Transcript

[00:00:00] **Monica Gagliano:** I was looking out and I was feeling very overwhelmed by the idea of the state of the world and how can we destroy this? How can we destroy all this beauty? How can we be so blind and not care? And you know, that kind of mood and the land. Was like, don't, don't be, don't be sad. Don't be sad. The seeds that are creating the, the, the dream of this place are intact, and over time they will just come back.

[00:00:32] Don't worry about it.

[00:00:48] **Jonathan Rose:** Welcome to the Garrison Institute Podcast. I'm your host, Jonathan Rose, the co-founder, the Garrison Institute. Today we're exploring the world of plants and what they can teach us about intelligence, community, and our place [00:01:00] in the web of life. Our guest is Dr. Monica Gagliano. She's pioneered the field of plant bioacoustics, demonstrating the plants not only emit their own voices, but can detect and respond to sounds in their environment, fundamentally expanding our understanding of the pervasiveness of intelligence and consciousness. She's the author of influential books, including Thus Spoke the Plant and the co-editor of The Mind of Plants. She's been recognized as one of Bio Habitat's 24 most inspiring women of ecology alongside Jane Goodall and Rachel Carson.

[00:01:33] Join us as we discuss plant communication, interconnectedness of all life, and how recognizing plant sentient could reshape our vision of the common good. [00:02:00] Welcome, Monica. You've been in Australia. I've met you in New York and at the Garrison Institute. You've been in the Dolomites looking and listening to the community of trees. Is you've been in Peru and in South America and Brazil, where are you now?

[00:02:17] **Monica Gagliano:** Hello Jonathan. So good to to see you again and to be here. Here right now is actually Harvard University, so I'm in the US. I'm a scholar in residence at the Center for the Study of the of World Religions within Harvard Divinity School, and I'm here as part of the Center's Thinking With Plants and Fungi Initiative.

[00:02:38] We'll have actually a conference coming soon with lots of very interesting people joining. The Center has had a long interest in engaging with issues related to matter, spirit, ecology, and of course the, the modern human, and that, I guess, is they're trying to look at these issues in a interdisciplinary way.

[00:02:57] So it's very exciting to be here. [00:03:00] Mm-hmm.

[00:03:01] **Jonathan Rose:** Well. But this is an evolution for you. So let's start at the beginning and then we're gonna get to the work that you're doing now.

[00:03:08] **Monica Gagliano:** Okay.

[00:03:09] **Jonathan Rose:** So you began actually working with fish.

[00:03:12] **Monica Gagliano:** I do.

[00:03:13] **Jonathan Rose:** Okay. But I wanna even go back earlier, because you were born in Italy,

[00:03:17] right? And you ended up in Australia. How'd you end up in Australia?

[00:03:21] **Monica Gagliano:** Yeah, like I was in Italy. I was born in Italy, in northern Italy, far away from the ocean, or far away from the sea in general. And since I was a child, I was totally afraid of the sea and yet totally drawn to it. And so there was this push and pull, I guess, of a love affair with the ocean and the water.

[00:03:43] And then it was very clear to me that that's where I wanted to work. And eventually when, once I finished high school, basically I applied to, to go and study marine science. And at the time there was no such a think in Italy. You know, you have to do bio generic biology, but I didn't wanna [00:04:00] study anything else except the ocean, so, so I ended up actually in the UK.

[00:04:05] And I did my undergrads and my master degrees up in Wales first and then Scotland later. And then when I finished my master degree, I just assumed that people with PhDs are people that are very smart. And so, and I, I am not particularly smart, so is no material for me. But I loved being in the field and being, you know, doing the thing.

[00:04:30] So I was the perfect research assistant basically. So I went and spent some times in New Zealand in one of the big labs there where the first marine protected area in the world had been established in the north island of New Zealand. And then after that I went to work in, in the Canary Islands and learned Spanish, which of course it will become very useful much later.

[00:04:52] But at the time I didn't know. And while I was there, actually I was, I was helping in the field and helping in the lab other [00:05:00] students who were doing their PhDs. And, and I thought, actually this is not that hard. You know, like I, I would be stupid if I wasn't even trying. And so, of course this is part of my attitude is like, okay, so I'll apply to the best possible place in the world for what I want to do, and then they will say no, and at least I can feel that I tried and then I can move on.

[00:05:25] And so of course I applied to two places. One was San Diego, the script because of for temperate water at the time, it was the best place in the world. And the other one was James Cook University on the Gray Barrier Reef in Australia, because of course for tropical marine science, that was the best place in the world.

[00:05:41] And Australia said yes. So I was like, perfect. Actually is much better in terms of temperature because I don't do very well in the cold. And I thought. Okay, we are going to Australia. And once I arrived, I, I think after traveling for a long time in my life, living in many places, [00:06:00] Australia, the land and the waters and the place, I don't know, it really spoke to me.

[00:06:05] I just felt it under my feet as like I'm a home. And so I've been there, you know, that's my home. And then I've been there on and off because I travel a lot, but that is my. My home and I'm there to stay, hopefully.

[00:06:21] **Jonathan Rose:** You were doing this wonderful work on the reef with fish, and there was a moment then where you were asked to dissect the fish and you realized that they were deeply sentient beings.

[00:06:33] **Monica Gagliano:** Mm-hmm. Yeah, that it was, was one of those points in one's career or life in general that you know, we. We call turning points or the beginning of the hero's

journey, depending on how we wanna see it. And you know, there is this call for adventure, but first something needs to break. And for me, that was what happened with my fish because I loved working on the Gray Barrier Reef.

