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[00:00:00] **Rosa Vásquez Espinoza:** A lot of our education globally has stayed in the times of the industrial revolution. You need to have this very progressive, isolated thinking of you need to learn math and you need to learn geography and then chemistry as if the world is separated by themes when it is just not the reality of even how a system within a river works.

[00:00:22] And I think we would benefit so much more by questioning could we perhaps just rethink why is our education system still like in the industrial revolution time? And then also do finding ways of getting the classrooms outdoors more, even if they are within a city, you will still find hopefully one single tree, which is enough of a subject to do talk about interconnection.

[00:00:49] **Nate Hagens:** Today I am pleased to be joined by Peruvian biologist Rosa Vasquez Espinoza to discuss her frontier work, bridging indigenous knowledge and modern science to protect the Amazon rainforest and its communities. Rosa is the founder of Amazon Research International, where she has pioneered groundbreaking research on biodiversity and extreme Amazonian ecosystems while advocating for policies that recognize the intrinsic value of nature.

[00:01:19] Rosa is also a National Geographic explorer and award-winning artist and author of the new book, the Spirit of the Rainforest. She also co-authored the first scientific paper with Ash NCA leaders for whom she also serves as an international ambassador. This episode, which has quickly become a favorite among the staff here at TGS, explores how modern science and indigenous ways of knowing can work together to propel wide boundary discovery, innovation, and conservation equally as exciting to me.

[00:01:54] Rosa shared stories from her time in the Amazon rainforest where she works with indigenous peoples while researching the amazing array of species that lived there. For those of you who may be listening to this on audio platforms, Rosa allowed us to include images as some of the fantastic wildlife they captured on the camera traps and that she's encountered in her work, which we feature in the YouTube version of this episode, including a montage at the end of the video.

[00:02:20] So I encourage you to check that out. Lastly, if you are enjoying this podcast, I invite you to subscribe to our substack newsletter where you can read more of the system science underpinning the human predicament, where I, my team and I increasingly share written content related to The Great Simplification.

[00:02:37] You can find the link to subscribe in the show description. With that, please welcome also one of my favorite episodes with Rosa Vasquez. Espinosa Rosa, welcome to the show.

[00:02:50] **Rosa Vásquez Espinoza:** Thank you so much for having me.

[00:02:52] **Nate Hagens:** Are you in South America now or where are you?

[00:02:55] **Rosa Vásquez Espinoza:** No, I am in the UK right now, but I will be back in South America in about a week and a half.

[00:03:01] **Nate Hagens:** in Peru, right?

[00:03:02] **Rosa Vásquez Espinoza:** In Perdue, yeah. In the jungle. Yeah.

[00:03:04] **Nate Hagens:** Yeah. I've been fortunate to be in the Peruvian jungle and the Ecuadorian jungle. and I'm jealous. I haven't been there in 20 years.

[00:03:13] **Rosa Vásquez Espinoza:** Oh, wow.

[00:03:14] **Nate Hagens:** Yeah. So, Among other reasons, I have invited you today to discuss the intersection of science and indigenous knowledge and wisdom, which you're deeply immersed in, in your work at Amazon Research International, which is a nonprofit you co-founded, to conserve Amazonian Biodiversity ecosystems and Indigenous knowledge.

[00:03:39] But before we get into that topic, I wanna start by re-asking you a question that I asked during our introductory phone call, because the answer really stuck with me, and I feel it's a helpful framing for the rest of this conversation. The question was, do you think our ancestors like 10,000 years ago were scientists?

[00:04:00] And what do you think that looked like for them?

[00:04:02] **Rosa Vásquez Espinoza:** The answer is yes, I do. And I think that may, trigger a lot of, questions and discussions amongst different people 10,000 years ago. People across our territories, including places like the Deep Andes and the Amazon, were already like the early agricultural experts.

[00:04:26] In fact, there is a debate amongst current experts that Agricul, as we know it may have had originated at that time, even if we date back more than 10,000 years ago, let's say 40,000 years ago. And they already controlled use of fire. That came to be not by purely chance on being able to use the fire in a systematic way to control growth of plans in specific areas that came through a rigorous process of testing, trial and error.

[00:05:03] An process of experimentation, which when placed in a different scenario, we would call science. So bottom line is, yes, I do believe our ancestors were scientists, and I think we find. So many vast examples throughout our history and through our planet, fire being one of them, agriculture, the fact that now with

genetic testing, we know that cacao didn't just randomly grew in all the places in which we find it now.

[00:05:31] Throughout the Amazon, it was selectively bred. The wild species were selectively bred to be able to lead to the cacao fruits that they were harboring at that time. That is, in a way, a process of genetic engineering, except without the fancy titles or perhaps very quantitative methods that we do have now, of course.

[00:05:54] So I think there was such a beautiful way of observation, testing, asking questions and hypothesis building to then seeing how the results turn out and iterating from there that we cannot. Like, not call it science.

[00:06:11] **Nate Hagens:** So is, observing testing and speculating and making some hypotheses, is that how you would define, a scientist?

[00:06:22] **Rosa Vásquez Espinoza:** I think I define that as the scientific mind. for, science, regardless of where, whether we wanna go into deep engineering, space, medicine, genetics, we ultimately have to come back to the very basics, which is we want to get to a hypothesis, whichever way we want to get. To that, whether it's by observing something, having questions, or having obser, you know, having tested already something accidentally, one way or another.

[00:06:47] That is the basics. Of course, modern science adds so many more layers and depth and quantification and analysis and understanding in a different level. I am, as a scientist, I cannot deny that or lower that down. It is just me saying that, Hey, I do think there has been a lot more science embedded within ancestral knowledge that we have not given it the place that it deserves.

[00:07:13] **Nate Hagens:** Yeah, I'm, really interested in, that topic. but getting back to the previous question, just for a moment, I think my, thinking on that has evolved as well. I think there's this pop culture meme that, oh, all of a sudden, 10

or 12,000 years ago, humans figured out how to, Do agriculture and then it was like this natural progression after.

[00:07:37] Yeah. Like people 40 or 50,000 years ago didn't understand how seeds were, come on, gimme a break. It was the huge volatility in global temperatures and then they, it warmed and stabilized. Then we were able to go and do more, more targeted agriculture, et cetera. So I suspect our distant ancestors were well aware of all these things

[00:08:04] **Rosa Vásquez Espinoza:** way back a hundred back in the day.

[00:08:05] **Nate Hagens:** Yeah. I

[00:08:05] **Rosa Vásquez Espinoza:** think there is a, I mean I'm sure there are many factors that impact that. I think there is an aspect of human ego that we want to feel like the strongest, the most advanced, the undestructible being right now. When, if we look at the incredible his. Story that we have and actually acknowledge it.

[00:08:24] You know, if we were to place it now, the advances that there were even in astronomy, back in the Mayan and Incan times, it was extraordinary considering they didn't even have the technology that we do now. You know, the water systems that we are now with Lidar getting revealed, where in the deep area of the Amazon, where if you ask now.

[00:08:42] Most companies will say no, that is just not potentially viable, you know, in many ways. Yet millions of people survive for hundreds of thousands of years. yeah, I agree with you. I, think it is so easy to dismiss the past as this trouble died kind of style where we barely were just surviving and making it, and we're constantly struggle with life when I think there was even some affluent kind

of like societies that, you know, were living a, in, in a lot more progressive kind of ideas and methods that we even acknowledge it.

[00:09:16] **Nate Hagens:** Yeah. So, can, you tell us a bit about your childhood and maybe your academic bra, background that brought you into this work at the intersection of scientific research and traditional indigenous knowledge?

[00:09:31] **Rosa Vásquez Espinoza:** Of course, yes. I, grew up in Peru, born and raised. I was born and raised in the capital city in Lima, two indigenous roots, which is something that I think I have kind of unveiled myself, especially over the last few years.

[00:09:46] My heritage comes from both the and Indian mountains in the Amazon Forest, particularly from my grand's side, my living grandmother. She is a traditional healer from the Andes, although perhaps she wouldn't necessarily even call herself that she lived in a tiny town of only 200 houses where there was no, hospital or access to medical doctors and people rely on the elderly and she learned through them as well.

[00:10:14] From previous generations, her ancestors came from the central Peruvian, Amazon, where they lived as nomad people. And we have learned that one of our great-great grandmothers was a very powerful shaman or known to be, and was known to kind of revive the dead using barks and trees and roots. And when they, my family moved to the city, they did so for my generation to have access to school, to have access to other opportunities to not live on the line of poverty.

[00:10:46] And, you know, they were able to really make that bridge so that. Me and my cousins could attend school, learn English early on, don't have to face hunger. You know, we're already living a much privileged life compared to them.

