



# THE USE BOOK

EDWARD HINES NATIONAL FOREST  
DEPARTMENT OF AGRICULTURE

INEXHAUSTIVE VOICES

**THE USE OF  
THE FOREST RESERVES**

Regulations and Instructions

Issued by the Secretary of Agriculture  
*To take effect November 2017*

Edward Hines National Forest acknowledges that  
we occupy the traditional lands of the Anishinabeg.

"Life on earth is more like a verb. It repairs,  
maintains, re-creates, and outdoes itself."

Lynn Margulis, *What is Life*

"By using the waterways to float pine to its "natural" market, Americans would join two regions that had formerly been isolated from each other and, in so doing, create a landscape of mutual advantage. What might happen to that landscape if and when the pines finally gave out was not at first a cause for much concern: after all, providence would see to that. As the same booster declared, "Centuries will hardly exhaust the pineries above us."<sup>1</sup>

William Cronin,  
*Nature's Metropolis: Chicago and the Great West*

<sup>1</sup> Cronon, William. *Nature's Metropolis: Chicago and the Great West*. W.W. Norton and Company, New York, 1991.



"Trees branch so as to break up their canopy in such a way that maximises their absorption of carbon dioxide and light. The final pattern of branching is both genetic...but also a result of how the tree responds to its environment as it grows. Growing shoots will seek out light (and presumably carbon dioxide) and leaves will position themselves to catch the light.

In some plants these movements occur as the shoot grows, but in many plants the leaves maintain some ability to move about when mature and in some species they may undergo daily movements as they follow the sun."<sup>1</sup>

1 [http://www.cronodon.com/BioTech/Plant\\_Bodies\\_2.html](http://www.cronodon.com/BioTech/Plant_Bodies_2.html)

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# THE USE OF THE NATIONAL FOREST RESERVES

## TO THE PUBLIC

The 2017 *Edward Hines National Forest Use Book* explores the relationship between land management and forest use in a series of texts. It adapts the structure and style of the original US Forest Service 1905 Use Book,<sup>1</sup> inviting inexhaustive voices to respond in writing and conversation.

*Edward Hines National Forest* recognizes ongoing human land management as connected to past, present and future anthropogenic alteration of our climate and ecosystems. In 2017, indigenous and protected lands and waterways continue to be threatened by deregulation and abuse. The current political climate provokes questions about our support structures, systems, institutions, and the architecture of democracy itself.

*Edward Hines National Forest* traces material—from plant to lumber and cellulose—to produce a hybrid forest system within Hyde Park Art Center, exposing the complex relationship between humans, the human-made, and the larger ecosystem.

## PART ONE

# HISTORY AND OBJECTS OF FOREST RESERVES

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### • Edward Hines National Forest •

The *Edward Hines National Forest* creates a temporary extension of the existing catwalk above the main gallery space of Hyde Park Art Center, bridging a void inside the architectural space. The lumber used to build the extension, and the cellulose extracted to create the biopolymer paint, are both derived from excess *Diplodia pinea*-exposed red pine trees grown by the Department of Natural Resources (DNR) in Hayward, Wisconsin. These red pines are descendants of the old-growth Northwoods that were deforested in part by the Chicago-based Edward Hines Lumber Company during the late 19th and early 20th Century.

Visitors to *Edward Hines National Forest* are able to move through a series of trellis-like structures that mimic timber-era architecture used to transport millions of board footage of lumber to Chicago. Skins of cellulose film are grafted into this architecture, transforming it into a hybrid forest system. In a material web of relationships: trees unfold into building material, return to a forest-form, and produce layers of ephemeral cellulose. The structures and materials are exposed from inside and outside, above and below, in an attempt to collapse traditional figure and ground relationships. Within this experience, visitors are drawn into co-extensive<sup>2</sup> relationships between surface, structure, skin and bones, human, non-human, inside and outside.



Edward Hines National Forest Postcard, 2017.



Erin Paul Donovan, Timber Era (1893) Wooden Railroad Trestle, 2011.

The Diplodia disease, visible as a livid stain within the wood grain, is an artifact of extractionist practices, as the changed forest (plantation) was more vulnerable to the introduction of disease through the global trade of Diplodia-exposed nursery plants. The felling of these Edward Hines National Forest trees was overseen by Jim Kujala, a DNR forester based in Hayward. In one of the conversations following this introduction, Jim shares a contemporary and historic view on land use management.

#### • Relation of forest officers to the public •

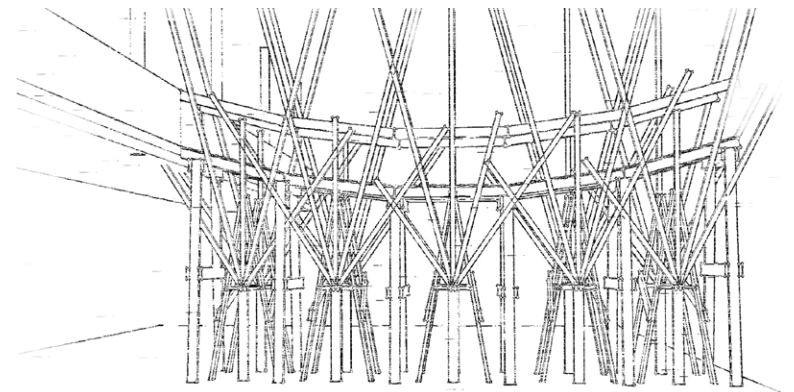
The processes used to source materials for the *Edward Hines National Forest* are complicit with the extraction-based capitalism of Edward Hines' lumber empire, centered at the intersection of the South Branch of the Chicago River and the I&M Shipping Canal. In discussions of human-induced changes to geologic processes, the term Plantationocene<sup>3</sup> has been proposed to identify industrialized resource extraction as cause of these changes and the idea of a "carbon imaginary"<sup>4</sup> becomes a way to understand the forms that this produces.

In this context, the material origins and highly manipulated nature of the *Edward Hines National Forest* installation provokes questions about ongoing extraction-based relationships with the regrowing forest, and who the agents and profiteers of these extractions are. The pragmatic

and neo-colonial gestures at work within the engineering and use of disease-resistant descendants of the old growth forest require us to ask: What possibilities are present to create refuge<sup>5</sup> within this Plantationocene? How do communities and government agencies work to enable both use and protection of commons within ecological systems, in the face of economic and political pressures?

#### • Private and State Rights, Jurisdiction •

During the last century, the advent and development of National Parks and National Forests occurred alongside parallel processes of global industrialized land use. Forest reserves and the National Forest System began to be established in 1891, and the National Park System in 1916. Their establishment was driven by the visible impacts of the 19th century lumber boom and predictions that desire for forest resources would accelerate in coming years with growth of cities. After World War II, urban life meant that recreational uses became desirable and further parks and campsites were created.<sup>6</sup> These publicly designated areas, alongside private, tribal, and community-led sites, are discretely conserved or preserved parts of the ecosystem that now persist within the increasingly destabilized global climate, and within hostile political and economic regimes. *Edward Hines National Forest* recognizes that present and future changes to our climate system are produced by human processes from both within and outside of such geographic park boundaries, and are inescapable from the larger ecosystem of which we are part.



Architectural rendering of Edward Hines National Forest structure, Charlie Vinz, 2017.

The excess Diplodia carrier trees sourced from the Department of Natural Resource's nursery plantation in Wisconsin are genetically and economically connected to the historical Northwoods and to the actively re-growing but diseased contemporary Northwoods, an ongoing legacy that runs parallel to the much celebrated National and Forest Park systems of refuge. In line with these synchronized histories, sites, and materials, the physical experience of walking through *Edward Hines National Forest* encourages multiple interconnected viewpoints on the possibilities of present, future, and past red pine refuge.

*"One way to live and die well as mortal critters in the Chthulucene is to join forces to reconstitute refuges, to make possible partial and robust biological, cultural, political, technological recuperation and recomposition, which must include mourning irreversible losses... There are so many losses already, and there will be many more. Renewed generative flourishing cannot grow from myths of immortality or failure to become with the dead and the extinct."*<sup>7</sup>

The *Use Book* includes texts and conversations from both Wisconsin in the Midwest of the United States, and Aotearoa New Zealand.<sup>8</sup> These texts begin to consider the globalized nature of current forest use, and more localized processes of decolonizing both nature and culture. This recognizes the global reach of the Chicago lumber industry; Hines exported logs to colonial New Zealand for a brief period in the early 20th century, and is historically connected to the contemporary Weyerhaeuser International company that currently has plantations in Aotearoa and elsewhere.

#### • Forest History—Duration and change for permits •

Glaciers of the last ice age receded from the territory now called Wisconsin between 10,000 and 12,000 years ago, making way for the northern mixed forest ecosystem comprised of white, red and jack pine, spruce, tamarack, sugar maple, hemlock, and yellow birch surrounding acid bogs. This new habitat supported many large and small animal species that are no longer present today, such as the timber wolf, caribou, moose, and elk. Forests covered 22–30 million acres, almost  $\frac{3}{4}$  of the state. A complex array of habitats supported wildlife, and plants. The glacier's departure had opened the area for colonization by plants, animals, and humans.<sup>9</sup>

The Lac Courte Oreilles Band of Lake Superior Chippewa Indians (LCO) historically occupied a vast territory within a 100-mile radius of the present location of the Lac Courte Oreilles Reservation located near Hayward, WI, with evidence of tribal mounds as early as 500 BCE.<sup>10</sup> In the conversation that follows this introduction, LCO Tribal Elder and former Tribal Preservation Officer, Jerry Smith, shares stories about the evolution of the forest from pre-colonial times to the present day, considering the concept of land use through the Lac Courte Oreilles perspective.

After a century-long period of trade and cohabitation with French Canadian fur traders in the region, the Chippewa band began to experience famine with the depletion of the fur trade. The mid-19th century initiated a period of struggle between the US government and the Lac Courte Oreilles, as the government offered provisions and annuities in exchange for land cessions. The treaties of 1837 and 1842 led to the creation of the Lac Courte Oreilles reservation, and a drastic reduction in their land occupancy.<sup>11</sup> This coincided with the advent of the timber boom and the beginning of the 50-plus year "cutover" period. Not only were the majority of trees removed from the region, there was a wave of fires following the clear cutting that left only ash in their path, massively degraded the soil, and took many human lives.<sup>12</sup> The wood residue from logging operations, called slash, burned very quickly. Following the 1837 treaty, the majority of virgin white pines were removed from the LCO reservation land as well, following a deeper level of deforestation through the turn of the 20th century on the reservation as well as the surrounding area.

## FREE USE OF TIMBER AND STONE

### • Enough to Build a Boardwalk 300 Feet Wide Circling the Equator •

The extraction of trees for timbers, fuel, and ship masts began in colonial America with English exports as early as 1606 CE, but it wasn't until the 19th century, with the advent of the industrial revolution, that the demand for timbers spiked. Wood was used for fuel, rail cars, rail station structures, railroad ties, and to supply the material for the settler nation to build its growing cities and westward settlements. Chicago grew from a population of 30,000 to 1.7 million in the five decades between 1850 and 1900. Further, the Chicago fire of 1871 led to a massive rebuild fueling





Department of Agriculture, Division of Forestry.  
Load of White Pine Logs on a Sled, 1881.



Zimmerman, Charles A.  
The Great Log Jam at Chippewa Falls Boom, April 6th 1869.

the demand for northern timbers. Many of the balloon-frame houses and warehouses built in that era remain throughout the city today, supported by a skeleton of old growth white, jack and red pine boards and beams 300 years or older at the time of harvest.<sup>13</sup>

• **Sale of timber: Roads and trails; Canals, ditches, reservoirs, etc; Private railroads, telephone lines, etc** •

In the 1850s the average lumberjack camp was comprised of 15 to 50 men who worked through the winter months in camps they had constructed. Trees were felled primarily using axes, stripped of branches and cut to length of 12 to 16 feet. They were stacked onto skids, secured with chains and hitched to a team of horses or oxen and hauled along iced pathways to river's edge. The rising water of the spring melt carried the assembled logs to distant mills and onto logging schooners for transport to major distribution centers.<sup>14</sup> Significantly, more logs floated through the city of Eau Claire, Wisconsin on the Chippewa River during the 19th century than any other city in the world before and since. As deforestation pushed from river's edge deeper inland and away from waterways, camps became more mechanized, mills more efficient, and the need for a massive web of railways increased. In 1892 alone, 13 billion board feet of timber was cut from the Wisconsin north woods, which according to Mike Dombeck, former Chief of the US Forest Service, was, "enough to build a boardwalk more than 300 feet wide circling the equator."<sup>15</sup>

• **Marking reserve boundaries** •

The first destination for this material was the city of Chicago where enormous lumber yards spread out along the south branch of the Chicago River for distribution of lumber throughout the city and the western United States. The Illinois and Michigan Canal created a funnel through which logging schooners navigated south from the mill towns of the north woods. Schooners would enter the Chicago River in numbers as high as 200 ships per day at the height of the timber era.<sup>16</sup>

Edward Hines, the lumber baron whose yard was sited at the intersection of the I&M Canal and the South Branch of the River, held vast tracts of forest in Wisconsin, Oregon, Mississippi, Minnesota and along the Canadian border. In Wisconsin alone Hines' holdings reached into eight northern counties. In partnership and under the mentorship

of lumber giant Frederick Weyerhaeuser, Hines built the largest lumberyard in Chicago (and allegedly the world) within a decade of the founding of the Edward Hines Lumber Company.<sup>17</sup>

### • Field and office equipment •

As the deforestation forced the timber companies into more and more remote sites, there was an increased need for technological development such as railways, steam engines, the circular saw, and the band saw. This enabled logging further inland, opening up the possibility for timber production in the south and the west.<sup>18</sup> These technologies also led to advent of the “lumber standard” that we are familiar with today. Railroads transportation utilized a system of measure based on weight, which was not a concern with the lumber schooners that transported material by the board foot. This careful shaping and standardization of boards led to the balloon-style architecture used to build many of the homes in Chicago.<sup>19</sup>

The huge expanse of old growth forests in the upper Midwest were fully deforested in less than 60 years, despite the belief that these forests would be a source of timber indefinitely. The alteration to the landscape, ecosystems, and soil in the affected regions was the most profound since the last ice age.<sup>20</sup> When the trees were gone, many of the timber barons abandoned the land and deforested sites were sold cheaply for farmland or were replanted by the Civilian Conservation Corp and the US Forest Service.

### • Records, reports, and correspondences •

In the chapters that follow this introduction, the *Edward Hines National Forest* Use Book explores the past, present, and future “use” of such forest sites. It gathers together the understanding of Jerry Smith, a La Courte Oreilles tribal elder, and staff at the Department of Natural Resources and US Forest Service. These conversations sit alongside accounts of future forest bonds and draining the swamp in the fiction and prose of Murdoch Stephens and Rachel O’Neill. In the second half of the book, Karsten Lund considers how ecological entanglements might infect our thinking, while conversations with Cilla Wehi, Kim Landsbergen, and Carl Houtman reconsider use as reciprocal practice and a creative means to more symbiotic relations within forest systems. ♣

1 [http://www.foresthistory.org/ASPNET/Publications/1905\\_Use\\_Book/use\\_intro.aspx](http://www.foresthistory.org/ASPNET/Publications/1905_Use_Book/use_intro.aspx)

2 The term co-extensive is used here in reference to David Joselit’s discussion of minimalism, and specifically the relationship between the inside and outside within Donald Judd’s artworks, where he cites Robert Smithson’s as stating: “Every surface is within full view, which makes the inside and outside equally important” (Joselit Objects, General and Specific: Assemblage, Minimalism, Fluxus, American Art Since 1945, 2003). Sara Black and Raewyn Martyn used this essay while developing ideas around hierarchies of surface and structure for their 2014 installation *In Formation* at Harper College, IL, from which the *Edward Hines National Forest* concept was developed during a 2015 residency at Virginia Center for Creative Arts.

3 Haraway et al in conversation, 2015 Donna Haraway, Noboru Ishikawa, Gilbert Scott, Kenneth Olwig, Anna L. Tsing & Nils Bubandt (2015): Anthropologists Are Talking – About the Anthropocene, *Ethnos*, DOI: 10.1080/00141844.2015.1105838

4 Povinelli, E. *Geontologies: a requiem to late liberalism*, Duke University Press, (2016)

5 Haraway, D, *Anthropocene, Capitalocene, Plantationocene, Chthulucene: Making Kin*, pg160, *Environmental Humanities* 6 (2015)

6 US Forest Service, Our History, <https://www.fs.fed.us/learn/our-history>

7 Haraway, D, *Anthropocene, Capitalocene, Plantationocene, Chthulucene: Making Kin*, pg160, *Environmental Humanities* 6 (2015)

8 Artists Sara Black and Raewyn Martyn grew up in Wisconsin, and the South Island of New Zealand, respectively. Their experiences of seeking to understand the ecology and history of each place has informed the inclusion of voices in this book.

9 Lac Courte Oreilles Band of Lake Superior Chippewa Indians Tribal Profile, Wisconsin State Tribal Relations Initiative <http://witrribes.wi.gov/>

10 Lac Courte Oreilles Tribal Mission, <http://www.lco-nsn.gov/lac-courte-oreilles-mission.php>

11 Wisconsin Department of Natural Resources, Statewide Forest Action Plan Part 1: Statewide Forest Assessment, “Cultural History of Wisconsin’s Forests,” 2010.