[00:06:58] I was in the water [00:07:00] for my work. I was in the water. All day, every day for, for months. And my field trips were long during the summer and, and long days. And so you are really becoming intimate with the animals there and with the, with the environment itself, with the space. And so you, you know, that you need to turn at that next coral that sticks out.

[00:07:21] You know, like you, you, you know it as you would know, like when you walk on a path in a forest every day. And so it was very familiar. I was very intimate. And same was the relationship with the fish. These were wild animals that I was working with who of course had their own little niches and their own little places, and I would see them every day and, and during that time I was just observing.

[00:07:44] So I think I realized only later that they knew that I was just observing and that I was just benign. There was nothing going on with Monica. To the point that some of them actually approached me during the, the time that we were doing the experiments and, and [00:08:00] literally they, they would sit in my hands, you know, these are wild animals.

[00:08:03] And I was like, wow. And then though my, the other side of me, so the party was trained to be the scientist in a western context that demands certain things at the end of the experiment, needed to collect these fish because my science demanded that I validate what I observe behaviorally with, you know, chemistry and, you know, all sorts of biochemical essays.

[00:08:28] And, and so for that work you need to have body parts, liver brains, hearts. Yeah, I, the day, when was the last day of the experiment, I knew that I needed to go and collect them all. But after so many months together, every day in this intimacy, I just felt I re, I really needed to say goodbye before barging in and collecting everything.

[00:08:51] And certainly the last thing I expected was for them to actually refuse this last encounter, basically. And they [00:09:00] were all hiding. it was heartbreaking for me. I realized, oh my God, they know exactly what's in my head or in my heart right now, and even if there was nothing outside that was giving me away, it's not that I've had nets and things to collect them.

[00:09:18] There was something inside. There was obviously emanating a message that they got very loud and clear and they were like, mm-hmm. This day today, Monica is not the same. Monica that we met. And in a way she has already betrayed that intimacy, so we are not coming out. Yeah, I felt completely frozen and, and I learned a very good lesson that when we are placed in situation where, you know, different worldview collapse onto each other. And, and there is a point of choice. You have to make a choice and you feel frozen because you know that the choice you have to make is actually contradicting a new [00:10:00] system of value that is arriving for you. So there was guilt which freezes you completely. And I walked out, well, I swam out of the water and I went back in the afternoon.

[00:10:11] And that's what I guess we do in situation like this. When we position in front of these dilemmas. We can only do what we already know. We tend to go back to what it's already familiar. And so for me, the familiar was like, well, I have my ethics approval. This is how science is done. I have to get this fish because otherwise my entire experiment cannot be finished and you know, what am I gonna do?

[00:10:37] So I went in and they fought for their life. I fought for my data, I collected all my fish. And that was the last time. And what I learned is like, well first of all. The message that I kept receiving while I was doing this collection was like, you have no right to do this, and, and actually [00:11:00] you have no right to do this to anyone, not just in this specific case with the fish, but it's like you have no right to take anybody's life in no circumstances.

[00:11:10] And so well, I, I became vegetarian immediately after. It was like, it was a no brainer, but it was a kind of like, okay, this is my compromise. I don't know how to deal with this. And then, yeah, eventually, you know, I shifted completely my science because I became very clear that the kind of questions that I wanted to ask demanded a, a sacrifice that I wasn't prepared to, to make anymore.

[00:11:37] And it wasn't my sacrifice with someone else's as well. So, so I shifted and, and started working with plants instead. Totally unexpected. And, you know, I was totally plantable blind. That's why I got interested in the topic and I was like, oh wow, there is even a name for this. But I had to thank my fish for the, for the lesson.

[00:11:58] **Jonathan Rose:** In many indigenous [00:12:00] cultures, there's the phrase they refer. To the rest of the world is all my relations. They often refer in American indigenous cultures to the bear as Big brother and the beaver as little brother, and, but they see everything as deeply interrelated, and this was your gateway to that. There are many wonderful things about Western science, but Western science is designed in many ways, but the predominant way is that it analyzes by disintegrating. The depth of deep interrelationship

[00:12:33] **Monica Gagliano:** That's right.

[00:12:34] **Jonathan Rose:** and so we're gonna get back to that. But so then you started working with plants and even those, you were working with plants as individuals rather than as communities, and you were actually separating them from community in some ways.

[00:12:47] So talk about that.

[00:12:49] **Monica Gagliano:** Yeah, well I was a field ecologist, so during my time as a marine scientist, I've always worked in the ocean with, with the others live and you know where the [00:13:00] communities are. And when I moved on to plants, it became. Very clear that the kind of question that I wanted to ask, which were actually the same question that I was already asking in the context of the animal science, there were in a way so outrageous that I couldn't just go and do a field experiment.

[00:13:17] I needed to go back almost to the basic of what our modern Western science demands. So I needed to really set the foundation for, for the question that I wanted to ask. For example, the first experiment I did was with looking at communication between different species. In this case, I had aen plants, Basel and chili plants.

[00:13:38] And the reason why these plants is because they were in my garden and they're like, well, they will do. I don't know anything about plants. I don't know. You know which one will be most appropriate. They seem like appropriate to me. And of course these particular plants are also known in the, in the more alternative, I guess, way of planting in gardens and farming.

[00:13:59] [00:14:00] They're companion plants or no, not so good companions. And so that idea really enticed me because it's like, okay, I don't know if this is true, but there must be

something about these plans that they can maybe share or not share that identify them as companion with each other or not so good companions.

