The Great Simplification

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[00:00:00] **Suzanne Simard:** Where I'm living, we are having huge wildfires on the west coast of North America, and the wildfire Severity in an extent is just, it's exponential. That's a real warning sign that things are out of balance. Fossil fuels has created a warmer climate which causes more fires to start. But then we've also, through our cultivation practices in forests, of creating monocultures or reduced species diversity, we actually increase the risk of those fires.

[00:00:27] forest burning down. That's already changing the composition of the forest in a big way.

[00:00:36] **Nate Hagens:** Today, I'm joined by Professor of Forest Ecology at the University of British Columbia, Suzanne Simard. Suzanne is a pioneer on the frontier of plant communication and intelligence and is known for her work on how trees interact and communicate using below ground fungal networks. Her current research investigates how these complex relationships contribute to forest resiliency, adaptability, and recovery, and has far reaching implications for how to manage and heal forests from human impacts, including, but not limited to, climate change.

[00:01:12] Susan and I discuss her journey from being part of a family of loggers working on a clear cutting operation in British Columbia to leading research on the importance of tree biodiversity and advocating for the importance of forest conservation. We also discuss the best practices for the timber industry globally based on these principles and how important these are in order to mitigate wildfires and preserve the health of our forests as the consequences of global heating continue.

[00:01:45] If you enjoy this conversation with Suzanne, one of the biggest ways you can support us is by subscribing to it on your favorite platform and sharing this episode with someone who might also enjoy it. I believe in making this content free and accessible to as many people around the world as possible, so we appreciate your support.

[00:02:07] With that, please welcome Suzanne Simard. Suzanne Simard, welcome to the program. Thank you for having me. How are you today? I'm good. Yeah. Are you teaching now or not?

[00:02:22] **Suzanne Simard:** I'm getting ready to teach. I'm actually mostly in the field working in the forest doing my

[00:02:29] **Nate Hagens:** experiments and my research. Let me ask a dumb question.

[00:02:33] Would you rather be in the forest or in your office?

[00:02:38] **Suzanne Simard:** In the forest, of course.

[00:02:41] **Nate Hagens:** so what are the classes that you will be teaching this fall, out of curiosity?

[00:02:45] **Suzanne Simard:** Yeah, I'm teaching a second year forest ecology course. I've taught it for 20 years, and I, yeah, this year I'm going to be teaching it with my graduate students so that'll be different.

[00:02:58] they're all excited to get some teaching experience. And then I, in the winter term, I'm teaching another course called forest stewardship changing climate, and it's a more advanced course.

[00:03:11] **Nate Hagens:** So since your book on the mother tree came out, is your class wildly popular and oversubscribed?

[00:03:19] **Suzanne Simard:** Yeah. I mean, the first one is a core course for the faculty of forestry at UBC.

[00:03:24] So there is a. So there's a couple hundred students. the other course is, for non forestry majors, and so the first year I taught it was last year, and I had 600 students. And so I think it's going to be even more this year as the word gets out.

[00:03:41] **Nate Hagens:** If I was back in college, I got my PhD in my late thirties and I would have audited or taken your class post haste for sure.

[00:03:51] what a topic. So I am to understand you grew up in a forestry family. let's start by, can you share what life was like then? What was the average day for your family in the forest and how did that experience shape your career and your life and your passion?

[00:04:11] **Suzanne Simard:** know, the most important time was in the summers, and, because in the winters we were in school, but in the summers we were roaming the woods, and so, you know, we were in this region that's called the Kootenays in, British Columbia and it's a very mountainous area with lots of lakes, and so, And bears.

[00:04:33] And lots of bears, yes. They're an ever present part of everything I do to this very day. but yes, so we would spend our summers on a lake where my grandparents were horse loggers called Mabel Lake. And Mabel Lake is really on the western edge of the Kootenai region, and it's in the Monashee Mountains, and it's the rainforest, so cedars, hemlocks, all kinds, like many species actually growing together, so they're very complex forests.

[00:05:04] and we would live on a logger's houseboat in the summer, my family, and right in this little bay called Cottonwood Bay. And at the time when I was growing up, there was really no logging in that area at all, other than the horse logging that these little, you know, family operations ran. And so we just had wild forest all around us.

[00:05:26] So it was, amazing.

[00:05:28] **Nate Hagens:** So was that your Citizen Kane rosebud, like the sled that he always remembered later in life? Do you have visions of how you grew up on that houseboat?

[00:05:40] **Suzanne Simard:** Absolutely. You know, I think that the, what is it, you know, these things that seep into your bones, they're part of your DNA.

[00:05:49] And, honestly, like, I look back through my family history and try to look at the lineage, and we, come from many, generations of sewers de bois, or woodcutters, that date back to France in the, you know, the 1500s. That's when we immigrated across to Canada. So it's, a long family tradition to be in the forest to be woodcutters or loggers and, and so it is in our DNA, and, but also just being in those forests, you know, it becomes you, and just things like, you know, the wind in the forest, the, rainfall on the, lake, the softness of the water the lushness of all the forests and the lake, you know, feeding into each other, the salmon runs It was just who we were.

[00:06:39] It was fantastic.

[00:06:42] **Nate Hagens:** I visualize and feel that. Just out of curiosity, how is the logging situation now, all those years later, in British Columbia compared to then?

[00:06:55] **Suzanne Simard:** Yeah, I mean, you know, it's really good to sort of relate that to your own experience. Like, as somebody who grew up picking huckleberries and running up flumes that my grandfather built and these lush forests that you breathed in every day and you ate from every day.

[00:07:13] you fished from the lakes that, that fed the forest and the forest fed back. and so over the years, you know, as I grew up, by the time I was in my twenties, in the early 1980s, they started clear cutting around. Mabel Lake. That had never happened before. It was all like pristine, beautiful, continuous forest, old growth forest.

[00:07:35] And so they, yeah, they started clear cutting in the early 80s, and now, you know, fast forward to where we are now, that's, what, 40 years? It, the hill slopes around where I grew up are covered with clear cuts. It's just like been this cumulative more and more clear cuts to now, you know, every direction you look has been sheared off with little patches of forest left and then, you know, with climate change, as things heat up, there's more lightning, you know, there's, We've shaped, changed the shape of the forest so they're more flammable, and so we, you know, there was a lightning strike a couple years back, and now there's a, fire has gone through, even over the planted, plantation forests that have replaced the old growth, so it's dramatically changed, and you could say that across all of British Columbia.

[00:08:26] other than in some remote places that are protected or they haven't gotten to yet, that the landscape has changed dramatically to where now, and just to get a grip on what this feels like, the big tall old growth ecosystems, you know, with the huge spruces and the huge cedars, the monumental trees, there's only two to 3 percent of those left.

[00:08:49] **Nate Hagens:** Relative to when?

[00:08:52] **Suzanne Simard:** Relative to when I was growing up. Oh my

[00:08:54] **Nate Hagens:** gosh.

[00:08:55] **Suzanne Simard:** Yes, I mean there's a lot of primary forest left, so primary forest mean, can mean very small bog forests, or you know, just, you know, lodgepole pine forests that have never been logged. There's, a, you know, a substantial amount of that left but the big ecosystems, the big forests that we all think about, they were targeted by the loggers first and foremost, and so yeah, we only have two to three percent of those left.

