

Creative Ecology with Dr. Madhur Anand

Ologies Podcast

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Oh hey, it's that guy on the train next to you, shopping for phones on his phone, Alie Ward, and here we are together. It's raining in Los Angeles, it's an atmospheric river, we're serving up a cozy little romp through words and science. So, I met this ologist on an island last summer – don't get too excited though, it was Catalina Island just off the coast of LA – and while I was presenting this audio storytelling symposium for USC's Wrigley school, it's a storymakers program they do, it was actually very exciting because it was full of climate scientists learning to communicate their work to the public so I was there to talk to them about audio storytelling. We all chatted after dinner around this little campfire, and I learned that this guest was not only studying the Earth but also doing poeming as well and not just, like, as a hobby. A real-life theoretical ecologist, a Professor of Ecology and Sustainability, and a Director of the Guelph Institute for Environmental Research, also an internationally lauded poet and author. How? We're going to talk about it.

So, among her scores of ecology publications are three books, there are two volumes of poetry, *A New Index for Predicting Catastrophes*, which was a Trillium Book Award finalist for poetry. Her next poetry book was called *Parasitic Oscillations* which was a *Globe and Mail* Top 100 book, and then her memoir, *This Red Line Goes Straight to Your Heart*, won the Governor General's Literary Award for nonfiction. So, after we had this fireside chat, I showed up the next morning on the porch of her bungalow on the Wrigley campus on Catalina Island with my battered bag of mics and a recorder, surrounded by salty air and birdsong and we talked about her work and the intersection of science and art before our boat to the mainland kind of threatened to strand us at the dock because we were talking too long. More on that later.

But first, thank you to all the folks on Patreon.com/Ologies who submitted questions for her to answer. You can join that for a dollar a month. And thank you to everyone out there in *Ologies* merch at OlogiesMerch.com. Thanks to everyone who leaves reviews for me to read so that I can pull a recent one and thank you personally, such as BPepz's recent review that read:

I bonded with a girl over how much we loved your podcast because I randomly said a fun fact about opossums that she recognized. Never stop doing this.

BPepz, I shan't, at least for a while.

So, with that said, let's get to Creative Ecology. So, did we create this term just desperate to talk about science writing and ecopoetry? Is ecopoetry a term? It is and so is creative ecology. In fact, UC Santa Cruz, I looked this up, has a whole program and a center for creative ecology. They define the field as the intersection of culture and environment, and they examine how filmmakers, and writers, and activists, and photojournalists, and theorists can creatively negotiate environmental concerns. So yeah, what to do if you have one foot in science and the other in language or visual arts, you straddle that division, yee-haw, and just call it creative ecology.

So, drag up a patio chair, come sit with us for climate storytelling, narratives in science, anticipating human motives, carbon stability, finding the absurdity in just, everything, vegetation dynamics, merging your internal identities, fieldwork, how to overcome writer's or scientist's block, looking back over your past work which can hurt, and how accepting ourselves can be contagious with author, global change scientist, ecologist, UC Wrigley Institute Storymaker Fellow, poet and ultimately, creative ecologist, Dr. Madhur Anand.

Madhur: I love your purse, I'm so jealous.

Alie: *[laughs]* Of this \$10 Mervyn's purse?

Madhur: I am. I'm jealous that it was \$10.

Alie: 10 bucks! Could definitely use a little zhuzhing. I got the handles fixed by a guy named George, a cobbler in the neighborhood. But it's been everywhere!

Madhur: It's perfect.

Alie: First thing I'll make you do is say your first and last name and your pronouns.

Madhur: My name is Madhur Anand, she/her.

Alie: You are, we found out yesterday, we discovered, a creative ecologist?

Madhur: Yes. Yes, I am.

Alie: Did you go back and do any more googling into it or were you just like, once we figured that out by the fire pit it was like, "No, it's on."

Madhur: No. As soon as I heard the term I thought, "Yeah, that works." And then after, *[Alie laughs]* when you actually found that it's objectively out there in the universe, I'm like, "Yeah, I'm good. I'm good with that." *[chuckles]*

Alie: Let's talk a little bit about the ecology part and the environmental science part.

Madhur: Sure.

Alie: Can you tell me what field were you in before you started writing? What did you identify with in terms of, "This is my job, this is what I do."

Madhur: Yes. So, there are several names for it but in ology terms, I'm a theoretical ecologist, and I still am. I still am a theoretical ecologist.

Alie: What do they do?

Aside: And by "they" I mean she. So, Dr. Anand, sidenote got a PhD in theoretical ecology at Western University which is in London, Ontario with a dissertation, "Towards a Unifying Theory of Vegetation Dynamics." Her ResearchGate list of papers just keeps going and going, like this winding river full of plants and frogs and climate change. Some recent scientific publications she's coauthored include things like "Drivers of tipping points in coupled human-environment systems," "Health and equity implications of individual adaptation to air pollution in a changing climate," "A novel approach to assess livestock management effects on biodiversity of drylands." Did you know that this was a job that you can do? Madhur did.

Madhur: So, theoretical ecologists generally tend to make models of ecosystems. So, they try to create abstract descriptions often involving mathematical equations, or computer code to try to simplify, summarize very complex ecosystems that you can't go out and study in nature or manipulate as much as you want to, to understand something about the underlying processes.

Alie: What were you theorizing on in terms of ecology? Space, or islands, or planets, or oceans, or all of the above?

