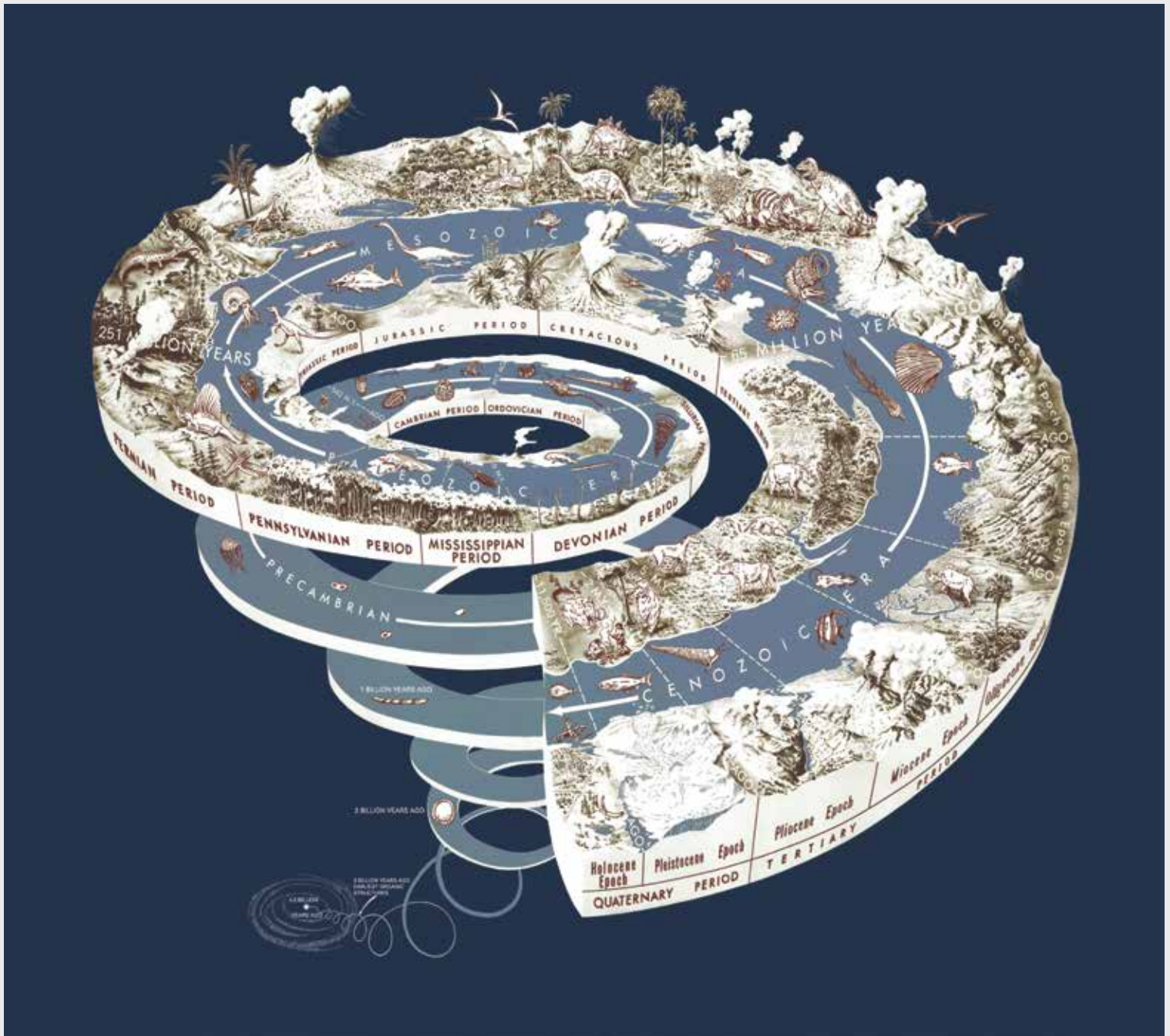


GRAFTING

Issue 01

The Society for the Diffusion of Useful Knowledge

June 2018



Joseph Graham, William Newman, and John Stacy, *The Geologic Time Spiral—A Path to the Past* (ver. 1.2, 2008). U.S. GEOLOGICAL SURVEY GENERAL INFORMATION.

graft (n.1)

"shoot inserted into another plant," late 15c. alteration of Middle English *graff* (late 14c.), from Old French *graife* "**grafting knife, carving tool; stylus, pen,**" from Latin *graphium* "stylus," from Greek *grapheion* "stylus," from *graphein* "**to write**". So called probably on resemblance of a stylus to the pencil-shaped shoots used in grafting.

graft (n.2)

"**corruption,**" 1865, perhaps 1859, American English, perhaps from British slang *graft* "one's occupation" (1853), which is perhaps from the identical word meaning "a ditch, moat," literally "**a digging**" (1640s), from Middle Dutch *graft*, from *graven* "to dig".

The Society for the Diffusion of Useful Knowledge is a serial broadsheet publication produced by the Blackwood Gallery, University of Toronto Mississauga, as part of *The Work of Wind: Air, Land, Sea*, a site-specific exhibition, public program, and publication series designed to expand perspectives on climate change through artistic practices, cultural inquiry, and political mobilization.

The Work of Wind: Air, Land, Sea

Exhibition: 14–23 September 2018
Books: September 2018, June 2019, September 2019
Public Programs: June 2018–April 2019
Broadsheet Series: June 2018–April 2019

The Work of Wind: Air, Land, Sea aims to foster a deeper public awareness of the complex entanglements of ecologies of excess, environmental legacies of colonialism, the financialization of weather, contemporary catastrophism, politics of sustainability, climate justice, and hopeful resilience. It sets out to develop durable visual-cultural literacies and invites publics to create new encounters in the common struggle for a future. The project flows across the city of Mississauga and is distributed locally, nationally, and internationally through a three-volume book series co-published with K. Verlag and *The Society for the Diffusion of Useful Knowledge*, an innovative public program and publishing platform.

The Society for the Diffusion of Useful Knowledge (SDUK)

In order to productively collide with the present crisis, we recognize that ideas cannot be constrained by disciplines. *The Society for the Diffusion of Useful Knowledge* (SDUK) composes and circulates an ecology of knowledge based on the relationship and antagonism of “useful” ideas. The name of this innovative platform is borrowed from a non-profit society founded in London in 1826, focused on publishing inexpensive texts such as the widely read *Penny Magazine* and *The Library of Useful Knowledge*, and aimed at spreading important world knowledge to anyone seeking to self-educate. Both continuing and troubling the origins of the society, the Blackwood Gallery’s SDUK platform circulates research, ideas, and debates from a range of exigent discourses and practices, including those among the visual arts, environmental humanities, public policy, political economy, sustainable design, science and technology studies, extinction studies, and the major scientific and cultural debate of a generation—the Anthropocene.

The **SDUK** broadsheet series brings together contributors from diverse fields in the sciences and humanities, students and faculty from across the University of Toronto Mississauga, community organizations and activists, policy makers and policy agitators, artist researchers and speculative thinkers, all to advance new forms of literacy around climate change discourse.

The Work of Wind: Air, Land, Sea

Curated by Christine Shaw
 Presented by the Blackwood Gallery in partnership with the University of Toronto Mississauga, the City of Mississauga, and K. Verlag.
 2018–2019



The Society for the Diffusion of Useful Knowledge is developed in collaboration with The Climate Change Project (City of Mississauga, Environment Division).



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01	GRAFTING	June 2018
02	COMMUTING	August 2018
03	BEARING	October 2018
04	SHORING	December 2018
05	ACCOUNTING	February 2019
06	FORGING	April 2019

Publisher
 Blackwood Gallery
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Editorial Collective
 D.T. Cochrane, Alison Cooley, Fraser McCallum, Christine Shaw, Joy Xiang

Designer
 Matthew Hoffman

Copy Editor
 Jeffrey Malecki

Printer
 Thistle Printing Ltd.



Contributors
 Amanda Boetzkes, Civic Laboratory for Environmental Action Research, The Climate Change Project, Heather Davis, Endocrine Disruptors Action Group, Lisa Hall, Julie Joosten, Elizabeth LaPensée, The LEAP, Yihan Li, Morris Lum, Shannon Mattern, Andrea Olive, Kika Thorne, Zoe Todd, Kyle Powys Whyte, Tania Willard

Staff
 Christine Shaw, Director/Curator
 Alison Cooley, Assistant Curator
 Caitlin Sutherland, Project Coordinator
 Joy Xiang, Curatorial Research Assistant
 Fraser McCallum, Publications and Outreach Assistant
 D.T. Cochrane, Research Associate



Blackwood Gallery
 University of Toronto Mississauga
 3359 Mississauga Road
 Mississauga, ON L5L 1C6
 905-828-3789
 blackwood.gallery@utoronto.ca
 blackwoodgallery.ca

On *The Geologic Time Spiral*

Lisa Hall

Drawing attention to the relative scales of geologic and human time, the *Geologic Time Spiral* is an apt starting place for an inquiry into the Anthropocene. Earth’s origin and early life are obscure, receding into a distant past some 4.5 billion years ago—but as time and the spiral unfold, more details emerge. Depicted is the story of a changing planet and evolving life, a story recovered from the rocks that form the planet’s crust. Human-time barely registers, yet our traces may define the next chapter. The spiral image also calls to mind oft-quoted lines from Yeats’s 1919 poem “The Second Coming.” The sentiment continues to resonate:

*Turning and turning in the widening gyre
 The falcon cannot hear the falconer;
 Things fall apart; the centre cannot hold...*

How to Read this Broadsheet

The SDUK broadsheet series takes aim at a broad range of concerns—and this issue, **GRAFTING**, explores how we come to know, define, and interact with nature, where we see its boundaries and identify its needs, and how we understand its entanglement with culture. Following on the origins of *The Society for the Diffusion of Useful Knowledge*, and in the spirit of publishing, questioning, and problematizing “useful knowledge,” we recognize our readers as curious people who may pick up this publication with certain questions already in mind.

Perhaps you are asking, “**Where do nature and the city intersect? What does this mean for urbanism?**” We suggest you begin with Shannon Mattern’s “How to Graft a City” (p. 5); Morris Lum’s photographic project on Cooksville, a Mississauga neighbourhood built on intercultural relationships and subject to both urban development and climatic events (p. 6); or The Climate Change Project’s study of natural resource management (p. 25).

We often wonder, “**How can art and culture contribute to an understanding of nature-culture entanglement?**” If you wonder this too, Amanda Boetzkes’s essay on grafting and contemporary art (p. 18), and Kika Thorne’s artist project

Tree Permit TP-2016-00332 Applicant John Ross... (p. 16) are both excellent points of departure for this exploration.

If you are interested in **who is taking action on environmental issues in Mississauga**, profiles of the Association for Canadian Educational Resources, Credit River Anglers Association, HOUSE Lab, Enabling Garden, Making Social Knowledge, and UTM’s Beehives provide short introductions to some important local initiatives (p. 26), and Andrea Olive’s essay on the Credit Valley Conservation Authority (p. 24) offers additional in-depth analysis.

Landowners, residents, and entrepreneurs may be interested in asking, “**What are the implications of environmental degradation on land ownership and the economy?**” D.T. Cochrane and Fraser McCallum address this question through the lenses of economics and biodiversity, respectively (pp. 22–23).

“**How is climate change related to Indigenous knowledge, sovereignty, and kinship?**” is a central, vital question for reckoning with our relationship to land and the legacies of colonialism. It is taken up by many contributors in this issue, but you might begin with EDAction & CLEAR’s “Pollution is Colonialism”

(p. 20) and then move on to Heather Davis and Zoe Todd’s “Decolonizing the Anthropocene” (p. 12).

In the face of environmental catastrophe, many of us are asking, “**How do we reckon with time? How do we repair? What can we do?**” If you are too, a poem by Julie Joosten (p. 14) exploring the many histories bound up in climate’s present may deeply resonate with you, and Kyle Powys Whyte’s “Climate Change as an Unprecedentedly Old Catastrophe” (p. 8) may offer some ideas for grappling with the timeline(s) of climate change and prevention. The Leap Manifesto (p. 10) calls for a Canada based on caring for each other and the planet, moving swiftly to a post-carbon future, upholding Indigenous rights, and pursuing economic justice for all.

Finally, this publication closes with a glossary—a tool designed to help define the unfamiliar, but also describe, develop, connect, and trouble existing terminology. Words, too, are shifting ground, and each broadsheet’s glossary will respond to its contents, accumulating new language, and attesting to the need for a complex, entangled lexicon that equips us to learn, understand, and confront a rapidly changing world.



Brampton Flood, March 1948. Photograph by Russell K. Cooper. COURTESY REGION OF PEEL ARCHIVES.

How to Graft a City

Shannon Mattern

The machine-learning algorithm processes a training set composed of images of grafted fruit trees. It watches as gardeners and farmers cut underperforming-but-still-sturdy trees down to a stubby rootstock, trim healthy shoots from more desirable trees, insert those shoots—or scions—around the bark of the rootstock, bandage it all up, then fashion for our Siamesed tree-twins a rehabilitative greenhouse from a plastic bag. Over time, the rootstock’s and scion’s vascular tissues grow together: they “inosculate.” And after a couple of growing seasons, the machine observes, our gardeners yield sturdier, hardier, disease-resistant trees that produce more fruit, at much younger ages, than their unadulterated kin. The machine has learned to graft, and it’s observed which methods generate the greatest yield.

We then port that grafting algorithm over to the urban planning lab, where our data scientists aim to graft a healthier, sturdier, more fruitful city—an urban scion—onto some underperforming rootstock. Our planning algorithm searches aerial imagery and Street View images to identify barren waterfronts, brownfields, and blighted neighbourhoods with potential for resuscitation. It then grafts onto that urban rootstock a lattice of urban systems—pipes and cables and roads and buildings—in patterns it has learned from other successful cities (with “success,” of course, determined by the optimization of various urban indices). Over time, the root’s and scion’s infrastructural veins and arteries are sutured together. And after a few months, the urban machine is able to sustain a vibrant ecosystem of people and Dutch grocery bikes and King Charles spaniels and vegan eateries. And its yield—of data and profit—is abundant.

This is how cities are cultivated in an age in which the “science” in urban science draws more from data and computer science than from horticulture and ecology. Here, the old art of grafting is algorithmized and engineered.