12 Wisconsin Department of Natural Resources, Chapter 1, Wisconsin’s Forests: A Quick Overview, Revised 2011. <http://dnr.wi.gov/topic/forestmanagement/documents/guidelines/chapter1.pdf>

13 Dombeck, Mike. *Lessons From the Past: What Have we Learned to Maintain the Health of the Land*, [http://www.apg-wi.com/sawyer\\_county\\_record/special\\_sections/page/page\\_553215d0-c47c-55fa-a740-243c1791b746.html](http://www.apg-wi.com/sawyer_county_record/special_sections/page/page_553215d0-c47c-55fa-a740-243c1791b746.html)

14 Clement, Winston Wallace. *Standardization in the Lumber Industry: Trade Journals, Builder’s Guides and the American Home*. University of Pennsylvania, Philadelphia, PA. 2014

15 Dombeck, Mike. *Lessons From the Past: What Have we Learned to Maintain the Health of the Land*, [http://www.apg-wi.com/sawyer\\_county\\_record/special\\_sections/page/page\\_553215d0-c47c-55fa-a740-243c1791b746.html](http://www.apg-wi.com/sawyer_county_record/special_sections/page/page_553215d0-c47c-55fa-a740-243c1791b746.html)

16 Karamanski, Theodore, “Lumber,” *The Encyclopedia of Chicago*. Newberry Library, 2004.

17 Lewis, James G. “Biographical Portrait: Edward Hines (1863–1931)” *Forest History Today*. The Forest History Society (Spring/Fall 2004): 64–65.

18 “Lumber Industry.” *Encyclopedia of American History*. Answers Corporation, 2006.

19 Wallace, Winston Clement. *Standardization in the Lumber Industry: Trade Journals, Builder’s Guides and the American Home*. University of Pennsylvania, 2014.

20 Dombeck, Mike. *Lessons From the Past: What Have we Learned to Maintain the Health of the Land*, [http://www.apg-wi.com/sawyer\\_county\\_record/special\\_sections/page/page\\_553215d0-c47c-55fa-a740-243c1791b746.html](http://www.apg-wi.com/sawyer_county_record/special_sections/page/page_553215d0-c47c-55fa-a740-243c1791b746.html)





Maple tapping in Ashland & Iron Counties.  
 Photograph by Charlie Otto Rasmussen, Great Lakes Indian Fish & Wildlife Commission.



Red pine seeds at the Department of Natural Resources in Hayward, WI.  
 Photograph by Sara Black, 2017.

## CONVERSATION BETWEEN JERRY SMITH AND SARA BLACK

### WE'RE LESS THAN EVERYTHING OUT THERE, ACTUALLY

*Jerry Smith is a Lac Courte Oreilles Chippewa tribal elder  
and the former tribal Historic Preservation Officer, now retired.*

**Sara:** From your point of view, from your experience in your life, from your position both as a preservation officer<sup>1</sup> but also as a tribal elder, how do you think about the forest. In other words, what is a forest?

**Jerry:** That's a hard question to answer. If I were teaching a child, I'd probably take them outside and show them the trees. They're different now, the trees. You notice a lot of popple.<sup>2</sup> If you go back to the treaty of 1837, the White Pine Treaty, that's when Ojibwes ceded trees away. We can't find the interpreter's notes on some of it, but basically, the people here, the Chippewa, went to those treaty gatherings and gave the US government all of the pine trees, oaks, and maples. We didn't live on the reservation at that time. So that began the timber industry up in Wisconsin. These pines built up Chicago and a lot of other cities, especially going out west.

We were looking for these interpreter's notes because we believe the Indians understood this in a different way than the treaty. We said, "We're only giving you these pines, and the oaks, and maples one time. When they grow back they belong to us again."

So, basically, from the beginning there were stories; things pass by word of mouth, these stories. We believe that the trees are alive. Well, you can see that, but they're much more alive in a different sense of things too. They're like people. We would only take what we needed.

**The traders ingratiated themselves with the Ojibwa,  
the People, and they didn't try to change us like  
the others who came later.**

While I was a preservation officer, a house burned down on the reservation. When the family went to put a modular home on the site, they got the backhoe and were digging a basement. They found two graves, people wrapped up in birch bark. They put the bodies in birch bark and sewed it up with basswood twine, then wrapped this in dry sphagnum moss, because it was sterile, wicking away the moisture so the body didn't fade away quickly. A second layer of birch bark held it together.

Whenever you discover bodies like this you turn it over to the sheriff's office so they can determine if it's a modern murder. When they discovered how old these were, they turned them back to us to take. That whole summer we sifted the piles of sand and found as many of the remains that we could. Some so old they disintegrated when we touched them. We found old time trade muskets. There were brass figurines remaining from the muskets, symbolizing a dragon. They were European, from sometime in the 1700s.

**S:** From my understanding, before the mid 1800s there weren't a lot of colonial settlers here. The settlements and trading posts were sparse. I remember reading about a French Canadian person, who integrated himself with the tribal communities and lived peaceably for a time.

**J:** Yes, Michael Cadotte and Louis Corbin. Corbin was chased out of here because he beat up his wife. They were going to take his life, actually. Someone helped him escape and he made his way back up north and survived. Later on he worked his way back down and opened up the trading post again under the support of Cadotte.

**S:** At that time, with the exception of stories like that involving Louis Corbin abusing his wife, is it correct that there was not as much conflict between the colonial settlers and the indigenous people?

**J:** The traders ingratiated themselves with the Ojibwa, the People, and they didn't try to change us like the others who came later, the English. The French were kind of like the Ojibwa in their thought and what they did.

You know, there was everything out there that we needed.

**S:** Thank you for that insight and knowledge. Reflecting again on this burial, and the birch bark wrapped around these individuals, also speaks to what you're sharing about how the forest is perceived and what it was.

**J:** If you think about it, we're less than everything out there, actually. Because we rely on the trees to give us life. But we always make an offering when we take something. If I go and strip birch bark, I put tobacco at the base of the trees. Also, you remove the birch bark at a certain time of year so you don't kill the tree. You're taking the outer layer, the white vy part, and you leave the inner bark. It will grow back. It will never be white like that again, but the bark will grow again and become dark. It's hard to find birch now. All the trees have a cycle they go through, so when they cut all these other trees down they exposed the birch trees, and they began to die off.

The forest is reliant on trees falling. Some of the lumber practices, they want you to use every bit, but you've got to leave some because they help the forest and the ground. With those white pines, they were so thick, it was very clear underneath them; you could see a long ways away. Now, after deforestation, the undergrowth is all thick. If you look deep in the woods, it's all underbrush.

**You know, there was everything out there, that we needed.**

**S:** This idea of "using" the forest or drawing from the forest; you share that every time you draw something, you must return something. The language of "use" is very common in forestry and agriculture, and this causes me to think through the religious narrative of colonial settler and European ideas. In much of Western ideology and origin narrative, there's a belief that human being were made in the image of God, and that Earth and all of its inhabitants were created after the human being as a way of supplying the human with whatever they need. So we think of ourselves as superior to all things. Which is in contrast to what you're saying about us, being lesser than the forest. Because we are dependent on it. The other narrative has given us this sense that we can take, extract, and draw in a limitless way.

**J:** That's the difference between now and old time traditional people. Like, for firewood, they would just take the dead branches from the ground. Not big, but all dried out, and that's one way they kept the woods clear, too. If you look at old maps, you see how many tracks of land were owned by timber companies, and that's how they'd think: superiority over everything. Each generation, less and less they respect the trees and the things that we gather from the woods; they've lost knowledge of that.

**The four trees, said they would help him.**

A lot of stories about the Great Spirit are about the death of his mother, but she didn't really die, she just changed. She was more like a spirit put on the earth, a mother earth woman, and his grandmother would say, "Oh, your mother was out in Lake Superior, and the water spirits got her." There's a hierarchy of those water spirits and some were good and some would try to work against the people. So the Great Spirit went out to the shoreline asking how to get out there to revenge his mother's death. And the four trees said they would help him. The birch tree said, "Well, this thing we're going to help you to make, you can use my outer skin to give this thing a cover". And the cedar, said, "You can use my body," the wood, "to give this thing a frame and a shape." And the white pine said, "Well you can use my blood," that's the pitch, "to make this thing waterproof," and the other one, it's pine roots, to become the stuff you sew it with.

When you take pitch from a tree, you cut a triangle through the bark and the wood and leave it for a year, and the tree tries to heal itself. And that's how you get the pitch. There were times for all of these things to be available. Times for peeling, and wintertime bark for wintertime wigwams. Everything's changed because of the way they cut the trees. Even with the berries, we notice that you'd get strawberries first, by July the blueberries, later blackberries, and then raspberries. But now they kind of ripen up all together.

**S:** The story of the forest offering it's blood, it's body, it's skin; you don't take without being offered, and offering in return.

**J:** And if you don't have any tobacco, which is often given as an offering, you put down something else you like or use, and leave that as an offering when you take something. So if you left a pocket knife behind, someone else can come along and use the knife laying there by the tree, or berries. Everything has a material part and a spiritual part to it. The spiritual part would go to the spirit world. But it's permissible to use or take the material part. To take care of yourself and others.

**When the trees grow back, they belong to us again.**

**J:** So, to go back, they signed the white pine treaty, took the forests down to build the cities using that lumber after they removed all this white pine. Timber companies moved onto the reservation and took the red and white pines.



Chief Blue Sky, at the time, heard about the timber company and their camp. He talked with the head of the timber company, and Blue Sky said that in the treaty they had already given the white pines, maples, and oaks. "But we only gave you those one time, and when the trees grow back, they belong to us again." But that's what you can't find in the treaty; it was left out. And he also said, "We never gave you the white pines, maples, and the oak on the reservation. So you have to pack up and leave. I'm giving you two weeks to leave. And if you don't, I'll get my men and we'll have a little war." Ojibwa were pretty easy going people, but there's a limit too. So, the timber company got afraid and they packed up and left.

There's a story from down south, where other abandoned timber company cabins were taken up. It's an archaeological site now; there's burials there too. It's what old people said, We belong to this land because the bones of our people have intermingled with the soil and the earth, with that we have become one." And when talking to the non-Indian people they said, "It'll be a long time before you belong to the land like we do, a lot of generations." We belong to it and we don't want to ruin it.

When they surveyed the reservation, one of the chiefs said, "I want to walk behind these surveyors in my bare feet, so I can feel this imaginary line and where it's at. So we'll know the boundary," and that's what he did. And they reserved certain areas, that's why it's not square, to preserve wild rice and things they used. After 1933, the DNR was established and they took the power away from the rice chiefs to regulate the rice out there, and once they got rid of the Indians that's when the non-Indians starting going out there, and to save them time they opened the ricing lakes at the same time every year, but the thing is it's different every year. The rice chiefs would know how to wait for it before opening it up.

After the reservation, Indian people would go into the banks and put up their land as collateral for loans, but they didn't really realize that when they went to pay the money back, the banks wouldn't accept the money. The contract terms meant they had sold their land without knowing it. And that's how they got the land for the dam that flooded the village out, along with timber land which the government condemned as not fit for human use. But then, why are there cabins there in modern

times? You'll never get an answer to that. And of course the timber companies got to log land that was given up and made a lot of money from that. Indians didn't get anything for that. That all happened between 1915–1924.

The State Swampland Act was another way to get land from the people. That act said, "We own the bottom of these swamps and these lakes," and they started these Section 16s, and schools were meant to be built on those areas, but they were never used that way. It was a land grab by the state. When they got contested in modern times, they gave us some of those Section 16s back, but not all of them. And they went back to the treaties again and it shows the land grab, the changes in the boundaries of the reservation, because of the Swampland Act. There are a lot of houses on those lands now. And other land taken for educational purposes was given to timber companies.

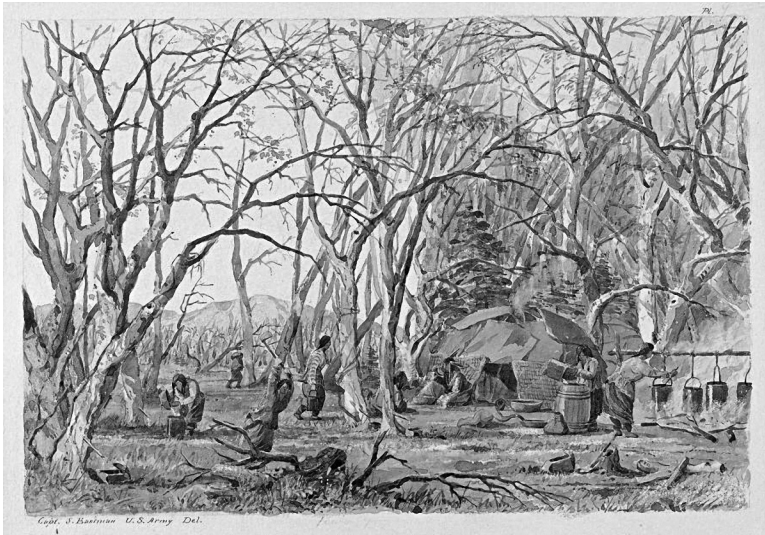
The Boy Scouts had some of that land and were going to sell it back to us at a low price, but then some of their leaders had other ideas, and it got to be \$10,000, then \$20,000. And the Boy Scout leaders had it logged off, too. Finally we bought it back for \$20,000, and it belongs to us now. That was probably in the 1970s, that we got the land back.

All that opened the way for modern cutting on the reservation now. Sadly, a lot of preservation offices don't actually go into the woods anymore. I would walk right along with the foresters and the archaeologist we had to bring along. The idea behind that they'd give you a little map, and you'd walk through the woods, and if you found an archaeological site, old growth trees, medicinal plants, you'd mark it off to be saved. The foresters said, "Out of all the preservation officers in all of Wisconsin, you're the only one who comes out in the woods with us," and I said, "Well, I want to see what you're cutting." And we'd put big buffers around some of the sites, so for the old growth trees.

**The people were given those things, to use, and by using them they are connected to their loved ones in the spirit world.**

**J:** They're still doing the timber sales. Discrete pieces of heired land get consolidated into tribal land without people realizing what that means. And people lose their ability to protect or use parts. Maple sugar collection, for example, gets interrupted. In the past, they'd use ironwood, very dense wood, to make spigots with a little channel cut and they'd pound them into the maples, through the bark, to make a spout, and

then they'd sew up bark to make a container for collecting the sap. No tin cans. That's how we did it later. My grandmother would tell me they'd put 900–1,000 taps out. The villages were abandoned almost when everybody went up the woods to make syrup. They'd come back to check on the houses every so often. 1915, or so. Everybody had a job. They'd be boiling sap all day.



Seth Eastman, Ojibwe Sugar Camp, Watercolor, 1850. Courtesy of Minnesota Historical Society.

**S:** Does tapping damage the trees?

**J:** Not if you do it right. Don't drill too deep; you're cutting into the layers that are the veins of that tree, and the sap is their blood. My grandmother said the sap might spoil on you if it isn't heated soon enough. When that happened, they would dump it out by the maple trees and it would go back to them through the roots. So in a sense, you're not wasting it. There's ways of thanking the maple trees, feasts before and after the season.

It also relates to practices of mourning; people in mourning were fed the maple sugar at that time of year. Depending what season it is when the death happens, it could be maple syrup or sugar, first berries of the year, wild rice, and then deer meat. So once you've fed that person, they

can come out of their mourning and pick berries again, or whatever it is you've fed them at that time of year.

**S:** The honoring of someone's mourning, the restoration.

**J:** When someone goes into mourning like that, they would take a lock of the deceased person's hair and sew it in a tobacco pouch. Then you would wrap and dress it, like it's a person. And over the next year they'd gather gifts to add to the bundle, and change the clothes. After a year's time, they open it up and give the clothing and goods away to others as gifts. At the same time, the deceased person receives those same gifts in the spirit world. So again, it's the relationship between the spirit world and the material world. People were given those things to use, and by using them they are connected to their loved ones in the spirit world.



Maple tapping in Ashland & Iron Counties.  
Photograph by Charlie Otto Rasmussen, Great Lakes Indian Fish & Wildlife Commission.

My grandfather said, someone takes the pouch with the lock of hair and goes up some place in the woods, taking your pipe and tobacco with you. And then you dig up some ground up there and open the pouch with the hair and tobacco in it, and you lay it in there. And then you smoke. And what you're really doing is releasing the soul of that

person back to the spirit world. And then you cover it up and leave. You can always go back there and visit your relative. I did this with my grandmother's hair. And I go back up there to visit. And in the woods everything is stronger; a lot of spirits are there. One time I was up there with my wife, and I said, I'll walk up to visit my grandma. As I was walking up to where grandma is, I started singing some songs, and then I sat and talked to grandma, as if she was there. And in a way, she is there. Anyway, I got back down to the camp and my wife said, "What were you doing up there? It sounded like you had a drum up there, and we could hear you singing at the top of your lungs." I said, "I wasn't doing that. I don't know what that was." She said, "Then you were talking, and we heard the language of the woods, too." I said, "Well yeah, I talked in Ojibwa, because that's a spiritual language, and when a person is born into a tribe, they only understand the language of the tribe, not English. When a person dies, they become pure Indian again, and don't understand English. And so, if you speak in English, it doesn't go very far. They don't hear it; you've got to speak in the language. So maybe that's why you heard it loud, even though I wasn't doing it like that. It got amplified". ♣



Maple tapping in Ashland & Iron Counties.  
Photograph by Charlie Otto Rasmussen, Great Lakes Indian Fish & Wildlife Commission.

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<sup>1</sup> As part of the National Historic Preservation Act (NHPA), a Tribal Historic Preservation Officer (THPO) is the designated tribal preservation official of a federally recognized Indian Tribe. <https://www.nps.gov/history/tribes/Documents/THPO.pdf>

<sup>2</sup> Also known as poplar or American aspen





Maple tapping, Ashland & Iron Counties.  
 Photograph from Great Lakes Indian Fish & Wildlife Commission.