Madhur: So, mostly it was terrestrial ecosystems and mostly it was forest ecosystems, initially. I wanted to understand how all of the different species that occur in an ecosystem interact, what creates the incredible diversity that we see, why do we see it in some places and not others, what are going to

be the impacts of different kinds of disturbances and perturbations on these systems. So, for a long time, I was just studying like that in ecological terms. And then, over the past 10 years, I've been starting to couple those dynamics to models of human behavior.

Alie: Ooh!

Madhur: Because I had this big epiphany while teaching an undergraduate course several years ago that ecologists have spent a long time, including myself, understanding the effects that humans can have on ecosystems which is, you know, often negative. But if we really want to see change in the world around us, we actually have to understand the humans as well.

Alie: Augh! What a big puzzle. [*Madhur laughs*] What a big wrench to throw into a theoretical model... humanity. [*laughs*]

Madhur: Oh god, they're really hard. You know that Björk song, "Human Behaviour." [*clip of song plays, "If you ever get close to a human, and human behavior. Be ready, be ready to get confused."*] It applies.

Alie: [*laughs*] And when you're studying forest ecosystems using theoretical models, are you figuring out, like, when a forest fire rips through or when it doesn't rip through, or what a beetle infestation does, if there's an invasive species...? What types of things are you able to look into the future and see like, "Oh, this might be a problem."

Madhur: Yeah, so we know that there's lots and lots of problems. What I've been interested in trying to figure out is what kind of interventions, what kind of ways of looking at the system could possibly create a reversal of those negative impacts. So, how can we create a positive feedback loop where the humans in the system learn from what they've done and change their behavior? So, if you want to take an example of invasive species, and in fact we have worked on some insect infestations in forests... And okay, the thing about those systems is that, like, initially... So, humans are obviously involved with invasive species in the sense that we introduce them, often accidentally. But the interesting thing about forest pests, for example, is that that initial introduction is bad, but not really that hard to control. The harder part is when humans subsequently move that invasive species further and in unpredictable ways. So, in forest ecosystems, that happens through moving firewood.

Alie: No!

Madhur: Really basic.

Alie: Really?!

Madhur: Yes.

Alie: That would not be a thing that I would find disastrous.

Madhur: [*softly*] I know.

Alie: I'd be like, if you're testing out a flame thrower at your cabin, that's an issue. [*Madhur laughs*] Or if you're, you know what I mean? Like, you're clear-cutting

Madhur: Yeah, it seems so benign.

Alie: Yeah.

Madhur: And on the flip side you would think, well, then that's just a really simple thing to not do, right? But if you go to the website like, the Canadian Natural Resource website on how to control invasive species, the number one thing on their website is, "Don't move firewood."

Alie: Oh my god. Oh my god, that's so simple... Oh my god, that's so simple.

Madhur: But people don't do that. [*Alie gasps*]

Aside: For more on this, you can see her paper, "Modelling interactions between forest pest invasions and human decisions regarding firewood transport restrictions." And yes, beetle infestations are kind of a secret ingredient in wildfires, and climate change and drought are giving them a leg up... They're giving them six legs up, so many legs up. And some species of longhorn beetle and the emerald ash borer and bark beetles leave them like giant standing matchsticks in a forest.

For more on fire management, you can see Dr. Gavin Jones's Fire Ecology episode we did and the Indigenous Fire Ecology episode with Dr. Amy Christianson, about how colonial firefighting systems are finally beginning to incorporate Indigenous land stewardship principles. But yeah, humans, and specifically colonist populations, have been picking and transporting hitchhiking beetles.

Madhur: So, we looked into what would be the conditions under which that would happen. And then again, you think okay, humans are pretty, you know, simple in that sense that "Well, just make it, just give it to them for free." [*"For free?" "For free."*] That was my idea. That was my brilliant idea, "Let's just give it to them for free when they go camping or wherever they're going, to the campground." It turns out you don't even have to do that. So, as wonderful and sometimes terribly predictable as we are, we don't actually behave completely rationally, okay, [*Alie laughs*] which is a good thing actually. In a sense, because if we did... So, this is to say that we don't always behave in response to economics, we do things for other reasons and those other reasons are the things that I think are going to save us, actually.

Alie: [*gasps*] What are they? What are those reasons?

Madhur: Love.

Alie: Awh!

Madhur: Yeah, who can put an economic... Well, maybe some people try... [*both laugh*] Valentine's Day, I don't know. But yeah, you know, we care. We care about things, we love things, we find things beautiful. So, all of those different types of "valuation" are important in our decision making and I think those are the aspects of humanity that will help us save the things we love, right?

Alie: So, is finding solutions appealing in understanding human psychology of what they love, what they care about, what they'll prioritize?

Madhur: Yes. Yeah. We need to include those types of things in our, we call them utility functions in the models.

Aside: Which means, what alternatives are people most likely to prefer and use? You've got to get in there, you've got to get in their heads like what's easiest? What's most feasible? And also, what matters?

Madhur: But we try to include that. There are other factors too; we care about our own health; we care about our own survival. We know that we are interdependent on healthy ecosystems so we're not going to do things that we consciously know are going to hurt us. So, there are things like risk perception too that come into these models as well.

Alie: And what about, for you... What got you into science? Was it the love of outdoors? Was it the love of mathematics? Did science seem like a well-worn path in your future, you know, from, were you raised in an academic family?