Yet cities have always been grafted terrains. Those that have sustained more than a couple generations of inhabitants bear layers of their material history. In their urban strata we find evidence of the Anthropocene: trash, construction materials, and ruins that chronicle humans’ alteration of the planet. Urban facades sport shrouds of territorial markings, official proclamations, and commercial insignia. And enduring cities that, over the course of their long lives, have been usurped by

empires or claimed by colonizers often host grafted architectures and infrastructures manifesting their mixed lineages—their entangled roots and scrambled genetic codes.

The term graft derives from the Greek *graphein*, or stylus—probably because those scion shoots looked a lot like writing implements. The city is grafted in this graphic sense, too: it’s a polyglot palimpsest of codes and scripts and plans. If we trace its lineage all the way back to Uruk and Çatalhöyük, among the earliest large-scale human settlements, we can see that the city has long mediated between multiple modes and means of inscription, transmission, and storage: legal codes and copper cables, algorithms and antennae, public proclamations and system protocols, clay tablets and ceramic type. Over generations and millennia, urban inhabitants have grafted code to clay, data to dirt, ether to ore.

But today’s data-grafters tend to cut the rootstock off at the stump, excising all inconvenient precedent, erasing legacy scripts. A too-low tree graft makes the organism susceptible to soil pathogens. Or it can entice a scion to plant its own roots, which can’t defend themselves against infection. The scion depends on the rootstock’s built-up immunities. Similarly, when our contemporary “urban test bed” prospectors, in their pursuit of *tabula rasa*, uproot the foundations of the city, they forsake the immunities of experience, the accreted defenses of history, the embedded and embodied knowledges of local communities.

Yet “a city is not a tree,” as architect Christopher Alexander reminds us.¹ He contrasts two urban structures: that of the “semilattice” and that of the “tree.” The “organic” semilattice city is a “complex fabric,” a structure that has “arisen more or less spontaneously over many, many years.” It is thick, tough, and subtle. The tree city, by contrast, is characterized by its structural simplicity and minimal overlap among its urban units—whether zones or arteries or superblocks. The tree is the signature form of the “artificial” city, the city “deliberately created by designers and planners” to reflect their “compulsive desire for neatness and order.”

Designers and planners have supposedly evolved beyond the hubris and folly of the master-planned city. Instead, maybe they’ve merely sublimated the master plan in the machine, grafted algorithms onto blue-

prints. They’ve swapped neural nets for compulsive desires, automation for deliberation, sublimely exhaustive datasets for neatness and order. In the end, though, they’re still grafting city-trees. “When we think in terms of trees,” Alexander warns, “we are trading the humanity and richness of the living city for a conceptual simplicity which benefits only designers, planners, administrators and developers. Every time a piece of a city is torn out, and a tree made to replace the semilattice that was there before, the city takes a further step toward dissociation.”

Those planners’ and developers’ interests remind us that there’s yet another traditional grafting technique involved in urban development: the graft of corruption. With the rise of urban-tech companies, data brokers, and black-boxed administrative platforms, and with the spread of public-private partnerships, our newly grafted cities are even more at risk of infection. Urban inhabitants are ever more susceptible to surveillance and hacking and data-mining, while the city itself is exposed to corporate rot, and the social contract is subject to decay.

Grafting is an integral component of urban evolution. But in this newest variation on a well-rehearsed practice, we have to be wary of our new scions, those offshoots of the tech giants. And we must protect the rootstock, which is what keeps us grounded and resilient—and, at the same time, mindful of the many foregoing graftings that have produced the thick, tough, and subtle semilattice structure of our organic cities.

¹ The following quoted passages are drawn from Christopher Alexander, “A City Is Not a Tree: Part I” *Architectural Forum* 122, no. 1 (April 1965): 58–62; and “A City Is Not a Tree: Part II,” *Architectural Forum* 122, no. 2 (May 1965): 58–62, <https://www.patternlanguage.com/archive/cityisnotatree.html>.

Intersections Morris Lum

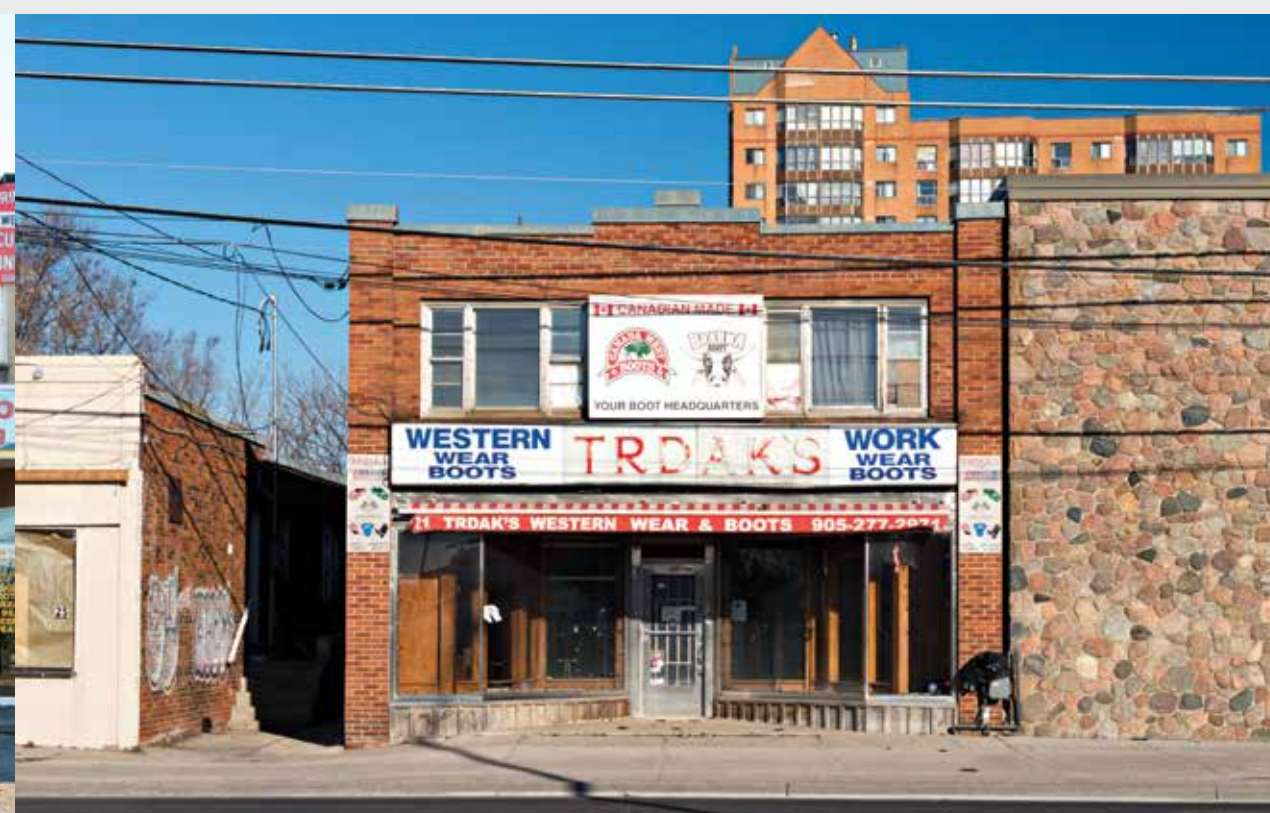
2545, 2543, 2541 Hurontario St. Morris Lum has been visiting Cooksville since his childhood, when he would come to buy Caribbean and Chinese groceries with his family. Reflecting on his family history, he notes the importance of this neighbourhood to newcomer communities—a fact that is shown in census data, which indicate that almost seventy percent of the ward's residents were born outside Canada. With the construction of light rail on Hurontario Street, increased attention to Cooksville Creek amid recent flooding, and renewed belief in the possibilities of apartment towers, Cooksville is changing.



113, 115 Dundas St. W. Sites of global money transfer services are indicated by the flags seen on the left. While flags are at home amid the bright colours of commercial signage, they also indicate the international scope of familial connections in Cooksville. Money links homelands here and abroad; it moves transnationally, changing shape along the way through currency exchange.



2549A, 2547 Hurontario St. The layered character of commercial signage is a common thread throughout Cooksville, where nearly 600 businesses compete for attention in one of Mississauga's densest wards. Nature scenes depicting tropical beaches or sunrises appear throughout, while Cooksville's built environment is itself periodically vulnerable to the natural floodplain on which it sits.



21 Dundas St. W. The street-facing low-rise buildings along Cooksville's roads are complemented by high-rise apartment towers nearby, as seen above. Over 2,000 of these towers were built in the Greater Golden Horseshoe from the post-war period through the mid-1980s, and they are increasingly being seen as important in the fight against climate change. Public and private sector specialists, as well as NGOs, are working to modernize the energy efficiency of these buildings, aiming at greenhouse-gas reductions of up to forty percent. Emissions reductions are one facet of the Tower Renewal Project, which also aims to revitalize the green spaces around apartments, foster urban agriculture, and leverage financial instruments to incentivize landlord participation.



3041, 3041A, 3039, 3039A, 3037A Hurontario St. Cooksville's restaurant culture shows how intercultural exchange is expressed through food: regional cuisines change and evolve to reflect the movement of people, ingredients, and influences. These intercultural relationships are often touted as prime examples of Canadian multiculturalism, a discourse that celebrates diversity but sometimes flattens or obscures the more difficult realities of migration and upheaval (war, political instability, economic necessity, encounters with overt and institutionalized racism in Canada, and linguistic and cultural isolation). Cooksville's restaurant culture paints a complex picture of change, hybridity, and resilience—rejecting the notion that cultures are static, and attesting to a wide range of histories that inform the community's present shape.



25 Dundas St. W. Empty storefronts are emblematic of a neighbourhood in transition, where people and businesses are in frequent movement. In Cooksville, newcomers tend to stay for just one to five years, and home-ownership is lower than the Mississauga average. Nearby, on both sides of Cooksville Creek, vacancies of a different kind are occurring: the City of Mississauga is attempting to purchase homes to create thirty acres of parkland on the creek's floodplain. Recent floods attest to the volatility of urban rivers: the 2009 flood of Cooksville Creek registered the highest streamflow rate ever recorded in Canada.

Climate Change: An Unprecedentedly Old Catastrophe

Kyle Powys Whyte

Indigenous peoples of Turtle Island have already passed through human-caused ecological catastrophe at least once in their history. Speaking of the U.S. here, an integral part of its settler colonial domination is the infliction of harmful environmental changes on Indigenous peoples. For example, in the nineteenth century, the U.S. forced some Potawatomi peoples to relocate from the Great Lakes region to the Great Plains region, some 1,000 miles south. This relocation required our ancestors to adjust rapidly to a completely different ecosystem and climate in what was then called the Indian Territory (later Oklahoma). Over time, U.S. settlers worked to privatize the land, dispossess Indigenous peoples of their land, and subsequently steal property held by Indigenous persons. They established extractive industries, including coal and other mining, oil drilling, agriculture, and livestock. Land privatization and dispossession stressed Indigenous kinship and gender systems, while residential and boarding schools stripped Indigenous children of generations of their history, memories, and knowledge. Extractive industries also generated pollution and contributed to the rise in greenhouse gas concentrations in the atmosphere. Unwise farming practices rendered the landscape vulnerable to drought, cul-

minating in the *dust bowl* period of the 1930s. Today, many Indigenous Oklahomans are seriously concerned about climate change impacts, such as drought effects on their water, agriculture, health, and energy supply. They are doubly concerned that the state and the U.S. *still* have not improved their respect for Indigenous self-determination sufficiently for Oklahoma Tribes to prepare for climate change.¹

For Indigenous peoples, it's by no means a new notion that human societies can inflict ecological catastrophe on one another. Way beyond the experience of U.S. colonialism, Indigenous intellectual traditions are rooted in philosophies that work to understand how the actions of human societies are entwined with environmental change. One aspect of these traditions concerns political philosophies of diplomacy for peoples who share ecosystems. The ancient *Dish with One Spoon* treaty between Anishinaabe and Haudenosaunee peoples is one such example in Great Lakes region. The treaty establishes reciprocal responsibilities for caretaking of the environment.²

Today, it is not entirely incorrect to fear that we are hurtling toward ecological catastrophe due to human-caused climate

change. I have witnessed many hundreds of Indigenous persons testify about the climate change threats their peoples are facing across the globe. My experiences include participating in or planning events such as the *First Stewards Symposium* and the *Shifting Seasons Summit*, authoring and advising for scientific synthesis reports on climate change vulnerability such as the U.S. Global Change Research Program, and creating educational programs for dozens of Tribes who are preparing for climate change. Indigenous peoples are reporting climate-related threats to their economies and cultures related to rapidly shifting seasonal patterns, sea-level rises, ocean acidification, thinning sea-ice, and the increased severity of extreme weather events.

Yet, in all my experiences, what is noticeable is that Indigenous peoples are bracing for climate change impacts that—in a certain sense—would not have been as risky for their ancestors. Many Indigenous peoples facing relocation due to sea-level rises in the Arctic or Gulf of Mexico are only in such a position because they were forced give up their more mobile governance practices and instead live permanently on small islands to make way for U.S. settlement.³ Climatic threats to fish populations on the

West Coast of North America are further stressors, adding to a longer list environmental stressors occurring because the U.S. has not respected Indigenous treaty rights to protect fish habitats.⁴ I already mentioned how some Indigenous people in Oklahoma are concerned about whether the state will respect their self-determination. On the climate-mitigation side, some Indigenous peoples in the Southwest and Mountain regions have been slow to transition to renewable energy because the U.S. re-engineered their governments in the twentieth century to promote a dependence on fossil fuels.⁵ These realities are why Indigenous leaders globally say that climate change and colonialism are interrelated. Sheila Watt-Cloutier claims that “Climate change is yet another rapid assault on our way of life. It cannot be separated from the first waves of changes and assaults at the very core of the human spirit that have come our way.”⁶ I would encourage readers to read her recent book, *The Right to Be Cold*.

While warranted, fears of ecological catastrophe must be put in context. Dale Jamieson, who recently published a book, *Reason in a Dark Time*, emphasizes how human-caused climate change is an “unprecedented problem.” The problem is driven by “greed, mendacity, ignorance, short-sightedness... manifest in the extreme power of corporations, the weakness of government, and the indifference of citizens.”⁷ For Indigenous peoples, the current climate change ordeal is bad, but not unprecedented. Jamieson's list of drivers, starting with greed, sounds a lot like U.S. settler colonialism. It sounds a lot like Canadian settler colonialism too, which explains why many of my interlocutors in this article are Indigenous persons working north of the border. Candis Callison, speaking of Indigenous peoples in the Arctic in her book, *How Climate Change Comes To Matter*, writes that we need to recognize what “climate change portends for those who have endured a century of immense cultural, political and environmental changes.”⁸

Heather Davis and Zoe Todd argue convincingly that non-Indigenous persons are sometimes rather unreflective when they fear future ecological catastrophe or deem climate change as unprecedented.⁹ Their concern is really that their children may be harmed by loop-back effects of the same capitalist-colonialist-industrialist systems that have hitherto benefited them and secured their aspirations for future well-being. So, when settler Americans or Canadians express concerns about a coming catastrophe, it's imagined to be a catastrophe disruptive of today's ecological status quo for them. Today's status quo, of course, is already an Indigenous ecological dystopia.

