

On Sustainabilization: Global Inequalities, Digital Habitats, and Material Governance - A Critical Ecology

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Abstract: This paper explores how the recent turn to the Anthropocene in many environmental and political debates appears, first, to mystify the characteristics of the humans who are transforming the planet Earth on a biophysical scale in geological time, and, second, to justify the importance of new planetary eco-managerial interventions to administer the costs and benefits of these ecological events in the most efficient manner possible. As a result, the discourses of sustainability and resilience amid these worldwide changes appear to operate with increasingly conservative political agendas. On the one hand, they legitimate a strange fusion of ecological sustainability and economic development in green modernization programs, which could be considered new policies for "sustainabilization." Yet, on the other hand, these codes of green performativity also work to preserve the historically inequitable distribution of wealth, technology, and power for those social forces that have caused the most ecological destruction around the world over the past 250 years.

Keywords: ANTHROPOCENE, ENVIRONMENTALISM, POLITICS, RESILIENCE, SUSTAINABILITY, TERRAFORMATIVITY

Introduction

In this discussion, I will be more than a bit contrary about one of today's most treasured pearls of conventional wisdom, namely, the notion of "the sustainable." As this concept circulates today, I question its wisdom, conventionality, and value. The idea of sustainability has attained a place in the policy lexicon almost as unquestioned as democracy, equality, freedom, growth, or liberty, but it also has become, like these other once vibrant ideals, more procedural, inequitable, limited, and vaporous. Such rhetorical qualities of conceptual plasticity, operational fogginess, or practical emptiness commonly are signs of ideology at work, and these changes are worth investigating.

Of course, any critical interrogation of sustainability will be irksome, because many corporate concerns and non-profit institutions commonly revere "the sustainable" as they piously seek sustainability certification, hire sustainability officers, tout sustainability plans, and support sustainability services. One also sees various colleges and universities gripped in a parallel craze, establishing new sustainability studies majors, sustainability centers, sustainability science faculties, and sustainability colleges. In many ways, the idea of modernization itself, which has never really gone away, despite so many efforts to criticize its practices and perspectives, is becoming intertwined with sustainability science to the point of becoming the highest form of modernity in the hybridized pursuits of "sustainabilization" in which sustainability and modernization are becoming blended to serve conflicting purposes.

Indeed, it is not clear, amidst our digital habitats, material systems, and global inequalities, that sustaining the planet and its ecologies is truly the mission of all the freshly mobilized programs, policies, and persons that now are being deployed to defend sustainability. The original inspiration once might have been well-worth pursuing in 1970, but is sustainability in 2015 headed elsewhere? Is sustainability now aiming at lesser targets, and serving lower purposes as it also becomes so vague that one almost cannot support it. On the one hand, its vapid values cloak everything with a sanctimonious air of “caring for Mother Earth” by praising ecological living and green growth. Yet, on the other hand, too many of its proponents are pushing ahead with improbable plans for sustainable coal production, sustainable pesticide manufacture, sustainable gas fracking or sustainable highway development? It is important, therefore, to articulate some doubts about the “sustainabilization” turn.

I. Sustainability and its Origins

The ideas of “sustainable development” crystallized several contradictory events and forces in the Cold War era of the late 1960s and early 1970s when the Earth had only around 3 billion people and atmospheric CO₂ levels were 317-325 ppm.ⁱ During these years, the world first witnessed space flights by the USSR and USA taking human beings into Earth’s orbit, and then the Moon, as Moscow and Washington amassed huge stocks of thermonuclear weapons with the capacity to create tremendous environmental destruction in strategic missile strikes that could cause “ecocide.”

Not surprisingly, then, academic, corporate, and government assessments of Earth sustainability, as a complex coupled Earth system, became a more frequent policy topic during the initial space faring efforts and intensive thermonuclear war-making preparations made by the Cold War-era superpowers. The “Spaceship Earth” trope, which was spun up in the media by philosophers, politicians, diplomats and columnists in the 1960s, envisioned the whole planet as one huge “space capsule.” After dropping this term into many of his public speeches over the years, R. Buckminster Fuller finally expressed his thoughts about this meme in *Operating Manual for Spaceship Earth*.ⁱⁱ U.S. Ambassador to the United Nations, Adlai Stevenson, used this idea in a 1965 presentation before the General Assembly, suggesting “We travel together, passengers on a little spaceship, dependent on its vulnerable reserves of air and soil.”ⁱⁱⁱ During 1966, the British author, Barbara Ward, published her book, *Spaceship Earth*, and the well-known American economist, Kenneth Boulding, presented his article, “The Economics of the Coming Spaceship Earth” (1966). Boulding’s presentation of his thoughts at a Resources for the Future forum in Washington, D.C. underscored the significance of making this rhetorical turn in the environmental policy community. And, many consulting firms and government agencies began to assess the scope of their operational responsibilities as steps taken toward caring more rationally, and perhaps even more ethically, for the ecology of “Spaceship Earth.”^{iv}

If the Earth is like a gigantic space capsule, then should its encapsulated spaces be planned, policed, and protected, which the *Limits to Growth* (1972) studies acclaimed as an important new societal norm?^v Activists from the 1960s still pushed for sustaining the Earth’s ecologies, but policy-makers in Moscow and Washington continued policies that favored rapid economic development to affirm the merits of socialism or capitalism.

