The Living Environment
Or, Designers Are Stuck in the Holocene

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> The sheer scale, diversity and volume of life on Earth surpasses the imagination. Take a square metre of European or North American forest and slice off the top 15 centimetres of soil, and you will find, among numerous other life forms, as many as 6 million tiny worms—nematodes—perhaps 200 different species. It is possible that there are as many as 10,000 species of bacterium in a single gram of soil, yet only 3,000 have so far been identified and named by microbiologists. Conservative estimates put the number of different species on Earth at 14 million; no one knows for sure and some have claimed that there are at least 30 million. Of these, only a few per cent—2 million at most—have been studied, identified, named. Indeed, almost all biological research has been based on a few hundred different life forms, at most.
> —Steven P. R. Rose[1]

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Steven P. R. Rose, *Lifelines: Biology beyond Determinism* (London: Oxford University Press, 1998), 2.

The earth is undergoing what is agreed to be an interval of accelerated biological change. More than ever, this "change" is guided by anthropogenic drivers that compound our human responsibility within the diversity of life that *still* surpasses the imagination. In our time, change is often correlated to climate, rather than positioned as a social engagement between human life and *other life-forms.* At present, design projects feel awkward and ill suited to the "change" challenges of the 21st century precisely because we continue to insist on "built environment" tactics, rather than cooperate with "living environment" practices. While the past is overwhelmingly difficult to overcome, recognition of the disparity between building and living helps explain why designers are irrevocably entrenched in repetitious eco-arguments and redundant bio-arrangements. It also explains why we no longer know how to share the planet with the magnitudes of earthly organisms that transmute, adapt, and migrate in response to accelerated change.

It is my hope that the position of design can expand to encompass the *living* environment, in order to shape an inclusive appreciation of *processes*—rather than *products*—of the environment. If built-environment theory produces planetary urbanization, overwhelms global carbon concentrations, and creates the great social inequalities of the Holocene, then perhaps design in the Anthropocene can consider humankind's role within the richness of 14–30 million other species. Consequently, I am suggesting that professional practices that claim solutions to "change" dynamics would benefit from paying closer attention to the implications of their ideas within an environment that is very much alive.

The pressing question of how to include aliveness in design is a question of commons. Commons as a politics does not need to be redefined or suffer a modifier. Rather, the commons of the 21st century must be able to ask how land is distinguished by its past in order to advance without recurring injustices. It can also ask how land can be shared more equitably in the future. A closer consideration of the *living* environment invites us to exchange antiquated professional standards for a future crafted by inclusive and shared practices. It is time to recognize that although designers enjoy the benefits of Anthropocene theory, the profession is stuck in the Holocene.

The Commonalities

What a world to inhabit, where the assembly of millions of different organisms is embraced by the term "living." For instance, the smallest breathing alga is no more than 0.8 micrometers, while the world's smallest flowering plant, duckweed (*Wolffia*), reaches 300 micrometers when fully grown. A micrometer is a unit of study that describes one millionth of a meter, a prompt to interpret, explain, and predict biological processes that dwell below the surface. On the other hand, the African bush elephant (*Loxodonta africana*) is the heaviest living terrestrial animal, yet only half the weight of the largest redwood trees (*Sequoia sempervirens*).[2] Consider that within the continuity of human knowledge production, both *Wolffia* and *Sequoia* are considered plant species despite their incredible variety that *surpasses the imagination.* Still, duckweed is not part of a designer's specification sheet because it self-propagates and cannot be patterned across a masterplan. At the same time, it would be pointless to approach planting *Sequoia* without paying attention to how gradually it grows and develops, requiring timescales far outside a typical scope. In such a community, the living world flourishes without design.