So I had an embedded indigenous way of seeing the world that they just inherently, by ways of doing things every day and.

[00:11:08] Saying how they were thinking and acting with the natural world in which they did. I inherently grew up with not realizing that was something very different to the rest of the world. And yet I was in a school that was very modern, it was very English based. I was learning about incredible science and technologies happening around the world.

[00:11:28] So I had this almost. Parallel view of looking at a plant here, my grandmother telling me how this plant has a spirit. And you asked to, you need to ask for permission before harvesting it and seeing her methodic ways to make different medicines. And at the same time, my teachers explaining to me about.

[00:11:46] Microbes in chemistry and DNA. So I think it is just by virtue of that, that I am here today.

[00:11:52] **Nate Hagens:** And maybe your unique personality, temperament and characteristics. I bet you were very curious about those things. As a five-year-old girl, as an 8-year-old girl, you had a curiosity, I'm guessing.

[00:12:04] **Rosa Vásquez Espinoza:** I had, too many questions.

[00:12:06] Always. It started with a love for space. I think I've just always been fascinated by the natural world, even from things to asking things about galaxies. When I was six, I remember some of the first books I deeply asked to read were about physics, and then I just became so in love with the aspect that there are microbes on our planet and there's this chemistry and there's all of them.

[00:12:28] My grandmother was kind of like living and being in every single day. I wanted to understand why, how is it that plants have this incredible power to cure

a human? And then in chemistry classes. Yet some have the power, you know, to be poisonous. I was just so fascinated, and I think it is this belief that there's just so much that we don't know.

[00:12:51] And I find that not a fearful thinking, but I find it so exciting 'cause it puts us back into this mindset of growth that we yet still can become better and we yet can learn something new.

[00:13:05] **Nate Hagens:** You're not talking about global economic growth, you're talking about individual like Yes. Spiritual wide growth in ourselves as yes.

[00:13:13] As individual creatures. Yeah. So were these two perspectives of science and indigenous, wisdom they might be called different ways of, knowing, were they always united for you or was there some moment when you were growing up, when you realized that they were connected or could be connected?

[00:13:34] **Rosa Vásquez Espinoza:** yeah, I think I think you're right. I would agree. I would call them different. Systems of knowledge and we have so many incredible systems of knowledge ac across our world, and yet a lot of our modern society and science and even laws and so many more other areas of our lives have been based on a singular, system of knowledge.

[00:13:56] The Western one, I don't think I realized I was growing up with two different systems of knowledge until later on because I, it was just such a common thing for me to learn about all this awesome science. 'cause I was in a lot of science schools, classes in school and then coming home and just hearing my grandma's stories, I took that as just normal 'cause nobody was questioning one another until I moved to the United States.

[00:14:21] **Nate Hagens:** So what was your, formal, a academic background again?

[00:14:25] **Rosa Vásquez Espinoza:** I, so I moved to, when I was 18, I got a full ride scholarship to do a dual, what? I started on, molecular biology, so a science degree in biology. And then within my first year I added a second degree in chemistry. So I was doing molecular biology and biochemistry.

[00:14:41] So I graduated with a dual degree and then eventually did my PhD in chemical biology.

[00:14:46] **Nate Hagens:** Okay. So as a professional chemical biologist who has indigenous wisdom in your living family, when your grandmother said one of your great-grandmothers brought people back from the dead with barks and roots and such, when I hear that, I'm like, oh, yeah.

[00:15:07] Right. Either. Either they're defining, bring back from the dead differently, or it's kind of woo. Yeah. So as a scientist, how do you translate that in your mind and body when you hear a statement like that?

[00:15:19] **Rosa Vásquez Espinoza:** I will start with the fact that. We currently believe that less than 1% of plants across the Amazon have been explored chemically for medicinal purposes in our current scientific times.

[00:15:36] So I think there is a high percentage of unknown data, whether they are exaggerated or there is some sort of, you know, holding onto this belief 'cause they have nothing else in whatever specific cases, I wouldn't know.

[00:15:52] **Nate Hagens:** And a, as an aside, sorry to interrupt, but as an aside, I hope, I kind of hope it stays that way because if they wanna explore 10% or 50%, there's gonna be nothing left.

[00:16:02] **Rosa Vásquez Espinoza:** I mean, yes, I think that we can unpack that in, in so many ways because of the unfortunate extractive systems that we have in

place and haven't really explored alternative ways fully, in my opinion. so yeah, I think, it's taken things. With all its nuances, you know, I don't know the specific cases that they may refer to.

[00:16:23] They've told me one or two that of course, as a scientist I'm like, well, you are doing a correlation based on a specific, you know, you happen to use this plan and then you happen to get better. Is it a direct result of using that specific plan or could it have been as a result of your immune system or a result of something else?

[00:16:44] I think there are so many more questions, but I think ultimately the one thing I cannot argue with is that in areas such as the ones they grew up, when people fall sick, they have no other resort than to go to medicinal plans. The percentage of how many times that works versus it doesn't, we don't have that data.

[00:17:01] But I will tell you based on everything we currently know about pharmaceuticals and how medi modern medicine has developed is that, I would presume that is a fair percentage of cases that it did contribute it, even if it, the plan was not the fully thing that. Help solve the health of that person that it had a significant contribution.

[00:17:20] **Nate Hagens:** So, you know way more about this than I do, but my curious mind, wonders some of these plants, you said maybe only 1% have been identified, but certainly some of them have to be kind of co-evolved, some co-evolution process with humans way back in the day that they would, like you said, the cacao plant.

[00:17:44] I, would imagine that story is true for lots of other plants. Yes.

[00:17:48] **Rosa Vásquez Espinoza:** Yes, I mean, I'll give you an example. I was back in, in a different part of the jungle, in a much deeper area that I had not been to before in the central Peruvian territory of the people. That is the largest indigenous group we have in South America.

[00:18:02] And we were staying with a Seminoma family that was really kind to welcome us 'cause we needed to get even farther and needed a place to stay overnight. they choose to live that way, typically is the man that kind of goes back and forth to help with, selling things that they're growing to bring some economy.

[00:18:18] but at some point he asked us to do a fire and to just kinda share stories. 'cause he and the wife were really. Curious about some of our team members that were either from the city or different countries and wanted to get even understand what sharks are or what living in a 14 building even is. yet his wife comes from an uncontacted tribe.

[00:18:40] So, you know, we, are talking with a, different kind of population in terms of what they have seen in the rest of the world. And the one thing that struck to me when we were sitting in the fire, this kind of a bit more clear space, right? Where they're transiting in their daily life. There was a one singular plant, really healthy, really tall right next to us.

[00:19:03] And he made a point that we all sat with that plan being on the north. and then at some point I just, you know, I think I knew what it was, but I didn't wanna assume 'cause it was dark and he just mentioned, oh, that is our guardian. That is tobacco, which is scientific name is Nicotiana Rustica, which it is a very.

[00:19:23] Powerful traditional medicine. and I believe that you know, is also similar to the cacao story has been used for so many, thousands of years that even it inspired to what eventually became tobacco in across Europe. It was one

of the initial plans brought into the new world back in the day of those, early visits.

[00:19:49] And so I You are right. I think there are so many more, and some anthropologists even describe the Amazon as the local people's garden. Not this naive space that is entirely wild, but as a place that has been morphed to people's needs.

[00:20:07] **Nate Hagens:** The scientists and human in me loves the story you just shared. The skeptic in me wonders if the, ancient peoples love the dopamine and buzz hit from tobacco and they created a story that it's our protector just to make sure they add it close.

[00:20:23] But I don't know. so just outta curiosity, you are, Obviously, especially given where you came from, like an incredibly capable and, evidence-based scientist. Do you ever get crap from your family? Why? I have no doubt. Love you and are proud of you. But do they ever say, oh, miss scientists, blah, blah, blah.

[00:20:49] Are there any arguments about science, indigenous wisdom within your family and friends?

[00:20:53] **Rosa Vásquez Espinoza:** That's a great question. And I'll just add before about your, the skeptic. Can you all I will say based on my personal experience with that tobacco MAs Amazonian plant is, that is a great natural repellent for mosquitoes when you smoke Like the smoke.

[00:21:06] Oh

[00:21:06] **Nate Hagens:** yeah. Oh, so it could actually be a repellent. a protector against malaria. Yeah.

[00:21:14] **Rosa Vásquez Espinoza:** You,

[00:21:14] use smoke, when you blow the smoke on you. It's a great repellent. We use it.

[00:21:18] **Nate Hagens:** So, so there's another message in there. You used a word protector. Which has multiple meanings. I perceive that to be like against war or violence, what it could actually mean against disease from mosquitoes.

