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Introduction

Materializing Climate

In the wake of the 2015 United Nations conference on climate change that reached an agreement among 195 nations to reduce human activities that facilitate global warming, scholars across the academy, from climate scientists to literary critics, continue to debate the adoption and implications of the designation "Anthropocene" to describe the current period of earth and human history – a time when humans are making an unprecedented impact on the earth system that has considerable consequences for all life on earth. Some, such as Crutzen (2002) and Morton (2013), trace its beginning to precisely 1784 with the invention of the steam engine and the "inception of humanity as a geophysical force" (Morton 2013: 7). Others place its boundary in the middle of the twentieth century, after which the chemical traces of atomic bombs are globally present in the earth's surficial stratigraphy (e.g., Waters et al. 2016; Zalasiewicz et al. 2015). While there is continued debate about where to place the Anthropocene's chronological boundary as a geological epoch (cf. Lewis and Maslin 2015; Vince 2011; Waters et al. 2016; Zalasiewicz et al. 2015), it is undebatable that the Anthropocene has gone "viral" – spanning both popular and academic discourses and spawning numerous lectures, symposia, editorials, articles, courses, films, and even designated journals. Most scholars, it seems, have been quick to adopt this new geological and historiographical period. And, why not? By definition, it re-centers humans and the study of humanity on some of the most pressing environmental and political concerns of the day.

The Anthropocene is now broadly discussed because its implications transcend obvious environmentalist concerns for global warming, species extinctions, conservation, and sustainability, and extend to how natural scientists and humanist scholars conceptualize many of their foundational categories. As the historian Dipesh Chakrabarty (2009) suggests, human

explanations for climate change that arguably warrant the designation Anthropocene "spell the collapse of the age-old humanist distinction between natural history and human history" (201), and destabilize the ontological foundations of modern political institutions that are based on ideals of separating a Society of people from an external realm of Nature. In short, the Anthropocene is huge – not just because for many people it is synonymous with the broad-scale implications of global warming and its catastrophic consequences for all life on earth (as if that weren't enough), but also because it may imply the end of science and society as they have long been conceptualized. As the philosopher of science Bruno Latour (2014a) has noted, the designation subverts traditional conceptions of an external objective natural world devoid of humans when humans are active not only in the construction of facts about that world, "but also in the very existence of the phenomena those facts are trying to document" (2). Needless to say, such pronouncements reinforce the need to analyze and perhaps rethink how we understand social life in the context of climate change, especially as it relates to fundamental anthropological concerns with nature, culture, climate, history, agency, and politics. Thus, much ink has been spilled over the Anthropocene since it was initially proposed just over fifteen years ago by atmospheric chemist Paul Crutzen and ecologist Eugene Stoermer (2000). And yet there is more to spill.

Social scientists and humanities scholars have only begun to significantly address the Anthropocene. As Andreas Malm and Alf Hornborg (2014) have critically pointed out, debates concerning the Anthropocene have been so dominated by the natural sciences that the concept has furthered the divide between nature and humanity.[1] Yet, it is not difficult to see how anthropology and the social sciences writ large may contribute to the debate over its historiographical, conceptual, and political usefulness. For instance, most of the Anthropocene literature reproduces the very dichotomy of Nature and Society that many argue the period dissolves. It treats the human species as a homogeneous geophysical force that stands above Nature or comes to dominate it, producing in turn environmental and climatic conditions that are distinct from the natural conditions of the past. Yet, global warming has not been produced by a uniform human species, undifferentiated by class, gender, or geography. Moreover, a massive corpus of anthropological research has posed serious challenges to the universality of the Nature-Society binary that undergirds the Anthropocene narrative at the same time

[1] See also the appeal of Ellis et al. (2016) to "Involve social scientists in defining the Anthropocene."

that climate scientists have shown how many of earth's biological species have long shaped the planet's geophysical conditions through a variety of interrelations with other organisms and materials. Nevertheless, these binaries, the distinctions between Society and Nature and human and nonhuman geophysical actors, continue to be reproduced in the Anthropocene narrative even as scholarship emanating from across the physical, natural, and social sciences has begun to call attention to the long-term porousness of organism–environment relations and the capacity of dynamic materials to shape both social and environmental histories (e.g., Coole and Frost 2010; Lewontin 2000; A. Moore 2016). Indeed, the Anthropocene by definition evokes a highly *anthropocentric* bias.

