



Viewpoint

To address the Anthropocene, engage the liberal arts

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ARTICLE INFO

Article history:

Received 21 November 2016

Received in revised form 5 June 2017

Accepted 7 June 2017

Available online 12 June 2017

With the announcement by the Working Group on the Anthropocene at the 35th International Geological Congress in August 2016, we may see the formalization of the Anthropocene as a geological epoch. Since the idea of a human-dominated geological epoch supplanting the Holocene emerged as a major scholarly and public topic a decade and a half ago (Crutzen and Stoermer, 2000: 17; Crutzen, 2002: 23), much energy has focused on identifying the “golden spike” moment of this epoch (see Erlandson and Braje, 2013; Smith and Zeder, 2013; Steffan et al., 2011). The Working Group on the Anthropocene selected one of the more recent “golden spike” candidates, proposing 1950 and radioactive elements as the necessary stratigraphic signature for an epoch declaration. We may agree that something geologically significant happened circa 1950, but what it was, why it happened and how we ought to respond remain open questions. Although defining the “when” of the Anthropocene is important, the who, what, where and why are equally, if not more, compelling and challenging questions we must ask.

The fundamental idea of the Anthropocene—that humans are geologic agents—presents us with a new conceptual reality, one in which human history and natural history should be viewed as intertwined (Chakrabarty, 2009: 215). For this reason, we cannot understand and respond to the Anthropocene without interrogating the place and role of *anthropos* within it (see Ellis et al., 2016: 193). Stepping back to consider the very etymology of “Anthropocene”—the age of humans—makes it impossible to ignore the necessity of asking questions about who these humans have been, are today and will be in the future. Scholars from the liberal arts are adept at answering such questions.

Mindful of the predominantly earth sciences audience of *Anthropocene*, in this commentary we aim to highlight the critical

importance and value of collaboration with the full range of liberal arts disciplines – from the humanities to the arts to the social sciences – in studying the Anthropocene. Whereas geoscientists may rightly lay claim to debating the pros and cons of a new formally recognized geological epoch, other disciplines necessarily come into play when we broaden inquiry to understanding the profound shifts the Anthropocene presents for human and natural history.

Borrowing a distinction between the capital-A Anthropocene and the little-a anthropocene made by Ruddiman et al. (2015) and taken up by Chin et al. (2016), we may productively understand the new conceptual reality opened up by renewed attention to the interface between humans and the geological environment as the anthropocene (little-a). Whether or not the International Commission on Stratigraphy declares that we’ve entered the (capital-A) Anthropocene, the space the consideration of this epoch has opened conceptually, as well as practically, in scientific research, public dialogue and ideological debate about humans’ accelerating influence on earth means the anthropocene (little-a) is here to stay (Chin et al., 2016; Revkin, 2016; Ruddiman et al., 2015). The anthropocene presents us with some of the most compelling questions of our time: Who is *anthropos* and what does it mean to the anthropocene? How did colonialism, markets, structural inequality and technology affect the varied trajectories that led to today’s degraded biosphere? How can, and should, we navigate these and other social, cultural and economic factors as we respond to current biosphere conditions? Can we identify culturally salient and ecologically attuned pathways toward a livable future?

It was not an undifferentiated, symmetrical, singular ‘human species’ that led to the A/anthropocene; rather, this *anthropos* is the “product of complex belief systems, social-technical trajectories and political-economical dynamics” (Bonneuil, 2015: 21). The Anthropocene is not merely about “natural” phenomena, and it is not an asocial, disconnected species *homo sapiens* that brought it about. Rather, the responsibility lies with diverse human beings

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existing under varied social, economic and ideological conditions. The questions of the Anthropocene are partly about the earth system but they are also about the multivalent actions of historically and culturally contextualized human communities who have altered this system in irreversible ways. While the story of the Anthropocene epoch has mainly been told by earth scientists, the story of the A/anthropocene cannot be told without humanists, artists and social scientists, encompassing the full range of the liberal arts. As Bonneuil and Fressoz argue in *The Shock of the Anthropocene*, to reconcile all of us with the Earth, we must understand the A/anthropocene as an event rather than a thing and we cannot count on the accumulation of scientific data alone to achieve this reconciliation (Bonneuil and Fressoz, 2016: xiii).