[00:14:18] And so I started this. It was my first experiment with plants, and of course I had to do it in the lab because I wanted to see whether lots of things were, you know, converging at the time. I had done my first trip to Peru because I wanted to understand. What I read in some of the anthropological reports about indigenous people in the Amazon talking to plants, or even more like learning from the plants and then singing their songs.

[00:14:48] And I'm like, what does that mean? And so it's like, ah, that's right. You know? Like if you look at the time, if you looked in the literature for plants. There was nothing about sound like there was already some [00:15:00] literature, beautiful work done on the communication between plants using chemistry, using even light, but nothing on sound.

[00:15:09] And yet coming from an animal perspective is like, it's all about sound. Everyone, including us of course, a very noisy and so like how can it be possible that there is nothing on plants? There was something, of course there was old stuff from the sixties, which were already like put in the basket of like pseudoscience, crazy science, whatever, science.

[00:15:31] And so in fact, that work in a way of those questions, nobody wanted to touch them precisely because there was this luggage, you know, and nobody wanted to be labeled like, oh, you're just another of those pseudo scientists. So, or those hippies or whatever, because the musical plants or you know. This is not what I was doing.

[00:15:52] This, like literally I wanted to see if I cut off all the cues that we know plants already use. For example, we knew light, we knew chemistry, we [00:16:00] knew touch as well, especially at the root level. Well, if these are really the only ways in which plants can communicate, then there will be nothing happening. If I block everything, there will not, nothing will happen.

[00:16:13] However, if something does happen and if they still know who is sitting next to them. Depending on the relationship as companion or not, then we should be able to see something and if something is happening, sound could be one of the way in which this communication is being activated is not the only answer of course, but it could be one of them.

[00:16:35] And so of course I ran the experiment and, and yeah, with crazy designs of boxes, matrika boxes basically of like with plants inside, so that I could alternatively cut off only the chemistry or only the light or all of it. And. And of course the plants still knew exactly what was going on, so I was like, oh, no, so oh, oh no.

[00:16:58] Yes. It's like clearly [00:17:00] they, they are communicating beyond the means that we know of. So this means that now I have an excuse to explore for, I have an excuse to explore, for example, sound. Then, yeah, I explored. And the thing is, as you know, sometimes when you look, you find with other colleagues as well, I started looking into, okay, what would be the role of sound?

[00:17:21] Would the plants meet their own sound? Would they be listening to the sound in their environment? If they do, what does it mean to them? What do they do? And, and of course to all of those answer, which is now over 10 years ago, but now we have several labs around the world specialized on plant bioacoustics.

[00:17:39] At the time it was like, she's crazy. But, you know, I, I actually had this feeling my job as a scientist to look at this question from the specific lens. But, you know, for people in various places in the world, indigenous people who have been doing this for a long time. And it works for them in their [00:18:00] contest.

[00:18:00] It works. We are not stupid to do things that don't work. We are, I think we are a relatively lazy species. Like if something doesn't work, we just drop it. So for something to persist and be so embedded in the culture and so useful, obviously in the context of that culture, there must be something in there that needs to be explored.

[00:18:23] So for me, I wasn't trying to validate indigenous knowledge. But it felt like almost like a wink is like a, I knew you were right and now at least we can talk about it as well in in this world, in the western world, where otherwise they wouldn't wanna hear. So science played that role basically.

[00:18:54] **Jonathan Rose:** Just to give our audience an example, if you have a particular plant that is [00:19:00] pollinated by a particular bee, you can play them dozens of bee sounds and it won't. Respond, but when you play the sound of that particular B, it opens up or it shifts towards the sound or, or

[00:19:10] **Monica Gagliano:** It produces more, more sugar to be more attractive.

[00:19:15] **Jonathan Rose:** So the key is actually the plant is discerning, making a dec discerning amongst many things, choosing one.

[00:19:24] And this tells us then that the plant not only is discernment and then reacting and making an adjustment that actually has intentionality. That it has memory

[00:19:35] because, so it's, these are all qualities of consciousness and it also has relationality because what your work and the work of others, such as Susan, some art have shown as how deeply interconnected all the plants are continuously communicating through these other mag.

[00:19:52] Not just sound, but through these other mechanisms too. And so the whole of nature is com is, is. [00:20:00] Actually a vibrant, continuously responding, learning, reacting realm of consciousness. So your work began to open that up to you. So take us through that journey and some of the revelations that you learned.

[00:20:17] **Monica Gagliano:** Well, as you know, like some of the experiments, you know, the next step it was like, okay, you got all of this information. Of course you know how to communicate, but what is the purpose of sharing information if the other can't remember it or if you can't remember it or if you don't learn from it, and like every time you need to start from scratch.

[00:20:38] And of course the system doesn't work like that. There is memory in the system. There is learning of course, because it's part of the memory and learning process, and that guides decision making. So all of the choices, all of the opportunities, all of the, I'll do this and I don't do that, and. And so I did several experiments.

[00:20:56] One of the famous one is the one with the mimosa, which was the first [00:21:00] one that demonstrated Yep. The, this plant can remember and learn from its own personal

experience. And I say personal as a, uh, you know, not, not necessarily as a provocation, but like a plant are persons of a different kind.

[00:21:16] **Jonathan Rose:** Do you wanna just briefly describe the mimosa experiments so people get the sense of adapting and learning?

