

# OUT ON A LIMB

Saving the Urban Tree Canopy

Erna Buffie



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Great Plains Press  
320 Rosedale Ave  
Winnipeg, MB R3L 1L8  
www.greatplainspress.ca

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Great Plains Publications gratefully acknowledges the financial support provided for its publishing program by the Government of Canada through the Canada Book Fund; the Canada Council for the Arts; the Province of Manitoba through the Book Publishing Tax Credit and the Book Publisher Marketing Assistance Program; and the Manitoba Arts Council.

Design & Typography by Beth Gillespie  
Printed in Canada by Friesens  
Library and Archives Canada Cataloguing in Publication

Title: Out on a limb : saving the urban tree canopy / Erna Buffie.  
Names: Buffie, Erna, author  
Description: Series statement: The city project  
Identifiers: Canadiana (print) 20250311925 | Canadiana (ebook) 2025031195X | ISBN 9781773371474  
(softcover) | ISBN 9781773371481 (EPUB)  
Subjects: LCSH: Trees in cities. | LCSH: Urban forestry. | LCSH: City planning.  
Classification: LCC SB436 .B84 2026 | DDC 635.9/77—dc23


For my Trees Please Winnipeg tribe:

Jean Altemyer, Emma Durand-Wood, Christopher Green,  
Dave Green, Charles Feaver, Jacquie Field, Lisa Forbes,  
Shirley Forsyth, Mellanie Lawrenz, Roxana Mazur,  
Lorraine Thomas, and our newest members, Bev Pike  
and Ann Loewen

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## Introduction

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It's hard to say where my love of the natural world began, but the most likely place is my family's old log cabin, located on the shores of a small Ontario lake just a few miles east of the Manitoba border. Set against a backdrop of granite ridges and the towering white spruce and jack pine synonymous with the boreal forest, it was, and still is, one of my favorite places in the world. But it's just as likely to have started in Winnipeg's West End neighbourhood, on a street lined with a tall sweeping canopy of what even then, more than fifty years ago, were massive elm trees. Or perhaps it began the day when, age nine or ten, I shimmied up our backyard Manitoba maple tree for the first time and joined the birds and squirrels on a thick solid branch to look out over the world from a tree's point

of view.

All my early experiences of nature were in some way connected to trees, and some of my first memories are associated with that backyard maple—the sight of its helicopter seeds caught on a breeze and spinning out of the tree branches, the sound of a high wind clapping through its leaves at night. Or being a child suddenly awestruck when looking up at an eighty-foot elm tree towering over my miniscule height.

Since then, I've been busy with a life that's included twenty years in Montreal, seven in Halifax, and a career in writing and science and nature filmmaking which, in the end, brought me full circle: back to Winnipeg and the natural world I love most and now fight to protect.

And the truth is that the natural world we're an integral part of desperately needs protection, because its systems are beginning to fail. Climate change, urban and industrial development, and pollution have unleashed a destructive force so powerful that animal populations have dropped by an average of 73% worldwide, while more than 40% of the world's plant species are at risk of extinction. Cities are major contributors to biodiversity loss,

whether as a result of urban expansion and the ensuing destruction of natural habitats or via habitat degradation driven by waste and pollution.

But there is good news. Cities can be at the forefront of offsetting those losses by providing opportunities for animal, insect, and plant life to thrive. Indeed, scientists have found that urban trees and protected urban wilderness can support high levels of biodiversity, and a number of cities, from Auckland, New Zealand and Singapore to Cape Town, South Africa now have strict regulations in place to protect their unique biodiversity. What those cities have learned is that urban tree canopies and green and blue spaces—parks, intact forests, marshlands, waterways, bioswales, green roofs and walls, even the trees and gardens in your yard—can support a diverse range of plant and animal species and provide an important habitat for pollinators and birds. And those habitats don't just benefit wildlife. They also benefit us in a multitude of ways, whether by reducing pollution, capturing carbon, offsetting the impact of flash floods and heat island effect, or simply by providing a peaceful refuge where we all can de-stress by reconnecting with nature.

In fact, the health benefits of exposure to nature have been well documented by scientists. One report that surveyed multiple studies on the impact of trees and nature on human health concluded that living in close proximity to nature—whether a greenspace, an intact forest, or a city park—reduces the risk of everything from type II diabetes to high blood pressure. Researchers can't yet fully explain why—it may be related to increased physical activity, exposure to healthy bacteria, or the aerosols released by trees that create these healing benefits. But the meta study strongly suggests that urban planners and policymakers take advantage of nature's health benefits and invest more in the development, restoration and maintenance of trees, parks, and greenspaces.

Even more significantly, nature has an amazingly positive impact on mental health and stress reduction, and at least one study suggests that the greenspaces with the richest biodiversity have the most significant positive impact on human wellbeing.

In other words, being surrounded by a mix of trees and forests, fields and meadows, birds and animals helps us feel more relaxed and less anxious and depressed. At

no other time was that made more evident to so many of us than during the three long years of the COVID pandemic. With their world shut down and restricted from indoor social contact, people flocked to the safety and serenity of outdoor spaces. In Winnipeg, some neighbourhood throughfares were shut down and given back to walkers and cyclists. Bodies wrapped in scarves, snow pants, and hats of all shapes and sizes—offset by face masks, both surgical and homemade—swarmed down frozen river paths embraced on either side by a rich riparian forest. And in chairs set the requisite two metres apart, neighbours gathered around front yard firepits in search of comfort and conversation.

