

# MICROBIAL MAGIC

SERIES 3 EPISODE 5

M<sup>♀</sup>I

@mothersinvent  

- Mary: I have aged a few years!
- Thimali: *(Laughs)* You were telling me...
- Mary: - Technology!
- Lisa: Unfortunately, I'll have to ask you to do a couple of things for me Mary just so I can get you connected to the computer. Has something called team viewer appeared?
- Mary: I have blue arrows down at the bottom - is that what you mean?
- Lisa: Yeah. If you click on that, that's exactly the one!
- Mary: That was what I was told. All I was told I needed to do nothing else. This fecking computer asked me for a thing that it would not let me in and then...  
*grrrrrrrrrr*..Oh, anyway, I hope I'm not being recorded.
- [Laughter]*
- [Theme Music Intro]*
- Thimali: It's season three, episode five of mothers of invention. I'm Thimali Kodikara and I'm series producing this thing.
- Maeve: And I'm Maeve Higgins the former president of Ireland
- Mary: *(Laughs)* How dare you?! *(Laughs)* I'm Mary Robinson. I am the former president of Ireland.
- Maeve: *(Laughs)* Oh, sorry. Yeah. Sorry. I got mixed up!
- Maeve: And I think that we're all, it's fair to say. The three of us, champions of the zoom calls at the moment and we're doing this podcast over Zoom and I'm really glad to see both of you.

Thimali: Oh, I love zoom. I don't wanna throw zoom out the window at all. I love it.

Mary: I tolerate zoom. I find it much less energizing than a live audience. It's nicer doing it with you two and the guests that we have because we can see the faces that we can interact with each other. And we get a lot of laughs,

Maeve:  
Thimali: Exactly,  
You can tell everybody that we are your favorite zoom call.

Mary: Errrm Errm.

Thimali: *(Laughs)* Just let it out.

Mary: I think you probably are actually because I get more laughs, yeah, definitely.

*[Thimali Laughs]*

Thimali: You heard it here!

*[Music Transition]*

Thimali: Yowza! What a month! We just celebrated NYC Climate Week.. Fridays For Future hosted its first socially-distanced Global Day of Climate Action. The UN General Assembly just hosted a high-level roundtable on Climate Action which focused on solutions. And it's sad that the Convention on Biodiversity had to be postponed to next year because that was due to be a big deal in the 2020 calendar. But the UN came through with the [Summit on Biodiversity](#) which is taking place today!

Can't stop won't stop!

Mary, you've been involved in all kinds of events around biodiversity recently, right?

Mary: I'm now on the high level steering committee of the campaign for nature, which is linked to the convention next year. And of course the summit today on biodiversity and sustainable development and it is proposing, protecting 30% of the land, you know, the, the landmass of the world and 30% of the oceans. Scientists are saying, this is the way to stop the real loss of biodiversity. And so this summit on biodiversity is a link with the climate change, Paris agreement world and

the sustainable development goals. It's, it's kind of bringing it all together in this big summit.

Thimali: Just to be clear, the summit is actually sort of this opportunity for state leaders to raise ambitions for a post 2020 global biodiversity framework. Is that right?

Mary: That's right. I was kind of expecting that Maeve might want me to bring her to this summit today.

*(Laughter)*

Maeve: I'm available. I'm more than available.

Mary: Funnily enough. I'm not so sure because it's open to zoom, whether you might actually be able to find a window - who knows you might be able to listen in.

Maeve: Yeah. But I know that you'd have me on mute though

*[Laughter]*

Mary: Oh, I definitely would be on mute.

*[Laughter]*

Thimali: Um, well then, I mean to honor this excellent day, I thought we'd do an episode on sporting events.

Maeve: Thimali...

Thimali: *(Laughs)*. Okay. No, sorry. I'm just kidding. We're doing an episode of biodiversity.

Maeve: *(Laughs)*. Great, amazing.

*[Music Transition]*

Thimali: So when we talk about biodiversity, we really are getting right down to the root of what climate change is and how it's destined to change all of our lives.

It's impossible to look at life on earth and not be in total awe of the unlikeliness of it all.

Thimali: And we're at the mercy and will of these unfathomably complex multidimensional systems that all depend on one another. And I mean, it really is the point where you

can understand why people start talking about God or magic. Right?