[00:21:22] **Monica Gagliano:** Yeah. So for example, with Mimosa was the first experiment to demonstrate that plants can learn and have memory, like we would define that is not a genetic memory because someone passed it on to you from previous times, but because of your own individual experience. So in the case of mimosa, who, little Plants, I created this contraption that allowed me to drop them literally.

[00:21:45] But no plants got hurt in the process. I know that. And the drop was very small, but it was enough to startle them basically. And this is a plan for those who are not familiar with mimosa. It's also known as the the shy plants [00:22:00] or Don't Touch Me Plant. And it's one of those plants that when you actually touch the leaves, it folds, enc, the leaves.

[00:22:06] And if he's really, really disturbed, he even flops down and he looks dead. So he plays dead. And of course these are all defensive mechanism for the plant and to look less appetizing for a potential predator, but in nature, clearly they don't get dropped. And that was exactly why I chose that way of doing experiments so that it wasn't something that the plants have had an experience before.

[00:22:28] It was something totally irrelevant to the plant's life. So there was no possibility for a genetic coding already present. So the only way in which the plant was then able to stop reacting to something like that, which was a bit scary maybe at the beginning, but then he had no consequences. So it was no point of responding constantly to it and wasting lots of energy in the process.

[00:22:50] It was only if he was able to learn on the spot, and that's exactly what they do. And they do a very fast, actually. So I was dropping them. And in my design, based on the [00:23:00] design that was used for animals, I had like, you know, I'm gonna drop them 60 times consecutively and then I'll do it again. And you know, after the first few, like few drops, the plants was already like, oh dear, you know, I don't need to close my leaves.

[00:23:16] It cost me lots of energy to open and close, open and close. And there is actually nothing happening. It's just annoying because this woman keeps dropping me, but it is actually nothing is happening here. And so after a few drops where the plant closes the leaves, then I keep dropping and the plants start reopening the leaves.

[00:23:34] Then he doesn't close them anymore. And of course at that point the scientist in me is like, okay, maybe I exhausted the plant physiologically, that's why it's not moving. But then there are tests that you do to check that what's happening is actually learning and not just physiological exhaustion. And so you, you do the same test, but instead of a drop, it needs to be another kind of stimulus of the same kind.

[00:23:57] So in this case, it was a mechanical stimulus, so it [00:24:00] need to be a mechanical stimulus, but not the same. So instead of dropping it, I was shaking them on a shaker plate from chemistry labs very briefly as well, because otherwise the plants might learn that too. And of course the plant reacted immediately.

[00:24:16] So that told me that like it wasn't exhaustion. The plant knew exactly what he was doing. It just realized, okay, there is nothing happening here. I don't need to protect myself. It's just annoying, but it will pass. But when the new stimulus come in. The plant has never had the experience of this one, then the learning need to occur yet.

[00:24:34] And so of course the first and the appropriate reaction is to protect yourself. So the plant closes the leaves and then you test it again on the original stimulus, which is the drop. And of course the plant's like, oh, but this one I know. And so on the second time around, when you test them again, the plants don't even, don't even bother closing the leaves.

[00:24:53] It's just like, I know this one. This one, I already got it. The incredible thing about this is like the, I repeated [00:25:00] the experiment of the test several times over time as well. Initially I thought like, you know, like I give them three days and then I give them six days. I give them 28 days and the plants still remember exactly, you know, the learning was happened, the memory was consolidated to the point that the plant was like, I know this and I'm not wasting my energy responding to something that is totally nothing.

[00:25:28] I suspect that they would probably have, you know, remembered for much longer. It just say, I run out of time in the lab. So the experiments stop there, but 28 days is already a long time. When we talk about. Long-term memory for other systems we're talking about, like for bees for example, which are very smart.

[00:25:45] We know that they remember and learn fast and a lot. 48 hours will be already a long-term memory. We're talking about 28 days, and it will be the equivalent of asking like, what did you eat 28 days ago? It's like, I don't know.[00:26:00]

[00:26:00] **Jonathan Rose:** So this is really amazing work because what you're showing, again, you're showing that we don't know the mechanisms, but we know the reality that plants have memories, that plants have consciousness, that plants can make decisions about it, they can make judgments. So I want to talk about some of the implications of this. There is a, an artist named James Bridle, and he has a, he said that everything is equally evolved. So if you think about it, there was the Big bang that happened 13.8 billion years ago. So we have this myth that humans are the crown of creation and we're the top of the evolutionary chain. But in fact, we're all 13.8 billion years.

[00:26:40] By the way, the rocks are 13.8 billion years ago. Every molecule of water goes back to 13.8 billion years, and obviously all the plants do. And we all fit together in this magnificent, interdependent thing of life. That in which every element is equally evolved, every element is equally old. Every element has fit together in this [00:27:00] magnificent unfolding.

[00:27:02] And now what you're saying is, and every element is conscious. And so you wanna talk a little bit about how you came to viscerally experience that.

[00:27:13] **Monica Gagliano:** I'm a human being before I'm a scientist, and the scientist is only the curious part of my humanness. And yet the scientists also drive some of that curiosity into the human experience and exploring all sorts of spaces, which are not necessarily what the science want to explore into or is becoming a little bit more recently, but it wasn't necessarily there.

[00:27:35] At the states of consciousness, at the states of being, which I find, at least from my experience, from, you know, the passion of meditation to shamanic drumming, to work with

psychedelic plants, to deep martial arts, yoga, all things that I have done and I, and I consider like my practices, meditation being fundamental, I think for [00:28:00] anybody.