[00:21:32] And I immediately framed it in the way that I perceive the word. When you might have met something different and your family and ancestors might have meant something totally different.

[00:21:43] **Rosa Vásquez Espinoza:** I, they mean it quite broadly, but I think come some of that could come from that or the fact that by, you know, constantly blowing smoke, you are kind of scaring the more larger predators away from you.

[00:21:54] Kind of like by, by keeping fire. I do think there's many different connotations, some associated purely to the spiritual protection. Would that may have come from the fact that those people were not getting as sick from things like malaria, you know?

[00:22:06] **Nate Hagens:** And it could be placebo as well, because for generations you feel comfortable with that plant because people say it protects us.

[00:22:13] So it does, and I, it makes me actually feel safer, for example.

[00:22:18] **Rosa Vásquez Espinoza:** Exactly. I think there is so many more nuances. And then of course, part of then the cultural and the human mind and the storytelling that gets added. But when we unpack a lot of these kind of more storytelling based knowledge, there is at least one thread of truth, which, you know.

[00:22:35] When we look at the history of other event medicines that still has contributed to, you know, lifesaving solutions that we have now, and, I have some, a few other stories like this as well. On the opposite side, things that have carried a negative connotation that are known as more like toxic and you wanna stay away from, we can get to that later.

[00:22:54] to answer your question. Do I ever get kind of, you know, people kinda like laughing or questioning? I think more than that. I mean this definitely happens, when I start to ask too many questions. But I have found that they welcome when I ask more questions. 'cause I feel like people wanna show you more stuff.

[00:23:12] And that has happened to us extensively, particularly over the last few years of more people across the Amazon get to learn about our work. They're like, oh, you are, you know, you guys are the scientists then. Like, what? You know, what about this? Or do you think this is cool? Or could there be something here?

[00:23:28] And that really has led us to some incredible stuff. Like yesterday, I spent a whole day finishing up a new paper that we have on Toxic frogs that the Ika eat, that they never. You know, even thought to share with the world. And then the moment we kind of been working together, at some point they're like, Rosa, do you think this is cool?

[00:23:47] Like we, you know, frogs and I have learned recently from reading this, that some people think this is toxic. Yes. And, you know, let's talk about that and let's document that if you want. And they're like, yeah, we'll document it, we'll do the interviews, we'll go around, you know, we're coauthoring with a shining cup person.

[00:24:01] So I think more than, if anything, it's just kind of, even hearing about the word science or this type of different system of knowledge triggers the same kind of human curiosity that is coming in you right now in the communities there.

[00:24:15] **Nate Hagens:** So when you go and meet with, indigenous communities somewhere in, in Peru or in Brazil, just generally, I'm just truly curious here, what is their attitude towards.

[00:24:32] The United States and the West and the broader world. Are they fascinated by it? Are they terrified by it? They want nothing to do with it, or they wanna learn everything? I mean, what, is like the general conversation? How does that go?

[00:24:45] **Rosa Vásquez Espinoza:** That's an interesting question. I. I would say it's, multilayered sometimes there is a lot of curiosity.

[00:24:54] There was this amazing environmental, expert that got traveled with us from the UK and a lot of the more seminal families were really curious to hear about her washing her clothes and how she did it because she was describing a machine and they were like, what do you mean you don't use a river? And they were really curious about that exchange and wanted to hear more machines coming from her as somebody that doesn't look like them, because they're like, oh, that is from outside more than even necessarily me.

[00:25:21] Right. So is that kind of like in, in inherent curiosity from seeing something very different to what you have grown up with, when of course you are discussing with leaders that have a bit, perhaps more contact constantly and are aware of what's happening? I think there is a tone, a dual tone of. The support that comes from Peru is not enough, and we need support from other places.

[00:25:48] But also the reality that, is it true that these places are causing the changes we're seeing here?

[00:25:55] **Nate Hagens:** Oh, so they're, aware of the changes. They feel the changes

[00:25:58] **Rosa Vásquez Espinoza:** a hundred percent. Can't tell you, they feel the changes. Even I not living there entering regularly though, can feel the changes. And I think people in the Amazon are some of the ones that feel the strongest changes to climate change by and being the ones that have contributed the least to it.

[00:26:17] **Nate Hagens:** That makes me really sad every time I think about that. I was in India and I just know the Southern Peninsula and some areas in India are just gonna become unlivable in the next 50 years. And when you just think about the wonderful people and the creatures there that had no, you know, they weren't complicit in what's happening.

[00:26:37] It's just really a really sad feeling.

[00:26:40] **Rosa Vásquez Espinoza:** One of the. First time this became even more clear in my head was a few years ago, I wanna say maybe four years ago. we were in a indigenous community in the jungle part of Cusco. most people think of Cusco Andes, but there is an Amazonian part. It, and we were there already for a few days and at some point we were just relaxing around a fire and just having, you know, after a long day of work.

[00:27:03] And I saw the main apple, the main leader kind of moving in and around when usually he was the one, like the first one, singing and dancing. And I was like, oh, something's going on. I can tell. But of course, you know, I can wait

until anybody wants to share more. And eventually we learn that evening, a man from an uncontacted community, but from the same culture had.

[00:27:26] Arrived after walking on barefoot for six days straight because he wanted to ask for food to bring back. And unfortunately that it was not the first time that happened. 'cause they, that had happened in the past and it's not the last time I have seen it. And it speaks to the fact that they are not finding the same amount of food and resources as they did before.

[00:27:49] **Nate Hagens:** Yeah. Because. Maybe the fish swam away or the animals move to a more stable climate northward or, whatever.

[00:27:59] **Rosa Vásquez Espinoza:** Yeah, they, a lot of animals are kind of going even higher altitude in some cases because it's a little cooler. A lot of the contamination is spreading in areas that are not even necessarily near the contamination.

[00:28:09] And I think the dryness in the soils is a lot deeper and farther, even in areas that are, that we don't necessarily think of. So, yeah, I do think there is not to be, you know, doom and gloom 'cause I am such a believer that we can still do something, which is why I'm dedicating my entire use to do this.

[00:28:27] but I don't think we can wait.

[00:28:29] **Nate Hagens:** I'm dedicating my entire old age to doing this, so yes, let's keep trying. Please. Winning more people. yeah, I mean, just as a human being, I could spend the rest of this podcast just asking you stories about the jungle and your experience, but I want to get back to the core of your work.

[00:28:50] so from your experience, what does science, or I guess I should label it, western modern conventional science and all that entails, what does that miss

when it. Doesn't intentionally incorporate indigenous wisdom and knowledge into its questions and methodology during the research process.

[00:29:10] **Rosa Vásquez Espinoza:** I think we are missing out from not incorporating more, systems of knowledge.

[00:29:16] I think there is a, at a sense of, of being attuned with the rest of the world and the systems thinking like the interconnected nature of our planet by not incorporating those, systems of knowledge why we haven't incorporated it. I think part of that comes from the simplicity of following this one path or maybe part of human ego that more traditionally developed Western societies are, more advanced or whatever the reason may be.

[00:29:47] I do think we're missing out in terms of identifying new species, of identifying more sustainable long-term solutions for the climate, for water, for animals, for. Even for our health.

[00:29:58] **Nate Hagens:** I wasn't gonna ask you this, but I think, it's fair to ask you the opposite question is, well at least to ask the question, what does indigenous wisdom and knowledge potentially miss by not intentionally incorporating Western science and some of the methodologies?

[00:30:16] **Rosa Vásquez Espinoza:** I'm glad you asked the question because I think it, we have had such a longstanding view that, oh, it has to be a competition if we're considering both and it has to be one or the other, or we have to walk around so much fragility that we cannot even talk about it. And that is just. A lose for every part of the world.

[00:30:36] I do think there's so many ways that indigenous knowledge gets benefited from incorporating modern science. For example, with modern science, we are able to map where stainless bees are across the Amazon, which is helping

indigenous people expand their beekeeping systems to be able to bring more food and more economy.

[00:30:53] They, with camera trap knowledge using and technology and like ai, we are able to identify and see animals in areas that they may have never seen them before. A very clear example in this last trip in July, we were working in this shining territory where they, by virtue of their own indigenous knowledge and some early surveys, they have an idea of the fauna there and the list of endangered species that lives there, which is critical for them to advocate for funding and support.

[00:31:20] But they had never, ever imagined that the ND and Bear lives in their territory. We only just discovered that because of the camera Trap modern science system that we have input there.

[00:31:32] **Nate Hagens:** I just wonder what I would be most happy about is knowing that I lived, and there were Andy and Bears on my property where I lived or not knowing there were bears and there actually were bears there.

