NINA MOINI: We'll head now to northern Minnesota, to a mysterious landscape. Here, the largest stretch of peatlands in the contiguous US can be found. The wet terrain has taken thousands of years to form and draws scientists and experts from across the world.

That includes our next guest, who spent quite a bit of time there researching for her new book,*Water, Carbon, Time: Exploring Peatlands in a Warming World.* The book is out now, and Jennifer de Mooy is here to tell us more about these important ecosystems. Thanks for being with us, Jennifer.

JENNIFER DE MOOY: Thank you so much, Nina.

NINA MOINI: Minnesotans are really pretty familiar and proud of our forests, prairies. There's a lot of conversation around it. But can you describe for us what peatlands are and what they look like and how they kind fit into the mix?

JENNIFER DE MOOY: Absolutely. Certainly, there are a lot of peatlands in Minnesota, so I think everyone listening to your program should know a little bit about what's really in your backyard in the northern part of the state. They're sometimes a little inscrutable.

They're kind of hard to identify because they're wetlands, but they don't always look wet. They can have forests on them, or they can look kind of like prairies with a lot of grasslike vegetation. They're quite variable ecologically and geographically, because peatlands are actually found all over the world except Antarctica.

But in the northern hemisphere and in the northern latitudes, like northern Minnesota, they tend to look large savannas in a way. They're often dominated by sedges, which are kind of grasslike plants, and mosses, sphagnum mosses. So if you're up close to one, you usually know when you're in or near a peatland because the ground is very wet.

There might not be standing water, but if you walk through it, your feet are going to get wet if not sink down into the peat itself. If you see trees, they're probably short and stubby looking because the ground is so wet that it doesn't really support trees very well unless they can use very shallow root systems.

So sometimes, the trees are kind of crooked and standing at an angle. They're sometimes called drunken forests for that reason. But they are amazing ecosystems, and they store an enormous amount of carbon, which is one of the themes in the book that connects it to climate change.

NINA MOINI: Yeah. Would you say a little bit more about that, the link and the importance of tracking it?

JENNIFER DE MOOY: So every kind of plant absorbs carbon from the atmosphere and stores it in their plant tissues. And then when the plants die, it goes into the soil. But typically, some of that plant material-- as it's broken down by decomposing organisms, some of that carbon is released back into the atmosphere.

But in a peatland, because the peat itself is so wet, it creates a kind of airless environment. And without oxygen, those decomposing organisms don't really work very well. So a lot of that carbon, it just accumulates and sinks down into this wet matrix, which is peat. And so they become really important for carbon storage.

And one of the interesting little facts that you'll often read when you see articles about peatlands is that they cover only about 3% of the land surface on the planet, but they store more than twice as much carbon as all the world's forests. So you think about all the forests-- tropical forests, coniferous forests, deciduous forests.

Forests cover about 30% of the planet's land surface, but peatlands store more carbon than trees do-- which is not to discount the importance of trees. They're incredibly important ecosystems as well.

But this superpower that peatlands have to store carbon and to store it for long periods of time, for thousands of years, really makes them important in terms of the carbon cycle and how much carbon is released in the atmosphere versus how much is stored in the ground.

NINA MOINI: And you went to peatlands all over the world, Peru, Alaska, Canada, and you came here to Minnesota. Was there something about Minnesota that kept you coming back? I understand it's the focus of quite a bit of the book.

JENNIFER DE MOOY: Yes. I had three chapters. Each chapter in the book focuses on a different location, and Minnesota really had a big peatland magnet that kept drawing me back. Because the peatlands are not only extensive across the northern part of the state, but they're also quite diverse.

And of course, I also met some incredible people who are experts in the ecology and science behind peatland ecosystems, and so that was another reason that I kept focusing my attention there was because I had really good sources of information, as well as incredible places to explore on my own.

NINA MOINI: Do you know why there would be more peatlands here in Minnesota? I'm seeing here it's 10% of Minnesota and that it's the largest peatlands in the US outside of Alaska.

JENNIFER DE MOOY: Well, if you look at a map of peatlands around the world, you'll see there's this really big swath of peatlands that crosses most of Canada, the middle of Canada-- the boreal region, it's called-- and similarly across Europe and Russia and Asia. Canada and Russia together hold something like 2/3 of the world's peat.

This big swath of the boreal region in Canada has just the right combination of conditions of cold temperatures, lots of precipitation, and a shared glacial history of the end of the last Ice Age, the end of the Pleistocene.

All that water that was locked up in ice in those ice sheets that covered North America, as that ice melted and retreated, it just created this enormous amount of water that set the stage for peatland formation. Minnesota, and northern Minnesota in particular, is the southern edge of this large area of boreal peatlands.

NINA MOINI: Well, I think it's important to learn about this for historical purposes and to try to make sense of where everybody is headed in the future. And I wonder what you're learning about the role peatlands can play in addressing climate change and what the research says about how to ensure that these areas are protected.

JENNIFER DE MOOY: There's some wonderful examples in the book about restoration of peatlands that have been damaged. And the most common kind of challenge that peatlands face is drainage. So anything that causes a peatland to dry out is a problem for how it operates as an ecosystem.

So if it's a ditch that's cut into the peatland intentionally in order to drain water away-- which has happened in many places in attempts to try to reclaim peatlands into agricultural areas, for example, or forestry in some places. But other things can be problems for peatland persistence, I guess.

One of the parts of the climate connection that's discussed in the book is, how is the process of climate change, global climate change, affecting peatlands? So as the climate warms and temperatures rise and winter temperatures rise in particular, how is that affecting peat?

And scientists are finding evidence that it is drying peat out and turning some of those carbon sinks or carbon storage areas into carbon sources where carbon is being released back into the atmosphere. So both conservation and protection of peatlands is important, but restoration to make sure that they continue to work as carbon sinks is also important.

NINA MOINI: Jennifer, thank you so much for coming on the program and raising awareness, educating all of us about this. We really appreciate your time and your work.

JENNIFER DE MOOY: It's my pleasure, Nina. Thank you so much for having me.

NINA MOINI: Jennifer de Mooy's book is *Water, Carbon, Time: Exploring Peatlands in a Warming World.* It's out now.