Review

Finding the Mother Tree by Suzanne Simard

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At first glance, Suzanne Simard's *Finding the Mother Tree* is an odd book to be reviewed in *Cosmos + Taxis*. It is largely about trees.

Simard is a professor of Forest Ecology at The University of British Columbia, Vancouver. She is best known for her initial extraordinary finding that many trees are connected together through mycorrhizal fungi, and these connections enable tree even of different species to support one another rather than simply existing as isolated individuals. Her PhD dissertation detailing her research led to front page billing in *Nature,* one of the world's most prestigious scientific journals. It was there the term "wood wide web" was coined to describe her discovery. It caught on.

Simard and others' subsequent discoveries demonstrate trees are far more interlinked with one another, and with other organisms, than scientists had ever imagined. In her research, Simard demonstrated trees, living side by side for hundreds of years, recognized neighbors, learned and adapted their behaviors to one another, remembered the past, and even distinguished between their descendants from others of the same species, and acted to favor their kin.

Before Simard's discoveries individual trees were regarded as in competition with all others and in especially fierce competition with other species. Rooted in a one-sided reading of Darwin, this view had led to replacing logged forests with monocultures of one species, and eradicating 'weed' species that supposedly competed with them. This practice reflected the supposedly Darwinian doctrine that nature could best be understood as 'survival of the fittest.' Adapting this superficial belief about evolution, the 'economically fittest' trees were selected for and all who were considered their competitors were extirpated.

Simard argues this model of trees is destructively simplistic. As social, cooperative networks connected both underground and atmospherically, forests constitute complex, interdependent circles of life. Competition happens, but so do other processes that are its opposite. Trees communicate their vitality and vulnerabilities to other trees, even when of other species, leading to breathtaking revisions on how modern Westerners have viewed forests. Unlike long-dominant conventional views about plants, Simard demonstrated they give warnings to neighbors, mount defenses, and compete and cooperate with one another in ways we would unhesitatingly call intelligent, were we to observe the equivalent in animals. Considered abstractly, their communal lives are not that different from our own.

Throughout her book Dr. Simard introduces many concepts long discussed in this journal, but within a very different context. To describe what she and other scientists are

discovering, Simard has to use language equally appropriate for the social sciences, observing "Ecosystems are . . . similar to human societies – they are built on relationships" (p. 189). She is not simply being metaphorical. As with human societies, a forest is a complex community where competition and cooperation, parasitism and mutualism, communication both above and below the ground, networks of support even between different species, all collectively generate a complex adaptive system with features not present in any of the individual organisms.

Networks of communication are foundational to this process. In the wood-wide-web, like the world-wide-web, the market, or science itself, complex adaptive systems arise within networks of linkages between different hubs, some centers linking many and others less connected with others. In a forest, old trees were the biggest communication hubs, but all participated in transmitting messages back and forth through fungal links (p. 225). Her book takes its title from "Mother Trees," the trees constituting the most important hubs, connecting and sustaining the much younger trees surrounding them, assisting all but with a clear preference for their own descendants.

Interestingly, within forest ecology Simard's work encountered versions of the same assumptions many writers in this journal have challenged. While Darwin was well aware of cooperation as well as competition in natural processes, for the most part others' subsequent work emphasized competition alone, leading to recommendations in forestry to treat less immediately desirable trees in a forest as 'weeds' to be extirpated, aiding a monoculture to better serve human aims.

Many of the social sciences, especially economics. have a similar problem. Dominant models focus on competition alone, with models of rational choice and self-interest supposedly able to grasp the complexities of the human world. In both fields the result is a kind of intellectual monoculture where social complexities are sought to be comprehended through narrow economic and evolutionary models. Unfortunately, public policies are often rooted in these models.

In both cases the result is a one-sided analysis. The competitive model for understanding forest growth misses its cooperative elements, resulting in declining productivity and many unpleasant side effects. Simard demonstrates this in forest ecology and I and others have done so in social policy where a one-sided attention to competition and resulting economism have led to undermined market dynamics and the health of a free society.

Dr. Simard also sees this parallel. Her home page suggests a strong analogy of this extraordinary biological complexity is civil society.[1] A forest is to civil society, as a tree plantation is to a planned society —with the latter demonstrating similar patterns of impoverished relationships and declining well-being, both individually and systemically.

A DIFFERENT APPROACH

The argument as I have presented it could have been presented in a more traditional academic format, and Simard certainly has done plenty of that. But in *Finding the Mother Tree* she has taken a different approach, one I think is valuable. Dr. Simard described her discoveries as they unfolded in the course of her life, first growing up in a small logging family in British Columbia which brought her the initial insights leading to her discoveries, followed by work in a large capitalist lumber company, and then working within the provincial government studying silviculture. Here she encountered ingrown networks of authorities closed to the implications of her discoveries. In time Simard found a position at The University of British Columbia where, protected from the pressures of both corporate logging and ingrown bureaucracies, she could more freely pursue her research. But even here she encountered difficulties.

