

FEBRUARY 2014

SITELINES

Landscape Architecture in British Columbia



FRONTIERS

On the Edge of Inspiration | Frontiers in Geology, Economics, and Human Spirit – Christchurch Rebuilds | “What if we were to ...?” Landscape Architecture and Holistic Design | Resilience Theory: On the Frontier of Sustainable Landscape Design? | We are Nothing if not Adaptable



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Frontiers

By Andrew Robertson, MBCSLA

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The purpose of Sitelines is to provide an open forum for the exchange of ideas and information pertaining to the profession of landscape architecture. Individual opinions expressed are those of the writers and not necessarily of those of the BCSLA.

The theme for this issue of Sitelines is “Frontiers.” The term “frontier” can mean (1) The limits of knowledge in a particular field; (2) The border between two disciplines; and (3) A distant area, an edge of settlement.

Frontiers are formed by mental lines; they exist nowhere on the ground. They belong to the realms of the unknown, the unimagined, and the impossible. Yet, in an age of global travel, global knowledge, and endless invention, do frontiers still exist? What was once remote and unknown has become immediate and revealed. Do we now live in a world without frontiers? Have we pushed them so far that they now no longer exist?

“Everything has been thought of before — what remains is restatement.” This claim suggests there is nothing new to discover, that no frontiers now exist. However, whenever I hear someone say this, I am always reminded of the last time I was amazed by some novel design, the last time I wondered, “why didn’t I think of that first.” When I started out in this profession more than 12 years ago, I realized I knew little about landscape architecture. Now

it seems I know even less. This is more a statement about the ever increasing vastness of our profession than the failure of my memory.

Sometimes we may think we are masters of our craft. The ongoing realization that we actually know so little is both enlightening and humbling.

Knowledge is infinite as is our capacity to invent. As knowledge and invention advance so does what we define as their frontier. We possess an endless curiosity and so we keep moving, ever outward into the unknown. Sometimes we think we have reached the limit but then some creative outlaw defies convention and leads us beyond. We keep reaching frontiers and finding new ones, in our world, in our profession, and in ourselves. This is as true today as it has ever been. [SL](#)

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Cover Image: Lori Kieser, *Glacial Fragments at Jökulsárlón*, Iceland, 2013, Digital Photograph. Image courtesy of Lori Kieser.

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On the Edge of INSPIRATION

By Lori Kieser, MBCSLA

When I hear the term “Renaissance man”, the immediate image that comes to mind is that of Leonardo da Vinci. He was a man far ahead of his time with an incredibly diverse and profound depth of knowledge, a man who found innovation in places where no one had thought to look before.

I believe that many landscape architects are Renaissance men and women in their own right. With the knowledge of multiple disciplines, they combine theory, technical expertise, and spatial understanding to create places of previously unimagined poetry and utility.

Translating my ideas into practice has been one of the greatest challenges I face as an early career landscape architect. However, overcoming a design challenge through sudden insight is one of the greatest rewards of the journey. How can I achieve this phenomena more often and more profoundly?

Recently, I had the opportunity of a lifetime to attend an artist residency in Ólafsfjörður, Iceland. For the month of November 2013, I experienced the vast natural and cultural landscape of Iceland while creating art alongside other international artists. My work focuses on sustainability, biotechnology, and the dichotomy of the built and natural world. It is no surprise that Iceland is a phenomenal hotbed of creative inspiration.

What came as a surprise to me, prior to my trip, was how many people asked me if I was leaving my career as a landscape architect to become an artist. Never in my life had I considered art and landscape architecture as mutually exclusive. In fact, I would not give up one for the other. As a result of this simple question, I began to wonder why for me, art is an important part of being a landscape architect and

why being a landscape architect is an important part of being an artist.