[00:28:00] These are also scientific explorations. And what happened for me is like that they became fundamental to inform my science as the scientist in academia, of course, being very aware of the, let's say, the status quo of Western science, at least you know, until 10 years ago, is changing very rapidly. Maybe not rapidly enough, this kind of conversation of like, oh, so I went and you know, I did this practice in the Amazon and the plants.

[00:28:30] This is a practice that is being used for millennia and is designed to enter in conversation and dialogue with the modern human world. That's what it is. It's a technology. And so I went with the specialist of that field, the experts, and they, they show me how to do it. I did the practice with the guidance and I got the information and then I come back and in my lab I can follow the instructions and do an experiment and look what the experiment actually works.

[00:28:57] And it's crazy and it finds things that probably [00:29:00] I wouldn't even question unless I was shown something else. I think this approach. I didn't share that part on me for a long time because I didn't want my colleagues to judge me. I didn't want my science to be judged, although I got judged anyway. And so by the end of it, it is like, you know, if you're gonna judge, then you need to know everything. And if you're gonna judge, then I want you to actually have the same experiences, because otherwise you don't have the right to judge for something that you do not know. So, you know, like a lot of colleagues still, like they have called me all sorts of names. I think one of the insults would be to call me animist, but actually I take that as like, yeah, actually I think that's pretty appropriate because fundamentally it means that like, yeah, everything is alive and it's true.

[00:29:54] And in my experience, that's what life is. And so why should I do a science that doesn't [00:30:00] reflect that, that aliveness that I'm exploring?

[00:30:04] **Jonathan Rose:** So it's not just that it's alive, that it's conscious.

[00:30:07] **Monica Gagliano:** Yeah.

[00:30:20] **Jonathan Rose:** I wanna take you a little bit Bo, into the evolution of the science, which is that in. Social sciences. Now, there's a whole philosophy that you need to include for humans in the questions. For example, when you're going to a community and doing research, you need to understand they're co-creators of the questions and the answers that you, anthropology a lot is not done is this removed visiting, but it's a, it's a, the recognition of a relationship in quantum science.

[00:30:46] We now understand that everything is deeply interconnected, including the observer changes the observation. So this is, I think, so all pervasive that it actually shows how reactionary the, the science that hasn't gotten [00:31:00] this yet is actually, you know, kind of 19th century science.

[00:31:04] **Monica Gagliano:** It is, and I guess the, the scary bit would be that suddenly you can't just play God and play the detached observer. You had to get dirty, you had to get into it because you are already in it. You're already in that dialogue in. The exchange every time. Even if you are in your mind, you are telling yourself the story that you are the detached observer.

[00:31:26] There is no such a thing that, that, that is a myth. And the thing is, what we found as well, talking to some of the colleagues who are already taking similar steps is like, you actually do poor science. So it is not actually embracing the empathic side of ourselves and including the subjectivity of ourself in the studies, whether it is anthropology or like biological sciences that look at animals, plants, and whatever else fungi. Embracing that and including it, a knowledge that is present is actually [00:32:00] very scientific. It's like you're not just throwing the data because they're uncomfortable saying, no, no, this piece of data is there. I need to take account of it because otherwise it might influence what I'm seeing and I'm not counting for it.

[00:32:13] So then what you find is that when you are actually. Acknowledging, yeah, I'm a subject in this space. I am part of the experiment. I'm not doing the experiment. I am the experiment with everyone else. Then you are also allowing yourself to see things that potentially you would ignore, and this has happened to me many times now.

[00:32:34] **Jonathan Rose:** this happened to everybody and any signs that isolates does that. But also, I wanna point out to two things that happened about a hundred years ago. So, you know, Heisenberg came up with the uncertainty principle, which is actually recognizing things are not objects. They're parts of relational fields, and. About five years later, g Evelyn Hutchinson, a great ecologist, went to [00:33:00] Laak in the Himalayas. And, and it took me a while to kind of put these things together to realize how much Buddhism must have affected his and his sense that everything, again, that there are these trophic levels. But he, he saw that again, that ecosystems were nested fields of deep relationality.

[00:33:18] So science has had these on both the ecological and the physics side of it for a hundred years, and yet we've been ignoring that. So every time we do an experiment as you had to do, where you put a plant in its own little cage and isolate it from sound and chemical signals to try and see one function of it, we're actually disaggregating something that's deeply interconnected.

[00:33:42] **Monica Gagliano:** That's right.

[00:33:43] **Jonathan Rose:** And so now, and by the way, there are all these indigenous traditions which have been looking at an interdependent world and understanding interdependent world for a very long time. So how does this tell us that going forward we should actually be doing our science?

[00:33:59] **Monica Gagliano:** Well, [00:34:00] science needs to look very different.

[00:34:02] **Jonathan Rose:** Seymours recently published a paper you would co-authors, which was about how. A community of trees were communicating electronically, electrically with each other and how they actually perceived an eclipse, which is something that many species respond to. We didn't know the trees did. Do you feel that that began, that experiment began to look at deep relationality.

[00:34:25] **Monica Gagliano:** Yeah. In fact, I think the power of the experiment was that we were able to have the super. Version of the physics. Basically, this happened in the Dolomites. One of my colleagues created this system where we was able to connect and be able to monitor live in real time individual trees for the bioelectrical activity.

[00:34:47] It is actually called Electron because is like, the genome is a summary of bioelectrical activities, so it's not a specific one. It's a good proxy for all sorts of physiological processes and

all sorts of [00:35:00] long, long distance potential signaling, which of course is the basis for communication. And what was, what was interesting about this experiment is that basically it wasn't designed to test eclipse.

