Introduction
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This volume creates a new “state of the field” inventory and analysis of the central terms and debates currently structuring the most exciting research in and across environmental studies, including the environmental humanities, environmental social science, sustainability sciences, and the sciences of nature. Inspired in part by Bruce Burgett and Glenn Hendler’s *Keywords for American Cultural Studies*, and linked to that volume through Vermonja Alston’s essay, “Environment,” which she revisits and expands here for *Keywords for Environmental Studies*, we, and each of our contributors, aim to show how, in its broadest sense, the term “environment” enables “a questioning of the relations of power, agency, and responsibility to human and nonhuman environments” (Alston 2007, 103).

The deeper roots of this Keywords project may be found in cultural theorist Raymond Williams’s *Keywords: A Vocabulary of Culture and Society* and the iconic “blank pages” at the end of that volume. Williams insisted that his book was not “a dictionary or glossary of a particular academic subject. . . . It is rather, the record of an inquiry into a *vocabulary*” (1976 [1983], 15). He interpreted the blank pages at the end of the book “as a sign that the inquiry remains open, and that the author will welcome all amendments” as contributions “towards the revised edition which it is hoped will be necessary” (1976 [1983], 26). Williams’s own revised and expanded *Keywords* edition, coupled with Burgett and Hendler’s first *Keywords* project (recently released in a second edition) and the new Keywords volumes in the New York University Press series, has proved Williams’s hunch (that the project would be ongoing) to be correct. From “Ecotourism” to “Eco-terrorism,” from “Genome” to “Species,” readers can see how dramatically Williams’s project is expanding in the fields we group into environmental studies for this volume.

Williams shrewdly observed that “[n]ature is perhaps the most complex word in the language” and that any full history of the uses of the word “would be a history of a large part of human thought” (1976 [1983], 219, 221). Noel Castree, who takes up the challenge of addressing that history in this volume, notes that, today, “the things that certain biophysical scientists are saying (and doing) are pitching one of the Western world’s most foundational concepts into a state of crisis. For better or worse, ‘nature’ appears to have more of a past than a future (hence the scare-quotes).” However, Castree notes, “there’s no compelling evidence that ‘nature’ has lost its semantic importance as a key signifier in both expert and lay discourse. It still performs very important work in various cognitive, moral, and aesthetic registers; a great deal is still said and done in its name.” This is why inquiry into the work of “nature” is still crucial these many years after Williams first wrote his own essay. As Castree writes, such an inquiry can help us answer such questions as, “Is the death of nature real or exaggerated,
a matter of degree or kind? Which scientists, if any, might we turn to for robust evidential answers to this question?” As Dorion Sagan observes in his essay for this volume (“Evolution”), “massive evidence—from fossils, biology, morphology, organismal behavior, biogeochemistry, ecology, and cosmology”—has made it clear that “life [has been] evolving since its inception over 3.5 billion years ago.” An eco-evolutionary perspective has made it even more clear that “for humans to survive in the long run we must become more attentive of, and connected to, the planetmates that support us within the long-lived global ecosystem,” a process that will require all the disciplines to be conversant, one with the others.

The essays in Keywords for Environmental Studies show how a given term circulates within a particular knowledge community while also circulating across others, including nonacademic publics. Indeed, some of the essays show how terms and problems move from activist and general publics into academic knowledge communities, and in doing so, sometimes reverse the directionality and routes that academics often imagine knowledge follows. Each author is committed to an interdisciplinarity that is accessible to nonacademic audiences while making sure to include the most up-to-date research on a given term.

Readers will discover in the pages to follow that a broad range of approaches—including the quantitative and the qualitative—are critical to addressing the central issues in the field. Readers will also find certain inconsistencies and contradictions within the volume that reveal that some of the most important keywords continue to be used in different ways by writers coming from different scholarly traditions. This is not simply an equivocation or easy relativism but rather a stage in knowledge production that, we would argue, helps develop definitions and genealogies stable enough to allow the pursuit of broadly collective goals and actions. For example, several essays in this volume use different start dates for the “Anthropocene,” a term coined by atmospheric chemist Paul Crutzen and biologist Eugene Stoermer to describe a new epoch in Earth’s history. Crutzen and Stoermer intended the term to identify a pivotal transformation in the life of the planet that began some two hundred years ago, around the time of the invention of the steam engine, in which humans became the primary driver of rapid changes across the world’s ecosystems. Although this idea has gained considerable traction since the early 1990s, the International Commission on Stratigraphy, the scientific body charged with determining whether or not the planet has moved beyond the Holocene (the geological era that began at the end of the last Ice Age), is still “years away” from a formal decision (Revkin 2015). However, leaders of the Anthropocene Working Group (established in 2009 by the Subcommission on Quaternary Stratigraphy), including Jan Zalasiewicz, Mark Williams, and Colin Waters, who contribute “Anthropocene” to this volume, have already moved substantially beyond asking “whether such a transition has occurred to deciding when” (Revkin 2015). In a paper published in early 2015 in Quaternary International, twenty-six members of the working group point to roughly 1950 as the starting point, indicated by a variety of markers, including “global spread of carbon isotopes from nuclear weapon detonations starting in 1945 and the mass production of and disposal of [approximately six billion tons of] plastics” (Revkin 2015).