In fact, design is so far from being part of a commons that it is hard to imagine a future where practices are correlated with confident and constructive outcomes. Perhaps a designer might imagine herself positioned between social engagement and ecological change, between terrestrial human life and *other life-forms.* This would evoke commonalities, features, and characteristics held in common. Can humans share behavior with other life-forms? If so, the environment has never looked so alive. It pulses with the *Wolffia* and the *Sequoia* equally. It overwhelms us with herds of salamanders and vast domains of clonal roots. It trusts in soil as an organism rather than a cubic equation. Even the

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For a succinct overview of Darwinian evolution, see Stephen Jay Gould, "Evolutionary Theory, Evolutionary Stories," in *Dinosaur in a Haystack: Reflections in Natural History* (New York: Harmony Books, 1995), 325–414.

term "living" does little to encompass the magnitude of earthly organisms that we work with as the ground erodes, shakes, slides, dries, and floods underfoot.

The decision to include the *living* environment is one that every designer must make on her own. But once she has committed, it helps shed light on the misguided pursuits of professional projects and the particularly chilling new focus on design solutions for a changing climate. The solution mandate assumes that the past can give us textbook precedents from which to shape the future. To paraphrase William Cronon, perhaps we are getting back to the wrong nature.[3] Of note is the designer's reliance on outcomes that do not acknowledge entanglement among other life-forms, let alone the particular disparity between plant and human life.[4] Labeling a relationship ecological without recognizing the value of other living species is not only a cop-out, it is a relic of Holocene thinking.

The tendency toward problem-solution assertions influences design discourse in two ways: (1) through the acceptance of geoengineering, a conceit for high-tech manipulation of the earth's atmosphere, and (2) in the reappearance of environmentalism and its confidence in conservation policy. One tactic explicitly uses past technological advances to advocate for increased predictability and human jurisdiction. The other relies on a fragile version of nature that needs to be protected from other humans. In both cases, the repercussions of short-term, singular solutions protects *here* in order to exploit *there.* The immediacy of the encounter neglects the slower paces of living, verified by the *6 million tiny worms, 200 different plants, 10,000 species of bacterium and millions of yet unnamed species in the top 15 centimeters of soil.* The professional authority of problem-solution assertions also confronts the complex of Indigenous diversity, the loss of practical skills and oral history, not to mention the exclusion of knowledge that is garnered only through personal, land-based practices. We are inheriting a present shaped by inconsistencies and inequalities of all kinds—a present inadequately positioned to inform the future.

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William Cronon, "The Trouble with Wilderness; Or, Getting Back to the Wrong Nature," *Environmental History* 1, no. 1 (1996): 7–28.

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The word "entanglement" is more acceptable since its use by Donna Haraway to refer to the complex interrelation between species. See, for instance, Donna Jeanne Haraway, *The Companion Species Manifesto: Dogs, People, and Significant Otherness* (Chicago: Prickly Paradigm Press, 2003), 8.

Problem-Solution Assertions

In 1990 Michel Serres bravely articulated the sine qua non between fragile nature and social humans, situating the conflict in our astonishing reliance on human lifetimes: "We are proposing only short-term answers or solutions, because we live with immediate reckonings, upon which

most of our power depends."[5] In this short sentence Serres reveals that exchanges of power are hinged not only on "solutions" but on the temporal conflict between human-time thinking (short) and the time of nature (long). Time defines the solution. It offers a rational frame built of human assertion. It normalizes to advance. Yet time tends to work against design intentions, as nature lags behind budgets, failing to keep pace with an ever-impatient cultural context. But time also breaks down the elusive experience of belonging and alienation because nature can be quick, fierce, and vengeful. Consider the single-day records of COVID-19 infections, the six-minute duration of the Tohoku earthquake and tsunami, or the fact that Louisiana loses one football field's worth of land every hour and a half. How might time, the base of this weighty conflict, empower designers to slow their practices rather than speed up the profession?

Serres asks us to consider a "natural contract" that begins with a temporal distinction apart from human privilege. This has more relevance than ever as we respond to a temporally faster, more assertive, and less predictable planet. Whether we can sign a contract with the natural world is overly reductive, according to his thesis. Instead, what is at stake is our own insistence on immediate techno-solutions implicit in the project of geoengineering and carbon-offsetting calculations as solar panels blanket the land and aerosols are eagerly introduced into the stratosphere. Solution tactics pile up precisely because they hold together human contracts.