[00:09:22] **Nate Hagens:** So I want to get to your important and seminal research on, on trees and how they communicate, but when you go back to where you grew up and you see these scars of clear cuts and fires and such, is it Oh, that's out there. And that's too bad because it was pretty and I liked it.

[00:09:46] Or does it feel like a scar, like a personal wound to your, soul? Like it's personal can you Nate,

[00:09:53] **Suzanne Simard:** it's devastating. I can't describe it in any other way. It is heartbreaking. You know, this summer, my dad just passed away. So And we went and buried, we threw his ashes into the Shuswap River where he was born, and went to the lake the whole family to celebrate his life, and, you know, look across the lake and it's clear cut, and you just, it's heartbreaking.

[00:10:20] You know, the memories that you had are, you have those memories, but now it's a different thing. it's been changed. It's been, you know, it's been abused. I can't say it any other way, And so, my job, you know, I think as a forester, as a, who I am is to protect what's left as much as possible and then work with these

industrialized forests and try to get them back so they're biodiver they have diversity again, so that they're healthy again.

[00:10:55] **Nate Hagens:** Yeah. I, now have even more questions than I started with. So let's get to your, important research. can you briefly walk us through the first experiment that you did into the relationships between Douglas firs, birch trees, and red cedar trees, and what your findings were regarding the tree's ability to transfer nutrients which was unexpected at that point between each other and, below the ground even.

[00:11:24] **Suzanne Simard:** So I think it's really important to put this in context of where I was at the time, so I'll just spend a little bit of time doing that. So I had gotten, I was working as a researcher for the Ministry of Forests and my job was to grow back these clear cut forests so that they had healthy forests again.

[00:11:45] And, but the, you know, The fixation of the forest industry was, of course, on making money, extracting timber for money to drive the economy, and then to reduce risk of producing more planted forests that you could then keep harvesting into the future, and so that was the context, and there were these policies put in place that were meant to accelerate that process.

[00:12:15] You know, always think about, you know, follow the money, right? So they're trying to accelerate that process by basically short circuiting natural succession in a forest after it's been disturbed. And so one of the ways they wanted to, like, advance through the, the healing stage, where after a disturbance you get certain plants coming back that heal the land.

[00:12:37] So there's the wild, sorry, fireweed and birches and aspens. These are deciduous plants that have short life cycles, but they produce a lot of photosynthetic materials. They decompose and they enrich the soil. They heal the land. And then the conifers kind of come in and dominate. So they said, okay, we're going to get rid of that stage of the plants healing the land, and we're just going to go straight to the money, right?

[00:13:03] We're going to just go straight to those moneyed plantations. And I was really worried about that. And what I was seeing, and I was doing my experiments and going, okay, what if you do that? How does that compare to having a, nice

mixed forest that is going to come up naturally natural succession, and what I found was that there was more disease in these cleaned forests, so they were cleaned using herbicides like glyphosate any cutting, you know, there were all kinds of chemicals back then that were used to just, you know, get rid of this plant community that they thought was competitive and so I started seeing when I compared those, you know, nice, lush, diverse forests with the ones that were simplified, increased infections from diseases and insects.

[00:13:51] And so, I thought, you know, maybe we're on the wrong track. Like, if we actually allow the forest to naturally grow back the way it wants to, that'll create a healthier ecosystem. There was all kinds of evidence that I and many people were accumulating to point in that direction. But The power of money is so strong in the extractive timber industry that, you know, there was not much thought given to that.

[00:14:19] So I did my PhD saying, Our birch, so birch was one of the plants, the trees that they wanted to get rid of. It was considered the evil competitor, and I thought it's essential in these ecosystems. Actually, the, you know, the nations, the First Nations people considered the birch tree the mother tree. that brought water up from down below and redistributed it to the forest, that kept the forest moist.

[00:14:45] That was already in their knowledge systems. I didn't know that at the time, but there was an understanding that these, species were essential in the cycle of the forest, in the connections in the forest. And so I thought, okay, I'm gonna, I'm gonna follow this line of thought and say, what if birch isn't just an evil competitor?

[00:15:05] What if it's actually a good competitor? has other more complex interactions or relationships with these other trees that we're trying to grow, Douglas fir, cedar, and so on. And so I did this experiment that grew kind of out of, a bit out of my master's thesis where I was always interested in where do nutrients and water and car photosynthate go.

[00:15:26] among these different plants that we think are competing, like the idea being that they just are going to keep it for themselves, right? that was the mantra, that was the hypothesis of, the timber production hypothesis. And I thought, I can't just be it. And so I started tracing where carbon went in my experiments between birch and fir and cedar, with birch being the evil competitor, fir being what we

wanted, and cedar being Well, it is the tree of life in the nations in Britain along the West Coast, so it's an important cultural species.

[00:16:00] It's important as a late successional species in these old forests, but it's also different in that it doesn't form mycorrhizal networks with birch and fir. It forms a different suite of networks, which, by the way, with my other graduate students now, we're exploring in more detail. But I use cedar as kind of a control to pick up any movement of carbon that might be leaked out of birch or fir mycorrhizas into the soil and then picked up by cedar.

[00:16:29] But I, so I, to get to the experiment then, I covered my birch and fir with Basically plastic bags, so that you imagine, you know, imagine a plastic bag over your head and you're breathing in and out. It's like that's what the tree is doing, it's breathing in and out, and injecting isotopes, so carbon 14 into one of the species, say birch, carbon 13 into the fir, and then I swapped it and did a full replication of it the other way around, and then I just traced where that carbon 14 came from.

[00:16:58] that photosynthate went. So the CO2 got taken up through photosynthesis, turned to sugars, that then are distributed down through the phloem and out into the roots and into the mycorrhizas, which we knew using our fairly basic tools back then that birch and fir formed many, mycorrhizas with fungal species in common.

[00:17:18] And the idea being while they linked up together. We thought that was, could happen. And what I found is that, yes, there's a lot of carbon photosynthate that are going back and forth between birch and fir. You know, it's not just that they're competing, they're actually sharing these carbon molecules back and forth.

[00:17:38] And cedar get, got some of it, and I interpreted that to say, okay, if most of it's going between birch and fir, and none through cedar, to cedar through the soil, it must be going through these networks that we think.

[00:18:00] **Nate Hagens:** So there's so many parallels here I mean, I want to ask you, what is the evolutionary reason that you think this happened. and how does it map on to multi level selection theory? And to me, it sounds like it's not individual trees that are selected for, but it's ecosystems that are healthy and interconnected.

[00:18:27] **Suzanne Simard:** Yeah, I mean, it gets complex with geneticists because, you know, selection happens at the species level or the individual level. And when you talk about selection at the ecosystem level, that doesn't really fit with that paradigm way of thinking. however, I'll go there with you in that you know, species are trying to, you know, be as fit as possible, reproduce and be fit.

[00:18:55] And, they, you know, they gain fitness through adaptation and mutations and you know, if they're in an environment where something is, you know, downgrading their fitness, they will, you know, adapt to increase their fitness. And so in these complex communities, which all forests are complex communities with many species growing together, in most cases, that you cannot, you know, you do not behave in a vacuum.

[00:19:27] You're behaving while you're interacting with all these other species going on all the time. So your selection is actually a complex interaction with all these other things. And so, if you have a healthy community that, that limits your disease. So, for example, in the birch fir situation, birch, you know, it's highly, you know, it's got a high photosynthetic rate.

