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Notes from the Field

Month in Review • November 2025
woodwellclimate.org

top (l-r): Woodwell Climate's collaboration space; Joseph Zambo (fifth from right) with Arlette Bahati (fourth from right), Deputy Minister of Environment, Sustainable Development and the New Climate Economy of the DRC, and DRC delegates. bottom (l-r): Dr. Matti Goldberg chairing a COP30 meeting proving updates on COP30 negotiations; Drs. Frances Seymour and Ludmila Rattis speaking at a Nature Hub Pavilion event; Senator Sheldon Whitehouse, here with President & CEO Dr. R. Max Holmes, visits Woodwell's collaboration space; Dr. Christina Schädel presents at a Cryosphere event.

COP30 did not deliver all that could have been hoped. However, Brazil did declare new Indigenous territories. The Tropical Forests Forever Facility launched with commitments for more than $5.5 billion in finance. And The Belem Call for the Forests of the Congo Basin garnered commitments for $2.5 billion over the next five years.

"For all those reasons, I would call COP30 a success for forests."

—Senior Policy Advisor Dr. Frances Seymour speaking to *Reuters* about COP30 outcomes.

THOUGHT LEADERSHIP

Scale high integrity forest carbon markets

by Dr. Frances Seymour, Senior Policy Advisor

READ carbon-pulse.com/459703

COPs Need a Regular Science Track - Not a Seven-Year Science Lag

by Dr. Matti Goldberg, Director of Government Relations - International

READ carbon-pulse.com/460099

RECOGNITION

Congratulations to Dr. Ludmila Rattis for being recognized among the 100 Latinos Most Committed to Climate Action 2025.

READ bit.ly/observo-rattis (Portuguese)

What are Nationally Determined Contributions?

New NDCs raise ambition for emissions reductions, but will countries implement them?

Margaret Osborne Freelance Science Writer

Every 5 years, all 195 signatories of the 2015 Paris Agreement must submit updated plans to reduce their greenhouse gas emissions to limit global warming. These plans, known as Nationally Determined Contributions (NDCs), are key components of the agreement and represent countries' highest ambitions for emissions reductions over the next decade.

"The NDC is a pledge," Director of Government Relations-International at Woodwell Climate Dr. Matti Goldberg says. "It's a pledge by a government to reduce their emissions by a certain amount, by a certain time frame. It can also be a pledge of taking certain types of actions. Each NDC also contains plans and measures to put it into action."

This year, countries had to submit their third NDC ahead of COP30 in Belém, Brazil.

How do NDCs fit into the Paris Agreement?

The Paris Agreement is a legally-binding international treaty under the UNFCCC. The treaty states that signatories should work together to limit global temperature increase to "well under 2°C" above pre-industrial levels and pursue efforts to keep the increase below 1.5°C. Nationally Determined Contributions outline how countries plan to achieve this goal and take other measures as part of the global climate effort.

Each NDC must build upon a country's previous submission and reflect the party's "highest possible ambition," according to the Paris Agreement. While parties are legally required to submit an NDC and pursue actions to reach the target, they are "not legally bound to reach the target," Goldberg says. "It's a gigantic loophole in a way... although such flexibility is obviously necessary for countries to agree to this, and it does create a structure of pressure."

After NDCs are submitted, the UNFCCC assesses the combined impact of countries' NDCs on projected global emissions in a synthesis report. Parties in the Paris agreement also submit a Biennial Transparency Report (BTR) every two years, which outlines each country's progress made towards accomplishing their NDCs.

"It's the country's own assessment," Goldberg says. "But if a country announces a metric, then others can, of course, also look at whether that metric is being followed. This information creates the basis for civil society and other governments to put pressure on those governments." Further transparency is created by a process where international experts review each country's biennial reports.

Despite the ambitious intent of NDCs, Executive Secretary of the United Nations Framework Convention on Climate Change (UNFCCC) Simon Stiell determined last November that previous pledges fell "miles short of what's needed to stop global heating from crippling every economy and wrecking billions of lives and livelihoods across every country."

What is in the 2025 NDCs?

NDCs were initially due in February 2025, but with only 13 Parties submitting on time, the UNFCCC Secretariat announced a cut-off date in September to have enough time to prepare its synthesis before the start of COP30 in November. China, the United States, India, the European Union, Russia and Brazil were the world's top emitters in 2023. Together, these six parties accounted for 62.7% of all global emissions. Of the top greenhouse gas emitters, only the U.S. and Brazil sent in their NDCs as of early September 2025.