Bad River and Red Cliff harvesters peel birch bark for a canoe making project in Bad River, WI.  
 Photograph from the Great Lakes Indian Fish & Wildlife Commission.





Diplodia pinea-exposed red pine trees grown by the Department of Natural Resources in Hayward, Wisconsin. These trees are now present at *Edward Hines National Forest*, Chicago.  
Photograph by Sara Black.



# CONVERSATION BETWEEN JIM KUJALA AND SARA BLACK

## WITH SUSTAINABLE SILVICULTURE, WE MIMIC NATURAL SYSTEMS

*Jim Kujala is a Department of Natural Resources Forester in Hayward, WI.*

**Sara:** Can you share with me your thoughts on the forest? How would you define the forest? What is a forest?

**Jim:** A place where trees are growing. There are different types of forests. For instance, up here in the north you have industrial forest lands where the primary purpose is growing timber for timber production. We have private forest lands that people use for recreation and hunting. There are public forest lands that are used for timber, recreation, and wildlife. A forest is a place where, as the basic biological requirement, trees are growing. Then you can consider the different uses of the forest.

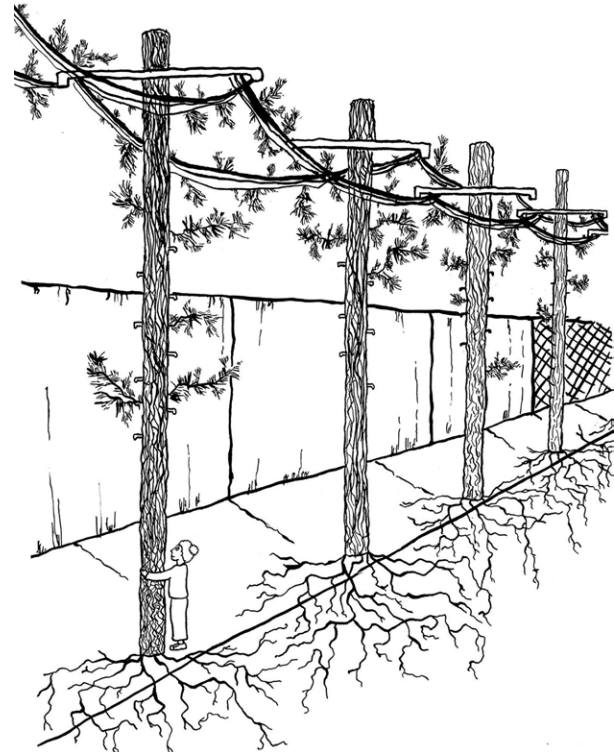
**S:** You are thinking through the lens of “use,” when defining a forest. How a forest can be utilized by a human population?

**J:** Yes, that’s what I’m thinking about when I think of a forest. From my forester point of view, I ask how we can use the forest as a sustainable source of energy, fiber, and wood along with a forest’s other ecological benefits. Humans have removed the natural management regime of forests, such as fire, insect outbreaks, and windstorms. Well, of course we can’t minimize windstorm effects, but we can suppress forest fires and control disease and pests. In this way, humans are creating the disturbances in the forest landscape.

**S:** Do you imagine that kind of perpetual intervention is something that we can consider sustainable?

**J:** I do. It’s true that the forest system *can* manage itself. We *could* just leave forests alone. We could stop suppressing forest fires. We could stop cutting for timbers. We could let everything go back to the way it once was. In one way, that could be fine, but silviculture is a way to mimic those natural forces and to also gain sustainable resources. The primary objective to managing the forest through silviculture is the

yield of sustainable products. Also, if you speak with wildlife people, forest management provides benefits to wildlife. Some people may disagree with this view, but in some ways old growth forests, compared to a young managed forest, is like a biological wasteland. There *are* species that need old growth characteristics of the forest, but if you look at the number of species that live in a young forest managed by sustainable silviculture, we can provide habitat for a greater variety of animals.



Pen and ink drawing by Al Zork, 2017.

**S:** Old growth forests provide habitat for a narrower range of species?

**J:** Narrower in terms of *number* of the animal species it can sustain. We can mimic a number of the old growth characteristics that some species thrive on, such as snags and wooded debris. Certainly there are some things that we can’t mimic, so there is a place for unmanaged forest, but a lot of species (grouse, woodcock, deer, turkeys) thrive on young aspen stands, for instance.

**S:** Let me see if I'm understanding you well. The perspective or belief that underlies the management process, is that the forests (as we have defined them here) are something that we *can* coexist with and draw from indefinitely. In order to do that well, and for the broadest range of species, we need to manage the forest...Perhaps by mimicking natural systems, but management is the way to create the greatest yields of forest benefits.

**J:** I think so. With silviculture, we're trying to mimic natural disturbance and capture mortality that would happen regardless. Basically, if a new forest is planted you would see several thousand seedlings per acre. On the other hand, consider the red pine stand where your trees are coming from; there are far fewer seedlings, maybe a couple hundred stems per acre. In a natural system thousands of seedlings would have died on the ground. We're trying to capture that to grow a renewable product. The products that can come out of wood are constantly evolving through technology. Cellulose is in everything from clothing to yogurt, and it can become a plastic-replacement material. This is a better alternative than oil and petroleum.

**S:** When you look back in history and the arc of colonial human intervention in forest systems, the biggest intervention in this region was with timber boom, led by timber barons Weyerhaeuser and Hines. They believed, quite sincerely, that the most sustainable or responsible method of forestry was the clear cut. They believed that if you open up the canopy, you're giving a greater "shot" to the new growth understory, but we've discovered it isn't anywhere this simple. The clear cutting that occurred up here in the Northwoods had a strong impact then and a long lasting impact.

**J:** Right. In one way they weren't *wrong* in thinking what they thought; it just wasn't complete. Some species, Aspen (poplar/popple) for instance, are still managed by clear cutting. It's called a coppice cut. The new shoots sprout up from the roots. With managed pine stands, especially red pine stands, it's difficult to mimic the natural reproduction cycle because they have a very inconsistent seed crop. Every five to seven years they produce a good seed crop, so it is easier to grow red pines in a nursery setting like this. You plant them, fertilize them, pull them and replant them. So a managed red pine stand you might also clear cut and replant as well. It depends on the species. Oak timber types require a two-step method where we disturb the soil, open up the

canopy a little bit to let that regeneration start and once the stand is up to an acceptable stocking level, then we'll take the overstory out. It's a stepped approach. When the timber barons came through and cut these old growth pine stands there was very little growing in the understory because the canopy was so thick.

**S:** We've learned from our research on this project that when you take down old growth forests, the secondary growth—natural or planted—is in and around the same age, and that when a forest lacks age diversity it isn't as disease resistant. How does the DNR address that problem? Also, do you see current evidence of that early clear cutting now?

**J:** To address the age diversity question: There are two different types of stands (well, of course there are millions of differences), but for purposes of this conversation, there are even-aged stands and uneven aged stands. With an even-age stand everything originated around the same time frame; for example, you might have a red pine plantation where everything was planted in the same year, or a hardwood stand that seeded in around the same time—say within five years—due to a major disturbance event. Then you have uneven aged stands such as our northern hardwood stands. With different age classes of regeneration, you have shade tolerant species growing in the understory. Only certain types of tree species can function in an uneven aged stand. Generally, pine is an even-aged species. They are a climax species. It's hard to manage them as an uneven aged stand. So, age-diversity is not a "good characteristic" in general, but dependent on the species. It is important though, to have diversity across stands of timber type.

Take for example the pine bark beetle epidemic out west. Historically, when fires were not suppressed, you would see a 100 acre block of forest that was ten years old next to another 100 acre block that was maybe 60 years old. The pine bark beetles might go through the older stand of mature trees and damage them but when they'd hit the younger and stronger stand, they wouldn't be affected. Since we've started suppressing fires, trees out west are largely the same age. The beetles can sweep through and kill all of them. What we try to do with our forests here is manage in blocks. It may be the same timber type, but you've got various stages of progression in maturity. You can have even-aged timber types (say a 1,000 acre block of red pine plantation) but it would not be next to a stand at the same stage of progression. It's broken up on the landscape.

For the second part of your question, the area was completely cutover and farms moved in following. Some of the land was productive and some was not. Much was replanted. The pre-settlement landcover and occupant species were completely different than what they are now. These forests are second growth forests. They were either planted or regenerated after the cutover period. We have healthy forests, they are just a different composition than they were before.



*Diplodia pinea*-exposed red pine trees grown by the Department of Natural Resources in Hayward, Wisconsin. Photograph by Sara Black, 2017.

**S:** Would you say we have created a situation that now requires our permanent intervention or management?

**J:** Absolutely. Yes. So, with the addition of invasive species that have been introduced into the landscape, it would be very difficult to go hands-off with the forest without losing our native species. Certainly forests could be allowed to grow and do their own thing. If we get to a point where there's an alternative to timber fiber in industry it might be alright to do that.

**S:** If we view the forest through a different lens than that of the "forest product", we could behave differently?

**J:** We could. It's true that we may lose some of those secondary benefits that we can provide through management, increasing wildlife numbers...For example, prior to the cutover period, whitetail deer were

hardly present; rather, there were woodland caribou, moose, and elk as the primary large game animals. If we lost our whitetail deer you'd have folks losing their behinds (laughter).

**S:** Are whitetail deer behaving at all like an invasive species at this point?

**J:** This also depends on your perspective. If I have my forester hat on, there are too many deer. You can see evidence of it everywhere as you walk through the forest. The browse levels are high, you can see it. In the southern Wisconsin prairie habitat, there were higher whitetail deer numbers, but in northern Wisconsin, there were very few deer. The deer population numbers do become an issue when we are working to regenerate forests.

**S:** I appreciate that your responses often reveal, as in most all circumstances, that one's beliefs and behaviors are dependent on what lens they are looking through. Perhaps you put on your forester hat one day and have a different answer than if you put on your hunter hat another.

**J:** Right. I hunt, and it's certainly nice to see a lot of deer, but you really do have to consider the "multiple use" perspective. The forest doesn't do just one thing. It has many uses. Especially public lands, which I work with primarily. In Sawyer County, skiers use it, bikers use it. We have a lot of ATV and snowmobile trails, but then we also have a strong timber industry. My job is to mesh it all together and balance the various uses.

**S:** This leads me to my next and final question. I find it problematic that we so regularly separate the cultural from the natural. We say, culture is here: it involves human beings, their production and activities; while nature is over there: which involves all of the nonhuman beings including the nonliving. Of course, we are "nature." We are another species that is moving within a given ecosystem and our production is often born of the nonhuman. It is very difficult not to reinforce that false dichotomy. When we think through the position of "use," that is utilizing processes of *silviculture* and *agriculture* as a lens, we are suggesting in some way that everything nonhuman is here for our use and management. You suggest we must attend to all of the different needs and uses of the forest and attempt to balance them. What if we were to also attend to the needs and uses of all other creatures of the forest, even the non-living beings? How does that change our thinking into the future of the forest, if it does? Is it possible for a forester to mesh together such a broad scope of uses?



**J:** Your question is interesting. We use sustainable silviculture. When considering public lands, there are certifications standards that we have to meet. The Sustainable Forestry Initiative is one of them, SFI. You'll see that marked on paper notebooks or other forest derived products. CFI (Community Forestry Initiative) is another. These programs perform audits and have specific requirements. For example, when we set up a timber sale, we have requirements for best management practices for water quality. We have many things to take into consideration for water quality to protect ephemeral ponds for lizards and newts that use those areas. The rivers and streams have a multitude of these where we need to provide adequate buffer strips for wildlife. We have to leave a certain number of snag den trees per acre. In biomass harvesting operations, we have requirements of how much slash we need to leave on the ground to maintain the soil nutrient level. These are all attentive to other species. When practicing sustainable silviculture, the other users of the forest are on our mind. Certainly there are private land holders in Wisconsin. In fact, they are the majority holders of land in Wisconsin. They, in some cases, practice sustainable silviculture with other beings needs in mind, but there are others where the logger knocks on their doors and offers a certain amount of money and gives them a commercial incentive not to. That is what happened at the turn of the century only at a much larger scale. ♣



*Rusty needles, Diplodia exposed red pine, Hayward WI.  
Photograph by Sara Black, 2017*



Root Architecture, Lake Daniel Track, Waka Huia biodiversity area, Aotearoa New Zealand.  
Photograph by Raewyn Martyn, 2016.



Root Architecture, Hoh River Trail, Olympic National Park, WA.  
Photograph by Raewyn Martyn, 2016.

**ABNORMAL TIDES**

Her ribs are sunken logs  
her tissue            the rot of willows  
her muscles  
silver in length  
overlaid on bones  
her tongues        of several  
depths and levels  
subdivided into a number of  
well-defined areas            three foot rains  
of impending importance  
wash away a soldier's uniform  
valued at 54,400 pounds  
now she farms the foreshore  
only her nitrates are in suspension  
until her drains bloom  
her mornings  
are very careful  
of capillary attraction  
90,000 acres of transformation  
the newspaper boasts  
in black trench  
that runs right to left  
she snaps the paper open  
"The term 'swamp' is no longer accurate"  
there is now a telephone    and a post office  
an illuvial deposit in a state of ooze  
snags in a dream  
no, a dam            the editor apologises  
either way it receives and discharges  
the last            abnormal tides  
in a cage of logs  
she installs an intimate  
watertight compartment  
at night she feels the weight  
the ripples        in her chest  
the draining       of the heart  
of the last great swamp.

## HAURAKI PLAINS DRAINAGE

I came across the article “Hauraki Plains Drainage”, written by V. M. STRONG<sup>1</sup> (*Ohinemuri Regional History Journal* 21, June 1977) as part of broad research I’m doing into swamps in Aotearoa, many of which were “reclaimed” and transformed with variable “success” into farmland by Pākehā colonisers from the mid-to-late 1800s onwards. As the child of Pākehā parents who farmed “reclaimed” swamp in the Waikato, this research is a personal confrontation with the legacies that have shaped me and that I am complicit in.

“Hauraki Plains Drainage” possesses a complete lack of consciousness or acknowledgment of the effects and affects of colonisation manifest through the drainage of the Piako swamp. The curious rhythmic sensibilities of the writing, which seem geared to lull the reader into colonial amnesia, or make readers comfortable with dispossession of Māori people and land so that soldiers returning from WW1 might “transform” it into farms and homes, also felt sinister and creepy. For these reasons, the article made ripe material for a poem that appropriates words and phrases and aims to re-orientate the meaning of “reclamation.” At the same time, I am not from the Hauraki Plains and am not familiar with the specific histories of the place. While the poem remains quite general for this reason, writing the poem has prompted me to learn more about this area and to look for related connections.

The day I wrote the poem I had just returned to Kirikiriroa after attending the exhibition opening at Tauranga Art Gallery of a new work, *Irihanga*, by Bridget Reweti (Ngāti Ranginui, Ngāi Te Rangi).<sup>2</sup> I felt some connections form between swamp drainage in the Waikato and Hauraki Plains and the Crown scorched earth policies in Tauranga that her work addresses. Reweti’s installation marks 150 years since the 1867 Tauranga Bush Campaign that saw the destruction of the settlement of Te Irihanga and many others between Whakamarama to Waoku. This campaign ultimately enabled raupatu (confiscation) of Tauranga Moana. It struck me that the reclamation of swamps could similarly be seen as another arm of the New Zealand Government’s scorched earth policies. While a swamp seems an unlikely place for fire, once drained, it becomes a harbour.

I was born in Tokoroa and grew up in the Waikato. The land that my parents farmed was composed of peat, a soil constituted by sedimentation

built up over 40,000 years by the course of the Waikato river and tributaries. The “Piako block” was part of 1865 land confiscations by the New Zealand Government, which followed the invasion of the Waikato during the New Zealand wars. The block was primarily swamp, so striking that it was referred to as an “inland sea” by one Pākehā colonist. As the swamps were drained, the land became prone to underground fires in summer—fires you can’t see, that snake away underground for days, weeks or months. Often, decomposing tree roots in the dry peat would catch alight due to a spark from a burnoff.

In a 1946 newsreel of a Piako peat fire, shirtless men dig grave-like trenches to halt the spread of the flames, at war with the earth. A male commentator says over the footage:

*In this district, peat fires have broken out again in the peat swamps. These fires are an annual menace for swampland farmers and this year, with a rainless summer, they’re raging as never before. Trench digging is the only way to stop them for the peat burns underground. In some places it comes to the surface to burn rushes, grasses, fences, haystacks, houses, and all farm property. As fires range over thousands of acres in Rukuhia and Piako swamps, smoke pours across the whole Waikato. In the middle of it, all farmers fight on. For them, rain alone can bring relief.*

I was struck while watching the newsreel by the thought that some of these farmworkers fighting the fires would have been returned WWII soldiers, come home to dig yet more trenches.

As “Hauraki Plains Drainage” points out, before swamps could be drained, and in some cases later torched, they were cleared of dead or rotting logs. Again, there is a clearing of forests, of new and old trees, for the purposes of colonial land use. I hope to acknowledge the legacy of colonisation at play in “reclamation,” and ask how this legacy might be represented in order to challenge readers’ views and understanding of swamps and wetlands today. ♣

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1 Strong, V. M., “Hauraki Plains Drainage”, *Ohinemuri Regional History Journal* 21, June 1977 <http://www.ohinemuri.org.nz/journals/47-journal-21-june-1977/913-hauraki-plains-drainage>

2 Reweti, Bridget, *Irihanga*, Tauranga Art Gallery, 9 September 2017–January 2018 <https://www.artgallery.org.nz/exhibitions/id/990>





Bridget Reweti, *Irihanga*, Tauranga Art Gallery, 9 September 2017–January 2018.