Madhur: Yeah, no. So, I am the first person to get a PhD in my family and I am the first scientist in my family. So, it was not directly from family experiences, except to say that my parents (perhaps predictably as immigrants from India to Canada) really pushed me to continue in science when they saw that I was good at it. Because in high school, I really did love arts and science equally, but they were like, “Oh well, if you’re good in science, go there. Do that.” And they were like, “We don’t see a lot of women in science.” They were already quite ahead of their time. [*Alie laughs*] So yeah, I did that. Obviously, they were probably also thinking of my future and wanting it to be more stable, so they did push me in that direction.

And then in undergrad, I took a degree in Ecology and Evolution so there was not much exposure to anything else so all the stuff that I realized I loved in high school, I couldn’t really pursue. But I was also learning a lot of new things. I didn’t have any experience in the field, I didn’t grow up in nature, I grew up in cities. But in fourth year, two things simultaneously happened. One is that I took a course called “Theoretical Ecology” and I just loved that ecology and science could be filled with ideas, filled with speculation about how things work, just at a really high level. And I think already at that point, I was coming to see that it could be really creative. I just loved that I could play with ideas in my head and that things, actually, if you just kind of squinted, looked like little fictions...

Alie: Ahh! [*laughs*]

Madhur: Like little theoretical models that we were studying just were so strange, and I found that really appealing.

Aside: So, theoretical ecology involves possible narratives, almost like science fiction brainstorming for ecological futurism in the real world, filled with psychological aspects. It’s kind of like D&D for nature nerds.

Madhur: And then, the other thing that happened was that I took my first field course. It was the first time I put on hip waders in my life.

Alie: [*laughs*] City girl in hip waders!

Madhur: Yeah! And so, we had to choose little projects that we would work on, and we had to put forward a hypothesis and test it while we were there.

Alie: Oh wow.

Madhur: So, my hypothesis had to do with submergent aquatic vegetation in a lake. I was going to look at like, how things change along a gradient in this lake. So, I had to get in the water, get these quadrats and move along, walk along, estimate all of the species that were in the quadrat, and then analyze that data.

Aside: And as we learned in Corina Newsome’s Wildlife Ecology episode on fieldwork and the recent Indigenous Phytology episode with Leigh Joseph which was on ethnobotany, these are called transect studies and it means scientists make a big old grid and they count things in individual squares to make this bigger picture of what’s going on in the area and then also in the world. But it starts with counting tiny plants and animals.

Madhur: And basically, at that point, again, it was a really beautiful environment, I certainly learned to appreciate the beauty of nature through that. But again, I think the thing that I really, really loved was the empowerment of asking your own question and then finding a way to answer it and then sharing that with the world.

Alie: And tell me about the first time you wrote poetry.

Madhur: Okay, so it happened in the final year of writing up my PhD thesis. I had been studying vegetation dynamics. So, I went on to study vegetation dynamics and I was looking at how to reconcile the fact that there were different phases in vegetation dynamics, there were more linear, predictable types of dynamics that would be easily fit by standard models. But then there were also these really, really unpredictable, turbulent types of dynamics, part of the same system but that conventional models couldn't predict. So, I was trying to come up with a new model in which there was a kind of vegetation recovery process that started out really, really linear and predictable, but then suddenly became turbulent.

Alie: Ooh!

Madhur: Yeah.

Alie: Drama! Plot twist. *[laughs]*

Madhur: I know! Yeah, exactly. Meanwhile, as I was writing up my thesis in the final year, something happened one day. I was spending a lot of time alone in the lab writing code, writing this model, analyzing this data, thinking about these different theories and how to combine them and I just remember feeling one day that I could not continue. I couldn't continue working at my desk. In retrospect, what I think I was feeling was scientist's block.

Alie: *[laughs]* Just stuck.

Madhur: I was stuck, and I couldn't explain why or what it was. And I walked to the window of the lab, and I looked outside, and I just remember seeing a horse chestnut tree, surrounded by lawn at the university. I came back to my desk, and I wrote a poem.

Alie: Was that common for you?

Madhur: I had *never* done that before. *[Alie laughs]* So, that was my very first poem that I had ever written, and I was like, "What is going on? What *is* this? Who is this?" *[laughs]* Yeah, and then basically after that, every few days, that would happen and I started to write a few more because I was like, "What's going on here?" And honestly, they were just coming out.

Alie: Well, take me back to writing that one. Did you take out a notepad? Did you write it on the back of an envelope? Did you take out your laptop? Like, what made you open a document? Did you have a line or two and then that just started to crystallize out from that?

Madhur: I think I wrote it on paper.

Aside: So, the very first one was a rhyming poem, but her second one ever – from the same era, writing her PhD in Ontario, Canada – is titled, "Cold."

[clip of Madhur reading "Cold."]

No wonder

Where's her coat now?

It was covering her costume

Give her a blanket now

She has work to do.

It might be a fever

making her shiver

She's usually quite warm they say

What was she doing outside anyway?

Pretty soon after that, I had completed my thesis and I was submitting it and I was showing it to my supervisor, the final stages of it, and I was like, "You know, something weird has been happening these days."

Alie: *[laughs]* "I've been afflicted with... poetry."

Madhur: I've been writing poems. And he said, "That's marvelous." Without even actually looking at them, he said, "You must include them in your thesis."