In A/anthropocene studies, then, science cannot proceed unaccompanied and those in the liberal arts cannot sit on the sidelines. Neither practice will bring us to where we collectively need to be, as both scholars and humans living on earth, to address this global grand challenge of our time (Bostic, 2016). If we understand grand challenges as urgent, widely shared problems that call for large-scale, long-term coordinated responses, the Anthropocene along with its ramifications for complex problems as varied as sea level rise, food security and global health certainly qualifies as a grand challenge, and indeed perhaps even as the most basic grand challenge we face.

Readers of *Anthropocene* know that granting agencies increasingly require evidence of societal impact and social relevance when weighing whether or not to fund a project. Publications like the National Academies book *Convergence: Facilitating Transdisciplinary Integration of Life Sciences, Physical Sciences, Engineering, and Beyond* (2014) point to the need for discipline-spanning work. Humanists and social scientists in areas such as environmental humanities, the fine and performing arts, geography, history, risk communication and science and technology studies (often abbreviated STS) among many others, have recognized the need to work with natural scientists to respond to grand challenges in the age of the Anthropocene (Bonneuil and Fressoz, 2016; Lane, 2015; Palsson et al., 2013; Scranton, 2015; Chakrabarty, 2009; Latour, 2004). Earth scientists themselves increasingly call for more collaboration with the humanities and social sciences (Allison and Bassett, 2015; Hulme, 2011; Steffen et al., 2015).

Yet there is still a tendency for the liberal arts to be brought in, if at all, only after the fact, or “downstream,” after the research questions are established, the methods identified and data collected. Such work can certainly be valuable, but a critical best practice for A/anthropocene research is for the liberal arts also to be involved “upstream,” that is, in the very formulation of the problems to address, the methods needed to address them and the interpretation and application of findings (Castree 2014:255). It is a

nontrivial question to ask, who gets invited upstream? We suggest that, especially in the early stages of developing a research program, it is beneficial to consider a wide array of liberal arts disciplines, to try to ask what it means to “think from the liberal arts” about the A/anthropocene. Engaging in such a process may, we suggest, lead to research approaches that are not just novel, but truly transformative. We summarize a range of collaborative possibilities in Table 1.

From some ecological perspectives, “resistance” means the extent to which a system can resist change when it is disturbed, and “resilience” means how quickly the system recovers after a disturbance (Wohl, 2016; cf. Holling, 1973; Walker et al., 2004). Typically, the more complex a system is, the more resistant and resilient. Using the example of rivers, Wohl notes that observers often appreciate the apparent aesthetic beauty of a pristine-looking river. However, it is “messy” rivers that are in fact healthy. Likewise, interdisciplinary research actually reflects greater strength than the apparent neatness of remaining within clear disciplinary boundaries. Messy rivers don’t stay in one neat channel and they have big trees fallen into them, which creates habitat diversity where many species flourish. The lessons of this example from river ecology apply to interdisciplinary work on the A/anthropocene more broadly: together we are more resistant and resilient in the face of change. The messiness of our work may actually reflect greater health than would an apparent neatness.

Of course, incorporating the liberal arts early in A/anthropocene research can be done only if those in the liberal arts are prepared to engage. Human geographer Noel Castree (2014:244) has urged humanists and social scientists to move beyond common humanistic modes of “inventor-discloser” (simply adopting frameworks laid out by natural scientists) or “destructor-critic” (intent on showing how natural scientists get it wrong) to being “engaged analysts” working upstream with earth scientists, reframing problems and ready “to get their hands dirty in the places those scientists operate.” Liberal arts colleagues must be willing to connect with earth scientists (Brondizio et al., 2016; Palsson et al., 2013). These connections may germinate from seemingly small changes, for instance just looking at one’s established area of study in new ways, including from the perspective of other disciplinary frameworks. At the same time, some liberal arts scholars, as well as colleagues in earth sciences, will need to shift their research in significant ways to ensure that the liberal arts are central in telling the story of the A/anthropocene.