[00:19:50] A lot of carbon is allocated to its roots. It's a very rich environment for other soil organisms to live in. I was particularly interested in one called fluorescent pseudomonads. It's a bacteria that is known to have antibodies or abilities to resist infections generally. soils, and among other plants.

[00:20:10] And so I tested for its presence in population densities and found that it was very, you know, highly present, or very abundant when birch was present in these communities. And I kind of, I thought that was one mechanism. by which, you know, when you combine species together, that they can actually help each other.

[00:20:31] They help each other's fitness. The, birch was hosting these bacteria that, that the fir, by the, through their overlapping root systems, was benefiting from this, you know, this sort of symbiosis that was a co symbiosis. so, so then it became like a community level, you know, the community had an influence on the individual fitness of the species.

[00:20:55] And so, When you understand that, you realize, you know, it's like, you know, our own fitness doesn't happen in a vacuum either. You know, we're the

product of our family, our societies, and forests, you're the product of your forest, your community. And so that's what I saw. So how does this affect fitness? I think that You know, there is, selection going on, of course, at the individual level, but it's highly influenced by the health of the surrounding community.

[00:21:24] **Nate Hagens:** What are the mechanics of a tree passing on nutrients? And in your book you also talk about other things that trees communicate, information like physical threats or diseases or relationships and such.

[00:21:41] **Suzanne Simard:** And I've continued to do these experiments with my graduate students over the last 20 years, and we've looked at, you know, done many experiments that have tried to get at this question in different ways.

[00:21:53] If we take the simple example of photosynthate, or sugar molecules, or, you know, carbon molecules moving from plant to plant. how does that happen? Well, we tried to get at this by using the tools that I had and could, was familiar with at the time, which was through manipulating the plant community. I could affect how carbon was moving from plant to plant.

[00:22:21] So, for example, I would shade one plant compared to another one and find that when I shaded that plant, so if I shaded Douglas fir sort of to emulate how birch, which is taller, would shade Douglas fir that you, you create a gradient in photosynthate concentration and abundance. so you've got this rich birch tree and this, you know, kind of shaded, depopulate Douglas fir, and we found that more carbon would move from the big birch to the little fir, the more we shaded the Douglas fir.

[00:22:53] And so that spoke to a potential mechanism of, carbon moving from high, levels or high concentrations or pressure gradients to low pressure gradients, and that it would move by mass flow through these mycorrhizal networks that, that appeared to be connecting these trees together at least using the tools that we had at the time, that's what we, that we thought.

[00:23:18] And and so the way that works is that, and I describe this in my book, Finding the Mother in detail about how the photosynthate, you know, gets, it gets allocated through a tree from leaves down to the phloem into the roots along source sink gradients from high sources in the leaves to sinks in the roots, which

that sink strength in the root is, is, is accentuated by basically uploading or passive diffusion of the photosynthate into the mycorrhizal networks, and thinking, knowing that all roots form mycorrhizas.

[00:23:59] all of these trees are mycorrhizal, so they, and they have a demand, the mycorrhiza has a demand, so Growing out through the soil, it has a demand for sugars. And so it keeps that sourcing gradient strong as it's

[00:24:10] **Nate Hagens:** growing. So you're talking about birch trees and cedar trees and Douglas firs, but then there's also other species involved in this ecosystem, which is the fungal networks.

[00:24:22] Like how important are those and how many different kinds of interrelate with the trees themselves?

[00:24:32] **Suzanne Simard:** Yeah, I mean, there are, thousands of fungal, of these mycorrhizal fungal species. And you know, other people look at, not me so much, but how, yes, that the specific species of fungus, we've done some of this work where we've, you know, isolated certain species of fungi and compared how carbon is transferred.

[00:24:52] through those species compared with others, and there are species effects. There's even like ecotype effects, if you will, where you know, where you have better matchings between local fungi and locally adapted trees or seedlings that function better. And so there is a myriad of complexities there. The network itself is highly complex.

[00:25:14] And so this movement between, through the It's a pathway that I don't understand, but what I do is I just see isotope moving from one tree to another, and I find it in another, and that pathway is quite

[00:25:30] **Nate Hagens:** complex. Is the driver, the, fungal networks. Like, have you studied if there were just the three kinds of trees, but no fungal networks, if this transfer of carbon would still happen?

[00:25:44] Or is it, or is the mycorrhizal fungi essential?

[00:25:48] **Suzanne Simard:** You can do these kinds of experiments where you, you can get rid of the fungi or at least reduce them a lot through the use of fungicides. or mesh barriers, or there's all kinds of little techniques you can use to try to sort of remove them from the system and then see how much carbon moves from plant to plant.

[00:26:10] And there is some that moves from plant to plant without the fungi, so I don't completely understand how that happens. I find that quite fascinating because if you think about a soil is a soil food web. There are millions of organisms in that soil, right? there's a, and they're in an eating food chain.

[00:26:33] They're, they are you know, they are limited by carbon. And so if carbon is moving into that soil with all that food web, you know, they're going to be. eating it immediately after it leaks out of the root and transforming it and then maybe moving it down the food chain and maybe another plant will pick it up.

[00:26:50] We definitely see this carbon being picked up but I don't understand that pathway must be incredibly complex.

[00:26:59] **Nate Hagens:** So I'm getting a big aha here that when we look at the global forest cover and we talk about this is a little bit of a rabbit hole from, your, main research, I think, but we talk about the quantity of forest product.

[00:27:16] It's my understanding that nature trees and, such grow at around 2. 8% on average per year. And so that would be the amount that would be sustainably harvest. So there's a quantity, but then there's a quality and the quality is not included in most of the international for profit extractive processes.

[00:27:39] For instance, there are lots of quote unquote sustainable forestry. plantations in Spain, but it's all monoculture. So they are getting the quantity that they're projecting, but the quality, the ecosystem, the, community is sterile and what do you think about that or, yeah, or changed.

[00:28:02] **Suzanne Simard:** There, there are lots of global examples of what you're talking about, you know as timber companies, pulp and paper companies, you know, it's really, a lot easier and cheaper for them to grow monocultures in place of the natural forest, the native forest that was there.

[00:28:19] And so we're seeing, you know, across many countries in South America, North America, Europe, the conversion of native bush or forest to things like eucalyptus or radiata pine or Douglas fir or cottonwood. Let's take eucalyptus. I mean, that's a tree that is, you know, is being, Actually, I was just in Ecuador and I saw a lot of this where, you know, the, sort of like the natural food systems that people are, have been living with for thousands of years are being replaced with these eucalyptus plantations by timber companies.

[00:28:55] The eucalyptus has a huge demand for water, and so that's drying up the creeks that are otherwise also, you know, feeding into the, gardens and the food systems. They're also very flammable. And so, So you've got low diversity, you've got low water outputs now, you've got high flammability, and some, remember one Portuguese Politician called them killer forests.

[00:29:21] So this is a big problem.

[00:29:23] **Nate Hagens:** Because we're selecting for one thing, which is the amount of wood biomass to be sold, and we're not selecting for all the, and then what implications of you said, flammability and loss of water and food, et cetera.

[00:29:38] **Suzanne Simard:** As examples. Yes.