It was a tragic and fearful time, but it was also a magical one as we watched the streets empty of vehicles and the city fall silent. And as the quiet spread, wildlife began to emerge out of the urban shadows. In the first days of April 2020, the citizen science database iNaturalist almost doubled the number of wildlife sightings recorded by Canadians in the previous year. Drawn by dimmer lights and less noise, birds became more abundant, and species rarely seen in a city environment seemed to have taken up

residence in the urban forest.

I remember one such sighting of my own. I was sitting around an outdoor firebox in my city centre front yard with my partner and a couple of friends, when a lull in the conversation—the kind often precipitated by the mesmerising effect of a bonfire—made me look up. There, on a high branch of my boulevard elm, backlit by the moon, was the outline of a great horned owl. A few months later as my partner made a late-night journey through a swirling snowstorm, the vehicle he was in crawled to a stop as a stag—his curving antlers almost double the width of his body—picked his way through the snow drifting across Winnipeg’s Portage Avenue.

But if wildlife sightings increased during the pandemic, it’s likely that most of the animals we saw had actually been urban residents for some time. As our cities expanded and we destroyed their habitats to make way for housing and other developments, many of the animals displaced didn’t necessarily move on. Instead, some stayed, found a safe urban niche to live in—a pond, a fragment of forest or a remnant of marshland—and adapted to the city environment.

Which is why what remains of our natural urban forests, wetlands, and river corridors should be preserved and protected, because the loss of habitat has become so acute that it doesn’t just threaten urban biodiversity. It also threatens us.

So how successful has Winnipeg been in preserving its urban forest and other habitats that support urban biodiversity? Well, one would think that a city situated on two rivers would be a welcoming place for both people and wildlife, but the truth is, decisions made in the post-war period and well into the new millennium have dramatically reduced what were once intact city forests, grasslands, marshes, and nearby farmland. So much so that in 2023, Winnipeg was rated by Statistics Canada as having one of the lowest greenness scores in Canada.

And a lack of greenness in cities is a serious problem, because the habitats that allow animals to thrive also protect *us*, forming a bulwark against the impacts of climate change and helping to make our cities more resilient. So how do we turn that around? How can we work together within our communities to enhance biodiversity and ensure that our cities preserve the forests, trees, and green-

spaces we still have, while restoring or expanding others? What can we do to climate-proof our neighbourhoods and create safe spaces for our fellow creatures?

They're important questions, and I hope this book provides a few of the answers.

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## The Place That I Belong To

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### A City of Tree Huggers

When my partner and I moved back to Winnipeg in 2010, we found a house in Wolseley, a neighbourhood known locally as “the granola belt” because of its association with the hippies and ex-hippies who took up residence there in the ‘60s and ‘70s, long before the neighbourhood became trendy. We chose Wolseley not only because we had friends and family nearby, but also because, out of all the houses we viewed, our soon-to-be-home on Palmerston Avenue was the first one where we looked out the front window and saw families and kids out on the street enjoying a warm autumn day.

That active street life is far from unusual, because

Wolseley offers everything urban advocate, ecologist and philosopher Jane Jacobs prescribes for a lively, livable community. It's pedestrian and bike-friendly, offers easy access to coffeeshops, restaurants, and grocery stores, and has two small community parks, one nestled right next to the Assiniboine River.

It's a high-density neighbourhood that mixes single family homes with apartment blocks—a place where people generally know each other, at least enough to nod and say hello. It's also a community that has been and continues to be in love with its public trees. So much so that one of the more famous episodes in Wolseley history involves a 1957 protest aimed at protecting a massive elm that grew smack dab in the middle of a major thoroughfare called Wolseley Avenue. The original sapling had been planted in the 1860s on one of the area's original river-lot farms. Eventually, the farm disappeared, a residential neighbourhood sprang up, and for decades, Wolseleyites happily manoeuvred themselves and their vehicles around the big elm.

But in 1957, the city decided that the tree had to go because it was obstructing the building of a new road and

thus blocking what was, in their opinion, vital development. The women of the neighbourhood disagreed and swung into action, petitioning city council to prevent the tree's destruction. They won their case, and the road was built around the tree, but the victory was short-lived. Within three years, the old Wolseley elm was finally cut down.

I love this story for many reasons, not least because it's a perfect metaphor for Winnipeg's relationship with the land and its urban forest. On the one hand, Winnipeggers—ordinary people like you and me—who love their public and private trees, mourn when they die and frequently join together in the fight to protect them. On the other, a city government that has all too frequently put development, road building and car convenience ahead of both people and nature.

It's also a prescient story because it foreshadows a tragedy so significant that no one, not the closely knit Wolseley community, not even city council, could have fully anticipated its destructive reach: the arrival of Dutch Elm Disease and an ongoing battle to save Winnipeg's urban elm canopy.

## Elm City

Some years ago, I read Wendell Berry's poem "This Place That You Belong To" for the first time, and few lines of poetry have had a greater impact on my life than these:

Hope/then to belong to your place by your knowl-  
edge/of what it is that no other place is, and by/ your  
caring for it as you care for no other place

I've read that poem dozens of times since then, especially when I find myself overwhelmed with despair about the state of the natural world. It's a poem about knowing the place you belong to and tending to it; a poem about hope and inspiring hope in others, not by denying what has been lost or eroded in the natural world, but by embracing what still remains and what may yet be restored in the places we love and live in. And sometimes that means studying both the deep and near past to try and envision what the place you belong to looked like long before you arrived. It's something I've done in every neighbourhood I've lived in, from the once predominantly African American neighbourhood of Little Burgundy in Montreal to

our seaside home on the outskirts of Halifax and our current residence in Wolseley.

