

This is a transcript of The Conversation Weekly podcast 'Unprecedented drought in the Amazon threatens to release huge stores of carbon,' published on December 7, 2023.

NOTE: *Transcripts may contain errors. Please check the corresponding audio before quoting in print.*

Gemma Ware: As world leaders and their climate negotiators gathered in December at the COP28 climate summit in Dubai to negotiate lowering man-made greenhouse gas emissions, on the other side of the world, Brazil has been experiencing an unprecedented drought in the Amazon. Scientists fear that it could release billions of additional tons of carbon into the atmosphere. In this episode, we speak to an ecologist who has spent 45 years living in and studying the Amazon, about the causes of the drought, why it's so dangerous for the planet, and what can be done to protect the rainforest.

I'm Gemma Ware and this is The Conversation Weekly, the world explained by experts.

To kick off this episode, I'm joined by César Baimawho works as an editor at The Conversation in Brazil. Welcome, César.

César Baima: Hi, glad to be here.

Gemma Ware: And it's great to have you on. You're our first guest from the newest part of The Conversation's global network in Brazil, so welcome.

César Bayma: Yes, yes. We just started the Brazilian Conversation. We have a very small team, but we are very active and already pulling out some very good stories, like this one we are going to talk about.

Gemma Ware: Absolutely. And you're in Rio de Janeiro, but one of the big stories that you've been covering in the first few months of The Conversation Brazil's existence is this severe and unprecedented drought that's happening in the Amazon. Tell me, how big a story is this drought for Brazil right now?

César Baima: Yeah, well, Brazil is a very, very big country and Rio is like thousands of kilometers away from the Amazon but the Amazon is a climate regulator for a great part of the world and for Brazil also. So we are very concerned about this because it has the potential to harpen our industries and most of all, the agriculture we have here because it regulates the rain that comes down from the continent to the places where we grow food. So yes, it's very concerning and it is also one of the worst droughts ever recorded in the Amazon.

Gemma Ware: And are people following it very closely? Is it getting a lot of news coverage?

César Baima: Yes, yes. We have a lot of news coverage about it because in the Amazon, the rivers act like roads for the people that live there. And in some places, the levels are so low that the people can't go around anymore and they can't get food, they can't get medicine, they can't

get out of their small towns by the river to go to bigger towns for hospitals or for work or things like this. And besides being their roads, it's also their way of living. They get their food from the river also, a lot of fish and a lot of produce that comes from the river itself.

Gemma Ware: And this drought is happening just as world leaders and their teams of negotiators are meeting in the COP28 climate summit in Dubai in the United Arab Emirates. The Conversation is focusing a lot on the Amazon drought as part of its coverage of COP28, particularly what you guys are doing in Brazil. Why are you choosing to focus on the Amazon?

César Baima: When the Amazon suffers, the world suffers also. And at this time, when we go for a climate summit like we were going to have in Dubai, it's another sign that climate change is not a story for the future. It's not something that's going to happen. It's happening now, and time is going out for us to do something. Two years from now, 2025, COP30 is going to be here in Brazil, it's going to be in Belem, it's another big city we have in Amazon, and we have to be very much ahead than where we are now.

Gemma Ware: And you and your colleagues have turned to a number of different researchers in Brazil to help you explain what's going on in the Amazon. One of them is Philip Fearnside. Can you tell us a bit about him?

César Baima: Well Philip, he's a biologist and he's one of the researchers at the Instituto Nacional de Pesquisas da Amazônia. It's the National Institute of Amazon Research. It is a government-funded, but independent research center that focuses on research about the Amazon. He's American, but he has been living and working in the Amazon for almost 50 years. He's one of the world's top experts in the Amazon carbon cycle and it was very good to have him writing this story for us.

Gemma Ware: Thanks, Cesar. So, Philip is based in Manaus, which is a city of around 2 million people in Amazonas state, which is also known as the capital of the Amazon. When I spoke to him, I asked him what the situation was like in the city right now.

Philip Fearnside: We've had several peaks of smoke. We've had this huge drought which is leading to the fires that are causing this smoke. Manaus is on the Rio Negro but right beside the confluence with the Amazon river.

Newsclips

Philip Fearnside: So the water level in Manaus is really controlled by the water level in the Amazon river. And you have the riverbed exposed in the upper Amazon, huge areas, it's obviously a record drought. It's the lowest water levels at Manaus since data started being recorded in 1902, so 121 years, the lowest level we've had.

Gemma Ware: What about the animals and the wildlife and the biodiversity of the Amazon? What's happening to that during the drought?

Philip Fearnside: Well, certainly this affects the animals. It's killed over 150 dolphins.