Over the past three decades, this growth-minded agenda has become both more pressing and quite contested, as bigger and broader publics opened broader debates about the material realities of rapid climate change during the 1980s and 1990s, as the Cold War fizzled out. Never ones to let “a good crisis go to waste,” it was not surprising to see global corporate players begin working with their supplier networks and consumers in ways that focused new green business thinking on the so-called “triple bottom line” of “people, planet, profit.”^{vi}

Meanwhile, emerging networks of scientists, citizens, journalists, and artists explored sustainability ideas for paths to preserve the Earth as it has been evolving for millennia. A few pragmatists admitted that an industrial economy could continue rationally regulating commercial growth to maintain a modern material existence for the human and nonhuman passengers carried within the encapsulated spaces of Spaceship Earth spinning through the cosmos. The Earth was clearly being endangered by greed and power lust echoing the “catastrophocapitalism” narratives first explored by Polanyi in *The Great Transformation* (2001) and continued today by Naomi Klein.^{vii} Instead of preserving long-term ecological sustainability of Earth as a habitat, however, humanity was burning down the home it occupied.^{viii}

Still, critical analysis must note how ecology and environmentalism are moving away from the narratives of “catastrophism” that first were woven deeply through green rhetoric five decades ago with Rachel Carson’s *Silent Spring*. Her persuasive aesthetic plea and powerful scientific case against the profligate use of DDT motivated many to see how horrendous industrial chemicals had catastrophic effects on wildlife, soil and water, human health, and the biosphere in general. Her rhetoric of biological catastrophe rang true, and innumerable other activists, academics, and authorities soon adopted similar intellectual and rhetorical narrative frames, from Barry Commoner in *The Closing Circle* (1971), Paul R. Ehrlich in *The Population Bomb* (1968), and Donella Meadows *et al.*, *The Limits to Growth* (1972) to Bill McKibben *The End of Nature* (1989), Al Gore, *An Inconvenient Truth* (2007), James Hansen, *Storms of My Grandchildren: The Truth About the Coming Climate Catastrophe and Our Last Chance to Save Humanity* (2009), and Naomi Klein, *This Changes Everything: Capitalism vs. The Climate* (2014).^{ix}

Rapid climate change, obvious sea rise, and quickening ice loss continue, but at varying rates. In turn, climate change denialists have come to stiffly challenge catastrophism--not to the point of discrediting it entirely--but enough to raise major doubts about the die-hard environmentalists clinging to its interpretative frames, because catastrophes usually are understood as quick episodes of total crisis. Some, like Maniates and Meyer in *The Environmental Politics of Sacrifice* (2010), recommend adopting new rhetorics of political response, like discipline, frugality or sacrifice, while others, like Lilley, McNally, Yuen and Davis in *Catastrophism: The Apocalyptic Politics of Collapse and Rebirth* (2012), dispute the mobilization of catastrophism in ecological policies almost *in toto*.^x

Nonetheless, alternative critical visions for environmentalism, which embraced accepting and administering the Earth as truly “a processed world,” have always existed in the green movement. Their logics were best articulated in the United States by the

less well-known Murray Bookchin writing under a pseudonym, Lewis Herber, as he presented a harsher ethico-political interpretation of post-war environmental crises in *Our Synthetic Environment* (1962).^{xi} Carson's first edition book cover was colored lightly green with an impressionist sketch of a small brook or fresh spring flowing mysteriously into silence; Bookchin's displayed mid-town Manhattan from the air shrouded in smog with a stark black and white photograph. This minor design divergence in cover art layout, however, marks deeper intellectual and political splits in American environmentalism.

Rather than seeing Nature/Culture, Ecology/Economy, Environment/Humanity in such classically dichotomous terms, Bookchin was already asking the public, many decades before Timothy Morton (2007), to see "ecology without nature" in the material flux of autochthonous natural and anthropogenic technical forces continuously churning through chaotic hybridizing changes.^{xii} His arguments implicitly anticipate the advent of a new rhetorical register embraced today by environmentalist and anti-environmentalist forces alike, namely, "the Anthropocene." In naming a new era in geological and historical time, the Anthropocene thesis sees our synthetic environment's anthropogenic changes as being so powerful, and now permanently enduring, that they now are a biogeophysical force, recording their effects in rock, marine sediments, aquatic flows, soil composition, ice layers, atmospheric chemistry, and overall biotic diversity.

Realizing how little political pull the older traditions of environmental catastrophism is giving green politics today, many ethicists, naturalists or philosophers await official clarification about "the Anthropocene" from paleontologists. They hope that the world's agro-industrial disasters now becoming marked in geological time will get more concentrated attention than the looming extinction of elephants, tigers or whales and the disappearance of salmon runs, reliable watershed flows or coral reefs in the oceans.

Inventing "the Anthropocene," then, is a fascinating intellectual and political intervention.^{xiii} On the one hand, it resonates well around the world in declarations about a new ecological state of emergency from scientists anxious to mobilize nation-states "to do something" about the destruction "Man" has wrought in the environment for 250 years.^{xiv} On the other hand, it anchors a protracted theoretical debate within the many scientific communities over whether or not this impact, if it is solely anthropogenic in origin, even exists on a geological time scale. And, if it does, then what practical import should its formal ratification bring to the business, educational, governmental, and scientific communities as well as lay publics that are concerned about maintaining the biotic carrying capacities of the Earth's environments?

The imperatives of sustainabilization as a political project for those who have the most to win or lose from greater ecological sustainability policing cannot be ignored in these theoretical deliberations. Hence, the rapid development and eager adoption of the Anthropocene thesis as a scientific foundation for new policy practices should be approached, conceptually and discursively, not so much as confirmed geophysical fact perhaps as instead "the history of actuality in the process of taking shape" all around us in the twenty-first century.^{xv} Strangely enough when it comes to the Anthropocene concept, academic squabbles over the paleontological stratigraphy justifying its

acceptance or political proclamations already embracing the term as a foregone conclusion are both politicized new movements engaged in reimagining what humanity is becoming in the twenty-first century.

Leslie Paul Thiele in his efforts to define sustainability has highlighted this idea as a “key concept,” because “learning to live and work sustainably is *the* practical challenge of our times.”^{xvi} This claim is often widely accepted, but he takes 199 pages to make his use of “the”—a definite article anchoring our practical challenge—much less definite, and quite diffuse. Such analyses are what enables sustainability to remain “one of the least meaningful and most overused words in the English language.”^{xvii} Its loss of meaning and overuse is attributable, at least in part, to this rapid turn toward “sustainabilization.” The potent fusion of modernizing change with reverence toward Nature is energizing too many conflicting social forces. If the practices of living now require learning why our times are being defined by new planetarian-scale ecomanagerial agendas, then whose work is it to manage who and what will attain sustainable existences, who and what will maintain their material life, and who and what will not gain anything much? Even though many hard-working individuals and well-meaning groups still are energetically trying to attain deeper ecological values, like sustainability in its truly strongest sense more prevalent, it is evident that far more favor is being given to utterly weak sustainability in today’s policy debates.