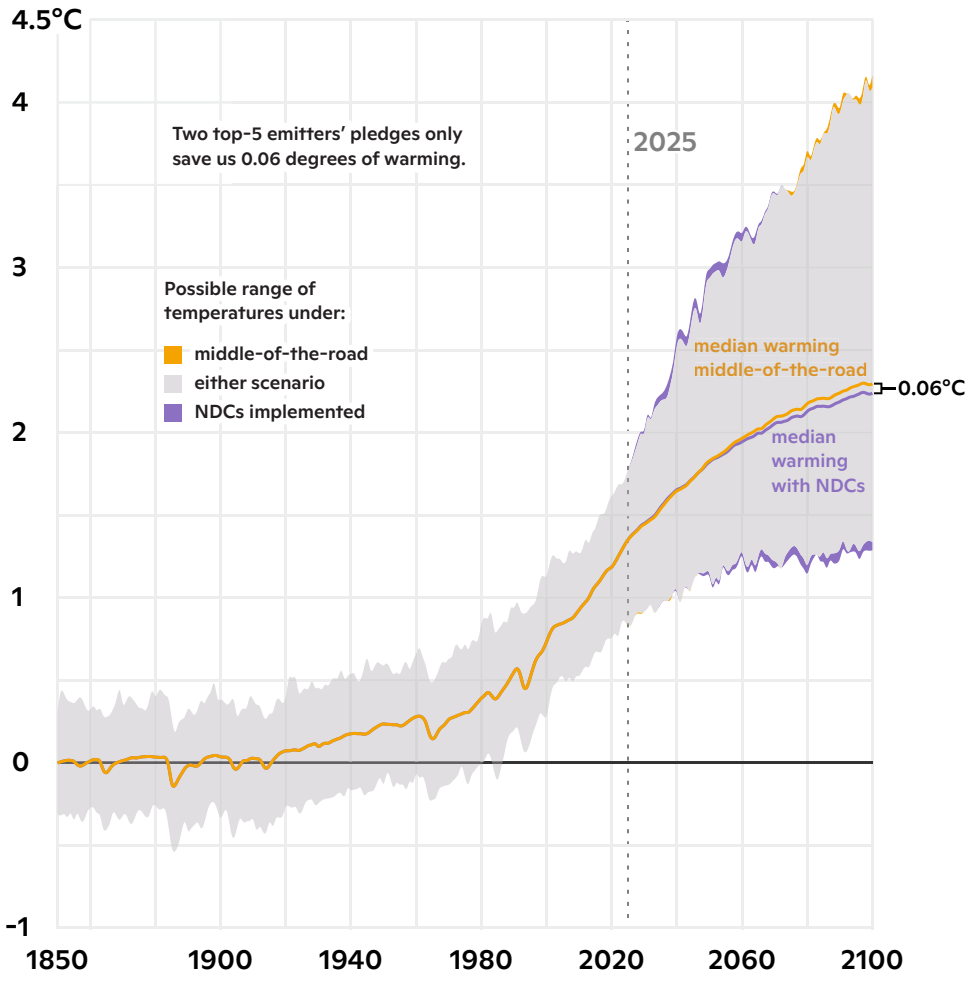
The United States submitted its NDC in 2024 under the Biden Administration and set a target of reducing its net greenhouse gas emissions by 61 to 66% below 2005 levels in 2035. After taking office, President Trump issued an executive order announcing the U.S.'s intent to withdraw from the Paris Agreement, which will go into effect in 2026. After January 2026, the U.S. will no longer be required to submit new NDCs or Biennial Transparency Reports.

Sunset through smokestack haze. / photo by Brendan O'Donnell/Unsplash

Despite the country's withdrawal, Goldberg says the U.S. may see a reduction in greenhouse gas emissions because of its continuing transition from coal to natural gas, renewables and nuclear power—which, according to Goldberg, is driven more by economics and less by policy. Still, Dr. Christopher Schwalm, Vice President of Science at Woodwell Climate, predicts there is "no way" the United States will hit the targets set out in the NDC given the current global political climate. Even if the U.S. does reach its goals, the NDC still does not align with the global 1.5°C limit, according to the Climate Action Tracker. Schwalm calls the 1.5°C target "dead as a doornail." To reach this goal, we would have needed global greenhouse gas emissions to peak by 2025.