In the opening pages of the essay, Serres sets up his thesis by drawing our attention to a Goya painting depicting a human duel. Our attention to the battle is rendered as a human struggle. Serres points the reader toward what we *don't notice*, what evades our attention—the marsh into which the struggle is sinking.[6] He goes on to say: "Aren't we forgetting the world of things themselves, the sand, the water, the mud and the reeds of the marsh?" The centuries of small beginnings and transformations produce a messy and concealed context for the battle. Consider the *6 million tiny worms, 200 different plants and 10,000 species of bacterium* living in proximity to the battle. Consider the unapologetic exclusion of Indigenous livelihoods expelled prior to the battle. Consider the layers of thriving dormancy that will transform the marsh in the future. Serres suggests that human struggle diverts our attention from our struggle to live with the earth. If we have not been paying close enough attention, it is because the same temporally normalized, human-centered struggles continue to divert us from the living environment.

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Michel Serres, *The Natural Contract*, trans. Elizabeth MacArthur and William Paulson (Ann Arbor: University of Michigan Press, 1995), 30. Originally published in French as *Le Contrat Naturel* (Paris: Editions François Bourin, 1990).

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Serres, *The Natural Contract*, 1.

Singular, short-term solutions appear perverse when the living environment is considered for how it holds us together. In this way, "best practices" emerge as remnant products of the Holocene, clever approaches that serve only to validate the keen designer rushing to identify a problem in order to source ever-increasing specialists. A problem, once identified, begs a solution. And solutions contour the profession. Design is historicized across this linear trajectory of administrative prowess, as project leaders allocate services in order to validate their own shortcomings. With evidence all around us, each singularly maladapted solution is achieved with guidance from the engineering sciences, as details trace redundant techniques. Projects prompt solutions, which create more problems as the cycle is professionalized away from the living environment. The prompt by Serres vividly expresses this temporal friction between human calculation and the dynamic earth:

> To become effective, the solution to a long-term, far-reaching problem must at least match the problem in scope. Those who used to live out in the weather's rain and wind, whose habitual acts brought forth long-lasting cultures out of local experiences—peasants and sailors—have had no say for a long time now, if they ever had it. It is we who have the say: administrators, journalists and scientists, all men of the short term and of highly focused specialization.[7]

The misalignment between short-term political power and long-lasting cultural bias is another temporal struggle that Serres formulates as he follows his argument with an appeal to replace humans as "experts" at the center with humans as a species on the periphery. Consigning the gradual adaptation of biophysical life to the center embraces the time of the earthly world, though I would argue for less spatial hierarchy, a world without centers or peripheries. How can we respond without hierarchy when the questions posed *leave out* most of the living environment? Are humans the *most* living species? If misalignment is the incorrect position of something in relation to something else, then the argument is that human experts (in this case, designers) are at present inadequately aligned with the time of the earth.

The misalignment grows with professionalization. This is why Serres's *Natural Contract* resurfaces as a warning. In his description, "nature" emerges from the 19th century as an object to dominate and in the 20th century as an object to *possess*.[8] Thus professionalization works to objectify, rather than share commonalities. The perverse sense

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Serres, *The Natural Contract*, 32.

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Serres, *The Natural Contract*, 32–34.

of comfort that accompanies qualifications without experience and elite education without familiarity serves only to engender distance from land-based practices. Consider the present state of plant life: an object currency that trades in Photoshop silhouettes, AutoCAD blocks, carbon units, pots by the gallon, and the indices of commercial trade. Plant-as-object or environment-as-commodity endures only to proliferate solutions for a few privileged professionals.

Can design embrace *practices* rather than sustain *professionalization*? The practice lineage brings hope to the future of design, as it engages repetition of effort and firsthand experience, evoking belief, method, and skill. After all, we are practitioners. Practices are actively turned toward knowledge as something that grows and connects through common care for the living environment.