Barry Commoner first captured the challenging contradictions of sustainability in rethinking the historic tasks of materialistic growth-minded people preserving the planet’s ecosphere and sustaining its biotic integrity for all life forms. In *The Closing Circle*, Commoner depicted his own research as “an effort to find out what the environmental crisis means,” while he noted:

Suddenly we have discovered what we should have known long before: that the ecosphere sustains people and everything that they do; that anything that fails to fit into the ecosphere is a threat to its finely tuned cycles; that wastes are not only unpleasant, not only toxic, but, more meaningfully evidence that the ecosphere is being driven towards collapse.^{xviii}

Sustaining the whole ecosphere, therefore, demands staving off man-made collapse, and the survival of the planet’s many life-forms should check, and then reverse any potential sources of ecosystemic collapse, like the much feared “population explosion” of the 1960s.^{xix}

Yet, in 2014, we have over 7 billion people on Earth, and CO₂ ppm concentrations in the atmosphere about 400, or 50 ppm past what once was regarded as the safe upper limit. It is clear that “environmentally, the world is in an overshoot mode”.^{xx} The sustainabilization turn in development discourses, however, also allows many economists, who might be wary of an ecological collapse, to celebrate an almost 10-fold growth in the world economy since 1950 and the associated gains in living standards as the crowning achievement of our modern civilization. During this period, income per person worldwide climbed nearly fourfold, boosting living standards to previously unimaginable levels.^{xxi}

Averages, however, are always deceptive, especially now when 85 individuals on the planet own as much wealth as the bottom 3.5 billion people. Economic output, once measured in billions of dollars, is now measured in trillions, but accumulating such wealth too rarely is tied directly to the miserable measures of the ecosphere's degradation and society's operational overshoot of its natural resources.^{xxii}

Looking back, it appears that "ecology rhetoric" ideologically distorted "economic reality" enough to help enable this explosive rapid growth. Embracing sustainability ideas ironically became one easily adopted solution for *not* altering the course of history, curing the environmental crisis, or ending the post-war culture of growth. The ultimate political insurance for industrial democracy under the conditions of "actually existing capitalism" is continuous economic growth: "growth is a substitute for equality of income. So long as there is growth there is hope, and that makes large income differentials tolerable."^{xxiii} To keep this hope alive, the sustainabilization turn sees good sense in recoloring it as "green."

Commoner maintained during the 1970s that the ecological pressures on the Earth are a simultaneous complex crush of contradictory events. He also noted that "none of us, singly or sitting in committee, can possibly blueprint a specific 'plan' for resolving the environmental crisis. To pretend otherwise is only to evade the real meaning of the environmental crisis: that the world is being carried to the brink of ecological disaster not by a singular fault, which some clever scheme can correct, but by the phalanx of powerful economic, political and social forces that constitute the march of progress."^{xxiv}

II. Shifting Meaning and Sustainability as Modernity

Between the 1970s and today, the discursive uses of sustainability in public life have become more contradictory. When expressed with its original intent from the 1960s and 1970s, "sustainability" was understood as a very radical goal for human ethical codes and economic systems. Political ecology did hope then to lessen the most inequitable trends in capitalist economies, and maybe limit their most toxic industrial tendencies.^{xxv} This radical change was required to assure the Earth's existence and to test sustainable forms of developed material life that would shift all human communities toward less materialistic ways of individual and collective everyday life.^{xxvi} Many thinkers endorsed the moral imperatives of living simpler material lives. The best individual and collective responses to what appeared during the 1970s as resource shortages and looming ecological collapse were efforts at thorough, rapid, and permanent downsizing. Brown affirmed this point three decades ago, "creating a sustainable society will require fundamental economic and social changes, a wholesale alteration of economic priorities and population policies," but these most preferred choices still have yet to be made.^{xxvii}

Sustainability, or unsustainability, is neither some minor convenience people adopt on their own nor larger conditions that determine their fate without their knowledge. Instead, such practices remake the thought and practice at the roots of modern milieux behind all of material life itself. For human beings, individually and collectively, these considerations are,

...what they do and the way they do it. That is, the forms of rationality that organize their ways of doing things (the *technological aspect*) and the freedom with which they act within these practical systems, reacting to what others do, modifying the rules of the game, up to a certain point (this might be called the *strategic* side of the *practices*).^{xxviii}

Indeed, sustainability per se comes broadly into common public currency around 1972 along with the initial Club of Rome studies and the 1974 Cocoyoc Declaration of the United Nations, and it came to be understood as “capable of being continued at a certain level” as anxieties about economic stagnation gripped the world during the so-called OPEC oil crises.

This semantic twist in sustainability today highlights a key motif in its original seventeenth century meanings, which implied some sense of being a “bearable,” or even “defensible,” condition, experience or situation. A bearable ordeal of suffering or a defensible site for bearing such suffering in 1610, as capitalism and nation-states took hold in the Atlantic world, then, became something equated--at least by the twentieth century--with accepting disasters like Bhopal, Chernobyl, Deepwater Horizon or Fukushima Daiichi. That is, sustainable development is a whole way of life tied to ever greater rates of commercial trade and technical innovation that are capable of being borne at a certain level of commodious, but also increasingly unbearable, being. Maintaining high-tech modernity at its high pitch of heavy environmental costs now is *the* “development” that must be made “sustainable,” even though the early proponents of sustainability in the 1960s definitely implied that it should address protecting people and all other life thriving in the planet’s biosphere.