Ironically, I have not yet seen any settler American or Canadian offer an imagined projection of a climate future that is more ecologically dire than what Indigenous peoples have already endured due to colonialism. Like our peoples who relocated

to Oklahoma in the nineteenth century, many Indigenous peoples have already experienced the irreversible collapse of their ecosystems. They have forever lost relationships with hundreds of species. They were forced to ration the commodity foods available to them, separate from their kinship and family relationships, and lose much of their linguistic and knowledge systems. They had to have their labour exploited by settlers. Of course, all the while, it was the settlers who believed that they—the settlers!—were morally superior while oppressing Indigenous peoples. This is a scenario worthy of the most horrific science fiction.

Settler narratives of preventing tomorrow's ecological catastrophe can be dangerous, for they involve future imaginations clouded by crisis-mode thinking. They ignore why Indigenous peoples—and other groups too—are threatened by climate change in the first place. The U.S. and Canada have not yet reconciled their laws, education systems, scientific institutions, and cultural norms sufficiently. They have failed to support Indigenous cultural and political self-determination in climate adaptation, honour treaty rights, or promote Indigenous leadership in local and global climate-change mitigation. Today's failures stem directly from the lack of reconciliation of the original settler colonial legal, educational, scientific, and cultural strategies for dispossessing Indigenous peoples of their lands to make way for the drivers of human-caused climate change.

Indigenous peoples, of course, are not waiting for the U.S. or Canada to change—even though it would be beneficial if they did change. Many are making their work on climate change public, which is inspiring kindred efforts across diverse Indigenous peoples. The St. Regis Mohawk Tribe has created its climate change plan, organized entirely around relationships of reciprocal responsibility with plants, animals, spiritual beings, and ecosystems, with the plan's sections divided into chapters with titles such as “Mother Earth” and “Three Sisters.”¹⁰ As well, the Lummi Nation has taken action to block the establishment of a coal shipment and train railway near its treaty-protected sacred area of Xwe'chi'eXen, citing the U.S. failure to honour treaty rights as enabling the continuation of dangerous fossil fuel industries that commit harms locally (e.g. pollution) and globally (e.g. climate change).¹¹

In these and many other efforts, Indigenous peoples are drawing on their own intellectual traditions in preparing for climate change. They are calling on settler nations like the U.S. to finally live up to moral and just expectations for diplomacy and reciprocal responsibility by taking care of shared environments, including the climate system. But non-Indigenous leaders in the U.S. and Canada will never be in the position to do right by Indigenous peoples until they acknowledge climate change as the *unprecedentedly old* ecological crisis that it is.

1 See Rachel Riley, Paulette Blanchard, Randy Peppler, Bull Bennett, and Daniel Wildcat, *Oklahoma Inter-Tribal Meeting on Climate Variability and Change* (Norman, OK: National Weather Center, 2012).

2 See Leanne Simpson. “Looking after Gdoo-Naaganinaa: Precolonial Nishnaabeg Diplomatic and Treaty Relationships.” *Wicazo Sa Review* 23, no. 2 (2008): 29–42. See also Victor P. Lytwyn. “A Dish with One Spoon: The Shared Hunting Grounds Agreement in the Great Lakes and St. Lawrence Valley Region,” in *Papers of the 28th Algonquian Conference*, ed. David H. Pentland (Winnipeg: University of Manitoba, 1997).

3 Julie Koppel Maldonado, Christine Shearer, Robin Bronen, Kristina Peterson, and Heather Lazrus. “The Impact of Climate Change on Tribal Communities in the US: Displacement, Relocation, and Human Rights,” *Climatic Change* 120, no. 3 (2013): 601–614.

4 Treaty Indian Tribes in Western Washington, *Treaty Rights at Risk: Ongoing Habitat Loss, the Decline of the Salmon Resource, and Recommendations for Change*, 14 July 2011, <http://www.treaty-rights-at-risk.org/downloads/treaty-rights-at-risk>.

5 Julie Turkewitz. “Tribes That Live Off Coal Hold Tight to Trump's Promises,” *New York Times*, 1 April 2017.

6 See Peter Robb, “Q and A: Sheila Watt-Cloutier Seeks Some Cold Comfort,” *The Ottawa Citizen*, 27 March 2015.

7 “Reason in Our Dark Time: Interview with Dale Jamieson,” *3AM Magazine*, 22 October 2016, <http://www.3ammagazine.com/3am/reason-dark-time>.

8 Candis Callison, *How Climate Change Comes to Matter: The Communal Life of Facts* (Durham: Duke University Press, 2014), 42.

9 Heather Davis and Zoe Todd, “On the Importance of a Date, or, Decolonizing the Anthropocene,” *ACME: An International Journal for Critical Geographies* 16, no. 4 (2017): 761–780.

10 St. Regis Mohawk Environmental Division, *Climate Change Adaptation Plan for Akwasasne* (Akwasasne, St. Regis Mohawk Tribe, 2013).

11 Vincent Schilling, “Lummi Tribal Leaders Rally in D.C. Against Nation's Largest Coal Terminal,” *Indian Country Today*, 12 November 2015.

The LEAP Manifesto

We start from the premise that Canada is facing the deepest crisis in recent memory.

The Truth and Reconciliation Commission has acknowledged shocking details about the violence of Canada's near past. Deepening poverty and inequality are a scar on the country's present. And Canada's record on climate change is a crime against humanity's future.

These facts are all the more jarring because they depart so dramatically from our stated values: respect for Indigenous rights, internationalism, human rights, diversity, and environmental stewardship.

Canada is not this place today—but it could be.

We could live in a country powered entirely by renewable energy, woven together by accessible public transit, in which the jobs and opportunities of this transition are designed to systematically eliminate racial and gender inequality. Caring for one another and caring for the planet could be the economy's fastest-growing sectors. Many more people could have higher wage jobs with fewer work hours, leaving us ample time to enjoy our loved ones and flourish in our communities.

We know that the time for this great transition is short. Climate scientists have told us that this is the decade to take decisive action to prevent catastrophic global warming. That means small steps will no longer get us where we need to go.

So we need to leap.

This leap must **begin by respecting the inherent rights and title of the original**

caretakers of this land. Indigenous communities have been at the forefront of protecting rivers, coasts, forests, and lands from out-of-control industrial activity. We can bolster this role, and reset our relationship, by **fully implementing the United Nations Declaration on the Rights of Indigenous Peoples.**

Moved by the treaties that form the legal basis of this country and bind us to share the land “for as long as the sun shines, the grass grows and the rivers flow,” we want energy sources that will last for time immemorial and never run out or poison the land. Technological breakthroughs have brought this dream within reach. The latest research shows it is feasible for Canada to get 100% of its electricity from renewable resources within two decades¹; by 2050 we could have a 100% clean economy.²

We demand that this shift begin now.

There is **no longer an excuse for building new infrastructure projects that lock us into increased extraction decades into the future.** The new iron law of energy development must be: **if you wouldn't want it in your backyard, then it doesn't belong in anyone's backyard.** That applies equally to oil and gas pipelines; fracking in New Brunswick, Quebec, and British Columbia; increased tanker traffic off our coasts; and to Canadian-owned mining projects the world over.

The time for **energy democracy** has come: we believe not just in changes to our energy sources, but that wherever possible **communities should collectively control these new energy systems.**

As an alternative to the profit-gouging of private companies and the remote bureaucracy of some centralized state ones, we can create innovative ownership structures: democratically run, paying living wages and keeping much-needed revenue in communities. And **Indigenous Peoples should be first to receive public support for their own clean energy projects. So should communities currently dealing with heavy health impacts of polluting industrial activity.**

Power generated this way will not merely light our homes but redistribute wealth, deepen our democracy, strengthen our economy and start to heal the wounds that date back to this country's founding.

A leap to a non-polluting economy creates countless openings for similar multiple “wins.” We want **a universal program to build energy-efficient homes and retrofit existing housing, ensuring that the lowest-income communities and neighbourhoods will benefit first** and receive job training and opportunities that reduce poverty over the long term. **We want training and other resources for workers in carbon-intensive jobs, ensuring they are fully able to take part in the clean-energy economy.** This transition should involve the democratic participation of workers themselves. **High-speed rail powered by renewables and affordable public transit can unite every community in this country**—in place of more cars, pipelines, and exploding trains that endanger and divide us.

And since we know this leap is beginning late, we need to **invest in our decaying public infrastructure** so that it can withstand increasingly frequent extreme weather events.

Moving to a far more localized and ecologically based agricultural system would reduce reliance on fossil fuels, capture carbon in the soil, and absorb sudden shocks in the global supply—as well as produce healthier and more affordable food for everyone.

We call for an end to all trade deals that interfere with our attempts to rebuild local economies, regulate corporations, and stop damaging extractive projects. Rebalancing the scales of justice, we should ensure **immigration status and full protection for all workers.** Recognizing Canada's contributions to military conflicts and climate change—primary drivers of the global refugee crisis—we must welcome refugees and migrants seeking safety and a better life.

Shifting to an economy in balance with the earth's limits also means **expanding the sectors of our economy that are already low carbon: caregiving, teaching, social work, the arts, and public-interest media. Following on Quebec's lead, a national childcare program is long past due.** All this work, much of it performed by women, is the glue that builds humane, resilient communities—and we will need our communities to be as strong as possible in the face of the rocky future we have already locked in.

Since so much of the labour of caretaking—whether of people or the planet—is currently unpaid, we call for a vigorous debate about the introduction of **a universal basic annual income.** Pioneered in Manitoba in the 1970s, this sturdy safety net could help ensure that no one is forced to take work that threatens their children's tomorrow, just to feed those children today.

We declare that “austerity”—which has systematically attacked low-carbon sectors like education and healthcare, while starving public transit and forcing reckless energy privatizations—is a fossilized form of thinking that has become a threat to life on earth.

How we can pay for all of this? Read “We Can Afford The Leap” by Bruce Campbell, Seth Klein, and Marc Lee.³

The money we need to pay for this great transformation is available—we just need the right policies to release it. Like an **end to fossil fuel subsidies. Financial transaction taxes. Increased resource royalties. Higher income taxes on corporations and wealthy people. A progressive carbon tax. Cuts to military spending.** All of these are based on a simple “**polluter pays**” principle and hold enormous promise.

One thing is clear: public scarcity in times of unprecedented private wealth is a manufactured crisis, designed to extinguish our dreams before they have a chance to be born.

Those dreams go well beyond this document. “We call on all those seeking political office to seize this opportunity and embrace the urgent need for transformation.” We call for **town hall meetings across the country** where residents can gather to democratically define what a genuine leap to the next economy means in their communities.

Inevitably, this bottom-up revival will lead to a renewal of democracy at every level of government, working swiftly towards a system in which **every vote counts and corporate money is removed from political campaigns.**

This is a great deal to take on all at once, but such are the times in which we live.

The drop in oil prices has temporarily relieved the pressure to dig up fossil fuels as rapidly as high-risk technologies will allow. This pause in frenetic expansion should not be viewed as a crisis, but as a gift.

It has given us a rare moment to look at what we have become—and decide to change.

And so we call on all those seeking political office to seize this opportunity and embrace the urgent need for transformation. This is our sacred duty to those this country harmed in the past, to those suffering needlessly in the present, and to all who have a right to a bright and safe future.

Now is the time for boldness.

Now is the time to leap.

¹ Sustainable Canada Dialogues, *Acting on Climate Change: Solutions from Canadian Scholars* (Montreal: McGill University, 2015).

² Mark Jacobson and Mark Delucchi, *Providing All Global Energy with Wind, Water, and Solar Power, Part I: Technologies, Energy Resources, Quantities and Areas of Infrastructure, and Materials*, *Energy Policy* 39, no. 3 (2011): 1154–1169.

³ See <https://leapmanifesto.org/en/how-can-we-afford-the-leap/>.

Decolonizing the Anthropocene

Heather Davis and Zoe Todd

The Anthropocene has never been a properly geological concept—it has always been political. And, we argue, it has always been entwined with settler colonialism, at least on Turtle Island. Other places on Earth might have the Anthropocene starting at different times, with different events, but for us, here, thinking the Anthropocene outside of its Eurocentric framings and identifying the interlinking connections between the Anthropocene and colonialism helps us begin to name and then dismantle its ecocidal logics.¹

Colonialism, especially settler colonialism—which in the Americas simultaneously employed the twinned processes of dispossession and chattel slavery—was always about changing the land, transforming the earth itself, including the creatures, plants, soil composition, and atmosphere. It was about moving and unearthing rocks and minerals. All of these acts were intimately tied to the project of erasure that is the imperative of settler colonialism. The damming of rivers, clear-cutting of forests, and importing of plants and animals remade the worlds of North America into the vision of a displaced Europe, fundamentally altering the climate and ecosystems. Settler colonialism, in North America and elsewhere, is marked by this process of terraforming.² As Kyle Whyte of the Potawatomi Nation argues, “industrial settler campaigns erase what makes a place ecologically unique in terms of human and nonhuman relations, the ecological history of a place, and the sharing of the environment by different human societies.”³ Further, the forced displacement that many tribal communities suffered involved adaptation to entirely new environments, new climates, new ecosystems, new plants and animals. These processes of environmental transformation and forced displacement can be understood as climate change, or more broadly, a preview of what it is like to live under the conditions of the Anthropocene. And so, as Whyte makes clear, the current environmental crises named through the designation of the Anthropocene can be viewed as a continuation of, rather than a break from, previous eras that begin with colonialism and white supremacy, and extend through advanced capitalism. In other words, climate change and the Anthropocene, understood from an Indigenous perspective, are not new events, but are rather the cyclical recurrence of logics of extraction (of bodies, lands, minerals, fossil fuels) that have amplified to become a global phenomenon.