Alie: *[exclaims]* What a gem! Was that the reaction you were expecting?

Madhur: No.

Alie: Was it what you were hoping for?

Madhur: No! No. *[laughs]*

Alie: Really?

Madhur: No. I didn't think they were very good, and they're not.

Alie: What?! I beg to differ.

Madhur: What I'll say is that if you want to see those poems, there's one poem at the beginning of each chapter of my thesis which is publicly accessible at Western University's database.

Aside: Again, that paper is titled, "Towards a Unifying Theory of Vegetation Dynamics," and I looked it up, I found it, and I was scanning the 255 pages for sanction, and there, nestled between graphs and tables and citations were poems holding court on otherwise blank pages, one read:

Mine before I take it.

That's how things go typically.

Done before I make it,

Sure before I fake it.

And when certainty

was not a guarantee,

I did not admit desire.

What happened to me?

Man, I wish I could go back in time to her thesis defense. I bet it was a great party but also a very smart one.

Alie: What happened when it came time to defend?

Madhur: I didn't present the poems in my oral presentation but of course, all of the committee members and the external got them in the thesis and everybody commented on how original it was and how lovely it was actually to have included the poems and how much they enjoyed having them.

Alie: And you look embarrassed that you have to admit that everyone did love them. *[Madhur laughs]* Maybe I'm making you toot your own horn right now, but people responded well to them. That must have been surprising for you at the time or...?

Madhur: Oh yeah, totally. Yeah, totally.

Alie: You were like, “Oh shit, I just became a doctor and poet on the same day, a published poet.” Well actually, you became a published poet! Because you’re published! You got a BOGO; you got a buy-one-get-one. [*Madhur laughs*] So, you became, literally the day that that published you were a doctor and a poet.

Madhur: Oh my god, yeah. Now that you put it that way, I’m realizing that’s true, yeah. [*laughs*]

Alie: At the same exact moment, like Schrodinger’s cat kind of like...

Aside: Okay, not really don’t email me. Just listen to our Quantum Ontology episode with astrophysicist Dr. Adam Becker who is the author of the book, *What is Real?* Because what *is* real? Does anything even matter? Are there more of us in countless universes just living our best and our worst lives with our best hair? I don’t know what’s going on out there. But what’s holding you back from acting weirder in this one life that you’re in, that you’ve got? How can you shift your limiting philosophies to one that says, “Fuck this, I’m just going to be me and you’re going to like it.”

Alie: What was it doing for you to write poetry? What itch was it scratching?

Madhur: So, it’s always hard to know when you’re in it. But in retrospect now, because that was about, gosh... 25 years ago. Now that I have two books of poetry, when I look back, I think the thing that it was doing was allowing me for a way to express all of the parts of my heart and mind that I was not able to express through doing this really, really intense, focused, constrained, scientific method.

Also, I was probably at a cusp, right? So, this is a thing I’ve also thought about is that when you get to the end of your PhD, you would think that that’s a point in time where you feel really good and you’re like, “Okay. [*Alie laughs*] I’m the expert now in this very specific thing. I know the most about it in the world because I’m about to publish a PhD thesis on it.” [*“I did it. I did it.”*] But I was feeling the opposite, I was starting to feel like, “Oh my god, I know nothing!”

Alie: Really?!

Madhur: Yeah! And it’s that thing where, “The more you know the more you realize how much there is out there to know,” and I was starting to feel that and I think it was that kind of, there’s got to be a word for that, a psychological term.

Aside: Okay, I looked into this and I found Plato’s work called *Apology*. It’s his 399 BCE recounting of a public trial of Socrates and Socrates was Plato’s philosophy mentor. Socrates asserted something along the lines of, “... I seem to be wiser than this man at any rate that what I do not know, I do not think I know either.” This is sometimes referred to as the Socratic Paradox. Although I’m sure some of our furry ancestors, way before that, grunted some kind of spitty equivalent of, like, “Hey man, one thing I know is that I don’t know shit.” And if you’ve ever studied anything in depth, you get it.

Madhur: But in fact, I was just realizing that completing the thesis was actually not an endpoint, but it was like a starting point for something.

Alie: It’s not like crossing a finish line, is it?

Madhur: That’s right, that’s right.

Alie: It’s a completely different race. You get to the end of a marathon and then a starting gun goes off and it’s like, “And... the rest of your life.” [*laughs*]

Madhur: [*laughs*] Yes, exactly.” That was just the warmup.” [*laughs*]

Alie: *[laughs]* Tell me about publishing your poetry in book form. You have two volumes; which one came first and why did you title it that?

Madhur: Okay. So, the first one is entitled, *A New Index for Predicting Catastrophes*.

Alie: *[laughs]* I love the title so much!

Madhur: It took many, many years for that book to come about.

Aside: So, Dr. Anand got her PhD in 1997 but didn't really jump deep into poetry right away. Kind of like the protagonist in some film that I wish existed, she sort of hip-waded in gently as she completed a bunch of post-docs overseas.

Madhur: I went to Trieste, Italy.

Alie: Heard of it.