[00:31:47] I would like both of those by the way, they were

[00:31:48] **Rosa Vásquez Espinoza:** so shocked. They were not expecting with that specific camera drop was at an altitude of about a thousand meters. Above sea level and at the end, D bird that does happen to enter into the Amazonian territory typically does at maybe 2000 meters above sea level.

[00:32:06] So they had never imagined that it is also part of their home. They were all so thrilled, and I can send you the clip. The and D Bear was like looking at the camera and like sniffing it and it was so playful as well. it was such a big, huge moment for everyone as to another case as to how yes, indigenous knowledge and systems and societies are also benefited, you know?

[00:32:27] **Nate Hagens:** So are there areas in the past where science has inadvertently been influenced by indigenous and natural systems knowledge?

[00:32:35] **Rosa Vásquez Espinoza:** Yes. Have you ever heard of the medicine Artemisinin?

[00:32:41] **Nate Hagens:** Artian

[00:32:41] **Rosa Vásquez Espinoza:** Artemisinin. I may be pronouncing it with my Spanish accent. so in 2015 or 2012, the Nobel Prize for Medicine was assigned to assigned a Chinese scientist named to Yuu, an incredible researcher who discovered, and I'm gonna say discover like that because there it's a lot more nuance, at this drug to treat malaria.

[00:33:05] So back in the day when malaria was really still untreatable, the government of China was really keen to try to find a solution. And all the chemists, by virtue of their synthetic methods within the laboratory, were not finding that one single cure. And so to you, you super smart decided to why not check out all of this incredible ancestral Chinese medicine that has been written down in their country and went back to some really old records, of different plans that were drawn out and.

[00:33:37] Where they were describing what conditions they were using to treat the plan with, and at that moment there was a description that sounded very similar to what you get when you have malaria and a plan that they yet had not really investigated. Long story short, with the incredible scientific methods that we have, they were able to extract the active component from that which developed into this medicine known as artemisinin, that, you know, it's a lifesaving medicine to treat malaria.

[00:34:07] **Nate Hagens:** So I know nothing about this other than I do know in the oceans there's a huge pharmaceutical drive to test different coral reefs and the different organisms, because then they spin this out in some spectrometer and look for new compounds. Is there like a battle on the frontier in the Amazon and the broad, jungles?

[00:34:33] And is there a, battle or a, between protecting and having the local people who it's their land versus the multinational pharmaceuticals? Is, that a thing right now?

[00:34:45] **Rosa Vásquez Espinoza:** That's a great question. There has been already many cases that I can tell you of current medicines that have either been inspired or directly derived from am Amazonian plants that have no, are still being actively used and have no method of retribution back.

[00:35:00] Right. And I have even read some of these a hundred pages long patent to even see if there's any mention of how sustainably or not sustainably they may be harvesting some of these resources. There's no point because there's nothing. Stated because there's been no system to fight legally for nature, which is where the rights of nature movement for us becomes so strongly.

[00:35:21] So I, there has been, there was in the seventies what we call the golden age of natural product medicine, where a lot of pharmaceuticals were spending a lot of money going to natural remote spaces, trying to find everything they can bring back to the lab and discover that at some point ended up yielding just similar compounds and then too much effort.

[00:35:41] So then eventually in the eighties it switched to the more combinatorial chemistry, synthetic chemistry, building the lab out of your human imagination, which also led to great discoveries, but then also to some sort of a plateau in a sense. I do think there is constant interest in and arounds. In our specific case, I

think the way to move forward is not necessarily to say, let's block all things, but let's do it in a measured way that actually puts nature first.

[00:36:11] We know better now and we have better tools. If we don't do that's just because we're actively choosing. To be dumb because not taking care of right. Nature is not taking care of our ourselves.

[00:36:22] **Nate Hagens:** Well. Humans, often actively choose to be dumb. so, but I guess my question was, is there a cultural zeitgeist now versus 10 or 20 years ago, or even where it's like, no, stay away, stay we, we, wanna be left alone sort of thing.

[00:36:42] **Rosa Vásquez Espinoza:** There is a lot more awareness, from the indigenous communities as to, I don't want people to just come and take because then they don't give back. And then there's some others that, you know, may not, be too aware and be. Maybe play on the naivety of, yeah, let's just welcome. And then they get hurt or they get injured or they just don't get compensated.

[00:37:01] But I think overall, at least within the leaders or even the youth, there is a lot more awareness of either don't come in because I don't trust, and there's been such a bad history and mistrust and a lot of the trust relationships are completely broken. But there is also some that are, no, we do. See one, find a path forward.

[00:37:20] We do believe there could be some sort of balance with economic sustainability and development, but it has to be done with them at the sitting table. How to do that. I think you need local leadership to lead, which is why we're so committed, right. To get this indigenous youth to become the next one's leader.

[00:37:38] so it's, I think it's a mixed reaction.

[00:37:40] **Nate Hagens:** What about the non-indigenous youth, the youth in, the west, in, in the United States? In your opinion, what are our educational systems missing in order to inspire ecological learning and engagement in, in both scientific and traditional ways of knowing, even in urban places and cities that might be far from, the nature of the Peruvian, Amazon,

[00:38:05] **Rosa Vásquez Espinoza:** I think a lot of our education globally has stayed in the times of the industrial revolution where everything became systemized and optimized for.

[00:38:16] Quick, fast, more, you know, nine to five. Or you need to have this very progressive, isolated thinking of you need to learn math and you need to learn, geography and then chemistry as if the world is separated by themes when it is just not the reality of even how a system within a river or land works.

[00:38:39] and unfortunately, I think most of our nationally implemented curricula globally are following still that methods. Of course there's a lot of private, more independent institutions that are really changing ways, but that is not the common norm. And I think we would benefit so much more by. Questioning whether if we're innovated in so many aspects as the human society, could we perhaps just rethink why is our education system still like in the industrial revolution time, aren't, haven't we progressed in any single way to at least question and update that for our generations?

[00:39:16] I think that type of system thinking of interconnection and then also do finding ways of getting the classrooms outdoors more, even if they are within a city, you will still find hopefully one single tree, which is enough of a subject to do talk about interconnection.

[00:39:32] **Nate Hagens:** I hope some high level educators, are watching this program and they reach out and ask your advice on that because I, happen to agree with you.

[00:39:39] Absolutely. Yeah.

[00:39:40] **Rosa Vásquez Espinoza:** Absolutely. I'm happy. I, work with, collaborate with a lot of educators just openly and voluntarily. 'cause I think that is how we change our little ones, you know, and develop those mindsets.

[00:39:51] **Nate Hagens:** I agree. so I want to dig into a specific example of how science and indigenous knowledge can mix to create really great outcomes.

[00:40:04] and I understand your most well-known project that you're working on now has been centered around the protection of, you mentioned them earlier, stingless bees, in the Amazon. Can you tell us, a bit more about that? Why do you chose to focus on Stingless bees and describe your, unique approach for their conservation and protection?

[00:40:24] **Rosa Vásquez Espinoza:** Had you heard about stainless bees before?

[00:40:26] **Nate Hagens:** I have not.

[00:40:28] **Rosa Vásquez Espinoza:** So you didn't get to see them when you were in the Peruvian jungle or equator jungle?

[00:40:31] **Nate Hagens:** No, I was in the cloud forest in, Loma Alta in Ecuador, and I was in Cusco and surrounding areas in Peru. I don't remember the term Stingless bees, but I would imagine if they're truly stingless, that co-evolution and human that a thousand years from now, we'll only have stainless bees.

[00:40:48] But please tell us what they are. what's the story?

[00:40:53] **Rosa Vásquez Espinoza:** The first and maybe the

[00:40:53] **Nate Hagens:** Andy and Bear would like them as well.

[00:40:56] **Rosa Vásquez Espinoza:** For the honey, they steal the honey. Yeah. And they're definitely in the cloud forest too. The first fun fact that'll start is that they are all as old as our dinosaurs. They used to lift already what?

[00:41:06] Stingless bees 80 million years ago. There is, irrefutable evidence of a fossilized resin of a tree that is, that was found in what is now known as New York, where there was a tiny bee frozen in time. That happened to be a stingless bee.

[00:41:23] **Nate Hagens:** So the whole 80 million years of evolution that the stinger was evolutionary adaptive doesn't necessarily tell the full story if they didn't need stingers for 80 million years.

[00:41:34] **Rosa Vásquez Espinoza:** I think there are more gaps in there than we care to really recognize. Okay. but the first true B fossil that we have on the planet with scientific literature to back it up is the stingless B. And when you look at its current living relative, it comes from the Amazon right now. So yes, they do not have a functional stinger either.