Brazil's most recent NDC states a goal of reducing greenhouse gas emissions 59% to 67% compared to its 2005 emissions. Goldberg calls it a "pretty ambitious" absolute target for a country classified as a developing country under the UNFCCC. However, the Brazilian climate organization Observatório do Clima states the NDC goals do not align with the global 1.5°C limit.

Impact of Brazil and the U.S.'s new NDCs on projected warming.



How could reaching targets in NDCs impact warming trajectories?

Woodwell Climate research scientist Dr. Abigail Lute wanted to see how much of a difference just two of the top-emitting countries' NDCs could make.

"Are we moving the needle here or not?" she says. "How much are we moving the needle? Are we moving it enough to avoid 2°C? That's the big picture, to see how ambitious these new pledges are."

Lute modeled how both the U.S. and Brazil's promises together could change the global warming trajectory using a "middle-of-the-road" scenario for future greenhouse gas emissions—though, at the moment, that scenario might be more optimistic than our current trajectory, she says.

For the first 10 to 20 years after implementing the NDCs, temperatures will temporarily increase. This is due to the reduction in polluting gases such as sulfates that actually have a cooling effect in the atmosphere. After about a decade or two, the reduction in warming gases such as methane and carbon dioxide will cause temperatures to fall.

According to Lute's calculations, under moderate emissions scenarios, the probability of exceeding 2°C is 25% by 2050 and 78% by 2100. If both the U.S. and Brazil reach their NDC targets, the probability of exceeding 2°C stays about the same for 2050 but drops down to 73% for 2100.

Global warming is expected to reach 1.8°C by 2050 and 2.3°C by 2100 under the medium emissions scenario. With the U.S. and Brazil's combined NDCs, Lute expects warming to be reduced by about 0.01°C in 2050 and 0.06°C by 2100.

While these contributions may seem small, Brazil and the U.S. only represent two of the 195 parties in the Paris Agreement.

"It's two of the larger ones for sure, but it's only two," Lute says. "If we extrapolate it to everybody, then it can make a meaningful difference... the story here is that everybody needs to contribute. This is a collective problem, and even one large country can't solve it."

Impact potential of implementing NDCs. / graph by Christina Shintani

Indigenous brigades deploy geospatial tech to fight fires

Knowledge-sharing workshops offer skills, opportunities and a pathway to protecting precious forests

Sarah Ruiz Science Writer and Editor

On the shores of Lago Caracaranã, deep in the Brazilian State of Roraima, a group of Indigenous brigadistas gather around printed paper maps. They have come to this lakeside meeting place from their territories across the state and beyond to learn about maps from Dr. Ray Pinheiro Alves, a research analyst at the Amazon Environmental Research Institute (IPAM). Alves directs each woman to a map of their own territory, completely unlabeled. He hands them drawing supplies, and within moments the brigadistas have oriented perfectly to the map, tracing familiar rivers, home sites, and landmarks from memory.

Roraima is Brazil's northernmost state. It straddles the equator, and contains both native sweeping grasslands like those around Caracaranã and misty, mountainous stretches of the Amazon rainforest. It is remote, and sometimes disconnected from the rest of the country, yet experiencing the same encroachment from agriculture and illegal mining, and the same increase in destructive fires that often follow in the wake of deforestation. Which is why the Indigenous fire-fighting brigades here are eager to pick up new tools that could help them manage and protect their forests and homes.

Alves believes maps should be one of those tools. He, along with Woodwell Climate Research Scientist Dr. Manoela Machado, has been spearheading a series of workshops designed to help Indigenous fire brigades build the skills of cartography and geographic information systems (GIS). Strong GIS knowledge allows fire crews to make use of data to guide decisions about both on- and off-season fire management activities—both of which will become more critical as the climate warms and fire becomes more prevalent and difficult to control.

Brazil's fiery landscape

It is supposed to be raining in Roraima right now, but the winter has been dry this year. Climate change has been elongating dry seasons in many regions of the country, increasing the time that ecosystems are prone to burning.

