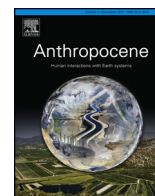




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## Archaeology for the Anthropocene: Scale, soil, and the settlement of Iceland

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### ABSTRACT

Archaeologists have devised numerous methods for measuring and describing past human–environmental interactions, but connecting historic case studies with present-day global concerns often proves challenging. New ways of considering scale are needed to bring case studies of past communities into productive conversation with the global Anthropocene. Iceland, one of the last land masses colonized by humans, was transformed by the agricultural practices of the first generations of Norse settlers in the 9th and 10th centuries, including a significant reduction in forest cover and soil loss to erosion. However, the large-scale, island-wide process of erosion manifested in different ways that become clear when changes in soil cover are investigated at the regional scale. These changes were beneficial in some places and detrimental in others, and the development of inequality was contingent on both social and environmental contexts. Scholars of the contemporary Anthropocene must likewise connect local effects, including landscape degradation and social inequality, to anthropogenic processes that operate beyond the scale of everyday experience. Social landscapes, including infrastructure and environmental degradation, act in concert with ecological processes to reconstitute the ‘natural’ into new, taken-for-granted landscapes of inequality. Studying the way past communities experienced relatively larger-scale anthropogenic environmental change leads to new ways of thinking about, and perhaps managing, human responses to contemporary global-scale change.

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### 1. Introduction

How can archaeology provide a contribution to the present and future of the Anthropocene? Multiple definitions and start dates have been proposed for the Anthropocene since the term was coined, including a recent volume of this journal that used archaeological evidence to demonstrate the significant impact of human activity on global environmental and geological processes throughout the Holocene (Braje, 2015; Crutzen and Stoermer, 2000; Erlandson and Braje, 2013). In this paper, I use the term to denote that period during which human actions have directly led to changes in global-scale climatic systems which, if unchecked, threaten contemporary ways of life (Lewis and Maslin, 2015; Steffen et al., 2011). Kintigh et al. (2014, p. 15–19) listed Anthropocene research among archaeology’s “grand challenges” for the 21st century, calling for the discipline to “situate itself at the center of fundamental questions . . . that are the focus of important international policy debate” (16). The archaeology of the

Anthropocene then becomes a call to action, not only a geological epoch but primarily a political statement that situates present and future environmental degradation as a consequence of the Industrial Revolution and capitalist modernity (Braje and Erlandson 2013, p. 120).

Foley et al. (2013) introduced the term palaeoanthropocene to describe the diffuse, transitional period between early Holocene environmental modification by humans and the clear, global changes brought about by the Industrial Revolution. The palaeoanthropocene designation emphasizes regional human-induced environmental change, recognizing that pre-Industrial environmental change occurred around the world at different paces and scales, in different cultural contexts and by engaging different ecological processes. These changes may not have had immediate global impact, but caused significant alteration to local and regional landscapes. The palaeoanthropocene may therefore be understood to have begun at multiple times around the world. Iceland’s palaeoanthropocene, the focus of the second half of this paper, began at the end of the 9th century CE shortly after the island was first settled by Norse farmers (Streeter et al., 2015). These periods of rapid, human-induced transition between

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different regional environmental regimes can be productively considered as earlier, smaller-scale analogues to the modern Anthropocene.

The discipline of archaeology is well suited to address questions of relevance to the Anthropocene, as by definition it investigates how people have both instigated and responded to changes in the material world around them throughout the span of human existence (see Braje and Erlandson, 2013; Mrozowski, 2011; Rockman and Flatman, 2012). Archaeology has engaged questions of environmental interest since at least the 1950s, with the advent of cultural ecology research (Balée, 2006; Butzer, 2006, 1975, 1975; Crumley, 1994; Reitz and Shackley, 2012; Steward, 1955). Since that time, archaeologists have become well versed in creating environmental reconstructions of past landscapes, and have developed nuanced understandings of the complex and interconnected relationship between human society and environmental change (e.g. Fisher et al., 2009; Hilger et al., 2015; Lentfer et al., 2002; Melville, 1990; Mrozowski, 2006; Thurston, 2009; Woodbridge et al., 2012). From the late 20th century to the present day, many archaeologists have addressed their work towards understanding how past societies have caused and responded to environmental challenges (e.g. Briggs et al., 2006; Cooper and Sheets, 2012; McGovern et al., 2007). These are questions that can only be answered archaeologically, particularly for times and places when historical documentation is absent or sparse. Past examples of sustainability, resilience, and collapse abound in the literature; two of the most well-known palaeoanthropocenes include deforestation on Easter Island (e.g. Rull et al., 2013) and resource management and depletion among the ancient Maya (e.g. Chase and Scarborough, 2014a; Robin, 2006).