[00:29:40] Yes,

[00:29:41] I know it's this very parochial view that we're, that, you know, certain companies are going to make a lot of money, you know, producing biomass for pulp or timber, you know, and it's, you know, there's so many examples of the exclusion of local communities who have been dependent on the native forest for food and all, you know, their livelihoods.

[00:30:04] it's happening in my own background. backyard in Canada, where we've converted a lot of our, you know, primary forest to shoot planted forests.

[00:30:14] **Nate Hagens:** So if there was a movement in the world to have long term stock exchange, as one example, where we didn't care about. this quarter or this year, but we cared about the wood production over the next 50 years or next hundred years and maybe valued things beyond just the amount of wood.

[00:30:38] Would your research inform such a path? And we would want to have birch trees, fir trees, and cedar trees with a functioning mycorrhizal fungal network towards that end.

[00:30:51] **Suzanne Simard:** Yes, I mean, mine and many other people's research showing that, that demonstrates that and we, you know, this is becoming more of a crisis now, like where I'm living we are having huge wildfires on the West Coast of North America.

[00:31:08] Um in my lifetime, I, these didn't, these were, started really emerging in the last, you know, since 2017. That's only seven years, and the wildfire you know, severity and, extent is just, it's exponential. And that's a, you know, that's a real warning sign that things are out of balance. And the reason they're out of balance, It, for many reasons, I mean, obviously fossil fuels has created a warmer climate, which creates more lightning, which causes more fires to, start, but then we've also, through our cultivation practices in forests of creating monocultures or reduced species diversity that we, you know, we actually increase the risk of those forests burning down.

[00:31:54] The other thing that we're doing, in focusing on wood production, we're forgetting about all those other ecosystem services, like what about, clean water and, and, and and hydrologic cycles that are more predictable, that don't have these extremes, where you have a drought and then a flood, and like those are out of balance there's so many examples of, that lack of balance.

[00:32:20] And it's from, you know, shifting these forests from, their diverse, you know, productive balance systems to, you know, to these, you know, singular monocultures.

[00:32:31] **Nate Hagens:** So, so let's just say that climate change happens, the global economy peaks and we use less carbon and that the end state is, Two and a quarter to two and a half degrees Celsius.

[00:32:45] Let's just speculate that's what it might be. Would forests and ecosystems that are more in symbiosis whether that better because of the nutrient uptake and maybe there's more moisture soil and there's less fires than a monoculture, just keeping the climate,

[00:33:05] **Suzanne Simard:** it will help.

[00:33:06] **Nate Hagens:** Okay.

[00:33:07] **Suzanne Simard:** You know, if we're going to a two and a half degree future increase in two and a half degrees, we're going to see a lot more fire on our landscapes.

[00:33:13] We're already seeing that. that's going to, that's already changing the composition of the forest in a big way. When you have really severe, deep burns like what we're seeing, you know, you're, even the naturally diverse communities that would normally come back are not coming back in the same way. So we really don't want to get to two and a half degree warming.

[00:33:36] That will, I think that all forests will be, no matter how healthy that they are going to be at risk of these catastrophic disturbances. So I'll just say that up front. on the other hand, yes, right now we should be, you know, protecting what forests are remaining in their natural state because they're, highly evolved.

[00:33:56] They've been, you know, they've been regenerating in this way for thousands of years since the last ice age, in our case here in North America. But we can also, we can learn from those forests and we can say, okay, The forest that we've converted to these industrial plantations, we can approximate what the forest looked like by opening them up, increasing shrub diversity, increasing hardwood or broadleaf diversity, you know, trying to emulate what was healthy and diverse, so that we can mitigate the rate of change.

[00:34:28] We really need to mitigate the rate of change and really keep that rate, keep that temperature increase as low as we can, because honestly, the models, are not, it's not going to be great, right? It's, a scary future if we don't do this.

[00:34:45] **Nate Hagens:** Yeah, I'm, well aware Suzanne. what, do you know offhand how our forest cover globally is today as a percentage of 200 years ago and as a percentage of 10, 000 years ago before the agricultural revolution?

[00:35:04] Do you have a rough knowledge of that?

[00:35:06] **Suzanne Simard:** Yes, I do, and I, you see different figures depending on who's writing about this, but the one that strikes me, just a series of papers written in the last five years talking about how we're at about 50 percent of the primary forest cover that we were at now, maybe versus a couple hundred years ago, 50%.

[00:35:28] I mean, there are forests increasing in other areas, but they're not the same they're maybe not as old, maybe not as diverse, so, but the primary cover that you could say is pretty closely approximating what would naturally be there, there's about half of that left and, you know, scientists are also estimating that along with that, you know, there's the biodiversity part of this and then there's the Part of this as we lose forests, that we lose biodiversity.

[00:35:58] Forests are home to 80 percent of global biodiversity, terrestrial biodiversity, and so the loss of those primary forests is associated with the loss of species, not just extinctions, but also reductions And then the loss of those forests also is associated with a carbon deficit. And scientists are estimating that we have, because of land use change, roughly a 25 to 50 percent carbon deficit in our terrestrial ecosystems.

[00:36:25] So, you know, those things go together. And I think really, You know, what we should be trying to do as we mitigate climate change is to try to restore those, so we are filling those deficits back up again. So that the forests are as healthy as possible to be drawing down CO2 to avoid this 2. 5 degree temperature increase.

[00:36:46] And I think we should be really putting a lot of effort into this now.

[00:36:50] **Nate Hagens:** So Dr. Seuss's The Lorax was more nonfiction than fiction.

[00:36:56] **Suzanne Simard:** I'd rather be a nonfiction character sometimes.

[00:37:01] **Nate Hagens:** So is it possible to, in, in, your work, in your communication, I mean, The Mother Tree, um book, Was, was so well received, you know, where I saw it first I was watching Ted Lasso and coach Beard was reading the mother tree in, in the soccer coaching thing, but is it, I think people, my sense is that people respond so well to that.

[00:37:27] narrative, and your research in your book, because they feel that we are more connected to nature than, our culture gives credit to, and that trees, of course, are central to our past, our present, and our future. And is it possible that we could have local Eco groups that recognize the importance of everything you've been saying and prioritize the mitigation and tree planting, but not just monoculture, but building ecosystems that are and, and supporting them that are healthy and will act as carbon sinks and provide ecosystem services in the future.

[00:38:11] Is this happening globally? what's standing in the way of that and how could we scale such a thing?

[00:38:17] **Suzanne Simard:** Yes, it is happening globally, and that is really great. It's happening in local communities. It's happening in a big way with Indigenous people. And so I work with a number of First Nations in Canada, First Nations or Indigenous tribes, and their whole, I don't know, governance systems, their ways of life.

[00:38:46] Their languages the way they conduct themselves is all, you know, evolved with the forest. We live in forested places, and so the forest is essential to their livelihoods, and it's steeped right through their cultures. And when they become removed from their forest, you know, they themselves suffer hugely.

[00:39:05] And we, you know, you can, We could talk about those amounts of suffering, but it's enormous. And so they're, you know, they're on top of this and always have been. And so I'm working with a number of nations in British Columbia to try to protect their remaining forests, because protecting remaining forests is absolutely essential.