[00:41:56] No stinger at all, or a truncated one. Either way, it cannot sting. You can do other things like bite you or get into your eyes or your ears and nose, but it cannot sting you and. If you follow the equator line, you'll find Stingless bees. So for example, the Aztec and the Mayan cultures have incredible records about using Stingless bi honey even as a high end ceremonial gift for the deceased.

[00:42:24] And even in the, you know, in the Toms and you find them in the jungles of Australia, Africa, and Asia. And of course Peru.

[00:42:31] **Nate Hagens:** Dumb question. I assume you've tried honey from Stingless Bees. Does it taste different than bees with stingers or,

[00:42:40] **Rosa Vásquez Espinoza:** I am glad you asked that. It does. so when we think about typical honey, you go and buy in the shop.

[00:42:47] It is very, you know, thick in this gooey sense stingless bee honey, it. A lot more watery. So it, you basically pour it and it will come out. It won't just slowly move. No, it will come out as a thick lemonade. And the taste also can vary wa vastly depending on what area, depending

[00:43:08] **Nate Hagens:** on the flowers or what, they're, yeah.

[00:43:10] Correct. Some

[00:43:11] **Rosa Vásquez Espinoza:** can taste like fruits, some can taste a little like coffee, some can taste even a little like wine, a little bit more of a fermented type of taste.

[00:43:21] **Nate Hagens:** So are these bees, endangered and what are you doing to conserve and protect them and why

[00:43:27] **Rosa Vásquez Espinoza:** they are, the first clue we got was already around the times of the pandemic.

[00:43:32] So five years ago, where we were being told by the communities that back in the day, or you know, before they were able to walk 30 minutes into the jungle and find hives because it's such an important traditional medicine that it was a. The stainless bee honey was actually one of the two top ingredients for Amazonians across Peru, at least to treat the symptoms of COVID, which is how we even got into the project.

[00:43:55] **Nate Hagens:** So how much of the, their problem, the Stingless bees is not really a problem with the Stingless bees, but with too many humans wanting their product.

[00:44:05] **Rosa Vásquez Espinoza:** Well, it's, definitely I think, a rising concern and I think that is why a multi-layer approach as we're also trying to lead Don necessary with advocacy and legal protection at the same time.

[00:44:18] And we actually have incredible news of something just happened yesterday that I'll share in a minute. but the threats, yeah. Saying yeah, we used to take us 30 minutes into the jungle to find a wild hive and now. And I say this from experience 'cause I, you know, I've done a lot of this work myself.

[00:44:37] It can take five hours, six hours of tracking into the jungle to even find that first hype. That was our first indication. Early on, we learned there was no na data to be able to actually track or quantify its climate change impacting them. It's deforestation, it makes sense and we ha we're gathering this cultural data.

[00:44:55] but there was no numbers. And because of that, of course they could not even be considering any red list and so forth. Long story short, we are integrating a lot of partners and scientific methods to build the first map of where stingless, while Stingless beehives are protected so that we could propose a natural corridor, but also understand where are the trees that they prefer to nest in so that we can better monitor deforestation of those trees with the government, but also propose reforestation that is be friendly.

[00:45:26] **Nate Hagens:** So if you do this all, vertically, horizontally, diagonally, and, have a system and a model for this, for the stingless bees in their conservation, can that map onto other, species and the methodology you're using?

[00:45:43] **Rosa Vásquez Espinoza:** That is our goal. That has been the, my vision from the start. Let's, I, we started with stainless bees because it was such a no brainer.

[00:45:52] It sat as such an important part of traditional medicine, but so deeply embedded in indigenous culture that they even relate some stories of origin of us humans to bees. But then it also had this critical role in pollinating some of the most important crops that you and I enjoy. You know, everyday coffee, cacao, avocado, blueberries,

[00:46:12] **Nate Hagens:** well distinguished bees, pollinate those.

[00:46:14] **Rosa Vásquez Espinoza:** Yes, they do. And again, we have barely researched to document this. We do know, based on the research we have been doing and starting

[00:46:24] **Nate Hagens:** well, I, I thought that, coffee and blueberries just came from the store.

[00:46:30] **Rosa Vásquez Espinoza:** Next time you'll think about the little stainless from the Amazon that is visiting the coffee flowers.

[00:46:36] **Nate Hagens:** Well, isn't this at the root of indigenous thinking? And indigenous wisdom is it's wide boundary thinking. There. We're part of a system, we're part of the web of life. Everything is connected. You can't just look at the end product in a container without its life story and how that got there and all the things that are required for its, sustainability.

[00:46:58] **Rosa Vásquez Espinoza:** That's a beautiful example of even an educational project that schools could adopt. Take one product that they find in the local market and apply all of these systems thinking, even connecting a place

like Idaho or Chicago all the way to the Amazon and other parts of the world. What I was also gonna mention is as part of this framework that we have been developing over the last few years, that, you know, we openly share with anybody that wants to, be able to translate into other species and ecosystems, including some of the youth who we're working with was that yesterday, mark, quite a historic step in Peru is only getting released today or tomorrow.

[00:47:32] So completely, you know, Behind the scenes still, we have been fighting for the inherent rights of stainless bees to be recognized legally. No insect worldwide has had their inherent rights to exist, to thrive, to regenerate, recognize anywhere. and yesterday the municipality of Typo, which is in a central Amazonian part of Peru, legally made it into a local law to recognize the rights of stainless bees.

[00:48:02] **Nate Hagens:** Wow. Congratulations.

[00:48:05] **Rosa Vásquez Espinoza:** Thank you. And

[00:48:05] **Nate Hagens:** that's the first of its kind anywhere. That is the

[00:48:08] **Rosa Vásquez Espinoza:** first of its kind. No insect before had the rights recognized and the fact that we're starting with like the oldest be of our planet that happens to be the native, be of the Amazon, and yet nobody really has heard of.

[00:48:21] I think it's very powerful.

[00:48:23] **Nate Hagens:** A small step for mankind, a giant leap for the web of life. congratulations on that. That's very encouraging. thank you. And this is the thing, I think more people can be active on these things. I mean, they don't have the expertise and background you do on Stingless Bees, but there might be

something else in their own community that they want to take a stand on and just need to do it.

[00:48:47] **Rosa Vásquez Espinoza:** A hundred percent. I mean, again, another project for schools. I'm just giving ideas here. Wild bees everywhere, but just there's so many cases. I think we think by changing the world, we need to do this massive global, you know, crazy thing when reality. All we need to focus is on local change, and that's all we have been doing.

[00:49:08] What are local acts we can do that is within our control to make a difference? And with that, I think hopefully we are reaching global impact too.

[00:49:17] **Nate Hagens:** What are some of the other projects you're working on right now? Rosa?

[00:49:20] **Rosa Vásquez Espinoza:** So we have started new projects with that idea of, you know, how could we be applying this framework?

[00:49:25] And, you know, now that we have more amazing collaborators across the Amazon as well, we started a new project on indigenous led camera trap systems. where usually cameras trap work, requires hundreds of cameras to be able to have this metric, you know, grid system within the Amazon. But when we're exploring spaces that by virtue of the terrain can you actually even imagine like a grid system and like physically, and when you have, you know, something like eight camera traps and not hundreds of them because of limited funding, how can you do that?

[00:49:57] And the answer is indigenous methods. So with that, we've been able so far to track, tapers, giant armadillos that are so difficult to find, Jaguars, d and bear incredible wildlife. We're turning into a paper to show that it is a method on its own. They have their specific things that they're looking for to find this wildlife.

[00:50:18] **Nate Hagens:** Once you capture a wildlife on a camera like a jaguar, have you ever seen a Jaguar in person by the way, or only on a,

[00:50:27] **Rosa Vásquez Espinoza:** track? no. We believe we're at, could have been. They're at, yeah, they're at night. I mean, I, have a lot of my indigenous colleagues that have, but no, I believe we may have come close one time by other senses and clues that we had, but no, not like, like

[00:50:42] **Nate Hagens:** the hair standing up on your arm.

[00:50:45] **Rosa Vásquez Espinoza:** Well, there was this one time where we were, we knew we were gonna head into area that, you know, we know Jaguars are in and we had, we knew we were gonna be ours on an in the night looking for stainless bees. And our indigenous colleagues said, you guys focus on what you're doing. The moment I tell you stop, you freeze.

[00:51:02] And he had been quiet for hours. Okay. We were just like chatting and like doing our thing. We're looking for bees. And suddenly he just. You know, puts his hand up and then very clearly says, stop. And our hearts froze. And I did remember the many share clues that my friends that have had experiences with j share, which are very similar, that the jungle goes quiet and things kind of feel eerie.