I think this account offers more than a simple autobiography, but rather helps cement the similarities between the human world and the forest ecologies she studies.

Scientific papers, such as her ground-breaking *Nature* piece, report experiments and other investigations, written to exclude the human element as far as possible from the arguments made. The more objective the information provided, the better. This approach seeks to separate the research reported from the

human world as far as possible. This ideal both seeks to minimize distortions our desires can introduce into our thinking and perceptions, and reflects a deep cultural belief the human world is different in kind from the natural world.

But what of this belief is itself a distortion? What if objectivity remains a central value for good science but the separation between the human and the natural worlds is ultimately illusory?

In *Finding the Mother Tree* Simard seeks to integrate her scientific work into the broader context of what led her to investigate phenomena most scientists had ignored or denied were possible.

While Simard's argument unfolds within her description of her own life, the events she emphasizes are primarily those that contributed to her findings. Rather than a typical memoir, she describes an unfolding investigation that includes relevant details that would never find their way into an orthodox scientific paper. In the process she has written a book accessible to many more than forest ecologists and that describes how science is actually done as well at a personal, social, and systemic level.

Science is not done by scientists in isolation from all but fellow scientists writing papers back and forth. It is an exceptionally complex process in which refereed papers, like votes in a democracy, are absolutely essential, but do not begin to capture science as a whole.

The scientific process begins with confronting a problem, and major advances begin exploring insights not shared by the scientific community as a whole. In Simard's case it was something unusual about the roots of healthy seedlings she observed compared to those planted in tree plantations.

Exploring the problem often takes place within scientific organizations powered by grants, but it can also begin outside these organizations, within the deeper civil society. Simard's early work involved family and friends and only later engaged graduate students. At this early point, had she depended on existing scientific organizations, it never would have happened. Science depends on a rich civil society for support. Simard's first formal organizational framework was for a lumber company exploring how to increase the survival rate of planted seedlings. While the company's interests were not served by her discoveries, the interests of certain people in the company were more supportive.

The motivations of scientists, and science as an inclusive system, *necessarily* manifest different values. The best scientists are motivated by their search for truth, however, *as a system*, science never discovers truth, but only the most reliable knowledge available at the time. Isaac Newton thought he had uncovered basic truths but we know today he had uncovered the most reliable knowledge potentially available at the time. Sometimes, and this point is important, what the scientific community previously determined to be reliable obscured what later discoveries revealed to be more important. Simard's account of her research is decisively shaped by this problem.

Simard also clearly demonstrates the tensions between science and markets. The lumber company for which she worked employed people who cared about trees. But the company cared about profits. When the two clashed, profits dominated for organizational reasons. And organizations are one kind of organism that exists within the social ecology. Further, different organizations adapt to the social contexts within which they exist. Therefore, scientific organizations must adapt to different conditions than do market organizations.

Scientists doing science must always do it within organizational ecologies, and a theme in her book describes the problems arising when a scientist works within non-supportive organizational ecologies, such as a lumber company and a provincial bureaucracy answering first to political pressures.

Further, even within supportive organizational ecologies, such as a university, challenges remain when research argues for new perspectives. The supporters of the older perspectives often remain personally committed to defending them. This kind of competitive environment serves to weed out false new arguments, but can also seriously impede better ones.

The world she describes is the world of civil society where no single value or organization dominates. From crucial early steps involving friends and family to later ones where a few open-minded allies helped even within organizationally inappropriate environments, to the increasing interest in her work from di-

rections not involving forest ecology, Simard's account helps illuminate how science is aided by being immersed in civil society.

Coming from studying forest ecologies, Simard appears to arrive at a position similar to one I and some other scholars argue from our own perspective: that large realms of the social sciences can be understood as subsets of evolutionary and ecological science, as she uses social scientific terms and we use ecological ones.

Finally, as I argued in a recent piece for *C+T*, sustainable ecological practices require an ethical component. Even the wisest self-interest as the self is usually conceived does not incorporate the time frames needed to act sustainably, although expanding the sense of self to include others can. One fascinating aspect of Simard's account is her reporting that a number of traditional peoples of Pacific Northwest forests already knew what she was discovering, and had long acted in accordance with that knowledge.

Finding the Mother Tree is an excellent account of Simard's discoveries revolutionizing how we think about forests, but it is also a rich description of how science is conducted in her field (including advice about dealing with grizzly bears) and how it and the human world co-exist within the larger ecology of life on earth.

NOTES

1 https://suzannesimard.com/finding-the-mother-tree-book/