As landscape architects, we have the technical skills, theoretical understanding, and political influence to create physical spaces that positively impact people’s lives. Our projects become part of the everyday by shaping the world we live in. People carry out their daily lives without thinking twice about the way the invisible hand of the designer encourages them to move, act, and react within their environments. We are designers of the subtle — the gentle and sometimes not-so-gentle — encouragement for people to move through and interact with a space in a particular way. As landscape architects, we have the opportunity to shape people’s actions.

In contrast, artists are perceptual creators rather than spatial architects. We think conceptually, unconventionally, and, at times, impulsively. We create physical forms that embody thought, spirit, and ►



The Delicate Mirage, 2013, digital study for future art work.

All images courtesy of Lori Kieser.

emotion. Our work has the potential to interrupt daily life and compel people to reconsider the places they occupy and their lives within them. As artists, we are messengers, interpreters, and instigators. We have the opportunity to shape people's perspectives.

As a landscape architect/artist, I feel that I have limitless opportunities to explore the world and motivate positive change in the lives of individuals and communities. Landscape architecture gives me spatial understanding and technical expertise; art allows my imagination to range far beyond apparent project constraints. Rather than immediately eliminating ideas because they are "unrealistic," I am able to test the boundaries of the profession and current social perspectives. While client expectations, real-world challenges, and budget constraints eventually weed out impractical ideas, it is impossible to innovate unless we challenge our assumptions and push out into the unknown.

Though art is a major motivator, it is not my only source of inspiration. Whether it is an interest in science, writing, sports, or music,



Lori Kieser, *Glacial Fragments at Jökulsárlón, Iceland*, 2013, Digital Photograph.

inspiration can come from anywhere. Finding the common threads and previously unimagined links between different professions, pursuits, and activities may be the key to tapping into new realms of knowledge, skill, and insight.

In retrospect, perhaps the real reason

da Vinci was a Renaissance man was because he was able to harness his multiple passions into an integrated pursuit of innovation. By bridging the gaps between seemingly disparate interests, we may surprise ourselves with a solution previously unseen but already in hand. *sl*



Lori Kieser, *Shadowing the Surfaced*, 2013, digital study for future art work.



Lori Kieser, *Raised but Unrisen*, 2013, digital study for future art work.

FRONTIERS IN

Geology, Economics, and Human Spirit — Christchurch Rebuilds

By Douglas Backhouse, MBCSLA, FCSLA

On September 4, 2010, a 7.0 magnitude earthquake struck Christchurch, New Zealand. This was followed by a prolonged series of tremors with the largest aftershock (magnitude 6.3) occurring on February 22, 2011.

Buildings and roads across the Christchurch region, which had been weakened by the September event and its aftershocks, were severely damaged or destroyed in the February event. Christchurch's city centre was hit particularly hard and was evacuated. Hundreds of buildings in the central business district (CBD) and some 10,000 dwellings were deemed to be unsalvageable and are scheduled for demolition. In the central city, 100% of horizontal infrastructure will need to be replaced, including stormwater, drinking water, and sanitary sewer lines.

Liquefaction is a sinister relative of seismic activity. Whole Christchurch neighbourhoods now sit from 300 to 1300mm lower than they did before the earthquakes. The quakes have made some areas of the city so unstable that they might have to be abandoned altogether.

Today, Christchurch is in the midst of a rebuilding effort that is currently estimated to cost NZD\$40 billion (CDN\$36.5 billion). This is a big sum for a country with a ▶



There were approximately 800 commercial buildings in the Christchurch CBD before the earthquakes in 2010 and 2011. More than two years after the February 2011 earthquake, work continues to fully deconstruct three quarters of this infrastructure. Looking through the chain link cordon has been a popular Sunday afternoon activity for locals and visitors alike. All images courtesy of Douglas Backhouse.



population of 4.5 million people — equal to 20% of the country’s GDP.