The gap between the dates proposed by Crutzen and Stoermer and the working group for the start of the Anthropocene not only suggests why contributors to this volume might place its onset in different eras but also illustrates how ongoing conversations and debates (in this case spanning more than twenty years) help shape
the production of knowledge itself. In their essay for this volume, Zalasiewicz, Williams, and Waters trace the origin of the concept of anthropogenic change to the earliest days of organized geological study, when the Comte de Buffon prepared “arguably the first evidence-based geological history of the world—Les Époques de la Nature, published in 1788.” Humanists, familiar with Thomas Jefferson’s Notes on the State of Virginia, know that Buffon’s theories on racial environmentalism have been soundly dismissed, but they may not know that Buffon was the first to describe a “time during which humans dominated and warmed (beneficially, Buffon thought) the Earth” (Zalasiewicz, Williams, and Waters).

The genealogy and history of the keyword “Anthropocene” dramatically illustrate the benefits of bringing humanists, social scientists, and scientists together in one volume at this particular stage of knowledge production in environmental studies. As scientist Daniel P. Schrag, director of the Harvard University Center for the Environment, has observed, it is more important than ever to foster “conversations and interactions between scholars from different fields” (Schrag 2009, vii). Successfully addressing the challenges of accelerating environmental change will require understanding Earth systems, new technologies, economics, and policy. But it will also require understanding that emerges from the humanities about the “cultural components that led us here, the religious and philosophical traditions that affect how people make choices about their interactions with the natural world, and the social norms that are fostered by music, by art, and by literature” (Schrag 2009, viii). Perhaps even more important, as Lawrence Buell, who includes his own influential inventory of key terms in The Future of Environmental Criticism, has observed, “we who study in the environmental humanities and sciences are presented with challenges of ‘intercommunication’ because we have no ‘critical vocabularies’ in common” (Buell 2011, 107). More urgent still, writes Noel Castree and colleagues, is the fact that much of the writing about the “human dimensions” of global environmental change in the social and sustainability sciences has offered “little or no sense of humans as diverse, interpretive creatures who frequently disagree about values, means, and ends; and there is nary a mention of power, violence, inequality” (Castree et al. 2014, 765). Castree adds that there now is wide recognition that the natural sciences cannot provide us with all the “knowledge or insight humanity will need to inhabit a post-Holocene environment” (2014, 763). As Andrew Ross writes in his entry for this volume (“Climate Change”), the ongoing task of averting or mitigating drastic environmental change will require a vast collective, creative, interdisciplinary effort to engage in a “social experiment in decision making and democratic action” and “concerted action on the part of political and economic elites as well as comprehensive shifts in the routine behavior of general populations, especially in carbon-rich countries.”

Each essay in this volume frames and pursues these conversations and interactions from the perspectives of the humanities, social sciences, and sciences in ways that open access to debates on each keyword to scholars and general readers alike. Building on the work of influential feminists, poststructuralists, sociologists, and science and technology studies (STS) scholars, including Sandra Harding (1986), Donna Haraway (1991), and Val Plumwood (2002), and influenced by the convergent development of narrative, network, complexity, and relationality theories in the social and natural sciences (Latour, 1993, 2004a, 2010), contributors illustrate how the environmental humanities and sciences of nature are, in a sense, “reencoding” each other, by blurring the lines separating humans, nonhuman animals, and machines, nature and culture, and the humanities and
the sciences. As Dianne Rocheleau and Padini Nirmal observe in their essay on “Culture,” scholars who take interdisciplinary approaches are increasingly taking up the “rhizome” (the root structures that supply nutrients to trees and other woody species) as an ideal metaphor for the intellectual, artistic, and scholarly histories and methods that are now profoundly transforming the larger endeavor of “environmental studies.” Anthropologist Anna Tsing’s study of the matsutake mushroom is often cited as inspiration for this transformation. She and her collaborators, in an open-access digital archive, write compellingly about the global cultural, scientific, and commercial networks surrounding the matsutake, as they explore entangled intellectual, cultural, and natural systems (Tsing 2012; matsutakeworlds.org) that can be “read” or narrated as what environmental literary critics have begun calling “storied matter” (Iovino and Oppermann 2012).

