

Framing the Anthropocene: Educating for Sustainability

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Abstract

As the concept of the Anthropocene as an epoch marking humankind's power as a geophysical force gathers momentum, sustainability educators will be confronted by conflicting interpretations of its significance. More than a geological epoch, the Anthropocene marks a turning point for cultural, spiritual, and political ways of moving forward in confronting and framing humankind's impact on earth systems. In this article, I examine the frames and rhetorics surrounding the use of the term the Anthropocene and their implications for sustainability education across several disciplines. Through the use of ecolinguistics and critical discourse analysis, I argue that analysis of the framing of the Anthropocene provides a critical tool for examining interpretations and approaches to what it means to be in the midst of an epoch in which humankind's impact on the planet merits a new geologic time frame. An examination of frames across disciplines found that the Anthropocene is characterized both positively and negatively, with some scholars embracing the opportunities for continued growth while others warn of planetary boundaries and rupture from the previously calm Holocene.

Keywords: sustainability education, Anthropocene, ecolinguistics, framing, discourse analysis

Framing the Anthropocene: Educating for Sustainability

As the concept of the Anthropocene as an epoch marking humankind's power as a geophysical force (Rickards, 2015; Steffen, Grinevald, Crutzen & McNeill, 2011) gathers momentum, sustainability educators will be confronted by conflicting interpretations of its significance. More than a geological epoch, the Anthropocene marks a turning point for cultural, spiritual, and political ways of moving forward in confronting and framing humankind's impact on earth systems. In this article, I examine the frames surrounding the use of the term the *Anthropocene* and their implications for sustainability education across several disciplines. In investigating key texts in political science, Earth system science, climate science, and economics, several frames emerge, each implying a way forward in meeting the challenges of the Anthropocene. Through the use of ecolinguistics (Stibbe, 2015) and critical discourse analysis (Machin & Mayr, 2012), I argue that analysis of the framing of the Anthropocene provides a critical tool for examining interpretations and approaches to what it means to be in the midst of an epoch in which humankind's impact on the planet merits a new geologic time frame—all of which are deeply significant to sustainability education.

One of the fundamental premises of sustainability education is the need to facilitate a shift in the societal and cultural consciousness of every stakeholder, from policy makers to energy users and everyday consumers, to re-envision the connectedness of those societal and material networks that we rely on for our well-being as ultimately interrelated at every level (Coop, 2011; Hamilton, 2016; Sterling, 2004). Sustainability educators aim to shift our students' awareness, inviting them to experience a paradigm shift that conceptualizes the Earth as a dynamic system greater than the sum of its parts (Hamilton, 2016). As anthropogenic impacts on our planet

become increasingly evident, the cognitive frames through which we process and understand our impact on the planet must of necessity shift as well. Those frames through which we perceive our impact have become a source of discussion and debate, especially following the recent vote by the Working Group on the Anthropocene on 29 August 2016 to recognize the Anthropocene as a geologic epoch and to forward that recommendation to the International Geological Congress (Carrington, 2016).

Perspectives

The need to educate students in discerning sustainable pathways, to teach them to reason through the many rhetorics circulating around talk of the Anthropocene, is urgent. By giving our students a clear understanding of the various arguments for the significance of the emerging age of the Anthropocene and the various positions proposed, we will educate them to critically assess those arguments, thereby nurturing in them a sense of agency and civic responsibility. They will then be able to make deliberate and informed choices and advocate for sustainable solutions. While studies of metaphors for the Anthropocene exist (Cohen, 2013; Corlett, 2014; Comstock & Hocks, 2016; Larson, 2011; Rickards, 2015; Robbins, 2013), an analysis of the framing relevant to educators is largely absent from the literature.

Defining the Anthropocene

The proposal to mark the current epoch as one best characterized by humankind's impact on the environment was initially suggested by biologist Eugene Stoermer in the 1980s (Grinevald, 2007). In 2000, atmospheric chemist Paul Crutzen and Stoermer (2000) made a more elaborated case. As McNeill (2014) explains in *The Great Acceleration*,

The changing composition of the atmosphere, especially the well-documented increase in carbon dioxide, seemed to Crutzen so dramatic and so potentially consequential for life

on Earth that he concluded that a new stage had begun in Earth's history, one in which humankind had emerged as the most powerful influence on global ecology. The crux of the Anthropocene concept is just that: a new period (whether epoch, period, or era in geologists' parlance) in which human actions overshadow the quiet persistence of microbes and the endless wobbles and eccentricities in the Earth's orbit, affecting the governing systems of the Earth, and therefore define the age. (pp. 1-2)

Some have initially dated the start of the Anthropocene to the start of human agriculture, some 7,000 years ago (Corlett, 2015), or to when humans mastered fire, 12,000 to 15,000 years ago (McNeill, 2014; Crutzen, 2000). A more widely accepted start date for the Anthropocene has been set in the years following World War II, after 1945 CE, a period otherwise known as The Great Acceleration (McNeill, 2014; Steffen, 2015). It was at that time that human impacts could be empirically documented as "the most important factor governing crucial biogeochemical cycles, to wit, the carbon cycle, the sulfur cycle, and the nitrogen cycle" (McNeill, 2014, p. 4). The "golden spike" (Corlett, 2015, p. 37) that characterizes a distinct starting point for geological epochs can be readily discerned in the work of Steffen et al. (2004), whose graphs of accelerated consumption and resource use illustrate increased change. Charts documenting these changes can be seen at the website for the Global International Geosphere-Biosphere Programme Change (Steffen et al., 2015) and in Figures 1 and 2 below.

Theoretical Framework

When we consider the various frames and metaphors used to characterize the Anthropocene through the lens of ecolinguistics, we avail ourselves of valuable tools for unmasking the key assumptions embedded in those representations. Understanding those frames enables us to approach the issues surrounding the emergence of the Anthropocene and the rhetoric surrounding it as tools for education, for making choices, for critical reflection, and for evading and resisting

those frames that fail to serve a life-affirming ecologically-grounded life philosophy or *ecosphophy* (Stibbe, 2015).