In the immediate aftermath of the earthquakes, Christchurch became a magnet for city-builders and visionaries attracting many of this world’s greatest and most thoughtful designers. However, much of this design effort was led by talented local landscape architects. Their inputs are vividly apparent in the form and character of the solutions. Take, for example, the focus on the Avon River/*Te Papa Ōtākaro* as a natural corridor, and the bold introduction of new open space to be known as the East and South Frame which give further definition to the city’s core.

The future of the city is also being shaped by broad public input. A “Share an Idea” campaign generated 194,000 individual responses, all carefully and thoughtfully collated into the Blueprint Plan for Christchurch’s recovery and rebuild. Politicians frequently refer to this successful engagement as an indication of attention paid to local voices.

Surprisingly and perhaps most interestingly, has been the collective business and commercial response to the decimated central core. In the immediate post-earthquake scramble, businesses scattered to

the low rise fringes of the city to re-establish themselves. Shops and services sought to be back in business as quickly as possible. The move to quickly regain a business footing was strongly supported by a government that was, through a wage subsidy program, picking up much of the short term payroll for a city of 450,000 people. Over a surprisingly short period of time, these moves out of the downtown have been cemented as the commercial real estate market responds with the rapid construction of efficient (tilt-up concrete) commercial space.

But Christchurch, it turns out, is constrained by the same political and economic forces that bedevil many modern cities. Its rebuilding has taken on a life of its own with a much different flavour than has been described above. The carefully constructed Blueprint Plan met its first challenge in the politics of a national government responsible for funding substantial portions of its implementation. They were skeptical, for example, of the viability of rail as a meaningful component of integrated transportation infrastructure and all references to rail-based transportation solutions have been deleted.

Similarly, in well-meaning efforts to respond to the need to provide immediate housing, steps have been taken to fast track

The Re:START Mall is a centre business success story. Located across the street from the iconic retail department store Ballantynes, the Re:START Mall is an initial glimpse at what Christchurch can expect in the coming years. Ongoing commercial successes will be challenging and the return to vitality for central Christchurch remains far from certain.

significant greenfield sites for residential development on the urban fringes. Much might be written as to whether this is good planning or good politics, or even whether these are the same thing, but it will be difficult to dispute that such decisions will have both short and long drag on the redevelopment of a vibrant central precinct. In addition, the city centre is still looking to reconfirm its former identity as it faces a dual threat from uncertain community expectations and strong competitive pressures from newly established suburban commercial precincts.

At the ground level, Christchurch is a land of orange traffic cones. There are between 130 and 150 active construction sites accounting for NZD\$50 million (CAD\$46 million) per month in spending. Current estimates are that NZD\$3.5 billion



(CAD\$3.2 billion) will be spent on utility pipes alone in the next three years. Heroic efforts to rebuild a city have spawned other problems. Infrastructure replacements are substantially funded through insurance. When the liabilities run into the billions of dollars, the decision-making of insurance providers based in Bermuda or Grand Cayman play an outsized role. There is enormous pressure to quantify the insurer's post-earthquake liabilities and to deliver a "like for like" solution. Local decision making is taxed to the breaking point to meet basic health and safety needs on the one hand, and to provide prompt and immediate resolution for liability planning on the other. While it may be unfair to criticize the efforts of an overwhelmed city council and staff, it is clear that many opportunities are missed in the rush to respond to metrics of linear metres of pipe installed or square metres of new pavement. There is simply no time to contemplate the sweeping opportunity to create a profoundly resilient community. Low impact design strategies which might include rain gardens, soil cells, and infiltration galleries struggle to find resonance in an engineering world already beyond its capacity to provide the most basic solutions. Broader initiatives which may provide watershed based stormwater solutions are defunded in favour of the short term need to "just get it built".

Reflecting on these challenges and initiatives, the future form of the city remains quite unclear. Iconic initiatives to develop a unique commercial precinct, built entirely out of refurbished shipping

containers show what can be done by a dedicated group of downtown merchants. More recently, international design competitions have moved to the forefront in providing direction on the location, size, and role of residential areas. But these efforts are unfolding tentatively, and the drumbeat of life and business rolls on. Without tangible results, people begin to make other plans.