I remember the first time I walked out of my house on Palmerston Avenue and wandered down the road to a little copse of trees and a set of stairs leading down a steep bank to the lower shore of the Assiniboine. With my back to the city, surrounded by greenery and looking out over the slow flowing, sediment-rich waters of the river, I felt as if I might have travelled through a time warp. I could have been standing on the furthest reach of a Metis river-lot farm in the 1860s, or on a riverbank where Indigenous fishermen might have beached their canoes and then made their way up the shoreline to make camp for the night.

It was a walk I made many times in all seasons, and part of its delight was a massive tree that stood near to the bottom of the shoreline stairs. Some two metres in circumference with a body that would have towered over a multi-storey building, the tree had to be at least 150 years old, and I assumed it was an elm, until an arborist corrected me: "That," he said, "is one of the old-growth cottonwoods that once lined our riverbanks in the thousands."

Winnipeg is a prairie floodplain city located at the junction of two rivers, the Red and the Assiniboine, and the cottonwood tree is ideally suited to survive on the lower shores of those rivers. That's because the cottonwood, unlike other trees, has made an extraordinary adaptation that allows it to survive with its roots submerged in water for a few weeks at a time. Amazingly, as the river rises and their roots are drowned, their flood-tolerant bodies send out little surprises called adventitious roots which are able to harvest nutrients and dissolved oxygen from the water. But despite their flood tolerance and spectacularly fast growth—more than a metre a year—the cottonwood trees in this area haven't fared well over the past 150 years. During the steamboat era, thousands were harvested for fuel and that, combined with disease and pests, has only served to further lower their numbers.

The final nail in the coffin for the cottonwoods may have been the 1968 completion of the Winnipeg floodway. Designed to prevent the kind of catastrophic flooding that hit the city in 1950, the floodway aimed to divert the flow of excess river water into a massive, engineered trough, 47 kilometres long. But the lack of overflow on the

lower shores of the river channels meant that the moist, post-flood soil conditions needed for cottonwood seeds to germinate had virtually disappeared. So, while some of those trees still line our riverbanks, unless they're replanted, the cottonwoods may be gone for good, along with what little remains of the old-growth river bottom forest.

So what did Winnipeg's broader landscape look like before settlers arrived, and how much of it, like the cottonwoods, has disappeared or changed? And how did Winnipeg come to be known as "Elm City?"

Ironically, the elms that still grace Winnipeg streets and parks are in no way part of a "natural" landscape. The dominant landscape prior to colonization was tall grass prairie, dotted here and there with sloughs and marshes as well as oak and aspen groves. It was only along the shores of the Red and Assiniboine rivers that a riparian forest flourished, with flood tolerant, water-guzzling cottonwoods and willows dominating the lower riverbank and native elm, ash, basswood, and Manitoba maples growing on upper banks or floodplain. That prairie landscape was an essential part of the ancestral lands of the Anishinaabeg, Anishinewuk, Dakota Oyate, Dene-

suline, and Nehethowuk nations, one that had endured for thousands of years thanks to their traditional land use practices.

In fact, the narrative of the prairies as an untouched, unaltered, natural landscape prior to colonization has proven to be entirely false. Traditional knowledge, confirmed by recent studies, has shown that the Indigenous peoples of the Plains shaped the prairie ecosystem, in part through the use of controlled fires, which extended the range and dominance of the grassland plants favourable not only to them, but to grazing animals, like the bison, which they relied on for food.

Fire was also used to help clear riverbank plots for cultivation. Archeological evidence of ancient Indigenous farms near Lockport, Manitoba where the “three sisters” crops (squash, beans, and corn) along with sunflowers were cultivated, dates back to the fifteenth century. Cree/Metis knowledge keeper Audrey Logan suggests that agriculture in this region may well have been underway prior to that. As she explains it: “Corn has been in Canada for over 10,000 years. There was extensive north-south trade between our peoples, so it’s more than possible that land

cultivation was happening in this area earlier than the 1400s.”

In the last chapter of her book, *Braiding Sweetgrass*, Robin Wall Kimmerer recalls the teachings of her father, a member of the Potawatomi nation, who described Indigenous fire use as a kind of paintbrush on the landscape, a creative force used to clear the debris on forest floors to mitigate wildfires, open meadows for grazing animals, clear land to plant crops, and generate the conditions favourable for the growth of edible and medicinal plants as well as the birch trees used to construct canoes.

What she documents is a people who knew and understood the places they belonged to in a way few of us do in the modern world. Their land use practices were grounded in a spiritual relationship with nature, one based in a notion of reciprocity—“a give to the land while taking from it” approach—which honoured and acknowledged the bounty of the natural world that sustained them. Values that stand in stark contrast to the dominant Western approach, which measures land value mainly by its productivity and ability to generate profit.

Small surprise then that after Manitoba’s entry into

Confederation, the Plains people were victimized, starved, and forced from their traditional lands then shunted onto reserves. And the devastation of a people was accompanied by the destruction of their environment. By the early twentieth century, most of Manitoba's indigenous tall grass prairie had been destroyed to make way for towns, cities, and agriculture.

Currently, less than 1% remains of the resilient and richly biodiverse tall grass ecosystem that once dominated the south-central region of Manitoba where Winnipeg now stands. It's a pattern of loss seen right across the Great Plains region of North America, and it has resulted in this continent's grasslands being ranked as one of the world's most endangered ecosystems.