Mary: Yeah. I find something extraordinary in watching every spring what looks like a dead tree come to life. It makes you feel energized and alive and renewed. And then when you think of the devastating forest fires, that's because we're out of kilter, we're out of sync with nature. We're not complying with the ecosystems that sustain us and that's, that's the seriousness.

Thimali: That's exactly it, I mean, if any one of those ancient systems falls out of place and causes a plant or creature to cycle irregularly or even die, then there's this end to synchrony for that system. And it has enormous effects because all living things are interdependent with each other and these changes will never be isolated events. So one change could trigger hundreds of feedback loops and all the life around it, large and small, visible and invisible, until all those things are forced to spiral or deteriorate or die out.

Mary: Yes. And we, of course know now that a poor regulation of greenhouse gases in our atmosphere is what's causing these changes in climate because it's not that climate changes are incurring, that they've always been incurring. The planet has always experienced small climate changes. It's the incredibly intense rate at which it's happening. We just cannot catch up and adapt without capping this terrible kind of locomotive rate of change, which is not tolerable by nature. And, you know, people talk about saving the planet - it's the saving of humanity and the other species that depend on us behaving well, that we're concerned about.

Maeve: Exactly.

Thimali: Yeah, and it sort of leaves us with two questions. What are the best ways to protect the biodiversity we still have? And although we can never recreate the work of thousands of years of natural evolution, what kinds of natural solutions can we develop? And since Mary tells us all the time, we're full of ingenuity as human beings.

Maeve: Right. But we're not going to depend on new technologies to do it are we?

Mary: There's plenty of room for new ideas, but we have to stop assuming that any of our quick fix solutions could be more advanced than thousands of years of evolution that scientists are still actually trying to comprehend.

The aim of the game isn't to put bandages on a problem. As it's hemorrhaging, we need as many long-term proven solutions, nature-based solutions. We've gained an inspiring wealth of knowledge throughout human civilization, but the indigenous tribes who survived and resisted the most destructive aspects of it, have always known the answers to our global health and longevity. So we're lucky, because the best possible scenarios for our future already exist.

Maeve: Yeah. And that makes total sense because as we learned in episode one, indigenous peoples protect 80% of the world's biodiversity. So if we're smart about it, we design solutions that are even more resilient than before. And with equality built in to coin a popular phrase, this season, 'we build back better'.

Thimali: Ooh yeah, exactly. So this week we're going to talk to a Mother who can share her solutions for preserving biodiversity and another Mother who is working on rebuilding it, but this time with even higher carbon sequestration front of mind.

*[Music Transition]*

Thimali: Mina, Susanna Septra is indigenous Dayak Pompakng from West Kalimantan, Indonesia, and she helps lead the Indigenous Peoples' Alliance of the Archipelagos.

Thimali: So happy to see Mina, I've been following you for a long time also! So it's great to have you here.

Mina: Thank you for having me.

Maeve: Welcome Mina.

Mary: Welcome. Thank you for visiting us. I would personally love to be with you in beautiful Indonesia. Where exactly are you as we speak?

Mina: Well, I'm in Jakarta now.

Mary: Ah.

Mina: Yeah, because we still cannot go out from Jakarta. We have to be locked down. Yeah. Work from home still.

Mary: I know Jakarta a little bit. I was there a number of times when I was UN high commissioner for human rights. And only the first time wasn't so pleasant because I had

to tell your then president to stop abusing human rights in Timor Leste.

Mary: But I do know that you're not a city girl you grew up amongst very dramatic, beautiful countryside. Can you describe it for us? What was like growing up there?

Mina: When I was child, I still remember, how beautiful the forest is. My parents was a rubber tapper. So usually I wake up in the morning, follow them to do the rubber tapping.

Thimali: Actually I remember doing rubber tapping at my grandmother's house in Sri Lanka running through paddy fields and falling in them actually, just like drowning in paddy fields (*laughs*).

Mina: That is really fun time because usually when we plant a paddy, so our parents make a hole with sticks

Thimali: Yeah!

Mina: - And we, the children put the seed in the hole - that was really fun.

Mina: And we have a small river branch where I used to play canoe with my brothers. There's a lot of fruit trees.