Whether meaning emerges from behavior, or activity is shaped by thought, these operational dead-ends ironically are embedded in the very idea of the sustainable itself. Sustaining someone or something, as this notion is now understood in modern English, comes from the Middle English “sustainen,” the Old French “sustinere,” and most crucially here, the Latin “tenēre.” With Latin’s *surum*, “sus” implies “on” or “atop,” while declensions of *tenēre* suggest “to hold, have or grasp,” and “to possess, occupy, or control;” and, finally, “to acquire, guard or keep.” Sustainable development starkly implies a struggle to attain material gain with an aim to maintain this entire circuit of control.

Therefore, sustainability is, in part, economic growth that has been reached for, grasped solidly, controlled directly, and guarded carefully as an attainment. Gains that have been attained now must be kept and maintained. To keep, occupy, and hold that which has been attained and possessed, as the energy-intensive and resource-wasting gains of a maintainable carbon-intensive modernity for the masses, without any, or at least too many, limits bizarrely are understood as “sustainability.” This green economic logic, in turn, defines our time--the so-called era of the Anthropocene--and “we” or those who have attained these gains will do anything to keep and maintain them.

Whether or not it is subtle cynicism or subconscious calculation, today’s fusion of sustainability with developmentalism makes far more sense in this light. Even though becoming fixated upon holding what one controls is neither necessarily sustainable nor

developmental, it enables one to realize that transnational energy and agribusiness companies organizing serious discussions about advancing “sustainable oil and gas development” or “green agro-industrial operations” are not as rhetorically improbable as they first sound. Indeed, sustainability science seems to be something more like the professionally correct ideology that would-be modernizers/developers seeking national-statal “tenure track opportunities” need to pursue heedless growth. Once fresh modernization via economic development is gained, these gains must be maintained more leanly, cleanly, and greenly as those holding the “tenured position” of modernized materiality drive sustainabilization’s search for endless efficiencies. At some level, the relations between the human race as living beings and their environment pertains to the environments constructed at Nature/Culture, Ecology/Economy, Planet/People interfaces, but these environments, as I have argued elsewhere, have multiple materialities with regard to their first, second or third natural properties.^{xxix}

Recognizing and labelling the Anthropocene, not surprisingly, develops at around the same historic conjuncture as the advent of informational globality and telemetric territoriality.^{xxx} That is, interactions of power, politics, and ideology in cyberspace are sparking qualitative changes in which

new transnational flows of capital, people, commodities, information and culture are generating a cybersphere/telesphere that is coextensive with, but different from, first nature in the natural biosphere and second nature in the industrial technosphere. This new ‘third nature’ of cyberspatial/televisual/informational glocality fuses the local and the global in new everyday life-worlds. And, it is the hyperreal estate of these glocal territories which anchors many social struggles, political organizations, economic competitions and cultural creolizations in most regions of the existing capitalist world system.^{xxxi}

One sees here the three decisive moments of reflection anchoring this conference. Our habitats are now, and have indeed been digital for years, given the operational iterations of cyberspatiality/televisuality/informationality as the “third nature” of the cybersphere/infosphere/telesphere colonizes the first nature’s biosphere and second nature’s technosphere. The localized degradation of our natural habitats by fossil fueled global metabolisms fuse acts and artifacts, ideas and implements, thoughts and things whose intended products and unintended by-products build up, on the one hand, the marvels of the developed world, and, on the other hand, the miseries of its detrital wash. That these flows converge in the tremendous disruptions now being traced in contemporary deposits into the Earth’s geological record is no surprise inasmuch as sustainability seekers want to mediate these ephemeral fusions of the local and glocal in the timeless formations of terrestrial materiality.

The digital habitats of third nature are also a new regimen of material governance as the always already cybernetic qualities of built environments, material artifacts, and cultural acts are being fabricated. As IBM’s current marketing campaigns to sell big data network technologies assert, the world must be made “smarter.” The material governance of the industrial technosphere and natural biosphere has long been, despite

the putative “breakthroughs” of accepting the “new materialism” or “post-environmentalism;” and, engaged in steering vibrant matter, like the active objects, animate things, and agentic aggregates of smart materiality.^{xxxii}

Architecture, engineering, construction, mining, design, planning, or manufacture to name but a few pursuits cannot occur without accepting how vibrant or actant many extant materialities already are. Activating ontologies of such object orientations with new proactant, coactant or reactant energies is simple; it merely certifies technifications under their material governance. Reification constitutes things, but things so constituted inevitably function as embedded legislation, congealed management, solidified adjudication, artificial intelligence, systematic sapience or serviceable sentence for things, which easily disclose how fully materiality and humanity collaborate, and collide, in the regimentation of reification.

Finally, global inequality is both manifest and masked in the glocalities of third nature. The domination of human beings precedes or coevolves with the domination of nonhuman beings, things, spaces or the domains of second and first nature. A quick reading of Aristotle’s *Ethics* reminds us how women, slaves, children, and animals constitute much of any settled *oikos*’ most vibrant matter, and the agricultural, industrial or international ecologies that unfold so banally for object-oriented ontologists reflect enduring embedded inequalities that have been misunderstood for too long as being quite neat, necessary or natural. Indeed, these ideological constructs have been identified, part and parcel, in the on-going terraformation of our biosphere, technosphere, and infosphere.^{xxxiii} Yet, critical ecology must contest the ideological blocs at work behind their affirmative sustainability as well as their theories of sustaining affirmation.