The ecosophy invoked in this paper and by ecolinguists in general is informed by ecological science and a concomitant acceptance of the insights offered by climate scientists (Stibbe, 2015). While climate change deniers frequently invoke the science-is-always-uncertain argument, along with the assertion that we don't know enough to argue for a specific course of action because the data are not conclusive (Dunlap & McCright, 2010), these arguments are not sufficient, especially in light of the need to act to preserve biodiversity and mitigate and adapt to other impacts of climate change, such as ocean acidification, desertification, loss of water aquifers and albedo, and so on. Instead, we must engage a broad-based understanding and support for policies, what Larson refers to as "stakeholder-based quality control [broader] than normal science" (Larson, 2011, p. 12). As Larson points out,

Science alone cannot decide how we want to live. Instead, we need to recognize the contributions of science as a way of knowing, while simultaneously placing it in the context of more democratic decision-making. Such democracy is particularly necessary for environmental and other sciences whose results tend to be uncertain from the perspective of both facts and values. (2011, p. 12)

Indeed, scientists and social science and humanities scholars recognize that policy-making must go beyond the authoritarian top-down decision-making consistent with technocratic, expert-driven policy planning (Funtowicz & Ravetz, 1993; Funtowicz & Ravetz, 2003; Larson, 2011), to what Funtowicz and Ravetz (1993; 2003) refer to as *post-normal science*.

An essential part of that framing involves mapping out how we imagine and conceptualize nature and its roles. As such, ecolinguistics acknowledges the normative role that the analysis of frames and metaphors can play in advancing orientations and philosophies that honor an ecological appreciation for life systems, "encourage[ing] behavior that protects the ecosystems

that support life, and promoting those metaphors so that they can become new metaphors we live by” (Stibbe, 2015, p. 81).

Methods

The struggle to define what we understand by the Anthropocene contains a spectrum of possible interpretations. This paper focuses on several dominant frames given to the Anthropocene using the analytical tools of ecolinguistics. *Ecolinguistics* critiques those forms of language used to characterize and/or justify ecological destruction and seeks out and proposes language that guides humankind toward more respectful, life-affirming positions (Naess, 1995; Stibbe, 2015). It concerns itself with human ecology, as defined by Gare (2002), as “the interaction of humans with other humans, other organisms and the physical environment” (cited in Stibbe, 2015, p. 8) and encompasses “language, culture, human cognition, stories and texts” (Stibbe, 2015, p. 8). As explained by Stibbe (2015),

Ecolinguistic studies . . . have normative goals. . . [that seek to affirm] the life-sustaining relationships of humans with other humans, other organisms and the physical environment, with a normative orientation towards protecting the systems that humans and other forms of life depend on for their wellbeing and survival. (p. 9, emphasis in text).

This study will focus on frames used to characterize the Anthropocene. As explained by George Lakoff (2006), “Frames are the mental structures that allow human beings to understand reality – and sometimes to create what we take to be reality” (p. 25). Frames are constructed using metaphors, cognitive structures that build on similarities but also cause us to accept ideologies that attend those metaphors uncritically. Framing involves the use of a conceptual narrative structure from one context or story applied to another context. Frames organize actors, actions, and how actors relate to one another in a coherent story line (Stibbe, 2015, p. 47). Within ecolinguistic practice,

Analysing framing from an ecolinguistic perspective firstly requires identification of the source frame and the target domain. The target domain is the general area being talked about, while the source frame is a different area of life that is brought to mind through trigger words. (Stibbe, 2015, p. 52)

Thus the source frame structures relationships, actions, and participants for the target domain (Stibbe, 2015).

The artifacts selected for this analysis are representative of a range of discourses surrounding the Anthropocene, from the Promethean (Dryzek, 2013) beliefs of ecomodernists such as Rasmus Karlsson (2016) and the democratic pragmatism of Jedidiah Purdy (2015) to the green radicalism of Richard Smith (2016), whose ecosocialist economic advocacy places him firmly to the left of the discussion. They span the range of political discourses on the environment, and in doing so illustrate the variety of frames or cognitive road maps (Lakoff, 2012) for understanding the Anthropocene and the subsequent agency given to specific actors in each proposed scenario. These provide various perspectives on the promise and peril that this new geological epoch holds — whether we will emerge with the power to respond effectively to the dawn of humankind's impact on the Earth or to simply capitulate to administrative rationalists (Dryzek, 2013) whose solutions inevitably follow the lines of power and the prevailing politics of an increasingly inequitable, technocratic, and most likely autocratic philosophy of governance. The implications for education are substantial. As we become increasingly conscious of the ways in which our fates, locally and nationally, are linked to a global interdependence, we will need to shape a politics of cooperation and coexistence. And for that, we must have an educational system that explicitly teaches about the interconnectedness of global systems, linking ecology, economics, and politics with the need to come together to solve the problems facing humankind as a result of anthropogenic climate change.

The corpus for this analysis has been taken from the following texts:

- Richard T. Corlett’s “The Anthropocene Concept in Ecology and Conservation” (2015);
- Clive Hamilton’s “The Anthropocene as Rupture” (2016);
- Rasmus Karlsson’s “Three Metaphors for Sustainability in the Anthropocene” (2015);
- Jedidiah Purdy’s *After Nature: A Politics for the Anthropocene* (2015);
- Richard Smith’s *Green Capitalism: The God that Failed* (2016); and
- Will Steffen, Wendy Broadgate, Lisa Deutsch, Owen Gaffney, and Cornelia Ludwig’s “The Trajectory of the Anthropocene: The Great Acceleration” (2015).

These works capture current trends in shaping our perception of the Anthropocene and its implications for action.

Research Questions

This paper focuses on the following research questions:

- What do the frames surrounding discussions of the emergence of the Anthropocene tell us about the agency given to readers/participants in the shaping of the Anthropocene?
- What ecosophy (Stibbe, 2015) does this discourse communicate to readers?
- How do the discourses surrounding the Anthropocene educate readers about humankind’s role in shaping and changing outcomes?

