ART AS SOCIAL PRACTICE

Technologies for Change

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MODEST IN NATURE, WE ARE ALL LICHEN AND OTHER LESSONS LEARNED WITH *CARBON SPONGE*

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Carbon Sponge is an interdisciplinary collaboration that brings together artists and scientists as well as urban land stewards, agroecologists, educators, cultural institutions and city agencies in an effort to consider what carbon farming can be and do in the urban environment. Science alone is unable to tackle high-stakes issues such as climate change that are urgent, complex, and uncertain. Projects like *Carbon Sponge* test the ability of a group of people with divergent expertise to work together to apply and co-create knowledge with science, art, and inclusion at its core.

I initially proposed the project as a pilot to the New York Hall of Science (NYSCI) in Flushing Meadows Corona Park, Queens, in 2017. In early 2018, with a newly assembled team (including Dr. Sara Perl Egendorf, Dr. Maha Deeb, Marisa Prefer, and Katharhy G.) we launched *Carbon Sponge* as part of the museum's Designer in Residence program (Figure 1.1). For two years at NYSCI, *Carbon Sponge* was a dual museum exhibit and scientific study. Since then, we have built two more *Carbon Sponge* pilots at Pioneer Works in Red Hook, Brooklyn, and GrowNYC's Teaching Garden on Governors Island, a small island in New York Harbor. The *Carbon Sponge* team has completed laboratory analysis of soil samples spanning two years at CUNY Graduate Center's Advanced Scientific Research Center and is developing a generalist's kit for anyone to use and join us in our inquiry. In 2020 and 2021, we beta tested the kit with a small group of urban farmers and gardeners throughout New York City. With a *Carbon Sponge* kit, guidebook, and workshops, we are expanding our network of urban carbon farmers in NYC and, therefore, the number of people contributing to a new stream of data focused on urban soils.

FIGURE 1.1 Newly constructed *Carbon Sponge* pilot at New York Hall of Science (NYSCI) in Spring 2018.

Images courtesy of the artist.

(Urban) Carbon Farming

While carbon dioxide levels in the atmosphere have changed throughout Earth's history, there is scientific consensus that human activities, such as agricultural practices, are contributing to the current measured level of 400 parts per million (ppm), which is higher than it has ever been since humans evolved.[1] Carbon farming is an agricultural movement designed to make food production a part of the climate crisis solution rather than a major contributor. Currently, agricultural land use makes up approximately 10% of the US greenhouse gas emissions budget.[2] Carbon farming, also referred to as regenerative agriculture, is a set of practices and principles that include no tilling, reduction of chemical inputs, and increased crop diversity (i.e., no monoculture). It's important to note that while the movement is newly catching on in the US, the core philosophy is quite ancient. Regenerative agriculture relies on Indigenous knowledge and practices that go back over a millennium.[3] Without acknowledging this source and coming to terms with the violence of the US colonialist past that exterminated native peoples and forcefully stole their land, regenerative agriculture will only perpetuate harm rather than undo it.

See Chapter 2 in which Beverly Naidus writes about projects that react to colonialized land, Superfund sites, and contaminated bodies of water.

From a scientific perspective, carbon farming is a cycle that starts when plants breathe in carbon dioxide and convert the gas to food through photosynthesis. This food enables the plant to grow, and whatever is not needed is released via plant roots and feeds soil microbes. Carbon farmers aim to keep most of this carbon in the ground where it has numerous benefits—ranging from new soil formation, increased fertility, and water retention—and prevent carbon's return back into the atmosphere as carbon dioxide. Carbon farming takes into consideration the carbon cycle, which today is seriously out of whack from human extraction of fossil fuels and destructive land use practices, causing the highest levels of carbon dioxide in our atmosphere in the past 800,000 years.[4] Carbon farming is not *the* solution to our climate crisis but it could be *a* solution. Retooling the entire agriculture food production system is, of course, a mighty endeavor that will not only be costly but take a lot of collective, political will. The hurdles are huge, but so are the potential rewards.