In the Amazon, fires are set intentionally as a part of the deforestation process. Land grabbers use fire to clear the piled vegetation that was cut to make way for cattle ranching, which later will be converted to cropland. With climate shifts, these fires are now more likely to escape into drier and weakened surrounding forests. In Central Brazil, the savanna and seasonal wetland ecosystems of the Cerrado and Pantanal have co-evolved with varying levels of frequency and intensity of fire. But prolonged drought and rising temperatures have turned fire seasons into crisis seasons.

Indigenous communities across Brazil have used fire for millennia, working with the ecosystem to promote culturally important species. With climate change extending fire seasons, traditional calendars are also shifting, as the time available for safe burning shrinks. Communities are also facing incursions into their territories from runaway fires ignited on nearby farms.

The world got a taste of the scope of the crisis in 2019 when, during an already record-breaking summer of fire, land grabbers in the Amazon intentionally set so many fires in a single day that the smoke traveled to the City of São Paulo hundreds of miles away.

Brigadista Terena Neudines Felix from the Brigada Taunay Ipegue, Aquiduana, Pantanal, Mato Grosso do Sul state. / photo by Alicce Rodrigues/Instituto Terra Brasilis

“The sky in São Paulo became dark at 3pm. And then the world started paying attention to fires in the Amazon,” says Machado. Protecting Brazil’s forests from fire, especially the carbon-rich Amazon rainforest, became a much higher priority for the international community.

Brazil has an extensive wildland fire fighting system, composed of both official and voluntary brigades, supported by various government agencies to operate across private lands, protected public lands, and Indigenous territories. Amidst the increased urgency to quell fires, Machado was interested in understanding what brigades at different jurisdiction levels might need to be more effective during crisis months. She herself has extensive expertise in geospatial software and analysis and wondered whether organizations like Woodwell Climate and IPAM could help by providing data on terrain, weather patterns, vegetation type, and other field-relevant information.

So Machado and Senior Scientist Dr. Marcia Macedo, conducted a needs assessment of the firefighting system to identify what analyses might be most useful.

“The answer was a little bit different, depending on who we were talking to,” says Macedo. “But when we spoke to the Indigenous fire brigades, one of the things that came out right away was not just a desire for spatial data, but for training in spatial analysis. They wanted to be able to work with the data the same way we did.”

Two ways of knowing the land

For the Indigenous communities of Brazil, maps aren’t needed for navigating their territory the way Google Maps might be for someone walking in unfamiliar lands.

“The Indigenous peoples of Brazil have a great understanding of their territory,” says Alves. “We show them an image and they recognize some river or some landmark. They can see it immediately in the satellite view.”

Instead, geospatial data offers another way of communicating their innate knowledge of the land. For the Indigenous fire brigades Machado and Macedo spoke with, the ability to use the same GIS tools that scientists use, and make maps the way a government agency like Brazil’s Institute of the Environment and Renewable Natural Resources (IBAMA) might, is invaluable to advocating for themselves in non-Indigenous spaces.

“To be able to make their own maps can strengthen their autonomy to make decisions, and [aid in] dialogues with people about public policies,” says Alves.

Machado worked with Alves to develop the curriculum for a series of workshops that would help teach the foundations of GIS to fire brigade members from Indigenous territories across Brazil. The first was held in Brasília in 2022, and three more have followed since, the class in Roraima most recently.

Each workshop begins with the basics—latitude and longitude, hemispheres, projections. Alves is a natural teacher, and makes use of props, metaphors, and activities like drawing on the printed maps to make the concepts feel more tangible.

On later days of the workshop, as participants get familiar with QGIS, a free map-making software, Alves sometimes adapts the suggested curriculum to the needs of the communities in attendance.

“For example, in one class we were presenting topographic maps, and they said ‘this is really, really, useful for us,’” says Alves. “So we changed that part of the course to solve for the question they were dealing with.”

By the end of the course, participants have successfully created maps relevant to their own territories. Seeing their own homes represented in map form, Machado says, connects them more strongly to the material.

“You could see the pride on their face,” Machado says. “They recognize every element of that map because they built it. They made each decision of what to show on the map.”

left: Ana Shelley (center) with a Xerente women's fire brigade teammate on an outreach visit. / photo courtesy of Ana Shelley
center: Brigades present their hand-drawn maps during the workshop's mapmaking session. / photo by Sara Leal Pereira/IPAM

The women's brigade

Ana Shelley Xerente of the Xerente people had watched her husband work on their territory's official fire brigade for 13 years before she decided she'd like to try her hand at it as well. Over the years raising her two children, she observed changes occurring in the native Cerrado ecosystem of the Xerente territory—hotter temperatures, drying streams, more fires.