Bridget Reweti, *Irihanga*, Tauranga Art Gallery, 9 September 2017–January 2018.

SUPERVISORS' ACCOUNTS  
ON PERMANENT FOREST BONDS

*This is the story of Jeffie and Dan. It is a traditional tale, though one not often recorded in story. It is the story of what comes after toils have been made and successes achieved. It's not the story of heroic combat but the story of spoils. Let me begin...*

Jeffie's meeting with Dan was oriented towards new investments, which—all factors being equal—would eventually lead to a genuinely softer, benevolent Jeffie. This softening was not the conscious intention of Jeffie, for he already considered himself to be benevolent.

Jeffie had always succeeded. He was possessed and self-assured. This can-niness appealed to both the rebellious and to the ambitious, and that is also how Jeffie saw all people, as one. All strived, all needed something.

Jeffie succeeded in life because he knew how to feed off of all people's joys and to be a source for future joys.

He embraced bonhomie, which was oft lacking in the rebels, and he was welcomed for it. He embraced the bohemian, which was rarely present in the social climbers, and he was welcomed for this too.

Presently, Jeffie found himself in a most unreasonable space: his success had bred a kind of complacency. It was a malaise lacking the satisfaction of tropical humidity. His hunger had wandered. This was no miscalculation on Jeffie's part but an inevitable, though untimely, result of him being the nicest, most convivial person you could ever meet. Did he have charisma? Well, no, he didn't. But he recognised that intelligent charm in others, and was able to use it rather than be flustered by it.

This is why everyone liked Jeffie and why Jeffie was now able to command his own small fortune. But let us not get carried away—the fortune was not so vast. Maybe it wasn't even a fortune. Jeffie was only young and possessed a strong moderate risk portfolio that would ensure his fortunes would never sink below that of the national and world economies. His fate was linked to the broader economy in a manner he liked to compare to the umbilical cord connecting mother and child.

Dan had a three o'clock with a, an—um—yes...he had to check. Yes, a Jeffie Burke. No Mr, no Mrs: just Jeffie. Would Dan ask about this? No...best not to ask personal questions of a client. No good could come from it.

He chose to meet him on site. Near the showcase redwoods. That's how you close a sale. Get the customer to buy into the dream. Engage all of the senses, not just the sense of profit.

It's the same selling a stereo as it is selling forestry bonds. Surely it was: hit them with the full on, full body sensory experience of what's to come. Wait until they're in that sweet zone. Then yank it away, slip the whole wonderful, unadulterated mess under their nose and get those signatures. Make that money.

Dan regularly told friends that—actually—he was also pretty keen to invest in some of the redwood stocks. Then he'd be able to show investors, as an aside, that he had skin in the game. Not that this prevented him telling investors he already had skin in the game, but this would allow him to prove it.

Returns looked good on paper. They were slightly less than investments in the property syndicates in good times and slightly less than investments in precious metals in the bad times. But instead of ferrying between the two, investing in Environmental Impact Bonds (EIBs for short—Dan wondered if anyone called them 'eebs', or maybe 'abes') allowed the charting of a mid-road. Low-risk, moderate return.<sup>1</sup> The numbers lined up. But despite all this there was a nervousness to Dan about it all—not the numbers, but the people trending towards this... something about them not being so sound... not yet.

Counting the years on his fingers, Dan estimated that another five years in this work and he'd probably do it. Do it! Yes, you know? Do something good for the earth, and do something good for his own pocket.

To be honest—narrator to the narrated to—Dan would never do something good for the earth, at least not altruistically. In the years to come, he would make one tentative investment in an EIB. But even though he was the one who sold the bonds, the involvement of the public sector scared him. He'd on-sell his EIB investment just shy of one year in.

Jeffie was present when Dan drove up.

Dan took his measure of Jeffie who was crouched, musing about in the redwood needles as if foraging for a lost wedding ring. He was presentable. Not a time waster.

Dan noted no wedding ring. No jewellery. Nor were there other visible marks of success. Not a tattoo or hair out of place. Discreet.

Some might think that a man is odd if the first thing he does is touch and sniff at or around a tree. They'd rather a man place himself with a lumberjack's gait, make a visual measure of the tree and if the authority of this pose doesn't register, then a whistle of appreciation might be added.

But Dan was a modern fellow and had preempted the generation's change in comportment. When he whistled it was always slightly ironic. Men and women like Jeffie were the ones who had the incomes and nous to invest in something as intangible as an idea. They were as discreet with their appraisals as they were economical with their wardrobes.

'Sap. Needles. The smell of the earth about exposed roots. My friend, it's all here. You're Jeffie, right? Dan.'

Jeffie, still crouched, looked up at Dan. He continued.

'Listen. Follow me. There's a newly pruned section a short hike in. You'll get the real sense of it there. It'll speak to you.'

Jeffie took in Dan for the first time. Dan was a cut-rate version of Jeffie. But it was not Dan's fault. Jeffie's father had been a Professor of English. Jeffie guessed that Dan's father had probably been a manual worker working with sheet metal or in a factory. Jeffie had never worked in a factory and did not know what sheet metal was, but the words had stuck with him as an indicator of the most industrial type of labour. Dan would be incapable of putting one over on him, he guessed. This relaxed Jeffie almost to the point of trusting him.

'Do they speak to you?' Dan continued, trying to get a stronger read on his customer.

'Well...' Jeffie answered, 'I suppose they do, in a sense. How could they not?'

It was supposed to be small talk—which both Jeffie and Dan considered to be their strong suit—but both took one another off guard.

'Most people who invest just see trees as big clunky forests—a grove at best with a few woodland creatures,' Dan continued. 'They don't really

realise what a tree is made of—trunk, leaves or needles, branches. But there is so much more, too... the bark, the sap, nests that wouldn't exist without the right-angled twigs.'

As they walked, Dan gave his spiel on the new investment opportunities in Permanent Forest bonds. Dan's main income didn't come from Permanent Forests. Quite the opposite. It came from selling forestry blocks with the intention of a thunderous harvest. The pace of his patter underscored that he was new to the game.

Dan knew what he sounded like. But since there was no one else with the foresight to sell EIBs, it was fine. No need to worry about someone else doing it better. This relaxed him. That being that, he was still keen to impress Jeffie, and to let him know he was the man's equal.

'Well the point all starts from a very simple principle—consider the trees not as growing towards a deadline when they'll be cut down and can be used. You know this of course, being a bit more refined than our usual investors. Consider them as having actually already been producing for decades now. And not just because people have some simple appreciation of trees as things of beauty but for it all—a place to store carbon, protection against soil erosion, a habitat for endangered snails or ... or whatever lives here.'

'And is that factored into the evaluator impacts?' Jeffie asked, already knowing the answer.

'Well, no. No. But that's not to say it's not a reason to invest. It's just so hard to measure, right? I mean—the proof of these bonds is that there's nothing to fear. The government will pay out if the trees are still standing—which they will be. It's not if the snail stocks—counted or not, adult or not, there are so many measures!—are maintained. We're not a bunch of hippies. We're foresters around here and what we know is growing trees. If people want to pay us to *not* cut them down it's as good as—no it's better!—than having to do so. We all know how terrible it looks—really it looks terrible!—when the log harvesters tear through.'

Jeffie had stopped listening as Dan set about the delicate task of proving his local credentials while not upsetting an investor. It was embarrassing for Jeffie to see any person try to justify themselves between income and morality.

The two walked on and Dan's speech slowed. The redwoods gave way to a pruned section of fir. But that section, too, was coming to an end.

In front of the investor and the intermediary was a bare gully rutted with an excess of skidded tread marks. Both sides of the gully sloped down to a point where a stream must have once trickled along. But before the two of them was no such idyll. While grasses and weeds were beginning to grow back on the sides of the gully, the soil and wasted branches and upended roots had made their way down to the bottom of the valley. A dirty little stream wended its way through the morass of mud and rubble.

‘This is where the Permanent Forest will be located. I don’t like people to see this. But you’re investing in regeneration as much as anything else. And we can’t regenerate unless we know how low we’ve really gone.’

### • Impact •

Dan sensed that Jeffie was cheating him somehow. This wasn’t his first deal in Permanent Forests but there was something about Jeffie that put him at such ease that he eventually became uneasy. It all seemed too simple, too... effortless. A sale without the sense of some small moral crime having been committed: this was new.

Dan thought back to other sales. He was more comfortable making a killing, and knowing it, than with a deal made with unenthusiastic equanimity.

But with these (and here Dan checked the deed of the document he was trying to sell) Environmental Impact Bonds based on these Permanent Forests, well, he was more used to investors with a yearning to be seen as moral. There *was* a type and a tone: imploring and insistent, as if one could only be moral by doing the right thing as well as being surrounded by those who were also moral.

But to make a sale and to not have coerced nor felt dragged along in the moral wake of Jeffie just felt wrong. I mean, Dan thought, why do the right thing if you act so damn uncaring about it?

‘Let’s go through it again. Just once more.’

Jeffie adjusted himself in his seat. It wasn’t the first time he’d had to explain only mildly difficult concepts to overly difficult people. And while it was odd that Dan now had Jeffie explaining the benefits of the deal to him, it was somehow...needed. No doubt, Dan was deeply confused.

Jeffie tried a different approach. ‘We’ve already talked about your role. You are the intermediary, I am the investor, and the government gives

the reward. Who does the work? Well this is work...this is your work, convincing me, which isn’t much work at all. But the maintaining of the forests—the creation of them and making sure they don’t all die off is up to your contractors. Just workers. Just people who you pay to do the job. It’s simple—investment plus effort equals profit. There’s no magic there. The only difference between what we’re doing and what you usually do is that instead of someone paying you with an eye on timber, it’s the government paying you to beautify the land and keep capturing carbon in the tree trunks.’

Dan rearranged himself in the seat. There was just something off about Jeffie, as if he didn’t actually love nature, as if he were more like his usual uncaring clients. And there was something else too...but he couldn’t name it and the time for closing was upon them.

‘OK. Sounds good, sounds good,’ agreed Dan. ‘I’ll put the paperwork together and, oh, I’ve got to head to the office to get some deposit authorisation forms, so... well... are you in a rush?’

The two men agreed neither were in a rush. Dan’s office was close by but he had a tradition of signing off a deal at a bar on the way back into town. It was one of those places where the clientele was changing but a makeover hadn’t been done. If it were a dive, it was only so because of a palpable history and certainly not because of the current customers.

### • Bond •

The discomfort Dan was feeling was a result of Jeffie being the very first person he had met of a new breed. Yes: a new breed. Let me explain with a parallel I draw from the writings of the French sociologist Bruno Latour.

In the 1890s there was a movement, including political parties, formed for people interested in hygiene including, among other things, water quality, vaccination, and the keeping of health records. This movement eventually disappeared as the policies of these parties became policies of all parties. Latour suggests that in the future, the same fate will befall the Green parties of today: their policies will be adopted by major parties as a matter less of politics and more of good civil management of the commons.

Jeffie was the first person that Dan had met who belonged to a future beyond being Green as a moral choice. He invested in permanent

forest stocks in the same way that his forefathers may have invested in railroads. Yes, his forefathers may have said: The rail is a wonderful invention that allows humans to travel great distances in short amounts of time, but as investors we're interested in being ahead of the pack, rather than behind it. Jeffie was a little more sanguine—yes, yes, he did understand that there was a moral need for investment in forest, but really this was just an investment in bonds, not environmental impact. The morality that he saw was in the people planting the trees, not in his investment. His return? It wasn't as phenomenally high as early rail investment, but it was a stable part of a diversified portfolio.

Jeffie was, as intended, assured by signing a forestry document in a local bar. Dan knew the bar staff and practiced a professional restraint with them that he hoped passed as ease. He may have been a little more strategic than Dan, but he wasn't looking for guile or deception. He was simply signing off on a deed he'd decided on before even agreeing to meet with Dan.

The evening progressed as one might expect: a tab opened, offers to pay for one another, a kind or perhaps knowing word from the bartender, and a few songs queued up on the jukebox.

The papers were signed without Dan even doing his usual joke about the irony of signing off on permanent forests on paper—'recycled, mind!'

As they moved onto a second beer, which was Dan's self imposed limit for work meetings, a sense of ease came over him and all wariness left. Jeffie, he decided, was unlike the other Environmental Impact investors and more like those who usually invested in timber. This made him seem genuine to Dan, in his own way.

Jeffie, however, was beginning to have doubts. He'd realised that this was the first time he'd invested in government bonds. They were sure and stable, no doubt, and he trusted the kinds of people who were in Dan's bar to make sure of his investment. But the government? What investor tied themselves to the government, rather than outfoxed it? These were, Jeffie would later decide, inconsequential, juvenile thoughts and merely one worry for a person slowly becoming more invested in stability than in chaos.

There was something, he would decide, quite nice about a Permanent Forest bond, something quite nice about having an environmental impact.

And so while Jeffie was the first breed of a new type of person that Dan had met, this personality was not so stable yet and it started to ebb away...Jeffie was on his way to becoming moral, even traditional. He was soon to understand himself as a man on the path to good. At first it would be just a hint, but he'd begin to implore. This intoxication of a moral environmentalism was not such a terrible thing, but it was also not a permanent thing. We will have to wait for another day for a human to truly live in the atmosphere of modern forests without an insistence on goodness. ♣

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1 In *Greening the Future: a case for environmental impact bonds*, Policy Quarterly, May 2017, David Hall, a senior researcher for the Policy Observatory at the Auckland University of Technology, discusses the incentives, and potential for environmental success, found within outcome-based contracts and EIBs. <http://igps.victoria.ac.nz/publications/files/da05d4aca69.pdf>





Permanent forest bonds, Hannah Salmon, 2017.







Red pine cellulose, Edward Hines National Forest, 2017.  
Photograph by Sara Black and Raewyn Martyn.



**PART TWO**

**SPECIAL INVESTIGATIONS  
UPON FOREST RESERVES**

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In the following chapter, “use” is discussed as integral to ecological, social, and economic systems. Use is reconsidered as a culture, a set of use practices that cultivate social and ecological protections and growth. And use is understood as practices of reciprocity, to reframe our understanding of how human activities can be symbiotic within forest systems.

*Edward Hines National Forest* is made using materials engineered, harvested, and derived from the interactions of ecological, social, and economic systems—materials that are artifacts of long-term use and industrialization. And from forest systems and materials currently being developed with future use in mind. Scientists Cilla Wehi, Carl Houtman, and Kim Landsbergen speak to these practices of research and use. And curator and writer Karsten Lund considers how diseased trees, can open up a frame of mind more attuned to interspecies entanglements that might be otherwise invisible to us.

**. Cellulose and wood products .**

Cellulose is found in the cell walls of plants, and in secretions of many organisms including plants, bacteria, and some sea invertebrates. Naturally occurring cellulose fibers, like cotton, have long been used by humans to make paper and textiles. In 1719, a French naturalist observed that: “The American wasps form very fine paper, like ours. They extract the fibers of common wood of the countries where they live; they teach us that paper can be made from the fibers of plants without the use of rags and linen, and seem to invite us to try whether we cannot make fine and good paper from the use of certain woods.”<sup>1</sup> As demand for cellulose grew humans looked for ways to extract cellulose from plant materials. For example, extraction of cellulose “occurred in the Chinese practice of boiling bamboo in milk of lime”. In 1838, during investigations to understand what differentiates woody and non-woody plants, ligneous matter was separated from the more starchy cellulose.<sup>2</sup> We now know that cellulose is comprised of long chains of glucose molecules, which provide the naturally fibrous forms. The chemical extraction of cellulose from wood has led to products like methylcellulose and nanocellulose which result from industrial processes.

We can understand these cellulosic discoveries as part of extraction-based economic and material histories, geographically specific and tied to particular ecologies that have moved through industrialization and deforestation to more sustainable use. At the industrial scale of production, geographic origins can become multiple. As a material invention it is tied to histories of waste capitalization and innovation of by-products. In the current context of peak oil and global warming, plant-based polymers are of renewed interest and subject to intense development.

The by-products of 19th century cellulose research, the earliest forms of plastics, led to development of Rayon and Viscose that disrupted the consumer and industrial cloth industries. As we go to print on this 2017 *Use Book*, new reports inform us that tiny microplastic fibres have been found in 94% of US drinking water<sup>3</sup>, and in at least four brands of European beer. Many of these microplastic fibres come from the “synthetic silks”, Rayon and Viscose, first developed in the postwar years as a way of using cellulosic by-products from the lumber industry that Edward Hines helped create. These fibres find their way from our washing machines through waterways to the sea. Some move through

the atmosphere and come back down in precipitation and a sort of fibrous dry and invisible rain. And others, older ones, once trapped in arctic ice, are now melting out and back to us again.<sup>4</sup>

In one sense, this might be nothing to fear. We don't know the impacts yet, and after all, much of it came from the trees. Knowingly or not, we've been inviting these invisible microplastic fogs and streams, into our bodies, via the ecosystem, on a daily basis for decades. This might be one of the largest "experiments" in biomaterial that we've ever (not) seen. Biomaterials are one way in which humans have forever been intimately in interaction with other parts of ecological systems. The systems that some corporations and governments seem to think we can separate ourselves from.

Cellulose-derived material has long been used as what we call biomaterial, substances that have been made to interact with the human body for medical purposes.<sup>5</sup> "The first device which can be called a biomaterial was a wooden prosthetic of a toe, in Thebes west tombs in Egypt, which was estimated to have been created around 1065-740 BC"<sup>6</sup>

### **. The US Forest Service Products Laboratory .**

Carl Houtman is a chemical engineer who researches cellulose materials at the US Forest Service Forest Products Lab in Madison Wisconsin. He's interested in generating new products and forms of "use" that can help sustain healthy forest systems.