1. Engineering Earth

Geoengineering is one of the most perverse manifestations of how the complicated ties and relations made in the human world—namely, between constructing a scientific truth, generating a resource, and misleading public understanding—are physically manifest in the landscape. Two of the most widely voiced techniques of geoengineering are Solar Radiation Management (SRM) and Greenhouse Gas Removal (GGR).[9] Invariably, both techniques are tendered by intergovernmental panels, advised by climate scientists, and constrained by existing technologies. The growing attention is well documented by the knowledge economy: the rise of journal articles, academic papers, and scientific publications.[10] Underlying questions about research governance aside, the intellectual experiment is naturalized into the design fields because it trades in solution tactics.

Science is mixed up with politics in ways that are too often overlooked by designers eager for capital gain. The tension in the design professions is fashioned by a constructed reality that relies on science to make sense of things *out there*, as it were. The temporal misalignments raise alarming questions as evidence is appropriated in the rush for solutions:

> Since the nineteenth century, the sciences have been mobilized, have become "fast" sciences, with researchers regarding whatever concerns that do not directly contribute to "the advancement of knowledge" as a sinful waste of time. Now, within the knowledge economy, fast sciences are perceived as not fast enough; they are making patents and launching fabulous promises of technological revolutions that are attractive for investors but do not need reliable knowledge. The apotheosis of this paradigm is geo-engineering, the mobilization of technology against the Earth.[11]

9 http://www.geoengineering.ox.ac.uk/ www.geoengineering.ox.ac.uk/what-is-geoengineering/what-is-geoengineering/.

10 See, for instance, P. Oldham, B. Szerszynski, J. Stilgoe, C. Brown, B. Eacott, and A. Yuille, "Mapping the Landscape of Climate Engineering," *Philosophical Transactions: Mathematical, Physical and Engineering Sciences* 372, no. 2031 (2014): 1–20.

11 Interview with Isabelle Stengers in Etienne Turpin, *Architecture in the Anthropocene: Encounters among Design, Deep Time, Science and Philosophy* (n.p.: Open Humanities Press, 2013), 179.

Geoengineering is a clever means to extend the paradigm of human dominance over the living environment; it rehearses the same pattern of controlling or profiting from the outcomes by mobilizing technology against the earth. Physical, material, and biotic phenomena are framed as problems and are tackled by "solutions." For instance, one of the core tactics of GGR is afforestation, the deliberate planting of trees in otherwise treeless environments. While afforestation has a long history, it is obscured by the plant-as-object inheritance. Planting trees is framed as a do-good mechanism, without questioning who is planting the tree, or where. Species selection is certainly too mundane for impatient development campaigns. Endless research is enforced, as corporate testing and control continue to inform decision making because planting trees is offered as a solution. Can planting trees realistically lessen large-scale deforestation, extreme urbanization, megadrought, or global ice melt? Positioning afforestation in the 21st century as a viable means to remove carbon dioxide or other greenhouse gases from the atmosphere counts only as an industrialized gain, obscuring the spectrum of ecological losses.

The landscape of afforestation is made rigid, predictable, and static. It categorically disregards the extant environment and proposes a substitute biome. Woody trees reduce fibrous perennial forbs and grasses. Dryland is not vacant or deserted because it is arid. It is alive with millions of unnamed species and billions of dormant seeds in unknown relationships that surpass the human imagination. This is not to say that we should not organize planting projects, plant trees, advance conservation, or plant in drylands. It is the means and methods of our plans that require our attentive notice. What I am interested in is a practice that is less reliant upon speed, scalability, and unit-based valuation, instead paying close attention to the landscape as an organism—the living landscape.