The ideological presuppositions of the Anthropocene were made explicit in the eponymous article by Paul Crutzen and Eugene Stoermer (2000), who rely upon the concept of the noosphere to articulate their position.⁴ The noosphere places thought above the biosphere and geosphere, and is framed as a teleological progression that follows the development of the earth’s geological features and biota, as demonstrated by Pierre Teilhard de Chardin’s writings on the concept.⁵ This conceptualization assumes that the biosphere cannot, in and of itself, constitute an “envelope of thinking substance,” which contradicts the millennia-old philosophical traditions of many Indigenous peoples.⁶ In particular, Vanessa Watts elegantly articulates the concept of Indigenous Place-Thought, drawn from her own familiarity with deeply rooted Indigenous philosophies still practiced and applied in North America.⁷ Place-Thought necessarily disrupts a concept of knowledge separate from the geosphere and biosphere, and posits instead that land and thought are *integral* to one another; knowledge is not another technological layer somehow presumed to be outside of the earth. Indigenous Place-Thought thus asserts that life and thought are animated through and bound to bodies, stories, time, and land. Global colonial dispossessions continue to haunt—through bones, bodies, and stories—and assert the removal of human thought and technology from the earth.

Marking the contiguous histories of colonialism and the Anthropocene is not an academic exercise. It is rather about taking stock, being affected by, and feeling the reverberations of the violence of European settlement.⁸ Colonialism tore apart and disrupted worlds in the places both of us currently reside—these unceded and unsundered lands across North America—and hit like a seismic shock. The seismic shock of dispossession and brutality that colonialism employed to gain entry into and claims over Indigenous lands in the fifteenth to nineteenth centuries kept rolling like a slinky, pressing and compacting in different ways in different places, as colonialism spread outwards into homelands of self-determining peoples around the globe. It worked to compact and speed up time, laying waste to legal orders, languages, and place-stories in quick succession. The fleshy, violent loss of 50 million Indigenous peoples in the Americas is something we read as a “quickening” of space-time. This seismic shock of geno-

cide met with another one, that of the Middle Passage, again premised upon a logic of extraction and violence. Christina Sharpe describes the ongoing reverberations of chattel slavery and the rending of life-worlds in the wake of the ships and ideologies that transported captured Africans across the Atlantic. Sharpe teaches us that “in the wake, the past that is not past reappears, always, to rupture the present.”⁹ Building on her work, we can gesture towards how the entangled viciousness of capital and white supremacy have their direct roots in the epistemic violence of discovery, dispossession, extraction, and the horrific capture of life, bodies, and worlds. The Anthropocene-as-disaster narrative in dominant scientific and social science discourse must reckon with the ongoing disaster of the Middle Passage and settler colonialism. This seismic shockwave has rolled through and across space and time, and is now hitting those nations, legal systems, and structures that brought about the rending and disruption of lifeways and life-worlds in the first place.¹⁰

Indigenous and Black resistance in the face of apocalypse—including the renewal and resurgence of Indigenous and Black communities *in spite of* world-ending violence—is something that Euro-Western thinkers should heed as we contend with the implications of the seismic upheaval of worlds that began back in 1492. In order to adequately address climate change and other environmental catastrophes we need to seriously think through and enact processes of decolonization. This involves self-governance for Indigenous peoples, the return of stolen lands, and reparations for the descendants of captured Africans. It must also fundamentally question the bounds and the legitimacy of the nation-state structure itself. As we are already seeing around the world, people will not simply sit still in the face of ecological destruction, but will move, adapt, and try to find ways of recomposing with their kin and companion species. Rather than positioning the salvation of Man¹¹—the liberation of humanity from the horrors of the Anthropocene—in the technics and technologies of the noosphere, we call here for a tending once again to relations, to kin, to life, longing, and care.¹² This commitment to tenderness and relationships is one necessary and lasting refraction of the violent and unjust worlds set in motion at the beginning of the colonial moment.



Tania Willard and New BC Indian Art and Welfare Society Collective, *haunted_hunted*, 2015. Photo: Aaron Leon. COURTESY THE ARTIST.

1 This is a shortened version of a longer essay, “On the Importance of a Date, or, Decolonizing the Anthropocene,” published in *ACME* journal (16, no. 4, 2017). <https://www.acme-journal.org/index.php/acme/article/view/1539>. Our argument builds upon the thesis advanced by Simon Lewis and Mark Maslin in “Defining the Anthropocene” (*Nature*, 11 March 2015) that the Anthropocene should be dated to 1610 to coincide with the geologic legacies of colonialism.

2 See also Eyal Weizman, *The Conflict Shoreline* (Göttingen: Steidl, 2015).

3 Kyle Powys Whyte, “Our Ancestors’ Dystopia Now: Indigenous Conservation and the Anthropocene,” in *Routledge Companion to the Environmental Humanities*, ed. Ursula Heise, Jon Christensen, and Michelle Niemann (London: Routledge, 2016), 8.

4 Paul Crutzen and Eugene Stoermer, “The Anthropocene,” *Global Change Newsletter* 41 (2000): 17–18.

5 Chardin writes: “We must enlarge our approach to encompass the formation, taking place before our eyes and arising out of this factor of hominization, of a particular biological entity such as has never before existed on earth—the growth, outside and above the biosphere, of an added planetary layer, an envelope of thinking substance, to which, for the sake of convenience and symmetry, I have given the

name of the Noosphere.” Pierre Teilhard de Chardin, *The Future of Man* (New York: Image Books/Doubleday, 2004), 114.

6 See Julie Cruikshank, *Do Glaciers Listen? Local Knowledge, Colonial Encounters & Social Imagination* (Vancouver: UBC Press, 2005); Eduardo Kohn, *How Forests Think* (Berkeley and Los Angeles: University of California Press, 2013); Rachel Attitug Qitsualik, “Word and Will—Part Two: Words and the Substance of Life,” *Nunatsiag News*, 12 November 1998. http://nunatsiag.com/archives/nunavut981130/nvt81113_09.html; Deloria Vine Jr., *Red Earth, White Lies: Native Americans and the Myth of Scientific Fact* (New York: Scribner, 1995); Bawaka Country, Sarah Wright, Sandie Suchet-Pearson, Kate Lloyd, Laklak Burarrwanga, Ritjilli Ganambarr, Merrkiyawuy Ganambarr-Stubbs, Banbapuy Ganambarr, and Djawundil Maymuru, “Working with and Learning from Country: Decentering Human Authority,” *Cultural Geographies* 22, no. 2 (2015): 269–283; Elizabeth Povinelli, *Geontologies: A Requiem for Late Liberalism* (Durham: Duke University Press, 2016).

7 Vanessa Watts, “Indigenous Place-Thought & Agency amongst Humans and Non-humans (First Woman and Sky Woman Go on a European World Tour!),” *Decolonization: Indigeneity, Education & Society* 2, no. 4 (2013): 20–34.

8 We want to make clear that this violence was structural, and as such even those people from Europe who were fleeing poverty, famine, or dispossession (in, for example, the case of the Highland clearances) were also complicit in systems of Indigenous genocide, systems through which people of European descent benefited regardless of their original reasons for migration. This structured violence was systematically enacted through: the instantiation of the Canadian nation-state as an English and French colony; the failure to abide by treaties; the imposition of private property and the reservation system; brutal and violent residential schools; the continued over-placement of Indigenous children into the childcare system; the imposition of patriarchy; the obvious disregard for Indigenous lives as manifested by the continued inaction in regards to Missing and Murdered Indigenous Women; and immigration laws, specifically section 38, which severely restricted access to people from places other than Northern and Western European origins until 1978. Therefore, Canada must be understood as a white supremacist state in the sense that white people are systematically given preferential treatment. On the relation between white supremacy and the Anthropocene, see Nicholas Mirzoeff, “It’s Not the Anthropocene, It’s the White Supremacy Scene, Or, The Geological Color Line,” in *After Extinction*, ed. Richard Grusin (Minneapolis: University of Minnesota Press, 2016).

9 Christina Sharpe, *In the Wake: On Blackness and Being* (Durham: Duke University Press, 2016), 9.

10 For example, as Ta-Nehisi Coates has written “the Dreamers have improved themselves, and the damming of seas for voltage, the extraction of coal, the transmuting of oil into food, have enabled an expansion in plunder with no known precedent.” Ta-Nehisi Coates, *Between the World and Me* (New York: Spiegel & Grau, 2015), 150. This is the amplification and globalization of systems that have long been underway.

11 Sylvia Wynter draws attention to the ways in which the concept of Man, which is the “foundational basis of modernity,” serves to deny humanity to many people while also divorcing humans from the earth. She calls for an unsettling of Man in order to reinscribe a vision of the *human* in line with social and environmental justice. Sylvia Wynter, “Unsettling the Coloniality of Being/Power/Truth/Freedom: Towards the Human, After Man, Its Overrepresentation—An Argument,” *CR: The New Centennial Review* 3, no. 3 (2003): 288.

12 See Sharpe, *In the Wake*, and Kim Tallbear, “Failed Settler Kinship, Truth and Reconciliation, and Science,” 2016. <http://indigenousts.com/failed-settler-kinship-truth-and-reconciliation-and-science/>.

This, Seeded in a Glance

Julie Joosten

You build a room
for me to enter
four walls
of fog

and your thimbleful pulse,
an amorous
sequence. Your blood
streams so gently
it's a moth pollinating night
flowers.

Sinking back, disappearing
like texture's line, like confusion
darting through breakthrough,
my blood trickles, turns tourniquet
in your gaze

heedful
of the filament
of life.

Imagination's energy
caresses your
earlobe (soft skin
between my teeth),
widening fury –
together, we cultivate
doubt as an echo
in an empty field.

Proof your mouth exists: a moth
makes me think of you
while this rabbit-fur night
needles solitude, raises
an unverifiable thought, different
from geometry, archeology,
time –

Power runs in grooves –
We must interfere in the silky
habit
of our dying.

Thus

in the avalanche of shameful livery
assembled from colonial centuries

I undress –

take off my mother's ermine-trimmed
coat, my brother's sugarloaf hat, my
grandmother's pomegranate gown with
the gold-embroidered sleeves, my
father's suspenders and blue jeans, my
ruched veil, high-tops, and striped wool
socks –

in baroque fog

unlace my bodice –

We stand naked before a warship
sprawling on dry ground.

You start to dress (white silk slip, white
cotton shift), telling me about a
distance (of centuries, continents,
blood) that ruffles thought (as if tickling
it). Then pricks and burns it.

I try to think of a way to organize
distance not as time or desire or will,
but as a style of living we might call
elation and damage –

You wear white
honour what distance
dissolves.

The avalanche
exposes the mechanics
of dehumanization –

an ugly word for an
ugly concept.

Ugly has its own
necessity. Like
existence.

Like the cold
when morning disappears
splintering certainty
into acts of being –

As the world arrests the world.
A sentence that means almost nothing.
Almost interests me.
Like how, despite history, we keep
falling in love with the world.

It is the evening.
It is the morning, the noon, a new
evening.
It is the night. It is the night. It is
the night.

I'm listening to Mozart's Requiem
for the repose of the souls
of the dead.
I want at the same time to be listening
to a requiem for the souls of
the living,

a requiem being a kind of prayer
and persuasion being a kind of path.

Being persuaded is about consenting
to believe.

I gather my consent, hold it fast, stare
at a scribbled moon.
We're standing amidst known oceans,
seasons, and miseries –
this fault line is half-memory, half winter
beginning unnoticed.

Memory evokes ruin at different speeds
in different lights, nothingness unspooling
contaminated words – body and soul, clear
canyon, turbulent sovereignty, impregnated
empire, a flight of divinities – then dis-
appearing
just like that, its path an inky coastline
my neurons flex their bodies in –

History, shipwrecked against the matter
of our bodies, our cultures, ship
wrecking them, stays afloat.

We see the silence.

See hooves and puddles and
unavoidable laws dissolving into
mathematical equations, caverns,
a brain,

this night, the continents, atmospheric
pressure, breathing, three-dimensional
images of the dead –

A nest sways in its weather
envelope. The atmosphere, cropped
close, alters –

invisibility is the answer too long
ordering what happens.

Hooves gallop to the rhythm
not of what follows
but of the anterior
of what was foreseen
as following.

A way to give time
to this time
that doesn't exist
but presses up
against my skin

is to write to you –
what I would say to you tonight
our proximity imagines –
one of your ribs, my left hand, breasts, feet –

I have not in the end felt ready.



Kika Thorne
Tree Permit TP-2016-00332,
Applicant: John Ross,
Application Date: Apr 14, 2016,
City of Vancouver.
Legal Description:
026-604-124-12 & 15 EXC.
OLD COURTHOUSE & SITE
INCLUDE VOLUMETRIC
PCLS COLOURED GREEN EX
PLAN 12829 BLK.
Still from mvi_3652.mov
April 19, 2016, 5:20:54 PST (left).
Still from mvi_3689.mov
April 19, 2016, 5:44:07 PST (right).
2018. Digital images,
dimensions variable.
COURTESY CEDRUS ATLANTICA.

Prosthetic Carapace

Amanda Boetzkes

Grafting has emerged as an insistent figural operation at a time when sensory environments are charged with colliding political and ecological forces. Indeed, we can think of such conflicts as incisions into the defense structure of the subject from which new material trajectories grow. New carapaces are being constituted at the site of ecological wounds. The graft is therefore ambivalent—neither a suture nor a bandage, but a layer that integrates itself to form a resilient but receptive shell for a new condition. Artistic grafting implants offshoots that propagate outward growth in unforeseen directions. But it also involves ingrowth, the corporeal acceptance of foreign material. Grafting is thus an aesthetic activity that spans epistemological and ontological concerns.

Consider Pierre Huyghe's *Untilled* installation at Documenta 13 in 2012. Like much of Huyghe's work, *Untilled* staged discrete animal and vegetal *Umwelten*—lifeworlds—that overlapped but nevertheless maintained gaps of indifference toward one another. The outdoor installation was composed of a sculptured nude set amidst groupings of poisonous nightshade plants, fungi that produce LSD, and toxic flowering foxgloves. A greyhound named Human with a dyed pink leg lived on the plot of land, moving freely about the site with no constraints. These disparate components—or as Huyghe describes them, these “alive entities and inanimate things, made and not made, dimensions and duration variable”—were gathered together by a focalizing agent, a graft at the core of the sprawling dimensions: a colony of bees built a massive hive around the head of the sculpture, thus seaming together the numerous divides in the space. In grafting concrete and honeycomb, it joined sites of meaning and meaninglessness; the signifying world of art and the signalitic

world of bees. The graft flattened the expressivity of the work to articulate a paradox: the capacity to communicate across ontological difference is shown as the sculpture's incommunicability. The face of the female figure was remapped as the bees' dominion.