One day, in early August 2017, we spent the afternoon talking with Carl about forest use. The fire season was beginning, but the large fires in California, Montana, and Oregon were yet to come. When Carl spoke of forest fires, he carefully explained the difference between fires that are part of the natural system, fertilizing fires, and sterilizing ones. Many ecosystems are adapted to periodic fires, but fire suppression and imbalanced use can lead to overstocked stands that burn with extreme intensity. In North America, humans have disrupted the use and processes of forests to the extent that the US Forest Service is now compelled to develop more (self-funding) ways of using it, as a means to remove material from the forest and prevent these sterilizing fires.

### **. Surveys within forest reserves .**

Cilla Wehi, an ecologist who works to connect mātauranga Māori and ecology in Aotearoa New Zealand, speaks about the possibilities of use as a practice of reciprocity between humans and other species, and between cultures. She asks questions about the use and circulation of forest knowledge, and discusses some of her community-based research that surveys how forest management systems can better provide access and interaction; the uses that create reciprocal relationships between species. Kim Landsbergen a forest ecologist and Associate Professor of Biology based in Ohio, discusses the ways ecologists read past, present, and future landscapes by "walking the landscape". And how both old and new technologies are used to collect data and interpret changes over time. The current political landscape creates new challenges for this work and in spite of this, she considers the possibilities for biophilia to have its way. ♣

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1 René Antoine Ferchault de Réaumur, physicist and naturalist, in a treatise submitted to the French Royal Academy,

2 4.A. Payne, *Comp. Rend.*, 1838, 7, 1052

3 <https://www.theguardian.com/environment/2017/sep/06/plastic-fibres-found-tap-water-around-world-study-reveals>

4 Obbard, R. W., Sadri, S., Wong, Y. Q., Khitun, A. A., Baker, I. and Thompson, R. C. (2014), Global warming releases microplastic legacy frozen in Arctic Sea ice. *Earth's Future*, 2: 315–320. doi:10.1002/2014EF000240

5 Wikipedia, <https://en.wikipedia.org/wiki/Biomaterial>, (August 2017)

6 Pg 24, *Hybrid polymer composite materials : structure and chemistry* / edited by Vijay Kumar Thakur, Manju Kumari Thakur, Raju Kumar Gupta, Woodhead Publishing 2017

## CONVERSATION BETWEEN CARL HOUTMAN AND RAEWYN MARTYN

### A SEA OF HEMICELLULOSE GEL: IT'S HARD TO THINK LIKE A TREE, WHICH MAY LIVE FOR HUNDREDS OF YEARS

*Carl Houtman is a chemical engineer who researches cellulose materials at the US Forest Service Forest Products Lab in Madison Wisconsin.*

**Raewyn:** What are you working on here at the Forest Products Laboratory?

**Carl:** We're converting wood into cellulose nanomaterials. Trees and plants have already been making nanocellulose, so it's silly for us to say we're inventing nanocellulose. We're just coming up with a way of isolating it. In a chemical sense we're being very vicious to the wood. And the only reason we can get nanocellulose out is that the cellulose is so chemically strong that it can survive the abuse that we put it through.

**R:** There's a long history of trying to extract it; Anselm Payen, the chemist, in the 1830s. And, in other ways, much earlier, in Egypt, Greece, and China. People were also looking at paper wasps and the way that wasps were able to extract cellulosic material.

**C:** Dard Hunter, in the History of Papermaking, talks about that history. Early modern papers were made using old rags. There was a huge industry in the 1700s, with a union, a rag pickers guild. The rise of aggressive chemical pulping came with the rise of the industrial revolution and increased demand for paper. They had looked at paper wasps and started macerating wood, using mechanical processes. And then the aggressive chemicals came in, to match the quality of rag paper. Largely sulfite, to depolymerize the lignin and make it soluble. To make paper strong you have to get the cellulose bonding to other cellulose molecules. Because the lignin is encrusted around the cellulose you remove the lignin to make strong paper.

### Wood is really all about making tubes

**C:** To understand wood, talking about wood biogenesis is useful. If you start with an algae, how does it become a terrestrial plant? *Cooksonia* is one of the first things that actually stood up, giving it some selective advantage over things that were still flat, on the surface, or under the water. And then, we think *Archaeopteris* was the first tree, fern-like things. They were made of tubes. If you think about it, wood has to solve several problems: water loss, carbon dioxide transport, support, and protection.



Pen and ink drawing by Al Zork, 2017.

That's where those tubes started. Some of those tubes are structural, especially the secondary xylem which is the inside of wood. In the early phases of that wood, it provides water transport, and other functions. The tubes start out as a disorganized, oozy, cellulose/hemicellulose layer. Cellulose microfibrils start wrapping around the cell, almost like a cocoon. Then lignification occurs and the whole matrix is glued together as a composite tube. This wrapped structure provides tension which makes it strong.

### **Material often fails at the interface**

**C:** To talk about tree growth: the secondary xylem is wood, and the secondary phloem is bark. Phloem transports down and the xylem transports up. The only thing that's really living is the thin layer between the xylem and the phloem. On an electron micrograph, you see little islands (nodules) that are putting out cellulose. The cellulose is coming out into a sea of hemicellulose gel, and they're associating and combining, and hemicellulose coats the cellulose nanocrystals.

**R:** The "interfacial moment"?

**C:** Yes. Hemicelluloses act as an interface between the cellulose nanofibrils and the lignin matrix, this interfacial moment. If you're making a composite, like carbon fiber for a tennis racket, there's these really hard carbon rods, and an epoxy, or other matrix that holds this all together. The material often fails at the interface between the hard rods of carbon fiber and the epoxy matrix. Hemicellulose prevents this kind of failure in wood, it's incredibly strong because it can respond to stresses without fracture.

### **We're still having that conversation. What is a forest? How does it sustain itself?**

**R:** In terms of forest products research and forest use, how would you say the relationship has shifted, between sustaining production vs sustaining ecological systems?

**C:** In the US, we've been having this conversation for a long time. Gifford Pinchot, basically the founder of the Forest Service, in 1890 he was looking forward and saying, railroads are expanding, industrialization means we're going to need resources. Then you had folks like John Muir, who said, we've got to preserve the land. And so Teddy Roosevelt was part of this grand compromise, with Pinchot and The Wilderness Society, they came up with this idea of "let's set aside wilderness", like Yosemite at the time. The other side of the compromise was the National Forest system. We're still having that conversation. What is a forest? How does it sustain itself?

One thing our forests currently face, is that modern suppression of fire was too good. Many of these locations are actually fire adapted; their ecosystem is built around a 30 or a 20, or a 40 year fires cycle. There are various lengths of time between fires, but they need the fire to

go through. Some trees need a fire to germinate. In some ways, Smokey Bear has been too good, and we face horrendous fire seasons because we have overstocked forest stands.

In the inner mountain areas, Idaho, Montana, when a fire comes through and it's an overstocked stand, it's what is referred to as a sterilizing fire, it's so intense it wipes out the ecosystem. Ideally, there'd be enough money to do mechanical remediation, if you cut the undergrowth and lay it on the ground, it'll rot, when a fire comes through it's fine. But it's costly. So developing these cellulose products means you can get some value back from the cost of removing trees.

### **There are actually more standing trees in the US than ever, but there's not more standing forest.**

**R:** What's the difference between a plantation and forest, in your mind?

**C:** The distinction is important. There are actually more standing trees in the US than ever, but there's not more standing forest. If you use the definition of a naturally functioning—burning, sometimes—system, there's a lot less of that than there was in previous history. But there are a lot of trees being grown. I see plantation forests as any other crop. You have to make a choice about what you want that land to be doing. Do you want that land to be growing corn? Or, do you want that land to be growing trees? A tree plantation that you harvest every 40 years has much less environmental impact in terms of fossil fuel consumption, and other metrics, than corn that's row-cropped every year.

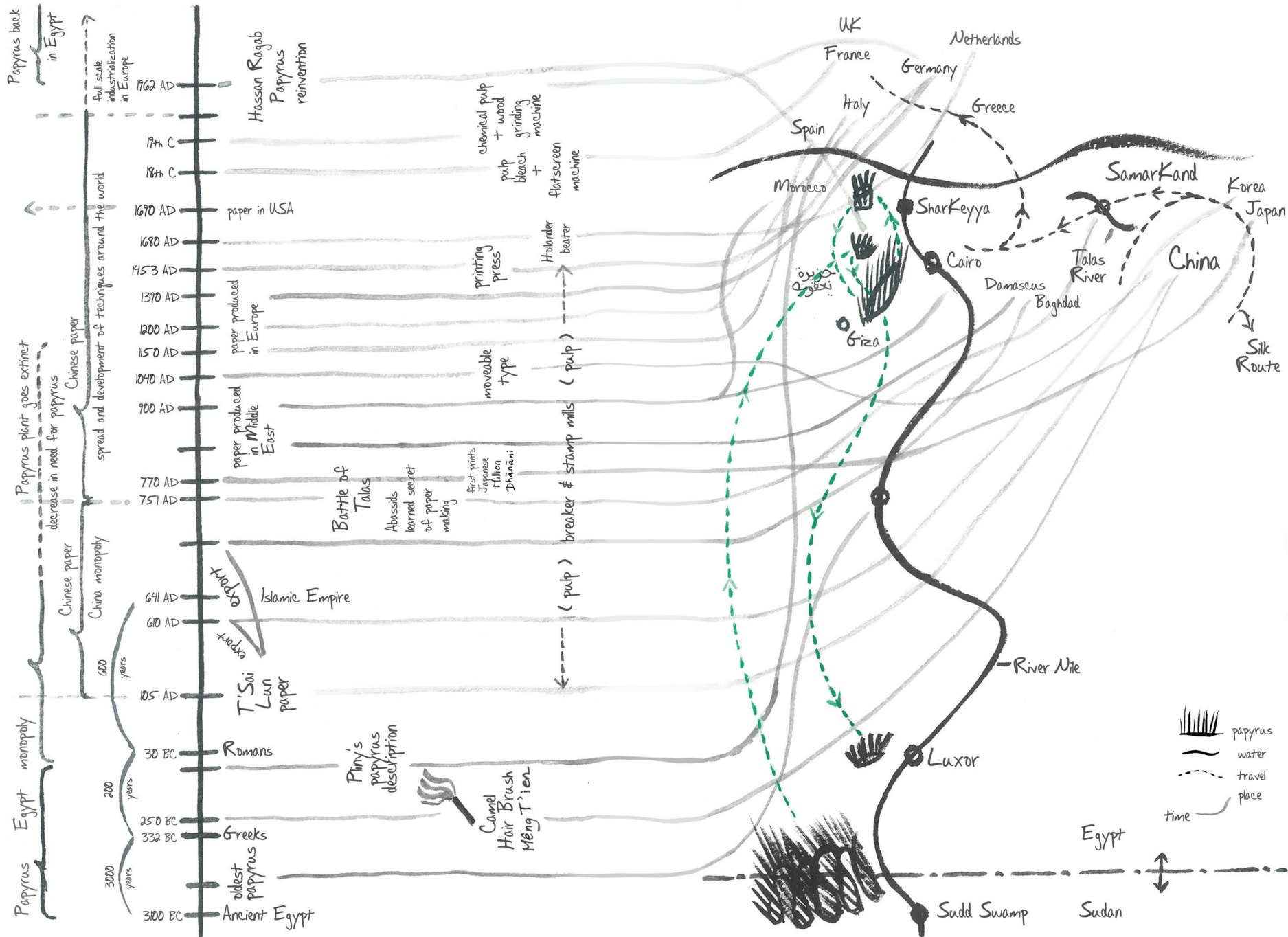
**R:** To feed cattle that then emit carbon

**C:** That's right. I see plantation forest as practically useful material, and it still supports wildlife. There's a lot of woodpeckers and squirrels and other invertebrates that can live there, which can't live as well in soybean fields or cotton fields.

The National Forest system, I would call those forests. They are systems with management plans, but there often isn't enough money. There are some prescribed burns, and they do plant trees, sometimes. And they're also left to naturally reproduce. This tends to make the forest more consistent with what its local environment supports. When you let a forest reproduce itself, then you get something that's closer to a properly adapted system. Forest systems we haven't made as many choices about, are probably more robust. There's a lot going on in forests that we don't even understand.



# The Making of Paper, a timeline by Abba elBahrawy, 2017





**Do you photosynthesize?  
No. You're fundamentally consumptive.**

**C:** Even in our removed and glassed world, most of us are still biophilic; we like life. Most people have some experience walking into a forest, and feeling "ahhh", often as a kid, so it's a formative emotion. We still have that little kid in us that does not want to kill trees.

As an engineer, I look at it and say: well, do you photosynthesize? No. You're fundamentally consumptive. You're going to eat things because you aren't autotrophic. You don't make your own food. I think there are folks that don't think about it that way. Especially in the environmental movement. And I consider myself an environmentalist. For example, I was at a conference, and there was someone from the Sierra Club, who was arguing that we should use steel 2x4 framing to build houses. And I asked them, do you realize how much embodied energy is in that galvanized piece of steel? You've mined ore, you've burned coal, and all of that. Whereas, a tree, cutting it, drying it, turning it into lumber, is consuming less resources. In fact, given our current global warming, the more trees we make (plant, use, and replant) the less carbon is in the air, because lumber takes carbon out of circulation.

**R:** But does it matter where the trees are taken from?

**C:** It does. For some ecosystems, research suggests you should do strip clear cutting, meaning that you pick a swathe and then you cut all of the trees in that swathe. As opposed to selective harvesting that often removes the high quality reproductive trees, the trees that you want to survive. It does damage by driving on other roots, and messing-up the ecosystem. Swathes of clear cutting, leave intact forests on either side, and it will reproduce itself naturally. People don't like the look of it and get angry, but If you drive by five years later, it'll be a lush and verdant system that's reproducing and doing what it needs to do.

In 1988, Yellowstone burned. With this huge fire, and there was a big debate, and the Forest Service and the National Park Service took a lot of flak for deciding to let it burn. People were livid, calling up congressmen, etc. And now the data shows that Yellowstone system responded incredibly well. And in fact, there's some suggestion that many good things happened. It's hard to think like a tree, which may live for hundreds of years.

**The earth is not a closed system**

**R:** how does this relate to the idea of entropy within systems theory?

**C:** Well, you can never win, is what thermodynamics says about entropy. But the thing is, the earth is not a closed system. If you make your box bigger so that it includes the sun...then that's different. If you just think about the earth, there's a huge amount of energy coming in every day. Biological systems use this energy to work against entropy.

We're in an unstable system. But the reason we exist is because of sunlight. Plants store sunlight and then when we eat them, we get energy to make us more ordered. All of this energy allows us to sit uphill in a thermodynamic sense. It's funny, I actually see myself as part of the system. As an engineer, I don't have the engineering arrogance to think that I can control nature. So if you look at the forest fires, we are going to spend, this year, probably 2.5 to almost 3 billion dollars, fighting fires. The fires that consume that money are the big ones you hear about in the news, encroaching on a city. Forest Service did studies on the factors contributing to fires going big and the factors that allow us to put them out. The only time we get fires under control is when nature shifts; rain comes in, wind calms down, terrain changes so that there isn't fresh fuel. Basically once it's going, there's not much we can do. We can save a few structures, we can save lives. But we really can't control it once it's gone big.

Practically every forest in Wisconsin has been clear cut. It is no longer a natural system. By doing that, we have set ourselves up to have to continue managing the system. A good example is in Canada where the pine beetle infected wood, and we're not sure if that is caused by (human-induced) climate change<sup>1</sup>, or not, but those dead trees, are like a tinderbox. So, there's a case where we've got to come up with uses for that wood. Or it is going to burn and sterilize the land. In other places in the world, there's a need to be reducing consumption of wood. I don't think the exploitive wood harvesting is happening in the US.

**R:** it already occurred.

**C:** Exactly. Basically, all of Chicago was built out of white pines from northern Wisconsin. Twice. Because after the Chicago fires they had to do it again.

**That is carbon that is not in the atmosphere,  
for the life of the building.**

**R:** What are you most excited about for the future of nanocellulose?

**C:** Going into nanomaterials research, I wasn't convinced. It's such an energy intensive process to make/get these nanomaterials. Trees did such a good job of putting wood together in the first place that it's really hard to take it all apart again. That's fundamentally the problem. But as I've gone forward, I've started to realize that it's resulting in products that are better environmentally.

**R:** What's the risk of these advances encouraging people who want to make these products to cut down trees that are not sustainably harvested?

**C:** Some weird things can happen with international trade. Not so long ago, the mid 2000s, it was cheaper to ship wood chips from Brazil to Wisconsin than to cut down trees and chip them, in Wisconsin. It's got to do with exchange rate, availability, and all kinds of things. You can get these weird mass flows. Whether producing a new product could make it so lucrative that people would start shipping wood from Brazil to do it, I don't know. I do know that if I can make a product of enough value, it will make sense to make it from wood here.

Because of the way Germany was giving biomass credits for burning wood pellets, there was a while when ships were coming to the port in Duluth, northern Minnesota, loading with wood chips and sailing to Germany. So when you start thinking about government incentivizing, you don't know what the consequences will be. And capital can move around so easily, you just don't know what can happen.

**R:** How about bacterial cellulose?

**C:** The *Acetobacter xylinum* make this bacterial cellulose. I did some research twenty years ago, using the bacterial cellulose as a model system, trying to understand how cellulose is formed. When you're growing *Acetobacter* though, you still need glucose. So where are you going to get your glucose from? Well, cornstarch is usually the place. In terms of environment, it's probably easier to get hold of it and do the refining, so there's some uses for bacterial cellulose.