When I learned about carbon farming, I was already incorporating urban soil into my practices. My art practice in 2011 took me to Madrid where I collaborated on a project called *Excedentes* (or *Excess* in English) to design new systems and tools to divert edible food waste from trash into the hands of people. This work led me to activities such as composting, soil microscopy and, ultimately, cofounding a community garden in South Williamsburg, Brooklyn, called La Casita Verde. Building a new garden on top of a derelict lot that had been a dumping ground for over 40 years made me acutely aware of the importance of soil. There were high lead levels in the existing soil at La Casita Verde that we needed to cap and cover to reduce exposure. To do this we trucked in clean soil but also started a community composting program and collected food scraps in the neighborhood. Building the right foundation for our garden took over a year before we turned to planting; when people passing by asked what we were doing and where were the vegetables, we replied "We are growing soil."

It comes as a surprise to most people that 36.3% of the surface area of New York City is covered by soil and not concrete.[5] A collection of many, small *Carbon Sponges* distributed throughout the city could have a positive impact not only on greenhouse gas emissions but also on the heat island effect, stormwater runoff, and air quality. Carbon sponges should be prioritized in neighborhoods with the worst environmental conditions that are linked to a myriad of health consequences and proven to disproportionately affect communities of color. With *Carbon Sponge*'s data we can numerically represent the ways urban land stewards, many of them volunteers, are already contributing to the city's zero-emissions goals and green infrastructure plans and use that information to help inform practices. The data could protect existing greenspaces and advocate for more.

These are the project's origins and what has inspired me from the start. The architect Teddy Cruz persuasively describes the need for transforming institutions from the inside out and rallies cultural producers to create the conditions for the collision between top-down and bottom-up organizations to make way

for a more just and equitable future. This may sound grandiose, but, in fact, Cruz argues it begins with small or modest acts.

> The most radical intervention in our time can emerge from specific, bottom-up urban and regulatory alterations, *modest in nature*, but with enough resolution and assurance to trickle up to transform top-down institutional structures. And this is the reason, I maintain, that this project of rethinking public space today is not primarily an architectural or artistic project but a political one, a project that architects and artists can mobilize. [emphasis added][6]

Cruz's quest to reconnect artistic experimentation and social responsibility insists on the relevancy of the arts and champions expanded modes of artistic practice. The history of visual artists repudiating the belief that art is detached or disinterested is long and varied; Cruz recognizes artistic involvement in the conditions of life as "a major aspiration of the historic avant-garde."[7]

Cruz's call strongly resonates with me and there are many artists that inspire me to forge such connections and work in the expanded field (quite literally!). One artist is Agnes Denes, and, in particular, her work *Wheatfield* from 1982. Denes planted wheat on a two-acre landfill in lower Manhattan, blocks from Wall Street and in the shadow of the Twin Towers. She grew 1,000 pounds of wheat with a market value of $60 on land with an estimated worth of $4.5 billion.[8] Denes's work questioned societal values, drawing attention to issues such as world hunger, waste, and ecological concerns. *Wheatfield* merged the cityscape and the rural, inviting the urban public in to confront these critical issues through embodied experience. Nearly ten years later, Mel Chin created *Revival Field* (1991), which was also sited on a landfill. He was testing the scientific theory of hyperaccumulation, or the ability of certain plants to draw heavy metal contamination from soil as a means of remediation. He speaks of the work as "a conceptual artwork with the intent to sculpt a site's ecology."[9] The Futurefarmer's *Lunchbox Laboratory* from 2008 is another example of amateur science, or science conducted by nonprofessionals, using a distributed research program in schools and a tricked-out lunchbox. The lunchbox allows students to test algae strains, helping scientists identify ones that produce hydrogen and, therefore, can be used as a renewable energy source for biodiesel.[10] Lastly, Fritz Haeg's project, *Edible Estates*, started in 2005, is, in the artist's own words, "the modest gesture of reconsidering the use of our small plots of land."[11] The project turned the domestic front lawns of private homes into food-producing gardens meant to inspire and enable others to rethink what is possible in their own front yards.

