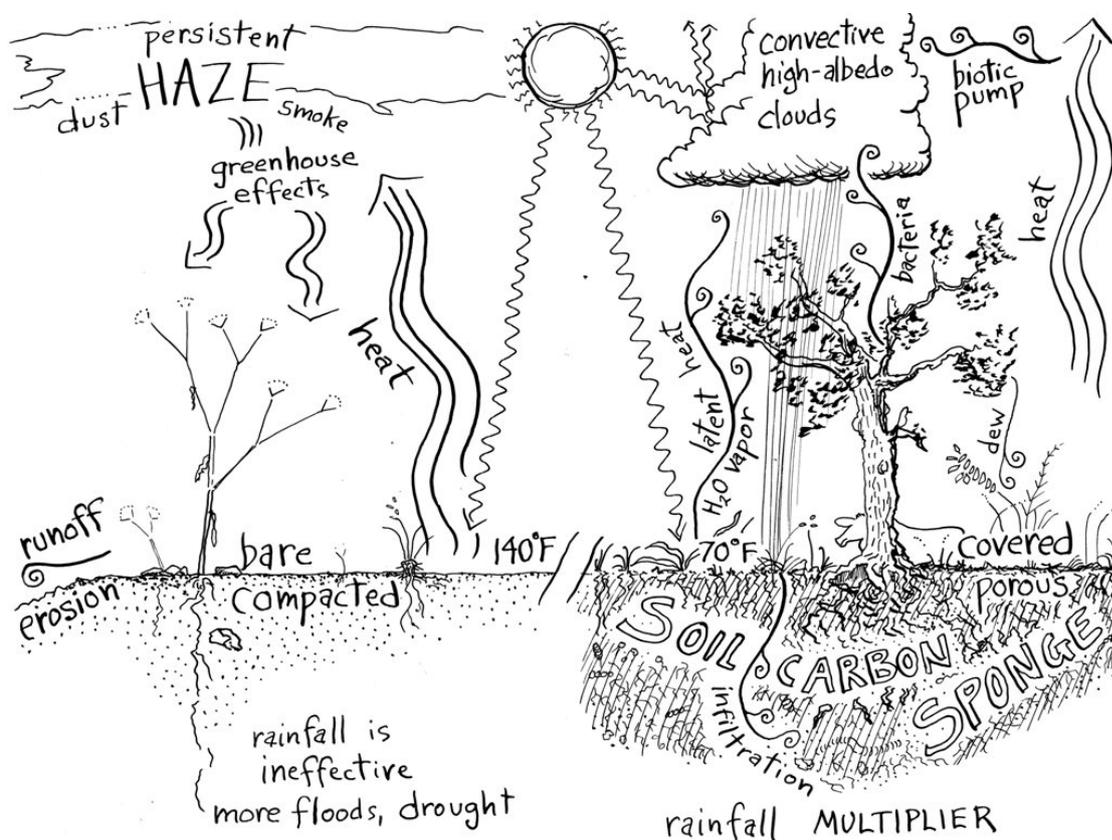


# “ Fires are going to be a critical determinant in our landscape.

What's happened with climate change, whole landscapes are systemically aridifying, drying. Southern Australia will get 30% less rainfall, so it'll dry, but much more worrying than just the lower rainfall is that the weather is more variable, unreliable and extreme.

With that drying, and with that extreme climate, we're going to go into dangerous fire, wildfire weather. And it's going to go beyond the capacity for fire management, conventional fire management, to control. We've already seen that. We're now getting crown fires, we're getting fuel volatilising, and burning in the crowns, well ahead of any fire fronts, impossible to put out on an extreme day. ”

-Walter Jehne



**Hello, you're listening to Earth Matters. Earth Matters brings you environment and social justice stories.**

## Bec Horridge

Today's story was produced in the studios of Radio 2XX, Canberra, on the lines of Ngunnawal and the Gambrey peoples, for Radio 3CR in Melbourne, Wiradjuri country, and broadcast nationally on the Community Radio Network. I'm Bec Horridge.