Complicated versus Complex Systems

Frames provided by metaphors are by their nature incomplete, especially when providing conceptual frameworks for ecological issues. In confronting the limitations of metaphors, we

need to distinguish between complicated and complex issues. Complicated problems are tame and able to be solved in a linear fashion. Complex issues, on the other hand, “have emergent properties” (Larson, 2011, p. 209) and are nonlinear in their manifestations. Paul Cilliers notes that “metaphors both highlight and hide, and what they hide may be critical” (cited in Larson, 2011, p. 209) because they cannot capture complex systems that by their nature are nonlinear and continually emerging.

We must therefore learn to draw on multiple metaphors in order to articulate the complex nature of nonlinear systems at play, so characteristic of the ecological realities around us. Because metaphors are continually in play in the world around us, we cannot constrain the use of metaphors in their value-laden social spheres. Instead, we need to understand how values and empirical observations and facts combine to create metaphors as conceptual constructs for understanding and action.

Findings

An analysis of the ways in which authors of the texts listed above framed the Anthropocene illustrated a wide range of interpretations, from alarm and dismay to an open embrace of this new era of humankind’s dominance as a species on the Earth system.

The Anthropocene as era of the Great Acceleration. This frame has been proposed by Paul Crutzen, Paul Steffen, and various co-authors (Crutzen, 2002; Crutzen & Stoermer, 2002; Steffen, Broadgate, Deutsch, Gaffney, & Ludwig, 2015; Steffen et al., 2015) to characterize this epoch as a time of accelerating impacts from industrial activity. As Steffen et al. (2015) explain, the term, “the ‘Great Acceleration’ aims to capture the holistic, comprehensive and interlinked nature of the post-1950 changes simultaneously sweeping across the socio-economic and

biophysical spheres of the Earth, encompassing far more than climate change” (p. 2). The collective efforts of the International Geosphere-Biosphere Programme (IGBP), headed by Paul Crutzen and Will Steffen (Steffen et al., 2016), culminated in the ‘Great Acceleration’ graphs, quantifiable audits for each category from 1750 to 2000, originally captured in 24 graphs, with 12 focusing on socio-economic trends (p. 4), including among others population, water use, primary energy use, and transportation (see Figure 1). The second group documents 12 charted Earth system trends (p. 7), such as carbon dioxide emissions, stratospheric ozone, marine fish capture, and terrestrial biosphere degradation (see Figure 2). Each of these graphs was subsequently updated to reflect data inputs up to 2010. Both sets of graphs show significant growth from the years 1950 to 2010, similar to the image of a hockey stick, in every area of human activity, from economic growth to resource depletion to carbon emissions (Steffen et al., 2016, p. 12), “mak[ing] it possible to specify the onset of the Anthropocene with a high degree of precision” (p. 13). Steffen et al. place the beginning of the Anthropocene at “Monday 16 July 1945, about the time that the Great Acceleration began, [when] the first atomic bomb was detonated in the New Mexico desert. Radioactive isotopes from this detonation were emitted to the atmosphere and spread worldwide entering the sedimentary record” (p. 13), thus providing the ‘golden spike’ for geologists to mark the new epoch.

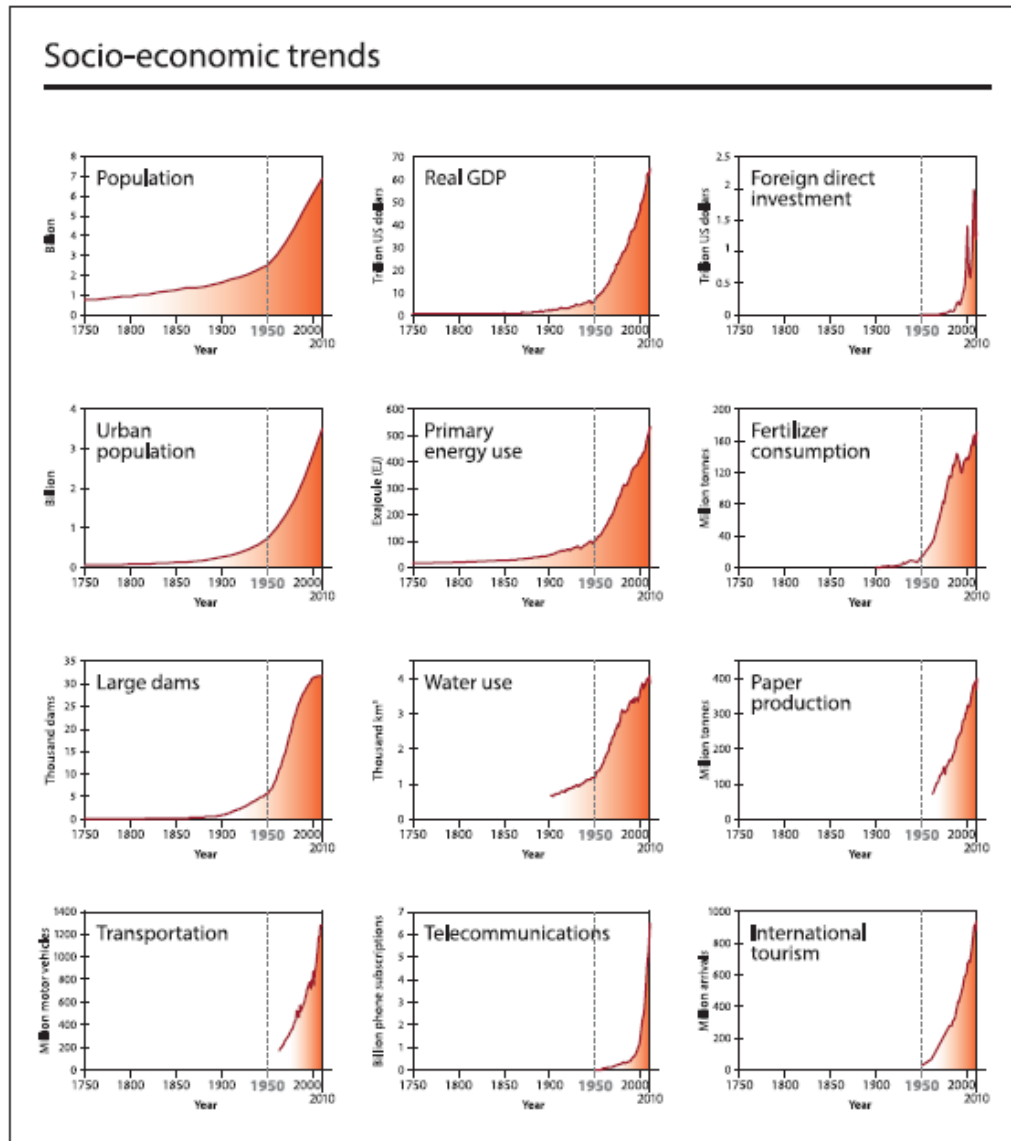


Figure 1. Socio-economic trends calculated from 1750 to 2010 taken from the International Geosphere-Biosphere Programme’s assessment of globally aggregated indicators for socio-economic development. (Steffen et al., 2016, p. 4.)

