mauelshagen, 2009, 2013; Pfister, 2009, 2011; Rohland, 2011, 2014b).

In 2010 Christian Pfister identified the vulnerability of past societies as 'a new focus for historical climatology in the twenty-first century' (Pfister, 2010). A certain resurgence in long-term climate adaptation research within historical climatology – referred to by Mauelshagen and Pfister (2010) as 'macro-history' of the climate – has occurred since around this time. Much of this research has been driven by Pfister and consequently most has focussed on central Europe (Behringer, 1999, 2009; Brázdil et al., 2005; Mauelshagen, 2010, 2011; Pfister, 2002; Pfister and Brázdil, 2006), although in recent years this has been extended to Mexico (Endfield, 2007, 2008, 2012; Endfield and Tejedo, 2006), Anatolia (White, 2011), India (Adamson, 2014) and southern Africa (Hannaford et al., 2014; Hannaford and Nash, 2016; Kelso and Vogel, 2015). Recent work by historical geographers within this tradition has expanded the focus to incorporate the role of knowledge, memory and perceptions in constructing vulnerability and informing adaptive practice and governance (Adamson, 2012, 2015; DeSilvey, 2012; Endfield and Naylor, 2015; Endfield and Nash, 2002a, 2002b, 2005; Endfield and Veale, 2017; Hulme, 2012; Jones et al., 2012; Veale et al., 2014). This research has been informed by theoretical advances in mainstream adaptation research; however, there has been little influence in the other direction.



3.2. Forecasting by analogy

A more expressly present-focussed approach to historical climate responses was developed in the USA during the early era of anthropogenic climate change research, pioneered by the social scientist Michael H. Glantz (Glantz, 1989, 1990, 1991, 1996). This represented past experiences of human responses to climate-related threats as analogous to future challenges and used past case studies to forecast the likely implications of climate change. Analogue methodologies are based on the premise that if two subjects are known to share some components (e.g. they both involve responses to abrupt climate change), inferences can be made about other components in one subject by examining the same components in the other (Ford et al., 2010). Temporal analogues of human-society interactions have been utilised as a way to understand how human systems manage and experience climate risks, to identify successful and non-successful adaptations, and to understand the processes that shape vulnerability (Glantz, 1991).

'Forecasting by analogy' declined in usage during the mid-1990s as mainstream climate change impacts studies moved towards vulnerability assessment (Ford et al., 2010; Magistro and Roncoli, 2001). However, the use of analogues in climate change research – although not always formalised as such – continued through the 2000s with the proliferation of a number of climate-history review articles that appeared in the palaeoclimatological literature (Bussey et al., 2012; Butzer, 2012; deMenocal, 2001; Fraser, 2007; Holmgren and Öberg, 2006; Messerli et al., 2000; Orlove, 2005). These often followed a similar pattern: 1) an elucidation of the severity of anthropogenic climate change; 2) the brief summary of a number of case studies from a diverse range of spatial and temporal contexts together with a description of palaeoclimatological evidence; and 3) a discussion to draw universal lessons from these case studies. The selection of case studies is also often fairly artificial in that they represent known 'collapses' during periods of significant climate change, which are often purported to be similar to the present (van der Leeuw et al., 2011).

Proponents of analogues have argued that their primary benefit is as heuristic devices (Meyer et al., 1998) and communication tools that allow complex and intangible future changes to be presented as cohesive narratives of demonstrable change, hence engendering action amongst non-specialists (Ford et al., 2010; Glantz, 1991). However, these analyses have been open to criticisms of determinism due to a temporal concertinaing which gives the illusion of linearity and reduces the societies in question to respondents to a series of threats. Other criticisms of analogues have revolved around the imprudence of trying to gain contemporary lessons from societies that are markedly different to those of today (Endfield, 2007; Giles and Perry, 1998; Meyer et al., 1998; Patt et al., 2005), the oversimplification of complex processes (Kates et al., 2000), and the lack of meaningful analogues for anthropogenic climate change (Lenton et al., 2008; Williams and Jackson, 2007).

