# Acoustic Communities of the Forest – Confessions of a Dendrophiliac

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**ABSTRACT:** I wish to draw our attention to trees... their ubiquity, their vulnerability and their capacity for communication have until recently been neglected in most areas of study. The forests of the world are under siege. The clear cutting and burning of vast tracks of temperate and rainforests have reached epidemic proportions. Irreplaceable complex forest ecosystems have been eradicated.

Recent research in forest ecology, plant bioacoustics and forestry practice reveals complex communications relationships among communities of trees, which include subtle components of sound. Our growing awareness of the vulnerability of global forests lends a sense of urgency to current research by people like Professor **Suzanne Simard** at the University of British Columbia, a forest ecologist whose research focuses on organisms, like fungi, living in soil helping trees establish and grow. Her research program focuses on natural and anthropogenic disturbance and climate change effects on the structure, function and resilience of forest ecosystems. She specializes in examining feedbacks and communication between plant and soil communities. In 1997 Simard was part of a team of researchers that discovered that trees are connected through underground webs of mycorrhizal fungi. These networks allow trees to communicate by transferring carbon, nutrients and water to one another. Dr. Simard also helped identify something called a hub tree, or "Mother Tree." Mother trees are generally the largest trees in a forest area that act as central hubs for vast below ground mycorrhizal networks. Mother trees support young trees or seedlings by introducing fungi to their root systems and thereby transferring the essential nutrients needed for them to develop and grow. Under each square foot of forest floor there are hundreds of miles of mycorrhizal fungi examining every inch of the earth and transferring nutrients via their fine hairy networks as if they were neural networks. Even in dying forests the mother trees pass on their own carbon and nutrients to others in the canopy area around them to provide continued support for the survival of the surrounding community of trees. (Suzanne Simard: Thinking Like a Forest: http://www.ttbook.org/listen/75606)

German forester **Peter Wohlleben** writes about his discovery that trees are social beings. He elaborates on his experience, observations and research by articulating how trees working together establish consistent local climates moderating extremes of cold and heat and other significant factors that allow trees to reach old age. In his runaway best seller, The Hidden Life of Trees, he states,

> They can count, learn and remember; nurse sick neighbors; warn each other of danger by sending electrical signals across a fungal network known as the 'Wood Wide Web' – and, for reasons unknown, keep the ancient stumps of long-felled companions alive for centuries by feeding them a sugar solution through their roots.

Through these processes complex communities evolve creating healthy ecosystems that bring benefits to each other as with all forms of life.

When coming upon a pair of huge beech trees in the forest of some 3000 acres he managed near Cologne, Wohlleben wrote,

> These trees are friends. You see how the thick branches point away from each other? That's so they don't block their buddy's light." "Sometimes," he adds, "pairs like this are so interconnected at the roots that when one tree dies, the other one dies, too.

**Monica Gagliano**, from the Center for Evolutionary Biology at the University of Western Australia along with colleagues Daniel Robert from the School of Biological Sciences at the University of Bristol, England and Stefano Mancuso from the Department of Plant, Soil and Environmental Science, University of Firenze, Italy have been studying grain seedlings. These seedlings are easier to deal with than working in a natural ecosystem like a forest. Before too long they found that their devices were registering roots crackling softly at 220 hertz, one octave below standard pitch at A440. Upon further examination they noted that,

> the roots of seedlings not directly involved in the experiment reacted whenever the seedlings' roots were exposed to a crackling at 220 hertz, they oriented their tips in that direction. That means the grasses registered this frequency, so it makes sense to say they "heard" it.
> https://www.youtube.com/watch?v=m-lq4sTMCqg
> (Towards Understanding Plant Bioacoustics: Monica Gagliano, Stefano Mancuso and Daniel Robert)

Gagliano and her colleagues go on to state that:

> Much of this research has arisen at the interface between scientific disciplines, such as ecology and chemistry. As a successful example of interdisciplinary partnership, chemical ecology has greatly advanced our understanding of plants by unveiling their strikingly 'talkative' nature and the eloquent diversity of their volatile vocabulary. [ibid]

They continue to stress the importance of further research on the micro-details of biological ecosystems. To me the significance of interdisciplinary collaboration is key because it opens most specialized languages up to fresh options and interpretations offering up new insights and possibilities.

> Similarly, we reckon that multidisciplinary research is required for an effective exploration of the functional, ecological and ultimately evolutionary significance of acoustic communication in the life of plants. [ibid]

The exciting thing for me about these findings is that **the trees of the forest are sound articulating acoustic communities**. It is also becoming ever clearer that these communities become identifiable through establishing place and a sense of place invariably must also be defined through the sounds of that place. I have thought for a long time that even a single tree embodies place. They affect everything around them, providing shade, providing dwelling places for countless creatures, establishing a below ground feeding network encouraging more trees to grow and contribute to evolving ecosystems. They are chronicles enclosing within themselves variations in climate and environmental conditions... and now we know they talk to each other.

In my visual work I make drawings of trees whose entire images are composed of the name of the particular tree I am representing in tiny letters up to as many as 50,000 times. In order to make each drawing I also intone the name of the tree out loud each time I write the name.

My studio space is alive with the names of trees, the production becomes a personal performance, akin to an incantation that I imagine lends support and strength to the trees.