Kiwis are a resilient bunch. Armed with quick wit and a keen sense of purpose, they have shown that they can band together in adversity and achieve great things. This is a country of great natural resources and relentless beauty. In spite of the significant setbacks created by almost continuous seismic activity over the past three years, the Kiwis provide much leadership as to how community resilience is shaped and what it can achieve.

British Columbia, of course, has a similar seismic context as Christchurch. BC residents would do well to pay close attention to Christchurch's hard won lessons. Perhaps we should all consider how we might respond if/when we find ourselves thrust from the comfortable middle ground we often find ourselves into the frontiers in geology, economics, and the human spirit. *SL*

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“What if we were to ...?”

Landscape Architecture and Holistic Design

In terms of site design, the terrain of landscape architecture is often seen to exist between the edge of a proposed building and the site’s property lines. It is found primarily on the surface of this space — or close to it.

By Andrew Robertson, MBCSLA

Buildings are considered the domain of architects, with subsurface sitework the realm of engineers (civil, structural, and geotechnical). However, the greats of our profession, Garrett Eckbo, Dan Kiley, Roberto Burle Marx and, closer to home, Cornelia Oberlander, LMBCSLA, FCSLA, FASLA, OC, rarely seem to operate within these definitions and spatial confines. Their work is often part of a poetic interplay of built form and nature that encompasses the entire project.

How can we as design professionals achieve such sublime invention? One way to increase its likelihood is to engage in what these masters do: holistic design, at the earliest stages of the project, and involving the whole design team.

Holistic design means considering a project in its totality rather than an accumulation of separate components (landscape, building, systems, and use). The goal of holistic design is both the expression of a “Big Idea” and the harmonious interplay of project components in terms of form and function. Collaborative design gives voice to a range of perspectives (thereby increasing the chances of innovative design solutions), creates a unified design vision, and ensures the whole team adopts it as their own.

Holistic and collaborative design primarily occur in the conceptual stage of a project. As the project advances towards construction documentation, scope becomes more delineated among disciplines for reasons of professional expertise and the law. However, if a holistic design vision is clearly articulated and supported, it should find expression in project construction (and ideally in how the project is maintained thereafter).

Landscape architects should be the champions of holistic design

The benefits of holistic design are not merely aesthetic, but also extend to project cost savings, constructability, and performance. In an ever increasing competitive market, with clients demanding more for less, and rising environmental construction standards, these are not small considerations.

Landscape architects are inherently suited

to engage in holistic design. While architects tend to be object focused and engineers concentrate on technical issues, landscape architects are contextual thinkers. Our work interfaces with almost all other project disciplines, the project building and the neighbouring context, be it built or not. Landscape architects should be the champions of holistic design; the multi-disciplinary nature of our work means we will be one of its chief beneficiaries.

There are, however, some significant obstacles to achieving holistic design. These include:

Scope Territoriality – Some consultants regard their traditionally defined project scope as their domain and see any attempt to influence “their” design as an unwelcome intrusion. As we have all likely encountered, some design professionals come with oversized egos and bristly natures when their expertise, influence, or standing is “threatened.” Indeed, sometimes we may ourselves be equally defensive.

Scope Fragmentation – As projects become more complex, design teams enlarge and an increasing array of site design specialists (environmental, playground, industrial design, fountain mechanical,

and signage consultants to name but a few) become involved. As a result, the voice of each team member may diminish, reducing the likelihood of overarching design. Scope fragmentation may also result in an increasing narrow project vision as each member focusses on the specifics of their discipline rather than the project as a whole.