Mary: Yes.

Mina: The house is full with different kinds of fruits.

Thimali: Oh my goodness!

Mina: Durians, rambutan.

Thimali: I love rambutan and durians!

Mina: Yes and we have so many different kinds of rambutans in Kalimantan. And durians also.

Maeve: What did learning about life in the forest teach you about, you know, your culture and its connections to biodiversity?

Mina: The livelihood of the people is entirely connected with biodiversity, with the forest.

Maeve: Yep.

Mina: The spiritual connection is also very strong. You know, the reason why we protect the forest is because forest is the home of our ancestors. Not our home. That is the home of ancestors that they asked you to protect.

Thimali: Hmm.

Mina: And inside their home, there are plenty of things that people can use for their livelihood. So medicine plants, you know, we have so many healers in the community who understand different kinds of plants. Even animals, some kind of animals can also function as, as medicine, you know, and different kinds of roots, flowers, leaves,

Thimali: Yeah. One of the most biodiverse regions in Asia, I think.

Mina: Yes.

Mina: My tribe is Pompankg, but my community's territory has gone for oil palm plantations. I am really sad talking about my own community.

Thimali: Yeah I'm sure.

Mina: Every time you go back, you'll see how dry it is. And during the rainy seasons, it easily gets flooded, the oil palm trees cannot absorb a lot of water. So it's left the community's area becomes flood. So that's why I try to find another community to be my community.

Thimali: Mmhmm.

Mina: My second community is the Ibanic people in the long house in West Kalimantan as well.

Mina: The whole life is centralized in this spiritual connection between the spirit of their ancestors. So everything they do have the its own rituals.

Mina: If you go to the longhouse you can feel it literally - every corner of the longhouse and in the forest, you can feel the presence of the spirit.

Thimali: What is the long house?

Mina: Long house is the traditional house of the Dayak people, in Kalimantan, long time ago, every Dayak people live in a longhouse, but now only few left.

Mary: It must be wonderful for Birdsong. Is it?

Mina: Yes. Oh, in the agriculture system of the Ibanic there's a specific kind of birds when they hear this bird singing. That is the sign when they had to start farming.

Mary: The birds told them to farm and they farmed! *(Laughs)*.

Mina: Exactly Yeah. And also, also of course the reading of the stars, the star star constellations. So they can see when they have to start, when they have to stop as well.

Thimali: Wow.

Maeve: Mina I know it's such a huge problem, these palm oil plantations have been a terrible cause of stress for forest communities, could you tell us how palm oil production has affected your area?

Mina: Yeah. I was still child when the oil palm plantation started in my own community. So the Pomakngnk people is one of the communities that already lost most of our territories for oil palm plantations. So in Indonesia, Sumatra is the first island that have these oil palm plantation. And then they moved to Kalimantan in 1970 something. I think, 1980s, they really start planting. So yeah, mostly our territory is gone. That's why the river, where I used to play canoe with my brothers, it's gone now, dry. You cannot find it anymore only.

Thimali: That's so sad.

Mary: and of course it's a monoculture isn't it?

Mina: Yeah. It's monoculture. And it's so dry, everywhere. And the problem with oil palm is other plants cannot really compete with them. So you cannot really plant anything. Like many people don't farm anymore. Indigenous communities are communities who are in crisis for food security. It's people who, whose land ought to be turned into oil palm plantations or mining, these people are in crisis actually, especially for food stock because now they cannot, they cannot do their own farming.

Thimali: There's no like diversity of food anymore. Basically and everything has to be bought from shops instead of grown at home.

Mina: Exactly.



Thimali: I mean, it's so sad. I'm so sorry. And it's not just palm oil plantations that you've been fighting back against as well. You mentioned mining. I know this illegal logging has been an issue in Indonesia for a long time now, but also the residual effects of the Suharto presidency. I'm sure it has, and has also taken its toll over the long term. Can you tell us a little bit about the political and environmental histories that have affected your community in your work?

Mina: During Suharto era was really terrible. That is when it all started. But most of all the presidencies, this still happen, even now in Jokowi's time, we still have our, our community's been criminalized. It's really sad actually peoples not really care about their forest, the forest, but criminalize people who protecting the forest.