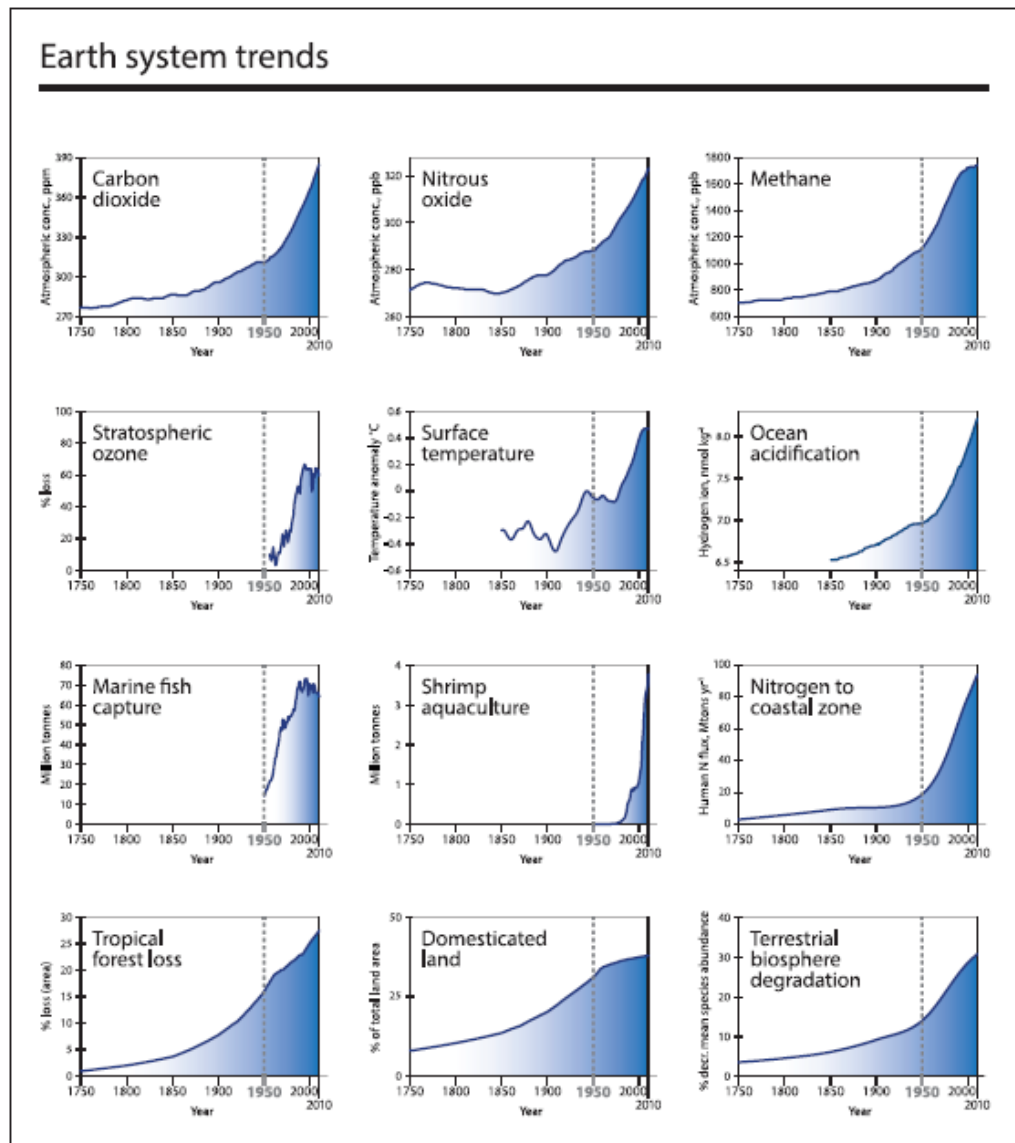


Figure 2. Earth system trends calculated from 1750 to 2010 taken from the International Geosphere-Biosphere Programme's assessment of the various indicators for the structure and functioning of the Earth system. (Steffen et al., 2016, p. 7.)

What separates the Anthropocene from other geological epochs are the quantifiable impacts of human activities on the Earth system. We are, as Will Steffen and his co-authors (2016) point out, “living in a no-analogue world” (p. 14), a geological epoch without comparison due to the anthropogenic nature of the changes to the Earth system. Yet the term “The Great Acceleration” highlights the human agency implied in the rapidly unfolding evidence of system wide change. With that agency comes choice and action, with the agency for the Great Acceleration evident in the heightened pace of growth and movement to an unknown destination.

When Steffen and his co-authors (2016) pose the question of whether the Great Acceleration will play out as overshoot and collapse or be recognized and reversed, they note those actions that point to collective agency—the regulation of chlorofluorocarbons and the anticipated subsequent recovery of the stratosphere, a slowing of exponential population growth, and the emergence of leapfrog technologies with the potential for “decoupling development from environmental impacts” (p. 14). And yet, greenhouse gas emissions continue unabated, reaching 408.84 CO₂ parts per million (ppm) in the summer of 2017 (McGee, 2017), according to Mauna Loa Observatory’s measurements, well beyond the 350 CO₂ ppm recognized as the safe limit for CO₂ ppm (McKibben, 2011). These contradictory trends underscore a failure of agency in addressing the situation as we know it. As Steffen et al. point out, “Planetary stewardship has yet to emerge” (p. 14). The agency to address the emerging Anthropocene resides at every level, from the technocrat crafting public policy to the citizen supporting environmentally responsible representatives. Steffen and his co-authors (2016) pose the question, “Will the next 50 years bring the Great Decoupling or the Great Collapse?” (p. 14). The resolution to our dilemma, they note, lies within multiple sites of civic responsibility and scientific and technical expertise and will be evident to all by 2050.