Fortunately, a variety of tools can be employed by landscape architects and other design professionals to overcome obstacles of holistic design. These include:

Design Language – If you can speak the language of other design disciplines, various team members may be more receptive to ideas that involve “their” terrain. Architects can speak in unintelligible jargon (e.g. “A discourse on emerging tectonic visualization”). Rather than attempting these lofty linguistic heights, it may be better to familiarize yourself with building components and systems as well as broader design terms such as mass, void, proportion, interface, connectivity, and dissonance. In contrast, engineers seem to thrive in the realm of technical information. Understanding how engineered elements work and the beauty of functionality may be the key to winning their confidence. In short, speaking a common language of form and function allows for the freest exchange of ideas in a design team.

The Art of Persuasion – When dealing with oversized egos, exercising emotional intelligence can be effective. I once witnessed a master of persuasion, a fellow landscape architect, employing his craft: “I wonder what would happen if the building was mirrored so the main entrance is to the west rather than the east? That would open up the views and eliminate the need for a retaining wall. Just a thought.” The lead architect, notoriously self-important, merely grunted and we went on to other

matters. A week later I noticed that the building had indeed been mirrored in the latest drawings. At the design panel, the architect was commended on the thoughtful positioning of the structure. He took full credit while my compatriot just smiled. Sometimes, persuading other design professionals to adopt an idea means alluding to a solution rather than outright stating it. This allows others the satisfaction of “solving” a problem themselves (and getting the credit for doing so).

Established Reputation – Obviously, those with a reputation for design excellence tend to be listened to and respected more by allied professionals. This is particularly true if you are known not just in your specific professional field but by the design community as a whole. Your past successes generate comfort among other design team members. The assumption is that the innovative design that you achieved before can be attained on this project as well, to the benefit of the whole team.

Bravado – Every great design project requires a visionary and any vision requires an element of fearlessness. What hasn’t been tried before means a leap into the unknown (and the risk of possible failure). What’s best for the project? What can possibly be achieved here? Holistic design is the time to ask and answer bold questions before technical considerations and compartmentalized thinking occurs. Having a “what if” attitude keeps a project’s full potential alive.

As noted, the benefits of holistic design are significant while various approaches and attitudes can be employed to increase the likelihood of it occurring. Nevertheless, holistic design in its most profound and realized form seems to occur very rarely. Scope territoriality, professional egos, the rush to detail in the face of limited consultant fees, and lack of communication bedevil many a project. Nevertheless, we as landscape architects and advocates of contextual thinking should push for holistic

The benefits of holistic design are not merely aesthetic, but also extend to project cost savings, constructability, and performance.

Relationship Building – Strong professional relationships are formed over time, forged by working on multiple projects. Developing a rapport and demonstrating competence and mettle builds trust, facilitates open dialogue and promotes collective risk-taking. In such an environment, holistic design is far more likely to occur.

design. While sublime invention may elude us, each of us can reach beyond our conventional design terrain, and see our projects reach the fullest potential circumstances allow. 51

RESILIENCE THEORY:

On the Frontier of Sustainable Landscape Design?

By Kevin Connery, MBCSLA



Hunter's Point South Waterfront Park – perspective rendering. Image courtesy of Thomas Balsley Associates and WEISS/MANFREDI. Additional information about this project is available at www.tbany.com.

Hunter's Point South Waterfront Park in Queens, New York, is at the forefront of sustainable landscape design. Built in 2013, this park was designed by Thomas Balsley Associates and WEISS/MANFREDI, with prime consultant and infrastructure designer, ARUP. It is a waterfront park designed to contend with rising sea levels.

As such, it embodies an increasingly necessary quality in a time of rapid climate change: embedded ecological resiliency.

For Meriwether Lewis and William Clark, it was the American West. For Captain James Tiberius Kirk it was space. For Thomas Balsley Associates and WEISS/MANFREDI, the “frontier” was a waterfront park in Queens, New York. While the quest was less about the discovery of new worlds, it was nevertheless a journey into somewhat uncharted territory in the design of a



Hunter's Point South Waterfront Park – waterfront rendering. Image courtesy of Thomas Balsley Associates and WEISS/MANFREDI.

waterfront park: embedding resiliency into the form and function of a new park that could be impacted by climate change and rising sea levels.