## Bec Horridge

Today I'm talking to soil scientist, Walter Jehne, and campaigner Cindy Iritz. Now they're two climate activists who've been in demand overseas with a proposal, how to build a global soil carbon sponge, that would soak up CO<sub>2</sub>, and save us from global warming. Cindy, how did you get involved in all of this?

## Cindy Iritz

When I retired from my career, I spent a couple of years doing action research, trying to work out where

was the best place for me to put my time and my energy to be able to make the biggest difference. And I came upon soils, and discovered that soils can, through plants, take carbon out of the atmosphere, and store them stably in soils. And I was like, "Wow, okay, this is where I need to put my time and energy." So that's what I've been doing.

## Bec Horridge

You can store carbon in soils, and plants do that. Could you explain a little bit for us?

**Cindy Iritz**

Most people understand about forests, and when forests are cleared, that carbon goes up into the sky. So basically, it's the opposite. We all learned about photosynthesis in schools. Through photosynthesis, the plants take carbon out of the sky, and it goes down into the roots, and is dripped into the soil, and then it's held securely in the soil. It's quite exciting.

**Bec Horridge**

You were invited to be part of a delegation to COP 21 in Paris. What was that?

**Cindy Iritz**

I had networks in different parts of the world, and one of these networks established an organization called Regeneration International, and they decided that they would invite delegates from all over the world to come to Paris. And I was one of those delegates.

The Paris people were starting an initiative called 4p1000, which is under the Lima-Paris accord. I was there with about three dozen other delegates. And it was amazing, mostly because we'd all been working in isolation - so the solidarity was incredible.

**Bec Horridge**

I looked up what the Four Per Thousand initiative is and found that an annual growth rate of 4% in the soil carbon stocks per year would halt the increase in the CO2 concentration in the atmosphere related to human activities. The Four Per Thousand International Initiative was launched in 2015, at the COP 21 International Climate Conference. It consists of federating voluntary stakeholders of the public and private sectors.

The aim of the initiative is to demonstrate that agriculture and, agricultural soils, can play a crucial role where food security and climate change are concerned. The ambition of the initiative is to encourage stakeholders to transition towards a

productive, highly resilient agriculture, based on the appropriate management of lands and soils creating jobs and incomes, hence, ensuring sustainable development.

**Walter Jehne**

We're at this position now, after 50 years of hard evidence, that CO2 is going up, and increasing. And we're in a position now where CO2 will continue to rise. And drawing down, or just slowing down emissions, or even politically pretending to slow down emissions is nowhere near enough. And so, it's not just a matter of slowing emissions. We still must do that, but we also must and can draw down massive quantities of carbon naturally back into the soils and the biosphere.

Up to now we've completely ignored the potential of our residual natural biosystems to draw that down, but if we stop ignoring that, and start enhancing that, yes, we can draw down twice as much carbon as we are now annually emitting into the atmosphere. And that really is imperative for the climate, globally, in the next decades, we haven't got much time.

**Bec Horridge**

Building up our soils with carbon could draw down a massive amount of CO2. I'd like to dig into the science a little more. What are soil microbes? What do they do?

**Walter Jehne**

Soil microbes are really the active agents. They're really the front-line soldiers or activists that are working right across the planet, have been doing that for 420 million years. And they're the things that sequester that sugar, and the root exudates that Cindy mentioned, and store that sugar as stable soil carbon.

In doing so, they build that soil carbon sponge, that loose, fluffy, aggregated soil, that is able to hold water and nutrients and drives a whole productivity of all our bio-systems. It's that soil carbon sponge that holds the water, allows rain to infiltrate, and be retained, and of

course it's that hydrology that governs 95% of the heat dynamics of the blue planet, Earth. And it's that hydrology that we must now restore to safely, naturally cool the planet.

**Bec Horridge**

I read that biological agriculture that puts carbon back in the soils can give us healthier food. Can you please explain?