3.3. Social-ecological systems approaches

Much of the critique levied at analogue methodologies has come from the social-ecological systems community that were instrumental in creating the IHOPE (Integrated History and Future of People on Earth) network. This global network was founded by the ecological economist Robert Costanza in 2003 as a way to understand the future of human-environment relationships by studying the past, calling for an integrative approach that rejects past, present and future as separate entities and instead views temporality as the 'long now' (Brand, 2000; Carpenter, 2002; Dearing et al., 2010; Redman and Kinzig, 2003). The SES/IHOPE approach derives from the multiple stable states and non-linear dynamics of C.S. Holling's ecological systems (Gunderson and Holling, 2001; Holling, 1973, 2001) extended to incorporate humans within the social-ecological system (Berkes and Folke, 1998). In this way the approach differs fundamentally from *longue-durée* approaches in that it is derived by ecologists rather than historians, it primarily adopts resilience (Folke, 2006; Gallopín, 2006) rather than vulnerability as a central theory, and it adopts a holistic rather than an anthropocentric framework.

The ultimate goal of this systems-based approach is to provide recommendations that will build sustainability. The various mission-statements provided by IHOPE (Costanza et al., 2007, 2011, 2012; Dearing et al., 2010, 2015; Hibbard et al., 2010; van der Leeuw et al., 2011) advocate the integration of historical data into systems models in order to identify 'safe and just' spaces for humanity to operate within (Dearing et al., 2014). These can be statistical, systems-dynamic, agent-based, cellular-automaton or conceptual models, although the latter is generally viewed as a first step towards the generation of quantitative models (Dearing et al., 2010). Critiques of this approach have revolved around the broader critique of resilience as a discursive concept (Adamson, 2014; Cannon and Müller-Mahn, 2010; Cote and Nightingale, 2011; Pillatt, 2012a; Swyngedouw, 2010; Walker and Cooper, 2011); in particular, that SES approaches present historical trajectories without recourse to political agency, social stratification and consequent uneven distribution of power, and that the models reduce human culture to 'cultural adaptations' (Van de Noort, 2011). Systems approaches can therefore ultimately suffer the same issues that their proponents levied at analogue methodologies. These ideas, however, have considerable standing within discourses around the Anthropocene (Ogden et al., 2013; Rockström et al., 2014; Steffen et al., 2011) and the planetary boundaries concept (Hughes et al., 2013; Rockström et al., 2009; Steffen et al., 2015).

4. Towards historically-informed research in climate change adaptation

The sections above have presented the extent to which the past has been addressed within mainstream climate change adaptation research and outlined approaches to historical climate adaptation emerging from

other disciplines. Within mainstream adaptation research the incorporation of temporal dimensions is being advocated within the nascent adaptation pathways approach, but the exact ways that history can contribute have not yet been adequately explored. Within academic history, climate has been generally avoided as an agent of study due to a disavowal of environmental determinism, and historical climate impacts remain a relatively marginal field of study. The subdiscipline of historical climatology has engaged with the concept of adaptation to a greater or lesser degree; however, there is little evidence of mainstream adaptation research adopting insights from this subfield. Research on the climate and society in the past has therefore often been undertaken by those without a formal historical training, framed as analogues of future change and/or the temporal dimension of complex coupled systems. These approaches can simplify human-environment relationships and downplay human agency, leading to accusations of neo-determinism (Dove, 2013; Hulme, 2011b; Livingstone, 2012, 2015).

In the following section, we present our argument for the contribution that history should make to climate change adaptation research. Our approaches differ from those outlined above in that they expressly focus on the narrative side of history. We suggest that fine-grained analyses of extensive corpora of archival records can bring into focus the role of individual and institutional agency as well as the significance of the uneven distribution of power in past adaptation processes. This allows for a nuanced perspective on long-term, complex human-environment interactions in the past, rather than collapsing these under opaque systems-theoretical *autopoiesis* and a short-term focus on individual events. We argue for three interventions: 'particularizing' adaptation, analysis of institutional path dependency and memory, and historicizing the concept of adaptation through second-order observation.