Grafting crosses realities and binds them together by asserting the very material excess of its procedure. It injects exterior matter into interior content and projects interior content outwards. In this way, a graft behaves like a frame or pedestal to the work of art, or what Jacques Derrida calls the *parergon*: a device that indicates the space of art and without which art would not be what it is. In *The Truth in Painting*, Derrida argues that framing and ornamentation are integral components of the meaning of the artwork. The *ergon* (the work of art) is offset by its *parergon*, the limit that separates the work from what lies outside it, thus binding the two together. Derrida shows how Kant established a model of aesthetics based on an elaborate conception of the artwork, using framing devices as prostheses that are necessarily integral to the work's internal subject matter. It is therefore only by virtue of the external *parergon*, the scaffoldings that deliver the work of art as art, that Kant can make aesthetic judgments based on internal criteria. In other words, the world of art is upheld by frames.

The *parergon* is not a literal frame, but rather a procedure of encircling, supporting, and presenting the work of art. Derrida maintains that the relationship between the artwork and its *parergon* may be as close as that between the drapery and inferred body of a classical sculpture. The drapery is material excess, a supplement without which there would be no sense of the body. Yet the drapery is not an interior

or intrinsic component of the complete representation; it belongs to the work in an extrinsic fashion.¹ It adorns and veils the nudity of the body. But precisely as a supplement on the edge of the work, it naturalizes the representation itself.

Grafting similarly undertakes this activity of supplementation. As in the case of a skin graft, a material supplement is applied in order to (re)constitute the whole organ. The graft must be absorbed into a seamless totality in order for the skin to function as the body's primary organic boundary. In grafting, we see the fundamental excess of all concepts and terms: the graft points to ruptures and affordances. Like Derrida's frame, it forms and deforms, and we might also consider how grafting *informs*. The excess of the graft feeds back into the work and even has the potential to recast intention and meaning. Grafting applies a surface that is both sensorial and informational, a bi-directional interface that grows excessively in the fissures of meaning and orientation. Through its interweaving of that excess, it produces new skeins of sense.

Consider Nadia Myre's work *Code-Switching* (2017), comprised of photographic images of clay-pipe fragments woven with Indigenous beadwork. Set against a black background, the objects call to mind traditional ceremonial dress. Yet the work switches the visual code of the object, implanting it with inferences of its colonial history. A Montreal-based artist and member of the Kitigan Zibi Anishinabeg First Nation, Myre began the work as a study of the tobacco trade. She and her son recovered the pipe-fragments from the Thames River, debris from a time when traders would dock in London with ships full of imported tobacco from the “New World,” where goods and resources were



Nadia Myre, *Circle*, 2017. Digital Print. COURTESY THE ARTIST AND ART MÖR.

circulated on trade routes that spanned the Atlantic. Myre's recovery of the clay pipe becomes an act of grafting: she sews the pieces into a fabric that supplements traditional beadwork with the material remains of the tobacco trade. The fragments bind together the total object but nonetheless inform it with a new code: a colonial history and decolonizing intervention. She inflects the visual code of all beadwork, insisting on its historical and material specificity in lieu of timeless mythologies of Indigenous craft. In so doing, her graft-work resists the historical masking of colonial violence and deterritorialization.

But grafting does not merely inflect; it transforms through the movement of informational relay, making incisions into visual contextures and recoding them. The effects of such manoeuvres are more than instructive, however, as recoding changes

both perspective and experience. It brings materiality to the horizon's edge and resonates with what lies beyond the world. The graft therefore resounds between the virtual and the material, generating sensible possibilities at the limits of discursive knowledge. When Australian artist Stelarc grew a full-sized ear from his own tissue and surgically inserted it into his arm, he did so to resituate the body's sensorial orientations and to intervene in the way that others direct their input. *Ear on Arm* is one of several prosthesis projects designed by Stelarc to “augment the body's architecture, engineering extended operational systems of bodies and bits of bodies, spatially separated but electronically connected.”² His work does not intend to reconstitute a body that is missing an existing organ or limb, but rather to explore the possibilities of extending, repurposing, and reconnecting the body to the external

world. Importantly, the ear is rigged with a wireless internet connection and a microphone, so that it will serve as a communicative organ that both receives and outputs information. Stelarc envisions that it could also be a remote sensor, so that someone across the globe could tune into it and listen to what it hears. Furthermore, it would be part of a distributed remote communication system, in which a speaker would be implanted in Stelarc's mouth so that he might talk to someone by speaking into the ear on his arm, and hear the answer from the implant in his head. Stelarc has thus grafted a new sense system into his body in such a way as to problematize corporeal boundaries altogether. His prostheses collapse the naturalized parameters of the body, closing the spatio-temporal gaps that separate individuals by building an exoskeleton by which others are assimilated into its fabric.

Grafting is therefore ambivalent. It anticipates, speculates, and feeds back, but the procedure is not always successful, confronting material recalcitrance and historical reflexes. Grafting takes place against the repetitions of “nature,” colonial oppression, the capitalist psyche, and bodily repression. It is anticipatory yet must also protect against grooved patterns of reification; it attempts to reset the nervous energies bound up in our perceptual reactivity. Grafting is a “perlocutionary gesture,” as Judith Butler defines it—a performative act constituted by the very possibility of failure, by virtue of the existing discourse into which it is performed.³ It runs up against the existing contexture in all its extended material implications. It is not surprising to note that Stelarc’s implants have suffered from necrosis and have had to be removed and re-implanted. Grafts can indeed be rejected and feed their failure back into the host system. Grafting is therefore a risky practice and not merely an exercise of the imagination.

The feedback of the graft, whether utopian extension or dystopian infection (or both at the same time), intercedes in the processes of anthropogenesis by generating communication with the assemblage of forces that make up the earth’s ecology. In this regard, let us consider Mary Mattingly’s *Wearable Homes* series, which imagines portable architecture as superadded layers to the body, designed to respond to global climate change. Through these fabricated carapaces, she grafts bodily reflexes and sensibilities. In turn, climate is incorporated into individual movement, habitation, and response capabilities.

The *Wearable Homes* designs take clothing patterns from a variety of cultural traditions, information technologies, and portable energy systems. Through these components, the architecture of each *Wearable Home* is designed for a subject that will be exposed to volatile climates without an anchored geographic location. In fact, it anticipates the very undoing of cultural identities grounded in environmental consistency. Mattingly’s templates derive from Inuit garments, Indian saris, Buddhist robes, American chains like The Gap and Banana Republic, Japanese kimonos, safari camouflage, and military uniforms. The synthesized textiles protect the body and provide it with a general global form.

Mattingly relates the general globality of the *Wearable Home* to an understanding of the clothing’s sheltering capacity, insofar as she notes that one wearer would be indistinguishable from the other. At the same time that this would provide for privacy and anonymity, however, she notes that “the pervasiveness and scrutiny of high-powered networks would still catalog our movements and whereabouts.”⁴ The home would be outfitted with an information technology mainframe, so the wearer could receive and

transmit signals via GPS, cell phone networks, VA goggles, and the internet. Additionally, the home would be outfitted to inflate in water, with solar panels to provide electricity, warming and cooling fabrics, and batteries recharged through bodily motion by power sensor nodes. Each home would also have thirty pockets to fit the pills necessary for a month of “mood and health monitoring.” In short, the affordance of this intelligent membrane is precisely its plasticity: its endurance through any and all climates—political, environmental, cultural, and subjective.

Wearable Homes is a speculative fiction of the entanglement of the body, climate, and aesthetics, which Mattingly sets in moody dystopian landscapes in her photographic series. The *Wearable Homes* appear in the charged environments for which they were designed. Lone individuals appear against dark, cloudy skies, craggy cliffs, or churning waters. The images thus enact grafting as a response to the systemic interplay between body and climate, with all the political and technological entanglements this implies. It gives articulation to the form and movement of grafting, creating mediatized sense-objects that are at once interfaces with possible worlds and hypothetical objects of those worlds. As grafting envelops and moves between interiorized and exteriorized realities, inverting and extroverting, it weaves a syntagmatic chain that runs through the speculative real and feeds back a retrospective sensibility. Its operation serves as what Félix Guattari calls a *chaoïde*, an intervention to unlock the body from its nervous repetitions and open material possibilities.⁵

1 Jacques Derrida, “The Parergon,” trans. Craig Owens, *October* 9 (Summer 1989): 21.

2 Stelarc, *Ear on Arm: Engineering Internet Organ*, <http://stelarc.org/?catID=20242>.

3 Judith Butler, “Performative Agency,” *Journal of Cultural Economy* 3, no. 2 (2010): 152.

4 Mary Mattingly, *Wearable Homes*, <http://www.marymattingly.com/html/MATTINGLYWearableHomes.html>.

5 Félix Guattari, *Chaosmosis: An Ethico-Aesthetic Paradigm* (Bloomington: Indiana University Press, 1995).

Pollution is Colonialism

EDAction &
Civic Laboratory for
Environmental
Action Research
(CLEAR)

Colonialism in Canada is an ongoing structure whereby settler society and government assert sovereignty over lands already occupied by Indigenous peoples. This includes disrupting and exterminating Indigenous life, values, and self-determination, as well as disruption of established relationships between bodies, lands, waters, airs, plants, animals, and other beings.

Pollution is Colonialism because:

Land is at the centre of colonialism.

Industry and the state disrupt and damage the many relationships that make up the Land when they understand it as a resource. They use the Land to extract value, such as in mining, but use the Land as a place to put pollution—from radioactive waste to urban sewage—as another way to make economic value. Using the Land for the best interests of industry, profit, settlers, or colonial governments is a central part of colonialism.

Pollutants are material forms of harm.

Canada’s extraction economy—from fur to fossil fuels—has been at the forefront of Canadian disruptions to Indigenous Land and self-determination. The pollution from extraction, as well as from refining, manufacturing, and other industries, is often concentrated in Indigenous communities, becoming a form of intergenerational violence.

More than this, persistent pollutants such as PCBs, methylmercury, and radioactive isotopes have no respect for jurisdiction, distributing harm and death to people, fish, animals, plants, water, and other parts of the Land, disrupting relationships between them. Pollution is a significant and ongoing form of colonial violence in Canada, a violence that overflows legal jurisdiction and point sources. As Native Youth Sexual Health Network has shown, “Violence on the Land is Violence on our Bodies.”

The state gives permission to pollute.

It is legal for some pollution to occur under Canadian and U.S. environmental law. Under the permission-to-pollute system in Canada, some effluents can be released to a certain amount, and spills and leaks

are considered acceptable risks even though they happen regularly. Canada’s current toxics governance relies on industries to self-report their emissions and do the research to determine whether their own chemicals are harmful. It is thus difficult to get accurate information from the government about the past and present status of environmental harms.

There is little accountability about the role of pollution in Canadian colonialism; for example, pollution was not discussed in the Truth and Reconciliation process. Until 2016, Canada refused to be a signatory to the United Nations Declaration of the Rights of Indigenous People, nor recognize the right to free, prior and informed consent. This includes consent to be polluted or not. How might a different environmental governance system acknowledge the significant and ongoing role of pollution in Canadian colonialism?

A Call to Action

It took a lot of work to make the state acknowledge the injustices of residential schools, but this is essential to decolonization and Indigenous resurgence and self-determination. Similarly, it will take a lot of work to bring the state, industry, and others into responsibility for the violences of pollution. There are already many groups and nations calling for action and change:

- Native Youth Sexual Health Network & Women’s Earth Alliance, “Violence on the Land, Violence on our Bodies,” 2015, <http://landbodydefense.org/>.
- T̓silhqot’in National Government, “In time of crisis, B.C. makes unbelievable move to approve drilling permits for twice rejected New Prosperity mine,” 2017, <https://dgnnewservice.org/civilization/ecocide/extraction/canada-drilling-permits-issued-tsilhqotin-lands-wildfires-rage/>.
- Mikisew Cree First Nation, “Written Brief of the Mikisew Cree First Nation to the Standing Committee on Environment and Sustainable Development,” 2015, <http://www.ourcommons.ca/Content/Committee/421/ENVI/Brief/BR8622379/br-external/MikisewCreeFirstNation-e.pdf>.
- Gwich’in Council International, Arctic Athabaskan Council, Climate Action Network Canada – Réseau action climat Canada, Ecology North, Pembina Institute, “The Inuvik Declaration on Arctic Climate Change and Global Action,” 2008, <http://bit.ly/2FKuMul>.
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- Xapuri Declaration, “We reject any form of climate colonialism,” 2017, <http://www.ienearth.org/xapuri-declaration-we-reject-any-form-of-climate-colonialism/>.
- Idle No More, *The Manifesto*, <http://www.idlenomore.ca/manifesto>.
- Indigenous Environmental Justice Project, <http://iejproject.info.yorku.ca/>.
- EcoJustice, “Exposing Canada’s Chemical Valley: An Investigation of Cumulative Air Pollution in the Sarnia, Ontario Area,” 2007, <https://www.ecojustice.ca/wp-content/uploads/2015/09/2007-Exposing-Canadas-Chemical-Valley.pdf>.
- Free Grassy Narrows, “River Run 2016: Healthy river, healthy people,” 2016, <http://freegrassy.net/2015/12/22/river-run-2016-healthy-river-healthy-people/>.
- Aamjiwnaang and Sarnia Against Pipelines, “Aamjiwnaang Water Gathering and Toxic Tour,” 2017, <https://aamjiwnaangsolidarity.com/>.
- Stop Alton Gas, <https://stopaltongas.wordpress.com/>.
- Chippewas of the Thames First Nation, “#NoLine9,” <http://www.cottfn.com/pipeline/>.
- Nunatsiavut Government, “#MakeMuskratRight” and “Lake Melville: Avativut, Kanuittailinnivut (Our Environment, Our Health),” <http://makemuskratright.com/>.
- Chippewas of Georgina Island First Nation, “Stand with #GIFNLakeGuardians,” <http://georginaisland.com/protect-the-lake-simcoe-watershed/>.



Elizabeth LaPensée, *With Songs to Pull Oil from Water*, 2017. Digital Illustration. COURTESY THE ARTIST.

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What is The Economy?

D.T. Cochrane

The Economy does not take place.

In 1991, Jean Baudrillard provoked outrage when he proclaimed, “The Gulf War did not take place.”¹ The outrage was based on a willful misunderstanding of what Baudrillard meant. He was not claiming that the violence visited upon Iraq by the U.S. military had not happened. Rather, he argued that the object of “The Gulf War” referred to by military spokespersons, government officials, reporters, and pundits—and known by the publics of Europe and North America—was not synonymous with the actual events in the region. Western powers mediated and systemically distorted information such that what was offered to viewers was not an accurate representation of a war effort. Instead “The Gulf War” constituted a novel entity manufactured out of images of military violence.