[00:35:12] Of course, the eclipse just like, oh, oh, there is an eclipse coming and we have all our apparatus up and running, so why don't we look at the data for that. So of course we had a long baseline. For like what's happening in a normal day-to-day life of this forest, and then the eclipse comes

[00:35:30] **Jonathan Rose:** So the baseline data is showing the sun rises and the trees start doing some things, and then there's wind and they do some other things. And then the sun sets and they, and they have these daily rhythms,

[00:35:41] **Monica Gagliano:** that are very predictable. Yeah.

[00:35:42] **Jonathan Rose:** right? But they're communicating with each other and they're not, they're intentional rhythms because as things change, the rhythms are showing to change.

[00:35:50] **Monica Gagliano:** Yeah, but the question here or the, the important point here is that. This variability is actually very predictable and it's kind of like, you know, less than [00:36:00] one in terms of deviation from like a baseline. So it's very small. It's like, you know, when it, when it's sunrise, you can tell, oh, this is the signature for sunrise.

[00:36:10] It might change a little bit between individual, but it's more or less the signature for sunrise. Oh, when your sunset. Yeah. You can tell. And so it was very predictable.

[00:36:18] **Jonathan Rose:** So the trees were like. Guy who goes to work every day, every he gets

[00:36:22] **Monica Gagliano:** Exactly.

[00:36:23] **Jonathan Rose:** coffee, gets on a train. You

[00:36:25] **Monica Gagliano:** That's right. And it's very predictable. Exactly.

[00:36:28] **Jonathan Rose:** okay?

[00:36:29] **Monica Gagliano:** Then something unexpected or from our perspective as humans, rare from the perspective of the tree, this might bo might not be a rare event, but the eclipse arrives. This was a partial solar eclipse and we had several elements that occurred. They were like, oh wow, and this is thanks to the physics as well, that we were able to see it.

[00:36:50] **Jonathan Rose:** So not trees. So normally with humans in non-Western traditions, how have humans responded to eclipses?

[00:36:58] **Monica Gagliano:** Well, we aggregate, [00:37:00] but like we've seen it many times. Like we tend to all go to a place, and in this case we, we want to watch the eclipse, but there are historical record that actually point to the fact that eclipses were able to stop wars.

[00:37:14] **Jonathan Rose:** So there's a thing where people

[00:37:16] **Monica Gagliano:** Yeah. Activities. Yeah. And we see these in animals as well. Yeah.

[00:37:20] **Jonathan Rose:** like whole forest of birds become silent.

[00:37:23] **Monica Gagliano:** Yeah. Or they all flock or they, yeah.

[00:37:27] **Jonathan Rose:** So there seems to be in much of nature this universal response that when of almost reverence by entering into more contemplative mode of integrating that happens when Eclipse happens.

[00:37:41] **Monica Gagliano:** Also, we should acknowledge that it could be a very scary thing. You know, the sun goes away and it's going away in a time, which is not normal. You know, if it does it during the day, and so it can be like very disorientating. And so it makes sense that you would join forces and stay [00:38:00] close to your peers instead of finding yourself alone.

[00:38:03] And so that, that those tendency of congregating and doing the same, it's also like, uh, protecting, you know, the, the self and the, in the, in the group. So the thing is with the, with this forest, the first amazing thing that we saw was anticipation. So it's not just like, oh, isn't it great? The tree synchronized?

[00:38:22] No, no, no, no. Before they synchronized, there was a behavior that we would define in animals as anticipation, and we saw it through the physics because anticipation basically is organization of the system. So in terms of entropy or energy moving, the entropy is very low. Because you're trying to organize the thing.

[00:38:45] So it's almost like the equivalent of like, oh, everyone shut up. You know, like, because we need to decide what's gonna happen. So there is this almost like a pause where the system becomes more structured because, and less random because it needs to work out what's happening. And we see this [00:39:00] in the physics and so there was anticipation.

[00:39:03] The anticipation that we recorded was like for the all the trees up to 14 hours. That means that the sun is not even close to Italy. Italy is in the middle of their night and the sun is actually in Australia or thereabout, and yet the old trees from that forest can detect something that is giving them the clue of what's coming, and they start that process or like, okay, let's lower the entropy.

[00:39:31] Let's organize the system. Something is arriving. Then there is the, the moment of where this collective system actually transition from that state of light anticipating to acting. And so they see, they enter into a synchronized state. So we see the signature from the bioelectrical readings where all of the trees start doing the same thing.

[00:39:54] There is one signature. So in a way, we are, we were looking at individual trees a moment before, and now we're [00:40:00] looking at the forest. As one entity, one, one integrated system. And in these cases, in a synchronized state, you have an entropy flow. So the, the entropy or the movement, the chaos is not stable, low structured is moving.

[00:40:18] When we think of entropy, I think most of us will think like disorder, right? High entropy is like disorder, and it is there. But in living systems, it's not just disorder, it means flow. Which means that this is how information is being passed through the, the, the storage, the processing, the use of this information is happening at that stage.

[00:40:39] So during that moment of synchronization, there is a lot of information being moved around to coordinate basically this state, which I think is amazing. And in fact, the. As we were saying before, you know, on a everyday kind of mood, the forest is on this level, like our baseline and the deviation in from that level is [00:41:00] in the order of one.

[00:41:01] Well, the deviation during the synchronized state is in the order of 10, so it's 10 times more variable. And so all of that information and that energy moving and, and transferring then not during everyday business as usual. And then of course the, all the trees were the one that maintained the lowest internal entropy, which meant that they were holding the memory.