But while European settlers were steadily plowing up the grasslands, they had a somewhat different relationship with the region's trees. In *City at Leisure*, author Catherine Macdonald observes that it was with the arrival of European settlers that trees began to be transplanted away from the riverbanks and up onto river lot farms and into the communities that spread inland along the Red and Assiniboine rivers. Elms were the transplanted species

of choice, and by the late nineteenth and early twentieth centuries, the City of Winnipeg was planting hundreds of them along its expanding roads and boulevards.

Macdonald maintains that the American Elm was chosen not only because it was an incredibly hardy native tree—as one writer observed “seemingly impervious to anything thrown at them by humans”—but because of “the elegant vase shape of the crown.” Anyone who has lived on a street lined on either side with mature elm trees knows just how beautiful those canopies are—their graceful branches reaching across the road from boulevard to boulevard like the archways of a medieval cathedral, softening the concrete landscape below and cooling city streets with their dappled shade.

But Winnipeg's tree choice wasn't unique. The American Elm was a favourite in cities across North America, from Toronto and New York to Minneapolis. The only problem was that the tree's massive popularity led to the creation of urban forest monocultures which, in the end, turned out to be incredibly vulnerable. Because if the elms were afflicted with a fatal disease, millions of trees would disappear.

Which is exactly what happened with the appearance of Dutch Elm Disease (DED).

When DED first appeared on this continent and began to spread, very few people could have fully appreciated just how devastating its impact would be. Identified in Europe in the early twentieth century, the disease likely arrived in the eastern United States with infected lumber imported from either France or the Netherlands, sometime between 1928 and 1930. By the 1940s, the disease had spread into eastern Canada and within less than five decades it had decimated most of the elm canopy there. In Montreal and Toronto alone, between 80% and 90% of the cities' trees would succumb to the disease.

Winnipeg was a bit more fortunate. It wasn't until 1975 that DED was detected here, and its late arrival gave us an edge. In fact, by the early 1980s, when Mike Allen, the city's first urban forester was hired, he and his team could take advantage of decades of research aimed at establishing treatments and best practices that might slow the spread of the disease. As a result, while Winnipeg's elm canopy has suffered huge losses, the city can still boast of having the largest remaining elm canopy in North

America, something I was reminded of just last year when I met American-born Canadian author John Vaillant.

Vaillant was in town to receive the J.W. Dafoe prize for his most recent book, *Fire Weather: A True Story of a Hotter World*, a hair-raising account of the massive climate-driven wildfires that decimated the northern Alberta town of Fort McMurray. A friend happened to mention that he was giving a talk at a local bookstore, and I decided to attend. Just before the lecture, my friend introduced us, and the conversation eventually turned to my work advocating for the protection of Winnipeg's urban forest. I was at the point where I thought I might be boring him to tears, when his eyes suddenly lit up. "I'm so happy to be in a city that still has elm trees," he said. "We pretty much lost them all where I grew up and it's wonderful to walk streets that are still lined with them."

The lost elms Vaillant was referring to had once graced the streets of Cambridge, Massachusetts, the town where he was born and raised. Like so many New England towns and cities, the elms there were all but wiped out, and given Vaillant's reaction, their loss was deeply mourned, just as the death of every boulevard elm is

mourned by the people of Winnipeg.

Perhaps it's because with every loss, we're made more aware of what we're actually losing.

### An Urban Forest in Crisis

It could be said that Winnipeg's fight to save its elm trees was the most successful in North America, despite the fact that up until very recently, every level of government has done their level best to underfund or ignore the problem. Most devastating were the federal and Manitoba government decisions to cut the bulk of funding for the city's fight against Dutch Elm Disease (DED) in the early 1990s, compounded by a consistent refusal by successive city councils to provide urban forestry with a sustainable budget over the ensuing decades.

In fact, it could be argued that the survival of our remaining elm canopy was largely due to a cash-strapped but proactive urban forestry department that did its level best to take advantage of new research on the disease, as well as the amazing work done by grassroots organizations like Coalition to Save the Elms. Formed in 1992,

the Coalition was eventually successful in pressuring the provincial government to maintain and increase their support in the fight against DED. And while their lobbying efforts didn't result in radical increases in the city's forestry budget, their public education programs providing information on Dutch Elm Disease—what it is, how it spreads and what can be done to slow its progress—galvanized citizens across the city to take the precautions needed to reduce its spread.

One of those precautions—obeying the ban on transporting or storing elm wood—was key. That's because DED is a fungal disease carried by the native elm bark beetle, which breeds in dead or dying elm material. Giving those beetles a foothold, say, in a DED-infected stack of firewood, means that they can pick up the fungal spores on their bodies then carry them back to the base of healthy elms where they overwinter. Come spring they carry those spores up into the tree branches where they settle into feed.

Once the spores are transferred to the tree, they attack the elm's xylem—its water conducting vessels—and as the fungus releases its toxins, the tree's response is to block the infected vessels thus shutting off the flow of water. Out-

wardly, one of the first signs of an infected elm can be the appearance of wilting, dying leaves on branches where the tree has cut off its own water supply in an attempt to contain the disease. As DED inevitably spreads, and the tree continues to try and block the fungus, it essentially cuts off its own life blood and dies.