4.1. Particularizing climate change adaptation



Adaptation to climate change is locally specific and requires a diverse range of actors to be successful (IPCC, 2014). Vulnerable communities largely do not experience 'global' climate change (Brace and Geoghegan, 2011); rather, climate change is experienced in the form of local or regional threats such as extreme weather, the flood regime of a local river, the security of regional food and water supply systems, threats to the built environment, damage to local ecosystems, or coastal erosion. Individuals may link local climate stress to global climate change through information they have taken from the media or elsewhere. However, climate-related hazards are locally and individually specific; the perception of risk is mediated by cultural practices (Douglas, 1992; Hulme, 2015; Rudiak-Gould, 2012) and can be informed by the cultural memory of climate variability and extreme events in the past (Carey et al., 2014; Endfield and Veale, 2017).

Working Group II of AR5 explicitly recognises a need for adaptation that is 'place- and context-specific, with no single approach for reducing risks appropriate across all settings'. However, this particularized view of climate adaptation is not consistent across the literature. Generalised and simplistic readings of climate have appeared in, for example, studies of the relationship between climate and conflict (Burke et al., 2009; Hsiang et al., 2011; Hsiang and Burke, 2014), and climate migration (Feng et al., 2010; Kelley et al., 2015). This risks a return to climatic determinism and the racist connotations that come with it (Liverman, 2009). An over-reliance on model projections – without a deep appreciation of the cultural specificities of a region – can also result in climate 'reductionism' (Hulme, 2011b), which constrains novel solutions and can increase the possibility of negative adaptation consequences and institutional lock-in.

Detailed long-term analyses of the complex relationships between communities and their local climates can help to ground climate adaptation within a particular place and avoid determinism and reductionism. An appreciation of, for example, factors that inform settlement patterns in particularly sensitive areas, cropping patterns that

can mitigate against drought impacts, or cyclical migration patterns, can ensure that adaptation decisions are working with local variability, not only projected unidirectional change. For example, the migration of pastoralists in response to drought is frequently classed as ‘maladaptive’, yet such responses have been shown to be long-standing and effective ways of sustaining livelihoods in the face of climate variability (Agrawal and Perrin, 2009). Historical analysis can also help to understand how adaptation is informed by individual and cultural memory of weather in the past (Carey et al., 2014; DeSilvey, 2012; Endfield and Naylor, 2015; Geoghegan and Leyshon, 2012; Hall and Endfield, 2015), which can ‘serve an important orientating function with respect to understanding popular perceptions of risk to potential future climate change’ (Endfield, 2014, p. 307). Several studies, for example, have demonstrated how the 1930s US Great Plain’s ‘Dustbowl’ drought has become ingrained in the cultural memory of the region and continues to inform attitudes towards risk (McLeman and Hunter, 2010; Meyer et al., 1998; Riebsame, 1990).

Where sufficiently detailed written records exist, historical analysis can also be used to ‘thicken’ the understanding of climate-society relationships. Literature from anthropology and cultural geography suggests that individuals do not passively respond to climate but live within constructed ‘weather-worlds’ (García et al., 2012; Ingold, 2011; Pillatt, 2012b; Rantala et al., 2011). These are produced through ‘affective, embodied and imaginative encounters’ with weather and environment (Geoghegan and Leyshon, 2012, p. 59), interacting with sense of place and community identity, place-specific translations of dominant knowledges (such as climate science or climatic determinism) and locally-specific ‘lay’ knowledges of environmental variability (Brace and Geoghegan, 2011). A focus on weather-worlds can provide a theoretical lens to illuminate the cultural losses likely to result from a change of climate by fully exploring the cultural attachment that people have to weather and environmental variability in a particular place (Adger et al., 2013; DeSilvey, 2012; Rohland et al., 2014). Weather-worlds explored in the past and present can also illuminate the cultural barriers to adaptation, by examining the interrelationships between scientific and local knowledges (Adger et al., 2009a; Geoghegan and Leyshon, 2012; Matless, 2016; Rayner, 2003), exploring how nostalgia for (imagined) past climates can affect the way people interact with their environment today and the perception of threat (Endfield and Naylor, 2015), and understanding why people return to locations with high exposure to extreme events (Rohland et al., 2014). Personal diaries can be a fruitful source for this research (Adamson, 2012, 2015; Bodenmann et al., 2011; Foxhall, 2010; Pillatt, 2012b).