The continuous churn of 24x7 commercial imperatives, under clean, green or lean capitalism, which Jameson might characterize as “a new social system beyond classical capitalism” multiplexing its operations through “the world space of multinational capital” is repositioning planetarian ecomanagerialism in these tracks for sustainabilization.^{xxxiv} It perhaps becomes “a breakthrough” for “new modes of representing as individual and collective subjects” that “regain a capacity to act and struggle” with “the invention and projection of a global cognitive mapping, on a social as well as spatial scale” in the Anthropocene.^{xxxv} Today’s push and pull toward terraforming the Earth through geoengineering, rampant urbanization, and globalization in the collaborative engagements of commodification in the biosphere, technosphere, and infosphere all firmly reaffirm “performativity--that is, the best possible input/output equation. The State and/or company must abandon the idealist and humanist narratives of legitimation in order to justify the new goal: in the discourse of today’s financial backers of research the only credible goal is power. Scientists, technicians, and instruments are purchased not to find truth, but to augment power.”^{xxxvi}

The technologies mobilized by institutes of global sustainability simply can adopt the performative logics of sustainabilized globality. Their informational and industrial technics fully affirm the premise that all technology must be enmeshed in managerial and machinic applications where its utilization pertains “not to the true, the just or the beautiful, etc., but to efficiency: a technical “move” is “good” when it does better and/or

expends less energy than another.”^{xxxvii} Centers for global sustainability, then, find their sustainability centered on the same agenda of mindful globalism at play with the world watch of Al Gore’s Earth Inc.^{xxxviii}

As performativity norms “spread to the applied science laboratories: hierarchy, centralized decision making, teamwork, calculation of individual and collective returns, the development of saleable programs, market research, and so on,” sustainabilization takes command.^{xxxix} When the informatic reality of third nature soaks into second and first nature, their coextensive manifestations in human actions can be easily categorized as the Anthropocene--an age when the performativity of global exchange is the default design behind the Earth’s technified transformations. This systemic shift toward what essentially is “terraformativity” radically enhances the impact of informationalization and industrialization, fusing more closely many massive global changes and minute local shifts together as a “smarter planet.”

III. Terraformativity: Options and Limits

In some sense, my general comments here about now to advance a critical ecology of the present are an exploration of short passages in Foucault’s *Security, Territory, Population: Lectures at the Collège de France 1977-1978* which mention briefly “control over relations between the human race, or human beings insofar as they are a species, insofar as they are living beings, and their environment, the milieu in which they live.”^{xi} To speak of material governance and digital habitats for humanity is to recognize how extensively “the milieu in which they live” are indeed mixed, multiple and manifold.^{xii} Whether it is architecture or informatics, these milieux shape the time, place, way, space, manner of life made possible by “control over relations between the human race.”^{xiii}

Foucault addresses these power/knowledge conjunctures, again quite briefly, in *the Birth of Biopolitics* when he suggests modalities of environmental governance iterate themselves through dispositifs and discourses “in which there is an environmental type of intervention instead of the internal subjugation of individuals.”^{xliii} The machinations and/or cybernations at work in producing second and third natures are grounded squarely in milieux as machinic formations of/for/by people engaged in multiplex ways of living.^{xliv}

Sustainabilization evolves with the melding of third, second, and first nature in the terraforming designs of sustainability sciences that are now intent upon instituting sustainability globally as a sustainabilization project. Indeed, one should concede how geoengineering possibilities also unfold from the terraforms of the Anthropocene. These elective affinities are putting forward new iterations of green governmentality by using today’s planetarian ecomanagerialism to express, and then master, logics of terraformativity in planetarian management. While such economic development might be attributed to a caring conspiracy intent on instituting a control society over all domains of life, maybe it is far simpler? In the quest to put STEM (science, technology, engineering, and medicine) systems reasoning at the forefront, one finds biomimicry here coming full circle. Energy efficiency, closed loops, vital materialism are all watchwords in terraformativity’s quest to pound together the best possible input-output equations for sustainabilizing forces.

As a power/knowledge formation, terraformativity is clearly at play in much of today's earth science, ecological policy, and environmental economics. Perhaps the Anthropocene is itself "the invention and projection of a global cognitive mapping on a social and spatial scale."^{xlv} Currently, for example, the publication, *International Journal of Biodiversity Science, Ecosystem Services & Management* is seeking special issue papers on "landscape dynamics" for the enlightenment of ecosystem service analysts. Living in the Anthropocene, they claim, forces us to ask, "Which institutional adjustments are needed for the paradigm shift in ecosystem and resource management?" Terraforming-oriented theory and practice are assumed to have answers for "what are the opportunities and challenges of applying ecosystem services in science and policy?"

Since "terraformativity" plainly implies developing a conscious design and discipline for projects of *terranormativity*, sustainabilization centers also ask, "how can measuring, assessing, mapping and valorizing ES contribute to knowledge building about the link between ES providers-benefits-beneficiaries?"^{xlvi} Third nature materially implies that nature itself--with society embedded within it--is planetary infrastructure, and all of these elements must be monitored, managed, and maintained on a planetary scale. Modernity's attainability self-evidently justifies its sustainability, but now the Anthropocenic turn calls energy and attention to the maintainability of the links between ecosystem service providers-benefits-beneficiaries. Hence, the substainabilization project must know more, have power within, and hash out continuously "What are the interrelations between ecosystem functions, ecosystem services, and human benefits?" Searching, of course, for "the best possible input/output equation," terraformativity mobilizes ecosystem services, methodologies and tools "to support and inform decisions" being made by planetarian ecomanagerialists who must be continuously engaged in "the identification of ecosystem service beneficiaries and providers, investigating interrelationships between landscape structure, ecosystem functions, ecosystem services, and human benefits."^{xlvii}

In much the same way, resilience logics also being absorbed into terraformativity can be defined in terms of short-term responses to abrupt shocks, like natural disasters or weather emergencies, or long-term adaptive capacities to cope with unsteady conditions or recurrent disequilibria. In both instances, however, the root notions at the core of resilience, like recovery, recuperation or restoration in the "bounce-backability" of individuals and institutions, modulate their reactive or proactive range of recuperative interactions to recapture some former state of relative balance, normality or steadiness. Sophisticated versions of resilience admit the world is always contingent, complicated, and chaotic, but even that turbulence can attain a certain orderliness that enables an adaptive reset. Less sophisticated variants see the environment as more predictable, placid or permanent, so the goal becomes recapturing more normal conditions with some intrinsic ability to bounce back into its prior patterns.