[00:39:26] You know, if you think of this carbon deficit, just think of it right now, right? Every day we're making it bigger by cutting down primary forests, because when we cut them down, we're actually, a lot of that carbon, it just evaporates into the atmosphere. And we could talk about those numbers, but it's substantial.

[00:39:44] And so the number one thing is to just stop doing that, especially the old ecosystems. And so they want to do that. They understand that, because their lives depend on it. and then the restoration of the damaged forests in their own territories. We're working with them to try to do that, to, to use the traditional

knowledge systems to and, and just way of seeing the world to, restore these places.

[00:40:09] And I think that is, I was actually in the Amazon last year talking to, Tribes down there. They're doing the same thing. You know, talking to the shamans down there, they're aware all over the world that this is happening at the grassroots level all over the world. People want to restore their forest ecosystems.

[00:40:28] **Nate Hagens:** And the Amazon is is especially important because if it shrinks much more, it turns into a carbon source instead of a sink. So it has global implications on maintaining the forest cover.

[00:40:42] **Suzanne Simard:** Yeah, absolutely. That it is the heart, you know, the, I never understood that until I went to the Amazon last year and flew over these, you know, hundreds of kilometers of intact forest and looking at the whole biotic pump of how the water system is Funneled through the, trees are essential part of that biotic pump, and that, that regulates the climate and that we lose that, then the whole heart of the, globe, you know, becomes ill.

[00:41:16] **Nate Hagens:** Is that Is that true that the forests then are, act as biotic pumps and create their own weather patterns? there's a Russian scientist, Anastasia, I forgot her last name, but is that valid research?

[00:41:32] **Suzanne Simard:** I mean, you know, I'm not, Super familiar with all the studies she's done or her writings, but to me, in my observations and what I have read about her, it makes sense to me.

[00:41:46] I mean, you know, they say that like 50 percent of the Amazon is cycled through the trees on a, like, on a regular basis, and you can see it happening. You don't have to be a genius, right? The water is taken up by the roots, it's fun, you know, it comes up through the transpiration stream, you can see the clouds basically coming out of, you know, the transpiration coming straight out of the trees, and then it kind of falls, and it creates its own rainfall patterns, and it's taken up again, and it doesn't, it, you know, it, makes sense to me, and I know in our own forests, when I study things like hydraulic lift, you know, I look at hydraulic lift in Douglas Fir forests, where water is brought up at night through the hydraulic lift,

and then it's redistributed day through the atmosphere, through the transpiration, but also through mycorrhizal networks and through the soil.

[00:42:36] They're biotic pumps too. So yeah, I mean, it makes sense to me. It's, I know that it's been controversial for her and, you know, after experiencing my own level of controversy, I can, it's tough to to address these and using the language, but but that is what's, you know, as an ecologist, you know, that's what's happening with these biotic pumps.

[00:43:02] **Nate Hagens:** How often do you feel the way that I'm feeling right now? Which is, we are an incredibly clever species, and we've arrived at this point, and it's at the pinnacle of what we call civilization, but we're like kindergartners in understanding how our beautiful blue green Earth actually works, and at the 11th hour, we have scientists like yourself that are figuring it out, and We don't have much time and we have to educate and inspire people to play a role in the service of life.

[00:43:40] I mean, everything you've said so far makes perfect sense to me. It's just, our culture has not cared about it or ignored it, but we're starting to wake up. I mean, do you feel that?

[00:43:52] **Suzanne Simard:** Absolutely. You know, there's an awakening happening all over the world, and we've got to, we've got to work with those positive movements.

[00:44:01] yes, there's a great deal of infrastructure and inertia in place by corporate power already, and ownership of forests the products that they get used to. They use the money they make. There's a huge inertia in that, but there's also a great deal of energetic movement at the grassroots level of making changes on the ground, protecting their communities, growing their diverse forests, growing their food systems back, and you know, and then my Indigenous colleagues, they never stop doing that, right?

[00:44:35] They always are tied to the land. They always practice their knowledge systems to protect, and so we can learn from that, like that's a seed, right? We, I think that there's an idea around leadership, That, you know, that leadership happens at all levels, and that we need to coalesce around these leaders who are,

no matter how small it is, that are making these very positive changes, and that are, and using knowledge systems that are about balance, and about respect, and about that idea of reciprocity.

[00:45:08] that you don't take more than you need. Those fundamental worldviews are, underlies sustainable, you know, balanced ecosystem management.

[00:45:18] **Nate Hagens:** You might know this statistic. I can't remember it. but it's a huge amount of the land that creates ecosystem services in the world is shepherded by indigenous peoples.

[00:45:32] Like a huge percentage. And is that true in British Columbia as well?

[00:45:37] **Suzanne Simard:** Yes. I mean, the statistic I think is that between 17 and 20 percent of terrestrial land base is stewarded by Indigenous people, but that's where 80 percent of the biodiversity is.

[00:45:49] **Nate Hagens:** Yes.

[00:45:50] **Suzanne Simard:** Amazing. That's telling just in itself.

[00:45:52] **Nate Hagens:** Wow. Oh my gosh.

[00:45:55] Well, I mean, so thank yh, for continuing to do this, work. Um, so, so we're quite a way into this already. And I haven't asked you about your main research, which is the mother tree. So can you briefly outline how you discovered what you call the mother tree, which exactly, you know, essentially acts as a nutrient hub within the forest?

[00:46:25] How did you discover this? And why is it so important?

[00:46:28] **Suzanne Simard:** Yeah, so, so what we did is that We, you know, with my graduate students and colleagues, we made maps of what these mycorrhizal networks look like in the forest. And, you know, using graph theory, we're able to identify that the most highly connected individuals in the forest, the big, the hubs, if you will, were the biggest, oldest trees.

[00:46:52] And it makes sense because they've got the most crown the most photosynthetic capacity, they're, a lot of energy is moving through these big old trees, and then they're distributing that energy through their mycorrhizas, even without networks being to other trees, but some of that energy does go to these other trees, and that, so then, they become the hubs or the connectors of the forest.

[00:47:15] And The resilience of the forest then is also associated with that because the more highly connected the individual is to others if you lose some of those connections then you can still carry on because you've got a lot of connections already. This also happens in diverse forests and diversity of fungi is that all that diversity just increases the probability that you're going to have intact connections to carry out the cycle of the forest moving forward.

[00:47:45] So that's how we've figured out, you know, just using these maps of looking what the mycorrhizal networks mapped out as the big old trees identified as the most highly connected. And this follows along the lines of lots of other research showing that big old trees are important. it, you know, if you think back, let's go back to the Amazon, you know, the old quipaq trees, the biggest tree in the Amazon, Ecuadorian Amazon forest, is what the Achuar people call the grandmother trees.

[00:48:16] So, these big old trees, they're known to have not just spiritual significance, but also, you know, food and connectivity in those forests, these biotic pumps. back up here in North America, you know, people have long studied how old trees, they do things like they provide habitat for birds and for other animals.

[00:48:38] Like, for example, last week, or two weeks ago, we were up in Vancouver Island looking at bear dens in old growth forests, right? in the, under the root, you know, the root caverns of old trees. That's where they den and have their babies. you know, it, and, it, The diversity of seeds that they produce, because these old trees, let's say you're a 2, 000, 3, 000 year old cedar tree, you've seen 3, 000 years of climatic variation, and that is encoded in the genes in your seeds.