"Nowadays, right after the rain, it's basically dry," says Ana Shelley. "All due to climate change."

She felt a strong duty to protect the environment, and told her husband she'd like to work at Prevfogo, the firefighting arm of Brazil's Institute of the Environment and Renewable Natural Resources (IBAMA), like him.

"He kept teasing me. 'There's no way you could handle that,'" Ana Shelley says. "But I kept talking about it and he came up with the idea of creating a volunteer brigade."

Volunteer brigades support official brigades, including with critical non-crisis season prevention work. In 2021, responding to interest from Ana Shelley and others in the territory, Prevfogo and the National Indian Foundation (FUNAI) provided support to start an all-woman volunteer brigade—the first in Brazil. Ana Shelley drove her team of 29 women from village to village, speaking to elders, educating children, re-planting vegetation around headwater streams, and discussing how climate change has affected their traditional calendar for cultural burning.

"We have our own calendar, made by our elders. It marks the rainy season and the dry season, when burning isn't allowed. So we went through the whole territory, talking to people about what fire brings, the impact it has on humans and animals, and there was a significant reduction [in fires]," Ana Shelley says.

Ana Shelley began to stand out as a leader among the volunteers. In 2024, when her husband left his role as president of the official territory brigade to pursue work with FUNAI, she was asked to fill in for the remainder of his term. At the start of 2025, she was named president for her own four-year term, and has eagerly assumed the responsibility of organizing the activities of 74 Indigenous firefighters, both men and women.

"Everything is new to me, being a brigade chief. And since in our community it's mostly men who call the shots, it causes an impact, because now the chief is a woman, so it's all new to them, too," Ana Shelley says. "I learn a lot from them, and I also share with them what I know. I'm sure it's going to be challenging, but I also know it's going to bring a lot of good results."

Classroom representation

The second GIS workshop was hosted in Ana Shelley's own territory in Tocantins, but only her husband participated in the course. In fact, midway through the workshop, Machado looked around and wondered why, in a territory with an established brigade of motivated female fire fighters, she was the only woman in the classroom.

Despite not being in operation for as long as the men's brigades, the brigadistas were eager to perform at the same level. Perhaps, Machado wondered, the workshops could be an opportunity to level the playing field.

She suggested hosting a women's-only brigade training to encourage their participation, giving women a chance to learn alongside others with similar experiences. The first one took place in Maranhão in June, followed by the one in Roraima.

Macedo says this kind of peer representation is critical to the success of capacity sharing efforts like this one.

"Peer-to-peer teaching and knowledge sharing among people who are living the same reality is almost always more effective than us scientists standing at the front [of a class]," Macedo says.

The brigadistas of Roraima are the clear result of women's

right: Manoela Machado provides instruction to workshop participants learning how to use GIS. / photo by Sara Leal Pereira/IPAM

representation on fire brigades, which started in Tocantins with Ana Shelley and has now unfurled across the country. Roraima was the first Brazilian state to formalize all-female fire brigades with the Brigada Pataxibas—a multi-territory collective of female firefighters. During the closing ceremony for the workshop in Roraima a Tuxaua, or an elderly community member honored for their wisdom, named Azila stood to point out the bravery of the women assembled, who had accomplished things she never had the opportunity to do in her youth.

Brigade participation has also begun to open doors for women even beyond their territories.

“Some have become teachers, others are in college. It has broadened their horizons. We’ve inspired many women across Brazil,” says Ana Shelley.

According to Machado, the GIS training offers all participants, men and women, the opportunity to tell their own stories on their own terms.

“Maps tell stories,” says Machado. “So the importance of all community members being able to build their own maps is that it allows them to control the narrative. They control how their story is told, instead of waiting for someone else to build a map and tell the story for them.”

The future of fire management

For now, the workshops are planned and hosted on an ad hoc basis, as funding allows. But Macedo sees a pressing need to scale up. The more brigades participate, the more excitement grows for the material.

“If we offered one of these a month for a while, we still wouldn’t be able to meet the demand for them,” says Macedo.