While existing scholarship on the Anthropocene has called attention to human agency as a geophysical force, it has only begun to engage with the recent multispecies and materialist turn in the social sciences and humanities that questions the ontological distinctions between humans and other organisms and materials as constitutive agents of environmental and social conditions (e.g., Haraway 2016). A variety of "posthumanist" and "new materialist" scholarship has positioned humans within webs or networks of people, things, materials, and organisms and attributed action and agency to a variety of heterogeneous assemblages (cf. Bennett 2010; Ingold 2012; Latour 2005). This scholarship has equally high stakes to that of the Anthropocene inasmuch as it has problematized issues that are profoundly important to both academics and policy makers, questioning who defines the contours of society, how agency is understood, how history occurs, and how responsibility is allocated. Thus, on one hand, scholars of the Anthropocene are now highlighting the agency and implications of humans as a geophysical force capable of impacting all life on earth for generations to come. On the other hand, scholars from the humanities and the social sciences are calling attention to the historical agency of nonhuman things, organisms, and physicochemical processes that also shape socioenvironmental histories and limit the agentive actions of humans at the same time that they make them possible.

It is somewhat ironic that these two strands of scholarship have not as yet been brought more fully into direct conversation. Climate, after all, could be considered a paradigmatic example of what Deleuze and Guattari (1987) describe as an assemblage comprised by ontologically heterogeneous elements (see also DeLanda 2006). As we detail in the next chapter, it is constituted by interrelationships and dependencies among a multitude of different materials, things, and organisms that range from the gravitational pull of massive celestial bodies that impact earth's orbital

parameters to the respiratory activities of microscopic bacteria that contribute to atmospheric greenhouse gas concentrations. Indeed, the vicissitudes of climate are nothing less than the dynamic configurations of a variety of active bodies, organisms, and materials that constitute environmental conditions through their relational actions: earth's tendency to wobble on its orbital axis, trees' requirements to sequester carbon, the reflective properties of snow and ice, beavers' desires for wetlands that produce methane, and, of course, humans' dependences on fossil fuels all contribute to climate. Indeed, James Lovelock (2001) has now famously argued with his theory of *Gaia* that part of what has made earth's atmospheric and climatic conditions habitable to human life *is life itself*, given feedbacks between the atmosphere and biosphere. Rather than implying a singular logic or order as a vastly distributed *hyperobject* (*sensu* Morton 2013), however, the characterization of climate as a dynamic organism or assemblage necessarily evokes a temporality of an emergence, in which heterogeneity, contingency, multiplicity, and historical dynamics create inter-relationalities between diverse sets of actors, processes, and events to generate what emerges in its final form as climate (Collier and Ong 2005:12; see also DeLanda 2006). Yet, that is not to say that all of these relationships produce climate uniformly. As Smith (2015) cogently reminds us, to understand the "historical workings" of an assemblage means defining elements that "do not just articulate, but operate" (48). And this brings us to our present concern for spilling more ink on the Anthropocene and the objectives of this book.

We share the well-founded and urgent concerns for mitigating global warming and as such believe that it is important to critically question the Anthropocene's empirical, philosophical, and political implications from the various lenses that anthropology provides. By documenting the diverse ways people conceptualize, engage, and produce their environments, a long history of ethnographic and archaeological scholarship has challenged the underlying Nature-Society divide that makes the Anthropocene narrative possible. Moreover, to attribute a geological or historiographical period to the *anthropos* is to attribute geophysical agency to the human species as a totality. Yet humans do not produce environments as a homogeneous mass of actors; they do so differentially and unequally as placed, classed, gendered, and cultured actors. These differences are often *silenced* (*sensu* Trouillot 1995) in overgeneralizing emphases on anthropogenic environmental narratives – a critique that we argue applies as much to the Anthropocene's historical emphasis on the human species as it does to many archaeological narratives of the more distant past that treat societies