The Great Acceleration complements the historian and economist Richard Smith's (2016) metaphorical representation of the economic system in the Anthropocene as a train racing along its predetermined tracks that lead to an abyss. The source frame of the train underscores the mechanistic nature of the vehicle hurtling toward a fateful destination and raises the questions that Smith implies. Who is in control of the train? Who set us on a journey headed toward the edge of an abyss, only to plunge over the side? Who is in control? In Smith's scenario, the captains of industry, instead of slowing down the progress of the train, urge us on: "Go faster! Grow larger!" Smith proposed this metaphor to call attention to the many ways in which democratically determined self-governance is circumvented by the trajectory implicit in capitalism as an economic system. Smith's solution, to strengthen the forces of democracy and overturn the plutocracy, involve either getting off the train altogether—abandoning capitalism as a global system—or by changing course, slowing down, or stopping a destructive economic system as it ravages the planet. The question remains: Whose hands control the brake? By what means can we stop a vehicle caught up in its own momentum?

Smith's (2015) reply to the questions posed here is to recognize capitalism as the chief mechanism causing out-of-control growth and its cancerous consumption of our planet. He proposes instead a radical departure from the path we're on—that of shared democratic planning. As he points out,

[I]f we are, after all, just 'one people on one planet,' it's time we begin to make conscious and *collective* decisions about how our economic activity affects the natural world The problems we face with respect to the planetary environment and ecology can't be solved by individual choice in the marketplace. They require *collective democratic control over the economy to prioritize the needs of society, the environment, other species, and future generations*. This requires *local, national and global economic planning to reorganize the world economy and redeploy labor and resources to these ends*. (pp. 104-105, emphasis in text)

Moreover, he argues that privatization and individualism as solutions to our ecological crisis ensure that unconstrained runaway growth will continue unabated. Struggles against corporate oligarchies and plutocratic control are evident in any number of movements today, from the rising popularity of collectives, cooperatives, and worker-owned industries (Kelly, 2012) to democratic uprisings throughout the world that seek to wrest power from autocrats working on behalf of corporate interests (Klein and Archer, 2014). Such a frame provides a hopeful sense of agency to those awake enough to see the dangers of an ideology of growth and expansion on a finite planet. The appeal of a democratic solution to the challenges confronting us in the Anthropocene is undeniable, and the potential for deeply democratic wellsprings of resistance to corporate autocracy and runaway growth has begun to emerge, even as the extremely wealthy seek to silence and outmaneuver the 99% beneath them.

The Anthropocene as rupture. The frame of the Anthropocene as rupture, as argued by Clive Hamilton (2016), Earth System scientist, identifies the Anthropocene “as the very recent rupture in Earth history arising from the impact of human activity on the Earth System as a whole” (p. 93). The Anthropocene as a sharp departure from the relative stability of the Holocene, as identified by Hamilton and other Earth System scientists, signals a paradigm shift in conceptualizing the Earth as a dynamic system greater than the sum of its parts. Earth System science is the culmination of a steady stream of methodological and conceptual breakthroughs, including systems thinking (Meadows, Meadows, Randers & Behrens, 1972), computer modeling, and global systems tracking via satellite, among others (Hamilton, 2016, p. 94).

Hamilton (2016) explains that “Earth System thinking, which emerged in the 1990s, [is] . . . the integrative meta-science of the whole planet as a unified, complex, evolving system beyond the sum of its parts. It is a transdisciplinary and holistic approach integrating earth

sciences and life sciences, as well as the ‘industrial metabolism’ of humankind, all within a systems way of thinking, with special focus on the non-linear dynamics of a system.” (p. 94). Only by conceptualizing the changes wrought by humankind through the insights gained from understanding the Earth as a dynamic system can we appreciate the current dilemma posed by anthropogenic climate disruption (ACD) (Jamail, 2016).

Global systems thinking has emerged in every discipline as a result of our capacity to visualize and witness, via satellite imaging and global communications via the Internet (Hamilton, 2016), the Earth as a whole. As such, recognition of the Anthropocene signals the need to understand the Earth as a dynamic system. The urgency to act has the potential to shatter boundaries, among disciplines, nations, and economies. Fully grasping and exploring the impacts of the Anthropocene has revolutionary implications in every area of study, but most especially for education. A clear understanding of our interconnectedness that the Anthropocene seen through the lens of Earth System science provides calls for the integration of the principles of sustainability throughout the curriculum. Doing so would transform our conceptualization of every discipline, from economics to political science to education itself.

The Anthropocene as an epoch ruled by humankind. This frame for the Anthropocene is voiced in political scientist Jedidiah Purdy’s *After Nature* (2015). No longer relegated to the role of hapless recipient of natural processes, this argument runs, humankind now possesses the potential capability to rule over those processes. As Purdy (2015) puts it,

. . . there is no more nature that stands apart from human beings. . . . It makes no sense now to honor and preserve a nature that is defined by being not human, that is purest in wilderness, rain forest and the oceans. Instead, in a world we can’t help shaping, the question is what we will shape. (pp. 2-3)

This frame asserts humankind’s dominion over all systems and processes and ignores those forces driving climate change, ocean acidification, and other changes to the biosphere. Similar

to management as a frame, this lacks a grounding in Earth system science. Similar to other Promethean models of industrialism that champion growth and see humankind's mastery of the environment as inevitable (Dryzek, 2013), Purdy's framing of the Anthropocene conflates humankind's impact with dominance and control.

The Anthropocene as a rocket set to take off, transporting humankind to another state.