Of more practical policy relevance, place-specific historical analysis can contribute to an understanding of the long-term causes of vulnerability, particularly where adaptation to climate variability itself directly contributes. For example, multi-decadal cyclicity in drought occurrence can promote debt through encouragement of greater farmer risk during prolonged wet periods (Adamson, 2016, 2014; Singh, 2014), and climate stress can also increase indebtedness as a response to livelihood losses (Adamson, 2016; Keshavarz et al., 2013). Historical studies in India have demonstrated how these processes can create intense vulnerability to large-scale droughts (Adamson, 2016, 2014), with trajectories that are closely mirrored in recent decades (Singh, 2014). Understanding such self-reinforcing cycles of vulnerability over long periods can help to target interventions to disentangle livelihood stresses. This is particularly important within areas where extreme events are likely to become more regular, such as monsoon regions.

4.2. Institutional path dependency and memory

The second argument we put forward for historical research is a more explicit focus on the path dependencies embedded within formal institutions and decision-making processes over the long-run. (Note by ‘formal institutions’ we refer to specific organisations or policy instruments, rather than the ‘informal’ values and norms dealt with in the

previous section.) This concept of path dependency was first employed in the field of economics (David, 1985) and further developed by political scientists (Pierson, 2000a, 2000b; Schreyögg and Sydow, 2014). Referring to the economic context of increasing returns, political scientist Paul Pierson highlighted two key characteristics of path dependency. Firstly, that increasing costs develop over time when switching from one policy alternative to another, and, secondly, that clearly distinctive formative moments or conjunctures drive or reinforce divergent paths (Pierson, 2000a). Central to both of these points are developments that evolve over long time spans, i.e. historical processes (Pierson, 2000b).

Institutions are not static entities; their functions are contingent upon the social context within which they were formed and on the memory of issues they have addressed over the course of their existence (van Bavel and Curtis, 2016). Some argue that this path dependency renders us “prisoners of history”, in that institutions tend to embody past understanding and imperatives rather than those attuned to the present and future (Dovers and Hezri, 2010). Yet, too often research tends to view the functioning of institutions in isolation of their deeper historical-social context, and as a result overlooks that certain institutions, policies and adaptation strategies are such (and indeed may be ‘rational’) precisely because they are embedded within very specific social settings (van Bavel and Curtis, 2016), or because they are read, interpreted and mutated by various actors within these settings (Livingstone, 2005; McCann and Ward, 2012). We therefore advocate a historical approach that provides greater contextualisation on how various types of institutions have functioned historically in relation to climatic hazards and impacts – from problem-framing and information gathering to policy implementation and evaluation – in different contexts, and that maps out where and how path dependencies become active over time.

A focus on historical path dependence can permit identification of how institutions have evolved towards the needs of restricted interest groups, how the interests of these groups have shaped adaptation policy over time (e.g. by way of their influence on the equity of access to resources), and ensure that adaptations do not simply reproduce historical power structures. In turn, this focus can add useful temporal depth to the nature of decision-making processes embedded within in specific settings, for example by evaluating the outcomes of adaptation against the extent of discussions held, the information that was taken into account, how many and whose voices were heard, the underlying values that enhanced or restricted certain choices, whether decision-making was local or distant, and the ‘adaptability’ of institutional structures themselves. A search for universal successful characteristics would be misleading, but addressing these questions can enrich our understanding of the interrelation between decision-making, value systems, interest groups and adaptation in particular contexts.

Path dependencies are also manifest in the consequences of decision-making. Current timeframes are largely inadequate to identify instances of adaptation that led to greater vulnerability for certain sections of society, therefore we must turn to the ‘completed experiment’ of the deeper past to do so (Dugmore et al., 2012). This can then help identify the consequences of particular choices for climate-related vulnerability, establish who were the winners and losers, and reveal how such successes and failures arose. This reasoning has its pitfalls (Endfield, 2012); however, research in historical disaster studies has shown how decisions even centuries in the past can become difficult to shift and lead to the development of particular pathways that influence vulnerability and responses right through to the present (Frankema and Masé, 2014; Libecap, 2011; Rohland, 2014b, 2017, 2018).