The conflict of tree planting is found in the thickness of extant drylands, those dormant layers of earth that *surpass the imagination.* Correspondingly, the temporal durability of seeds exemplifies not only the inability to name, identify, or exploit, but also the failure of analysis in relation to the duration of biological existence. Of interest is an

experiment conducted by Dr. William Beal over 120 years ago.[12] The experiment involved burying glass jars with tall-prairie-grass seeds in order to test dormancy in the prairies. Beal's own words best explain the simple experiment:

> I selected fifty freshly grown seeds from each of twenty-three different kinds of plants. Twenty such lots were prepared with the view of testing them at different times in the future. Each lot or set of seeds was well mixed in moderately moist sand, just as it was taken three feet below the surface, where the land had never been plowed. The seeds of each set were well mixed with the sand and placed in a pint bottle, the bottle being filled and left uncorked, and placed with the mouth slanting downwards so that the water could not accumulate about the seeds. These bottles were buried on a sandy knoll in a row running east and west and placed fifteen paces northwest from the west end of the big stone set by the class of 1873. A boulder stone, barely even with the surface soil, was set at each end of the row of bottles, which were buried about 20 inches below the surface of the ground.[13]

Beal worked with the temporal scales inherent to the living environment in order to inform the future. His work has lasting impact because it was contingent on the time of seeds, not the time of his career. The experiment continues to yield successful germination rates to this day, confirming not only that grassland seeds are viable for a future that extends past the 120 years of his experiment, but that our applied practices demand timescales aligned with prolonged coexistence and a consortium of other species. Emergent seeds might certainly be ancient grassland species, but many other species are more likely to emerge as well, including plants that are better adapted to the present and to the torn, depleted ground we have designed. Human determination for immediate reckoning cannot serve as a substitute to the century-old prairie formation that Beal so carefully estimated. To cultivate and redevelop the superficial layers of the planet works against the intelligence of physical dormancy found in deeper soil horizons that host seeds, roots and rhizomes, mycorrhizal agents, moisture thresholds, and bacterial exchange. There is no problem statement to assign the experiment. It can neither be scaled up nor sped up, and it resists any commercial gain statistics that could distort his practice as a solution.

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H. T. Darlington, "Dr. W. J. Beal's Seed-Viability Experiment," *American Journal of Botany* 9, no. 5 (1922): 266–269; Frank W. Telewski and Jan A. D. Zeevaart, "The 120-Yr. Period for Dr. Beal's Seed Viability Experiment," *American Journal of Botany* 89, no. 8 (2002): 1285–1288.

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Darlington, "Dr. W. J. Beal's Seed-Viability Experiment," 266.

In the Anthropocene, we are not only pioneers, creators, heroes, inventors, designers, and developers—now we are also a force. As a result, theory abounds over solution and resolution, posing questions scholars cannot answer.[14] In order to propose *something*, proponents often suggest conservation because it appears to be a means to balance the equation. At stake is how these so-called solutions sneak into the designer's playbook. Arguments are contingent on the few areas of the biosphere that are still deemed "intact" and can be placed on life support to maintain public confidence.[15] Such claims are debated but are worth considering for how a monolithic view of nature proliferates, setting into motion the terms of environmentalism that focus on immediate outcomes under the assumption that previous states can inform future conditions. The continued reliance on this ideology ignores the influence of humans and our compound effect over time. Thus the Anthropocene grants us self-designated creator status, replete with solutions. It is time to take down the singular genius of humanity as the inventor of planetary evolution and invite other significant forces into an earthly narrative.

Why do advocates of the Anthropocene so often rely on conservation? Threatened areas, endangered species acts, and red lists are appeased by principles that insinuate how protection by humans can disentangle our predicament, despite the fact that human affairs more broadly have brought about the concern. The fragile version of nature reappears by calling upon heavily degraded landscapes, ocean acidification, greenhouse emissions, and other decline statistics.[16] Equating fragility with nature is the point of departure for traditional environmental thought, including Aldo Leopold's *Sand County Almanac* (1966), Rachel Carson's *Silent Spring* (1963), and Al Gore's *Earth in the Balance* (1993).[17] Accordingly, assertions are usually followed by expressions such as "there is very little nature left," seemingly due to the crisis of an ever-expanding base of fossil fuel consumption and the ensuing population explosion that pairs with destructive technology. This statement "there is very little nature left" profoundly limits the terms of the Anthropocene because it is predicated on the inclusion of humankind in the earthly world—part of, not outside, nature.