Strangely enough, resilience thinking fits well in the logics of terraformativity. Human beings are now anthropocenarians creating or cultivating a diverse array of anthropoceneries in their terraformative impact on the surroundings. Whether one sees humans as adjusted to orderly turbulence, or as agents accustomed to predictable

patterns who must face abrupt shocks, the agendas of terraformativity are exerting terranormative imperatives to maintain productivity, safety, and stability in bouncing-back to patterned order, coping constantly with chaotic variations. Resiliency is another side of green governmentality producing particular subjects with the knowledge and power needed to maintain what was as well to push it all up, on, out to attain fresh productive advances in sustaining the development of new material worlds needing governance.

Critical ecologists, then, must be more incisive in conducting political ecocritique today, because we all live at the biopolitical conjunction of digital habitats, material governance, and global inequalities. This achievement, however, should not lead one to believe that humanity truly dominates every aspect of nature, modernity is a seamless envelope of technical perfection or equality is close to being attained in the very near future. To be terraformative cannot, by any stretch of the imagination, be made equal to omnipotence.

Those who would doubt these ragged recalcitrant realities most of the time with regard to human beings living on the Earth need only recall two recent tragic incidents: the shoot-down of Malaysian Airlines Flight 17 on July 17, 2014 and the mysterious vanishing of Flight 370 on March 8, 2014 whose losses have preoccupied the global media since March 2014. The case of MH17 is an apparent instance of mistaken targeting by an Ukrainian separatist mobile anti-aircraft missile unit. In the breakaway hostilities associated with Russophone regions in Eastern Ukraine, the Malaysian Air Flight was shot down in a series of events that suggest modernity indeed is no guarantee of technical perfection today. The case of MH370, however, is more troubling. A *New York Times* headline about MH370 nearly two weeks later summed up the situation adroitly: “In a Wired World with Abundant Eyes, the Disappearance of a Jet Perplexes.”^{xlviii} Given all media accounts to date, this baffling event already has cycled through multiple causal framings in the world’s mass media markets to cultivate a collective cultural consciousness of random risk. And, these narratives mostly appear now to have been scripted out digitally simulated, digitally implemented, and digitally dramatized crime stories slowly getting dressed up as a mystifying eventual accident. Its texture, however, reveals how much of our still largely unknown earthly habitat and its many inequalities are readily reducible to endlessly reprocessed bits whose digital ebb and flow is actually regarded by many as “reality.”

Google Earth, for example, is continuously digitizing multiple layers of spatial data about our planet. People routinely scan their cities and towns using satellite images to check out changes in their neighbors’ backyards behind high fences, look at beach houses for summer rentals for coming vacations or monitor how construction projects are advancing. Many nation-states keep the world under daily 24x7x365 surveillance for strategic, meteorological, and environmental purposes, while much of the world’s daily media, money, and management traffic moves as bits to sustain increasingly global supply chains.

NASA even has been slowly digitizing the topography of Mars for years with its Pathfinder, Spirit, Opportunity, and Curiosity robotic explorers. At time in which one can be telepresent on Martian landscapes via Curiosity’s color cameras, geochemical tools,

and mechanical wanderings, while the Mars Odyssey ahead also images the planet from space, how could a Boeing 777-200 with 239 people aboard simply vanish not only materially, but also informationally? Thinking about this event in Paul Virilio's terms, out in the open sky, how could the vision machine fail? Was this event a strategy of deception or an information bomb?

Flying here on IBM's "smarter planet," the Boeing 777-200 jetliner is a complex communicant machine moving through multiple machinic milieux, but it vanished. How could over 230 people's mobile wireless devices stay in "airplane mode"; how could so many nations' sophisticated radars all suddenly become uncommunicant; how could someone or something aboard Flight 370 disconnect most of its links, making it essentially go dark in our digital habitat's landscape of events? Without data, the co-conveyant/co-motive/co-accelerant human beings aboard this jetliner perhaps were already gone, but the plane's two Rolls Royce jet engines kept relaying maintenance pings on engine performance to satellites overhead for hours until the plane ran out of fuel. Where it hit the ocean remains a mystery, and it will remain one until nearly 23,000 square miles of the Indian Ocean's floor can be searched.^{xlix}

The material governance of transport, security, publicity, safety, mobility all are informational and material events plugged into transnational firms, world cities, major states, national populations, and local economies. Again, who would think that this many people-in-flight on a communicant aircraft traversing numerous data fields, information grids, and imaging systems could simply vanish from all these habitats? Because so many of its co-monitored passengers were compatriots in the world's largest national population; its co-produced aircraft was produced and powered by the world's sole remaining superpower and one-time imperial hegemon; and, so much of the world's material commerce is in the care, and for the welfare, of many nation-states like the 15 countries with passengers on board, the production and reproduction of everyday economic, social, and technical existence, as governed materiality itself seems, if only as one futurism of that instant, vulnerable. Admitting that the Earth is still a known unknown, the oceans are deep and unmapped, the skies are vast and not always scanned, or many lands are remote and rarely visited are realities few acknowledge until the trance of human technological omnipotence breaks up against disruptive events--regardless of whatever the ill-fate of Flight 370 is, was or will turn out to be when discovered.

Moreover, nothing typifies global inequality like an international jet flight, even this Malaysian Air red-eye. Billions of people remain on the ground, stuck in place, barely surviving on a dollar a day. After all, it is spring again in the Northern hemisphere, and scores of boats are leaving from Haiti to America or sailing from Libya to Italy, but who knows how many vanish on any given day? Over 26,000 have arrived in Italy just from Libya from January to May 2014, but migrants' boats capsize all the time, as the European Union's Frontex border agency announced in mid-May, like the one that killed 17 people on May 13.¹ When they disappear at sea on overloaded ferries or fishing boats, no one in Australia, China or the Netherlands often knows, and few care about such people.