**Walter Jehne**

Every living organism on this planet needs nutrients. It needs those nutrients for total biochemistry, for its health. We need in the excess of 30 different nutrients in the right concentration, forms, ratios and balance. And we get those nutrients naturally, from our soils. The things that make those nutrients available in the right concentration ratios, forms and balances are the microbes, the fungi that are involved with taking up those nutrients, and then transporting them to plants, in exchange for the sugars that Cindy mentioned, the plants are exuding. The health of our food, and the health of people, then depends on - are we getting these right nutrients? We can only get those nutrients if we grow food in these natural ways, from these natural soils. Otherwise we're dependent on fertilizer nutrients, and invariably we have hyper concentrations of some, and deficiencies in others, and that's causing massive disease consequences right across modern humans, because the whole nutritional integrity of our food is fundamentally compromised.

**Bec Horridge**

What sort of diseases are you thinking of there?

**Walter Jehne**

Well, over the last 60 - 70 years, we've had an explosion of a whole range of self-induced diseases. These are diseases which are really our biochemistry malfunctioning. And that includes the cancers, the cardiac heart diseases, the autoimmune, the

whole range of diabetes, the whole range of diseases that are-

### **Bec Horridge**

Attention deficit disorders?

### **Walter Jehne**

Yes, attention deficit, allergy reactions. But these are all diseases that directly relate to what we put into our bodies through our food. And if the nutritional integrity of that food is compromised, by definition, so is our biochemistry, and so is our preventative health. We've had this massive exponential explosion, where two-thirds of the community globally are now either obese or malnourished. And that's all related to the lack of nutritional integrity of our food, and how we've destroyed that through agriculture, because of our destruction of healthy soils. We have globally a \$10 trillion a year global industrial food system. It wants to produce its products and the cheapest possible way. It's not really interested in our health, because it makes even more money on then fixing the symptoms of that lack of nutritional integrity in what we're eating.

If you go to a supermarket and 98% of the shelf spaces are from these nutritionally poor products. And invariably, that's what people are buying. Trillions of dollars of marketing money is being spent on to induce us to buy that stuff. There are impediments there, there's vested interest. It's a, as Cindy said, a very challenging, difficult area.

### **Bec Horridge**

How exactly are you proposing to produce healthier food in Australia?

### **Walter Jehne**

Working with groups of, or individually, with innovative farmers all over Australia and regions. They're already doing it, but then really saying, "Here is a natural way. Here's a healthier way that we can regenerate those soils, grow better crops with far fewer artificial inputs." And in so, doing by it through these

natural processes, produce healthier food. And so, our challenge now is to say, "Okay, how do we work with individuals, groups, and how do we help them to do that at that local level, get into markets, to get those products as high premium, high nutritional integrity products, into markets at the premiums that they deserve?"

### **Bec Horridge**

Walter made the change to regenerative agriculture sound so easy, but Cindy could see some obstacles.

### **Cindy Iritz**

Farmers who put themselves forward and try new things get ostracised within their community. There's a thing which is known in our field as 'the Hundred Mile Rule', where, within a hundred miles of your farm, everybody thinks you're a fool, and nobody wants to know you. Socially, you're ostracised. And you imagine how difficult this makes farming, which is a traditional industry. Relationships are obviously very deep in rural areas - terribly hard.

What we've just been doing is working with those innovators, giving them credibility, giving them support. This has made a big difference. There's more produce and products being required for export, that means that more land is getting regenerated.

The original story of the carbon being taken out of the atmosphere is stored in the soil. The more regenerative agriculture, the more exports that are happening of regenerative agriculture, the better chance of us getting closer towards saving the planet one day.

### **Bec Horridge**

Walter, we know that there's been fires all over the place. When you see litter on a forest floor, dead branches and things, what do you think of?

### **Walter Jehne**

Fires are going to be a critical determinant in our landscape. What's

happened with climate change, whole landscapes are systemically aridifying, drying. Southern Australia will get 30% less rainfall, so it'll dry, but much more worrying than just the lower rainfall is that the weather is more variable, unreliable and extreme.