as undifferentiated environmental actors. At the same time that such narratives often ignore social differences among people, the *anthro*pogenic framing also loses sight of the fact that differentiated people only act through articulations with a variety of materials, organisms, and things that also impact and contribute to the outcome of their actions. This point is now being highlighted anew by a variety of scholarship produced under the guise of new materialist and posthumanist approaches that have questioned human exceptionalism in producing *sociomaterial* histories, which are conjoined products of actors that fall on both sides of the human–nonhuman divide. By distributing action among humans, other animals, plants, and things in constituting sociomaterial conditions, and by providing the foundations for *materializing climate*, such scholarship forces us to reevaluate the stakes of the Anthropocene. The question "when did people become geophysical agents?" or when can it be said that humans began living in a period that was "after nature" requires a much grayer response when one considers humans as part of a dynamic and heterogeneous assemblage of humans and nonhumans that have always collectively, albeit unequally, produced environmental histories. Furthermore, the political questions of naming people, corporations, and institutions as culpable and accountable for climate change and climate-change-related disasters is similarly complicated with action distributed across an assemblage of humans and nonhumans. Although these are difficult questions to address, the stakes are clearly high.

In this book we draw on our anthropological work in South Asia as well as on a variety of research from across the social and natural sciences in other geographical contexts to critically intersect the ostensibly contradictory stances of anthropocentric and new materialist frameworks as they pertain to the Anthropocene – but not as a mere philosophical exercise. Our concerns have as much to do with the politics of global warming that the Anthropocene narrative constrains and enables as they do with philosophical issues surrounding questions of actors, agency, or the nature of history. We will speak of humans as a heterogeneous category not a singular one, while remaining cognizant of how recent posthumanist, new materialist, and animal studies scholarship has shaken the very foundations of modern species differentiation and rightfully drawn attention to the racial, class, and gendered logics of anthropocentrism (Kirksey and Helmreich 2010; Leong 2016; Livingston and Puar 2011).

And yet, while we recognize the need to decenter and destabilize the ontological certainties underlying the human–nonhuman binary, a much required political intervention to "unravel" the Western, individuated

category of the human, we remain wary of erasing urgent questions about human action and responsibility in shaping climate even as we recognize that we can only "become human with others" (Fuentes 2015). The category "human" is not a stable species category and yet the process of its stabilization is real, with consequences for some segments of humanity who have a hard time being seen as such and also for the other-than human beings, who, according to some Eurocentric perspectives, belong firmly to the realm of Nature. To the extent that we address human responsibility for climate change, our approach is, strictly speaking, still anthropocentric. So while we call attention to the distributed quality of action across multiple species, things, objects, and materials, the burden of responsibility, as we will later explain, is singularly human, yet not in any undifferentiated sense.

As our cases in South Asia exemplify, there is a serious need for anthropologists to critically engage with emerging discourses on the Anthropocene and to do so with attention to how people experience climate change as situated and differentiated actors, not simply as a homogeneous species that externalizes Nature. This does not mean, however, that humanity is the only force that constitutes a living and dynamic universe of materiality that is in any way limited by human design or subservient to its purposes. Perhaps, as McLean (2016) provocatively claims, an "irradicable or inscrutable nature," which lies "outside our capacity to relate to it" might indeed exist and to picture it is to recognize the limits of human thought and imagination. And yet, while we agree with him, we will argue that the Nature of the Anthropocene narrative is not an "inscrutable nature" (*sensu* McLean 2016), but one that is thoroughly externalized and simultaneously made even more amenable to technological interventions, and it is this conceptualization of Nature that we question in this book.

We do so by bringing new materialist scholarship into conversation with the all too urgent debate on the Anthropocene in order to ground climate change in historic human and nonhuman relationalities and bridge two related but different bodies of literature. This allows us to take seriously everyday lived experiences of changing weather and its impact on human lives as a significant aspect of the current framing of climate change. Such a focus, we will demonstrate, is critical for generating a distinctive politics of climate change that is attentive to people's everyday engagements with other environmental constituents and also to the efficacy of matter in shaping human welfare and environmental outcomes. As we will argue, an anthropologically informed analysis of how people historically and differentially engage a multitude of nonhuman environmental actors is not to disregard human agency as much as it is to locate its impact within

complex assemblages of historical human–nonhuman configurations that are dynamic and emergent, and therefore also not entirely predictable. Such an analysis does not minimize politics or the need for human action; on the contrary, it problematizes tendencies to conflate the ontology of action with politicized claims of blame and culpability. At the same time, such an approach opens new possibilities for political action, in which claims to social and environmental justice, instead of reifying Nature through market-based conservation interventions, are grounded in place-based and situated human–nonhuman relationalities.