Yet, because two wired Rolls-Royce jet engines kept spinning for hours in touch with the manufacturer's maintenance shops to carry a handful of well-heeled and legally documented passengers, this tiny fraction of the world's daily load of airborne corporate patrons has triggered weeks of expert discussions, air-sea-and-searches, and what probably will be--if the search and eventual recovery of Air France flight 447 from the South Atlantic that took over two years and \$160 million to complete is a baseline indicator--many years of toil, millions in spending, and thousands of people tracking down the lost materiality through whispers of digitality. The Earth is still in too many ways a barely known unknown, and totally losing one airline flight with its human conveyants easily can remain wholly shrouded in mystery for a long time.

Nevertheless, these linkages can still reveal much about our informational, industrial, and ideological ecologies, so tracing all of their imbricate ties in the articulation of sustainabilization is imperative. A Boeing 777-200 ER loaded like Flight 370 is 300 tons of vibrant matter--metal alloys, plastic, jet fuel, people, luggage, sophisticated computers—is capable of flying 7,000 miles at 550-600 mph. This machine's core fuselage structure is over 200 feet long, 20 feet wide, and 61 feet tall. Nonetheless, one or two wrong moves, and it all flips into an extraordinary instance of total unsustainability. As this incident suggests, developmental actuality is often nothing but a broken data trail, existence itself can end abruptly, and the sustainable can crash. The missing clues of this one unsustained flight, its terminal existences, and stark actuality as accidentality unexpectedly underscores how much more texture in the actual contours of our existing sustainabilization remains to be developed for critical ecology.

Meanwhile, those durable pieces of Air France Flight 447 not yet recovered, and those from Malaysian Air 370 still yet to be found, perhaps have come to rest in the ocean's sediments. New deposits from our fossil-fueled age, they gradually might become petrified, sedimented or fossiled into the Earth itself. If nothing else, the search for MH370 already has generated a series of new maps for nearly 60,000 square kilometers of the Indian Ocean's sea floor, revealing a "detailed tapestry of the sea bed" that has uncovered among many new things, including two hitherto unknown undersea volcanoes.^{li}

As bits of evidence of the Anthropocene awaiting recovery during the centuries ahead, this wreckage should never be discounted. Markers of an industry proud of its corporate sustainability programs, which nonetheless dumped megatons of greenhouse gases in the atmosphere getting people and things from points A to points B, deep sea air crash debris fields, like those of Air France 447 or MH370, will be very significant. For whatever resilient higher life forms survive this watershed moment in history, they well might--as future paleontologists-- explore such sites with great interest. Rooting through the layers of our past and present from a future still to come, the practices of terraformativity caught up within our present routines of mysterious machinic life will perhaps allow them to learn how sustainabilization actually came to exist, and cemented the regimens of resilience into the rhythms of the Earth itself.

Notes

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- ⁱⁱ R. Buckminster Fuller, *Operating Manual for Spaceship Earth* (Carbondale, I.L.: Southern Illinois University Press, (1963).
- ⁱⁱⁱ Adlai Stevenson, “Speech to UNESCO” (speech, July 9, 1965).
- ^{iv} Barbara Ward and René Dubos, *Only One Earth—The Care and Maintenance of a Small Planet* (London: Deutsch, 1972).
- ^v McCray, *The Visioneers*, 73-145.
- ^{vi} R. Edward Freeman, *Strategic Management: A Stakeholder Approach* (Boston: HarperCollins, 1984); John Elkington, *Cannibals with Forks: The Triple Bottom Line of the 21st Century Business* (Gabriola Island, B.C.: New Society Publishers, 1997).
- ^{vii} Karl Polyani, *The Great Transformation: The Political and Economic Origins of Our Time* (Boston: Beacon, 2001); Naomi Klein, *The Shock Doctrine: The Rise of Disaster Capitalism* (New York: Knopf, 2007).
- ^{viii} Edward Goldsmith et al., *Blueprint for Survival* (London: Penguin, 1972).
- ^{ix} Barry Commoner, *The Closing Circle: Nature, Man, and Technology* (New York: Knopf, 1971); Paul R. Ehrlich, *The Population Bomb* (New York: Ballantine Books, 1968); Donella Meadows et al., *The Limits to Growth: A Report for the Club of Rome’s Project on the Predicament of Mankind* (New York: Universe, 1972); Bill McKibben, *The End of Nature* (Boston: Houghton Mifflin, 1989); Al Gore and Davis Guggenheim, *An Inconvenient Truth* (Los Angeles: Lawrence Bender Productions, 2006); James Hansen, *Storms of My Grandchildren: The Truth About the Coming Climate Catastrophe and Our Last Chance to Save Humanity* (New York: Bloombury USA, 2009); Naomi Klein, *This Changes Everything: Capitalism vs. the Climate* (New York: Simon & Schuster, 2014).
- ^x Michael Miniates and John M. Meyer, eds., *The Environmental Politics of Sacrifice* (Cambridge, M.A.: MIT Press, 2010); Sasha Lilly et al., *Catastrophism: The Apocalyptic Politics of Collapse and Rebirth* (West Virginia: PM Press, 2012).
- ^{xi} Lewis Herber [Murray Bookchin], *Our Synthetic Environment* (New York: Knopf, 1962).
- ^{xii} Timothy Morton, *Ecology Without Nature: Rethinking Environmental Aesthetics* (Cambridge, M.A.: Harvard University Press, 2007).
- ^{xiii} Paul Crutzen and Eugene F. Stoermer in 2000 proclaimed human beings were now a geological and ecological force in Nature powerful enough to change our collective understanding of geological time: To assign a more specific date to

the onset of the “anthropocene” seems somewhat arbitrary, but we propose the latter part of the 18th century, although we are aware that alternative proposals can be made (some may even want to include the entire Holocene). However, we choose this date because, during the past two centuries, the global effects of human activities have become clearly noticeable. This is the period when data retrieved from glacial ice cores show the beginning of a growth in atmospheric concentrations of several “greenhouse gases,” in particular CO₂ and CH₄. Such a starting date also coincides with James Watt’s invention of the steam engine in 1784 (2000). Like so many “scientific facts,” the Anthropocene is “being made” as much as it is “being discovered” as more official scientific networks adopt the term in their sciences. As *Smithsonian* magazine observed in 2012, “This year, the word picked up velocity in elite science circles: It appeared in nearly 200 peer-reviewed articles, the publisher Elsevier has launched a new academic journal titled *Anthropocene* and IUGS (International Union of Geological Sciences) convened a group of scholars to decide by 2016 whether to officially declare that the Holocene is over and the Anthropocene has begun” (Stromberg, 2013).