Work such as Tsing’s is enriching the environmental humanities and sciences “with a more extensive conceptual vocabulary” that rethinks “the ontological exceptionality of the human” (Rose et al. 2012, 2). New concepts such as “slow violence” (Nixon 2011), “transcorporeality” (Alaimo 2010a), and “queer ecologies” (Mortimer-Sandilands and Erickson 2010), and new modes of research and writing such as “multispecies ethnography” (see Rose, “Ethnography,” this volume) and “biosemiotics” (Maran, this volume) reveal the inseparability of the humanities and sciences as they account for humans, nonhuman animals, invasive plants, microbes, and toxins on the move, all of which have material ramifications across place and space, entangling bodies, politics, and ecologies (Kirksey and Helmreich 2010; Rose, “Ethnography”; Maran, “Biosemiotics”). Indeed, each essay in the pages to follow illustrates how research in biology, chemistry, and physics, once on the margins of the humanities and social sciences, is pressing into the foreground of the fields of anthropology, literary study, history, politics, economics, and geography, among other fields.

These interdisciplinary efforts have implications not just for academics but also for the activists and community members who, as Giovanna Di Chiro notes in her essay on “Environmental Justice,” “challenge the disproportionate burden of toxic contamination, waste dumping, and ecological devastation borne by low-income communities, communities of color, and colonized territories.” For these groups, the “environment” is located in the places where we live, work, play, and learn. They “advocate for social policies that uphold the right to meaningful, democratic participation of frontline communities in environmental decision making, and they have redefined the core meanings of the ‘environment’ and the interrelationships between humans and nature, thereby challenging and transforming environmentalism more broadly” (Di Chiro). Likewise, in the fields of urban and political ecology, places that are typically represented as being “outside” of “Nature,” including the city, are being reimagined not as “anti-nature” but as “socionatures”—sites where the human and nonhuman intermingle to reveal a “conjoint constitution” of forces (Swyngedouw and Heynen 2003; Freudenburg, Frickel, and Gramling 1995). Hence nature is no longer a thing so much as a cultural “terrain of power” (Moore, Kosek, and Pandian 2003). As Nik Heynen writes in his entry on “Urban Ecology” for this volume, “The metabolic lens offered through Marxist urban political ecology can be marshaled to consider both who and what suffers and who or what benefits from the interrelated and interdependent processes of urban ecological change marching forward into the twenty-first century.” In their contribution, Mario Blaser and Arturo Escobar write that political ecology is a field in which scholars engage “reality as an emergent
effect of relations and interdependencies that permanently overflow the boundaries based on modern binaries (nature/culture, subject/object, material/immaterial, and so on); and via a revaluation of non-Western knowledges that emerge from conceiving what exists and make up the world in other ways than in terms of those binaries” (“Political Ecology”).

These developments have many implications with regard to questions about links between environmental politics and citizenship as well. Environmental justice movements and scholars have recently begun revisiting concepts of environmental citizenship that decenter human beings and expand the category of personhood to other living entities (Adamson and Ruffin 2013; Adamson 2014). As Sheila Jasanoff writes in her essay on “Democracy” for this volume, “the arrival of the ‘environment’ as a matter of public concern. . . . prompted once-unimaginable questions about the rights and entitlements of human beings and their fellow creatures on this planet.” Recognition of rights/citizenship within ecosystems and other-than-humans has the potential to transform the concepts and the institutional power that is traditionally behind them, thus destabilizing state and corporate power and challenging traditional notions of sovereignty (Adamson and Ruffin 2013). Ultimately, then, the essays in this volume point to critical questions that must be asked and answered with regard to what it means to be “human” and what it means to be in multispecies relationships within the “Biosphere,” which Tyler Volk in his essay for this volume defines as “the three environmental matrices of atmosphere, soils, and oceans” that “form a closely integrated network” called “Earth.”

Finally, the ideas and products of the arts, which make manifest our capacity to be deeply imaginative, creative, and feeling, will be critical to these conversations. As Joni Adamson writes in her essay on “Humanities,” in the opening decades of the twenty-first century there is wide recognition of this need among the business and education leaders around the world who are declaring the “environmental humanities”—history, philosophy, religious studies, literary criticism, theater, film, and media studies informed by the most recent research in the social sciences and sciences—crucial to the discovery of solutions to today’s entangled environmental and social challenges, from the complex problems associated with extreme weather events to the increasing global inequities associated with rapidly changing environments. In our view, the collaborative work of this volume demonstrates on the one hand that every discipline has a stake in the central environmental questions of our time, and on the other hand that interdisciplinarity and cross-disciplinary conversations not only enhance but are requisite to environmental studies today.