

MAKING THE GEOLOGIC NOW

RESPONSES TO MATERIAL CONDITIONS OF CONTEMPORARY LIFE

edited by
Elizabeth Ellsworth • Jamie Kruse

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Neo-Eocene

Oliver Kellhammer

Soon it would be too hot. Looking out from the hotel balcony shortly after eight o'clock, Kerans watched the sun rise behind the dense groves of giant gymnosperms crowding through the roofs of the abandoned department stores four hundred yards away on the east side of the lagoon. Even through the massive olive-green fronds the relentless power of the sun was plainly tangible.

—J.G. Ballard, *The Drowned World* (1962)



Metasequoia branch
Image by Oliver Kellhammer

Back in the mid-1960s, I was a feral sort of a child who loved scampering around construction sites, climbing the huge, grey piles of excavated shale that were popping up all over my rapidly developing Toronto suburb.

I might have been six or so when I first really noticed the slabs of muddy smelling rock often contained the imprints of scallop shells, snails, and fragments of coral, things I recognized from picture books but hadn't yet seen in real life as we lived hundreds of miles from the nearest ocean. Yet 450 million years before, during the Ordovician era, where I was playing would have been the middle of a vast ocean whose limpid, tropical waters teemed with fantastic life forms such as giant, predatory sea scorpions and nautiloids that jetted through the primeval currents like living missiles. I knew this from visiting the Royal Ontario Museum's brand new, McLuhan-inspired, Hall of Invertebrate Paleontology, which recreated detailed dioramas of life in Ontario's ancient seas, complete with theatrical lighting and interactive, taped-looped narratives played through banks of telephone receivers.

So where did it all go, the ocean and its creatures? My world was now just an uninspiring vista of torn-up farmland and under-construction mini malls with the cold, stinking expanse of Lake Ontario looming in the distance, a far cry from the warm coral sea that had left its mark so abundantly all over the local stone. That was when I first began to comprehend that all the things around me I took for granted, the climate I was used to, the location of oceans, even the ground beneath my feet, were completely ephemeral and that someday they would all be just another layer in the palimpsest of time we call geology.

I became more and more fascinated with this idea of planetary change through cataclysm, extinction, and evolution, imagining I could travel back in time to visit those sea scorpions and dinosaurs of bygone geological eras and to experience the world beyond our own species' comparatively recent dominance of the planet. Through every asteroid impact, Ice Age, and super volcanic eruption, biology always seemed eventually to adapt, despite the horrible setbacks, epitomized for me and others of my generation by the extinction of the dinosaurs sequence in Disney's "Fantasia." Yet I knew the demise of the dinosaurs in the late Mesozoic was followed by the rise of mammals in the Cenozoic and so on. But what, I wondered, would come after

our own geological age? Looking into the past was one thing, there were rocks and fossils to serve as clues for what had happened, but what about the future?

Lately, this has become more than an abstract discussion. Human-initiated climate change is proceeding so quickly we are now on the threshold of experiencing a planet where conditions are profoundly different from the ones we have come to know and trust. The most agreed upon climate models predict an upward global temperature shift of as much as four degrees Celsius within the next 100 years, with large parts of North America and most of Europe slated to heat up even more than the average. Yet what will this mean? Well we can be certain that organisms and cultures that have evolved within the narrow climatic conditions of recent history will either have to adapt, migrate, or die. The landscape itself is sure to change with the increasing temperature regime that will bring with it drought in some areas and excess precipitation in others. Trees adapted to cool environments will wither in the hotter conditions and pests no longer kept in check by winter frosts will run amok as has already happened in the beetle ravaged pine forests of western North America. It might be already too late to halt this climatological juggernaut, even if our species could express the collective will to do so, which we seem very far from doing. On the contrary, our greenhouse gas emissions continue to rise, pushing potential temperature outcomes still higher.