More recently, amid increasing concern about human responsibility for global climate change, the archaeology of environmental change has often been framed in terms of its potential to find solutions for contemporary problems, to “use a deeper understanding of the past to create a better future” (Costanza et al., 2007, p. 13; see also Chase and Scarborough, 2014b; Fisher and Feinman, 2005; Fisher et al., 2009; Harrison and Maher, 2014b; Rick et al., 2013, p. 42). Armed with a database of environmental responses drawn from past examples, many archaeologists want their work to inspire concrete, actionable solutions to the problems of global change in the Anthropocene (e.g. Harrison and Maher 2014b, p. 2–3).

A survey of recent literature on the subject suggests the project of turning archaeological findings towards modern environmental policy is not going as well as it could, despite archaeology's long history of engagement with the environmental and ecological sciences (Lane, 2015). In voices ranging from the plaintive to resolute, archaeologists have railed against what has been described as “the marginalization of our discipline” (Redman et al., 2009, p. 15): “Despite producing key data, archaeologists have largely been left out of this discussion” (Kintigh et al., 2014, p. 15); “in practice . . . few synergies have materialized” (Redman, 2005, p. 70); “we still lack complete narratives and concrete ways in which we can make a contribution” (Fisher et al., 2009, p. 256); “what has kept this avenue of research from reaching its potential audience?” (Fisher and Feinman, 2005, p. 64). Despite decades of significant historical and archaeological research, scholars have not yet demonstrated that knowledge of the past is of vital importance in planning for a sustainable future (Braje, 2015).

In this paper, I reflect on some potential causes of this disconnect between intention and action, and provide one possible solution. The major difficulty lies in moving from identification of historic human impact on the landscape to novel and actionable solutions for the present, particularly for issues of global import (Lane, 2015). I suggest, first, that archaeologists are once again up against the problem of scale (Chadwick, 2013; Crumley, 2003;

Harris, 2006): the problems are global but the data set is local. The majority of palaeoanthropocene research addresses ecosystem change within sites and regions; applying the conclusions to Anthropocene changes at the scale of the biosphere is difficult and often problematic (Dasmann, 1976). Second, the most effective archaeological research about past environmental change investigates precisely how long-term interaction between humans and their landscapes shaped and structured the range of possible social actions, integrating social processes into the observations and explanations of change (Hill, 2009; Lane, 2015).

Archaeology cannot tell the world how to halt climate change. However, a focus on the specific social causes of and responses to past environmental change may be able to demonstrate how and why contemporary problems often appear insurmountable. Environmental change in the past, as today, occurred at physical and temporal scales beyond the scope of everyday experience. As people interact with the local effects of large-scale environmental change, landscapes modified by human action and infrastructure can come to seem natural and commonplace (Brownlow, 2006; Cronon, 1991; Hayden, 2012; Larkin, 2013; Lefebvre, 2013, 1991). Archaeological investigation can suggest how social and political factors, such as the management of agricultural spaces or unequal distribution of resources, shaped the way changing environments and landscapes were subjectively experienced during palaeoanthropocene transitions. Viewing the archaeological record through such a lens may open new ways to address contemporary responses to the experience of climate change, such as institutionalized denial and political paralysis. I conclude with a case study from North Iceland, to explore how such an archaeology might be practiced.

## 2. The problem of scale

Environmental research in archaeology often asks how people and societies have reacted to changing environments. The archaeological data that results from this approach can elucidate long-term cycles of change, and sometimes determine the ultimate cause for observed environmental changes within a particular locale. This leads to conclusions that are both complex and historically specific. Archaeological research has repeatedly shown that when faced with environmental change, anthropogenic or otherwise, people react in ways that make sense within their particular social, political, and environmental context. These actions may or may not lead to the long-term survival of the society (Correia, 2013; Ensor et al., 2003). However, while socio-environmental interactions within each particular archaeological case study can be made legible, the results are rarely actionable in the present. There is often a mismatch in both spatial and temporal scale between the problems of modern climate change and the data set that results from an archaeological investigation. For such research to be effective, the two scales must be mutually intelligible (Crumley, 2003). One way in is to focus on scale itself, to recognize that environmental change and individual practice operated at difference scales in the past, just as they do today.

At relatively small scales, from the local to the regional, standard archaeological methods and questions have sometimes provided actionable suggestions. When a direct historical connection exists between past and present landscape practices, archaeology can provide an understanding of how long-term cycles of change have led to the present circumstances, which can sometimes suggest strategies for reversing or mitigating those specific changes (e.g. Lansing, 2007; Redman et al., 2009; Streeter and Dugmore, 2013; Van de Noort, 2013). These successes are rare, confined to regions near or very similar to the archaeological site, and provide actionable strategies only at the scale of the local community.

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