Anthropology, including all of its subdisciplines, is ideally situated to make this intervention. Only anthropologists are equipped with methods to map the situated ways that human actions are historically embedded in the earth's materiality of nonhuman things, organisms, and physicochemical processes that collectively produce environmental histories at multiple scales and temporalities. At the same time, anthropology gives us access to how people differentially experience and produce environmental phenomena that are more tangible than climate in their immediacy but no less real. Thus, by combining methods and analyses from archaeology and cultural anthropology, we seek to contribute to an important new emphasis in the study of climate change that calls for a greater degree of integration and collaboration among anthropologists while forcing us to think reflexively about our roles and responsibilities in mitigating climate-related disasters (Crate 2011).

Assembling the Anthropocene and Fracturing the *Anthropos*

Since the Anthropocene's early formulation by Crutzen and Stoermer (2000) to name a period of earth history that separates the current time of global human impacts on the planet's ecological and systemic functioning from the Holocene, the most recent geological epoch that spans approximately the last 11,500 years, the concept has variably been taken up by academics across both the natural and social sciences. For many scholars of the humanities it has come to represent a period in which humans have emerged as a "geophysical force" (e.g., Chakrabarty 2009; Morton 2013) to create a "damaged earth" (Haraway 2016:2), or "a dark new ecological era," one that was brought on by the Western belief in the great divide between Nature and humanity (Carrithers et al., 2011:663). The environmental historian Ian Miller (2013), for instance, has argued that the Anthropocene be considered coeval with the development of "ecological modernity" based on his research in Japan, where the emergence of zoological gardens

during the nineteenth century paradoxically assembled humans and animals from vast distances for the purposes of setting Nature apart from the modern, "Western-style civilization" (2). Yet, by underscoring humans' emergence as a geophysical force that is capable of shaping global environmental and climatic conditions for all life on earth, the Anthropocene has largely come to represent a period in which this great divide is now obsolete. It is a period in environmental imaginaries and historiographies that is now post-nature or "after nature" – "the end of the division between people and nature" in the words of Jedediah Purdy (Purdy 2015:3). For many anthropologists the Anthropocene stands in for the dissolution of the long-standing modernist binary that has structured how we understand political life in distinction from an external natural world. The Anthropocene designation has therefore come to mark a conceptual shift in the ways anthropologists engage with the binaries between nature and culture and human and nonhuman.

At the same time, the Anthropocene designation has also provided an opportunity for anthropologists to critically address the natural sciences' emphasis on the *anthropos* as a homogeneous species (Gibson and Venkateswar 2015:9). For instance, the natural sciences' emphasis on the human species has allowed some social sciences and humanities scholars to confront critical epistemological and ontological questions about the nature of history, historical subjects, and the constitution of the material world in which humans are embedded. By marking a period of human-caused global warming, the Anthropocene has engendered a philosophical recognition of objects and phenomena that transcend immediate human perception and experience. Timothy Morton (2013), for example, has argued that climate challenges human perception because of its nonlocal and enveloping qualities, and thus might better be considered a "hyperobject." Regardless of whether we consider climate as an (hyper) "object" or dynamic assemblage, its material instantiation in time and space raises significant questions that any discussion of global warming has to address. Who are the subjects and objects of history when massive planetary changes cannot be directly perceived and can only be brought about through collective action at the level of the species? How can anthropology contribute to an understanding of climate change if the object of investigation defies human perception? As a concept the Anthropocene has thus emerged not simply in reference to how history is written in this new period, but also in connection to the theorization of the ontological and epistemological relationships between subjects and objects, the constitution of social actors, and the mediation of perception and historical imagination (cf. Chakrabarty 2009, 2012; Latour 2014a; Mikhail 2016; Morton 2013).