Madhur: Went to Jerusalem for a year. I went to the Netherlands, Utrecht, for 9 months, and then I went to Albuquerque, New Mexico *[Alie gasps]* for a while, and then I got my first tenure track position. So, I really didn't quite return to poetry seriously until after I started my position, I had started to read a lot of poetry though, and then in that sense too, it was almost like, "Oh yeah, this is the world of poetry." Yes, I've published a few bad poems, but this is what I actually want to do. If I'm going to publish, I want to publish like these poets that I was reading. There was a Polish poet who won the Nobel Prize, I think in the same year that I published my PhD thesis.

Aside: So, Wislawa Szymborska became a Nobel Laureate in 1996 for "Poetry that with ironic precision allows the historical and biological context to come to light in fragments of human reality." And her volume, *View with a Grain of Sand: Selected Poems*, is a good place to start if you want to get to know her work.

Madhur: So, I just grabbed that book, and I carried that around with me. I think it was really lucky that she won the Nobel Prize that year and not some other poet, like, I don't know, Bob Dylan or something *[Alie laughs]* because she's known actually to use some scientific ideas in her poetry so when I started to read her poems, I was like, "Oh my god, there's science in here! There are scientific ideas in here and I could really bring these two things together maybe, someday."

So anyway, I started to write, I started to apply everything I knew about learning to poetry in the sense of going to workshops, finding mentors, reading poetry as research, and then eventually, eventually after a long time, and a few poems published here and there in literary journals, I had a collection that got published in book form. Yeah.

Aside: Again, this is in her 2015 book, *A New Index for Predicting Catastrophes*, which is this 102-page volume of poems whose dedication reads simply, "For my parents." Madhur would later publish the following poem in her 2021 collection, *Parasitic Oscillations*.

[clip of Madhur reading, "Mother Says I Talk Like a Son."]

All her life, my mother shunned pets until now.

Maybe because her right foot is less connected to her left brain since the stroke

It leaves her pervious to thunder, lightning, cats

She says, move, but nothing moves.

It was never one thing then two, with my mother

It was a third thing, igniting like rain on a wedding day,

*Predicting nothing but more rain for all a bride's life.
Now out of the blue Guelph sky, my mother says,
If you must have a pet, make it a parrot, they can talk.
She tells me her every last dream and each dream's interpretation,
Both permeable as long-term weather forecasts.
For all her life my mother lived in someone else's dreams like pending rain.
It's bad. She's at a wedding.
She sees the bride's face, who should never be seen like that without a veil.
The clouds part and my mother is in post-partition Dehradun,
is eight, and playing with the landlord's daughter whose name she can't recall.
Their pet, a female parrot named Bachi [phonetic] is whose call she hears now.
[speaks in Punjabi] She repeats, "Come child," ungendered.*

Alie: What did your parents think of all of this? Were they like, "Yeah well, we knew you'd do both." Or were they surprised by it? "We knew you'd go into arts and sciences."

Madhur: "We knew you were always good at everything." *[laughs]*

Alie: Yeah. *[laughs]*

Madhur: "When are we coming to the Nobel Prize ceremony?"

Alie: *[laughs]* What did you learn while you were approaching it scientifically? The, like, "I'm going to go to workshops, I'm going to get a mentor, I'm going to write poetry that I'm really proud of." Because I feel like no matter what you write, it's always hard to look back at anything you've done without thinking about everything you've learned or how to do it differently. We look back on what we make with such a critical eye that other people don't have. But how did you feel like your craft, in terms of poetry, was changing? And how can people be better poets? I'm also like, essentially, what did you learn? Tell us! *[laughs]*

Madhur: Yeah. I mean I think the most important thing is really to read. And you don't have to read everything because fact is, you're not going to like all of the poetry out there, there are so many different types. But you know, you do have to ask yourself why are you writing this. And I mean, I couldn't help but ask myself that because I am a scientist, I was already a fully formed scientist so I was like, what is this? Why am I doing this? And I was constantly asking myself that question because, you know, you can write poetry and not have the ambition to share it with others, people do it all the time. But I already had that ambition, I was like, how do I do that? How do I make it its own being?

Alie: Tell us a little bit of a key takeaway. What was one thing you learned while you were writing? Was it to not do a rough draft? Was it to write and come back and look at it later? Was it identifying clichés or anything like that?

Madhur: The difficult thing is, when you're writing creatively – generally, and I think it's true with poetry too – you think that what you're writing and what you've written at the time is good. I think that is just how it has to be. I write some poems, I revise them, I do my best. But then at some point, you think, "Okay I'm finished, and I think it's good." And you submit it to magazines, and they're

rejected but oftentimes it doesn't really have to do with the fact of how good it is, right? It's really hard to publish poetry by the way, if people don't know that.

Alie: Mm!

Madhur: So, you're basically up against practically impossible odds but honestly, that also kind of motivates me. *[laughs]* I do remember specifically the time that I was walking through the book fair at the Ecological Society America meeting when I was starting to write poetry and all the books there are like science books, textbooks because it's an ecology conference. But I just went up to this university press and was like, "Do you guys ever publish poetry?" And the guy goes, "Yeah, we do but don't even think about it. *["Wow. Okay. Umm..."]* You'll never publish a book of poetry, it's so hard."

Alie: Oh my god. Aw!

Madhur: I was like, *["voice cracks]* Uhokay," and then just moved on to the next booth but there was a part of that that was like, "You're wrong. You're wrong. You are wrong." So, you kind of just have to have an incredible amount of confidence and faith in yourself and it's okay to think that what you're doing is good even if you ultimately realize later that it's not, right? That's all part of the process.