Newsclip

Philip Fearnside: And you also have forest fires, which of course affect the animals.

Gemma Ware: The Amazon rainforest is almost the size of the continental United States, it's huge. It covers the northern portion of South America, stretching from the continent's Atlantic coastline in the east to the Andes Mountains running down the Pacific coast in the west. The southern edge of the forest runs through central Brazil and Bolivia, and in the north, it extends to central Venezuela, Colombia, and Ecuador. Philip explained that the ongoing drought in the Amazon has three simultaneous causes and two of them come from the climate pattern known as El Niño.

Philip Fearnside: There are two kinds of El Niño. We have an eastern El Niño and a central El Niño. The eastern El Niño is when in the eastern part of the Pacific Ocean near the equator, the water heats up. Like what we had in 2015 during the so-called Godzilla El Niño and that kind of El Niño in the Amazon gives you a drought both in the northern part of the Amazon and in the southern part. That started in June. Then in September and October, we had the central part of the Pacific Ocean heating up to give it the central El Niño, which is like what we had in 1997 and 1982. And that gives a big drought in the northern part of the Amazon.

And the projection for the next three months, through January, is to have drought in the entire Amazon. We may get some rain in the northern part of Peru, more than usual, which would help with the water levels in the Amazon river, but it won't help with the forest that is dry all over the place.

Gemma Ware: So those are the first two causes of the drought. The eastern and central El Niño. But there's another factor at play at the moment coming from the other side of the continent.

Philip Fearnside: Then we have the third kind of drought, which is called the Atlantic Dipole. And that's where you have warm water in the tropical part of the North Atlantic Ocean, and cold water in the South Atlantic. And so the difference between the temperatures in those two areas then relates to the rain in the southwestern part of the Amazon. And that's what we had in 2005 and in 2010 when you had big droughts there with forest fires in Acre, very unusual, and we've got that this year too on top of these El Niños. And that is also expected to last well into next year. The projections go through June and for the other El Niños, the central El Niño, wouldn't be until May or June that the probability of having normal water temperature in the center of the Pacific Ocean at least past is 50%. We've got a long time with droughts ahead of us.

Gemma Ware: Have these three factors, the eastern El Niño, the central El Niño, and the Atlantic Dipole, ever all happened together at the same time before?

Philip Fearnside: Not really. In 2010, you had the tail end of an El Niño together with the Atlantic Dipole, but it's not quite like this year when it's full-on, all three of them.

Gemma Ware: So back in 2007, the Intergovernmental Panel on Climate Change or IPCC warned that global warming will cause more frequent El Niño-like conditions. How much can we attribute the current drought in the Amazon to climate change at this point?

Philip Fearnside: Oh, I think it's clearly something linked to climate change. Certainly, this Atlantic Dipole is becoming more frequent. El Niño is also becoming more frequent. But it's really difficult to say that this event is because of anthropogenic climate change. But the frequency of this event is much, much greater because of climate change. That's certainly something that can be said with no reservation.

Gemma Ware: Droughts like this can bring fire to the rainforest. It sounds like an oxymoron. How can rainforests dripping with humidity catch fire? But global warming is drying out the rainforest. In December 2022, Philip published research which estimated that 58% of the Amazon is currently too wet to support forest fires, but that climate change could reduce that to 37% by 2050.

Philip Fearnside: We have just a little line of flame that goes advancing through the understory of the forest, burning the leaves and twigs and things on the ground. At least, the first time you have a forest fire. Next time you have a fire, you may have longer flames and hotter fires that kill more trees. But it's not what people think of. People think of the Disney movie Bambi with a whole forest burning up. That's what happens in a coniferous forest in North America, not in the Amazon. But you still wind up killing the trees even though it's not all at once. You kill a lot of trees with these understory fires.

Gemma Ware: The drying out of the Amazon, coupled with increased forest degradation caused by logging, increases the likelihood of fires in the rainforest.

Philip Fearnside: You have more and more of these big droughts and you have the forest being sort of prepared for fires as well because you have logging going on, not just deforestation, but actually the areas that are being logged are even bigger than the areas that are being cleared outright every year and that basically sets the forest up for forest fire because you leave all the branches and so forth from the trees that are harvested in the forest and then a lot of trees are killed accidentally when you're felling the trees and dragging the logs out so that you have a lot of dead wood in the forest and you also opened up holes in the canopy of the forest so you can get wind and sunlight coming in and drying out the floor of the forest more. And that makes it more likely that the forest will catch fire. And also, if it does catch fire, you have a hotter fire that kills more trees.