I always try to think through, what are the alternatives? Trying to think holistically; what am I replacing; what are the real energy inputs; what are the real resource inputs; and then what is the use. I think

we (the forest products industry), have gotten a bad rap, because we don't have double digit growth, and we've been around for 150 years and we're kind of dinosaurs.

**R:** wood is old technology

**C:** I think, fundamentally, the more things we make out of wood, solid wood especially, the better the ecosystems and planet are going to be. For example, there's a big project going on with mass timber and cross laminated timber. There's some work going on with making ten-story buildings, out of wood.

That technology, from a life cycle sense, is great because you're replacing concrete. The embodied energy in concrete is huge and cement production accounts for 5% of world CO2 emissions. If you build out of wood, that is carbon that is not in the atmosphere, for the life of the building.

**R:** How does the forest industry incentivize this kind of use?

**C:** I don't think you can incentivize our way out of this. I think it takes a shift of our desires, in a societal sense. If I want to drive down a smooth road in my big fancy car at 90 miles an hour to my beautiful house, if that's what I want to do with my life, that's not compatible with the biological cycles of the earth. We need to develop a lifestyle that reduces fossil fuel use, and wooden structures can contribute to this. ♣

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<sup>1</sup> More information about the relationship between human-induced climate change and bark beetles can be found on the Forest Service website: <https://www.fs.usda.gov/ccrc/topics/bark-beetles-and-climate-change-united-states>

## CONVERSATION BETWEEN CILLA WEHI AND RAEWYN MARTYN

### THEY HAVE BECOME OTHER THINGS

*Priscilla Wehi is a researcher within the Wildlife and Ecology team at Landcare Research in Aotearoa New Zealand. Cilla specializes in animal ecology, ethnobotany, and works to connect mātauranga Māori and ecology.*

**Cilla:** Recently, I attended a symposium, the Pierre Elliott Trudeau Symposium: ‘Indigenous peoples’ land rights and the roles of ethnoecology and ethnobotany—strategies for Canada’s future’, at the University of Victoria, to honour Dr Nancy Turner. She’s an amazing woman, an ethnobotanist who has worked with coastal First Nations people for more than thirty years. We entered the room where the symposium was held, and it was full of plants. What became really clear was that people at the meeting were saying, “gratitude is a really important part of our philosophy; the plants and animals are our relatives”. I heard this message again and again. And, “the plants here are witnessing, because we’re here to talk about plants, and it’s important that they listen and hear what we have to say.” That’s why the room was full of plants. I was really intrigued and moved by this, and I connected this with the Edward Hines Forest history that you have been working on, which focuses on how we connect with trees and other species.

**Raewyn:** The 1905 Use Book created a vision for future forests, in a way. What was included in that document became very powerful. Whose visions got to be in there, and whose didn’t. And, whether they’re all anthropocentric, or not.

**C:** My experiences in Canada re-emphasised that it’s about reciprocity. That there’s nothing inherently wrong with cutting down a tree, if you need it. But it’s about not wasting the tree, it’s about having a purpose in mind. It’s a reciprocal relationship. And it seems to me, that’s the relationship you’re engaging with in your work.

I am working on a project on whakataukī<sup>1</sup>, ancestral sayings that have been passed down intergenerationally. There’s a lot of ecological

knowledge in these sayings. My friend Hana, who lived up at Ruatoki, created a new project from some of this work. She and her sister and two other artists from Ruatoki made palisades from plywood to stand tall along the back of the stage at one of the recent Tūhoe<sup>2</sup> festivals at Ruatoki. On every palisade they recorded whakataukī relevant to that area. They took our work and created something new to make it visual and alive. After the festival, they gave the palisades away, to her health clinic, and other places. A lot of them went to her cousin who was building a house. I love that the palisades have become other things, but the memory of that past experience still lives.

### The birds they have a relationship with

**R:** One of your recent publications explores knowledge use. I’m interested to hear about how this thinking can influence the way we conceive of forest and land use?

**C:** In museums, there are Māori taonga<sup>3</sup>, valued items, like cloaks or taiaha<sup>4</sup>, that link back to particular people and tribes. At the moment there’s little connection between the objects and those people. Can we set up systems to reach people, but also protect knowledge at the same time? It’s all about ethics and how people use knowledge. In Western society, generally knowledge is available to all. But that’s not always the way that other societies do things; for example, different kinds of knowledge might belong to particular people or families.

**R:** In a Western context, there is still inequality in who has access to knowledge and, like you say, who can visit a museum. There can also be inequality with access to forests.

**C:** I brought my kids up outside the city in a semi rural area. Even there, our backyard birds were finches, and the kids didn’t know that they were introduced species. Yet these introduced birds were the ones they had a relationship with, that they were seeing. It is a profound change from the experience of people like me, who grew up with native birds like kaka, or kereru, and with forest around us.

**R:** That’s making me think of the term futurity. And our ability to allow both things (past and present) to be true and to move forward with them.



Photo by Hana Harawira from Te Ahurei o Tūhoe 2013.  
Palisades created by artists Hana Harawira, Wena Harawira,  
Adrienne Brown and Urquhart Henderson.



Palisades created by artists Hana Harawira, Wena Harawira, Adrienne Brown and Urquhart Henderson  
Photo by Hana Harawira from Te Ahurei o Tūhoe 2013.



## **We bring ourselves**

**C:** We bring ourselves, we bring our whole culture and context with us. The ways that we think and the things that we value.

**R:** The 1905 Use Book thought of use as attached to physical, tangible things that can be used and profited from, or used for pleasure or recreation. What you're talking about is perhaps less tangible, less utilitarian forms of knowledge. The stories, ideas, and experiences of forest, that might influence our use.

**C:** If you think about sharing knowledge, often you create a circle of some kind. You might have a project that you are working on together in a practical way. But you're probably also experiencing or talking about other kinds of knowledge, and intangible knowledge. There are some kinds of knowledge I don't work with in my job. I don't work with indigenous medicinal knowledge, because I think that's best left with practitioners.

Other kinds of knowledge that I've put in the public domain, come from that domain. I've been working with weavers in the north of the country recently. I love working with weavers! I did a critical review of historical documents, looking for information about weaving and plants weavers use—this helps to give weavers new access to information. But I also interviewed weavers, and they have a particular view and experience of the world that informs how they share knowledge. And there might be some things that they choose not to share knowledge about.

This work developed into a project on climate change. There are four or five different plants really valued for weaving; pingao, harakeke, kiekie from the forest, and kuta, a wetland sedge. A research student came over from Hawaii, to work with us. We asked: what will happen to these plants with climate change? We modelled plant distributions in relation to tribal boundaries and we then incorporated data on carbon emission trends. We asked: are there going to be safe havens for these important plants? Are they going to spread with the likely changes to climate? Or do we need to think about restoring habitat for them? It's a sideways approach; we're building on traditional knowledge of plants, and the practices of weavers, but we're adding another layer of science to create understanding of what might happen in the future. There's all sorts of ways you can use or align different kinds of knowledge.

## **We need lots of different skills and views at the table**

**C:** People who work with communities or mātauranga Māori now understand we need to be in discussion together to solve environmental problems. There's been so much appropriation of knowledge in the past, with colonization. I think people now are more careful not to appropriate; trying to give rather than to take. But we don't get it right all the time and there are people who are new to that.

Science has become more collaborative. Partly because the environmental issues that we're dealing with are now so pressing. We need lots of different skills and views at the table to find solutions. In the past it was more individualistic. Maybe that's also because more women are in science now, too.

**R:** By coincidence, we're Skyping a few hours after Trump confirmed he will pull out of the Paris Agreement. Predicting this, a network of cities around the United States have begun thinking about how they can galvanize their own commitments to CO2 reductions. I'm wondering what your thoughts are about that, specifically that localized approach to resistance.

**C:** It's a fantastic form of resistance. I think, often, power does truly reside in these smaller groups. Where people say to themselves and their community, "hey, we really have to do something. We can't rely on Trump, we can't rely on that greater machine"; that actually when it comes down to it, what we all do *does* matter. And so I think, bizarrely, it is actually a powerful position. It is very easy, in our busy lives, to not commit time or energy to things that matter because we think somebody else is taking care of it.

I was talking with a friend the other day about kereru and harvesting. He felt that when people can no longer harvest kereru, our relationship with the bird breaks, and the bird no longer feels that we care about it. And as part of that circle, one of the reasons we care about it is because we harvest it. The bird is important in our lives, in ceremony, as food. We protect it because of the importance of that relationship. So, in a similar kind of way, if we give what we have to the forms of resistance you are talking about, then ultimately, we will get something back. We will make a difference, and that's the world giving back to us. But if we do nothing and show that we don't care, it breaks that reciprocity. So we need to be part of the reciprocity. I reckon forests are the same.

### Where humans sit as part of “nature”

**C:** A lot of our conservation thinking, in New Zealand, has come from a British Victorian view where the enjoyment is based on aesthetic beauty, without real tactile interaction. You see that in museums too, although that’s changing. Even in the States, from my perspective it seems there is a strong aesthetic of preserving forests for their beauty.

For me, one of the great joys of working with indigenous peoples is learning about many different ways of being in a forest. We can have deeper relationships by interacting, not just looking. It becomes an emic rather than an etic relationship.

**R:** What are some of the things that allowed that to shift in NZ? Do you think it has shifted, much?

**C:** Stronger awareness of Māori world views has created a shift. The co-governance of Te Urewera<sup>5</sup> has created some change. Preservationist, conservationist views still persist in NZ, but there has been a shift towards more interactive relationships. We’re not yet engaged in fully interactive relationships though.

**R:** What’s an example of that, that you’ve seen in practice there.

**C:** In Te Urewera? It’s still very early days, but pig and deer hunting are really important activities for locals. The forest is a food and medicinal cupboard for Tūhoe, and people go to traditional places for medicinal plants. Having the freedom to do that again, is an important shift for both Tūhoe and New Zealand.

**R:** What are possibilities you see for balancing interactive and ecological things, elsewhere. In that tension there?

**C:** In National Parks, there’s a permit system to collect plants, but nobody likes permits. It’s a very impersonal process. If you think locally, in communities, people have informal agreements; who comes to their land to harvest, or collect firewood. Working closely with communities seems a better starting point.

We’re starting some research around urban people and kaitiakitanga.<sup>6</sup> How do urban people gain a sense of belonging to the land, and how do they exercise their kaitiakitanga, or reciprocity with the land when they live a long way from their roots, for example? This grew from an urban ecology project where we talked to elders about where they sourced plants. Some got medicinal plants from the roadside, or from

city parks. We went to the city council and asked if they’d thought about planting more of these plants in parks, to create spaces that encourage that interaction. I think this shift is very important for urban people. We need to find ways of keeping and creating connection.

### Ecology has become more complicated

**R:** What are your thoughts about forestry in plantation forests, and the management of more “naturally” occurring ones.

**C:** There’s the issue of where humans sit as part of “nature”. Sometimes we want to return a forest to what we think is “natural” by limiting human access, and that suggests we understand humans as outside of nature, not part of a functioning system.

As for introduced species, I’m not a huge fan of plantation pine forests here, but they often have an understorey of ferns and other plants that provide excellent habitat for endangered birds like kiwi. On the other hand, wilding pines can be immensely problematic because they spring up on iconic tussock landscapes for example. There are new, strange continuums in how we experience things. I don’t see the dichotomy between natural and “unnatural” landscapes in the way that I might have a few years ago—I think ecology has become more complicated than that.

**R:** How did that change for you?

**C:** I became aware of some of the interesting relationships that indigenous people have with introduced species. Hawaiian weavers harvest some plants that are considered to be pest species, and use them in cultural activities. The native species that were traditionally used have become rare, and people have replaced these with introduced species in order to maintain cultural identity. Introduced species may become useful and important, even while they are invasive. Which is part of the dialogue that we (you and I) were probably brought up with.

**R:** In Wisconsin, during periods of glaciation, the red pine initially migrated south, then to the northwest, above Michigan. It found its way back to white pine stands from a long-standing refuge in the Appalachian Highlands.<sup>7</sup>

How does contemporary “climate adaptation” connect to these other forms of adaptation that have happened through historic changes, and via land use?

**C:** When we talk about adaptation as an evolutionary process, the speed at which it happens is important. Time is important. Evolution is a generation-by-generation process, so for species that breed slowly, evolutionary change is slow.

With climate change, we hope that species will be able to shift their distributions. But it's often easier for animals to shift their distributions rather than plants. Because of connections between species there are problems. For example, flowers might open earlier or later in the season, and this temporal shift can affect insects that depend on the flowers.

When we talk about how ecosystems might shift with climate change, or human intervention, it's mind boggling, all the different interactions that you have to consider. When mining companies say "let's dig up Paparoa National Park, and then we'll restore the ecosystem afterwards"—when we go to restore it, we realise how little we understand of the ecosystem complexity. It becomes a simplified, barren version of itself.

### **In one harsh, very bitter climate he learned to become a tree**

**R:** You've spoken about interactivity. How does that connect to challenges of human-induced climate change, when we're part of that system, we are adapting too. Part of our adaptation is to assist the adaptation of other species?

**C:** People have always moved plants around. With plants like harakeke (flax), people discovered varieties that were good for weaving and moved desirable plants around the country. Some landscapes we think are "natural", aren't. Sometimes we don't recognize past interventions.

One book I love is a fantasy about a young man who inherited magic. He realized he was being hunted, and he traversed the whole landscape of that world. Everywhere he went he'd learned new things about the natural world, and himself. In one harsh, very bitter climate he learned to become a tree. For centuries, or a very long time, to slow down and become a different being. In that way it seemed that he had disappeared, but he was there all along, he had just become part of that landscape.

Dactylanthus is an endemic species in NZ, and it parasitises tree roots and then grows upward. It has really beautiful white flowers that are fragrant, and short tailed bats feed on the nectar. Short tailed bats pollinate Dactylanthus; they put their faces right into the flower and the pollen gets caught on their forehead. Their little faces are covered in



Pen and ink drawing by Al Zork, 2017.

pollen. That's an example of one of those very strange plants that people don't know much about.

**R:** And it has this intimate relationship with our only endemic mammal.

**C:** And with the trees. We know very little about how it actually grows, or finds its host plant.

If you're observant, you can see a lot of phenological changes, changes in the way plants grow or flower. People who chop forests down spend a lot of time in nature, and are very observant of what's going on around them. They offer all sorts of ecological insight despite being someone you might not think of as an environmental guardian or knowledge holder.

The New Zealand Department of Conservation is building boardwalks everywhere to protect things. But can you have the same relationship with a forest if you don't walk on the ground? It's bizarre that you can walk through a National Park and not touch the ground. I learned that when we as Celtic people said "touch wood" in past times, there was hope and desire in those words. The words came from a belief that trees held the spirits of our ancestors. Before someone went into battle they might pray to the ancestors to come home safe from battle, and touch the tree.

**R:** A reality check, and a promise.

**C:** Lots of worldviews support healthy relationships with the environment, but I think we are losing our way. I've always liked how people look for something wooden to touch for luck, even when there's nothing wooden around. Some of my family came from the Orkney Islands. There's a poem by Cilla McQueen about the Orkneys, "where no trees grew", and I think: wow, imagine coming from a place where there were no trees. What would that be like?

**R:** But then you've got all that peat. It's like there's a past, where the trees are locked underground, a different metabolism. But different again with the islands where the trees just didn't want to grow.

**C:** Too much cold, too much wind. Too much battering. But you are right. ♣

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1 In te reo Māori (Māori language), whakatauki are short sayings that transmit philosophy and knowledge. They are one form of oral tradition <http://www.tetaurawhiri.govt.nz/learn-te-reo-maori/tikanga-maori/whakatauki-en-nz/>

2 Tūhoe tribal groups trace their traditional lands to Te Urewera (Te Urewera National Park)

3 The word taonga is often translated as "treasure", which can be intangible. The te reo version of te tiriti o Waitangi, the 1842 treaty between the British Crown and Māori signed at Waitangi, guaranteed tino rangatiratanga (full authority), over taonga. <https://nzhistory.govt.nz/politics/treaty/the-treaty-in-brief>

4 Taiaha are staff-like weapons made from wood or whalebone

5 In 2013 Tūhoe people and the New Zealand government agreed to give Te Urewera National Park legal rights of personhood. There is co-governance to ensure guardianship of those rights. <https://www.earthlawcenter.org/international-law/2016/8/new-zealand>

6 Guardianship and a way of managing the environment through Māori world view <https://econation.co.nz/kaitiakitanga/>

7 [https://www.na.fs.fed.us/spfo/pubs/silvics\\_manual/Volume\\_1/pinus/resinosa.htm](https://www.na.fs.fed.us/spfo/pubs/silvics_manual/Volume_1/pinus/resinosa.htm)



## CONVERSATION BETWEEN KIM LANDSBERGEN AND RAEWYN MARTYN

### WE'RE WALKING INTO A SYSTEM THAT HAS BEEN BUILT BY ORGANISMS OTHER THAN US

*Kim Landsbergen is a forest ecologist who studies the impact of humans, invasive plants, and climate change on forest form and function. She is an Associate Professor of Biology and Environmental Science at Antioch College, and a Certified Senior Scientist with the Ecological Society of America.*

**Raewyn:** In the Use Book, we're asking people to think about past, present, and future uses of forests. How do you think about forest history?

**Kim:** Forest ecologists analyze forests through the lens of the past—even the ancient, pre-human ecological past. Structure, species composition, biological communities, soils, terrain—these facets of ecological communities are changing with time, and almost all have been changed by humans. In a forest, you're looking at organisms that have lifespans extending hundreds of years. In some cases, over thousands of years. Each living thing is integrating the environment over time, in one location. It's a living record of history.