This frame has been proposed by the ecomodernists (Asafu-Adjaye et al, 2015; Karlsson, 2016), political scientists who argue that our future sustainability can only be achieved through an increase in carbon emissions and resource use “in order to achieve an accelerated rate of innovation and *a more complete separation of humanity from nature*” (Karlsson, 2015, p. 24, emphasis added). This frame relies on techno-utopianism as a means of transcending and breaking away from the constraints of nature. Actors include technocrats, politicians, policy makers, and scientists. Actions imply geoengineering, tampering with atmospheric systems, and sequestering carbon.

In his explanation of the fault lines defining those who favor purposeful large-scale technological interventions and those who oppose them as *up-wingers* and *down-wingers* (p. 24), respectively, Karlsson outlines “the divide between down-wingers who automatically assume the economic convergence around OECD levels is ecologically impossible (Baker, 2006: 4) and up-wingers who see the same globalisation processes as necessary for financing breakthrough innovations” (p. 24).

The frame of *up-wingers* evokes the positive image of striving and upward effort. The term *down-wingers* implies defeat and despair. Up-wingers support “a fully-globalized high-energy planet . . . [,] advanced nuclear technologies . . . [and] space colonization in order to transcend remaining ecological limits (Fuller and Lipenska, 2014)” (Karlsson, 2016, p. 24). The

metaphor of up-wingers, Karlsson (2016) asserts, “introduces a dynamic perspective on human development and socio-technological evolution” putting humankind on “a sustainable long-term trajectory through the Anthropocene” (p. 27).

The metaphorical frame of the Earth as a rocket ship promotes a mechanistic and technocratic worldview. It concedes control of humankind’s fate to technocrats. Issues such as global warming and biodiversity loss are reduced to technical problems to be solved by technical experts. This promotes a mechanistic worldview whereby technicians need only tinker with the bothersome faulty parts. This frame also ignores limits to growth (Meadows et al., 1972), overshoot (Catton, 1980), and the ecological basis of sustainability as dependent on ecological constraints (Naess, 1995). Ecological boundaries, necessary to life, are characterized as “remaining ecological limits.” As such, the Anthropocene as a rocket set to go off can be evaluated as being ungrounded in the environmental realities of the biosphere (Assessment 2003, 2005a, 2005b, 2005c).

The Anthropocene as the age of planetary stewardship places the target domain of the Anthropocene with the source frame of stewardship. This implies ownership and management of a resource. Stewardship embraces the frame of ecosystem management (Schackelford, 2013; Stanturf, 2014), with “active intervention, adaptive management, and experimentation” (Corlett, 2015, p. 38) as key. These imply *the Anthropocene as a time of management*, with assumptions of sufficient knowledge and resources to control the planet’s biosystems.

Such assumptions are contradicted by those who argue for the complex and nonlinear nature of geophysical forces (Bekoff, 2014; Butler, 2014; Wuerthner, Crist, & Bulter, 2015). Conservationists like Tom Butler in *Keeping the Wild: Against the Domestication of Earth*

(2014), argue for resisting the frame of the stewardship of “Lord Man” (p. xii). Instead, conserving biosystems in their most untouched states and rewilding those landscapes negatively impacted are called for (Bekoff, 2014; Wuerthner, Crist, & Butler, 2015). Stewardship requires public policy initiatives and technocratic oversight, with civic agency undecided. Another key oversight in the rhetoric of management is its ambiguity, with the tendency toward objectivism and reductivist formulations of nature.

The Anthropocene as a call to recognize planetary boundaries. Guided by scientific data concerning nine planetary boundaries (Lewis, 2012; Steffen & Smith, 2013), planetary boundary setting as a frame recognizes “the need for interdisciplinarity, synthesis, and theory building” (Corlett, 2015, p. 38) to address the fundamental shifts that have occurred. Assumptions of steady-state planetary systems driving environmental science and ecology will need to be significantly revised or abandoned (Corlett, 2015), now that critical boundaries common to the Holocene have already been exceeded (Steffen, 2015; Steffen et al, 2004). This frame provides agency to multiple actors—citizens, public policy makers, and technocrats—who would follow the recommendations derived from these studies. The potential for democratic agency in this frame is possible but not guaranteed. The ecosophy embodied in this frame is life-affirming and consistent with the goals of sustainability education.

Limitations

In limiting this study to these texts, this analysis is constrained in the conclusions that can be drawn from these few examples of framing given to the Anthropocene. Still, the ways in which various authors from distinct disciplines chose to approach the Anthropocene speaks to similar differences in interpretation across disciplines. As Richard Corlett (2015) notes,

interpretations of the emerging Anthropocene are evident even within conservation biology, where “[t]he planetary boundaries hypothesis has . . . been criticized as negative and nostalgic” (p. 38), with too much emphasis given to crisis and not enough attention paid to the opportunities for the continued expansion and possible ingenuity of humankind. What remains clear, however, are the material limitations of our finite planet and the results that will inevitably manifest in ignoring the requirements of life. Any interpretation of those limitations that ignores the ongoing extinctions of species (Kolbert, 2015) and the threat to life should be met with skepticism.

Scholarly Significance: On Going Beyond Ecological Sustainability

“We seek not just ecological sustainability, but more encompassing socioecological sustainability. We want a sustainable relationship between humans and the natural world rather than sustained ecological systems without humans.” (Larson, 2011, p. 17)

The preceding are just a few frames characterizing action in the Anthropocene. Those of us in sustainability education, in embracing an ecosophy (Stibbe, 2015) that affirms the interdependence of all life, have in these schema a means of distinguishing from among those frames that honor the complexity of life and those that dismiss or reduce it. If we are to educate for sustainability, we need to be able to identify the frames used to characterize the emergence of the Anthropocene as critical to our understanding and our ability to analyze the many choices that lie ahead. We can ensure the relevance of the study of the rhetorics of the Anthropocene by relating these rhetorics to possible pathways to sustainability. The agency that positive approaches to sustainability promote can be achieved through a multidisciplinary study of the various frames, discourses, and metaphors surrounding the characterization of the Anthropocene. Every discipline, whether it be political science, economics, biology, or Earth system science, to

name just a few, contributes to the understanding that decisions about our common fate need to be made democratically, by an informed citizenry, and not by private corporations intent on greenwashing and devising technofixes to hide the symptoms of anthropogenic climate change. To the extent that we have control over our actions, our choices and their consequences, metaphors that focus on humankind's agency have a critical role to play in encouraging moral ownership of the consequences of our actions and may thereby produce an entirely different metaphorical perspective or frame—one of shared well-being and interdependent lives—reliant on trees, animals plants and numerous unknown, unnamed species outside our awareness.