The A/anthropocene requires broad-reaching, deeply inter- and trans-disciplinary approaches. Recognizing this need and actualizing it are, of course, two very different things. Below, we identify and explore some best practices for fostering such research,

Table 1
Continuum of Practices of Including the Liberal Arts in Interdisciplinary Collaborative Research Programs on the A/anthropocene.

	No Collaboration between the Liberal Arts and Earth Sciences	Inclusion of Liberal Arts Downstream	Inclusion of Liberal Arts Upstream
Questions	Research questions develop independently	Research questions develop independently	Research questions develop jointly
Methods	Separate, discipline-specific methods of research used	Separate, discipline-specific methods of research used	Integrated methodologies developed
Boundaries	Crossing disciplinary boundaries approached with indifference or even suspicion	Crossing disciplinary boundaries seen as valuable but not integral	Crossing disciplinary boundaries seen as integral and essential
Interpretation	Findings interpreted within and reinforce disciplinary specific frames	Findings interpreted within disciplinary frames but liberal arts frames included	Findings interpreted within broadened frames with the potential for unpredicted, transformative insights and interpretations
Impact	Specific, fragmented, and so potentially limited, scholarly and public audience for findings	Broadened, but still fragmented, scholarly and public audience for findings	Un-fragmented, vast, and diverse scholarly and public audience for findings

table format inspired/adapted from Colwell-Chanthaphonh and Ferguson (2008:11).

suggesting the benefits of involving the liberal arts upstream. We are guided by the four broad themes for *Anthropocene* laid out in the editorial “An Evolving Anthropocene for Science and Society” (Chin et al., 2016:2). Our aim in what follows is to give readers some sense of how coupled liberal arts/earth sciences interdisciplinary A/anthropocene research could proceed.

1. The early “Anthropocene”: how and when were past human interactions with earth systems registered in geologic and environmental records?

This theme points to the importance of such fields as anthropology, archaeology and history. If we are truly interested in the questions of *who* and *how* – not just *when* – then earth scientists stand to benefit by working with scholars who can develop contextualized understandings of historical cycles of resource decisions, depletions and capacities for cultural and ecological resilience. Working together, scholars can bring the lessons of these findings to bear on broader conversations about our ongoing transformation of the earth system in the A/anthropocene.

A developing research program led by co-author Howey in the Great Bay Estuary is employing such a deep-time, interdisciplinary socioecological approach to the A/anthropocene. The Great Bay Estuary is one of the most complex embayments on the Atlantic Ocean, draining over 2400 square kilometers in New Hampshire and Maine (Short, 1992). The interlocking forest-river-estuary-coastal environments as well as the Estuary’s combination of five internal habitats, make it an important bellwether of anthropogenic ecosystem change. Humans have had a long and variable presence in the Great Bay Estuary, tied throughout every period of occupation to the natural resource base of this system. In the Great Bay, nature *through time* has been inextricably linked to humans (Bolster, 2002: xxvii).

Systematic archaeological survey and excavation provides a robust means of establishing a suite of proxy data that can be analyzed to track the trajectory of socio-ecological change in the Great Bay over time to understand the ways people responded to, or failed to respond to, ecosystem degradation. Key collaborations with earth scientists include conducting a) geospatial analyses of persistent places and adaptive human landscape orientations from long-term settlement patterns and b) isotopic and genetic analyses of recovered prehistoric and historic plant and animal ecofactual remains to discern the rise of resource overexploitation, ecosystem degradation and the rate and scale of biodiversity loss.

2. Evidence and causes of large-scale human impacts; and quantifying recent, current, and future anthropogenic impacts

This theme suggests the importance of disciplines like economics, history, philosophy, political science and sociology. While stratigraphic evidence may be the realm of earth scientists, the causes of large-scale human impacts are economic, historical, socio-cultural and political. Physical actions by humans are not merely physical, but rather are simultaneously cultural (and often political). Indeed, the role of market-based overconsumption in the A/anthropocene has been a subject of lively discussion and debate as scholars map its contribution to large-scale human impacts (cf. Angus, 2016; Chakrabarty, 2009; Hornborg, 2016). Simple nature/culture distinctions are a thing of the past (Latour, 2004).