Aside: So, remember...

Madhur: So, I guess what I want to say about all of that is that it's important to think that what you're writing is good. It's *super* important. Super, super important. But then you also have to realize that you will ultimately look back on that work and say, "No, it wasn't." *[laughs]*

Aside: So, I asked her, in her scientific and her artistic opinion, if we tend to have a negative bias toward our own stuff or is that just a factor of growth, kind of like vegetation dynamics but instead of plants it's just cringe.

Madhur: Maybe! Right. That's a really good question because you've also become a different person. It's an evolutionary process, right, so you can't really get to any point without having those earlier forms.

Alie: And what about with the content of it? Because there is so much science and there's so much nature, it's just woven through, kind of like threads. What is that doing for you creatively and in terms of gratification? How did you feel putting a lens on nature and ecology creatively?

Madhur: I felt like I could be my whole self in science. It felt like I could bring everything that I was thinking and knowing and learning, the language and the culture of science, I felt like I could integrate it with all the other parts of my life. Whereas previously, they felt very separate.

Alie: Ahh, yeah. It's like you become stereoscopic, you know?

Madhur: Exactly! Yeah. I was like, "Oh, now I can see more clearly in a way." Yeah, it really did feel like that.

Alie: What was the reaction like? Did you think you were going to put out a book of poetry and be like, *["sighs]* I did it." Did you realize that you were going to put out another book of poetry and then a memoir (that was two memoirs) and then write a novel? Did you expect to find a claim like you have? Because you've won massive awards, you've been lauded so much for your work! Did you expect that?

Madhur: No. Does anybody? *[laughs]*

Alie: I don't know! I'm sure some people...

Madhur: I don't know, I can't imagine even... No.

Aside: So, in her first book, *A New Index for Predicting Catastrophes*, she notes in the back of the book that:

The majority of the poems in this book are written in 13-syllable lines. Of the three naturally occurring forms of carbon, only those with atomic mass 12 and 13 are stable, and they occur in a proportion of 99:1 in the natural world.

So, Carbon-13 is a rare and a stable thing to behold.

But also in this work is something called found poetry. You know when you read a sentence and taken out of context it's just the most gutting or hilarious thing you've ever read? So, that's kind of like found poetry; they're these literary quilts crafted of beautiful scraps salvaged from sources like, in Madhur's work, Pedalyte labels or her own published scientific work, like this poem "Forward-Backward Procedure," from her book, *A New Index*.

[clip of Madhur reading "Forward Backward Procedure"]

Because we simply do not have enough information, a priori,

Because no sequence is emitted, no conservative lower-bound

Because the annual cycling might represent a recurring disturbance.

Because well-known abilities can be masked

We have no framework for dealing with the shortcomings, the curve as it approaches zero

There are four problems that must be solved:

Drought, power, psychology, and light.

How many states should the final model have?

Tucker and Anand, "On the use of stationary versus hidden Markov models to detect simple versus complex ecological dynamics," in the journal Ecological Modeling

Madhur: I was just so thrilled to publish that first book and I was really curious, I was curious in terms of what people would think of it because it is really different, you know, it does use science in ways that other people haven't and I thought, oh, are people just going to be turned off of that? Are real poets going to think, "Ugh, this is not real poetry?" [laughs] I don't know.

Alie: Oh yeah.

Madhur: You know, that whole thing. I thought, are people going to accept me as a poet? I really wanted it to be read as poetry and not, for example, science communication. I mean, it's great that it also achieves that other science communication purpose, but it was not like "I've done all this science and now I want to communicate it to youth via this poetry." No, that was not my intention. And so, yeah, I was just curious how people would read it.

Alie: Have you gotten any emails or letters or people who've been really moved by it? Or people who have, kind of like, one foot in science and one foot in the arts as well, that are inspired by you or inspired to care more about the theoretical ecology that you do because they found your poetry first?

Madhur: Yes! Yeah, I received a lot of feedback, there were a lot of reviews written about it, both on the literary side and on the scientific side.

Aside: People have called her work brilliant, intense, tender, soulful, fascinating, and innovative. Madhur told me that it's still pretty rare to be a poet while doing scientific research so intensely.

She gets a lot of letters and notes from other scientists who appreciate her own duality, kind of as proof of concept for theirs.

Madhur: And on the flip side, what I was hearing a lot from the literary community, or just like non-scientists, I guess, was that they found that they could enter into scientific ideas and language via the poetry and that felt refreshing, it was different from how science was being presented to them in other media.

Alie: Yeah. Can I ask you some listener questions? Is that okay?

Madhur: Oh sure! Yeah.

Alie: Okay. They know you're coming on, specifically.

Madhur: I love that there are listener questions! *[laughs]*

Alie: I know!

Aside: But before we get to them, let's send some money to a cause of her choosing which is Rare Charitable Reserve. This is a community-based urban land trust and environmental institute that protects over 1,200 acres of highly sensitive lands across eight properties in Waterloo Region and Wellington County. The organization also manages over 15 kilometers of trails, free and open to the public. To learn more about them, you can visit RareSites.org which will be linked in our show notes. Thanks to sponsors of the show for making that possible.

[Ad Break]

Okay, let's answer some questions about artistic sci-comm or sciencey art.