One obvious overlapping feature of all these works is that they are not made for the museum or gallery (although all of them were later exhibited in traditional art spaces). These works originally took place or were activated in public spaces from city landfills to school classrooms and private (yet publicly visible) front

yards. Some involve participation by non-scientists and non-artists. Some are in close collaboration with scientists, bringing attention to emerging science as well as making it more accessible. In her essay "Outfitting the Laboratory of the Symbolic: Toward a Critical Inventory of Bioart," artist Claire Pentecost writes about a range of art/science practices in her analysis of bioart. She describes works of art that make "data" legible in which "[l]egibility is understood as a complex phenomenon including attraction, relevance to common experience, engagement of the senses, and adroit interface with popular media."[12] She describes projects that are dedicated to pedagogy or learning and experimenting in a shared arena that prevents mystification. While Pentecost does not mention any of the works included in this chapter, the model she outlines is certainly applicable to all.

In *Lunchbox Laboratory*, as well as *Carbon Sponge*, a tactic for engagement is the development and distribution of a kit that is easy to use and attractive in its novelty. While the lunchbox is a unique object and highly stylized, the *Carbon Sponge* kit is a collection of off-the-shelf tools that are assembled in a bucket with a guide for how to use, collect data, and analyze results in relation to carbon sequestration. One of the primary tools in the kit is called the microBiometer®, which the late James Sotillo, a biological landscaper and early developer of the microBiometer®, demonstrated for me in its infancy in 2014. The microBiometer® is an inexpensive, rapid field test that measures microbial biomass or the density of microbes in a soil sample, which is typically done in a lab at a higher cost and can take weeks before results are shared. Microbial biomass is an important indicator

FIGURE 1.2 New York Hall of Science (NYSCI) demonstration of *Carbon Sponge* and root nodules by NYSCI Explainer, Anghelo Guerro (2019).

of soil health because microscopic life in the soil is essential for supplying nutrients to plants, creating soil structure and balancing moisture.

How do we appreciate, defend and work with the microscopic underworld that lives beneath our feet, upon which all life depends but is mostly invisible to us? This is a question I have been grappling with for a decade. Over the years I have turned to numerous visual means—like using a microscope, burying a photo scanner in a raised-bed garden, and dyeing fabric with soil—as well as other tactile and olfactory pursuits to answer this question. When I saw the microBiometer®, a tool in development that was mainly geared toward farmers tracking soil health, I imagined a different use for it in the pursuit of carbon sequestration. Soil microbes are approximately 50% carbon and are essential to (as well have long been used as a proxy for) carbon sequestration, a process that takes hundreds if not thousands of years and is therefore beyond the scale of our human lifetime. However, the microBiometer® accompanied with other data generated by the kit can allow anyone to enter the carbon sequestration conversation and, in doing so, learn to love soil microbes.

Conclusion

There is a lot to love about microbes, starting with their vastness: 90% of all organisms in the world live underground. Soil microbes are diverse in their form, movements, and functions within an ecosystem. One of my favorite stories of microbe awesomeness is represented by the nodules attached to the roots of legume plants. We look for these white or pink-colored sacks as part of the *Carbon Sponge* visual assessment (Figure 1.2). Legume plants form a symbiotic relationship with rhizobia, a kind of bacteria that have the ability to transform atmospheric nitrogen into plant-usable form. The nodule protects the bacteria and allows for the exchange of nitrogen from these microbes to the plant in return for the plant's excess carbon nutrients. When the nodules turn pink, the symbiotic exchange is active. Without these bacteria, plants would not be able to uptake nitrogen, an essential nutrient for its growth, and humans depend on eating plants (or animals that eat plants) for our own nitrogen needs. We should thank rhizobia before every meal.