The antecedents of resiliency, and more generally ecological design, have been around for decades, albeit in the shadows of mainstream planning and development. In his 1949 seminal publication *A Sand County Almanac*, Aldo Leopold wrote, “a thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise.” Underpinning Ian Mcharg’s *Design With Nature* (1969) and John Lyle’s *Regenerative Design for Sustainable Development* (1994) are principles of ecological function. In 1998, *Landscape Journal* published a special issue dedicated to Eco-Revelatory Design: Nature Constructed/Nature Revealed that explored design approaches that could make ecological systems more transparent and, in theory, better understood by urban dwellers increasingly insulated from ecosystem function.

In Hunter’s Point South Waterfront Park, a design was advanced that could handle being

temporarily inundated by tidal surges and floodwaters. Open fields were placed in low-lying areas with efficient drainage systems to absorb and quickly convey saline water to ensure no lasting effects on soil pH. Furthermore, as the project’s limited budget did not allow for automatic irrigation, native plant communities were employed that could thrive under a range of water regimes while enhancing the park’s ecological function and help to define the site’s identity.

Hunter’s Point South Waterfront Park includes features and systems that engender a landscape capable of responding to changing environmental conditions. It is one of an increasingly diverse range of projects around the world that have, during the last decade, incorporated systems thinking and to some degree, resilience theory as fundamental programmatic objectives. In the process, such exemplars help to clarify what constitutes meaningful sustainable design, a term that has become increasingly amorphous.

Notions of resilient landscapes have been emerging for several years. In 2004, Joan Woodward,¹ FASLA, reported on the “feral

landscapes” in Los Angeles where previously cultivated landscapes were no longer maintained or irrigated. The consequence was a gradual re-colonization of these landscapes with the largely global plant palette being displaced with predominantly native mix better suited to the local environmental conditions.

Recent ASLA Annual Meetings have included presentations exploring “resilient” landscapes and associated themes of biological diversity, ecological function, and ecosystem services. Indeed the theme of the 2009 Annual Meeting, “Beyond Sustainability: Regenerating Places and People”, challenged the profession to transcend the limitations of many prevailing ideas of sustainable design and explore new approaches. Jack Ahern, FASLA, argued resilience theory and the new “non-equilibrium paradigm” in which landscapes are now understood to be constantly changing, where disturbances, chaos, and unpredictability are normal, presents opportunities to further define sustainable design.²

“Sustainability seeks to meet human needs, now and for future generations, by resisting ▶

change, yet change is fundamental to any system — therefore sustainability needs to accept, understand and manage change — including unexpected, unprecedented change. Resilience theory holds the potential to respond to or reconcile the paradox of sustainability.”³

Change and adaptability are the hallmarks of resilience thinking. The noted ecologist, C.S. Holling, described resilience as, “a measure of the persistence of systems and of their ability to absorb change and disturbance and still maintain the same relationships between populations or state variables.”⁴ The Resilience Alliance (www.resalliance.org) has elaborated resilience theory as it applies to urban systems and landscapes into four interrelated themes:

- Metabolic flows
- Social dynamics
- Governance networks
- Built environment

These themes provide potentially compelling fields of action within which sustainable landscape design can become more purposeful. To some degree, landscape architects are, perhaps unknowingly, already engaging elements of resilience theory in the pursuit of SITES™ and LEED® certified projects. Employing green infra-structure and reducing reliance on irrigation, enhancing, and restoring habitat, and including food production are clearly components of the resilient landscape.

However, one of the challenges of applying resilience theory is the scale at which it is most easily understood and the scale at which most landscape architecture projects occur. The tenets of resilience thinking speak to ecological function (e.g. water cycles, energy and nutrient flows, landscape connectivity, and species interaction) most easily understood at the regional landscape level. For landscape architects, we need to better relate our site scale design propositions to these broader ecological functions.