Thimali: Yeah.

Mina: Logging usually have a very good connection with oil palm plantation.

Thimali: Oh really?

Mina: Yeah. Because usually they come and they clear the forest so they chop and they sell it, they get benefit from it. And then after that, they plant the plantation - oil palm plantations, That was a practice from long time ago. It's still going on until today. So they steal the wood from us and they steal our land from us.

Thimali: Wow.

Mary: Hmm. That's terrible for me to hear in particular, because I know that AMAN, this wonderful Alliance of indigenous peoples of the Archipelago are great on human rights advocacy. And tell us a little bit about how you're dealing with these challenges.

Mina: Yeah. So we actually try to do different kinds of things in AMAN, because we are working to serve the community, and they have many different kinds of needs.

Mina: We work on different kinds of things like supporting communities to do the mapping of the territories. We already map 11.6 million hectares of indigenous territories in Indonesia.

Thimali: Wow.

Mina: Yeah. We need to secure the rights of indigenous peoples but until today, we still not yet having the law that recognise indigenous peoples, that we are still fighting for this, we start, advocacy for this since 2010. But we are still fighting now...

Mary: I remember in the UN how long it took to get the declaration of indigenous peoples.

Mina: Yes!

Mary: So keep fighting.

Mina: Yeah. Last week the parliament had a joint meeting and they agreed to continue the process.

Mary: Good. Yeah. What about youth? What about young people?

Mina: Oh, the youth. It's very interesting. I'm working a lot with the youth now. A few years back, many indigenous youth gathered, they're thinking about how they can best support their own communities. And they realized that the youth is power. So they established this movement they call the indigenous youth homecoming movement.

Mina: Calling all the youth indigenous youth in the cities to return back to their communities, to protect defense and manage their territories.

Thimali: Wow. Lovely.

Mina: We support communities with the food sovereignty program where we support them doing farming, providing seed for the communities.

Mary: You also had a fantastic win for a forest and indigenous land rights. I think it was in 2012. We've just had in my own country, Ireland, we've had a recent Supreme court case on climate change telling the Irish government you're not doing enough to mitigate the emissions. So that was great.

Mina: Nice, oh Congratulations!

Mary: So I like court cases *(laughs)*. Tell me about your court case.

Mina: It wasn't really historical for us. Because in the Indonesia law, forestry law, it says this, the customary forest is state forest within indigenous territory. That's how it's originally said. So we challenge this to court to return back the ownership of this customary forest to us. So after the process, the customary court come out with a ruling, they just actually simply delete the word 'state'.

Mary: Yeah.

Mina: So now it says customary forest is forest within indigenous territories.

Mary: Well, that's fantastic.

Mina: Yeah. It's not state forest anymore.

Maeve: That's amazing Mina.

Mina: Yeah. It's only one word, but it's meant a lot. It's changed everything.

Thimali: I mean, what were they doing with those forests before?

Mina: So government give permit, for oil plant plantation mining for different kinds of proposals without consent from the people.

Thimali: Wow.

Mina: We have so many problems in Indonesia regarding rights of indigenous peoples land, grabbing everywhere, criminalisation and recognition of the, indigenous belief is also still a problem. So if we have this basic law that recognizes the rights of indigenous peoples, we are hoping that this law can really protect all of our rights, including our political rights.

Thimali: Mina, what can our listeners do to support you and your work and follow the movements of AMAN?

Mina: Stop consuming products from oil palm plantations. That can really help because the production will keep going on if people still consume it.

Thimali: What are the primary uses for palm oil?

Mina: Cooking oil, lipstick, butter, chocolate..

Mary: So many things.

Mina: Yeah. You can see the ingredients if you buy something.

Mina: Our website is <https://www.aman.or.id/>.

Mina: I'm so grateful to be invited to this. Yeah. Been really interesting to connect with all of you.

Mary: Great to talk with you Mina. It really was.

***[Music Transition]***

Thimali: Kristina Douglass from episode two on reparations has sent us not one but two gorgeous soundscapes.

Mary: Well that's appropriate because she lives between Pennsylvania in the United States and Madagascar, which of course is that very big Island of the West coast of East Africa. You couldn't get two more contrasting landscapes could you?