[00:51:27] And there's just almost like a human instant feeling. But it is very connected to a tutorial and sensorial experiences. but anyways, nothing happened.

[00:51:36] **Nate Hagens:** An instinct that, maybe is a memory that we're not necessarily the top of the food chain.

[00:51:42] **Rosa Vásquez Espinoza:** Yes.

[00:51:43] **Nate Hagens:** Yeah. Let me ask you this. Does, and in your scientific experience, what can you say about this?

[00:51:51] Does the capturing of, a giant armadillo or a Jaguar on camera, and the evidence that they're there, does that change people's, perception of them and maybe value them more? I only ask because I have three wildlife cameras in the back yard here, and I go out there and there are things that I would never know that are here That I see. And it makes me appreciate them more, even though I'm not seeing them. Have you, what can you say about that?

[00:52:23] **Rosa Vásquez Espinoza:** I mean, I think that it's a very similar to what exp we experienced in the jungle. we were, you know, all together reviewing for the first time the camera trap footage with our indigenous leaders and the indigenous park rangers and community members, and.

[00:52:40] The reason why they knew they had giant armadillos besides the burrows that they live, you know, as they make their path, is because they had found one that had been eaten in half by a J and half of its body was left. That was their clue, the toast. Two clues as to why they knew and because of like the poop and a few other things.

[00:52:59] but they had actually never seen one life. That was the first time that they see one life. And it just triggered all of these stories of creation, the indigenous, storytelling that they had heard from the grandparents. The fact that, oh, we ha we know that a few people are still eating them. Perhaps we should start some training saying like, there are alternatives.

[00:53:14] Don't eat this incredible, you know, Jen Armadillo that is on decline. 'cause now they know for a fact that they have living, you know, specimens of this animal living in their territory. when they first saw the Jah and realized that they

tend to accumulate around the So lakes, the first thing they said is like, maybe I shouldn't go hunting the so lake anymore.

[00:53:34] 'cause I don't wanna have to come face to face with the J.

[00:53:36] **Nate Hagens:** So, so it's a form of education.

[00:53:39] **Rosa Vásquez Espinoza:** A hundred percent. And, I think appreciation as well. And in the case of course of the N Indian Bear, not knowing that was a IUC unread listed species that also lives in the territory adds so much more argument for them when they hopefully can ask for more funding and more protection too.

[00:53:57] **Nate Hagens:** So in an episode, I believe almost exactly a year ago with Andre Gui Rice, from BA Brazil, he emphasized that the ecological protection of the Amazon would never be successful without also focusing on the economic viability of the people who lived there. and from what I understand, this aligns with a core part of the work at your Amazon Research International, which uses the research to create, entrepreneurship for indigenous communities.

[00:54:29] can you tell us a bit about how you're able to do this and why you think it's important? I.

[00:54:34] **Rosa Vásquez Espinoza:** Wholeheartedly agree with what he said. A conservation without sustainable economy just does not go anywhere. And I can sit here and tell you hundreds of examples of projects that came in with millions of dollars thinking that it's gonna be the solution without thinking of, an economic way for people to develop.

[00:54:53] It is, I think, wishful thinking to think, oh, but we should all protect the trees and it should protect the animals. Of course, everybody wants to protect the

trees and the animals, but what can you do if you do not have food to eat, to feed your children? Goes back to basic human level. If you cannot feed your children, you would do anything.

[00:55:10] and I think we forget that human necessity as the basis core for decision making. And that really goes back to protecting humanity too. and so. For us, when I first started being fully honest, I came from a purely scientific interest about the Amazon and thinking maybe I can just do really cool academic research and join people and then that's it, you know, sit in a much more comfortable, easier space where I ask questions, I follow them and I create new knowledge.

[00:55:40] but when I had those first experiences leading scientific work myself and kind of reconnecting with the communities I grew up with and the places that I was born in, seeing and imagining that I would be one of the rest that previously came, did scientific research and left without leaving anything behind, just felt heartbreaking as if I was betrayed where I come from.

[00:56:06] Quickly learn as much as I could with all of our indigenous leaders sitting together at a table saying, what do you think would be the solution? Because they're the ones living there. I am not. And believe it or not, so many incredible solutions have already been thought about. And that's kind of where Stingless Bees came in.

[00:56:22] They said, well, you know, we're selling the honey. We can maybe do ecotourism, but the honey press needs to increase. And we're like, well, maybe the scientific research would, you know, teach us whether it's medicinal or not, but also being able to increase the value, which it did. Now, you know, with those studies, the honey now sells for higher prices and now it's leading into this whole other system that now in some families are entirely surviving based on stainless bees.

[00:56:47] **Nate Hagens:** How much of the, you know, underpinning this, you're right, is the human basic drives, but layered on top of that is the issue of scale. So, there might be enough bees to meet the demand of the population that long lived in the Amazon, but if they try to grow the population and scale it to grow, have more honey, et cetera, it might not be bees themselves that are the limiter.

[00:57:13] It might be the things that the bees process to turn into honey. Maybe those are in short supplies. So they're, how important is scale in these conversations?

[00:57:23] **Rosa Vásquez Espinoza:** I mean, it's definitely, scale is definitely important, but I will just bring, modern world parallelism. You know how a lot of people now my age and different age groups have to do multiple jobs to survive, right?

[00:57:35] The traditional I'm gonna be in this one single job for 40 years doesn't really happen anymore. I think parallel to that, in the Amazon, we leave something similar. You need to have these multiple things you can be relying on, whether that is you're driving your boat or you're growing a little bit of cacao, or you're, you know, fishing and then selling that and then adding stainless bees to that.

[00:57:53] Some families, by virtue of that, they happen to be in a territory that also receives high end tourism trips and et cetera. Have been able to now make economies that surround stainless bees, but not just by selling the product. Some of that is I'm gonna get into training and get paid for my training, or I'm gonna make the boxes that other people wanna buy to be able to grow.

[00:58:13] So it is a multi-layer and I do think scale is important. But the Amazon is suffering, right? The trees are dying and the flowers are drying up. They're not even having as much nectar as they did. So it has to be this regenerative approach. For the bees in the jungle.

[00:58:33] **Nate Hagens:** So how do your entrepreneurship opportunities, also help preserve the, ecological biodiversity and the, integrity of the Amazon jungle?

[00:58:43] What's the win-win?

[00:58:44] **Rosa Vásquez Espinoza:** So, sting, like the honeybee that we're all used to, you know, grew up seeing with a stinger, they can travel really long distances, one, two kilometers. So if they don't have plants right next to them, they're fine. They will go find their food and they'll come back. Stainless bees are not like that.

[00:59:00] Most stainless bees can only travel a hundred to 200 meters. Some can only end up even travel 20 meters. So if they don't have a thriving rainforest right next to it, they won't make it. They will leave, they will die. That's it.

[00:59:13] **Nate Hagens:** So this is, in a way, a, an alternative incentive to chopping down the forest to grow land for soybeans, to feed cows.

[00:59:25] **Rosa Vásquez Espinoza:** That's exactly it. And I'm glad you mentioned that because even in one of our last trips. Some of our indigenous partners came and say they have been growing cacao. 'cause that was a big push as a for alternative, you know, illicit activities grow cacao and you know, you're able to get an income and et cetera.

[00:59:42] And it has worked. But at the same time they are very aware that if they wanna scale, that they need to chop down more trees and they just don't wanna do that. 'cause now they're like, oh, but if I am able to, you know, get more stainless bees, I'm also able to get more fruits, which they can also sell because we are even tracking that for some native and local fruits, stainless bees help increase the crop by 44% yield.

[01:00:04] That is massive. and so it is becoming this really alternative where you're now able to keep a happy, thriving jungle where you need to have that floral diversity that also benefits the bees, but of course also benefits. Soil, the water, the trees, the air.

[01:00:20] **Nate Hagens:** I'm just thinking of a, merch for you. more fruit and honey.

[01:00:26] Beef, no moss or something like, like that I love. So, what are the biggest challenges you and your organization are, facing in the pursuit of generally trying to integrate indigenous knowledge and science together and, what are you doing to overcome those challenges?

[01:00:45] **Rosa Vásquez Espinoza:** I think at the very beginning, the challenge was for people to even recognize this as a valid method, that it would work.

[01:00:51] That by putting indigenous knowledge on the same plate, on the same level, that's it. Not comparing just on the same level that we would have active results. And I think over the last few years we're showing and people are starting to, recognize that, which is incredible and it is definitely encouraging.