In some respects, the adaptation pathways literature has already issued a call to identify path dependencies (Wise et al., 2014). However, in a path dependent pattern, events that take place in the early stages of a historical sequence can contain as much, if not greater importance as those in the more recent parts of the sequence. This means that considering the recent past alone, or attempting to map out path

dependencies starting from the present and working back through the recent past, can result in an artificial isolation of false path dependencies in a similar way to past analogies of climate change. In order to uncover path dependency, then, one must start from a critical juncture that underlies all subsequent events (e.g. the imposition of colonial rule upon pre-existing governance structures), which in many historical-institutional contexts necessitates a deeper temporal frame of reference – and by extension a far greater degree of historical research – than the multi-annual to multi-decadal scope advocated in pathways approaches to date. Historical research over long time periods can give more explicit meaning to path dependency and its implications for the current social-institutional context and cultural legitimacy for adaptation far beyond the vague notion that ‘the past influences the present’, or the tendency to simply compile lists of barriers to adaptation.

4.3. Historicizing adaptation and second-order observation

Finally, we argue that an historical approach to adaptation and climate change research provides the tools to reflect critically on present-day scientific concepts. In other words, ‘historicizing the concept’ (Koselleck, 2002) of adaptation allows for the position of second-order observation (Luhmann, 1993) – observing the observers – which is particularly called for in a research field such as climate change adaptation that frequently deals with questions of governance on the local, national or global scale. Questions of power and agency are the subject of this research (i.e. who is adapting where, to what, in which way?) and therefore the research itself becomes an object of such power and questions of agency. As is evident from the UNFCCC political process of the last decade, historically-grown political structures and geographies of power play a major role in global climate politics and climate change adaptation research ultimately feeds into this. Even in the post-colonial era, the distribution of power and attention in global climate politics still wears the imprint of the colonial, at present appearing in the guise of development aid and the weighting towards researchers from the global North within the climate change research community, as well as the hegemony of the English language (Bankoff, 2001).

The rise of postcolonial and subaltern studies in the 1970s precipitated a critical review of the European/western-centric perspective on the rest of the world that affected research in the humanities and social sciences, including history and human geography (Clayton and Bowd, 2006). Yet, even in the field of history, postcolonial positions have not been ubiquitously accepted, and there are other disciplines, such as economics, political sciences and many disciplines in the natural sciences which have remained largely or entirely unaffected by the movement, with the effect that Euro- or western-centrism underlying scientific theories or methodologies in these disciplines often goes without reflection. This is part of what has been called the ‘geopolitics of knowledge’ by Walter Mignolo (2002), one of the most prominent representatives of Latin American subaltern studies.

The idea of ‘adaptation’ or ‘acclimatization’ to the climatic circumstances of the tropics first became a crucial scientific and cultural question for European colonial powers during the period of the establishment of settlement colonies in South Asia and the Americas in the eighteenth and nineteenth centuries (Osborne, 2000). This colonial discourse about the tropics, particularly prevalent in the emerging nineteenth century disciplines of tropical medicine, geography and anthropology, produced a specific, European-focused risk geography of the globe. Based on the experience of high European death rates in the tropical colonies of South Asia and the West Indian islands, the tropical colonies came to be seen as a dangerous and hazardous place for European health and morals (Bankoff, 2001; Livingstone, 2002). The term ‘adaptation’ itself was originally used in the eighteenth century in the context of European colonization to discuss the question of whether and how Europeans could live within the tropical climates of the Americas, a discourse which included a justification for the enslavement of

African people (Long, 1774; Rohland, 2014b).

Reconstructing the entire history of the colonial risk discourse on the tropics is rather complex and is yet to be fully elucidated. Suffice it to say that the realm of politics and political institutions was deeply entangled in the colonial scientific discourse of the nineteenth and early twentieth century. Although understanding of human or cultural adaptation shifted towards a more nuanced conception during the twentieth century (Alland, 1975; Bennett, 1976), the discipline of international law became imbued with the idea of the superiority of European civilization. This fed into the evolution of institutions of global governance from the League of Nations to the United Nations, constructing the ‘Third World’ in this process. This enabled the continuity of the ‘civilizing mission’ of the west in the ‘Third World,’ which coincided geographically to a large extent with the former tropical colonies. This very brief overview shows that there is in fact, in the sense of Mignolo’s ‘geopolitics of knowledge’, an undercurrent of ideas or even ideology running from the colonial era to present day UN development policy and the climate change adaptation research that is entangled with it, though a more precise genealogy is yet to be researched.