***[SOUNDSCAPE AUDIO]***

***[Birds Tweeting]***

Kristina: When I'm sitting in my backyard in State College, Pennsylvania.

It's so reassuring to watch how the birds and the bees stay so busy, despite all the disruptions to our normal life under lockdown.

I'm so grateful to see how busy they are - It worries me that bees and other pollinators are so threatened. But makes me feel really good and at peace, every time I can shape our garden in a way that encourages them to be here and creates a safe habitat. As my son, Percy likes to say, we have to add more plants - so the bees have more food.

It's amazing to listen to the wind, go through the leaves of the different trees in the backyard.

It reminds me of the sea and Andavadoaka in Southwest Madagascar.

I owe the second recording to my dear, dear friend, and colleague Bik Manahira in Andavadoak.

And you're hearing the sound of the waves hit the shore in Andavadoaka as people go about their daily lives in this beautiful fishing village. It's amazing to think that no matter where you are in the world, if you have a connection to the sea, which all people in Southwest Madagascar do, it follows you and is with you wherever you go.

Sometimes maybe I'm unconscious of how the combination of these sounds helps to deal with all of this uncertainty in the world.

So the sea is always with us and we're always connected no matter where we are.

**END.**

**[Music Transition]**

- Thimali: What a lovely juxtaposition. Right?
- Maeve: Incredible. Pennsylvania sounds lovely. But I'm sure it's tough for Kristina to be away from the sea and the shores of Madagascar right now.
- Mary: I had an incredible moment of listening to nature. It happened in August last year, August, 2019 when I was lucky enough to be invited on a scientific expedition to Greenland.
- Mary: And we were brought by boat to stay in quite primitive huts overnight. And then the following morning, we were encouraged to listen to the glacier. And we were told to be on our own. And luckily everybody else went off and sat on rocks and I was able to sit on the nice, comfortable seat outside the hut where we were staying. And it was 16 degrees, utterly sunny.
- Maeve: Wow.
- Mary: And the sound was like thunder and the glacier was carving too intensely.
- Thimali: Wow.
- Mary: And every now and again, there'll be sort of rifle shots of small carving. And I found, I had tears in my eyes

because I felt this isn't right. Nature is under too much pressure. What are we doing? It was a very special moment of an empathy for the first time of that kind with nature, that we shouldn't be putting that pressure on and we were, and I'll never forget it. I was very fortunate to have that experience.

Thimali: I mean I know from living in the city, it's hard to remember that relationship with nature in that very direct way. So, thank you for sharing Mary.

### **[Music Transition]**

Thimali: So our next guest Jane Zelikova has a spangled resume to unpack with us this week. Jane is an ecosystem scientist studying the impacts of climate change on plants and soils at the University of Wyoming. But she's also chief scientist at carbon 180, which is an NGO rethinking carbon and co-founder of 500 women scientists, which is a network of folks confronting the threads of racism and misogyny and xenophobia and the anti-science rhetoric that sort of fell off the back of the 2016 US election. And because life is apparently boring, she also made an award-winning film called the 'End of snow'.

Thimali: Humble welcomes to Mothers of Invention. We're really happy to have you.

Maeve: Hi Jane!

Jane: Hi, thank you. Thanks for inviting me.

Mary: Welcome Jane.

Maeve: The anti-science stuff really struck me because science is still real isn't it? Despite what's happening here in the US at the moment.

Jane: Yeah. I mean, it never was not real, I just think it's just that science is inconvenient to certain people.

Maeve: Yeah. we all have stories around like, living in America in 2016, when Trump got elected, what would you say was the biggest change that you made?

Jane: Well I was living in Washington DC working at the department of energy on climate policy. So the biggest change was just leaving DC and moving back into the

mountains and switching jobs and putting most of my free time of nights and weekends into advocacy and pushing back against a lot of what's been happening.

Maeve: Oh so you left your job and you decided to become more effective outside of the system?

Jane: I could see really quickly that the new administration wasn't interested in continuing to move forward on climate policy, so I had this great opportunity to join a kind of new NGO that was focusing specifically on climate solutions and removing carbon dioxide from the atmosphere. And I felt like that was a really amazing opportunity that I couldn't pass up and I knew I could be more effective.