Five years ago, I held my breath as I watched an arborist checking the boughs of the boulevard elm that stands in front of my own house, wondering if it was about to suffer the same fate. An old warrior of a tree with holes and burls dotting its trunk like battle scars, it has a canopy so tall and wide that it stretches beyond the bounds of our three-storey house. At the time, Winnipeg's Urban Forestry Department had insufficient funds to regularly prune boulevard trees and no money to inoculate our elms against DED, so I asked the city for permission to pay for pruning, while a generous friend offered to inoculate my elm as a birthday gift. But as the arborist stood below it, staring at a large heavy branch that was only sparsely leafed, my heart started to pound. Was that big branch the first sign of DED? Was I about to lose my beloved elm just as my neighbour had lost his tree the year

before? Could the neighbour's tree have infected mine via their root connections?

In the end I was lucky, and my beautiful, if slightly beaten up, old elm was deemed healthy enough to prune and inoculate against DED. Other Winnipeggers weren't as fortunate.

By 2017, DED had once again reached pandemic proportions. With no money to inoculate healthy trees to slow the disease, and insufficient funds to cull every infected tree fast enough to prevent future losses, Winnipeg's urban forestry department seemed to be fighting a losing battle.

By 2019, the elms were dying at an alarming rate. That year alone, 9,500 elms were marked for removal. Worse still, our ash canopy, the second-largest population of city trees, was facing imminent threats from cottony psyllid and the Emerald Ash Borer (EAB), a pest that had already decimated urban canopies across eastern Canada. Urban Forestry estimated that if the Emerald Ash Borer made an appearance here, Winnipeg's combined tree losses from DED and EAB could result in a staggering 30% to 50% reduction in our boulevard and park trees within a matter of a few decades.

Then, in early October 2019, another disaster struck.

I vividly remember waking up on October 11 to ice showers and blowing snow, mounds of it steadily accumulating and overloading tree branches still heavy with leaves. That day I kept watch on a young tree across the street as its entire canopy steadily bent toward the sidewalk until its trunk finally snapped. Opening the door that day, I felt as if the only thing I could hear was the crack and boom of massive branches as they hit the ground under the combined weight of leaves and snow.

Almost every street in my neighbourhood had at least one tree that had been damaged or toppled. In the end, hundreds of power lines were downed, 50,000 Winnipeggers were left without power, and a staggering 30,000 trees were left damaged or dead.

In a city that was already losing an average of six thousand public trees a year to disease and attrition, with a forestry department that had insufficient funds to replace them all, the sense of loss and grief were palpable. And along with that grief came anger. Anger at successive city governments that had failed to provide enough funds to ensure our trees were pruned on a seven-year cycle, a ba-

sic maintenance procedure that might have helped avert or at least mitigate the disaster. Anger that the more than \$10 million spent on the post-storm cleanup could have been spent before the snowstorm, on the replacement and maintenance of our urban trees.

When my friend and fellow author Ariel Gordon wrote a feature article about the October storm for the *Winnipeg Free Press*, she asked me what I thought people could do to work through their anger and grief. My advice was simple: “If there was ever a time for us to take action, a time to plant trees on every square foot of available land—public and private—it’s now. We need to harness our grief and act to expand and protect a healthy, more biodiverse urban forest. And we need to demand that our governments allocate sufficient funds to get it done.”

On October 28, just seventeen days after the ice storm, that’s exactly what happened. That evening, twenty-two volunteer resident and greenspace organizations from across the city showed up at a community centre in Winnipeg’s Elmwood neighbourhood in answer to a call made by three young women from the Glenelm Neighbourhood Tree Committee: Lisa Forbes, Emma Durand-Wood, and

Mellanie Lawrenz. The purpose of that meeting was to come up with a strategy to lobby the city for a sustainable urban forestry budget.

Prior to the storm, neighbourhood groups across the city had been taking action to try to replace some of the thousands of public boulevard and park trees that had already fallen to the axe. In Crescentwood, a group called “The Friends of Peanut Park” was among the first to set about raising money and applying for grants to buy and plant trees to replace the park trees that had been lost to DED. Next up, the group lobbied their city councillor for funds to replace boulevard trees that had been removed and received enough money from the city’s Land Dedication Reserve Fund to plant another fifty-five trees. Neighbourhood groups in Kingston Crescent, Glenelm, and other areas of the city soon followed suit and received tree planting grants from their own councillors.

But while those volunteer community groups made a significant difference in their own neighbourhoods, it was nowhere near enough to address what was rapidly becoming a citywide crisis. After discussions with the city’s Chief Forester, Martha Barwinsky, the women of Glenelm de-

cidated that a few city grants here or there wasn’t enough to solve the problem. To address that, a paradigm shift in the way our city viewed the value of urban trees was needed, along with an urban forestry budget sufficient to protect and maintain our public trees.

As chair of my local greenspace committee, I was one of the fifty-odd people who travelled from all across the city to attend the October meeting where the Trees Please Winnipeg Coalition was born. What emerged was a core group of ten people who, over the next six years, would challenge the city, as well as the provincial and federal governments, to help provide sustainable budgets for urban forestry. Our strategy was simple: based on their value and benefits, trees should be viewed as an essential part of urban infrastructure, key public assets that deserved a level of funding sufficient to ensure best practices for their maintenance, replacement, and protection.

What lay behind that strategy was the looming reality of climate change, and along with it, the increased frequency of extreme weather events like the October 2019 snowstorm. For me and other members of Trees Please, the fight to protect and expand our urban forest would

become synonymous with enhancing our city's climate resiliency and its ability to weather the coming storms.