The same non-representation applies to The Economy. Political rhetoric, government policy, economic theory, and statistical calculations all transform economic events, rendering The Economy as a new object. To say “The Economy does not take place” is not to deny the existence of buying and selling, jobs and wages, goods and services. Rather, it is to assert that The Economy does not unify or determine all of the entities and processes widely deemed to be economic.

In 1992, while campaigning for U.S. President, Bill Clinton adopted the slogan “It’s The Economy, stupid.” According to the Clinton campaign, The Economy is undeniably people’s primary, if not singular, matter of concern. Clinton’s declaration was the culmination of Margaret Thatcher’s earlier insistence that “there’s no such thing as society.” The two slogans express a substitution that occurred within mainstream political opinion: Society was replaced with The Economy. One of the consequences of this substitution was the closure of public debate on the boundaries and content of human well-being, which was to become increasingly calculative. But this closure constitutes a paradox: while Thatcher rejected outright the existence of an emergent social being that exceeds the individual, in its place Clinton deployed another emergent being, this one the product of individualist economic theory and its calculative practices.

The non-existence of The Economy means it can be neither entirely blamed for nor

exonerated from producing climate change—which is not to say it is not implicated. Indeed, the material circulations that The Economy is intended to describe in their entirety generate waste products that are the engine of global warming and climate change. More importantly, the calculative practices that constrain our attention to economic matters have systematically failed to account for those waste products. This is why we continue to have defenders of economic growth when the pursuit of growth has arguably resulted in the climate crisis.

Timothy Mitchell argues that the idea of The Economy began to emerge “toward the end of the 1930s” with the development of national accounting.² The ascription of timelessness to The Economy derives, in part, from the much older components out of which the idea was assembled. Of principle importance are monetized transactions, dating back millennia and offering the means for calculating national accounts, which economists claim measure The Economy. But, economic processes have always been seen as exceeding monetary exchange. At least since David Hume, money has been considered a distraction; a *nominal* expression of value that obscures the *real* mechanisms of commodity exchange.³ Since then money has predominantly been theorized as a mere intermediary, and the distinction between real and nominal is now a fundamental component of The Economy.⁴

The declarations of politicians and pundits about The Economy continually reconstitute it as an actually existing object, as do the policies justified by national accounting—and gross domestic product (GDP), calculated by aggregating economic transactions, is the key ingredient in that reconstitution. Simply put, when GDP is increasing The Economy is growing.

It is possible to add together the sales of trees with the sales of armoured vehicles with the sales of massages because each is given a monetary value, which exists because each of these things has a price. However, within the calculative-rhetorical framework of The Economy, nominal increases in GDP are not a suitable indicator of growth. Nominal GDP will increase if prices increase, but this does not mean that people are actually better off. To remove inflation, statisticians have derived a measure known as real GDP.

The quarterly proclamations by Statistics Canada about the country’s real GDP are reported by the media as a snapshot of The Economy. A tenth of a percentage point up or down gets leveraged as an indication of sound stewardship or wanton mismanagement by the government. However, the very construction of “real” GDP undermines the implicit notion that it offers an objective measure of an objective entity.

Statistical agencies are large, complex apparatuses devised for data collection, sorting, and adjustment, all of which are needed to construct the measure. While statisticians standardize procedures to instill confidence in their constructions,

the calculation of real GDP has numerous problems that require continual tinkering with to resolve.⁵ For example, to account for changes in quality that get expressed in price changes, statisticians adjust the values used to construct real GDP. One of the consequences of these adjustments is the inability to compare real GDP values over long periods of time.

Debates around carbon pricing are the most visible deployments of The Economy, particularly by those who assert that their rejection of the scheme is a defence of The Economy. Conflicting studies contend that carbon pricing will boost or damage The Economy, provoking qualitative transformations that will have a financial expression. That expression may indicate a fall in economic performance. However, it is fundamentally predicated on calculative practices, determined by what is included and excluded from the calculations.

The misunderstanding of Baudrillard’s provocation is related to the popular misinterpretation of “construction” to mean “not real.” Although The Economy does not take place in the way presented in popular discourse, it is very much real. When we hear that The Economy is doing poorly, expressed in coverage of political declarations about statistical constructions, we factor that into our behaviours. Rather than representing the processes deemed economic, The Economy is grafted back onto them through the impacts it has on government policies, as well as on the plans and habits of businesses and the public. As such, there is no unfettered Economy that simply takes place, separate from either the global ecosystem or government policies.

1 Jean Baudrillard, *The Gulf War Did Not Take Place*, trans. Paul Patton (Bloomington: Indiana University Press, 1991).

2 Timothy Mitchell, *Rule of Experts: Egypt, Techno-politics, Modernity* (Berkeley: University of California Press, 2002), 82.

3 David Hume, “Of Money,” in *Essays, Moral, Political, and Literary*, ed. Eugene F. Miller (Indianapolis: Liberty Fund Inc., 1987 [1752]), <http://www.econlib.org/library/LFBooks/Hume/hmMPL26.html>.

4 Jonathan Nitzan and Shimshon Bichler, “Capital Accumulation: Breaking the Duality of ‘Economics’ and ‘Politics,’” in *Global Political Economy: Contemporary Theories*, ed. Ronen Palan (New York: Routledge, 2000), 67–88.

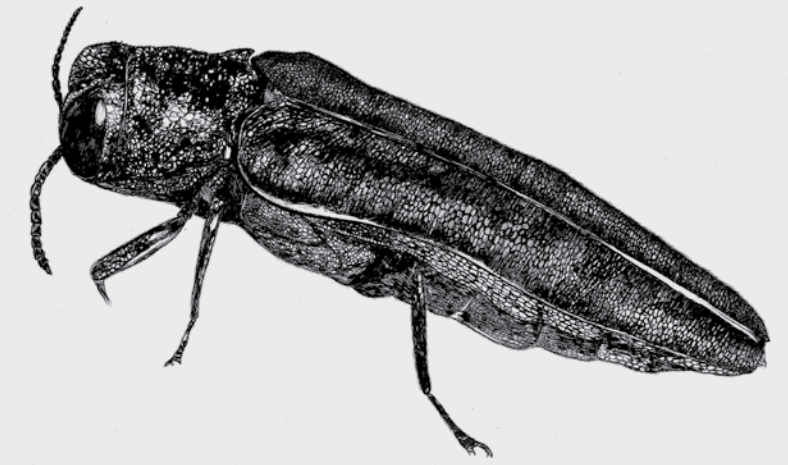
5 Joseph E. Stiglitz, Amartya Sen and Jean-Paul Fitoussi, *Report by the Commission on the Measurement of Economic Performance and Social Progress*, September 2009, <http://ec.europa.eu/eurostat/documents/118025/118123/Fitoussi+Commission+report>.

Part one of a serial column on the fundamental concepts of commerce and exchange as driving forces that propel climate change.

Issue 01: What is the Economy?
Issue 02: What is the Market?
Issue 03: What is Growth?
Issue 04: What is Innovation?
Issue 05: What is a Price?
Issue 06: What is Value?

Serpentine Galleries

Fraser McCallum



Emerald Ash Borer, the iridescent green beetle feeding on the ash trees of Ontario, Quebec, and the eastern United States, carves winding paths beneath the bark of its host tree. These wandering lines (“serpentine galleries,” plant biologists call them) trace the fatal effects of the beetle, whose feeding inhibits the movement of nutrients throughout the tree.

The patterns cut by this invasive species have been used to aesthetic effect in woodworking projects made from reclaimed ash wood. Beginning in 2014, Mississauga’s Partners in Project Green and Sawmill Sid spearheaded a region-wide reuse project for dead ash that has yielded a wide variety of wood products, and similar efforts are underway across the GTA. Such upcycling aims to create positive outcomes from the infestation, and in some cases these projects symbolically retain the traces of the beetles’ movements.

Whereas reclamation projects take advantage of fine woodworking and carpentry, it is believed that a much humbler wood product originally transported the beetle to this continent. A wooden crate carrying Japanese car parts allegedly caused the infestation in the Windsor–Detroit area in the early 1990s.² A passenger on the circuits of global trade, the Emerald Ash Borer owes its fortune to the mobility of commodities.

Mitigating the problem demands the opposite: a regional quarantine to prevent the further spread of the beetle. These regulations are most evident at national and provincial parks, where firewood is under strict scrutiny. Such constraint—where resources are compelled to remain near their place of origin—is rare in a world where plants and soils are transnational travellers among nurseries and plantations. Anthropologist Anna Tsing identifies the latter as a root cause of the devastating environmental effects of modernity. Plantations, she writes, “are machines of replication, ecologies devoted to the production of the same.”³ This phenomenon amplifies the destructive effect of invasive species, which can surge through monocultural plantations unimpeded by natural barriers to their advance.

Plantations and invasive species challenge the conventional understanding of ecosystems as cyclical and harmonic entities.

As social scientist Nigel Clark argues, invasive species reveal the turbulence inherent to ecosystems: transplanted life provokes “disaster,” which “stimulates the pressures of selection, at once testing life’s tolerance and galvanizing its creativity.”⁴ Whereas environmental education often compartmentalizes ecosystems into distinct units (wetlands, forests, plains), movement and migration potentially dissolve and recompose ecosystems. As Clark writes: “If it is in the ‘nature’ of life to stick to its home turf, why exactly are there species from all across the taxonomic spectrum that seem so eager for relocation, and so well-disposed to it?”⁵

A fuller picture of the Emerald Ash Borer infestation requires an understanding of plantations and invasive species in the context of global commerce. The beetle, after all, is relatively benign in its places of origin: Asian ash trees evolved to resist its fatal effects. It is only in a new ecosystem—one intensively mediated by human activity—that the beetle’s devastation is made possible. In Mississauga, these factors converge: ash trees make up an estimated ten percent of the tree canopy, and all are at risk if left unattended.⁶ As early growers in the forest life cycle, ash trees thrive in disturbed ecosystems, and they were historically planted as street trees during the city’s urbanization process.⁷

Rattray Marsh Conservation Area, on the shore of Lake Ontario, forcefully testifies to the devastation wrought by the Emerald Ash Borer. The marsh was used as farmland from the nineteenth century through to the 1950s, and afterwards ash spread widely on the disused fields—thus the end of plantation agriculture laid the groundwork for another fragile ecosystem.⁸ The 95-acre conservation area contained over 2,000 ash trees before hundreds of infested ones were recently removed.⁹ Mitigation and conservation practices at Rattray have necessitated dynamic, laborious, and techno-scientific processes. Tree pruning, removal, and wood-chipping, alongside ongoing treatments with biological insecticides for living trees, attest to the fact that conservation is largely a process of human intervention in human-caused situations.

In the challenges it poses to conservation practices and large-scale agriculture, the Emerald Ash Borer infestation raises important questions for the era of climate

change. Itself a passenger in human affairs, this invader requires us to reckon with our beliefs about the natural environment. Its serpentine galleries map out paths of commerce, globalization, agriculture, and urban development. Tracing these lines, we are forced to ask: What constitutes a stable ecosystem? How can our ideas of conservation and preservation account for invasion, migration, and destruction? And which forms of life are being preserved at the expense of others?

Illustration by Yihan Li.

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2 Oliver Rackham, *The Ash Tree* (Dorset: Little Toller Books, 2014): 132–133.

3 Anna Tsing, “Earth Stalked by Man,” *The Cambridge Journal of Anthropology* 34, no. 1 (Spring 2016): 4.

4 Nigel Clark, “The Demon-Seed: Bioinvasion as the Unsettling of Environmental Cosmopolitanism,” *Theory, Culture & Society* 19, no. 1–2 (Spring 2002): 113.

5 *Ibid.*, 112.

6 “Emerald Ash Borer,” City of Mississauga, <http://www.mississauga.ca/portal/residents/parks-emerald-ash-borer>.

7 Marchant, “City of Mississauga Emerald Ash Borer Management Plan,” 48.

8 Ruth Hussey and Judith M. Goulin, *Rattray Marsh Then and Now* (Mississauga: Rattray Marsh Protection Association, 1990): 80–81.

9 Kevin DeMille, “Emerald Ash Borer Impact to Rattray Marsh Conservation Area,” presentation for Credit Valley Conservation, 2014, <https://cvc.ca/wp-content/uploads/2014/05/Rattray-EAB-Meeting3.pdf>.

Part one of a serial column by a member of The Society for the Diffusion of Useful Knowledge team on the physical and material traces of climate change and environmental violence in the region.

Credit Valley Conservation Authority: Nature/Culture/Nature

Andrea Olive

The Credit River flows from its headwaters outside Orangeville at the Niagara Escarpment into Lake Ontario, and the river's entire watershed drains close to a thousand square kilometres. The area—with the river as a main artery—contains unique landscapes, from farms to moraines, and nourishes a vast array of biodiversity, from individual species like the rainbow trout, to larger ecosystems, like the community of Streetsville in Mississauga. The river and its watershed also sustain a rich history that reaches back thousands of years to the Huron-Wendat and Seneca peoples, and more recently to the Mississauga, an Anishinaabe-speaking peoples who inhabited the region when French fur traders set up a trading post at Port Credit. When Great Britain decided to colonize the area now known as southern Ontario in the late eighteenth century, they purchased land from the Mississauga, including the Credit River watershed region. Today, the watershed remains part of the traditional land of the Mississaugas of the New Credit, a nation that continues to practice stewardship of the waters, and in 2016 filed an Aboriginal Title Claim to the Waters within the Traditional Lands of the Mississaugas of the New Credit.¹

In the 1940s, Ontario was experiencing the impacts of environmental mismanagement by the early (re)settlers who deforested, drained, irrigated, and cleared land. With the Mississaugas of the New Credit formally relocated outside of their traditional territory and provincial and municipal governments looking to establish new modes of stewardship, the Credit Valley Conservation (CVC) Authority was established in 1954 to protect and manage the watershed. Today, Ontario has thirty-six Conservation Authorities across the province (thirty-one in the south and five in the north), which were legally established under the 1946 *Conservation Authorities Act* (CAA). Conservation Authorities (CAs) are semi-autonomous non-profit organizations. They are tied to Ontario's government structure by way of the CAA and a funding scheme that levies about half of their funding from municipalities. CAs are run by a board of directors, and work closely with municipalities, landowners, environmental and other non-government organizations, and the province.