With that drying, and with that extreme climate, we're going to really go into dangerous fire, wildfire weather. And it's going to go beyond the capacity for fire management, conventional fire management, to control. We've already seen that. We're now getting crown fires, we're getting fuel volatilising, and burning in the crowns, well ahead of any fire fronts, impossible to put out on an extreme day.

We need to rethink the whole basis of fire management. We must do it. It's critical, but we need a whole new paradigm of approaches. And it's again, very, very simple, and it's what happens naturally. We have photosynthesis that produces biomass. Green plants grow and produce biomass, which is cellulose and lignum, woody tissue. Balancing, balancing growth, the plant growth, biomass production, there's an equal balancing function in nature, which is biodegradation. The rotting down of that biomass, largely by fungi, and bacteria to turn that fuel into stable soil carbon.

### **Bec Horridge**

You're with Earth Matters. I'm Bec Horridge. And I have in the studio with us today, Cindy Iritz, who's a logistics expert, and Walter Jehne, a soil scientist.

### **Walter Jehne**

Every piece of biomass that's ever formed on land, for the last 420 million years on this planet, has either burned back to CO<sub>2</sub>, or oxidized back to CO<sub>2</sub>, or been converted into stable soil carbon. It's that balance between burning and stable soil carbon formation, which we control through our land management.

It's fungi that are the dominant factor in biodegrading it, so it's not there in fuel.

We've got a whole new, amazing, powerful opportunity to say, "Look, can we actually biodegrade the fuels, so as to avoid those dangerous fire periods?" And the answer is, "Yes, we can. We can do that practically readily." Instead of having five to 10 tonnes of fuel per hectare accumulating every year in our forest, leading to extreme catastrophic wildfires, we can turn that five to 10 tonnes of biomass into soil carbon, which will then hold water, increase the moisture retention of that soil, and change the fire risk. Both by reducing the fuel and maintaining higher soil moisture levels.

In turning from a dry, sclerophyll, extreme habitat, that same forest - we can turn into a moist, amazing sheltered, more wet sclerophyll environment. This is fundamental Australian ecology, that was described way back in the 60s, by Beadle, and [name?]. We have wet sclerophyll forest, and dry sclerophyll forest, from the same soils, in the same climate, with the same species. What's needed to turn it from a dry sclerophyll, fire-prone environment into a wet sclerophyll, more rainforest inducing environment? That is the activity of these fungi - we can control those, we can enhance those, and in that way, preventatively reduced fire risks.

### Bec Horridge

How does this relate to water? Friends of mine from different places in New South Wales are saying their local creeks and rivers have gone dry. Can you talk to that - the drying of rivers, and that the landscape is so dehydrated?

### Walter Jehne

It's a critical symptom of what's happening in the landscape with climate change. We get less rainfall. It becomes more critical that instead of worrying about that we've got less

rainfall; we've got to focus on what happens to every one of a hundred raindrops that do fall.

Does it infiltrate the soil, to recharge the soil carbon sponge, our in-soil reservoirs, and keep that landscape green and functioning - keep subsoil water recharging streams and springs, to keep the rivers flowing? Or do we allow that surface to become so compacted, so degraded, that 95% of those raindrops that do fall, just rapidly run off, in erosive flood flows, and invariably cause drought as a consequence? Drought isn't anything to do with the weather, per se. Drought is all about our mismanagement of our landscape. We've prevented those hundred raindrops that do fall, staying in the landscape, to keep that landscape green and healthy.

### Bec Horridge

And by cutting down so many trees, we've affected the hydrology cycle too, haven't we?

### Walter Jehne

We have fundamentally changed that soil hydrological cycle, because of our agricultural land management practices. As we clear the land, cutting down trees, as we burn the land excessively - indigenous fires were a completely different story. They were cool mosaic burns, largely by women, that managed the surface fuel level, but didn't degrade the soil. Ours are degrading the soil. Clearing, burning, cultivation, overfertilization, biocide use, which kills that soil microbial life, and bare fallows, are all extremely impacting on our soils, degrading, destructuring them, compacting them - causing most of this water to run off. As far as the whole hydrology of the landscape, it's making sure that every one of those a hundred raindrops infiltrates, is retained, rather than running off. And we can do that by changing our land management practices.