Anthropocene conservation tactics continue to make judgment calls about which *assemblages* are legitimate and which are not.[18] In much the same way, expecting preservation to keep out the mess or restoration to clean up the mess is unreasonable because it prioritizes

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According to Jason Moore. See Jason W. Moore, ed., *Anthropocene or Capitalocene? Nature, History, and the Crisis of Capitalism* (Oakland, CA: PM Press, 2016). See also Erle Ellis et al., "Involve Social Scientists in Defining the Anthropocene," *Nature* 540, no. 7632 (2016): 192–193.

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Large gaps in human footprints can be found in several key biomes, including equatorial (central Africa), subtropical (central Australia, Sahara), temperate (Himalayas), and Palearctic (Russia and Canada) latitudes. See Tim Caro et al., "Conservation in the Anthropocene," *Conservation Biology* 26, no. 1 (2012): 185–188.

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See, for instance, Jason W. Moore's end of cheap nature, Tsing's loss of refugia, and the irreversible catastrophes studied by Andreas Malm. The Anthropocene even boasts its own website and dedicated academic journal and popular reader. For instance: http://www.anthropocene.info, https://www.journals.elsevier.com/anthropocene, and Erle C. Ellis, *Anthropocene: A Very Short Introduction* (Oxford: Oxford University Press, 2018).

some species over others. Thus any act of conservation is also an act of destruction. The possibility of adapting or evolving conservation to reflect the times requires a broader appreciation of inclusion, beyond the polygon outlines of policy.

Maintaining islands of Holocene parcels can actually create an atmosphere in which people see nature as the enemy. Proponents of the Anthropocene—rather than debating a precise date of the decline—might transform the opportunity of a new epoch in which religious, nostalgic, or corrupt ideas of nature can be replaced by terms that are more equitable to the vast array of species that humans depend upon to survive. The ambition requires redefining conservation because it cannot be reduced to National Park boundaries, wildlife preserves, or the restrictions of human-free restoration projects. Witness the number of alien, or "invasive," species that overwhelm universalized databases and fund the emergent field of invasion biology.[19] European wasps are now pollinating New Zealand, Asian raspberry thickets are establishing roots in the Hawaiian Islands, and an imported blight feasts on American chestnut trees—these are all active, extant examples that diametrically oppose current interpretations that life-forms are withdrawing. Thriving examples abound whereby a great aliveness is coherent, if only it were not labeled as a foreign or invasive agent. Moreover, such species richness provides a wealth of ecosystem variation, catalyzed by human activities. Having entered into the relationship of changing ecosystems, we have to accept responsibility for the outcomes.[20] I suggest assent to the variations that mingle species and reduce hierarchy, especially those in the first layers of the soil and the atmosphere.

The novel climate is forcing us to find other ways to integrate with other living organisms, asking the same of the theorists that aim to pose questions and structure relevant interpretations. Rather than establish a critique based on rejecting conservation or fearing change, I am suggesting that conservation in the Anthropocene can evolve and adapt precisely because we know that local actions create global feedbacks for all species, even those as yet unknown and unnamed.

Design—from ecological planning to landscape architecture—falters when it trusts in a conservation that distances us from the living environment. Our lands necessitate an ongoing exchange of information and collaboration in order to develop common evolutionary relationships. For instance, consider that 80 percent of the food derived from plants comes from only 17 flowering plant families.[21] Further, we get half our calories from just three flowering crops: rice, maize, and wheat. Here, the constriction of flowering plant species cannot be

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Aldo Leopold, *A Sand County Almanac, with Other Essays on Conservation from Round River* (New York: Oxford University Press, 1966); Rachel Carson, *Silent Spring* (London: Hamish Hamilton, 1963); Al Gore, *Earth in the Balance: Ecology and the Human Spirit* (New York: Plume, 1993).