Another, more vexing challenge with resilience theory lies with prevailing attitudes the public have towards the landscape and the ability of local institutions to manage more dynamic landscapes. Seeliger and Pisano describe the importance of adaptive management and the necessity of governments to embrace the inevitability of change.^{5,6} Yet embracing change is easier said than done. Ecologically rich landscapes—less manicured and less structured, subject to seasonal and annual change—rarely look like the static “picturesque” landscapes that dominate current aesthetics. This different “messy” look, in the absence of understanding, often becomes a source of public criticism and complaints.

Compounding the problem is the lack of institutional knowledge of how to apply ecosystem management practices towards resilient landscapes. Moving away from controlling regimes of mowing and pruning towards management that encourages change, disturbance, and unpredictability requires new management skills.



Hunter's Point South Waterfront Park – Green Oval. Image courtesy of ©Albert Vecërka/Esto.

As landscape architects, our challenge is to frame the unpredictability of the resilient landscape so that the public and local governments better understand the “means and ends”. Further, as practitioners, we need to educate ourselves and our clients on ecologically grounded management practices that allow the resilient landscape to flourish and more sustainable landscapes to emerge. *SL*



Hunter's Point South Waterfront Park – resilient planting. Image courtesy of ©Wade Zimmerman.

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DESIGN. CULTURE. CRAFT.

We are Nothing

By David Flanders, BCSLA



if not Adaptable

With a late fall storm system moving in across southern Baffin Island, my colleague and I were lucky to be on a final “milk-run” flight to Iqaluit from Clyde River, Nunavut. We were picking up stranded travelers across a handful of remote coastal communities as airports became too socked in to fly.

We barely kept ahead of a growing, powdery grey mass of clouds as we approached the Iqaluit airstrip from over Frobisher Bay. If the pilot couldn't find any open sky to see the bright yellow airport building, we would be forced to re-route and wait out the storm. In a last-minute adaptive move, the pilot dropped the plane low in an attempt to get below the weather. Looking out my window I could see white caps skating across dark, open arctic waters below us. These years the freeze comes late and the spring thaw early, sending shocks into the annual cycle of just about everyone and everything. Still aimed at Iqaluit, we maintained a flight path so close to the ocean it felt like we were somehow going to make a water landing. Suddenly the airstrip tarmac shot under us and the little plane landed with a jolt of relief.

The northern frontier is an endless landscape, rich in nature and pockmarked with settlements and industry. The huge sums of investment and earth materials flow into and

out of these regions often ultimately, however indirectly, funding the environmental planning and mapping work that brings me to the North and the Arctic. Canada's vast north may seem empty to southerners, but it is very much inhabited. People's ways of life in Nunavut exist somewhere in between traditional and modern, with aspects of one bolstering the other. My experience working with the people and landscapes at the frontier suggests that they can guide us to navigate change and adversity elsewhere; they can reveal how we were, who we are, and what we can expect in the future.

Several years ago, I had a chance to stay with a Métis family in Pinehouse, northern Saskatchewan. I was part of a small team of researchers interviewing local hunters about their lives on the land. Fisherman in Pinehouse have a simple, yet ingenious method of dropping long lines of fishing nets through the ice, sending these nets a hundred metres across the unfrozen water underneath and then pulling them back up through ice

holes. The concept sounds simple enough, but remember that the ice is not clear, and is covered with a thin layer of windswept snow. A net pulled out after being suspended in the water column for only a few hours can provide a healthy catch of dozens of fish as long as my arm, or the ice could crack, sending you and your cargo back below. On the land, nature is unforgiving and could either swallow you in a quiet instant or nourish you for the entirety of the slow trip home.