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## Tree Power

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In the interests of full disclosure, I should tell you that I'm a bit of a science geek. I am also, if you haven't already noticed, a tree-hugging, nature-loving nerd. So imagine my surprise when, in anticipation of writing this book, I opened up the *Oxford English Dictionary* to look up the definition of "nature" and found this:

"Nature," says the world's most popular English dictionary, "is the phenomena of the physical world collectively, including plants, animals, the landscape and other features and products of the earth, as opposed to humans or human creations."

*Say what?* I thought to myself, *Who wrote this? And is it any wonder people feel alienated from nature when the word itself is defined as everything that isn't human?*

To my mind, it was and remains an absurd definition, given that we're as much a product of nature's evolution as an oak tree or a Bengal tiger. It is also a dangerous notion, because as long as we define ourselves as distinct from, or worse, superior to the natural world, the easier it is to destroy it.

When the truth is, despite our superhighways, mega buildings, and much-celebrated technologies, our lives, even within the confines of a city, are interwoven with the natural world. We are as intertwined with its seasons, rhythms, and systems as the thin filaments of fungal mycorrhizae in the soil are interconnected with the lives of trees.

And while we may like to think we know a lot about nature, scientists are just beginning to discover the wonders of the plant world that sustains us, and what it's revealing are lifeforms as active and interactive as we are.

I discovered that a little over ten years ago while researching a documentary film called *Smarty Plants* for CBC's *The Nature of Things*. During that process, I was lucky enough to meet scientists like Ian Baldwin of the Max Planck Institute, and Canadian scientist Suzanne

Simard. It was Suzanne's astonishing research on what she calls the "mother" and "nurse" trees that led to the coining of the phrase "the wood-wide web" to describe the underground fungal (mycorrhizal) networks that connect the roots of trees together and allow them to share nutrients and other resources, not just with their own kind but with other tree species.

And if plants are busy in the underground world, Baldwin's research reveals that they're just as busy above it. In studies of wild tobacco, he has discovered that this little plant can not only identify which herbivores are chomping down on its body by sensing the chemicals in their saliva, it can also release chemical signals from its leaves to call in specific insect allies, like caterpillar-eating "big eyed" bugs, to get rid of those leaf-eating predators.

This mighty little plant can even switch pollinators by changing the shape and scent of its flowers!

But these aren't the only exciting discoveries being made. Scientists studying the Amazon have documented how its vast tropical forest—some 390 billion trees at last count—actually creates its own weather system via a process called evapotranspiration. It all begins when a tree

takes in water from the soil then releases it through its leaves. That water vapour then enters the atmosphere to help form the rain clouds that mark the beginning of the region's rainy season. Remarkably, those clouds don't just impact local weather—they can influence climate conditions as far away as the American Midwest.

Then there's the miracle of photosynthesis, by which plants in the ocean and on land make their own food in a process poetically described by author Zoë Schlanger as “eating sunlight” and “breathing in” carbon dioxide. During the photosynthetic process, plants also produce the oxygen we breathe and lock the carbon they absorb into their bodies, including the CO<sub>2</sub> we emit through the burning of carbon-rich fossil fuels.

Which is why some scientists describe the world's great forests as “the lungs of the planet” and suggest that they may be one of our best lines of natural defence against a climate crisis we've created, thanks to our addiction to oil and gas.

It's just one of the reasons why urban trees—whether they thrive on our riverbanks, in a small area of natural forest, or flourish on boulevards and residential yards—are so vitally important. They provide all urban dwellers,

both human and animal, with a wealth of benefits we're just beginning to understand.

## The Benefits of Urban Trees

As Harriet Rix observes in her book *The Genius of Trees*, it is our great good fortune to have evolved into what she calls “a tree-shaped environment.” As a result, she maintains that, “our interests are aligned. Our existence, just like theirs depends on it.”

Indeed, our interests are so closely aligned with trees that we've been spreading their seeds, planting their young and benefitting from their power for millennia. They've assisted us in meeting our most basic needs for oxygen, shelter, food, fire, and clean water. Their woody flesh becomes the lumber we build with, the paper we communicate on, the cardboard moving boxes we fill with our possessions, and the corks in our wine bottles. Their seeds offer us everything from luscious fruit to the luxurious taste of chocolate to the best part of a coffee break. Even more amazing, they've provided us with a source for medicines we still use today to treat everything from

headaches to cancer.

As tree scientist Nalini Nadkarni observes in her book *Between Earth and Sky: Our Intimate Connections with Trees*, their long lives—some as long as five thousand years—also provide us with a sense of generational continuity, history and the awareness that our own brief lives may be connected to something “much larger than ourselves.” Something I was made acutely aware of in 1995, standing in an old-growth stand of white pine with forestry scientist Peggy Tripp Knowles.

My friend and I planned to feature Peggy in a film about women scientists, and as we walked and chatted, she explained how these elegant, towering pine trees had been used for everything from ship masts and spars to homes, barns, and furniture—harvested for human use to such an extent that the tree became endangered.

Then she stopped, pointed up at an old pine and observed: “It’s amazing to think that this tree may have started its life when Galileo was writing about the laws of nature.”

That simple observation stopped me in my tracks, and as I followed her gaze up into the boughs of the tree

I felt, perhaps for the first time, just how short our own lives are and how extraordinary the lives of trees must be.