Mary: And Jane, I love what you're saying about science, because I always liked to surprise Maeve. She probably doesn't know that I actually have a science hat. It's surprising that I'm not a scientist in any shape or form.

Maeve: No, I thought you're a lawyer!

Mary: But I'm actually a patron of the international science council.

Maeve: Oh for god's sake.

Jane: Oh.

*(Thimali laughs).*

Mary: It's quite impressive. It was formed in 2018, between the two big science bodies, the natural sciences and the social sciences. They came together.

Jane: Good!

Mary: In the international science council and I've actually chaired some pretty sophisticated meetings on science, but I'm really keen to sort of hear more about your first love with science and ecology and biodiversity. Tell us about that.

Jane: Yeah. I sort of think like we should put science in the hands of the people, so I'm glad to hear you're doing science, even as a lawyer.

Mary: Even as a mere lawyer you need to say *(laughs)*.

Jane: Just a lawyer and president of a country. No big deal. Super easy.

Jane: We should just ask people, do you want to do science? And I think they will say yes because science is awesome. Science is a profession of being curious. It's amazing.

Jane: I think for me, I didn't know I was a scientist, but I knew I liked playing outside, and getting my hands dirty. And I didn't know that could be a career.

Jane: Not because like my parents wouldn't support it, but just, I grew up in the Soviet Union. I just don't remember that conversation happening as a kid.

Mary: You grew up in what is now Ukraine? I think is that right?

Jane: Yeah. What is now Ukraine, but on the, on the border with Russia. So I grew up speaking Russian.

Jane: I liked climbing trees and digging holes and picking worms out of the ground. And I liked that stuff. I got to do it a lot as a kid, which is really lucky, cause I grew up in a really big city, but my grandmother had like a little house out in the country and I spent all my summers there. In high school, I wanted to be a National Geographic Explorer and then when I went to college I took my first ecology class and it just kind of hit for me. Basically in the very first day this woman came into the classroom, it was kind of a big lecture hall, stood on, stood at the front and she had this black T shirt on that said 'question everything'.

Jane: And it was my Ecology 101 professor, Dr. Judy Meyer. And I was just like, 'Oh my God, who is this person?' And I just like marched into my advisor's office that day and changed my major from Russian literature and anthropology to Ecology.

Mary: So what was your first job?

Jane: My first ecology job was basically going out and measuring chemical levels in local streams.

Jane: But then I got to work in a lab. So for folks that don't know and don't work in science, cleaning glassware is like the majority of your time in a lab, it's not actually doing experiments, it's cleaning up or setting things up. You just need things to be really clean.



Jane: So an ecosystem scientist is born.

Thimali: Jane can you tell us a little bit about your work and the importance of soil biodiversity. But also I guess why it's so important when we talk about climate change?

Jane: So, um, the way that I got to learn and get excited about soil is by studying ants and my PhD project was looking at the impacts of climate change on a specific ant species that disperses the seeds of this suite of understory plants.

Thimali: I love the term 'understory' but it basically refers to all that lovely growth under forest canopies right?

Jane: Yeah. So the idea was that, if these ants are responding to climate change and moving, they're leaving the plants they disperse behind because ants can move more quickly than plants can follow. And in doing that, I realized if I was going to ask that question, I had to also ask about what's happening in the soil because ants transform nutrients in soils and affect the likelihood of a plant germinating and growing and a lot of different ways.

Jane: So that's how I got into soils. And by the end of my PhD, I basically was like, I'm into ants. Ants are cool, but like, I really want to get, dig into soil and understand more about how it controls everything on our terrestrial planet.

Thimali: So then what was it that surprised you about soils?

Jane: So when I think about soils and what they bring us, I can't help, but think about the microbes that are actually driving all of those things, from how soils form to how soils help us grow our food. And it's all really these tiny critters that we can't even see, these microbes are, as I call them the invisible movers and shakers under our feet. They are the ones that transform carbon from, you know, what the plants deliver through their roots, into other forms of carbon that can be stored for a long time. So the microbes are responsible for a climate solution that we should be taking full advantage of. Microbes in the soil are a very, very diverse bunch.

Maeve: Wow, so drawing carbon back out of the atmosphere and back into the soil basically, literally reversing what happens when fossil fuels are burned. Those microbes are unbelievably useful - and there are so many of them.