To consider liberal arts involvement upstream in a research program focused on the evidence and causes of large-scale human impacts, consider deforestation in the world’s tropical forests, a topic of extensive earth science research. While the action of import is the destruction of biodiversity and the removal of trees (due to the impact on CO₂ levels), this action is driven by

multivalent social forces. Forest ecology research programs, by partnering with political scientists and economists able to contextualize the global market forces, laws, regulations and policies intertwined in deforestation (e.g. multinational corporate cattle farming, logging industries) stand to gain fine-grained (and quantifiable) insights into the distinct rates, scales and locational patterns of deforestation, insights likely to elude researchers without the upstream involvement of such liberal arts scholars.

Considering the second part of this theme a bit further—quantifying recent, current, and future anthropogenic impacts—we caution that an exclusive focus on quantitative data can mean neglecting crucial pieces of the puzzle. Purely quantitative assessments can, as leading STS scholar Sheila Jasanoff warns, obscure social behavior and socio-technical drivers and results (2016: 56). When considering anthropogenic climate effects, including a liberal arts perspective is crucial in helping us to realize to what extent both causes (responsibility) and impacts (the costs of paying for this responsibility) are unequally distributed. For example, which populations tend to be most heavily affected by environmental pollutants, sea-level rise or epidemics, which have the most influence in shaping policy on these matters and so on. Measuring CO₂ levels without looking at their sources has led to identifying the *anthropos* of the A/anthropocene in terms of an undifferentiated human species. As science and environmental writer Andrew Revkin asks rhetorically (2016), when there is talk of the “we” most affected by the A/anthropocene, are we considering “the rural villagers in India and Africa who scuffle to make a living facing *today’s* climatic and coastal threats and who contribute no meaningful amount of greenhouse gases to the atmosphere?” We urge earth scientists to recognize the critical need of working with scholars in the liberal arts to interpret quantitative data and impacts within their relevant sociocultural contexts.

3. Couplings among bio-physical and human processes including societal response to human-induced environmental change

With the reference to “societal response,” this theme opens the door to the inclusion of a wide range of liberal arts disciplines across the humanities and social sciences. Natural scientists have increasingly recognized that simply delivering scientific results does not lead to needed changes in policy, behavior and attitudes. Liberal arts scholars, especially those in the humanities, can play a vital role in persuading a sometimes skeptical public about the need to respond to anthropogenic climate change. Art, performance and literature can connect people at an emotional, personal level to the urgency of the situation we face in the A/anthropocene and spur action in ways facts and figures alone may not. It is a matter of identifying psychological, economic and cultural barriers to understanding the need for action and then formulating culturally nuanced responses. In the words of Robert Louis Chianese, an emeritus professor of English deeply involved in communicating climate change, “our planetary disturbance infiltrates our inner lives, with alarming and often unacknowledged effects,” a condition he characterizes as “eco-despair” (2015). Inaction is a side effect of such despair and while “scientific data and environmental papers rightly avoid fantasy” they “lack the power of mythic images and narrative to stir ordinary folks to action” (Chianese, 2015). Art, in its varied forms, requires interactive interpretation which can help bring people to realizations about the ways problems, anxieties and ambiguities are shared, drawing us away from an inward focus and toward action.

Studio art students at the authors’ institution partnered with NextGen Climate, an organization that works to prevent climate disaster and promote prosperity for every American, on an art

exhibit entitled “Rise: Climate Change in Our World” at 3S Artspace in Portsmouth, New Hampshire (October 21–November 12, 2016). Similarly, another exhibit by eight professional artists at Kaneko in Omaha, Nebraska entitled “Water” aimed to draw viewers into a multitude of understandings of water as a resource that is seemingly abundant but increasingly scarce (Fessenden, 2016). Climate Change Theater Action involved a series of worldwide readings and performances to bring awareness to and foster discussion around climate change leading up to and during the United Nations 2015 Paris Climate Conference (COP21). Such exhibits and performances offer a model that could be followed by earth scientists. A research team could partner upstream with a range of artists who would be involved in and document the research program from the outset. As the project unfolds, these artists could produce and exhibit renderings—visual, narrative and performative—of the coupled processes under examination to draw non-expert audiences into engagement with and response to the socioecological challenges identified over the course of the research.