Symbiosis—like microbes—is everywhere, if you care to look. Dr. Lynn Margulis, the champion of symbiosis as the driver of cellular evolution, encouraged us to look for it in *Symbiotic Planet: A New Look at Evolution*.[13] Her suggestion is modest, the consequences are not. Dr. Scott Gilbert, a biologist and author of the paper "A Symbiotic View of Life: We Have Never Been Individuals," writes that:

> The discovery of symbiosis throughout the animal kingdom is fundamentally transforming the classical conception of an insular individuality into one in which interactive relationships among species blurs the boundaries of the organism and obscures the notion of essential identity.[14]

He ends his thought-provoking paper with the concept that for animals and plants, there were never individuals, and the statement "We are all lichen."[15] Lichen are symbioses between algae and fungi and possibly a third partner, yeast. The human as individual is a myth of our own importance.

The architect and inventor, Buckminster Fuller, had a favorite dictum, "If you want to teach people a new way of thinking, don't bother trying to teach them. Instead, give them a tool, the use of which will lead to new ways of thinking."[16] Tools like *Carbon Sponge* can help us reconnect with ecological systems and more-than-human worlds in practical ways as well inspire visions of future worlds in which the human is decentered, no longer separate but enmeshed in relational systems. Microorganisms, infinitely small yet powerful, should not simply be a subject for us but provide models for creative pursuits and political interventions. We should dream big with these smallest of partners.

Participation Prompt

For students reading this chapter, how can you illuminate or collaborate with the microbial world? One activity you can try is the soiled underwear challenge; simply bury a pair of 100% cotton undies in the ground or a compost bin for about two months. The more disintegrated they are when you pull them out, the higher the microbial count. Claire Pentecost used this technique to create *Proposal for a New American Agriculture* (2012). Check out artist Paul Vanouse's *Labor* (2019), in which he directs our attention to a species of human skin bacteria that is responsible for the scent of sweat. Design a microbe experiment or situation of your own.

Notes

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14. Scott Gilbert, Jan Sapp, and Alfred I. Tauber, "A Symbiotic View of Life: We Have Never Been Individuals," *The Quarterly Review of Biology*, Vol. 87, No. 4 (December 2012): 326.
15. Ibid., 336.
16. Buckminster Fuller Institute, *Trimtab BFI Updates* (October 2017), www.bfi.org/trimtab/vol18/no10. Accessed 20 April 2021.

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2

PANDEMIC MAKEOVER

Reimagining Place and Community in a Time of Collapse

Beverly Naidus

During these COVID-19 times, I spent many moments gazing out of my studio window in downtown Tacoma. Despite the economic crisis, the industrial landscape of the Port of Tacoma has never stopped belching out smoke and toxins, making it clear to any who might inquire that petro-capitalism did not skip a beat during the various stages of lockdown. This is the traditional territory of the Puyallup people, one of many Coast Salish communities that sits on the shores of the Salish Sea (colonizer name: the Puget Sound).[1] These tidal flats are crowded with the ugly incursions of a fossil fuel economy that has run amok: huge container ships filled to the brim, lines of cranes work endlessly to fill voracious consumer appetites, and tanks of toxic chemicals from one end of the horizon to the other.

Looking out at this open wound of colonized land, Superfund sites, and contaminated bodies of water stirs up many emotions. Since my art practice centers on healing trauma, both collective and personal, there has been no shortage of inspiration for my work.

Thankfully, the purple, snow-covered mountains in the distance remind me of the impermanence of all that sits in front of me. We are living in a grief-saturated time: global mortality has been increasing exponentially due to an inadequate response to the invisible virus; economic disparities are extreme; we witness continuing police violence against Black and Brown bodies and hate crimes against Asian Americans; the global refugee crisis is ongoing; floods, fires, and ongoing ecocide contribute to climate chaos. So many of us have found ourselves reeling in the mess of it all. At the same time, there are many of us who have tapped into the chaos with determination, becoming part of the collective uprising of resistance to fascism and finding solidarity through many forms of activism.

It is in that spirit of transformation that I developed two projects, detailed in this chapter. The first, *Extreme Makeover: Reimagining the Port of Tacoma Free of*