Alie: Lisa Nijhuis says: THIS IS THE PERFECT FIELD how did I not know about this? Alexandre Catulle also had this question: Any tips for getting more into the creative side of the science world or how to break the barriers between fields? Specialization is the latest tendency in science, but cross-field studies brought us more discoveries. So, how did you feel like breaking into that? Was it just essentially feeding a different part of yourself and allowing that part of yourself to sit down with a journal and write or open up a doc and kind of pour out your thoughts?

Madhur: Yeah. And also, I would say that it was almost as though all of the rigor and research and discipline that I had been living as a scientist, I was not afraid to use all of that toward the art. *[Alie laughs]* So, you know, use all of your science superpowers but you can use them for art, right? So, take it seriously, is really the most important thing. And then, I mean, the barriers are definitely external but a lot of the times, I feel like the barriers are inside us.

Aside: So, if you feel like you have to choose one or the other and you stop yourself from straying too far from your committed identity, rethink it. My advice, her advice, both. She says, eventually, if enough of y'all are venturing out and trying this then our greater society may see people less bound to these singular identities.

Madhur: It was very heartening to find out that in fact, the world isn't quite as divided as it appears to be, and people are not as divided as they appear to be. So, you know, once you start to do it, you will realize that everybody, you know, wants to be a scientist, everybody wants to be a poet or artist. Both of these are very, just, fundamental aspects of humanity and I think that we pretend, our society is like pretending that they're separate, but they're actually not.

Alie: Mm! That's such a great point. As you began, there's so much love in humanity, how can we use theoretical ecology? How can we use that love to our benefit to help turn some things around?

Aside: So, theoretical ecology colliding with creative ecology like the natural world collides with the digital space. Madhur wrote about this in *Parasitic Oscillations* with a poem, hilariously dedicated to the square of scrambled pixels that have Tetrised their way into daily life.

[clip of Madhur reading, "Ode to A QR code."]

*In the Ornithology wing at the Natural History Museum,
Which I cannot scan because my position, alignment, and timing are not in sync with the
encrypter.
All the minor corrections in the world cannot replace broken trust.
What was there at the start, a non-human voice, a silence that lives like a standing wave.
When a scanner, and I mean eye, cannot recognize a symbol,
It will be treated as an erasure.
Chances are colored hands touched those skins first
Colored hands kept those blues and yellows alive
While tiny black squares in large white squares were enveloped by quiet zones
Are we not so lucky Emily Dickinson's editor found her handwriting akin to fossil bird tracks?
Every sign between me, dead bird, you, uniquely mapped to the same polynomial
All the truth funds in the world cannot replace error.
Justice is not the thing that seeks quick response.
Pattern print is not the thing that seeks conversion.
Tag yourself.*

All right, back to your questions.

Alie: Sienna Cenere wants to know: Where do you see sci-comm going in the next 10 years? I'm concerned most of sci-comm is moving to a video format, which is not an area I'm skilled at. What are your thoughts on the value of traditional art in scientific communication like fine art, books, and poetry? Are those effective tools for reaching a broad audience?

Madhur: I think they absolutely are. If you think about the literary arts, right? I mean, humans are... We communicate largely through language. And I think it's very odd, right, that the language of science is so different from other languages that we speak as humans. Like it is really its own, it has almost become its own language spoken by a certain subset of humans.

Aside: So, her book *Parasitic Oscillations* focuses heavily on the theme of birdsong. And speaking of linguistic elasticity, the word *jargon*, I looked this up, it comes from the old French for gibberish from a Latin root for the chattering of birds. Birdsong. Oh, these little mysteries.

Madhur: But language is also extremely powerful. It's basically all we have to really, really communicate with each other, ultimately. You know, poetry and fiction and creative storytelling are going to be essential forms for the future of science communication. We really need to see that access to knowledge is more democratic, it's more evolving. Yeah, and that we can't actually change as humans and make the changes that we need to see in the world without introducing and understanding each other, basically.

Alie: You know, you approached it with that kind of scientific rigor. You started with a poem back at the lab, and then you went to a book of poetry and then you wrote a memoir that is the most bogglingly cool concept where it starts off as a memoir of your parents, you flip it over and it becomes your memoir.

Aside: So, her book *This Red Line Goes Straight to Your Heart* is about the August 1947 change in political borders in India and the story of her parents' move to Canada. So, that's the book. But then literally flip the book over, everything is upside down, you have to flip it again, and it's a new book; it's like you're starting a fresh book, starting from the back. And instead of her parents' perspective, it's her parents' daughter's perspective through this lens of biology and history and physics and poetry. So, it's a homeland split into two, it's an experience split by generations, it's two books in one book.

Alie: Genius. And then you just finished a novel. You just got news about your first novel, right?

Madhur: Yeah.

Alie: So, you're really kind of getting bigger and bigger as you go. *[laughs]* Do you find that that trajectory for you of going from poetry to slim volumes... Was it harder to write your first poem than it was your first novel?

Madhur: Yeah, that's really, really a good question. I think like a lot of writers who write in different genres – like poetry versus prose or poetry versus fiction – they often get that question alone. Yeah, I think it was just that... A lot of novelists actually start off as poets, Margaret Atwood was a poet before she became a novelist. *[laughs]*

Alie: Oh right, yes.