[00:49:12] And so your seeds come Carry a genetic diversity in them.

[00:49:15] **Nate Hagens:** So there's, epigenetics. The seeds of a 2000 year old tree might be different than it when it was 50 years old.

[00:49:21] **Suzanne Simard:** Yes. Because it would have that, yeah. That epigenetic activity. I don't study genetics, but this is a principle in genetics that you know, that, you know, that variation becomes encoded in the in.

[00:49:33] in the genes, in the DNA.

[00:49:36] **Nate Hagens:** Can you explain not as a scientist, but as a human being my dad and I, our entire life, love hiking in old growth forests. And whenever we go somewhere that has, he used to call them wolf trees. you're, referring to them as mother trees. I don't know if there's a distinction, but we feel this sense of awe and sacredness.

[00:49:59] And we go like to Muir Woods in north of San Francisco. And I hug some of those giant redwood trees. And what is it about, like, humans recognizing the awe and majesty of these old trees that have lived hundreds of years? Is that something innate in our psychology?

[00:50:20] **Suzanne Simard:** Certainly innate in our stories, right?

[00:50:22] Like, So there's, you know, you look at, you know, the major religions of the world even look at the, you know, the Indigenous, you know, spirituality there's always trees present in helping us understand our place in the world. You know, there's the tree of life, the tree of fertility, the tree of abundance.

[00:50:49] it's in all of our stories, and we're shaped by our stories, our past. So that's there. so we relate to it, right? Like, we, depend on those stories to understand the world, to help us convey about our understanding. And then there's also this, you know, the physical interdependence of us and forests, like we talked about climate, when the trees breathe out, we breathe in, it's that visceral, right?

[00:51:15] They're breathing out oxygen, we're breathing it out. We breathe out CO2, they breathe in our CO2. It's that connected.

[00:51:22] **Nate Hagens:** So, so we're like cedars or, or furs in the symbiosis in a way.

[00:51:29] **Suzanne Simard:** Other creatures in this. in this big symbiotic web of interdependent living beings. Then if we can even, dissect it even further, like if you, know, people have been looking at forest bathing, for example, in Japan and elsewhere in the world.

[00:51:45] Right. Okay. And it's, you know, we go taking people to the forest and then measuring the health benefits. And. you know, they have measured things like reduced blood pressure, reduced cortisol levels you know, increased endorphin levels, that gets, the physiological impacts are immediate of being in the forest.

[00:52:08] We feel good, we smell what's coming out of the soil, like that smell of the early rains is from, you know, it's basically from the bacteria in the soil food web that is bursting when the rain comes, and we're smelling those actinomycetes, and, you know, it gives us this euphoric sense so we're biochemically linked to them.

[00:52:30] We get, you know, it's our stories, it's our biochemistry, it's our spirituality of being in these places and feeling these things and exalting that.

[00:52:40] **Nate Hagens:** Yeah, I feel that I, wonder how many people feel that certainly more than they used to.

[00:52:47] **Suzanne Simard:** I bet most people do, you know, if they get the opportunity.

[00:52:49] Well, I mean, part of the thing now is that most people are living in cities, in urban areas, and they don't have that opportunity. And so it's essential that we provide these opportunities for people. And they'll say, Oh yeah, I get that now. and my life is better, but I will also then protect forest because I see the importance.

[00:53:08] **Nate Hagens:** With your class of 600 or more students, do you find a way to get out in the forest on a field trip or such?

[00:53:15] **Suzanne Simard:** Well, I haven't so far. I mean, because I just taught it for the first time last year and it was online and so. I had to bring the forest into the online screen. We'll see what we can do this year because I think that is such an essential thing.

[00:53:30] I take all my 200 level students into the forest and it changes their lives, honestly.

[00:53:35] **Nate Hagens:** Well, what you could do is, is assign people into groups of four and have them go on a forest journey themselves and, write on it or something like that. Yes, absolutely.

[00:53:46] **Suzanne Simard:** That's a great idea.

[00:53:48] **Nate Hagens:** So, so given that these networks seemingly allow trees to communicate with each other and form connections with their neighbors, is there some relationship or do you see them functioning similar to the way a brain functions?

[00:54:04] **Suzanne Simard:** Well, I've talked about parallels in this. so, you know, and I'm not a neurobiologist, but I've read you know, that there are certain, like the, neural connections and the degree of connectivity follows a similar pattern. So you've got some big hubs and then a lot of little ones that aren't as highly connected.

[00:54:28] So that pattern is self similar across these two different types of organisms. the other thing that is kind of striking is that, you know, when we look at what we think the, chemicals or the the carbon compounds that are moving through the networks they're basically. the same composition or the same stoichiometry as glutamate.

[00:54:53] Glutamate is our main neurotransmitter in our brains. So there are these, aha, similar That you go, you know, there, that there are patterns there that, you know, nature has, conserved because it works well in my, view. That's my opinion. Yeah.

[00:55:11] **Nate Hagens:** So do you think it's possible for humans to communicate with trees?

[00:55:17] and have you felt that you've been able to communicate with trees in, in any way in your work?

[00:55:24] **Suzanne Simard:** Yes, I do communicate with trees. and I think that if you open your senses and allow yourself and, and, you know, all the structures of science and let them fall away and just be yourself with the forest and that you will have an experience, right, that's very spiritual.

[00:55:46] and, I think if you haven't had that, you haven't spent enough time because these are incredibly uplifting places. you know, we've written symphonies about this. We've written, you know, religious scriptures about trees. We've, you know, we as human beings, we've, you know, created, like the whole potlatch system is about exalting the resources through, their governance systems.

[00:56:12] And, you know, that spiritual connection to nature, the trees, the salmon, the bears, it's all, Yes, you know, you don't have to work too hard if you spend the time doing it to see that connection, to experience that connection.

[00:56:29] **Nate Hagens:** Let me follow that with a kind of depressing question or speculation, is as fossil carbon gets more expensive as it depletes, we're going to turn from using ancient carbon to using old carbon more than we have, is my fear.

[00:56:48] And given what Your research has been over your entire career, what would be the best practice informed by your research for logging and forestry industries to start implementing now and what would be the governance and policy implications to maintain that going forward?

[00:57:09] **Suzanne Simard:** Yeah, that's such a great question.

[00:57:11] Of course, you know, I don't have all the right answers, but I can tell you what I think. I think that, you know, And I look at things like carbon content in forests, and where is it all distributed? How much is there? How much is there in a West Coast forest versus an Amazon rainforest? How much is there in an arid forest versus a humid forest?

[00:57:32] What happens when you log it? And where does it all go? And when I look at that, the first thing that comes to mind is that we should not be logging our old growth forests, especially in humid regions, because they're the richest carbon stocks. And

[00:57:48] **Nate Hagens:** are we? We continue to log old growth forests? Yes, I was

[00:57:51] **Suzanne Simard:** just up in North Vancouver Island brand new stumps, thousand year old trees just cut.

[00:57:59] Yeah, it's going on every day. Every day trees are falling. And that's like, we should be doing the opposite, right? We should not, because what happens is that our research shows that about 60 to 70 percent of that carbon is immediately, or within a year, released to the atmosphere. So it's adding to that big carbon pool in the sky, the atmospheric CO2 levels, and we shouldn't be doing that, right?