Conservation Authorities, like the CVC, now seek to balance human needs with a flourishing natural environment. All thirty-six CAs share the same four objectives: to safeguard rivers, lakes, and streams; to protect woodlands, wetlands, and natural habitats; to protect life and property from natural hazards like flooding; and to provide opportunities for the public to enjoy nature. They meet these objectives through a variety of land-management tools like erosion control, reforestation, and groundwater monitoring, as well as by creating windbreaks, drainage areas, wildlife habitats, and wetlands. These programs are undertaken in collaboration with different partners, and by self-initiated grants, in addition to municipal levies. CAs vary in size and funding depending on their population base and their ability to secure partnership funding. In 2017, the province updated the CAA to strengthen protection of the watersheds, and to embolden CAs to work on climate change adaptation. These legislative changes also included updates to funding mechanisms by allowing CAs to alter and adapt their own fee system.

Today the Credit River watershed is home to 1,420 plant species, 264 bird species, seventy-nine fish species, fifty-five mammal species, seventeen amphibian species, five turtle species. With about one million human beings living in the area, it is also one of the most densely populated areas of Canada. As a consequence, the CVC is one of the largest CAs in the province in terms of staff and resources. This enables them to run numerous programs, and to conduct research on the local flora and fauna. They also monitor air and water quality at about 175 forest, wetland, and stream sites across their land base.

Beyond land management, the CVC also prioritizes the links between nature and culture. It owns and oversees nine cultural heritage sites and six archaeological sites. For example, hikers can walk through the ruins of Ontario's limestone industry at the Limehouse Conservation Area or walk down an old railway line on the Elora Cataract Trailway. Similarly, visitors to CVC lands can stroll along river trails that were significant trade routes, visit sacred sites of Indigenous peoples, and also visit areas where early European (re)settlement is still visible in the form of old mills and farm

ruins. These areas thus double as nature conservation sites and culture preservation sites, grafting together a unique landscape experience.

Stewarding culture as part of the natural landscape is not an objective laid out in the 1946 CAA. In fact, the legislation does not make a single mention of culture or heritage. The CAs' work in this area is not through any specific legislated mandate, but through their work as protectors and stewards of the land. However, it is not always easy to preserve heritage when it belongs to so many people and its pieces are split among different municipalities: the Credit River Watershed includes nine of them. Importantly, the nine municipalities are all members of the CVC, and councillors from each are appointed to the CVC's Board of Directors. By bringing together all the people and resources of the watershed, the CVC is then able to identify priority areas for protecting the landscape—including its history—although as of yet, the governing structure of the CVC does not include representation of the watershed's Indigenous stewards.

Since 1956, the CVC has been envisioning a trail along the entirety of the Credit River that would bolster local tourism and emphasize the cultural significance of the river. To bring this 113-kilometre trail into existence, the CVC has formally partnered with Credit Valley Heritage Society (CVHS), a non-governmental organization under the *Ontario Historical Act*, whose primary mission is to promote conservation of the natural and cultural heritage of the Credit River watershed. Together the CVC, CVHS, and roughly fifty other collaborators are working to establish a cultural heritage trail. This footpath is significant for the CVC because it aims to fulfill the CAA's mandate of protecting and restoring land by preserving nature *with* culture. Land's memory stretches across time, carrying the past into the present. This is why the mission of the CVC states: "It's our nature to conserve and our future to shape."

¹ Joan Holmes & Associates Inc. for the Mississauga of the New Credit, *Aboriginal Title Claim to the Waters within the Traditional Lands of the Mississaugas of the New Credit*, March 2015, <http://mncfn.ca/wp-content/uploads/2017/02/MNC-Aboriginal-Title-Report.pdf>.

Learning from Natural Assets

The Climate Change Project

The City of Mississauga is currently undertaking The Climate Change Project, developing the first ever comprehensive Climate Change Action Plan (CCAP), which aims to address the realities of climate change in Mississauga. Over recent years there has been a growing recognition of the impact climate change could have on the city. We can now point to first-hand experiences of extreme weather locally—from the ice storm in 2013 to floods in July of the same year and as recently as February 2018. Mississauga, like many other municipalities around the world, has identified the need to take action to reduce greenhouse gas emissions and position the city competitively in the transition to a low-carbon economy while working to increase the city's resilience and capacity to deal with and respond to the physical, social, and ecological effects of a changing climate.

Recognizing that many citizens, organizations, and businesses have major stakes in local climate action, a crucial first step in this process has been to establish a stakeholder panel to serve as a platform to consult with stakeholders in the community. Key partners in this process are Mississauga's Conservation Authorities.

Conservation Authorities are local watershed management agencies that deliver services and programs to protect and manage impacts on water and other natural resources. While independent organizations, Conservation Authorities work in close partnership with all levels of government, landowners, and many other organizations to ensure Ontario's water, land, and natural habitats are conserved, restored, and responsibly managed through watershed-based programming.¹

Flooding is a very real concern in the City of Mississauga. In August 2009, July 2013, summer of 2017, and as recently as February 2018, Mississauga residents experienced flooding events. In light of this, and the expectation that we are likely to see an increase in the intensity and frequency of heavy rain events, flooding is a significant focus within the City and the Climate Change Project in particular. Working collaboratively with Conservation Authorities on this issue is an important part of how we are responding to climate change impacts in the City.

One of the ways the City is working with Conservation Authorities to combat climate change, and flood risk in particular, is to challenge the traditional line between infrastructure and the environment. Adapting to climate change from a flooding perspective is largely about managing increas-

ing volumes of water, and the speed with which those volumes present. Both infrastructure and natural systems have built-in mechanisms to deal with excess water. They both give us a better understanding of how to cope with large, and sometimes sudden, amounts of water. Armed with this knowledge we can then build infrastructure that uses characteristics from nature to inform infrastructure—and vice versa—to lessen the effects of flooding.

The following are two examples that illustrate how the City is working with Conservation Authorities to better integrate and understand the value of natural systems that help mitigate flood risk.

In Ontario, intensification is the primary scheme for development, which consists of building in areas of existing development, as opposed to building where no development exists. This is especially true in Mississauga, which is largely built out. Traditional intensification also results in an increase in hard surfaces, which cannot absorb excess amounts of water. The result is what we call urban runoff; that is, the surface runoff of rainwater. Conservation Authorities have been leading the way on the research, development, and implementation of low-impact development (LID). LID involves a set of site design strategies, infrastructure choices, and distributed small-scale practices that minimize runoff and mimic the way nature deals with stormwater.² This includes permeable paving, green roofs, and rain gardens, which all help to capture, filter, and slow the flow of rainwater instead of runoff quickly overwhelming sewers and other stormwater infrastructure. By mimicking the flood-management services that nature provides within the context an increasingly urbanized community, we can build much more resilient systems that reduce flood risk and provide resiliency during extreme rain events.

Constructing infrastructure is traditionally the first choice of cities and conservation authorities to reduce flooding. Natural areas, also known as natural assets, can often provide the same flood reduction services as infrastructure, which is why we need to find a way to quantify the benefit of these services in order to understand the role they can play in flood-mitigation strategies. A natural asset is defined as the stock of natural resources or ecosystems that are relied upon, managed, or could be managed by a municipality, regional district, or other form of local government for the sustainable provision of one or more municipal services.³ Credit Valley Conservation (CVC) currently has a pilot project

to investigate the value of natural assets by assessing the services they provide. This complex process will assign a monetary value to natural assets, which can then be used by municipalities to assess the potential for using them in place of hard infrastructure to provide the same services.

Through this project, CVC is working with the City to determine the cost of the infrastructure that would be needed to replace the services from existing natural areas and assign a value to those services. By assigning this monetary value to natural assets, municipalities can better manage them, making business cases for their maintenance and future enhancement. It also allows cities to assess other opportunities to use naturalization, rather than build new infrastructure. This would allow natural assets to be considered in conversations and processes that traditionally were exclusively about engineering and infrastructure.

Both low-impact development and the valuation of existing natural areas blur the line between traditional approaches to nature and infrastructure. They consider nature alongside infrastructure and engineering, rather than separate from it. The environment has a built-in capacity to cope with flooding and water, so instead of just relying exclusively on hard infrastructure we need to find ways to integrate infrastructure and the environment. By understanding, mimicking, and valuing these natural assets, we will be in a much better position to create a resilient, low-carbon community.

If you want to learn more about the themes of the Climate Change Project, provide input, or get involved, visit us at theclimatchangeproject.ca.

¹ For more on conservation authorities and the history of Credit Valley Conservation, see Andrea Olive's profile of the CVC in this broadsheet, p. 24. Further discussion of conservation authorities is available via Conservation Ontario "About Conservation Authorities" <http://conservationontario.ca/conservation-authorities/about-conservation-authorities/>

² Credit Valley Conservation, "Low Impact Development," <https://cvc.ca/low-impact-development>.

³ Municipal Natural Assets Initiative, "Making Nature Count: Defining and Scoping Municipal Natural Assets," 15 March 2017, <https://www.assetmanagementbc.ca/wp-content/uploads/definingscopingmunicipalnaturalcapital-final-15mar2017.pdf>.

Part one of a serial column on the work guiding the City of Mississauga's Climate Change Action Plan.

Local Useful Knowledge: Resources, Research, Initiatives

The Port Credit-based **Association for Canadian Educational Resources** (ACER) works with educators to foster environmental observation and literacy among youth. Their recently launched **Citizen Science** program equips participants with the technical tools, scientific expertise, and leadership skills necessary to conduct local studies of environmental change. Founding President Alice Casselman notes that citizen scientists adopt this role through ACER's training, which encourages sustained observation and measurement of local surroundings. For instance, Casselman notes the importance of "ground-truthing," the practice of direct observation that verifies or elaborates on satellite imagery. In this process, citizen scientists can mobilize large volunteer teams—as in the case of annual bird counts—to obtain data that would otherwise be unfeasible for professional scientists to gather. Equipped with measuring tape, binoculars, notepads, and smartphones, citizen scientists document their local environments in ways that are important to professional scientists and policymakers alike. The growth of citizen science comes not only from the necessity to document climate change, but also from a desire for greater embodied connections with natural spaces.

For the **Credit River Anglers Association**, fishing is largely the final outcome of an ambitious program aimed at restoring fish populations in the Credit River. Over nearly three decades of operation, the CRAA has faced the challenges of ecological restoration for a river that has been degraded by human activities for two centuries through pollution, erosion, deforestation, and damming. Conscious that fish are a key indicator of overall ecosystem health, the CRAA's activities are diverse: members plant native species on riverbanks, optimize fish ladders for migration, and operate a fish hatchery that requires daily oversight year-round. In doing so, the CRAA maintains partnerships with municipalities and regional governments, conservation areas, private partners, and the Ministry of Natural Resources and Fisheries. Although the latter oversees fish populations, the CRAA's activities promote fish stewardship practices that go beyond the animals' characterization as a natural resource. Paying close attention to the diversity of ecological stressors, the CRAA intervenes in waterway environments in ways that work to reverse human-caused harms.

The **Household-level Urban Socio-Ecology Laboratory** (HOUSE Lab), directed by Tenley Conway, Associate Professor of Geography at the University of Toronto Mississauga, examines the diversity of human-environmental interactions in cities, suburbs, and exurban sites. Conway's lab has studied a variety of local issues in Mississauga, including the impacts of the 2013 ice storm, residents' attitudes toward municipal tree policies, urban agriculture, and urban forestry. HOUSE Lab uses diverse methodologies, including digital mapping, remote sensing (such as satellite imaging), interviews, surveys, and historical data. This multifaceted approach is crucial to the study of human-environmental interactions, given that residents' positions are informed by diverse motivations—be they economic, emotional, historical, scientific, or spiritual. HOUSE Lab's work observes growing urbanization amid environmental change—two converging issues that are acutely felt with the rise of extreme weather events—as well as increased interest in urban agriculture, and rising challenges to urban forests caused by invasive species and climate change. Conway's lab provides data and studies to inform citizens, scientists, urban planners, and policymakers about issues concerning natural urban environments.

Making Social Knowledge is the collaborative project of Elizabeth F. Hall, Assistant Professor at the University of Toronto's Dalla Lana School of Public Health, and Todd Sanders, Associate Professor of Anthropology at the University of Toronto Mississauga. Its central concern is to explore how natural scientists, social scientists, and humanities scholars produce "useful," impactful," and policy-relevant knowledge about global environmental change, as well as how their knowledge practices relate to others within and beyond the academy. The statement published on their website reads:

"We live in a knowledge society, wherein knowledge of every sort makes the world go round. We produce and manage knowledge. We commodify and sell it. We use it to know and to govern ourselves, others, and the planet. But what is this thing we call 'knowledge'? How is it made? How does it work? What's it worth? When is it new? Or useful for policy? And who says? [...]"

The **Riverwood Conservancy's Enabling Garden** is a teaching garden that cre-

ates inclusive space for people of all ages and abilities. It is animated by planters that accommodate mobility devices, raised beds, and ramps; wide-edged planters that support sitting, resting, and leaning; and sensory gardens with red, white, yellow, and orange plants for people with vision loss. At the core of Riverwood's educational programming is the notion that participation in urban wilderness, horticulture, and conservation is not simply about building skills in environmental sciences, biology, or geology, but also about integrating the natural world into everyday wellbeing. Embracing this commitment, the Enabling Garden roots access and inclusion into the cycles of seeding, planting, and harvesting. Making space for nature beyond the cultivated space of the garden, Enabling Garden programs feature opportunities to engage with birding, tree and plant identification, rocks and fossils from the banks of the Credit River, as well as programs focused on healthy eating and personal renewal, as well as the management of trauma, grief, and anxiety. Throughout these programs, the Enabling Garden encourages participants to respond to the land beyond information gathering and scientific analysis: as a space for re-envisioning embodied and spiritual connections to our surroundings.

With growing concern over Colony Collapse Disorder (the disappearance of large numbers of worker bees from otherwise stable honeybee colonies) since the mid-2000s, many environmentalists, beekeepers, and citizens are turning their attention to urban methods for conserving and sustaining pollinators. At the **University of Toronto Mississauga**, a project to introduce **beehives** to a green roof atop the Instructional Building was launched in 2017, and aims to increase food sustainability on campus and support pollinators and the plant communities that rely on them. The University's Facilities Management and Planning Team identified the rooftop as an under-utilized and ideal apian habitat, and together with Hospitality & Retail Services and beekeeper Don Forster (who works with hives across Southern Ontario), introduced about 5,000 bees to the campus last June. Since then, the population of Buckfast bees has risen to over 15,000. Honey produced by these bees has been made available to the campus community, with the bees' growing numbers facilitating the reproduction and diversity of plants well beyond the bounds of the university.