^{xiv} Timothy W. Luke, “Developing Planetary Accountancy: Fabricating Nature as Stock, Service, and System for Green Governmentality,” *Current Perspective in Social Theory* 26 (2009): 129-159.

^{xv} Michel Foucault, *The Politics of Truth*, ed. by Sylvère Lotringer (Los Angeles: Semiotext(e)/Foreign Agents, 2007), 137.

^{xvi} Leslie Paul Thiele, *Sustainability* (Oxford: Polity Press, 2013), 2.

^{xvii} David Owen, *The Conundrum: How Scientific Innovation, Increased Efficiency and Good Intentions Can Make Our Energy and Climate Problems Worse* (New York: Riverhead Books, 2011), 246.

^{xviii} Commoner, *The Closing Circle*, 8-9.

^{xix} Paul R. Ehrlich and Anne H. Ehrlich, *Population, Resources, Environment* (San Francisco: Freeman, 1970).

^{xx} Lester R. Brown, *World On the Edge: How to Prevent Environmental and Economic Collapse* (New York: W.W. Norton, 2011), 7.

^{xxi} Ibid.

^{xxii} Timothy W. Luke, “The System of Sustainable Degradation,” *Capitalism Nature Socialism* 17 (2006): 99-112; William R. Catton, Jr., *Overshoot: The Ecological Basis of Revolutionary Change* (Urbana: University of Illinois Press, 1980).

^{xxiii} Henry C. Wallich, “Zero Growth,” *Newsweek*, January 24, 1972, 62.

^{xxiv} Commoner, *The Closing Circle*, 299.

^{xxv} Goldsmith, *Blueprint for Survival*.

- xxvi Timothy W. Luke, *Ecocritique: Contesting the Politics of Nature, Economy and Culture* (Minneapolis: University of Minnesota Press, 1997).
- xxvii Lester R. Brown, *Building a Sustainable Society* (Washington D.C.: W.W. Norton, 1981), 8. Research presented by Wackernagel (2002: 9, 266-71) twenty years after Brown's call to action in 1981 underscores that a vitally important ecological and economic opportunity has closed since that historical conjuncture a generation ago. After living within the carrying capacity of the planet for 5,000 or 6,000 years, the collective material pressure of humanity upon the biosphere in terms of its resource extraction, economic transformation, and waste loading started exceeding the planet's capacity for ecospheric regeneration at/around 1980 (Brown, 2011: 7). Meanwhile, the Earth's human population has nearly doubled and CO₂ ppm has risen nearly a third over the past generation. What is politically most interesting here is how sustainability, as a one-time radical challenge to the status quo rapidly became rhetorically integrated to justify corporate and government growth policy.
- xxviii Foucault, *The Politics of Truth*, 116.
- xxix Timothy W. Luke, "New World Order of Neo-world Orders: Power, Politics, and Ideology in Informationalizing Glocalities," in *Global Modernities*, eds. Mike Featherstone and Scott Lash (London: Sage, 1995), 27-48.
- xxx Timothy W. Luke, "Simulated Sovereignty, Telematic Territoriality: The Political Economy of Cyberspace," in *Spaces of Culture: City-Nation-World*, eds. Mike Featherstone and Scott Lash (London: Sage, 1999), 27-48.
- xxxi Luke, "New World Order of Neo-world Orders," 91.
- xxxii Jane Bennett, *Vibrant Matter: A Political Ecology of Things* (Durham, N.C.: Duke University Press, 2010); Ted Nordhaus and Michael Shellenberger, *Breakthrough: From the Death of Environmentalism to the Politics of Possibility* (Boston: Houghton Mifflin Harcourt, 2007); Ted Nordhaus and Michael Shellenberger, *Love Your Monsters: Postenvironmentalism and the Anthropocene* (Washington D.C.: Breakthrough Institute, 2011).
- xxxiii Luke, *Ecocritique*, 106-110.
- xxxiv Frederick Jameson, *Postmodernism, or The Cultural Logic of Late Capitalism* (Durham, N.C.: Duke University Press, 1991), 45.
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- xxxvi Jean-Francois Lyotard, *The Postmodern Condition: A Report on Knowledge* (Minneapolis: University of Minnesota Press, 1984), 46.
- xxxvii *Ibid.*, 44.
- xxxviii Al Gore, *The Future: Six Drivers of Global Change* (New York: Random House, 2013).
- xxxix Lyotard, *The Postmodern Condition*, 46.

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- xlii Ibid., 244.
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- xliv Luke, *Ecocritique*; Luke, "Simulated Sovereignty."
- xliv Jameson, *Postmodernism*, 45.
- xlvi *International Journal of Biodiversity Science, Ecosystem Services & Management*, "Special Issue Call for Papers: ESS Policies Landscape Dynamics," *International Journal of Biodiversity Science, Ecosystem Services & Management*, 2014, <http://explore.tandfonline.com/cfp/est/tbsm-si-orient-landscape>.
- xlvi Lyotard, *The Postmodern Condition*, 46; *International Journal of Biodiversity*, "Special Issue Call for Papers."
- xlvi Chris Buckley, "In a Wired World with Abundant Eyes, The Disappearance of a Jet Perplexes," *New York Times*, March 23, 2014, A14.
- xlix "The Search for MH370: Deep Secrets," *The Economist*, September 6, 2014, <http://www.economist.com/node/21615487/print>.
- i "Illegal Immigration Into Europe Surges Toward Record High Levels," *Wall Street Journal*, May 15, 2014, A11.
- ii "The Search for MH370: Deep Secrets."