Indeed, the links between trees and the spiritual life of humans are as ancient as our species. And whether they take symbolic form as the tree of life, the tree of knowledge, or the tree that bears the fruit of both good and evil, they’ve long been associated with strength, wisdom and immortality. Nadkarni—known by her colleagues as “the queen of the forest”—has spent her career high up in the lush and busy canopy of the Costa Rican rainforest, studying the myriad plant and animal species that live and thrive up in the sky on the upper branches of those trees. For her, trees exist between earth and sky, rooted in the soil but reaching toward the heavens, in a world she describes as somewhere between “the mundane and the spiritual.”

And yet we rarely pause to appreciate the many benefits we and generations of other people have received as a result of their long, silent, and seemingly still lives.

Indeed, by the nineteenth and early twentieth centuries, city trees were seen primarily as a kind of “architectural embellishment,” a way to prettify and soften

the hard edges of the urban landscape and create shady greenspaces for leisure activities. Today, they're increasingly seen as essential urban assets, part of the natural infrastructure that cities need to protect their citizens in an increasingly hostile environment of concrete, cars, and climate change. In fact, a host of scientists, from engineers and botanists to ecologists and environmental researchers, now agree that the benefits of urban trees and intact forests are vast.

In addition to mitigating climate-driven superstorms by absorbing huge amounts of water—upwards of 42,000 litres a year for a 100-foot tree!—they also slow the impact of heavy rain with their canopies and replenish groundwater thanks to their extensive root systems that loosen the soil, making it more permeable and better able to absorb large amounts of rainwater. Those mighty roots, which can extend as much as two to three times the width of a tree's canopy, also stabilize riverbanks and coastlines. And they do it so effectively that the US Army Corps of Engineers now maintains that trees are the first and best line of defense to prevent shoreline erosion.

But those aren't the only benefits derived from the

intimate relationship between trees and water. Because tree roots are also able to capture sediments, toxins, and agricultural runoff, they help to keep our water supply healthy, clean, and drinkable. In fact, their ability to purify water is so effective that instead of sinking \$8 billion into a new water filtration plant, New York City invested \$1.5 billion into forest protection and reforestation in the Catskill watershed that provides their drinking water. Not only did it save the city billions, but it also resulted in some of the cleanest city water in the USA, with only 10% requiring human filtration.

And in towns and villages on the Japanese coast, it's fishermen who are protecting and planting trees. Centuries of traditional knowledge, confirmed by scientists, has taught those fishermen, often by hard experience, that healthy forests equal healthy rivers, which in turn supply clean, nutrient-rich waters to the coastal seas where they fish. Indeed, the leafy debris of deciduous trees that cascades into lakes and rivers in the fall provides nutrients that help to form the base of a complex food web that supports all aquatic life. And the reverse is also true. When Pacific salmon head upriver to spawn and then die, bears

and other predators carry their carcasses into the forest, where their nutrient-rich remains feed the trees. Which may help to explain why some people in the region say that “fish swim among the trees!”

Riparian forests along riverbanks and streams, even in cities, also help to cool the water, providing a refuge for fish species that prefer a colder environment. Even when a tree falls into a stream or river, it can benefit aquatic life by providing, among other things, a habitat and hiding place for fingerlings desperate to escape bigger predatory fish.

And if trees’ relationship with water is hugely beneficial, their impact on the air can be lifesaving. Trees can actually reduce air pollution by capturing toxic particulates with their leaves. Chicago’s canopy, for example, has been estimated to sequester 5,575 metric tons of air pollutants. But among the most important, and perhaps earliest recognized benefits of urban trees, is their ability to protect us from the dire health impact of extreme heat. And as the climate warms, that protection will become more and more important.

It was something that hit home for me in the summer of 2021 when the worst heatwave to date hit western

Canada like a sledgehammer. From late June until mid-July, Winnipeg experienced record-breaking temperatures and the longest heatwave on record, lasting a total of thirty-five blisteringly hot days. Days when I frequently found myself thrusting my face into a fridge freezer to cool off.

That heatwave produced more negative effects than sweaty bodies and short tempers. In the province of BC, the prolonged intense heat was associated with the deaths of more than six hundred people, and research conducted in the USA has confirmed just how deadly rising temperatures can be. Data from the National Oceanic and Atmospheric Association (NOAA) and Duke University suggests that heat kills more Americans than hurricanes, tornadoes, and all other extreme weather events, and is estimated to be associated with as many as 12,000 deaths in the USA per year, a figure far higher than the number of heat-related deaths currently recorded. Worldwide the numbers may be as high as half a million a year, figures that will no doubt continue to rise as global temperatures increase.

That’s because cities, especially city centres, have draped themselves in hard, heat-absorbent concrete and

asphalt surfaces, often at the expense of existing greenspaces and trees that offset the impact of intense heat. The result is a phenomenon known as “heat island effect”—an excess of heat-absorbing surfaces that can jack up already-high temperatures to an intolerable degree.

In my neighbourhood, the 2021 heatwave would have been a lot worse had it not been for our park and boulevard trees. While our elm canopy may be diminished, it, along with other trees planted over the last few decades, helped to make the days more bearable by doing what trees do so brilliantly: dialing down the heat. So how, exactly, do trees lower the temperature around your home and neighbourhood? Well, they do it not only by providing shade, but also via the same process that helps to create rain clouds over the Amazon. While a tree’s ability to create shade may seem simple—after all they’re big and tall and block the sun!—the other ways they cool things down are nothing short of miraculous. Not only do their leafy canopies absorb solar radiation as part of the photosynthetic process, but their leaves can also reflect heat back into the atmosphere. As a result, only 10% to 30% of the sun’s rays reach the area below, reducing the tem-

perature of heat-absorbing surfaces like asphalt by up to 19 degrees Celsius.