Sustainability as a way of life requires a shift in consciousness, a reevaluation of how we choose to live on the earth and use its resources. The frames we choose to understand the Anthropocene will shape our responses to the unfolding and emerging realities of this age. Recognizing planetary boundaries, embracing the responsibilities of humankind's place in the hierarchy of species, as the animal whose consciousness allows it to assess, evaluate, and plan for future actions, places specific burdens on us. That awareness is also a call to withdraw from previous denials of the consequences of our actions and to embrace wisdom and constraint. Some frames, notably those that ask us to ignore the consequences of our actions, come across as reckless, and yet there are those who echo their advice. Stephen Hawking's recent admonition to begin active planning for space colonization in order to save humankind as a species (Bardi, 2008; Chernela, 2012; Overbye, 2007) may begin to sound reasonable as various tipping points in the Earth's systems are reached. Other ways of conceptualizing survival, of the "bottleneck" that humankind may need to pass through in surviving anticipated catastrophes (Catton, 2009; Hansen, 2010) suggest more realistic scenarios of visionaries able to anticipate and avoid those catastrophic outcomes and thus survive.

Understanding the Anthropocene as a new emerging geological epoch provides significant incentive for radically revising our system of education. Mass extinctions, rising sea levels, ocean acidification and its impact on life—these are just a few of the factors that belie the argument that actions taken to mitigate climate change have little value to us today. It is the larger understanding of the impacts of anthropogenic climate disruption that must be communicated and taught to emerging generations, in schools from kindergarten to college. With the recent emergence of empirical data regarding anthropogenic climate disruption coming into conflict with “business-as-usual” scenarios promoted by economists, business people, and governments (Intergovernmental Panel on Climate Change, 2015; Stocker, 2014), the choices must be clearly described. How we as educators frame these choices, as a call to planetary stewardship or as a justification for continued economic expansion as a route to space colonization and the search for the ultimate technological fix, will communicate humankind’s options to this generation. Only then can an informed democratic decision be taken by the people (Smith, 2015). With the rise of discussions focusing on the emergence of the Anthropocene, a rhetorical contest awaits us all. How we respond to that challenge will mean the difference between a well-informed electorate and an easily frightened and manipulated populace unable to differentiate between the solipsistic arguments for continued prosperity at the cost of future generations and the realities of increased climate change and the need to act now.

References

- Asafu, Adjaye, J., Blomqvist, L. Brand., S. et al. (2015). An Ecomodernist Manifesto. Available at: <http://www.ecomodernism.org/>.
- Assessment, M. E. (2003). *Ecosystems and human well-being* (Vol. 200). Washington, D. C.: Island Press.
- Assessment, M. E. (2005a). *Ecosystems and human well-being: Opportunities and challenges for business and industry. A report of the Millennium Ecosystem Assessment*. World Resources Institute. Washington, D.C.: Island Press.
- Assessment, M. E. (2005b). *Millennium Ecosystem Assessment findings*. Millennium Ecosystem Assessment. Washington, D. C.: Island Press.
- Assessment, M. E. (2005c). *Synthesis report*. Washington, D. C.: Island Press.
- Bardi, J. S. (2008). Stephen Hawking renews call to colonize space. *American Institute of Physics, April, 23*.
- Bekoff, M. (2014). *Rewilding our hearts: Building pathways of compassion and coexistence*. New World Library.
- Bennet, J. (2017, April 28). Introducing our new columnist. *New York Times*. Retrieved from <http://www.nytimes.com>.
- Butler, T. (2015). Introduction. Lives not our own. In Wuerthner, G., Crist, E., & Butler, T. (Eds), *Keeping the wild: Against the domestication of the earth*. Island Press, ix-xv.

- Carrington, D. (2016, April 19). The Anthropocene epoch: Scientists declare dawn of human-influenced age. *The Guardian*. Retrieved from <http://www.theguardian.com>.
- Catton, W. R., Jr. (1980). *Overshoot: The ecological basis of revolutionary change*. Springfield, IL: University of Illinois Press.
- Catton, W. R., Jr. (2009). *Bottleneck: Humanity's impending impasse*. Exlibris.
- Chernela, J. (2012). A species apart: Ideology, science, and the end of life. In Sodikoff, G. (Ed.). *The Anthropology of Extinction: Essays on Culture and Species Death*. Bloomington, IN: Indiana University Press, pp. 18-38.
- Cilliers, P. (1998). *Complexity and postmodernism: Understanding complex systems*. New York, NY: Routledge.
- McGee, M. (2017, July 27). CO2.Earth. Retrieved from <http://www.co2.earth>.
- Cohen, K. M. (2014). The “Anthropocene” and “the Present is the Key to the Past”. In *STRATI 2013* (pp. 919-923). Springer International Publishing.
- Comstock, M., & Hocks, M. E. (2016). The Sounds of Climate Change: Sonic Rhetoric in the Anthropocene, the Age of Human Impact. *Rhetoric Review*, 35(2), 165-175.
- Corlett, R. T. (2015). The Anthropocene concept in ecology and conservation. *Trends in ecology & evolution*, 30(1), 36-41.
- Crutzen, P. J. (2002). Geology of mankind: The Anthropocene. *Nature* 415, 23 doi: 10.1038/415023a
- Crutzen, P. J., & Stoermer, E. F. (2000). The Anthropocene. *Global Change News* 41, 17-18.
- Dryzek, J. S. (2013). *The politics of the earth: Environmental discourses*. (3rd ed.) Oxford, UK: Oxford University press.

Dunlap, R. E., & McCright, A. M. (2010). Climate change denial: Sources, actors and strategies.

In C. Lever-Tracy (Ed.), *Routledge handbook of climate change and society*, Abingdon, UK: Routledge, 240-259.