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I use the term "assemblage" to connote multispecies relations. See Anna Lowenhaupt Tsing, *The Mushroom at the End of the World: On the Possibility of Life in Capitalist Ruins* (Princeton: Princeton University Press, 2015), 61.

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For example, European wasps, *Vespula vulgaris*; raspberry, *Rubus ellipticus;* chestnut blight, *Cryphonectria parasitica*. See also Global Invasive Database, http://www.iucngisd.org/gisd/?st=100ss.

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This line of reasoning is effectively argued in Robert H. Hilderbrand, Adam C. Watts, and April M. Randle, "The Myths of Restoration Ecology," *Ecology and Society* 10, no. 1 (2005).

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FAO, *International Treaty on Plant Genetic Resources for Food and Agriculture* (Rome: FAO, 2009), http://www.fao.org/3/a-i0510e.pdf; Holly Vincent et al., "A Prioritized Crop Wild Relative Inventory to Help Underpin Global Food Security," *Biological Conservation* 167 (November 2013): 265–275.

stubbornly reinvented because our processes of selection have been so effective across time. As one of many potential examples, consider the long-standing relationship between humans and flowering plants. The association is our longest, most durable earthly relationship. If the collaboration between human and plant life was acknowledged, could the limits of selective conservation be reached in order to value our coevolution?

The unprecedented mixing between humans and plants is paired with an unprecedented intensification in species composition that can rework the boundaries of conservation. Consider how climate-controlled seed banks are funded and resistant crosses are fabricated to avoid a collapse in human food systems. Yet edible plants abound outside industrial burdens and toxic chemistry—those plants that are robust to our selective tendencies. Instead, we exclude select plants, using the conceits of conservation, as unpleasant language and offensive simplifications proliferate: consider an "invasive" plant such as the edible Japanese knotweed (*Fallopia japonica*), which spreads despite costly eradication strategies instead of being consumed for its spinachy leaves. The term "unproductive" often limits crops such as teff *(Eragrostis tef)* and finger millet (*Eleusine coracana*), which hold social and regional significance in Africa but cannot keep pace with the global marketplace. As a result, wheat is a cash crop in Ethiopia, and knotweed is sprayed with glyphosate across Georgia, for instance. Selective cultivation between human and flowering plant life has forever altered the definition of nature. Nature is no longer "out there" or "in here," it is a coproduction. This is not a problem: it is an opportunity to expand our practices.

The Future of the Ground

The history of life on earth is a history of organisms over time, from development through conception and death—the mingling of life so diverse that it includes minute duckweed, indeterminate algae, weighty blue whales, extinct mammals, giant redwoods, and the political theorists of the Anthropocene. Every relationship in between is an inseparable part of what we become in the future. These exchange cosmologies of the earthly planet have received less attention than the disaggregated individual organisms that humans dissect. If amalgamations abound, they do so in both theoretical and physical space, as professional autonomy is as outdated as the terms of singular solutions.

An appreciation of the living environment extends the domain of earthly influence from a superficial coating to a universe of survival and decision making. Living can be redefined through the mingling of millions of unknown species, motivated by the inputs and outputs of the atmosphere. Whether as a dormant seed or a germinated cotyledon, plant life is most agile in its early life stages. The life stages of flowering plants are necessarily embedded in the ground because the plants that support us are overwhelmingly terrestrial. Plant life is located out of sight, in the actions made by the smallest roots and rhizomes that structure the habitable earth and actively persist in the shallow horizons of the soil. Could scholarship share *the first 15 centimeters of soil* in order to participate fully in our earth's vitality? How does that attention alter our design practices? Attention paid to the living over the built environment might even produce entirely novel images of the climate, shifting our gaze from the atmosphere to the ground under our feet.

Cartesian Enclosures

Marina Otero Verzier