[00:58:23] We have alternatives. If you look at what those old growth forest trees are used for, You know, a lot of them, right, the cedars are used for shakes, to put on houses, to, you know, look nice. you know, we need to be smarter than that. the, second thing I would do is, so old growth, big old growth forests should be off limits.

[00:58:46] Second thing is the primary forests, which the ones have not been logged before, they also contain lots of carbon, especially in the soil. And that, what we're finding is that modern logging, practices with big machines, disrupt that soil carbon in a big way. And that took a long, time to get there, thousands of years.

[00:59:06] So we should not be logging, or we should be doing very gentle touch, craftsman like logging, if we're going to do it in primary forests. So getting people on the ground instead of the big old machines that are going to disrupt that stuff. So that's the second thing. The third thing I would do is you know, is restore.

[00:59:24] I talk about restoration of forests. Restoring their biodiversity and their structures so that they're healthy again. And then I'll just say one last thing. You know, there's so many things I could say, but we're on this other trajectory right now where we're trying to replace fossil fuels with green energy.

[00:59:45] And one of those green energy tools is biofuels, and one of the sources of biofuels is forests. And when we do the math, you know, when we look at, you know, we're going to ship these biofuels to, from Canada, this is what we're doing, to Japan, to the UK, at huge expense, with very low electricity efficiency, 20 percent

compared to coal, that we're creating a huge carbon footprint in the atmosphere needlessly because we didn't do the math.

[01:00:19] and yet there's a lot of money to be made and governments will say, Oh, this is a quick way to make money. We'll cut down our forests for this. You know, that is just needs to be completely dissected and, understood before we set these markets up. I know they're accelerating at a massive rate, these pellet, you know, bioelectricity markets and cutting down forests.

[01:00:42] It's a, I'll say right now, it's a big mistake. We should not be doing that.

[01:00:47] **Nate Hagens:** And I agree with you. but. If, and I'm guessing that they do a narrow boundary calculation of we're not burning this coal and we're burning this wood instead and the wood has less carbon emitted, but they're not looking at the impacts on the soil and the ecosystem and the wider boundary carbon, right?

[01:01:08] **Suzanne Simard:** They're not. And actually I, didn't. I shouldn't, without having read the article in detail, but they just did an evaluation of carbon, the CO2 footprint of Drax in the UK, of biofuel burning. What's Drax? Drax. Drax is the big company that sort of has been at the forefront of developing the, bioelectricity or wood electricity market burning, burning wood to create electricity and it's supposed to replace fossil fuels in the UK.

[01:01:37] Japan. Also adopting it to replace nuclear energy since the Fukushima disaster and it, and it's being adopted in various places around the world, including in California, including in the, southwest of the U. S. To replace fossil fuels. But it's actually generating what this U.

[01:01:57] K. study showed is that those DRAX biofuel Incinerators are generating four times the carbon footprint of burning coal for the same amount of energy. So, you know what, I'd have to fact check myself on that article, but but it makes sense to me because the efficiency The energy efficiency of burning wood to create the same amount of electricity is about one fifth of coal.

[01:02:25] **Nate Hagens:** but setting that aside, what you're saying is when you remove those trees, there's, an additional carbon cost. right. And not only carbon, but maybe water and flammability and food and Yeah, yes, and all that.

[01:02:43] **Suzanne Simard:** Yes, we haven't counted it all up, right? And then we have all these funny international rules of where the carbon emissions are counted, right?

[01:02:52] Like the UK when it imports that or Japan imports that wood, they have heavily subsidized the imports for this industry, and they also don't have to pay the carbon cost of importing that wood. That's borne by the country, I believe, that is providing the wood, the one that's cutting down the forest.

[01:03:16] And so there's this sort of accounting that comforts, provides comfort to the country that's actually doing the polluting. Well, both countries are doing the polluting because, as you say, when you cut down the forest, you're affecting the water, the hydrology, the species, and so on in that country of origin.

[01:03:32] **Nate Hagens:** So what's you know, there is an awakening and no small thanks to you and your book and your, your research and many others in our network are, realizing how connected things are and how we have become a species out of context and how we need to reconnect. probably with a smaller material footprint.

[01:03:55] But does this happen from bottoms up, from top down, some combination? How can individuals listening to this program get involved to support thriving forest ecosystems where they live or in their regions or beyond?

[01:04:14] **Suzanne Simard:** Yeah, I think it's got to be bottom up and top down. We need both of those things. You know, complex systems, or complex systems thinking recognizes the top down and bottom up work together but that bottom up part, if we talk about that first, you know, if when, what's happening, I think, is that, that women especially, where they're you know, they're living on the land, looking after their children, they look after the crops, the water, the resources, this is what the shamans told us when we were in the Amazon.

[01:04:46] It's the women on the ground who are doing that caring that are doing it at the grassroots level of restoring their food systems, basically, to provide them with better security for them and their kids. and so to support those movements is really important and become involved yourself. You know, in your local community, what, Find the people who are rebuilding the, natural, you know, the estuary that,

that provides the, shellfish, for example, or, the berry forest that provide that food or, you know, the forest that, that are homes to the.

[01:05:26] the deer and the moose and so on that provide food or, or sustainable agriculture that, or agro, you know, sorry, regenerative agriculture that takes care of them and get involved in those at the grassroots level, and that starts change. And then at the same time, we need countries and international agreements to get serious about these emission levels and, to get rid of the loopholes so that, we have to meet these, international standards and not wiggle our way out of it, or say, oh, oops, I just, we just exceeded it.

[01:05:59] Oh, there's a small fine, if anything at all. We got to get serious about this. And so, and supporting these graphs, grassroots movements, so good policy that is going to regulate emissions with, consequences, and then supporting these grassroots movements that are already in place, that are doing really good work.

[01:06:19] **Nate Hagens:** How much of the top down and bottom up trajectory really starts with a change in consciousness? That when you walk outside, you don't say, oh, there's a bunch of trees outside, but oh, there's a birch, there's a Douglas fir, this is an old growth, I smell it, this is, I recognized this when I was younger.

[01:06:40] and we just, how much of it is a change in our consciousness of our time and what we're doing? Very

[01:06:45] **Suzanne Simard:** much. And, you know, we're such relational creatures. we're such spiritual creatures. we have it all in us to do that, and to find the opportunity to reconnect, what's in our DNA.

[01:07:01] Because when you go out there, and even if you've never been in an old forest, you will immediately understand where you are, and you will immediately understand the magic of it, and the health benefits, and all the, you will get it right away, because we are that, we've evolved that way. and that's a beautiful thing.

[01:07:18] so it is. take. It's like, you know, when you learn to meditate, it's like, oh, you can get it right away. When you get it, you got it, right? so, so do it, right? Go and reconnect. And then once you've got that, it never goes away. You've got that special thing. And then you use in your part, doing your part to solve climate

change which is protecting that forest outside your town or, you know, voting in that party that is about protecting forests or restoring forests or regenerative agriculture, regenerative forestry, about, you know, Finding smart ways of, getting off of fossil fuels that doesn't involve cutting down forests.

[01:08:02] you know, you'll start to see the patterns in act. So, but it does start with that. It starts with that. Get out there and love and fall in love.

[01:08:10] **Nate Hagens:** So I want to be respectful of your time, but I have a few more questions to ask all my guests. but, firstly, are there emergent directions that you're taking now?