[00:41:27] And so that information was stored. And then of course, once the event is over, the system returned to the baseline. I'm actually quite speechless when we saw the data the first time. We were like, this is not possible. Like, are we actually. Watching because basically that was recorded in real time. So it is like, are we actually seeing what the forest is literally doing?

[00:41:51] And I'm saying energetically speaking, because this is, we're talking about physics and entropy. This system is a living system [00:42:00] where we are watching what energy does as it passes through in response to an event that is, in this case, a celestial event. So the connection also planetary between what's happening on earth and what's happening in the rest of the universe is not trivial.

[00:42:16] It's like here we have two big bodies in the sky, the moon and the sun, which when they find themself aligned as they do in this kind of eclipse, their power of gravity, it's enormous. So we just need to think that the moon alone during the tidal rhythms, it can move oceans, but when the moon and the sun are together, you'll have maximum gravitational pool trees that are full of water would have a very good sense of that, that signal.

[00:42:46] And we proposed that this is what gave the, gave the eclipse away. And that's how the, all the trees who have experienced that before and, and the memory stored in that system. Would know like, ah, [00:43:00] there is a change in the gravimetric waves. We need to start preparing. I know what's coming and I was actually talking to Marcel, who you know is an astrophysicist and, and I was describing what we were doing and what we found and I didn't tell him what the cue that we were thinking might be.

[00:43:17] He was the one that said like, oh, could it be like a, you know, the shift in gravimetric waves? I was like, I'm glad you're saying it, because if it's an astrophysicist that say that, it makes sense. If it's me who don't know anything about it, it seems like a, a guess in the dark. What I think this experiment does is really like, aside from the technical feats of, of, of doing this and be able to pull it off and get it to like this kind of data, which were totally unexpected, but the fact that like, yeah, we, we are able to see the forest in its.

[00:43:49] Almost true behavior because here we didn't insert a signal, we didn't inject the trees and see, you know, which is what it's been done before, which is [00:44:00] amazing work. Obviously, you know, you like Susan Ard works and other have injected a signal that they know which one it is, and then you see how it moves through the system and you can show that the system is wide and connected and interrelated.

[00:44:13] But in this case, this is what happens simply by being. So this is one example of what will be happening in these systems all the time, because they don't just respond to an eclipse, they respond to all sorts of things, of course. And, and we are so naively blind, you know,

because like we, we don't know. We are just seeing these being, and we keep judging them as like, oh, they're just sitting there, you know?

[00:44:40] Rooted there and they don't do anything. They don't move, and he is like, oh, there is so much stuff going on inside and in within the system.

[00:44:53] **Jonathan Rose:** Are two related things that come from this to me, which is how limited our current [00:45:00] human perception is. And by the way, everything in our world is aimed at limiting it more. I mean, the. The modern technology, the iPhones that are designed in social media that's designed to completely capture our attention, narrow our attention, really with the goal ultimately of making us consumers versus actually seeing the tremendous rising sense of insecurity and isolation we're seeing in the world.

[00:45:26] But what you're describing is if you can dissolve that, the sense of self that all these things are, are focused at. We're actually at home in a deeply supportive, relational wise, knowing conscious web of life.

[00:45:44] **Monica Gagliano:** Well, I'm gonna share something that happened during these experiments in the Dolomites. My colleague who set up the system, the physicist that set up the system, had already started when I arrived. This was immediately after COVID. So you can imagine it was the first time that we could go in the [00:46:00] field again.

[00:46:00] It was very exciting and it's something of a habit that I have is like whenever I start a new experiment or new field work or when I go to a new place, I offer something to kind of like, I don't wanna barge in in a place, I just wanna say hello, I'm here, and can I be welcomed? Am I welcomed here? And so of course I approach this forest by offering tobacco.

[00:46:24] Because this is what I was taught in the tradition that I'm comfortable and a little bit more experience with from South America, but I know that is a tradi, like it's a, an attitude that is expressed in other situations from other indigenous cultures. Introduce yourself and like, don't be rude, like introduce yourself and ask permission to enter.

[00:46:43] So I offered tobacco and you know, I asked if I was welcome there and the forest responded immediately and he was like, you are welcome. It's clear now. I didn't understand at the time and the message that I heard was like, but the story to be told is not what you think. And I was like, what does [00:47:00] that mean?

[00:47:00] Is like, is a bit cryptic. And of course the experiment that we were setting up was a different experiment, so I didn't realize what the forest was talking about until, of course, in hindsight when it's like, oh my god. The forest already told me like, you're not here for what you think you're doing. And at the end of the experiment, so once everything unfolded, the eclipse happened.

[00:47:21] We had the date and everything and so it was the last trip basically. And we finished that field season and I went to, you know, up in the forest and, and I just, at this point, again, I wanted to offer tobacco, but also to say thank you and goodbye. We are going now. Thank you so much. And as I sat there, I, yeah, I had a very strong, a very strong experience.

[00:47:46] Many would probably define a mystical experience, but to me it's like a natural experience. So when you connect with the world, and the forest gave me a, a message, which was, again, very cryptic, but also [00:48:00] clear. And it was like, because I was looking out

and I was feeling very. Overwhelmed by the idea of the state of the world and how can we destroy this?