My group did a study in Roraima, the northern part of the Amazon, on the fires there, during the El Niño in 2015. And showed that the effect of logging on the fire more than doubles the effect of the logging itself, in terms of the amount of biomass that's lost because the trees dying.

Gemma Ware: More and more humans in the forest further compounds the problem. Most of the fires in the Amazon are caused by humans, often the result of burning weeds in cattle pastures.

Philip Fearnside: If the forest is all dry and sad you can just keep going in the forest and burn these huge areas. So this can actually destroy the forest because you set in motion a vicious circle where first you start with logging, then you have a forest fire, then you have another forest fire, and each one keeps killing more trees and making the next fire more likely. And pretty soon after three or four fires is no longer a forest.

Gemma Ware: The Amazon has enormous stores of carbon in the trees and in the soil. In his research, Philip has likened this to a latent bomb that could explode unintentionally because the droughts and the forest fires will actually destroy those carbon stores and release more carbon dioxide into the air.

As Philip was telling me about what this tipping point could mean for the planet, you'll hear in the background that a sabia bird, which is an official national symbol of Brazil, was adding its voice to his message.

Philip Fearnside: Yeah, so that's very important when everyone hears about how much deforestation there is every year and how much greenhouse gas is emitted, but this big store of carbon that isn't being emitted isn't talked about so much. But that could really be the straw that breaks the camel's back, in terms of global climate, because we're very near various tipping points, with global climate as well as with maintaining the Amazon forest. And while the Intergovernmental Panel on Climate Change has made clear that if you pass 1.5 degrees celsius above the pre-industrial average temperature as a global average, that the probability of passing these tipping points increases tremendously.

Gemma Ware: The 2022 report from the IPCC showed that all human activities, including the burning of fossil fuels and deforestation, are releasing 12 billion tonnes of carbon into the atmosphere per year.

Philip Fearnside: That total of 12 means that the most that we can do to stop global warming is to not emit anything more. If we don't put in another liter of gasoline, we don't cut another tree. It's only 12 billion tonnes of carbon.

Gemma Ware: But that number doesn't include carbon emissions from natural events such as forest fires.

Philip Fearnside: So what happens if what's coming into the atmosphere because you have more forest fires, you have the tundra melting, exposing your peat with a lot of carbon? You have the oceans warming up and not absorbing as much CO₂ as they used to. All those things add up to more than 12 billion tonnes of carbon. Then global warming gets out of control and there's nothing that humans can do to stop it. So we're very close to that point and the Amazon is in the center of that because we have huge amounts of carbon in the forest that could be emitted. Just the vegetation in the Amazon is around 80 billion tons of carbon, and then you have just the first 20 centimeters of soil have over 30 billion tons of carbon. Then you go from there down to a meter, you have another 60 or so billion tons of carbon. But those numbers are much, much bigger than 12. That's the problem. So just a fraction of that, going into the atmosphere in the

space of a few years, could push the climate over this tipping point. So it's essential not to let that happen.

Gemma Ware: This makes this year's drought even more concerning. Back in 2005, during what was then called a once-in-a-century drought in the Amazon, scientists estimated that more than 3 billion tonnes of carbon were released into the atmosphere because the drought killed trees and slowed growth. But it wasn't just about carbon being released. That year, the rainforest also didn't absorb the 2 billion tonnes of carbon it normally would have, making the total impact of the drought an extra 5 billion tonnes of carbon dioxide.

What are the predictions as we stand now in 2023 for what's going to happen to the Amazon's climate, say in the end of this century in 2100?

Philip Fearnside: Well, if it keeps going we're in a very bad situation because you have the dry season lengthening, especially in the southern part of the Amazon, which is on the border with the central Brazilian savannah and it's already a month or so longer than it used to be, something that is a tremendous concern, even threatens Brazil's great ace-in-the-hole of being able to get two crops of soybeans from every hectare in a single year. But it is, of course, also affecting the forest. And if you go past about five months of the dry season, it's the length of the dry season, and then the climate no longer supports rainforest. And that obviously implies a huge release of carbon. These zones of how many months of dry season you have are advancing into the Amazon, so that more and more of it becomes prone to becoming savannah.

Gemma Ware: So what you're basically saying is that the rainforest could have shrunk dramatically by the end of the century?

Philip Fearnside: Yes, that's right.

Gemma Ware: Coming up, what's being said about the Amazon at the COP28 climate summit in Dubai, and what can be done to save the rainforest?

But before we continue, I wanted to give a shout-out to a new climate podcast called 'Climate Decoded'. It explores the complexities of climate change by unpacking the science, policies, and personal stories behind climate headlines. It helps explain things like the inner workings of the IPCC and takes you behind the scenes at climate summits like COP28 to hear from top environmentalists explaining what climate change means for you. Subscribe to Climate Decoded, your essential guide to understanding the global climate challenge and the actions shaping our future. You can find it wherever you listen to your podcasts.