Ecologists parse out how the forest patterns we see are influenced by people. We use the fossil record and fossilized pollen, tree-rings and other tools to "read the landscape" and to understand how past factors have left patterns on forests today.

Environmental Historians like William Cronon (UW Madison), David Foster (Harvard Forest) and Michael Williams (Oxford) have beautifully documented this perspective, it's well-known in forest ecology and forestry circles but virtually unknown outside academia.

**R:** Is there an example from your teaching or research, where the prehuman time signature has informed your thinking?

**K:** A good example is fragments of ancient forest communities in Ohio that still exist from the last glacial recession, roughly 10,000 years ago. The Cedar Bog (actually a fen), has old northern white cedar. It's a relict

landscape from the last postglacial era. I take students to walk that landscape, to help them understand how ecological patterns we see now are connected to the past.

Ecologists often ask, "what is nature with a capital N?" There's a subfield called Restoration Ecology that asks the question—to what condition should an impacted system be restored? This is a conversation about the impacts of colonialism; are we talking about pre-European contact? Are we talking about pre-*Homo-sapiens* conditions? Native Americans did (and do) a lot to manage their landscapes. Anthropologists, paleobiologists, and restoration ecologists spend time in cross-talk with each other about that.

**The act of tree-planting is a poetic ode to the future:  
the planter knows they won't live to see the tree  
as a full-grown adult organism.**

**R:** What will forests be like in the future?

**K:** People talk about the impacts of invasive species on forests, things like emerald ash borer, non-native fungi, and the *Diplodia* in your red pine. We cannot predict what tomorrow's ash borer might be. Nobody could have predicted 15 years ago that millions of Ash trees would leave the landscape because of that insect. In fact the IUCN just listed five species of North American ash trees on its Red List, as critically endangered—that is a big deal, and a tragedy for humans and all the non-human species that depend on ash trees for food and habitat.<sup>1</sup> With continued globalization, these big impacts will reshuffle the species composition of forests.

We can use forest information today to understand what it will be like in the future. Throughout the United States there's a system of FIA (Forest Inventory and Analysis) plots, where The Forest Service monitors forest changes over time.<sup>2</sup> Some colleagues used that data to understand how forests of the future will change because of climate changes. They created The US Forest Service Global Change Tree Atlas, that predicts changes, species by species.<sup>3</sup> In one of our research papers, my colleague and I used this information to model how these future "reshuffled" forests might see changes in how they function, for example how they sequester carbon through time.<sup>4</sup> There's lots of data to suggest that forests will not only change in species, but in how they work, as climate changes.



Emerald ash borer beetle, pen and ink drawing, Al Zork, 2017

Forests are made of trees, most of which are very slow-growing, so it's rare for humans to see and appreciate this arc of community development within one lifetime (unless we're talking about a fast-growing, short-rotation plantation forest). Most of us who plant trees understand the act of tree-planting is a poetic ode to the future: the planter knows they won't live to see the tree as a full-grown adult organism.

When originally presented to Congress in 1905, the Use Book codified expectations of that time: that forests were for the exclusive uses of humans. When created, the U.S. Forest Service was charged with ensuring our nation would have continuous supply of forest products in the future. In order to do that, we have to predict what forests will be like in the future.

**A lot of scientists are leaving that polite space, realizing that political changes are impacting our ability to do science.**

**R:** There's all this great research and understanding being generated. How is that being received?

**K:** We've done a miserable job of sharing information with everyday people. For a long time scientists were discouraged from entering public forums, or politicizing science. Within the last 5–6 years that's radically changed. A lot of scientists are leaving that polite space, realizing that political changes are impacting our ability to do science, which we naively thought was an apolitical enterprise. Academicians get rewarded by publishing technical papers, for one another, in technical journals. Many scientists are realizing they can no longer be neutral, or only speak to each other.

**R:** How do you do that in an environment where authority figures and politicians are creating rhetoric and discourse which is overtly hostile to science?

**K:** Katharine Hayhoe, who's a climate scientist and an evangelical Christian, has been kicking it. But she gets hate mail everyday.<sup>5</sup> It's become more perilous to do speak out on behalf of science, but it's never been more important. The Science March on Washington was really important. It helped thousands of us feel solidarity and it motivated our actions. I use social media and collaborations with artists to reach out with scientific and policy ideas beyond my small scientific community, but I still feel the need to do more.

**Humans are arguably the grandest biological disturbance out there, with anthropogenic climate change impacting our entire planet.**

**R:** Going from political forms of disturbance back to other forms of disturbance...

**K:** Ecologists refer to the periodic changes that alter ecosystems as *disturbance*. Non-human examples are: hurricanes, disease, lightning-strike fires, flooding, tornados, invasive species, etc. The history of the Edward Hines National Forest, and this exhibition, uncovers the simultaneously layered past disturbances on existing forests today. These have impacted species found there, their arrangement in space, their genetic relationships, and more.

Humans are arguably the grandest biological disturbance out there, with anthropogenic climate change impacting our entire planet. Within the last century, we've seen atmospheric CO<sub>2</sub> increase from roughly 300 ppm to >400 ppm today.<sup>6</sup> We are now living in a nexus of changing

climate, and increasingly catastrophic fire; these severe fire seasons are a combined result of past fire suppression and today's climate. This means we are working to "reset the fire clock" for ecosystems where fire was suppressed for the last century.

Humans have had a huge hand in moving species around, and some of them have become invasive. I had a student who was very interested in the semantics of the word "invasive" and the concept of invasive. When we're thinking about the language of illegal and legal, "aliens", immigration, and building walls, this ecological issue of "invasiveness" arguably connects to that inflammatory rhetoric.

As someone who has observed the biological costs of invasive species in an ecological system, I don't want to get sidetracked from the science with the rhetorical analysis of the word invasive. Just because we can explore the metaphors in human social systems, that doesn't mean they accurately reflect the forest ecology.

**R:** There's an appropriation or misappropriation, by white "nativist" or nationalist humans. If I'm talking to a grumpy uncle, who is worried about increased immigration in New Zealand, how do I think like a scientist to respond to that?

**K:** Maybe it's about analysis of conflict. Perhaps humans can be more clever than plants can be, about occupying the same space at the same time, while also protecting their particular identity. Plants are sessile, they're rooted in the ground, they can't each be anchored in the same place.

If I had a crabby uncle, I would just ask him about his fears. I would say, "what are you afraid of?" Like, "can you articulate the changes that you think are bad, and that you are afraid of?". You know, if he was the Dutchman's Breeches flower in a Southwestern Ohio forest, Amur honeysuckle would literally come along and shade him out. And kill him. Is somebody trying to kill him? It's not going to happen.

**K:** Ask about their fears. Like, what are the changes, that you fear. Is the fear really realistic? And comparing it to an actual biological outcome, those are not the same things at all.

**We're now in a new phase, it's not about balance, it's about maximizing extraction on both public and private lands.**

**R:** Managing forests, who are we managing them for? How is this changing?

**K:** It depends who owns them, and where you're at. But we're now in a new phase, it's not about balance, it's about maximizing extraction on both public and private lands.

Due to changes in American environmental values and national legislation, forest managers now have to consider impacts of their forest "prescriptions" on species other than humans, and vital things like water and air quality. The Endangered Species Act and the National Environmental Policy Act require forest management to account for impacts of endangered species (like the federally listed Indiana Bat). Few Americans understand how this federal legislation protects the air, water and biodiversity of America.<sup>7</sup> And even fewer people actually voice their opinions on how our modern-day Forest Use Book should read.

When a forest manager offers a set of proposed plans for public forests, these are made available for public comment. Sometimes announcements for these comment periods can be cryptic, hard to find. In some ways, they are deliberately so, in order to minimize conflict and maximize freedom of managers to make decisions. Hopefully in the future Americans will see the value of participating more in the public process and pushing back on the privatization of public lands.

Forest management isn't exact science, and we should expect increasingly vocal debates about how much tree cutting ("thinning", "harvesting"), road building, resource extraction, non-native tree planting, and fire should be permitted on public forest lands. Since the inception of the U.S. Forest Service, there's been normal political oscillations; depending on who's in the executive office, the pendulum of management has swayed between a philosophy favoring forest conservation or forest consumption. Within the last year, this political pendulum has been ripped off and thrown away, and radical proposals are being put forward for much more extraction, much more privatization, and much less environmental oversight.

The cool thing about this exhibition is you're spanning a timeline prior and into the development of public lands as we know them now. Including the Wild West, "woohoo", cut-it-all-down times during the first 200 years of America's history. It was like people going on a drunk binge and then waking up, after the party, and being like, "woah, look at what



Mountain Top Removal,  
image source cc: [http://appvoices.org/images/uploads/2016/10/mtr\\_aerial.jpg](http://appvoices.org/images/uploads/2016/10/mtr_aerial.jpg)



Wood pellets,  
image source cc: <http://wunc.org/post/wood-pellet-industry-north-carolina>

we did...that was pretty bad". That binge forest consumption—literally mining away the continent's old growth forests—was the setting of the birth of the modern U.S. Forest Service, resulting from collaboration between Gifford Pinchot and Teddy Roosevelt. And now today, we have public lands and private lands, and supposedly, we're managing the public lands "for the most good for the most people".

America's forests East of the Mississippi are now roughly 60–80 years old, and ripe for recutting in the minds of many forest managers. The 20th century was touted as the "regrowth" century; we are likely entering a "recut all the forests" phase in the near future of the 21st century. New suburban development, fossil fuel mining and infrastructure (e.g., mountaintop removal and fracking), and new wood pellet-to-energy mills will only continue to increase this pressure, on private lands especially.

Cutting these "wild" forests typically involves cutting from forests where frequently no one but Nature has managed that landscape for many decades. Functionally, this is fairly equivalent to mining a renewable resource that the harvester had no investment in. Over time, repeatedly cutting the biggest and best trees out of a wild landscape, a practice called "high-grading", erodes soils and the forest's genetic resources.

An alternative is plantation forestry, where trees are planted, managed, and grown as crops. Plantation forests are biologically simplified compared to "wild" forests, but the organizations that raise these trees get out what they put in, in contrast to companies repeatedly cutting/high-grading forests, where they are only taking trees out, and not putting anything back for the future.

### **We have "outsourced" deforestation into Southeast Asia, Latin America and Africa**

**R:** What are some other ways people use forests now? Perhaps with a more reciprocal relationship. Not "use" in a highly extractive sense.

**K:** It depends upon where you are. In Appalachian Ohio, people have gathered medicinal herbs from the forest, as long as there's been people there. Native Americans did it, settlers did it, colonists did it, people still do it.<sup>8</sup> Collecting and selling American ginseng was one of the earliest crops there. You can apply for a permit to collect "non-timber forest products". There's all sorts of things available that way; ferns for



floral arrangements via “brush cutting”, firewood, Christmas trees; you don’t have to go to a Christmas tree farm. You can do many of those things with a permit on Federal forest lands in approved harvest areas. I don’t think many Americans know that all of those things are available.

**R:** Wood has always helped generate technology, human or nonhuman. Beyond building materials, it was one of the first biomaterials used in medicine, and cellulose materials are now used for heart valves, and dissolvable implants. How else does technology shift our visions of forest futures?

**K:** Technological advances in imagery and computing allow us to understand forests as never before. Aerial photography in the 1920’s evolved into satellite images in the 1980’s and now personalized drones can be used to scan and map our forests. Computers are used to create multidimensional maps, animations, and simulations that allow us to theorize the impacts of future climate, pests, fires and landscape changes on the forests of the future. These technologies allow us to see both areas of regrowth and degradation of the world’s forests.

Another product of technological change is the ascendancy of palm oil, and it’s rapidly resulting in (globalized) deforestation in tropical areas. Deforestation for palm plantations isn’t happening in America, but our markets for food, technology and cosmetics have created a HUGE demand for palm oil globally and have “outsourced” deforestation into Southeast Asia, Latin America and Africa.<sup>9</sup> There’s a big greenwashing campaign to say it’s sustainable, but I think it’s a nightmare.<sup>10</sup> This is an example of unforeseen consequences of our decisions as consumers. We have naive ideas about the benefits of our own technology without realizing the way it impacts global supply chains with consequences like impacts on: indigenous communities, biodiverse landscapes, and rare, magnificent species like orangutans.

Forest futures could be awful or could be utopian. People know when they’re inside a lovely forest, you can feel it. The Japanese have a practice —“forest bathing”—that combines forest walking with mindfulness.<sup>11</sup> There’s a movement called the Leave no Child Inside, where the push is to get kids outside, observing patterns, slowing down, and enjoying nature. I think that’s a move in the right direction—adults need it too! If you’re in a degraded forest, you can feel that, too. To protect and rebuild a biodiverse forest takes at least one human lifetime, if not two or three.

We’re walking into a system that has been built by organisms other than us, and we can choose how we take from it; appreciate it, and protect it.

**R:** What are other ways we can create that culture?

**K:** How do we do more of this, as a species? I think it’s going to have to happen through what Ian Wilson calls “biophilia”. And Wendell Berry has an essay “It All Turns On Affection”; his thesis is that it has to do with developing love, and loving things that are other than human beings, like the land where you live. If you think about a lot of social conflict that is happening, it’s all about dynamics within one species, within us. If we could get people to think about and spiritually value organisms other than human beings, that would be 99% of the battle.

As a kid, I got to spend a lot of time outside, and gained a real sense of joy in other species. I’m not saying everybody has to be like that, but I would say developing a sense of biophilia; love and sympathy and understanding for species other than humans is one pathway to a better future. ♣

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1 <https://www.iucn.org/news/secretariat/201709/once-abundant-ash-tree-and-antelope-species-face-extinction---iucn-red-list>

2 <https://www.fia.fs.fed.us>

3 <https://www.fs.fed.us/nrs/atlas/>

4 <http://www.sciencedirect.com/science/article/pii/S0378112707008857>

5 <https://www.theguardian.com/science/2016/nov/06/katharine-hayhoe-climate-scientist-evangelical-christian>

6 <https://www.esrl.noaa.gov/gmd/ccgg/trends/history.html>

7 <https://www.fs.fed.us/forestmanagement/aboutus/lawsandregs.shtml>

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9 <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0159668>

10 <http://www.ucsusa.org/global-warming/stop-deforestation/drivers-of-deforestation-2016-palm-oil>

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# KARSTEN LUND

## TREE LINES

Certain trees in my hometown were marked to die. I can still picture the red line on the bark, the length of my hand and the width of two fingers. It wasn't every tree, just a few throughout the neighborhood, but the marks were frequent enough that they become a familiar sight. My parents told me the trunks had been tagged because these elm trees were sick. Soon they would be taken down and cut up and hauled away, so that others wouldn't become infected. The vivid lines left behind on the trunks were signals to the tree cutters, saying: This is one of them, remove it. The municipal effort to keep this epidemic under control lasted for years, well beyond my childhood, unfolding quietly and slowly around town, mark by mark.

It's a simple image but hard to forget: that bright line standing out against the bark, clearly made in a single motion with a spray can. When I think about it, those marked trees, infected with Dutch elm disease, were effectively some of the first paintings I encountered and walked away thinking about. Although their origins were utilitarian, they had the makings of an artwork, at its most reduced. Each line was an efficient merging of intentional form and signifying power, a nice lesson in the impact of color, a concise example of figure and ground. Each one was a convergence of form and meaning (however cryptic the latter might be). Each line seemed like more than just a line.

Those early encounters with the painted elms, an intuitive introduction to aesthetics and hermeneutics, were for me the beginning of a longer arc, one most of us might share. Throughout our lives we take part in aesthetic experiences, many of which fall outside of the purview of art or blend seamlessly with our everyday comings and goings<sup>1</sup> We look at things and enjoy them; they affect us, and with varying degrees of immediacy and clarity we draw significance or meaning from what we see. We come away subtly changed perhaps. Artworks, at their best, can amplify these efforts and their effects.

In *Edward Hines National Forest*, an ambitious project culminating in this publication and an installation, Sara Black and Raewyn Martyn employ a variety of methods and forms to suggest a more complex

sense of forests and the relationships humans have with them. As this book reflects, their project has been deeply informed by research, as well as by conversations with people who have specialized knowledge in forestry, ecology, and local histories. Translating their findings and speculations into an expansive artwork, Black and Martyn have created a kind of defamiliarized forest, a step into an arboreal shadowland. Their work is inspired by the specific history of certain forests or plantations in Wisconsin, but it is also an extrapolation from particular times and places.

The installation takes shape through the artists' versatile use of materials derived from trees. Within the installation, the easiest material to identify is lumber, milled from red pines from the area planted by the eponymous Edward Hines. Drawing on this history, in one part of the gallery they have built a large trellis or truss bridge. This geometric construction is modeled after the kind that Hines and other lumber barons used to move timber, and it is built from the same materials it was once designed to help transport.

Other materials in the installation are more unfamiliar. In certain parts of the gallery, one is surrounded by something that has the feel of a forest canopy, but it's not made of leaves. What is this membrane-like material, this strange skin? In fact, Martyn has extracted cellulose from wood pulp, combining it with pigments and deploying it in ways that are at once painterly and sculptural.<sup>2</sup> These skins of cellulose material have a primordial feeling to them: organic and slime-like, seemingly of another world than the hard geometry of the truss, although they have their material origins in the very same trees.