[01:01:05] People from, even outside of Peru, I was just in the Bivian jungle for the first time because semi nomad women learn about our work and reached out and want to be able to know how to implement something like that. I think to me, that is like some of the best outcomes and like proof that we're doing something right that other locals are wanting to take on.

[01:01:25] Challenges wise, I think the long-term support and funding, we need teams to do this, right? We need teams to be able to scale and to bring more and to be able to support and getting to convince grants, funders or organizations

that. it is possible despite of the results. I think it's, I mean, I know funding of course is a difficult situation worldwide.

[01:01:49] but I think that it definitely has been the, most challenging thing and we've definitely put our heads together for alternative ways, maybe make it more accessible for anybody to be able to contribute, even if it's small ways then, you know, all sum up together to help save the bees in the Amazon.

[01:02:05] So we are exploring alternative ways to incorporate more of the general, public starting next year.

[01:02:11] **Nate Hagens:** So, You are a scientist, you are curious, and you obviously are passionate and have a vision. of course there's many things that are not in your control or my control or the viewers of this show, but paint a picture for me 20 or 30 years from now, when you're my age and looking back at all your work, what can you envision accomplishing?

[01:02:37] Like what are your big, hopes and dreams on, this path, for this work in the world

[01:02:44] **Rosa Vásquez Espinoza:** that we have? Tens of local and indigenous youth that are leading this kind of work within their own territories. Because there was an example that it could be done, that we don't come from wealthy background, we don't have a safety net to rely on.

[01:02:59] And yet we took it upon ourselves to find creative ways to do this. And I think by having that local leadership is how we can actually welcome, sustained global growth from an ethical perspective.

[01:03:12] **Nate Hagens:** So how can indigenous people and scientists who are based in other parts of the world, I don't know how many indigenous people are

gonna be watching this program, in, the jungle without internet, but if someone comes across this conversation and people are inspired by your ideas, what advice do you have for them to follow a path similar to yours where they live?

[01:03:36] Is there some basic suggestions?

[01:03:39] **Rosa Vásquez Espinoza:** I would say the art of listening and taking time to converse is underrated. I think scientists, I have found have so many incredible interests and questions that would benefit indigenous communities and likewise indigenous communities that would be benefit the scientists and lawmakers and environmental lawyers and whatnot.

[01:04:02] So I think anybody that has any interest, just reach out, send cold messages. That's how we got started. We have had, we constantly send cold messages because I think I. Out of 10, one person will respond and then the circle gets bigger of finding people that are aligned with a similar vision.

[01:04:19] **Nate Hagens:** Send what, kind of messages?

[01:04:20] **Rosa Vásquez Espinoza:** Call, sorry. Call to messages. Like even if you don't know the person, oh, okay. You have an idea. Reach out, and then take time to have a conversation. So I have had groups ask me how can we take on something similar, on a different species or to tackle a different problem and they perhaps have had groups of scientists or lawmakers come and show interest.

[01:04:43] And I said, take the time to sit down and talk and just both parts listen to one another. 'cause I think we're so common, commonly used to impose our ideas and not listen and. The solutions are there. It's just a matter of taking our time to find that common language where we come and meet equally on equal footing.

[01:05:03] And I do believe that is how we have managed to achieve what we have done so far. And I think it does, although feel so simple. I don't think a lot of people do

[01:05:13] **Nate Hagens:** that. No, I'm, well, I'm well aware. People do not do that. And the world needs more of that. I have some closing questions for you. But I cannot help myself.

[01:05:22] Before we go there, one of my favorite parts of this work and interviewing ecological scientists like you, is hearing the stories of the amazingly biodiverse organisms that, that you've come across. You mentioned the stingless bees and the almost Jaguar experience, but do you have anything more, any other of your favorite species you've encountered during your work?

[01:05:46] **Rosa Vásquez Espinoza:** Oh God. I mean. Do you get to see Pink dolphins?

[01:05:50] **Nate Hagens:** I, oh, the, in ITOs, there's a name for them. What is the,

[01:05:56] **Rosa Vásquez Espinoza:** buffet, Colorado? Some people call it a buffet.

[01:05:59] **Nate Hagens:** no. My ex-wife went on a river dolphin pink Dolphin trip. and I was at, Cusco at the same time, but I've never seen one. I've heard about 'em.

[01:06:10] You've seen them?

[01:06:10] **Rosa Vásquez Espinoza:** I, definitely have seen them. Absolutely beautiful. I think a lot of people still don't know we have even pink dolphins on our planet. and they always just feel like, so much wonder. So I would say pink dolphins. did you go, got to see the che fish, the largest freshwater fish we have in the world when you were there?

[01:06:31] **Nate Hagens:** No.

[01:06:31] **Rosa Vásquez Espinoza:** Okay. is at a pie maga, that's the scientific name. It can wait up to 200 to 300 kilograms. Wow. That is how giant it is like a small Volkswagen. And it's in the Amazon or, and it's in the rivers. Amazon. Okay. No, it is in the upper Amazon, primarily. I mean, it can feed entire, you know, communities. It, what do they eat?

[01:06:50] Fish, other small fish fruits. Okay. they're spectacular to see. Have you ever heard about the killer caterpillar?

[01:06:59] **Nate Hagens:** No.

[01:07:00] **Rosa Vásquez Espinoza:** Okay. It has the Guinness World Record for being the most poisonous caterpillar in the world. It looks like if

[01:07:07] **Nate Hagens:** you eat it or just touch it,

[01:07:08] **Rosa Vásquez Espinoza:** if you touch it, because it has a spikes that contain enough toxins to make you bleed from the eyeballs within two hours.

[01:07:15] **Nate Hagens:** Does this actually happen? Once in a while?

[01:07:17] **Rosa Vásquez Espinoza:** It actually happened to an American lady that survived luckily and went back. I will say that not within our teams, but this story is quite well known. What I will also just say is that it's all, it's also eaten. We learned just about two months ago that the ashan half to eat these very poisonous killer caterpillar and it's a delicacy.

[01:07:38] **Nate Hagens:** Human humans are so crazy. The monkfish liver, you need to be like a stage seven sushi chef to have the liver from the hmk fish, which is a delicacy, but if they don't do it right, you die. Yeah.

[01:07:50] yeah. So, I remember in Ecuador we went out at night with the little petzel headlamps and you could see thousands of pairs of eyes in, the forest 'cause there were spiders in the trees.

[01:08:04] Looking at you, I'm sure you have similar stories.

[01:08:07] **Rosa Vásquez Espinoza:** If you ever do that in the jungles of, well, Puerto Maldonado, where I think you got to visit and you're in a lake or some of the rivers, and you do that, you happen to see little red dots all around. No, you are surrounded by black Caymans. That can be also quite big.

[01:08:25] Cayman's

[01:08:26] **Nate Hagens:** like a alligator.

[01:08:28] **Rosa Vásquez Espinoza:** Yeah. Wow. The black kind that are tend to be quite big. I mean, yeah. The, spectacular, I believe we have definitely come across new species. They are constantly getting discovered. biofluorescent life as well is something that have not been documented or really well properly shared in the world.

[01:08:47] There are areas of the Amazon that they canopy so dense that it doesn't really allow for much light, and that really creates conditions that kind of, I think evolutionarily and genetically pushes wildlife to communicate in different ways, what happens in the deep ocean. And I think that pushes these methods of like bio fluorescence, which we have kind of started to see just very playfully.

[01:09:10] And I think it'll be a whole other world to explore in the future

[01:09:13] **Nate Hagens:** when you're in the Amazon, in Peru. Do you long for your, apartment or house in the uk? And when you're in the uk do you long to be back in, in Peru? How do you straddle that?

[01:09:27] **Rosa Vásquez Espinoza:** That's a great question. To be honest, I feel very free when I am there.

[01:09:34] 'cause I think my brain and human nature just goes back to the basics. 'cause you have to be aware of your surroundings, where you're stepping, what you are touching at all times. And I find that very freeing. And of course, I'm not gonna lie, when it is really hot and we haven't eaten or haven't had a clean shower, I am dreaming of having a nice shower back at home.

[01:09:58] But when I am here, I, there is of course a constant state of craving. it's just the beauty for me, it's the, it is the. Most beautiful expression of life. But I am also very aware of what I need to do to keep this work going, which means going and knocking on doors in different places. so yeah, I think it's a constant longing, but also that kind of teaches you to be happy where you are and call home where you are to also be a happy human being right.

[01:10:29] And enjoy your day-to-day life. And that's something that I think I'm constantly learning too.

[01:10:33] **Nate Hagens:** Well, your, last two minutes, are, applicable to you, but also kind of a microcosm of the human predicament, that we all face today. So, so as a young person, What recommendations do you have for other young humans, around your age or younger who become aware of climate change and the economic and sociopolitical constraints that we have today?