Madhur: Yeah, and Michael Ondaatje, I'm giving Canadian examples because I'm Canadian *[Alie laughs]* but they all started out as poets. So, there is this phenomenon of poets turning to prose. So, I think the thing that I find really, really, that drives my writing is when I find a structure that fits the story that I want to tell, you know? So, sometimes the structure is poetry; small, little, tiny containers for big ideas, that's like, packed with metaphor. But then in other cases, it was like the memoir, which is this thing that is in halves, and it's got these asymmetrical sides to it, but two sides to it. I think I just keep finding stories and structures, sometimes they're small and sometimes they're big. And thoughts, and ideas, and creativity itself is that it's not a linear, it's not a progression. I think they're just all part of the same system.

Alie: What about influences? Cnidarian Knight asked if you have thoughts on Jack London? Some other listeners, and I'll list them in an aside, mentioned I think Mary Oliver? We talked a little bit yesterday at the fire pit about traditions of nature in everything from haiku to you know, Jack Frost. Do you think that...

Madhur: Do you mean Robert Frost? *[laughs]*

Alie: Robert Frost. Thank you, so much.

Aside: Jack Frost was just nippin' at my tongue there. But a question on the minds of patrons, Anne, Lee T, Emma Ordonez-Enos, Valerie Bertha, and Mari.

Alie: In the tradition of science being in the creative arts, is there anything that's inspired you?

Madhur: Yeah. So, it is true that there's like a huge, huge history and tradition of nature poetry, including some of the ones that the listeners mentioned. The thing I find about all of that is that it's really beautiful, but it does kind of maintain that division between humans and nature. And as we know, like, it's not that simple, right? It's not like we can just sort of say, okay, here's where humans are

going to live, and here's where nature is and wilderness and these ideas about preserving something outside of us. More and more increasingly in our world, that kind of division doesn't even exist anymore. Like we hardly have any places that remain wild.

Alie: Yeah.

Madhur: So, then the question is, how do we put humans into the equation and into the environment? It almost goes back to some of my research where it's like, they're not separate, they're entwined. So, we have to kind of put everything together into these works. So, a lot of contemporary poets – there's a whole movement of ecopoetry or ecological poetry – really try not to aestheticize the natural world but sort of try to bring in more of the technologies or human relationships.

Some formative poets for me were the ones I read when I was just starting out. So yes, Wislawa Szymborska's book, *View with a Grain of Sand*, it's an anthology of her work, but it's contemporary, that's contemporary poetry. I also really loved the work of John Ashbery, contemporary American poet. This is what I love actually, is that many poets write but you wouldn't call them science poets or ecological poets but when I see ecology being reflected in their work, even though that's not necessarily what they set out to do, then I realize that, there it is. Nature is everywhere, it's all around us, it's in everything we think, it's in everything we do and sometimes when you come at it from an unintentional way, I think it can be really powerful.

Alie: Augh, I think that's beautiful.

So, ask poetic people some pathetic questions, like about Jack Frost being a poet because look, she didn't even laugh at me, she didn't even mind and I went for it. So, we'll link Dr. Anand's work, from the research to her poetry, in the show notes, along with her charity of choice. She's just a joy. I'm so proud to know her, I'm so glad that we got to be friends through this. And thank you to USC's Wrigley Storymakers Program for having me two years in a row for their symposium. teaching climate scientists about various forms of sci-comm. It was an honor to be there. Also, I got to harvest some interviews while on Catalina Island. We'll link Madhur's social media and website in the show notes and there are more links at AlieWard.com/Ologies/CreativeEcology,

We also offer kid-friendly edits of our classic episodes, those are called *Smologies*, and you can get them for free at AlieWard.com/Smologies which is linked in the show notes, or you can just look up *Smologies* in your podcast app. We are @Ologies on Twitter and Instagram and I'm @AlieWard on both. Erin Talbert admins our Ologies Podcast Facebook group, Aveline Malek and The Wordary make our professional transcripts, Noel Dilworth is our scheduling producer, Susan Hale is our Managing Director who does, like, everything, Kelly R. Dwyer makes our website and can make yours. Our editor and of all my chattering is Mercedes Maitland of Maitland Audio. Jarrett Sleeper of Mindjam Media also stepped back in this week to finish the episode while Mercedes is on jury duty. Thank you to the whole team. Nick Thorburn made the theme music.

And if you stick around until the end of the episode, I tell you a secret and this week is, it is raining. There's an atmospheric river in California – in LA, everything floods when it rains. But I have rainboots and I get to wear them maybe two, three times a year. They become filmy with dust from being under my bed most of the year, but I get excited to bust them out. I've had these things for probably 15 years. I bought them for \$10 in desperation when it snowed in October in Brooklyn once.

And back when I lived in my studio apartment probably six or seven years ago, I went to put them on, was like, "Oh, it's raining, I'm excited." And I felt something in one of the toes, I don't wear 'em often. So, I dumped it out and it was a cockroach. Very dead. I had smashed its head off of its brittle

body. It was *horrifying* and I don't know how that cockroach got in there. I didn't see them in my apartment building but somehow it made its way into this rubber boot. I took it out, I flushed it, I think I said goodbye to it, waved it off the Valhalla or whatever and then I think I sprayed some disinfectant in there. I still have the boots and I put them on excitedly when it rains but every single time I think, "God, I hope there's not a dead cockroach in this one." Obviously, there has not been. Anyway, gross. Stay warm, stay safe, stay dry. Berbye.

Transcribed by Aveline Malek at TheWordary.com

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