On the other side of the human and natural sciences divide many environmental scholars have adopted or advocated the Anthropocene's usage to signify a period during which humans have come to "dominate the great forces of nature" (Steffen et al. 2007: 614), or rather, as the climate scientists William F. Ruddiman et al. (2015) have characterized it, when humans have "*replaced* nature as the dominant environmental force on Earth" (38, our emphasis). In these contexts the Anthropocene largely demarcates a transition from the human species as merely agents of regional ecological and *biological* histories to agents of *geophysical* history that are capable of impacting climate and all planetary life by modifying the earth system as a whole. Earth system science research has largely cast attention on the processes by which humans have impacted the otherwise natural workings of the planet (e.g., Crutzen 2002; Hamilton 2015; Ruddiman et al. 2016; Stefen et al. 2007). But not surprisingly, the term's inherent temporal designation has forced geologists to critically focus on the Anthropocene's utility in demonstrating humans' planetary impacts within global stratigraphic systematics – i.e., the degree to which the physical environmental impacts of humans will be characteristic of earth's long-term lithological and sedimentary records (e.g., Vince 2011; Waters et al. 2016; Zalasiewicz et al. 2015). Indeed, vociferous debate has subsequently been generated among scientists about where to place the Anthropocene's boundary, or stratigraphic "golden spike" on the Geologic Time Scale that is governed by the International Commission on Stratigraphy (ICS). There has been no dearth of suggestions, with 1945 and 1784 being the most commonly advocated among many others – including 1610 (i.e., the "Orbis spike"), supplanting the "Holocene" and using the term to apply to the entirety of the last 10,000 plus years, or marking its inception with megafauna extinctions of the late Pleistocene (Table 1.1; cf. Braje 2016; Crutzen 2002; Erlandson and Braje 2013; Hamilton 2015; Lewis and Maslin 2015; Smith and Zeder 2013; Waters et al. 2016; Zalasiewicz et al. 2015).

Among all of the various academic emphases on the designation Anthropocene, it is worth pointing out that the most literal translation of its etymology in scientific nomenclature references the "recent age" (*cene*) of "humans" (*anthropos*). And indeed, regardless of research foci among the many natural and human science scholars that have engaged it, the Anthropocene concept appears as a chronological designation – a period during which scholars recognize humans as a geophysical force, when the earth system has shifted from "its natural geological epoch" (Stefen et al. 2007:614), or a period after which the physical traces of the *anthropos* appear in stratigraphic material evidence, characterizing earth's species

TABLE 1.1 *Proposed dates for the start of the Anthropocene, after Lewis and Maslin (2015)*

Note that the Anthropocene Working Group is only seriously considering those situated in the twentieth century, and to a lesser extent that of the eighteenth century (see also Ellis et al. 2016).

Date of Origin	Event	Primary Stratigraphic Marker
ca. 50,000–10,000 BP	Megafauna extinction	Fossil record for megafauna extinction
ca. 11,000 BP	Origin of agriculture	Fossil pollen or phytoliths of evidence for agriculture
ca. 8,000 BP	Extensive farming	Carbon dioxide inflection in ice core data
ca. 6,500 BP	Irrigated rice production	Methane inflection in ice core data
ca. 3,000–500 BP	Anthropogenic soil development	None
1492	Columbian exchange	Carbon dioxide low point in ice core data (i.e. Orbis spike)
1760	Industrial Revolution	Fly ash from coal burning
1945	Nuclear weapon detonation	Radionuclies (14C) in tree-rings
1950	Persistent industrial chemicals	E.g., SF6 peak in glacial ice core data

distributions and chemical composition. The Anthropocene has also been taken to mark the dissolution of natural history and human history and the end of the division between Society and Nature, a time when humans are now a great force of Nature. Given that the Anthropocene appears foundationally as a temporal or historiographical designation about how *human* activities relate to a variety of organisms, materials, and things that constitute our earthly environment one might assume that *anthro*pology would have greatly contributed to its formulation.

It is surprising to us that anthropology – a scholarly discipline that often emphasizes how experiential dimensions of human-environment relationships relate to long-term landscape transformations – has largely been peripheral to discussions of the Anthropocene. As archaeologist Keith Kintigh et al. (2014:15) have stressed, archaeology has barely contributed to the formulation of the Anthropocene concept. Indeed, the canonical articles that originally defined the Anthropocene cite little to no archaeology in their discussion of the current and alarming changes to earth's