[01:11:02] Do you have any advice?

[01:11:04] **Rosa Vásquez Espinoza:** Yes. I would say one of the biggest questions that I've received constantly from youth globally, especially in the hyper hemis North, northern hemisphere of the world, is how to deal with climate anxiety. And

I think that is so concerning. So what I will say is there is hope. We do not have time.

[01:11:24] So find something local that you can have an impact on, whatever that is. There's no set linear path to do things right anymore. And I think we need the human inquisitiveness and curiosity to, to thrive. And I think everybody has something unique to, to give. And how

[01:11:43] **Nate Hagens:** do you cope with kind of the, more despairing, visions or, fears, of the future?

[01:11:53] or is it just your. Natural personality is an antidote to those, scenarios.

[01:11:58] **Rosa Vásquez Espinoza:** I think I tend to be a very optimistic person, but I am also very realistic and aware, and I am not immune to the realities. But I would say what gives me hope is seeing so much joy in these remote, incredible Amazonian communities that yes, they are facing dryness.

[01:12:17] They may not find clean sources of water anymore. They may struggle to even find fish, but yet we'll still join together to dance around a fire and welcome strangers that are coming outside with the hope that perhaps this time it will work out. And if they can keep hope so we can.

[01:12:33] **Nate Hagens:** What are you, most scared of, and also most hopeful for in, in the coming decade?

[01:12:41] **Rosa Vásquez Espinoza:** More scared of, it's of this constant narrative that we should just give up. There's no point. it's too late. let's just go live somewhere else. I think there's so much to do and to still safe and regenerate. and I think anybody can do it. If we can do it coming from nothing. I think we're showing that it can be done.

[01:13:03] And I think most hopeful is that the youth around the world are standing up to say their peace and to ask for something different. And I think if we just bring together our forces and, show. How things can be better around the world than hopefully in 50 years our, you know, my grandkids can still have a, an notion to go to, to enjoy and a jungle to still go and watch parrots in the same experiences I had.

[01:13:32] And we can still have just a thrive in society too.

[01:13:36] **Nate Hagens:** So, let's, I'll ask an easier question instead of a saving the world question, back to your own, your own work, what research questions are you most personally excited about with your work?

[01:13:50] **Rosa Vásquez Espinoza:** How animals may know how to self-medicate. I think that is a topic that we know very little about.

[01:14:00] Most of the scientific work has been documented in Africa and Asia. There are examples of elephants, using tree bark to induce labor and women in the same community making. Tea from that trade bark to induced labor, chimps have been seen regenerating their skin with using leaves and teaching one another.

[01:14:17] we have started a new project with, another amazing scientist, El Freeman and our indigenous Shaka partners in Perdue. and I think that just opens so many amazing questions to development of medicinal knowledge. Could it have been inspired by observation of animals? Do animals have inherent medicinal knowledge that we should be looking at protecting?

[01:14:37] Could that guide reforestation that is not just good for our jungle or planet and people, but for animal health? I am really excited to dive into that and even how I came to that concept and curiosity. 'cause I knew nothing about the

topic or that ev it was even an area of science, was from an ayahuasca experience I had that I described actually in my book.

[01:14:59] I think it's one of the last chapters that just completely led me to this rabbit hole.

[01:15:03] **Nate Hagens:** I know nothing about that. My, I know my dogs prefer a certain sort of grass that they eat and then they throw up. but they do it all the time and it seems to work for them. And, but they also, they don't like any grass.

[01:15:15] It's a specific patch of grass, so they know. I don't,

[01:15:19] **Rosa Vásquez Espinoza:** that is exactly that concept. Just extend it into wildlife. J self-medicate and or certain monkeys knowing what rest entry to wrap themselves in to help, you know, cure

[01:15:31] **Nate Hagens:** in a different lifetime. If the metris and all The Great Simplification wasn't on the horizon, I would've loved to just be a wildlife biologist and work with people like you in the forest to understand and to observe and to share, the, stories and the history and the behaviors and, the differences with our nieces, nephews, cousins in nature.

[01:15:56] 'cause there's a lot of 'em. and we know so little about them.

[01:16:00] **Rosa Vásquez Espinoza:** A hundred percent. I think that topic to me personally fascinates me. 'cause I think it taps into this instinctual knowledge that I think a lot of us have lost and animals keep very strongly. And I think there's so much we can learn for ecology, but also just for human knowledge that, I mean, I wish to be able to do more and more of the field science myself as well, you know,

[01:16:24] **Nate Hagens:** but do you, think we've lost it?

[01:16:26] Or is it just being papered over by all the other BS in our feeds and stuff, or have we lost it?

[01:16:33] **Rosa Vásquez Espinoza:** My science brain tells me that we probably have lost them, or at least a part of population has. And that for the rest of those instincts, it is just very deeply hidden by virtue of the very highly modern and technological lives that we live that do not feed that systems.

[01:16:51] Right. If you stop looking, like watching from one eye for years, at some point you'll probably lose sight from that eye. Yeah. So I think it is a very similar, you know, example.

[01:17:01] **Nate Hagens:** So do you have advice to listeners who might wanna just try that where they live and try to, take the hand off their, eye metaphorically with respect to the web of life?

[01:17:13] **Rosa Vásquez Espinoza:** I think being very present in the outdoors, and I, say I. Even being very aware when you are, let's say in a, in any park of the smell of the soil, especially for example, after it rains 'cause it's physically carrying chemistry that is being produced by the microbes in that soil that have proven to actually help alter even our own human brain chemistry.

[01:17:36] And I think there is that part of a very quick and simplistic way that we can recognize with our senses. 'cause I think there is a lot more communication that happens in the natural world between wildlife ecosystems and us through chemistry that is unknown. For example, 20 years ago people would've laughed at the idea that trees can talk to one, one another through fungal.

[01:17:56] Network systems under soil. Now it is proven. We know it's even being used to help regenerate forests. I think similarly, there is a lot of chemical communications, not just between plants, I think between plants and animals. And

ultimately we humans are animals. So I do think the same way, you know, there's now research as well that shows that dogs can smell different emotions and that's why they have even different reactions to different people by the pheros and different chemistry that your own body oozes.

[01:18:22] I do think as people, there is certain senses that we ultimately would've be able to derive to different extent, of course. but we just know virtually nothing from that. And I think by looking at how simple question can animal self-medicate, we can start to tackle some of these, curiosities.

[01:18:42] **Nate Hagens:** Thank you for your time today and your work in the world.

[01:18:47] and this is one of the, positive examples of technology that I can share because I randomly came across your profile, on LinkedIn because you had posted something a few months back and I was so struck by what you said that I reached out and we had a phone call, and here you are and I'd love to have you back.

[01:19:06] I love your attitude and, your knowledge and your passion, for this, topic, which is our lives. do you have any closing comments for people who are watching and listening who understand and agree with what you've laid out here today? any, closing thoughts? Rosa.

[01:19:24] **Rosa Vásquez Espinoza:** I appreciate it. I'll, come back.

[01:19:26] Of course. Anytime. It's been wonderful to, to chat and some of the questions you've asked me I've never got before. This has been great. I would say if any of these resonated, any part of it, follow that curiosity. We have forgotten to follow our own questions and that is what leads to new discoveries and to new paths and new ideas.

[01:19:44] I share a lot of things that we've discussed today in my new book. That's a great way to like learn more about what we're doing, but also just kind of rekindle maybe that sense of curiosity and wonder about, yes, the Amazon, but just really bringing the lessons back home. I think that's really what I am so committed at sharing by, you know, dedicating some of my time as well to, to science, communication.

[01:20:06] **Nate Hagens:** And your new book is the Spirit in the Forest.

[01:20:09] **Rosa Vásquez Espinoza:** I have right it, the spirit of the rainforest. The rainforest, how indigenous wisdom and scientific curiosity reconnects us to the natural world. It's basically a very adventure driven, just sharing a lot about wildlife and places and stories that most of the world has never heard about.

[01:20:25] The Amazon, besides, of course, incredible js and anacondas that we're, you know, more commonly aware of.

[01:20:30] **Nate Hagens:** Thank you so much, Rosa and to be continued, my friend.

[01:20:34] **Rosa Vásquez Espinoza:** Yeah. Thank you so much.

[01:21:51] **Nate Hagens:** If you enjoyed or learned from this episode of The Great Simplification, please follow us on your favorite podcast platform. You can also visit The Great Simplification dot com for references and show notes from today's conversation. Additionally, I invite you to subscribe to our substack newsletter where we release written content and special announcements related to The Great Simplification.

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