Yet the planet has endured such warming before, most recently during the Eocene Thermal Maximum, some 55 million years ago, during which time palms and alligators flourished as far north as Alaska and the Canadian Arctic and the boreal forest was warm and temperate and far more biologically diverse than it is now. Then a long term cooling trend started and many of the tree species that had been widespread gradually disappeared from most of their range, surviving only in isolated refuges in areas that are now the southeastern United States and Western China, where conditions stayed just stable enough for them to hang on. Some formerly common trees such as *Metasequoia* and *Ginkgo* were almost completely wiped out, reduced to a few isolated groves of a few thousand trees, despite having once dominated large swaths of the northern hemisphere's forests. Known previously only from fossils, the *Metasequoia* was only discovered as a living species as recently as 1943, when botanists found a small population of them surviving in China's Hubei province. They collected seeds and now the tree is widely cultivated. Similarly, the *Ginkgo*, whose petrified remains can be found as far afield as Scotland and Oregon, vanished from all its native haunts except for another tiny area of China from where it was disseminated by Buddhist monks, who revered it and planted it in their temple gardens. Attractive and adaptable, Ginkgos are now widely grown in parks and gardens and are popular as a pollution resistant tree in cities.

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Fossil *Metasequoia* from British Columbia
Image by Oliver Kellhammer

Though we have done incalculable damage to the planet, we humans at least can congratulate ourselves for snatching the *Ginkgo* and the *Metasequoia* from the brink of extinction and, through horticulture, giving them a new lease on life in our parks and gardens. But why stop there? These and other anciently native trees prevalent during the Eocene Thermal Maximum might have what it takes to survive the warmer conditions we have already begun to experience. Why not bring them back on a larger scale to the areas they once lived in, so they can fill the niches that will be left behind as the more heat-sensitive present-day species begin to decline? Wouldn't this be somehow artificial? Of course it would. Yet modifying our earth's environment has already been our species' greatest legacy--so much so that the age in which we now live has been dubbed the Anthropocene in reference to the ubiquity of our impact. As well as affecting living systems, *Homo sapiens* have become the planet's most powerful geomorphological engine, expending an amount of energy annually in our re-shaping of the earth's crust that is roughly equivalent to the natural processes of erosion and mountain building. On top of the fossilized reefs and bone beds of previous geological ages, we are piling our own strata of abandoned architecture and persistent artificial materials, such as plastic. We

leave behind anthromes in place of biomes and even Earth's so-called "natural" areas now exist only under the precarious fiat of our political systems or because we haven't yet gotten around to incorporating them into our ever more voracious supply chains. In view of these epic and overarching realities, the reintroduction of a few formerly native tree species seems an almost minor sort of intervention and to my mind definitely worth a try. As an artist, I was interested in the social nature of such a proposition. Addressing climate change through strategic botanical intervention seemed like a proactive alternative to the hand wringing and negativity that have frequently characterized this issue.



Time Landscape
Image by Oliver Kellhammer

I was first drawn to the aesthetic potential of tree planting as a time-based art practice back in 1979, when, as a young artist visiting New York City, I first encountered Alan Sonfist's newly installed *Time Landscape*. For those not familiar with it, *Time Landscape* is an assemblage of horticultural plantings in a small lot just off Houston Street where Sonfist attempted to replicate a portion of Manhattan's original vegetation from the time before European colonization. When I first saw it, *Time Landscape* was still a rather abject arrangement of newly planted shrubs and saplings but over the intervening 30 years I watched it gradually transform into a stately, sylvan grove and it now looks as if it has always been there, which of course it hasn't. But then again it has, as the horticultural landscape is really just a re-setting by the artist of the state of the place at an earlier moment in time. What's different is the reversed figure/ground relationship between the once dominant biome and the architectural anthrome that has so overwhelmed it. By returning the site to its ecological past, Sonfist made time fluid and one can easily imagine oneself moving back and forth through the layers of its architectural and botanical history. But the re-installed former past has also moved forward, which makes *Time Landscape* a kind of anti-monument whose elements have their own agency and change constantly in appearance. As the trees grow on at their own stately paces, adding growth rings and extending their branches, they serve as a kind of time code, independent of our own frenetic aspirations.

But I wanted to turn the clock back more than just a few hundred years. Recreating the forest landscape of the Eocene was an even more conjectural undertaking. Fortunately the plants of the Eocene have left a rich fossil record that is well documented. By the late 1990's, I had established test plantings in my Cortes Island yard of many of the tree genera whose fossils have been found in British Columbia's Eocene deposits. Though I was limited for space, I was able to grow specimens of the conifers: *Metasequoia*, *Sequoiadendron* (Coast Redwood), *Sequoia* (Giant Sequoia), *Cunninghamia*, *Sciadopitys*, and *Ginkgo*, as well as deciduous genera such as *Juglans* (walnut) and *Ulmus* (elm). The trees thrived with minimal care and within a few years I was eager to scale up the project to a landscape level by introducing entire groves of them to an existing forest ecosystem.