Gemma Ware: I spoke to Philip, a few days before the COP28 climate summit kicked off in Dubai. In the opening few days of the summit, Brazil hit the ground running and proposed a new global fund called 'Tropical Forests Forever' that would help preserve rainforests. Under the scheme, landowners will be paid to protect forests and paid per hectare preserved, with the money coming from sovereign wealth funds and investors, including from the oil industry. I asked Philip what his message would be from Manaus in the middle of the Amazon, to the leaders negotiating the agreements about the future of the planet at COP28.

Philip Fearnside: Well, it's obvious that fossil fuels have to be reduced starting immediately and eventually, eliminated. This global stocktake that the climate convention has been doing estimates that we have to reduce total anthropogenic emissions, that are direct or on-purpose, fossil fuels and deforestation by 43% by 2030, if we're going to keep the climate within 1.5-degree limit. And 2030 is just six years away, so there's very little time to do this. But it means you have to have an immediate turnaround on fossil fuels. In terms of Brazil, first of all, Brazil should not be expanding new gas and oil fields, whereas the government wants to start drilling in the mouth of the Amazon river.

Gemma Ware: At his speech to COP28, Brazil's president Lula da Silva, who was elected back to power in the country in late 2022, stressed that the Amazon rainforest was at risk of collapse.

Newsclip

Gemma Ware: Deforestation in the Amazon was almost 50% lower in the past 10 months compared to the same period in 2022, and Lula promised to end deforestation in the Amazon by 2030. But Philip says that many of Lula's promises in the first year back in power, have been targeting illegal deforestation.

Philip Fearnside: And that's very different because there are two ways to stop illegal deforestation. One is to actually stop deforestation and the other is to simply legalize what's happening. We had some real successes in reducing deforestation with command and control operations from the Ministry of Environment, but the rest of the government is on the other side pushing for things that lead to more deforestation, such as the BR319 highway that would open up a huge area to the entry of de-foresters.

Gemma Ware: The BR319 highway would connect Manaus to the southwestern portion of the rainforest in Rondônia, where deforestation is already taking place. The construction of the highway itself wouldn't cause too much deforestation, but it would allow those responsible for it, better access to vulnerable forests.

So there has to stop building highways, there has to stop land grabs of land where you know, the rainforest has to remain. That's what you mean?

Philip Fearnside: Exactly. One of the things that is spurring this deforestation is land grabbing, which in Brazil means taking over government land, claiming that this has been going on ever since the Europeans arrived 500 years ago, where people invade government land, and sooner or later it winds up being forgiven, and so forth, what are called amnesties, and forgive all these past crimes and legalize the land. And that's one of the campaign promises of Lula was to have this term regularization of land which is a euphemism for legalizing these illegal land claims. And that just is a continuing thing. You legalize everything up to a certain year, and people see that if you invade the land, sooner or later, there will be another amnesty, you'll get a legal title and it just keeps going. So that has to be stopped one way or another.

Gemma Ware: Philip, thank you so much for your time. It's been really interesting speaking with you.

Philip Fearnside: It's been a pleasure.

Gemma Ware: That's it for this week's episode. Thanks to our colleagues in Brazil who helped us with this story, César Baima, Daniel Stycer, and Iasmim Amiden And thanks to Philip Fearnside. We'll put a link to a recent article he wrote for The Conversation about the Amazon drought in our show notes, along with links to The Conversation's coverage of the COP28 climate summit in Dubai.

Do also check out Fear and Wonder, a podcast about climate change, and the latest IPCC report from The Conversation. You can search for that wherever you listen to your podcast, just pop in Fear and Wonder.

This episode of The Conversation Weekly was written and produced by Katie Flood and me, Gemma Ware, with production assistance from Mend Mariwany. I'm also the show's executive producer. Sound design was by Eloise Stevens and our theme music is by Neeta Sarl. Stephen Khan is our global executive editor, Alice Mason runs our social media and Soraya Nandy does our transcripts. Thanks also to Piratá Waujá of the Wauja People, who recorded the sounds of the Amazon near his home in Brazil. You can connect with us on Instagram @theconversationdotcom, on X, formerly known as Twitter, @tc_audio, or email us directly at podcast@theconversation.com. If you like what we do, please support our podcast and The Conversation more broadly by going to donate.theconversation.com. And please rate and review the show wherever you listen, it really does help us reach a wider audience. Thank you so much for listening.