Jane: Yeah. One small teaspoon of soil holds millions of microbial species. And we're only just now getting to learn a little bit about what they do. So there is this untapped potential in soils through the microbes that they harbour for us to grow our soil fertility. And the way that we do that is that we think about building healthy soils with microbes in mind. So what do microbes want? They want roots in the soil, delivering carbon that the plants capture through photosynthesis. They want water, they want some nutrients. So we can manage soils to help bring the microbes what they want. Basically when you protect the soil, you protect the microbes. So we can start managing soil microbes in mind and get really good outcomes, healthier and more resilient soils. Who doesn't want that? and healthier and more resilient soil microbial communities too.

Mary: Jane, we had a guest earlier who is indigenous and from Indonesia. And she was talking about the importance of protecting biodiversity because it's so incredibly hard to replace it. And so I was wondering as an ecologist, do you feel that restoring biodiversity is achievable and can actually compensate for the degradation that we're seeing?

Jane: Yes, I think we can build back the biodiversity we have lost and we can't build all of it back because there are some species we'll never know we've lost in the first place. And that is especially true in soils because until recently they were a black box. We didn't have a lot of insight into what lived in our soils and we still don't in large parts of the world.

Mary: Hmm.

Jane: Um, but I think let's not like let's not lose the thing in the first place. So what can we do to conserve the biodiversity we have before we think about what we need to do to restore the biodiversity we have lost. We're in a situation where we have to do both and do them quickly.

Thimali: I really love some of the parallels you've made between the biodiversity of soils and the diversity of communities, Jane. And it seems like you've found yourself at the intersections of science and policy for it. So what are the societal blocks that you think we're gonna need to climb over to protect our soils and the Earth's biodiversity?

Jane: Yeah. Unlike a lot of other battles at the nexus of climate and the economy and energy systems and all of these things that are really hard and justice movements, I think soil can be the great connector. Um, soil is literally the foundation of most of the food that we eat. And a lot of the people that like to actually grow our food are really connected to their land and to their soil and think about it all the time. So protecting our soils, protects our ability to keep producing food and feeding a growing population. So it's a win, win solution for climate and for people. And in this way, I think soil can actually bring a lot of different opinions together under one tent. And we need more people together under the same tent.

Mary: I've been dying to ask you about the 500 women scientists that you brought together. I'm so excited about that. Tell me more, I'm 501 now *(laughs)*.

Jane: Yes!

Jane: We are a very inclusive organization. If you self identify as a scientist, you are welcome to join us *(everyone laughs)*.

Mary: Tell us about this group and what your, what your plans are and what you're doing?

Jane: Yeah. So we didn't mean to form an organization or a global movement. We've really just wrote a letter after Trump was elected kind of stating like this will not stand. And we wanted 500 women to sign it. So that's why we called it 500 women scientists. We thought 500 was an aspirational goal. And we reached a goal within a matter of hours.

Thimali: Wow.

Jane: Because the letter - hours, yeah. The letter kind of went viral, spread all over the world. We thought it would just be U.S. people signing, but it blew up internationally. We, you know, at the last counting we had over 20,000 signatures in a matter of a few months and 192 countries represented.

Thimali: Wow.

Jane: So clearly the message resonated. And we realized there was a need for an organization to kind of bring that activist voice to science. If you're not in science, you might not know, but scientists are generally

discouraged from having an activist stance or like really taking a strong stand on anything. But scientists are humans - we're affected by the same societal kind of ills that everybody else is. And we think bringing your whole self to science is actually really good. And that means bringing that activism and that passion and that drive for equity and justice.

Thimali:

Wow.

Mary:

You know, very often you think of scientists as wanting to stay out of the political, not wanting to engage, just wanting to do their science and even with the problematics in science, not to try to be too definitive. And it's great to actually get that engagement. And in particular from women who are scientists.

Jane:

Yeah. I think our thing is get off the sidelines. This is important. This is our lives. Uh, this isn't just a scientific question. And science has always been political. It's always been used to further certain causes over others. Science has been used to justify harming people, we do not have our hands clean. And if we can't address these ills in our own scientific institutions, we're not doing science for everyone.