This series of drawings/incantations is primarily concerned with the forests around my home along the Niagara Escarpment in Canada. The Niagara Escarpment is recognized as one of the world's unique natural wonders and is the most prominent topographical feature of southern Ontario. The landform is a forested ridge of fossil-rich sedimentary rock (dolostone) 725 km in length and is classified as a UNESCO World Biosphere Reserve.

The forests in the area I live in are part of the northern most reaches of the Carolinian forest zone. This is also the area where Cliff Ecology was first pioneered by Dr. Doug W. Larsen and his colleagues at the University of Guelph.

(The Last Stand: A Journey Through the Ancient Cliff-Face Forest of the Niagara Escarpment, by Peter E. Kelly and Douglas W. Larson, publisher, Natural Heritage Books. 2007.)

Dr. Larson and his team studied the Eastern White Cedar trees growing along the faces of the cliffs of the Niagara Escarpment. By analyzing core samples from the trees' trunks, Larson's team established that the cedars ranged in age up to 1316 years, which is the oldest one found. [(www.ancientforest.org/ontarios-oldest-trees/,) attributed to Kelly and Larson]

To the naked eye these gnarled and dry looking cedars, clinging to the cliffs in extended communities seem short-lived in a hostile environment, yet they have now been recognized as one of the old-growth forests in the world. I wonder how they manage to communicate in such a challenged environment, many of them isolated among vast, dense blocks of dolostone. Yet we do now understand that they indeed communicate and support one another... By extension I considered this ancient forest an acoustic community related to the countless other acoustic communities globally.

All of this recent research has altered my awareness and my own approach and attitude when I move through forested areas wherever I go. It has changed how I pay attention, how I listen and when I engage in listening I think about the Deep Listening training developed by Pauline Oliveros which has had an enormous influence on my capacity to listen more thoroughly and infused my listening with more focused intention. One of her Sonic Meditations asks people to walk outdoors at night, stepping so softly that our feet become our ears as we listen through skin and bones to vibration beyond our hearing.

I would like to recount a personal experience of intense significance to me. My life, my work and my research were profoundly influenced after having met an Anishnabe (Ojibway) elder some years ago in 1987. I first encountered Dan Pine while I was preparing for a large-scale outdoor installation in Sault Ste. Marie, Ontario. I was invited to a land claim hearing Dan was to have with Federal authorities. I entered the hearing a bit late, having driven for ten hours to get there. Upon entering I was met by the words of Dan Pine addressing the Federal authorities, "I gave you my arm and now I want my land back." Dan was a small, thin man of 88 years with one arm and his chest full of military medals from the First World War. He lost one arm during that war. He was in effect saying that he was not separate from the land, that the land was an extension of his body and by association the bodies of his people. These words imprinted on me deeply and altered my perceptions of what I saw around me in a way I could never have imagined.

When Dan and I began finding sites for my project he showed me a series of places to think about. Some were places charged with tragic histories such as an abandoned lot within the city limits of Sault Saint Marie, with unmarked graves of children who were victims of the Residential schools. Some sites were covered with wild plants and herbs he taught me about and pointed out their use in healing and cooking. We settled on a site in the middle of the St. Mary's River, a small artificial island with a land bridge…making it a peninsula. It was perfectly positioned within the bounds of the lands he was laying claim to: many thousands of acres now underwater that had been flooded to facilitate the canal and lock system between Lake Superior and Lake Huron. His claim addressed the lack of any agreement prior to the building of the lock system that flooded tribal lands along the river. My project was aimed at drawing attention to these claims and consisted of a circle of eight inverted trees. I had been given access to mature conifer trees growing in an area of the city that was soon going to be deforested for development. The trees were to be brought to the site and placed upside down in a circle on the island. The circle was sixty feet in diameter and each tree stuck out of the ground thirty feet, their naked root systems stretching toward the sky. The trunks were cleared of branches and peeled… their flesh exposed.

Dan Pine never once referred to them as trees. He instructed me that the first step in the process was to speak to those 'people' and to tell them what was going to happen to them. I was further instructed to camp beside them to spend time with those 'people' and to bring

them gifts, offerings of traditional tobacco and to give my apologies for taking them out of the ground and separating them from their community.

The circle when completed stood like something primordial, timeless and extremely powerful. When it came time to dedicate the project many officials from Ontario and Quebec attended. I recall vividly that when I walked toward the circle with the culture ministers they stopped suddenly once inside the periphery of the circle and the minister from Quebec looked at me and asked, "it is so silent inside here, how is that possible? It is so unexpected, so peaceful." I was surprised to hear these remarks especially from government officials. But it was indeed true and I had experienced that silence first hand upon completion of the project when I was alone with it at sunset the first evening. It was truly as enchanting as it was disturbing. The title of the project was, "No Title", referring to the titling/ownership of land.

So there it was... the traditional indigenous world-view already understood trees as communities. I was transformed and deeply humbled. All that I have done in my work and life was changed by this experience. Finally science is catching up. The rational mind is being transformed by changing perceptions and ever more sophisticated tools for measuring and bringing our attention to more focused listening.

In conclusion I want to also say that the experience of talking to those trees, communicating with them as people, is echoed these many years later in the drawings made of the names of trees...the conversation just seems to get ever more intimate and lively.