One might be inclined to ask why such efforts should be part of the upstream research development process and not simply a downstream collaboration. Representation is a key issue here (see Castree, 2015:503). Framing and representing are themselves a significant part of the evidence and the argument; how something is represented helps craft the phenomenon itself. Those areas of the liberal arts focused on representations—written, visual, auditory, cinematic and so on—are crucial upstream as they not only inspire, they create: action, interpretation and response.

4. Risk and environmental sustainability in an “Anthropocene” 21st century

For many earth scientists, this broad topic implies a strictly scientific “risks and hazards” assessment, which tends to deemphasize the human side, including the human beings actually at risk. A focus on risk from a solely quantitative perspective cannot substitute for a “full-blown discussion of cultural values and socioeconomic impacts” that should take place upstream in research and in policy debates (Jasanoff, 2016: 113). This theme, too, calls upon a wide range of liberal arts disciplines, especially given that scholars in the liberal arts are well-positioned to show that risk is not equally or evenly distributed in the A/anthropocene.

Productive avenues for upstream collaboration among earth scientists interested in risk and sustainability lie in working with liberal arts scholars who can speak to the variegated communities that bear the brunt of “risk” in the A/anthropocene (and who, in fact, may have novel approaches to environmental sustainability). Responding to this fourth broad theme, as with the third theme, involves changing some deeply ingrained psychological and sociological—as well as economic and political—attitudes, dispositions and practices. Where and how one stands very much determine what counts as a risk. If risk is not to be an abstract category (as the *anthropos* currently is), we need to ask: risk for whom?

A particularly important segment of the communities projected to be disproportionately affected by anthropogenic climate change are indigenous peoples (Vinyeta and Lynn, 2013:1; see also Bardsley and Wiseman, 2016). Indigenous peoples often occupy precarious positions in terms of climate change, living with the effects of ecosystem degradation for which they bear little responsibility. An international conference contributing to the COP21 Paris Climate Talks entitled “Resilience in a Time of Uncertainty: Indigenous Peoples and Climate Change” emphasized this issue, as well as the importance of indigenous knowledge in moving forward (<http://indigenous2015.org>).

By involving geographers, sociologists, cultural anthropologists and indigenous scholars and knowledge keepers able to conduct ethical, engaged participatory research with indigenous communities at high risk from climate change impacts (sea level rise, drought, etc.), earth scientists stand to gain key insight into Traditional Indigenous Knowledge (TIK). TIK comes from constant interaction with the natural world, including land, air and water. Indigenous peoples actively build “a knowledge base of climate change because they use the land and resources, and develop the sensitivity to ‘read’ critical signs and signals from the environment that something unusual is happening” (Berkes, 2009:153). This ability and knowledge base can bring to light substantive approaches to climate change adaptation that would go unconsidered in exclusively western-oriented scientific research programs.

Thinking again of framing and representation, a particularly compelling example, one that speaks to the fourth broad theme of risk and environmental sustainability in our present century, appears in the work of Kim Stanley Robinson, one of the greatest living science-fiction writers. KSR’s works reach and educate a broad global audience and often explore techno-utopian possibilities. In *Aurora* (2015), KSR imagines humans seeking to colonize a nearby planet. This is an intergenerational mission—one in which, therefore, the offspring of the original travelers are consigned to life on a faraway planet without having a say in the matter. In the novel, however, the colonizers find the new planet unlivable and ultimately have to return to earth. If all of this sounds fantastic, recall that Elon Musk through his company SpaceX dreams of facilitating interstellar travel. KSR has warned: “If we don’t create sustainability on our own world, there is no Planet B” (Robinson, 2016a, 2016b). We should not assume that we can mistreat the planet and then implement a technological “fix.”