Maeve:

Hmm.

Thimali:

Oh, Jane, it's been so wonderful to hear from you. Our listeners are a very curious bunch of humans. So how can they learn more about your plethora of projects and stay in touch with you?

Jane:

This is a great prompt for me to update my website. So I can find all these projects in one place, but five, zero, zero. And then ([500womenscientists.org](https://500womenscientists.org)). And you can see all the different things that we're doing, like the fellowship we have for our women of color sort of celebrating and amplifying their work.

Maeve

Great, amazing.

Mary:

Well, I'm pleased to say that the Mothers of Invention Instagram account has a great deal of activity, a flurry on it right now. Self-Care Sundays are being published, perhaps unsurprisingly, every Sunday. Each of our mothers, this season has shared their own self care strategies with Maeve, Thimali and myself. And Thimali, I understand has been having some very engaging chats

with rising climate leaders on this important matter, too. It's very important for young people from the beginning to have self care.

Thimali: Yes, indeed. I have Mary. So if you miss us during this week, that's where you can find all our behind the scenes footage.

Maeve: Jane, thank you so much.

Jane: Thanks Y'all this was fun.

### **Music Transition**

Thimali: Ugh! Microbes and ants are just magic. They're so tiny and so powerful.

Maeve: Well maybe we don't understand it ourselves, but scientists have a lot of critical answers to these questions that we have about our planet and that's how they're going to save it to preserve it.

Mary: I was actually very impressed with everything that Jane said about soil. Soil is absolutely vital it has to be nurtured, that's to be looked after that's what I took away. And I think it's really important.

Thimali: Yeah. further reiterating the need for indigenous communities to protect these landscapes for us.

Mary: Because they do it naturally, they do it with thousand years of wisdom.

Thimali: Hmm.

Maeve: So Thimali, where did we go from here? We have traversed colonization all the way down to microbes.

Thimali: *(Laughs)* Yeah. Well, now that we've really dug into the very nooks and crannies of climate justice, I think it's about that time for us to rethink what our value systems are. So everything we've lived through has had to pass through this lens of extractive capitalism, right? But now that we have all the facts and outcomes and they're all on the table, can we do better than extractive, patriarchal capitalism? Can we imagine a new economic system that respects all life and do that while respecting the natural resources that we all share and depend on?

Mary: Well, I'm certainly very keen on this. I call it climate justice actually. It's all about living in a way that's sustainable living in a way that's responding to the need for more equality in our societies. And we need also to honor the way in which we've built up our economies in the developed world, which was through fossil fuel and honor the workers in coal and oil and gas. So as we move to this new green, sustainable world with nature based solutions, we must also have just transitioned for the workers in coal, in particular, because they are most at risk at the moment and then oil and gas. And we must somehow have the solutions that will work for them as well. So they can almost become part of the way forward as opposed to trying through lobbying, to resist the way forward.

Thimali: Does anyone have a suspicion that we're changing the world over here?

Maeve: Thimali, could that be something you ate?

Thimali: Probably was actually.

*[Laughter]*

*[Music Transition]*

## **CREDITS**

Mary: Mothers of Invention is brought to you by Vulcan productions and Doc Society. Our series producer is Thimali Kodikara.

Maeve: Our development producer is Shanida Scotland. Our minisode producer is Lauren Armstrong Carter. Our editor is Sefa Nkyi and our sound designer is Alexis Adimora.

Mary: Our line producer is Rebecca Lucy Mills and our engineer is Lisa Hack.

Thimali: Our social media strategist is Imriel Morgan for Content Is Queen. Our impact producer is Quan Lateef Hill. Our partnership lead is Micha Nestor and Aisha Younis oversees our satellite project **Climate Reframe** for BAME climate leaders in the UK.

Maeve:

The Executive producers are Jody Allen, Ruth Johnston, Matt Milius, Jess Search, and Beadie Finzi. Team Vulcan is Andrea Dramer, Susan Grella, Kimberly Nyhous, Alex Pearson and Ted Richane.

Thimali:

Mina's audio was recorded with the help of Anton Alifandi and also Lia Christie at V radio in Jakarta, Indonesia.

Mary:

Our team tune was written by Jamie Perera and we're proudly distributed by PRX.

**END.**