Foust, C. R., & Murphy, W. O. (2009). Revealing and reframing apocalyptic tragedy in global warming discourse. *Environmental Communication* 3(2), 151-167.

Funtowicz, S., & Ravetz, J. (1993). Science for the postnormal age. *Futures* 25: 739-755.

Funtowicz, S., & Ravetz, J. (2003). Post-normal science. *International Society for Ecological Economics* (ed.), *Online Encyclopedia of Ecological Economics* at <http://www.ecoeco.org/publica/encyc.htm>.

Gare, A. (2002). Human ecology and public policy: Overcoming the hegemony of economics. *Democracy & Nature* 8(1), 131-41.

Grinevald, J. (2007). *La Biosphère de l'Anthropocène: Climat et pétrole, la double menace. Repères transdisciplinaires (1824-2007)*. Geneva, Switzerland: Georg/Éditions Médecine & Hygiène.

Hamilton, C. (2016). The Anthropocene as rupture. *The Anthropocene Review* 3(2): 93-106. doi: 10.1177/2053019616634741

Hansen, J. (2010). *Storms of my grandchildren: The truth about the coming climate catastrophe and our last chance to save humanity*. Bloomsbury Publishing USA.

Intergovernmental Panel on Climate Change. (2015). *Climate change 2014: Mitigation of climate change* (Vol. 3). Cambridge, UK: Cambridge University Press. Available at <http://www.ipcc.ch/ipccreports>

Karlsson, R. (2016). Three metaphors for sustainability in the Anthropocene. *The Anthropocene Review* 3(1), 23-32.

Kelly, M. (2012). *Owning our future: The emerging ownership revolution*. Oakland, CA: Berrett-Koehler Publishers.

Klein, N., & Archer, E. (2014). *This changes everything*. New York, NY: Simon & Schuster.

Kolbert, E. (2014). *The sixth extinction: An unnatural history*. A&C Black.

Larson, B. (2011). *Metaphors for environmental sustainability: Redefining our relationship with nature*. New Haven, CT: Yale University Press.

Lewis, S. L. (2012). We must set planetary boundaries wisely. *Nature* 485, 417.

Machin, D., & Mayr, A. (2012). *How to do critical discourse analysis*. Thousand Oaks, CA: Sage Publishing.

Meadows, D. H., Meadows, D. L., Randers, J., & Behrens, W. W. (1972). *The limits to growth: A report for the Club of Rome's project on the predicament of mankind*. New American Library.

McKibben, B. (2011). *Eaarth: Making a life on a tough new planet*. New York, NY: St. Martin's Griffin.

McNeill, J. R., & Engelke, P. (2014). *The Great Acceleration: An environmental history of the Anthropocene since 1945*. Cambridge, MA: Harvard University Press.

Naess, A. (1995). The shallow and long range, deep ecology movement. In A. Drengson and Y. Inoue (Eds.), *The deep ecology movement: An introductory anthology*. Berkeley, CA: North Atlantic Books, pp. 3-10.

- Overbye, D. (2007 March 1). Stephen Hawking plans prelude to the ride of his life". *The New York Times*. New York, NY: New York Times Corporation. Retrieved from www.nytimes.com.
- Purdy, J. (2015). *After nature: A politics for the Anthropocene*. Cambridge, MA: Harvard University Press.
- Rickards, L. A. (2015). Metaphor and the Anthropocene: Presenting humans as a geological force. *Geographical Research*, 53(3), 280-287. Doi: 10.1111/1745-5871.12128
- Robbins, P. (2013). Choosing metaphors for the Anthropocene: Cultural and political ecologies. In N. Johnson, R. Schein, & J. Winders (Eds.), *The Wiley-Blackwell Companion to Cultural Geography*, 305-319.
- Schackelford, N., et al. (2013). Primed for change: Developing ecological restoration for the 21st century. *Restoration Ecology* 21, 297-304.
- Smith, R. (2016). *Green capitalism: The god that failed*. College Publications.
- Stanturf, J. A., et al. (2014). Contemporary forest restoration: A review emphasizing function. *Forest Ecology Management* 331, 292-323.
- Steffen, W., Broadgate, W., Deutsch, L., Gaffney, O., & Ludwig, C. (2015). The trajectory of the Anthropocene: The Great Acceleration. *The Anthropocene Review* 2, 1-18.
- Steffen, W., Grinevald, J., Crutzen, P., & McNeill, J. (2011). The Anthropocene: Conceptual and historical perspectives. *Philosophical Transactions of the Royal Society A* 369, 842-867. doi: 10.1098/sta.2010.0327
- Steffen, W., Sanderson, A. Tyson, P. D., Jager, J., Matson, P. A., Moore III, B., Oldfield, F., & Rich, K. (2004). Executive summary. *Global change and the earth system: A planet under pressure*. New York, NY: Springer-Verlag. At

http://www.igbp.net/download/18.1b8ae20512db692f2a680007761/1376383137895/IGBP_ExecSummary_eng.pdf

Steffen, W., Sanderson, A. Tyson, P. D., Jager, J., Matson, P. A., Moore III, B., Oldfield, F., & Rich, K. (2015). The Great Acceleration. *The Global International Geosphere-Biosphere Programme*. At

<http://www.igbp.net/globalchange/greatacceleration.4.1b8ae20512db692f2a680001630.html>

Steffen, W. & Smith, M. S. (2013). Planetary boundaries, equity and global sustainability: Why wealthy countries could benefit from more equity. *Current Opinions on Environmental Sustainability* 5, 403-408.

Stephens, B. (2017, April 28). Climate of complete certainty. Opinion. *New York Times*. Retrieved from www.nytimes.com

Sterling, S. R. (2004). *Whole systems thinking as a basis for paradigm change in education: Explorations in the context of sustainability* (Order No. C821111). Available from ProQuest Dissertations & Theses Global. (305082652). Retrieved from <https://search-proquest-com.libproxy.chapman.edu/docview/305082652?accountid=10051>

Stocker, T. (Ed.). (2014). *Climate change 2013: The physical science basis: Working Group I contribution to the Fifth assessment report of the Intergovernmental Panel on Climate Change*. Cambridge, UK: Cambridge University Press.