[01:08:22] after having 30, 40 years working on this stuff that you hadn't foreseen when you began and, what are those and how did those come about with your research on trees?

[01:08:32] **Suzanne Simard:** Yeah, so I think the one thing that I hadn't foreseen and that I'm so blessed is that I, didn't, You know, I grew up in this logging family, I went through school wondering what, why was my thinking different than the loggers, or you know, the industrial loggers, and finally starting to work with Indigenous people, and then just going, oh my god, I've, found my people, right?

[01:08:58] They, understand this thing that I felt I've been fighting my whole life And so now I just work with them. I learned from them every day watching how their sy their knowledge systems work, how they, their epistemologies and ontologies all, how all of that is 'cause it changes your thinking.

[01:09:17] it rewires your, what your values are instead of thinking about, oh, I've gotta get more and more stuff. It becomes about the collective, like how do we make a better world for all of us? And the future generations, that changes your thinking. That is such a blessing when you get there. You become from an individual to a global person.

[01:09:41] So I invite everybody to go, try to go do that. I never thought I would. get there, but it's been amazing. I, now I work, you know, in these big systems that are at this intersection of the land and the sea and the air, like all the big biomes. How do we link all these things together so they're in balance again with the nations?

[01:10:00] That's that, and then to do it and then demonstrate to the world that this can be done. Because I think there's this hopelessness and despair out there that, oh, we can't do anything about this, but there is, and there's all kinds of. of emergent examples coming up. I think the work I'm doing is one of those small examples, and you look for those examples and go, if they can do it, I can do it, and then it builds.

[01:10:24] so I'm so, I feel so fortunate that I'm able to do that.

[01:10:30] **Nate Hagens:** That's awesome. and inspirational. So you teach college and have for a long time. What, do you tell your students or what would you tell young people listening to this program who are in their late teens or twenties and are aware of climate change and ecosystem loss of diversity and all the things that we face?

[01:10:53] do you have advice for them or how do you recommend and advise them?

[01:10:58] **Suzanne Simard:** Yeah. I think my advice is that we can solve climate change. And I know that's probably not very popular among many groups that to say, but we can solve this that there, there's models out there that show that if we do this kind of grassroots work and restore ecosystems and protect what we have left, we can change this.

[01:11:18] We don't have to go down this trajectory. So that's one thing.

[01:11:20] **Nate Hagens:** So when you say solve climate change You, you mean not from switching the bad energy for the good, necessarily, but actually changing the, the sink and building the sink to, to pull CO2 from the air? Yes,

[01:11:36] **Suzanne Simard:** it does. And it starts with, you know, it starts with that worldview right?

[01:11:41] That, that you, the worldview is such a simple thing, that when you see yourself as part of the solution as a collective, and in, in improving the collective work together the that gives you that great energy. Those, all that network that you're in now is powerful. It's not just you, it's the powerful group of you.

[01:12:03] and yes, and doing the work like, you know, like I said, like restoring forests, saving forests, and so on, and wetlands, and estuaries, that you add all that up, and scientists, say that if we do all these, they call them nature based solutions, or regenerative forestry with Indigenous knowledge systems, that we can actually fill these carbon deficits by a third.

[01:12:26] That's a huge change. And that's not even without getting off of fossil fuels. So, you know, that's why I say it's all within our grasp. You know, there's a lot of brilliance here. and we haven't activated it yet, but we can do it. So my first word of wisdom to all the young kids is get involved and, you know, even if you want to be a lawyer or a hockey coach, there is some way that you can be part of solution.

[01:12:56] just figure it out. And then as the collective, we will solve the problem. and then, you know, the other thing is tell your neighbors, right, and grow that network. So don't be shy because all of our lives and the future generations, the seven generations are depending on us to do this, to get the word out and show, demonstrate, absorb, include.

[01:13:20] **Nate Hagens:** I might guess the answer to this next question, but what do you care most about in the world, Suzanne?

[01:13:27] **Suzanne Simard:** Well, honestly, I care about my children. I have two daughters. If I, look at, you know,

[01:13:35] **Nate Hagens:** You also are a mother tree.

[01:13:36] **Suzanne Simard:** Yes. And I, and so it's, to me, it's all inseparable. my daughters are interdependent with the forest, their forest ecologists themselves, you know, it all comes together.

[01:13:52] so that is what I care about. Their health, the health of all the kids and all of us who are interwoven with the forest and the forest itself, of course, those are the things I care about the most.

[01:14:03] **Nate Hagens:** If you could wave a magic wand and there was no personal recourse to your decision, what is one thing you would do to improve human and planetary futures?

[01:14:14] **Suzanne Simard:** I think to, what's the single most thing? I think that we have to look at fundamentally, you know, the, creating more equality. and so, you know, I, talked a lot about how women especially are at the grassroots level doing this good work on the ground. Empower them, you know, provide them with funding, loans, like microloans was a thing for a while, you know, get them into, So that they have some, some say and I know as climate changes, it's going to push it in the other direction, but we need to really work hard to not have a, you know, to go backwards.

[01:14:55] so we want to empower women and when you have, in any marginalized community, you know, it's not just the women, it's all people who are doing this work, empower them, give them the resources that they need and distribute it. And I think that's the single most important thing. They'll figure out how to do it in their local neighborhood.

[01:15:15] That's the genius of the local movements.

[01:15:18] **Nate Hagens:** Thank you. I know you don't do much podcasts anymore because you're so busy, but just out of curiosity, if you were to come back on this show in the future, in six months or such, is there one topic that you may not have touched on in today's conversation that you're deeply passionate about that's relevant to our future that you would be interested in unpacking, taking a deep dive.

[01:15:44] **Suzanne Simard:** Yeah, I mean, one of them is, like these alternative markets emerging markets that are, not about extraction, but about the, you know, the growing well being economy. I would love to talk about that. You know, how do we take, like, all those results we're, showing, you know, the arguments that you can get into about, well, how are you going to pay for, you know, the jobs, you know, the, if you're going to, if you're not going to cut down the trees, what about the jobs?

[01:16:10] Well, you can convert those jobs. into growing this, these capital, these resources back again. You know, it takes actually more effort to restore. And then how do you get the money to do that? Well, we can monetize, we can put a better value. We're not valuing water and carbon and biodiversity at all, right?

[01:16:30] Let's put a value on those. and then the economy will shift on itself, Suddenly we won't be cutting down trees, we'll be growing trees, right? And we'll be, and carbon or biodiversity or water becomes the commodity instead of the two by four. I'd like to talk about that because that's where you can really make big changes really fast.

[01:16:51] **Nate Hagens:** Okay. I'm going to hold you to that. We're going to, we're going to do that. Thank you so much for your time today and for your career and on all your important work. Thank you,

[01:17:01] **Suzanne Simard:** Nate.

[01:17:01] **Nate Hagens:** I appreciate that. If you enjoyed or learned from this video, From this episode of The Great Simplification, please follow us on your favorite podcast platform.

[01:17:11] You can also visit thegreatsimplification. com for references and show notes from today's conversation. And to connect with fellow listeners of this podcast, check out our discord channel. This show is hosted by me. Nate Hagens, edited by No Troublemakers Media, and produced by Misty Stinnett, Leslie Batlutz, Brady Hyan, and Lizzie Sirianni.