[00:48:09] How can we destroy all this beauty? How can we be so blind and not care? And you know, that kind of mood and, and the forest was like, oh, the land, I should say, where this forest is. I was like, don't, don't be, don't be sad. Don't be sad. The, the, the seeds that are, you know, that are creating the, the, the dream of this place are intact and over time they will just come back.

[00:48:35] Don't worry about it. And I was like, okay. But you know, I, I didn't really understand it until a few days later I was talking to one of my colleagues and also one of the Rangers. And these are two separate events, which actually. Explain to me what it is that I received from when, when that forest spoke that way, the Ranger said to me, like totally unrelated or so, it seemed, the Ranger said, [00:49:00] you know, it's amazing we are seeing these new species of plants just like you know, emerging.

[00:49:07] We never planted them, but they're actually perfect for this place. And yet to know that the forest in inverter, comma, that we worked with was actually a monoculture. It's a monoculture of spruce that has been planted there for the last thousand year by the community there. So it's got a long history.

[00:49:25] But from the Earth's perspective, it's like, yeah, yeah, I let you play with this. Now it's time, you know, to clean up the room and put the toys back in order. And so the species that were starting to emerge, the pines that have been the monoculture for a long time, they're a dime. Climate change, pest, all sorts of things.

[00:49:46] But the, the plants that are actually emerging, so the species of trees that are emerging are all species that are perfectly adapted for the land, and they are perfectly adapted for the climate that is coming. So it was like, and the the, the [00:50:00] Ranger was telling me like this. I was like, isn't it cool? And I was thinking, oh my God, that's exactly what the forest or the land was telling me about is the seeds of the forest.

[00:50:09] That is really the dream here. It's intact and it will come back. Don't worry. And he's like, it's already coming back. And then another colleague of mine, when I shared this with him, he said to me, oh Monica, I need to give you this book. And he gave me this book from old fairytales and folk story from that region.

[00:50:31] And in that book, there are two lines that someone must have wrote probably a thousand years ago. It's basically telling the same, it's like the, the line says nine times it will be woodland, nine time it will be a prairie, and then it will return to, to what it was. And I was like, this to me is scientific replicability.

[00:50:54] It just at the timescale is very big. So here is the collaboration [00:51:00] from the land herself. They obviously at some point told someone similar to me. Don't worry about it. You know, it all will return. Then there is chaos and entropy happening, and then the system return to its own state, its own stable state and but to get there, it needs to do all of these changes.

[00:51:23] It needs to move all of this energy. And I think that's what we were observing and that's what the, the Ranger was seeing. Like, oh, these pieces are coming up. We never planted them, but they're perfect and they're gonna be the ones that is no monoculture anymore. This is gonna be the one that is creating the new biodiversity that is gonna sustain life here.

[00:51:43] So it's so smart and it's so incredible to me that it feels like. You dare tell me that this is not an intelligent system, that there is not someone here that knows what's going on, that is going on her own agenda and she's [00:52:00] looking after things. It gives me hope as well. So maybe at this time it's not bad bed.

[00:52:08] **Jonathan Rose:** So Janine Beez says that life creates the conditions conducive to life.

[00:52:13] **Monica Gagliano:** Mm-hmm.

[00:52:13] **Jonathan Rose:** And what you were seeing there is life because of climate change, those forests are dying. The forests that were speaking to you knew that they were dying because. There was an infestation of beetle bark eating trees that they were destroying the trees that was coming closer and closer.

[00:52:30] And we know the trees have a sensing system about that. So they knew they were actually facing death

[00:52:35] **Monica Gagliano:** Yep.

[00:52:36] **Jonathan Rose:** when they were telling you, don't worry, we're not worried. And they saw that this new life was emerging

[00:52:43] **Monica Gagliano:** That's.

[00:52:44] **Jonathan Rose:** and that is this extraordinary capacity of life to create the conditions conducive to life.

[00:52:50] **Monica Gagliano:** That's right. And as we know, like for young plants, lots of nutrients are required, but if you have all of these trees dying and the beetle, the role of that [00:53:00] beetle as well is to start breaking the wood down and then the mushroom will come. And there are lots of, we saw lots of mycelium that like the mushroom will come and then just start breaking down further.

[00:53:10] And returning it, you know, this is entropy, the returning the energy into the system so that it can be stabilized again in a new form. And this is, the new form is not the one that we imposed as humans, as a monoculture. The new form is the one that belongs there, which the land herself, the this planet decides.

[00:53:28] This is what looks good there. This is what is gonna work there for the good of the whole, not just one species. So that I find amazing.

[00:53:42] **Jonathan Rose:** So we should end here residing in hope and really residing in a sense of the energy, the intelligence, the consciousness that is underlying all of life that we see emerging through nature. If we can [00:54:00] quiet our subjective siloing self to see the whole,

[00:54:06] **Monica Gagliano:** Thank you, John.

[00:54:08] **Jonathan Rose:** Thank you so much for taking us through this journey of your work and this journey through the nature of nature.

[00:54:14] **Monica Gagliano:** Mm, thank you. It was great to have a conversation.

[00:54:28] **Jonathan Rose:** Thank you to our guest Monica Gagliano.

The Common Good is a production of the Garrison Institute and is hosted by me, Jonathan F.P. Rose.

We'd love to hear your thoughts about the podcast. Please send us a note at podcast@garrisoninstitute.org and let us know what you think. If you've enjoyed this episode, please consider leaving a positive review on Apple Podcasts. This show is produced by the Garrison Institute with production and marketing from the Podglomerate. Its theme music was composed by Jonathan F.P.

[00:55:00] Rose, and performed by Jog Blues.