These ‘geopolitics of knowledge’ have had two fundamental effects on climate change adaptation research. Firstly, there is the problem of invariably operating with terminology and conceptions of risk, vulnerability and security that have arisen from western science. The postcolonial perspective pushes the realization that these are not ‘neutral’ scientific theories, but loaded with historically grown, cultural values of the west. This point becomes particularly pertinent for researchers employing such concepts to study non-western societies, finding understandings of ‘risk’ and ‘security’ that are quite at odds with their western counterparts (Bankoff, 2001). Secondly, and in accord with the tropical risk geography/development logic, there is a bias in climate change research towards conceiving the societies of the Global South as most vulnerable and most in need of adapting to the effects of global warming, while it seems clear that the Global North will not be affected as badly by dint of its ability to buy or ‘technologize’ its way out of harm. Clearly, this perception is in many ways well founded. However, the examples of hurricane Katrina (in 2005), Fukushima (in 2011), and hurricane Sandy (in 2012) have highlighted the vulnerability of highly industrialized societies to climatic extreme events precisely *because* of their reliance on networked technologies and systems.

We do not argue for the dissolution of the concepts of adaptation or vulnerability into cultural relativism. Rather, we argue for the importance of a second-order observer position with regard to the theoretical concepts of one’s own and other disciplines. In this section, we have shown the importance of peeling off and making lucid the historical layers of such concepts (what the German historian Reinhart Koselleck called *Begriffsgeschichte* – conceptual history (Koselleck, 2002, 2006)) so as not to perpetuate – or at the very least to consciously reflect on – the colonial ‘geopolitics of knowledge.’ The further spread of such a second-order observer position within the climate change adaptation research community may change future research designs, the composition of research teams, and the use of concepts and theories. On a larger scale, it may even decrease the disparity of attention between research from the global South versus that of the global North, as researchers from the latter realm may increasingly draw on (indigenous) knowledge and concepts generated in the global South, outside of the sphere of western ‘geopolitics of knowledge.’

5. Conclusions

Fruitful collaboration between of historians and climate adaptation researchers is constrained as much by disciplinary norms as by a fear of determinism. The culture of individual scholarship within academic history departments can be quite distinct from the impact-driven agenda of much climate change research (Nobert and Pelling, 2017). In

addition, publishing rhythms in the field of history are slower than in most social science and, evidently, extensive archival research also takes a lot of time (Keighren, 2017). The full engagement of historical scholars in adaptation research may therefore have to involve a concerted change of research culture – including engaging with ideas of ‘slow scholarship’ (Berg and Seeber, 2016) – as well as a slight change of research focus within both history and climate change research. Nevertheless, we have outlined three areas in which we believe historians have a vital role to play, as climate change adaptation continues to become more important. Firstly, detailed empirical studies of climate-society interactions over the long term can provide a rich baseline to understand the role that climate plays in a particular location and contextualize adaptation options. In a similar vein, the historical record can provide important insights into decision pathways within formal institutions, which can help to overcome path dependency and avoid unintended consequences of adaptation decisions. Note that analyses of these domains can only occur where the historical record is sufficiently rich to understand the rationale behind certain decisions. Where decisions have to be inferred due to a poor written or oral record there is a risk of determinism; studies that rely only on models and the archaeological record should therefore be treated with scepticism as a guide for policy.

Our third argument is that historians can uncover the power and agency bound up within the history of concepts such as ‘adaptation’. Work such as this already exists, and is most sophisticated, with studies of resilience. Nevertheless, much remains to be examined particularly with the popularization of new terms such as maladaptation. Importantly, this research needs to come from within, as well as outside of, the climate change community. This will, we hope, create a culture of ‘second-order observation’ within climate change adaptation researchers and practitioners and ensure that adaptation options do not reproduce extant power structures.

In the next publication in this series we will elaborate these arguments using empirical research from a number of global locations.

Acknowledgements

An earlier version of this paper was presented at the workshop ‘From Past to Future: Towards historically-informed research in climate change adaptation, which was funded by Center for InterAmerican Studies, Bielefeld University and King’s College London. The authors would like to thank Franz Mauelshagen, Coleen Vogel and Greg Bankoff for their comments at the workshop. Matthew Hannaford acknowledges the support of the ERC Advanced Grant ‘Coordinating for Life’ (no. 339647).

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