Amazingly, that cooling effect can extend the life of asphalt roads and parking lots by as much as 40% to 60% by minimizing the heat triggered expansion and contraction that leads to cracks and deterioration. Which seems to suggest that even roads need relief from the heat!

Even better, if you add in the benefits of evapotranspiration, mature trees can chill things out even further, because that process uses up some of the sun’s heat to evaporate the water trees release. It’s not unlike the way our own bodies cool us down by sweating, and whether alone or combined with shade, evapotranspiration can reduce surrounding air temperatures by as much as 5 degrees Celsius or 9 degrees Fahrenheit.

And when it’s 32 degrees Celsius outside, a five-degree temperature drop spells enormous relief for all animals, including us. One study found that the cooling effect of trees can reduce heat stress on the human body by as much as 30% over the course of a day. Which, for people with underlying health conditions like heart disease, diabetes, or asthma can mean the difference between life

and death.

In addition to their heat-busting abilities, trees enhance human health in other ways. Spending time in a forest or a park graced with a grove of trees not only reduces blood pressure and stress, but it can also boost your immune system. Scientists have recently discovered that as we breathe in the fresh air of a forest, we're also taking in the antibacterial and anti-fungal aerosols trees release from their leaves to keep insects at bay. When we breathe in those chemicals, it prompts an extraordinary immune response in our bodies, firing up the killer cells that target both virus and tumor cells.

In Japan, where forest bathing, or *shinrin-yoku*, has long been an accepted health practice, scientists found that when subjects spent as little as three days surrounded by trees, their “killer cell” response lasted as much as a month.

Equally important is the role urban trees play in improving safety on city streets by acting as a kind of traffic calming device, or as one writer put it, a giant “safety cone.” Studies have shown that on streets with boulevard trees, drivers perceive the route as narrower and tend to

slow down. On open streets and freeways with no trees, drivers feel they have greater control and speeds are more apt to increase, along with the number of collisions. As pedestrians, we also tend to feel more at ease walking down a street sheltered by trees, because we perceive them as a safe barrier between us and traffic.

In addition to their traffic calming effect, urban trees also act as a kind of sound barrier, muffling the noisy soundscape of a city by as much as 72 decibels depending on the density of tree cover. That offers significant benefits, given that excessive urban noise—whether caused by nearby construction, traffic or other sources—doesn't just impact quality of life. It can also result in sleepless nights and hearing loss.

And if urban forests are good for *our* health and safety, they're essential to the health of the planet.

For millennia, the world's trees and plants, including ocean plankton, have helped to moderate the climate and keep our planet habitable by absorbing vast amounts of carbon dioxide to produce the food they need. And that includes absorbing significant amounts of the CO<sub>2</sub> emissions we release through the burning of fossil fuels, the

same emissions that are now driving climate change. In fact, the role forests play in reducing human-driven carbon emissions and slowing the rate of global warming has been well documented.

A study conducted in New York, for example, found that on sunny days, the city's trees, intact forests, and other plants were hard at work, absorbing all the CO<sub>2</sub> emitted "by every car, bus and truck, plus more." And if that ecosystem service matters in New York, you can bet it matters in every city around the world.

Here in Winnipeg, our three million public and private trees store nearly \$40 million worth of carbon and reduce our emissions by some 39,000 tonnes of carbon dioxide each year. Which is no small amount, given that it's the emission equivalent of operating more than 9,000 gas-powered passenger vehicles for a year!

If that wasn't enough, our mature trees also save us money. Winnipeg's tree canopy saves its citizens more than \$14 million a year in the services it provides, and that includes more than \$5 million in energy cost-savings every year—money you save on your household budget. Scientists at the US Department of Energy estimate that

homeowners can reduce not just their cooling costs in summer, but also their heating bills in winter by as much as 25% just by planting the right tree in the right place in their yards.

Moreover, surveys have found that homes featuring mature trees have higher property values and sell for more money. And when cities willingly sacrifice street trees on the altar of road work and construction, those actions can have a hugely negative impact on nearby retail businesses. In fact, studies show that shoppers spend more time in retail outlets on streets lined with trees and are willing to pay 12% more for their goods.

Add to that the fact that large, mature trees provide eight times the overall benefits of newly planted trees, and you get a sense of just how valuable our cities' mature canopies are and why they need to be protected. Moreover, investing in natural infrastructure like trees doesn't just help to reduce a city's carbon footprint and improve climate resiliency, it also makes good financial sense. Unlike roads and sewer pipes, trees are the only form of urban infrastructure which, over time, offer a return on investment to the tune of \$6 for every \$1 invested in their

planting and care.

All of which leaves me wondering why so many homeowners, builders and developers are obsessed with cutting them down. And why, to date, Winnipeg and a host of other North American cities have done so little to defend and protect them.

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## The Fight for Trees and Forests

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Educating the public and governments about the benefits of urban trees is a great way to raise awareness and promote the kind of paradigm shift needed to get cities to make sustainable investments in their canopies. It was certainly a key part of Trees Please Winnipeg Coalition's (TPW) mandate, and we used every means at our disposal to get our message out: posting about the benefits of trees on social media, sending out newsletters and "calls to action" to our thirty member groups, writing newspaper op-eds, and lobbying all levels of government for better public tree funding.

While we focused some of our attention on lobbying for additional funding from provincial and federal sourc-