The sometimes over-optimistic faith in purely technical solutions is reflected in so-called “negative emissions,” or the notion that technologies will be developed to remove CO₂ from the atmosphere through technical methods (Anderson and Peters, 2016). Following the 2015 Paris Climate Talks, the models for containing global warming to under 2° Celsius assume large-scale use of still-hypothetical negative-emissions technologies. But reliance on these still undeveloped technologies could lead society down a grim path toward a future of high temperatures that cannot be mitigated technologically (Anderson and Peters, 2016). Part of what the liberal arts can offer the A/anthropocene is bringing different futures into view and into dialogue (Wark, 2015: 187, 217, 221).

5. Conclusion

If we do the hard work of learning how to speak with one another across the earth sciences and liberal arts, we will have taken key steps toward learning to communicate the impact of this research to diverse stakeholders. Earth science and liberal arts collaboration can enable researchers to craft compelling narratives that are less fragmented and more holistic, helping to coordinate efforts and to communicate the significance of interdisciplinary A/anthropocene studies to elected officials, policy makers and the broader public (see Table 1). Such cohesion yields a bigger public impact and moves us closer to where we collectively need to be, as scholars and as humans living on earth, to address the grand challenges presented by the A/anthropocene. Working together, we can establish a “wider range of voices to speak up with authority (and passion) about the sort of Earth we wish our descendants to inhabit” (Castree, 2015:312).

Of course, there are hurdles to overcome in doing the kind of integrated interdisciplinary work we call for here. Some hurdles lie in more fundamental realms including conceptual challenges in methodological approaches and synchronizing diverse (even

contrasting) views of what constitutes data, while other hurdles are more logistical or structural in nature, including avenues for encouraging or rewarding interdisciplinary, translational work (Harden et al., 2014; National Research Council, 2014). For instance, the title of a June 2016 article in *Nature* (Bromham et al., 2016) conveys a sobering reality about interdisciplinary grant proposals: “Interdisciplinary research has consistently lower funding success.” We need to find avenues to encourage those who serve on grant review panels to be more open to research involving diverse disciplines. Until such openness becomes structural, the prospects for flourishing in collaboration will be hindered.

Opening up the conceptual and structural spaces for robust collaboration between the liberal arts and earth sciences can, we suggest, start with some simple strategies. While there may be interest to work outside of one’s comfort zone, concrete steps can seem elusive to scholars from the liberal arts and earth sciences alike. One simple suggestion is to read what scholars are writing about the Anthropocene outside one’s discipline. Attend lectures across disciplinary boundaries related to environmental and sustainability issues; even if they do not seem immediately relevant, one is likely to leave with some sense of how to think from a different perspective about the A/anthropocene. Start a committee on the interdisciplinary study of the A/anthropocene. Have coffee or lunch with a potential ally from another discipline across the liberal arts or earth sciences (an activity we like to call “find one’s doppelgänger”); such a small step is how collaboration often begins. The University of New Hampshire’s College of Liberal Arts has launched a Grand Challenges for the Liberal Arts Initiative, including an effort to spur interdisciplinary research on climate change and other issues. One mechanism this Grand Challenges Initiative uses to catalyze such research is interdisciplinary speed-networking events at which diverse colleagues come together to explore points of intersecting interests and expertise. As Noel Castree reminds us, “however regulated academic life may now be, we still possess plenty of freedom to alter our *modus operandi*” (Castree, 2015:312).

Do hurdles, limitations and complications mean we should give up on the kind of creative collaborative endeavors we encourage and outline here? Absolutely not. We should carry on and learn to see the “messiness” of collaborative work on the A/anthropocene productively as part of what makes it worthwhile. Saying that we all—across the spectrum of fine arts, humanities, social sciences, STEM and beyond—should engage in responding to the A/anthropocene is not simply to lay out a broad research program. It is to respond to the research program that the world has set for us, we A/anthropocene dwellers. And our work need not be organized into formal, long-lasting structures: there can be a virtue in creating more fluid arrangements (Thorp and Goldstein 2013: 111, 116). To put it another way, let’s be the messy rivers Wohl describes.

Effective engagement with the A/anthropocene requires the full range of disciplines. Scientific accounts of the rarity and fragility of life may rekindle our wonder, but they are not its source. To address the Anthropocene, we need the liberal arts.

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