### Bec Horridge

That's great, Walter, but you didn't really explain what I wanted to know.

How do you get fungi - how do you get them to eat more forest litter? How do you make more fungi?

### Walter Jehne

We'd just go back to nature because nature had beautifully balanced systems for doing this. It all revolves around the carbon-nitrogen ratio in that forest litter. If we have dry eucalypt litter, particularly as we have now, it's got a carbon nitrogen ratio of over 100 to one. There's so much carbon, there's so little nitrogen in that litter, it's almost impossible to break down. It accumulates to create these dangerous fire weathers. In nature we had a lot of animals and biodiversity in those forests. These animals were important in incorporating that nitrogen, and turning around that litter, to accelerate its breakdown. Let's go through that. We had koala bears and the crown turning eucalypt leaves into, basically frass, which was urine and excrement. Koalas, you could class them as aerial alimentary canals.

They were eating prodigious quantity of eucalypt leaves, excreting the nutrient as nitrogen litter, adding nitrogen to the forest floor in the urine and excrement, to help drive the breakdown of that litter.

We had vast quantities of leaf eating insects eating eucalypt leaves, turning 50% of that leaf into insect protein, and another 50% into excrement. Nitrogen that rained down on the forest floor helped break down that litter. We had bandicoots and potoroos and pademelons, little marsupials on the forest floor, continually digging for truffles, fungal fruiting bodies.

Every night, each little potoroo would dig up 150 little holes. On a yearly basis, zoologists have studied, they moved six tonnes of topsoil a year per pademelon.

Disturbing that forest floor, composting, accelerating that compost floor, putting extra nitrogen in.

We had lyre birds, what we called scratchable scrub turkeys, bush

turkeys, scratching through that litter, continually excreting in that litter, accelerating its composting to stable soil carbon. There was a myriad of biological life, all those beautiful fairy little animals, birds, and it was that biodiversity life that added nitrogen to the fuel, brought the carbon nitrogen ratio down to about 20 to one, not one hundred to one. At 20 to one, that litter breaks down rapidly to stable soil carbon, to build the sponge, to build its water holding capacity, and turn what were dry sclerophyll forests into progressively wet sclerophyll forest. Now you can see this, for those people who ever visited the South Coast of New South Wales, where we had spotted gum forest on very dry gravelly soils. In the same climate, those spotted gum forests can either be very dry, very fire prone, or where they have enough nitrogen, with their macrozamia communis understories, and these animals turning into effectively wet sclerophyll, for pre-rainforest conditions. It's as simple as accelerating the breakdown of that litter, to reduce the fire fuel, both through moving the fuel, and enhancing soil moisture.

### **Bec Horridge**

What are you going to do? Like, sprinkle fungi food on there? How do you do that, with vast areas of forest? It seems like a bit of a call.

### **Walter Jehne**

Of course, we don't sprinkle fungi around - there's no such thing, they're already there. We must now manage the forest, we must respect and restore the biodiversity, the animal diversity. We understand these animals in the forest are critically part of the ecology. We must start looking at these forests, not just as trees and timber, but as a living functional, dynamic biosystem with these nitrogen cycles, avoiding the fire.

It's respecting, restoring the ecological biodiversity of those forests. On top of that, we can do a lot of preventative work. We can have biological firebreaks, where we again can put natural nitrogen onto road edges, and accelerate the breakdown of litter, creating biological firebreaks in those forests. We can do a whole lot of basic land management changes that limit the amount of fuel. We can stop the fires crowning, going up into the crowns, where they become unmanageable and uncontrollable, and extremely dangerous.

### **Bec Horridge**

Walter Jehne and Cindy Iritz, from Regenerate Earth, talking on the global soil carbon sponge. You've been listening to Earth Matters.

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**The Earth Matters team will be back next week with more environmental and social justice stories, from all over this beautiful blue planet.**

**I'm Bec Horridge. That amazing music we've been listening to is the music of Dar Shelton, and that song, [Encounter By The River](#).**