In Pinehouse, we gorged ourselves with meat two or three times a day. Beaver killed by a neighbour, pickerel that we pulled out of the lake that afternoon, moose, and whole ducks lined up in the oven. I always fell asleep full and exhausted. Over the years since it was built, the small two-story house we were staying in had aged into more of a storied and timeless cabin. Everything in these northern towns shows signs of endless repair. Folks here can fix anything. Furniture is worn cozy from endless family visits; carpets are worn thin from endless children learning to crawl and walk; endless damage from endless weather. The entire house at times feels like a workshop; the kitchen table often serves as a butcher's block, the basement is part-time hair salon, the yard a well-used garage, the street a playground; the whole town a temporary resting point for a life in an endless land.

Several hours drive south of Pinehouse, locals on the Kawacatoose Reserve are



surrounded not by a treed wilderness, but by a rigid mosaic of industrial agriculture and towns that have supplanted it. Golden, warm, and dusty in the late spring, there are horses everywhere and in every shape and form. Everybody seems to know how to ride, including barefoot children who take turns galloping across open backyards. Land users there have adjusted to their surroundings by developing social networks with farmers in order to hunt grazing ungulate herds on neighbouring private farmland. This protects crops while allowing hunters to fill their family freezers.

On the northern tip of Hudson Bay in Nunavik, Quebec, a series of coastal hamlets perch along the narrow band of frontier where the treeline meets the tundra. In the hub of Kujjuaq, bearded Frenchmen, American sport tourists, native outfitters, government administrators, geologists, and shift workers for the mines make this busy place feel less like the frontier than like the centre of it all. Traveling even further north, a bare landscape covered in snow provides less depth perception. With details obscured, one thinks in terms of vast generalities across huge distances, large and long-term change, and a sense of permanence. In reality, the landscape is incredibly diverse. Winter winds are so cold they burn, summers so warm that the ground blooms green with small, colourful flowers. When the bay freezes, locals from Kangiksujuaq collect

scores of clams under the ice in brief, dangerous intervals while the tide is out, by lowering ladders down into a dark, icy labyrinth of caverns underneath. Everybody there knows somebody who has died while gathering like this when the tide surges back in before being able to climb back out.

On a recent flight into the belly of the Northwest Territories, at the same latitude as Kangiksujuaq but covered in boreal forest, I looked down over a diesel tank farm, stark white like crop circles arranged in the blackness of the woods. The North runs off diesel; it heats and powers everything. I could see a small line of ice road trucks carrying goods across the frozen Mackenzie River like lumbering ants. These trucks, towns, and flights all have heavy carbon emissions. In the North, the cost of heat, light, processed food, building materials, even the freedom to escape, is high, and it is paid in carbon.

My last trip to the Far North took six flights each way from Vancouver. My annual carbon footprint is over double the BC average. Global CO₂ emissions climbed by another 3% last year, despite the Intergovernmental Panel on Climate Change reminding us that global warming is unequivocal and humans are extremely likely the dominant influence. I am not optimistic about our collective ability to change this trend and am directly contributing to it. The impacts of climate change are already on the ground, across the taiga and the tundra. It looks back at me from my window seat.

Autumn gives rise to winter in the village of Kangiksujuaq, along the north coast of Quebec. Image courtesy of David Flanders.

These problems affect me, as they affect all of Canada, north and south alike.

If all the time I have spent in the frontier of the North has taught me anything, it is that the people living there are incredibly adaptable. Throughout my travels I have seen countless examples of behavioural, social, physical, and economic adaptations that make life possible in such an isolated and extreme environment. I have heard countless stories of injury, loss, and death from people who spend so much of their lives on the land. These stories are matched by others of survival, ingenuity, and perseverance. The people at the frontier are, it seems, always at the brink of change wrought by an unforgiving landscape and challenging climate. In spite of this environment, or perhaps because of it, they thrive, and by doing so, demonstrate for all of us just how resilient we are capable of being. We in the south would be wise to learn this resilience. As those shocks in the annual cycle are headed our way, all of us will be looking for our own way out of the clouds, hoping to reach the tarmac. 51

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