With its hint of slime, the cellulose elements nod to a different type of life, or if one follows philosopher Ben Woodard, even another ontology.<sup>3</sup> Making the case for what he calls "dark vitalism," Woodard develops his argument by exploring "the unseen and unsettling interior productivity of life through mitochondria, bacteria, contagion and the like" before turning to "the unnerving spatiality of molds and fungus."<sup>4</sup> He finds his way back to humankind at times in the book, but his effort is one to destabilize anthropocentrism. As he evocatively writes in his final paragraphs, closing the loop, "The material being of humans, and of all life is a slimy one. Slime is the smudge of reality, the remainder and reminder of the fact that things fall apart."<sup>5</sup>

Introduced to the United States in the 1930s, Dutch elm disease is a fatal fungal disorder spread by bark beetles as they feed on twigs and upper branches. Dead elms are breeding grounds for the beetles, unless cleared away, and the fungus can spread through root networks, infecting other trees. Symptoms develop quickly within four to six weeks, the tree wilting yellow one branch at a time (a process called “flagging”). By the 1980s, the disease could be found across much of the U.S.<sup>6</sup>

The red lines on the bark that I remember from my childhood linked these trees together—as the same species but also as things consigned a similar unsettling fate. The marks promised a certain future: death by disease or, before it could spread, by a few men with saws. That simple visual intervention, an arborist’s line across certain trees, made a set of invisible connections more observable, more accessible. This might have been one of my first hints of ecological thinking, accidentally achieved, long before I knew what an ecosystem was. The painted marks pointed beyond the trees, plotting points in a web of interrelations and hinting at other things that were acting on the elms—a role in which humans were not alone. Humans, trees, bugs, fungus: these different beings were entangled together, forming a matrix I couldn’t quite figure out or map at the time.

The trees from Wisconsin that Black and Martyn have used for their project, were allowed to be harvested from a nursery run by the Department of Natural Resources only because they, too, were infected. These particular trees were growing beside “disease resistant” red pine saplings and the DNR wanted to avoid cross-pollination. The red pines given to the artists weren’t afflicted with the same disease as the elms I remember from my hometown, but their condition presents a similar starting point to consider the complexity of the dynamic relationships between trees, humans, and other things. The trees that would become the material for Black and Martyn’s installation were vulnerable to infection in the first place because the ecosystem was weak, affected by clear cutting in the age of Edward Hines and then through the side effects of well-intended forestry practices since then. One quickly starts to see a cascade of cause and effect, spilling out in many directions.

The word “infection” implies the introduction of a dangerous element into the system, perhaps with dire consequences. Infection tends to be viewed as a profoundly negative phenomenon, something to be avoided at all costs. There is a certain truth to this. There are countless examples

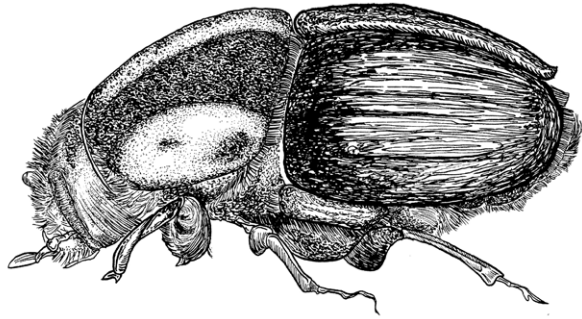
of infection that fit this mold: Dutch Elm Disease, for instance, like I’ve been describing here; or the arrival of European smallpox that decimated indigenous populations in the Americas; or, in a more banal form, the flu that seems to go around every winter in cities like Chicago.

In conversation with me this summer, Martyn and Black posed a question that reorients this line of thought: can we think about infection in a way that isn’t just pejorative? In one way or another we are always being contaminated, they observed. Not much exists in a pure state, a thing entirely unto itself.<sup>7</sup> Taken out of context, that question might risk sounding blithe or insensitive, but their project and this publication work from a central recognition of the intertwined histories of colonization and exploitation of natural environments, which have been profoundly destructive and in which disease played a part. To try weighing different ideas of infection (or to reach instead, perhaps, for a nearby word), isn’t to deny the impacts of disease; instead it might be to ask what infection reveals as a heightened example of entanglement (when the stakes are potentially life and death), or as an unlikely metaphor.

The rise of ecology as its own scientific discipline in the mid-20th century, focusing on the relationships between organisms and their physical surroundings, has contributed to greater recognition that the world is an entangled place.<sup>8</sup> Various kinds of indigenous knowledge, such as those in New Zealand discussed by Cilla Wehi in this volume, or that of the Ojibwa in Wisconsin as described here as well by Jerry Smith, have an even longer and stronger history of describing a fundamental interrelation between things—their epistemologies better attuned to the mingling of human and non-human, living and nonliving. While this rich history of indigenous knowledge continues to be a blind spot of sorts in a lot of Western scholarship, it is notable that there has been recent groundswell of work in various disciplines, from anthropology to philosophy to art, that now works from variations on the premise that entities are fundamentally configurations of relationships—that they come into being through continual encounters with other entities.<sup>9</sup>

Forests prove to be compelling cases for thinking through these entanglements, not least of all where humans are involved. The logging conquests of Edward Hines, which have altered the face of the northern half of Wisconsin, are compelling food for thought. Less obviously, forestry itself provides a complex example, demonstrating the prevalence

of unanticipated effects. As Carl Houtman describes elsewhere in this book, forestry principles long sought to prevent all forest fires, even where fire is a natural part of an ecosystem's rhythms. This has left many forests overstocked, each one a tinderbox ready to burn to the ground, leaving behind a sterile place, when fire does occur. To many eyes, these forests might look "untouched," but they too bear out the results of human attention and action.



Elm bark beetle, pen and ink drawing, Al Zork, 2017

Anthropologist Anna Lowenhaupt Tsing tells a different forest story in *The Mushroom at the End of the World: Life in the Capitalist Ruins*.<sup>10</sup> Tsing follows the trail of matsutake mushrooms, from Oregon to Japan (where they are a delicacy), placing them at the center of an illuminating ethnography. Matsutake thrive only in the reclaimed forests that grow in the wake of clear cutting, sprouting among the new growth. Her study encompasses the sweeping interventions of humans but also the adaptability of the coveted mushrooms, a participant in new ecosystems that take shape.

Black and Martyn's proposal to name a hypothetical National Forest after Edward Hines, a man who clear cut old growth forests and left a monoculture in their place, is a wry gesture. Its counter-intuitiveness points to some of the underlying drives of the project: a desire to shift the ground beneath our feet and to face all-too-real complications in our environments and their histories. With this in mind, the ways forests are "used" becomes a pressure point for the artists. Parts of their instal-

lation at the Art Center implicitly acknowledges certain long-standing attitudes about "use": whether the idea that trees are there to be used as a resource or that forest are a place to be enjoyed aesthetically, an idea that runs through the 1905 "Use Book" on which this current publication is modeled. In portions of the installation the artists use lumber in ways it has long been used: as a material for building, strong but workable. Elsewhere, such as the viewpoint from the catwalk, the staging momentarily echoes the familiar notion of the forest as a source of beauty, to be seen but not touched. This gives way, however, as the visitor dips down from the catwalk into the forest system (as the artists have described it); in lieu of a privileged viewing position, Black and Martyn offer the experience of moving through an expanded spatial field.

By starting from the history of lumber baron Edward Hines and looking at how "his" forest exists today, Black and Martyn tacitly ask how forest histories beget the forests we see now and how they point the way to potential forest futures. The installation at Hyde Park Art Center, however, anchors us in the present: their forest-like environment is something one experiences as you move through the large space, both a visual and ambulatory experience or maybe even a haptic one. As it unfolds, the project might begin to feel closer to other, more reciprocal notions of use that aren't founded in the same way on consumption (whether extractive or aesthetic). The experience of the work from the ground floor is more immersive, perhaps inspired by the more "interactive" relationships with the forest that Cilla Wehi describes in her interview with Martyn in this book. Another spot in the exhibition places the viewer beneath a large sheet of cellulose that the artists' intended as an analogy of the forest floor, suggesting a subterranean position that a human wouldn't normally be able to occupy.

There is a strange beauty to Dutch elm disease, in selective moments at least. If the disease is allowed to progress, bark beetles have their way with the dead trees, tunneling into the cambial layer of the trunk and forming elaborate feeding paths in radial patterns. These ornate tunnel systems are called "galleries." I never saw these patterns in person, but images are easy to find online. Other species can generate forms that rival our own. An equally viable lesson from this: esthetics and meaning can pull in very different direction. Of course another moment of beauty arises, however slight, when the local arborists intervene, leaving their vivid red lines.



John Dewey called works of art “intensified forms of experience.”<sup>11</sup> A painting, sculpture, or a spatial installation can make one more attuned to complex dynamics in the world, or bring them to life through material metaphors. They can give an embodied form to intangible things, or make strange and unforgettable something that’s familiar. How far can an ambitious project like this one reach? Can it nudge us out of our usual frames of mind? Can it hold multiple different mental frameworks within itself, allowing them collapse, or even conflict, as they sometimes do in the world at large? Black and Martyn’s installation creates an internally varied experience, in which different forms and materials help to produce different ways of perceiving and relating to the forest space they have created. Different moments within the project channel various ways of thinking about forests, and perhaps carry us toward a more entangled form of understanding, accompanied by a measure of enjoyment. Moving through their assemblage, one wants to see both the forest and the trees and allow the experience to leave its mark. ♣

1 The pragmatist philosopher John Dewey describes this at length in his book *Art as Experience* (Penguin, 2005), first published in 1932. One of the main tasks Dewey identifies is “to restore continuity between the refined and intensified forms of experience that are works of art and the everyday events, doings, and sufferings that are universally recognized to constitute experience” (2). He continues, “In order to *understand* the esthetic in its ultimate and approved forms, one must begin with it in the raw; in the events and scenes that hold the attentive eye and ear of man” (3).

2 More precisely, the artists have extracted nanocellulose from their red pines, combining it with methylcellulose from other wood sources. Wood is an old “technology,” used for millennia. The forest has also yielded new ones. Methylcellulose, which is extracted chemically from the wood. This process, as described in the introduction to this section in the book, is challenging, requires great effort, and has yet to be perfected. As forest products engineer Carl Houtman describes in his interview in this volume, the promise of the material is also great: it’s properties open up a new terrain for wood-based products, a range of uses that haven’t yet been identified.

3 See Ben Woodard, *Slime Dynamics: Generation, Mutation, and the Creep of Life*, (Winchester, UK: Zero Books, 2012).

4 Ibid. p. 26.

5 Ibid., p 125.

6 The disease lingers on, decades later, as can be easily gleaned by browsing the website for botanical gardens and arboretums in the region. Most have active pages devoted to symptoms, origins, and treatment. For example, see Chicago Botanic Garden, [https://www.chicagobotanic.org/plantinfo/dutch\\_elm\\_disease](https://www.chicagobotanic.org/plantinfo/dutch_elm_disease); Morton Arboretum, <http://www.mortonarb.org/trees-plants/tree-and-plant-advice/help-diseases/dutch-elm-disease>; and the Missouri Botanical Garden, <http://www.missouribotanicalgarden.org/gardens-gardening/your-garden/help-for-the-home-gardener/advice-tips-resources/pests-and-problems/diseases/cankers/dutch-elm-disease.aspx>. All sites accessed September 15, 2017.

7 Consider an example from the frontiers of biology today: research into human biomes shows bacteria are much more than a microscopic intruder that causes illness and harm. We now know our stomachs teem with bacteria, without which we can’t really live. Even human agency itself can be a hard thing to isolate. Writing about “moral luck,” the philosopher Bernard Williams observed, “One’s history as an agent is a web in which anything that is the product of the will is surrounded and held up and partly formed by things that are not.” Bernard Williams, *Moral Luck*, (Cambridge, 1981), p. 29.

8 The word *ecology* has its origins only in the 19th century, but ecological thought goes back many centuries farther, evident in the work of Charles Darwin and Carl Linnaeus, and even Theophrastus in the 4th century BC. Throughout this history, however, other notions also influence the bigger picture. More mechanistic views of organisms still help to bolster the idea that beings, whether humans or trees or other things, can still be treated as if they are discrete and effectively self-contained. Each organism its own island in an archipelago.

9 This kind of thinking takes different forms, but it unites the work of thinkers as varied as Deleuze and Guattari or Manuel DeLanda (writing in terms of “assemblages”), Karan Barad (“entanglement”), or Bruno Latour (actor network theory), to name just a few, all of whom try to reckon with a more deeply interrelated sense of life (and non-life) on earth. When speaking of a general blind spot, this isn’t to downplay the significant contributions of Native American or First Nations scholars like Zoe Todd or Kim TallBear, among others, many of whom have been integral in pointing out the sometimes unacknowledged debts or echoes.

10 Anna Lowenhaupt Tsing, *The Mushroom at the End of the World: Life in the Capitalist Ruins*. (Princeton University Press, 2015).

11 Dewey, *Art as Experience*, 2.

## CONTRIBUTOR BIOS

### **Jerry Smith**

Jerry is a tribal elder, former Tribal Historic Preservation Officer and spiritual leader for the Lac Courte Oreilles Band of Lake Superior Indians. He is currently retired and living on the Lac Courte Oreilles reservation in Couderay, Wisconsin in Sawyer County. He is a member of the LCO Tribal Governing board.

### **Jim Kujala**

Jim is a Department of Natural Resources forester and Sawyer County Search And Rescue fire fighter. He is responsible for timber management on State and County forest lands as well as wildland fire suppression within the state of Wisconsin and the Western US. His work is based at the DNR headquarters and nursery in Hayward, Wisconsin.

### **Al Zork**

All Al wants to do is draw pictures, paint in public, and make things stranger. Instead, she spends the majority of her waking hours packing boxes in a warehouse because she needs to support her food and shelter habit. Make Al happy. Pay her to draw things: g7c512@yahoo.com

### **Rachel O'Neill**

Rachel is a filmmaker, writer, and artist based in Te Whanganui-a-Tara, Aotearoa. Her debut collection of poems *One Human in Height* was published by Hue & Cry Press in 2013. She is a member of the art collective All the Cunning Stunts. Her blog: <https://allwellafloat08.wordpress.com>

### **Murdoch Stevens**

On slow days, Murdoch Stephens triangulates himself in relation to art, academia, and activism. On fast days, he sees those realms as barbs on a trident—he publishes literature as Lawrence and Gibson, leads New Zealand's #DoubleTheQuota campaign to increase refugee protection and is making the final changes to his PhD on critical theory, doubt and climate change.

### **Hannah Salmon**

Hannah is a Wellington-based artist. Her primarily illustrative practice involves the publication of zines, poster and propaganda art. Salmon's work often seeks to challenge the oppressive political and economic structures that prevent us from living in an equitable world, specifically media and political demagoguery, neoliberalism and the perpetuation of patriarchy. Her illustrative works have been exhibited and distributed locally and internationally.

### **Carl Houtman**

Carl is a chemical engineer who researches cellulose materials at the US Forest Service Forest Products Lab in Madison, Wisconsin.

### **Abla elBahrawy**

Abla elBahrawy's practice is concerned with the criticalities relating to the field of archaeology and with the grey zones through which it connects with architecture, art, and history making. In those zones, she is interested in the concepts of failure, chance, destruction, and speculation, whether systematic or not, and in the adoption of those concepts as adequate processes of creation.

Her long-term project, *A Story of Intentional Errors*, is an attempt to intertwine anecdotes about ambiguities of the practice of archaeology and knowledge creation, through presenting a collection of chosen objects that had fallen down. Currently, she is working on the fifth fall, *The Fall of a Reed*, in which she focuses on the history of papyrus papermaking and the narrative of its development from a historical material to a contemporary production which thrives on fluctuating interpretations of nationality and identity. Abla graduated from the Sandberg Institute (2015) and the Jan van Eyck Academy (2017) in the Netherlands.

### **Priscilla Wehi**

Cilla is a researcher within the Wildlife and Ecology team at Landcare Research in Aotearoa New Zealand. Cilla specializes in animal ecology, ethnobotany, and works to connect mātauranga Māori and ecology.

### **Kim Landsbergen**

Kim is a forest ecologist who studies the impact of humans, invasive plants, and climate change on forest form and function. She is an Associate Professor of Biology and Environmental Science at Antioch College and a Certified Senior Scientist with the Ecological Society of America. She holds Master's and Ph.D. degrees from Duke and University of Washington respectively, and did Postdoctoral research in New Zealand forests with the Lamont-Doherty Earth Observatory of Columbia University. She's been working in wild and managed forests since 1991, and tweets as Treebiology.

### **Karsten Lund**

Karsten is the Assistant Curator at the Renaissance Society, an independent contemporary art institution located at the University of Chicago. He has previously worked at the Museum of Contemporary Art Chicago and the Museum of Contemporary Photography (MoCP).

### **Cleo van der Veen**

Cleo is the Manager for the Wormfarm Artist Residency in Reedsburg, Wisconsin for the 2017 season. She works with sculpture, video, installation, and robotics. Cleo's artistic/painting/companion Droids keep her company in her studio and enjoy spilling paint on things.

### **Sara Black**

Sara creates works that expose the complex ways in which things and people are suspended in worlds together, often generating forms that push beyond human frames of reference. She received her MFA from the University of Chicago in 2006 and is currently an Assistant Professor of Sculpture at the School of the Art Institute of Chicago.

### **Raewyn Martyn**

Raewyn makes site-responsive paintings during attentive occupation of sites or situations. These paintings often transform from surface to material, or solid to liquid. She thinks a lot about how processes of entropy and empathy are interconnected within experiences of change. Raewyn was a visiting assistant professor of visual art at Antioch College, Ohio, and a research participant at the Jan van Eyck Academy in Maastricht, Netherlands.

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# **The Edward Hines National Forest Use Book**

2017