Ten-year-old Metasequoia, Cortes Island, British Columbia
Image by Oliver Kellhammer

The opportunity to do so came about in 2008, when I first met the UK-based botanist Rupert Sheldrake, who had recently purchased an acreage on the other side of our relatively small island. The bulk of his property had been logged-out a few years earlier by a timber company and then partially replanted in Douglas Fir (*Pseudotsuga menziesii*) and Western Red Cedar (*Thuja plicata*), the most commonly prescribed species for reforestation in the region. There were, however, substantial areas that hadn't yet been planted, thus providing an ideal situation for me to try out larger numbers of some of the Eocene tree varieties I had been experimenting with. With Rupert's financial and scientific sponsorship, the experiment proceeded apace and together with a professional forestry worker I planted hundreds of seedlings in a two year period. Despite unprecedented, back-to-back, summer droughts in 2008 and 2009, many of the trees thrived, most notably the *Sequoiadendron*, *Sequoia* and *Juglans* (*cineria* and *nigra*). Though stressed by drought, a number of specimens of *Metasequoia* and *Ginkgo* also made it through and are now putting on new growth. The *Metasequoia* is adapted to seasonal flooding and might gain a competitive advantage if the climate were to become wetter as well as warmer.

Unbeknownst to me, just after the property had been clear-cut by the timber company, it had been placed under a well-intentioned covenant held by an organization known as Nature's Trust. Though it allows for extensive industrial logging, the document stipulated that any subsequent reforestation be comprised of species native to the site's presently extant CWHxm1 (Coastal Western Hemlock, very dry) biogeoclimatic zone; essentially a seasonally dry rainforest. By the time we discovered this, the Neo-Eocene plantings were already well underway and Rupert and I proceeded to negotiate with Nature's Trust from our position that in the context of rapid climate change, the term "native" should be expanded to incorporate formerly, even prehistorically, native species, given the distribution of present day biogeoclimatic zones is surely likely to change. Originally, Nature's Trust deemed such trees as *Sequoia* and *Metasequoia* "exotic" and "potentially invasive" and wanted them removed, but in the end we worked out a compromise that allowed these anciently native species to be introduced to no more than 30% of the property's total area.



Rupert Shelldrake with young Coast Redwood
Image by Oliver Kellhammer

Predicting the future is always a risky business yet good science and the human imagination can give us at least some idea of what we might be in store for us with an increasingly hotter planet. In my mind, I like to travel through time to maybe a hundred years from now to try and picture how my "Neo-Eocene" plantings might be doing. If the temperatures continued to rise and the summers remained relatively dry, the Cortes Island landscape might more resemble that of present day coastal California. The redwoods and walnuts I planted might then be thriving within an otherwise depauperate forest where only some of the more drought tolerant current species, such as Douglas Fir and *Arbutus menziesii* would still manage to hang on. Alternately, if it got warmer and wetter, particularly in the summer, the landscape could evolve into something resembling northern Florida, with a more humid regime favoring *Metasequoia* and *Ginkgo*, perhaps even palms and cycads. The fact is we just don't know how climate change will turn out, but it makes good sense to hedge our bets. Human beings have a long history as vectors, spreading other species around the planet with both harmful and beneficial outcomes. To my mind we'll have to reassess some of our more cherished notions on what constitutes a native ecology and adopt a more geological perspective as to which species belong where, so we can invite some of Earth's most magnificent trees back to the places they once inhabited when conditions last suited them. Not to do so would be to turn our back on a precious biological heritage. Many tree varieties once more widely distributed during past warm periods now occupy extremely limited and geographically isolated ranges. Human-assisted migration could allow them once more to be a part of a broader ecological framework. With the rise of global warming and the Anthropocene, the future of Earth's biodiversity is already in our hands. Rightly or wrongly, we have taken on strangely god-like powers to affect the world's climate and the evolution of its ecosystems.

Notes

1. For more photos of the Time Landscape, see <http://www.flickr.com/photos/oliverk/sets/72157604121488155/>.

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