Biographies

Amanda Boetzkes is Associate Professor of Contemporary Art History and Theory at the University of Guelph. Her first book, *The Ethics of Earth Art* (University of Minnesota Press, 2010) analyzes the ethics and aesthetics of the earth art movement from the 1960s to the present. She is co-editor of *Heidegger and the Work of Art History* (Ashgate, 2014), and her upcoming book *Contemporary Art and the Drive to Waste* (MIT Press, 2019) analyzes how art defines and aestheticizes waste in the age of global capitalism. She is currently working on a project entitled *Ecology: Vision and Art for a World to Come*, which considers modes of visualizing environments and ecological phenomena.

Civic Laboratory for Environmental Action Research (CLEAR) is a feminist, anti-colonial, marine science laboratory. This means our methods foreground values of equity, humility, and justice. We specialize in community-based and citizen science monitoring of plastic pollution, particularly of plastics in food webs.

Heather Davis is an itinerant writer and editor. She has written widely for art and academic publications on questions of contemporary art, politics, and ecology. She is the co-editor of *Art in the Anthropocene: Encounters Among Aesthetics, Politics, Environments and Epistemologies* (Open Humanities Press, 2015) and editor of *Desire Change: Contemporary Feminist Art in Canada* (MAWA and McGill Queen's UP, 2017).

Endocrine Disruptors Action Group (EDAction) is a coalition of academic researchers concerned with the widespread presence of endocrine-disrupting chemicals (EDCs) in our bodies, commodities, built environments, industrial emissions, ecologies, waters, and atmospheres. EDAAction investigates ways to improve Canadian toxics governance and seeks to advance critical discussions about the regulation, science, and monitoring of endocrine-disrupting chemicals guided by the values of reproductive and environmental justice.

Lisa Hall is an Assistant Professor at the Dalla Lana School of Public Health, University of Toronto. Her current research explores the production of scientific knowledges and social imaginaries relating to energy, the environment, and health. Drawing on the anthropology and sociology of knowledge, she engages these issues empirically through a set of related projects on global environmental change and fracking. She previously worked as a public health physician and epidemiologist in London, UK.

Julie Joosten is a poet, essayist, and editor who lives and works in Tkaronto. Her first book of poetry, *Light Light* (Book Thug, 2013), was short-listed for the Gov-

ernor General's Award. Her next book, *For Nor*, is forthcoming from Book Thug in the spring of 2019. It explores perceptual styles, affect, form, and politics.

Elizabeth LaPensée is an award-winning designer, writer, artist, and researcher who creates and studies Indigenous-led media such as games and comics. She is Anishinaabe from Baawaating with relations at Bay Mills Indian Community, Métis named for Elizabeth Morris, and settler-Irish. She is Assistant Professor of Media & Information, and Writing, Rhetoric & American Cultures at Michigan State University. Her ongoing contributions have been recognized with the Serious Games Community Leadership Award (2017). She was a Research Assistant for Aboriginal Territories in Cyberspace and continues to collaborate as a Research Affiliate in the Initiative for Indigenous Futures. She is a 2018 Guggenheim Fellow.

The writing of **The LEAP Manifesto** was initiated in the spring of 2015 at a two-day meeting in Toronto attended by representatives from Canada's Indigenous rights, social and food justice, environmental, faith-based, and labour movements. The *This Changes Everything* team convened the meeting but did not determine any outcomes. The idea was to create a space to not just say "no" to the worst attacks on human rights and environmental standards, but to dream together about the world we actually want and how we could get there. The Manifesto went through several drafts and was shaped by the contributions of dozens of people.

Yihan Li is a multimedia artist originally from Guangdong Province, China. She is interested in presenting one concept in different form of expressions, such as sculpture, drawing, and design. Her recent work is inspired by the global problem of "invasive species." In June 2018, she will obtain her HBA in Art and Art History from both the University of Toronto and Sheridan College. Her drawings and sculptures have been presented in group exhibitions at Sheridan College Gallery and in published artistic catalogues, including *Project* (2015 and 2017) and *BUFF* (2017 and 2018).

Morris Lum is a Trinidadian-born photographer/artist whose work explores the hybrid nature of the Chinese-Canadian community through photography and documentary practices. His work also examines the ways in which Chinese history is represented in the media and archival material. Morris's work has been exhibited and screened across Canada and the United States. He is currently working on a North American-wide project that looks specifically at the transformation of the continent's Chinatowns.

Shannon Mattern is an Associate Professor of Media Studies at The New School. Her writing and teaching focus on archives, libraries, and other media

spaces; media infrastructures; spatial epistemologies; and mediated sensation and exhibition. She is the author of *The New Downtown Library: Designing with Communities*; *Deep Mapping the Media City*; and *Code and Clay, Data and Dirt*, and she contributes a regular long-form column about urban data and mediated infrastructures to *Places Journal*.

Andrea Olive is an Associate Professor of Political Science and Geography at the University of Toronto Mississauga. She is the author of two books, *Land, Stewardship and Legitimacy* and *The Canadian Environment in Political Context*. Her main areas of research are conservation policy, Canada-US environmental policy, and oil politics in the grasslands ecosystem. While not writing or teaching, Olive can be found wandering the trails of the Niagara Escarpment in the Credit Valley and Halton Conservation Authority areas.

A settler living in Tkaronto, **Kika Thorne** oscillates between action and abstraction.

Zoe Todd (Métis/otipemisiw) is from Amiskwaciwâskahikan (Edmonton), Alberta. She writes about fish, art, Métis legal traditions, the Anthropocene, extinction, and decolonization in urban and prairie contexts. She also studies human-animal relations, colonialism, and environmental change in north/western Canada.

Kyle Powys Whyte holds the Timnick Chair in the Humanities at Michigan State University. He is Associate Professor of Philosophy and Community Sustainability there, as well as a faculty member of the Environmental Philosophy & Ethics graduate concentration, the Geocognition Research Lab, and a faculty affiliate of the American Indian & Indigenous Studies and Environmental Science & Policy programs. Whyte is Potawatomi and an enrolled member of the Citizen Potawatomi Nation. His research, teaching, training, and activism address moral and political issues concerning climate policy and Indigenous peoples, as well as the ethics of cooperative relationships between Indigenous peoples and climate science organizations.

Tania Willard, Secwepemc Nation, has been a curator-in-residence with grunt gallery and Kamloops Art Gallery. Willard's curatorial work includes the national touring exhibition *Beat Nation: Art, Hip Hop and Aboriginal Culture* co-curated with Kathleen Ritter, and, more recently, *Unceded Territories: Lawrence Paul Yuxweluptun, Nanitch: Historical BC photography, BUSH gallery, and LandMarks 2017/Repères 2017*.

GLOSSARY

An entangled lexicon for a rapidly changing world

1. **Accounting:** The process of measuring an economic entity. Often used in a financial sense (see Cochrane, p. 22), accounting can also refer to systems of value, including “natural asset valuation” (see Climate Change Project, p. 25), or other methods of calculating and assessing the quantity, worth, or substance of something (see LEAP, p. 10; Local Useful Knowledge, p. 26). Accounting assumes stable and agreed-upon understandings of something’s value, but can also refer to a testimony, an account of the facts, a narration. Who is counting? Who determines an asset’s value and usefulness? Whose account of the facts counts?

2. **Adaptation:** In environmental policy, is a strategic process of adjusting to climate change and managing risks associated with known consequences. Adaptation is often discussed in tandem with **Mitigation**, which aims to tackle the root causes of climate change (see Climate Change Project, p. 25; Local Useful Knowledge, p. 26). In biology, adaptation refers to features that evolve in a population because they offer some advantage. In each sense, adaptation refers to the capacity for change—in a cultural context, it may also align with notions of resilience, or track necessary, long-endured, and under-recognized shifts (see Whyte, p. 8). Adaptation and mitigation are important corrective measures, but they cannot function without a collective reckoning with the systemic and historical foundations of environmental violence.

3. **Anthropocene:** From the Greek *anthropos* for “human” and *cene* for “new,” this proposed term describes the current epoch of major human impact on Earth. This neologism is hotly contested—both by those who contend that we remain in the Holocene (as our official current geological epoch is termed), and by those who suggest that the term “Anthropocene” does not do enough to describe how human impact on the earth has been unevenly influenced by the distribution of power, capital, and time across the globe. Alternative suggestions include **Capitalocene** (in order to reflect capitalism’s responsibility for environmental devastation), **Chthulucene** (a future epoch where human and animal kinships are renewed in response to climate change), and the **Plantationocene** (see Plantation in this glossary). See Davis & Todd (p. 13), and Hall (p. 3), who put the Anthropocene in temporal and decolonial contexts.

4. **Brownfield:** In urban planning, a site that has been previously developed but is not currently in use. Often used in reference to sites that have been contaminated, brownfield land contrasts with **greenfield** land, which has intentionally been left undeveloped (see Mattern, p.5).

5. **Carapace:** An outer shell (see Boetzkes, p. 18)—either metaphorically (e.g. a psychological defense mechanism), or literally (e.g. the shell of a turtle, or the dorsal section of a crustacean’s exoskeleton).

6. **Catastrophe:** A disastrous and often sudden event. How sudden? Many disaster researchers argue that **ecological catastrophe** is significantly different from **natural disaster**, because human-caused environmental degradation slowly lays the groundwork for collapse. See Whyte’s *Climate Change: An Unprecedentedly Old Catastrophe* (p. 8) and the LEAP Manifesto (p. 10), or consider the invasion of the Emerald Ash Borer (McCallum, p. 23), and the 2013 Mississauga ice storm (Climate Change Project, pg. 25).

7. **Chaoide:** A philosophical concept coined by Gilles Deleuze and Félix Guattari to describe a linguistic or artistic form (including poetry, science, or performance) that is capable of moving us from chaos to comprehensibility (see Boetzkes, p. 18). The concept of chaoide may be effective in describing how attempts to grasp and discern the scale of environmental crisis may emerge from a sense of overwhelm—and move towards an understanding of ecological complexity, human entanglement, and opportunities for action.

8. **Effluent:** Water pollution; often wastewater, sewage, or gas released into a natural body of water. The term comes from the Latin *effluere*, “to flow out,” and refers to any flowing offshoot of a river or lake—now much more sinister (see EDAction & CLEAR, p. 20).

9. **Era:** In geology, a subdivision of geologic time (for example, the Phanerozoic eon contains the Paleozoic, Mesozoic, and Cenozoic eras). Historians use the concept of an “era” to organize time around a specific event or ruling regime (e.g. “The Roman era”), often privileging, naming, and structuring knowledge around power and control. See Davis & Todd (p. 12), Hall (p. 3), Joosten (p. 14), and Whyte (p. 8) on seeing time across human and geological scales.

10. **Extraction** may refer to the physical process of extracting resources, but also, as Davis & Todd describe, to “logics of extraction (of bodies, land, minerals, fossil fuels)” (p. 12) that see everything as a resource available for capture (see also EDAction & CLEAR, p. 20; and LEAP, p. 10).

11. **Fault line:** In geology, a visible fracture in the ground caused by the shifting of the earth’s tectonic plates. In general usage, a place of friction and potential failure, often when opposing forces are brought into tension—this can be physical, but may also refer to fissures in systems of knowledge (see Joosten, p. 14).

12. **GPS, or Global Positioning System,** is navigation technology that comprises satellites, ground stations, and receivers. Originally a military technology, GPS’s popularization in the 2000s has had significant impacts—in terms of convenience, efficiency, infrastructure, and surveillance (see Boetzkes, p. 18).

13. **Infrastructure** refers to the basic physical structures of a society (see Lum, p. 6 for a portrait of Cookville’s infrastructural relationship with the floodplain), but can also describe digital frameworks and data circulation (see Mattern, p. 5). Infrastruc-

ture is closely related to land development, which can include redevelopment (see Kika Thorne’s artist project, p. 16, which pictures the meeting of landscaping, gallery, and courthouse at the site of the Vancouver Art Gallery), and asset valuation (see the Climate Change Project, p. 25).

14. **Methylmercury:** A toxic form of mercury often formed in aquatic systems through the action of bacteria in sediment, and historically produced through various industrial processes. Predatory fish in methylmercury-polluted waters accumulate higher rates of the toxicant through their diets, making fish-eating species (including humans) vulnerable to methylmercury poisoning (see EDAction & CLEAR, p. 20).

15. **Noösphere:** The concept of a “sphere” in earth sciences describes the systems that compose the earth: the **lithosphere** (or geosphere, containing all the earth’s surface’s rocks), the **hydrosphere** (its waters), the **atmosphere** (its gases), and the **biosphere** (its living organisms). Encompassing and moving beyond these, the philosophical concept of noösphere describes the sphere of thought and knowledge—and its capacity to alter and transform the other four spheres (see Davis & Todd, p. 12).

16. **Plantations:** Large-scale farms, particularly for monocultural cash crops, but sometimes including tree farms and reforestation efforts (see McCallum, p. 23). In proposing the “**Plantationocene**” as an alternative term to the “**Anthropocene**,” scholars implicate corporate capitalism and slave labour in environmental depletion and devastation.

17. **Reforestation:** The process of replanting an area with trees—in contrast with **Deforestation**, the mass removal of trees (for human purposes such as agriculture, urban development, and logging, or by natural means including forest fires). Deforestation without reforestation can have drastic effects, including disease outbreak, habitat loss, changes to climate conditions, and the displacement of plant and animal species (see Olive, p. 24; Thorne, p. 16; and McCallum, p. 23).

18. **Self-determination** describes a nation or people’s right to **self-governance** (see Davis & Todd, p. 12) and autonomy. For Indigenous peoples in Canada, this refers to the recognition of a people’s power to make decisions about land, resources, and social programs, as well as the right to negotiate “nation-to-nation” with the Federal government (see EDAction & CLEAR, p. 20; LEAP, p. 10; and Andrea Olive’s discussion of the Mississaugas of the New Credit First Nation’s Water Claim, p. 24).

19. **Settler-colonialism** is a form of **colonialism**. While “colonialism” generally refers to the creation or maintenance of colonies in other lands, often by exploitation of their peoples and lands, “settler-colonialism” describes settlers supplanting Indigenous peoples, with colonizers cultivating settler identity and sovereignty in order to support their continued occupation of land (see Davis & Todd, p. 12; Joosten, p. 14; Olive, p. 24; EDAction & CLEAR, p. 20; and Boetzkes, p. 18).