At some point, Macedo says, the project will have to shift to a “training the trainers” strategy. The team envisions a model where the most engaged workshop participants are taught the skills needed not just to make maps but to teach others, expanding this knowledge further and faster than Alves, Machado, and Macedo could on their own. Technology access is another limiter. Some Indigenous communities have access to laptops at central headquarters but it is not common for each community to have its own laptop and almost no individual brigade members do. More laptops would allow workshop participants to continue practicing their skills on their own time.

Policies in Brazil have also begun to shift to open additional opportunities. In 2024, the country passed a new Integrated Fire Management law that will require greater coordination among different brigade jurisdictions for pre-season and mid-season firefighting activities. The law places a specific emphasis on incorporating traditional knowledge. Macedo says she thinks the GIS workshops could contribute to this greater movement and help position Indigenous communities as central to the country’s fire management policies.

When Ana Shelley reflects on how much her brigades have already been able to accomplish, and the possibilities on the horizon, she is hopeful.

“I see a much better future.”

ACKNOWLEDGEMENTS

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At the workshop's end, a group photo with completion certificates. / photo by Sara Leal Pereira/IPAM

Selected news coverage

In an article about the lack of an official American COP delegation this year, *ABC News* quoted Dr. R. Max Holmes about how the scope and urgency of the climate crisis demand an international response.

Globo Rural interviewed Dr. Ludmila Rattis to discuss how climate change is changing the geography of agricultural production in Brazil.

O Eco quoted Rattis about how the synergy between climate and agriculture also extends to biodiversity, and how policies could support these important connections.

Dr. Frances Seymour made the title of a *Sustainable Investor* story covering the Tropical Forest Forever Facility (TFFF), where she described the fund as "an arrow in the quiver, not a silver bullet."

Frances participated in a meeting at COP between officials from Acre, Brazil, and Bolivia to discuss climate and jurisdictional REDD+. The meeting was covered in news stories from *O Rio Branco* (Portuguese; includes photos of Woodwell's meeting and collaboration space) and *Ahora El Pueblo*.

A COP30 roundup article from *Devex Newswire* covered an Audacious Project panel including Dr. Christina Schädel, who spoke about using satellite data to track permafrost emissions.

Matti Goldberg was quoted in *The Boston Globe* about the importance of convening at the COP, even when major progress isn't being made.

Stiftung Energie & Klimaschutz published a story about AI initiatives showcased at COP30, including Woodwell Climate's work using machine learning to better understand Amazon and boreal fire.

CSO Futures covered the launch of a new coalition announced at COP30—the Scaling JREDD+ Coalition—which aims to scale up jurisdictional forest carbon credits. Woodwell Climate is a coalition member.

John Le Coq, Board member and co-founder of Science on the Fly, was featured in an article from *The Sopris Sun* covering a presentation on water conservation at The Arts Campus at Willits.

Bloomberg quoted Dr. Jen Francis about how winter is the time of year with the most turbulent weather.

Francis responded to Bill Gates' recent memo about deprioritizing climate philanthropy in an article from *CNN*, where she argued that investments need to focus both on reducing emissions and "treating the symptoms" of climate change—threats to health and hunger, infrastructure, and ecosystems.

Francis was also quoted in a *New York Times* article about the fingerprints of climate change in disasters like the devastation caused by Hurricane Melissa.

Christina Shintani's map, created in collaboration with Ravdna Biret Marja Eira Sara of the International Centre for Reindeer Husbandry, illustrating climate effects on reindeer herding was featured on maps.com.

A *Bloomberg* feature story on the carbon and climate impacts of thawing Alaskan permafrost quotes Drs. Jackie Hung, Sue Natali, and John Holdren. The story was featured in Bloomberg's Green Daily newsletter, and also includes a map using data from a 2025 Virkkala et al. publication to show areas of the Arctic that are a carbon source.

Edward Alexander was interviewed by *Native America Calling* about the looming wildfire crisis in the Arctic. He and other guests discussed the latest research and what concerned Alaska Native tribes and other Indigenous stakeholders are doing to prepare.

Morris Alexie and Melissa Shapiro spoke to *The Guardian* about permafrost thaw and community relocation in Nunapitchuk, including the need for federal financial support and a leading authority to coordinate federal agencies involved in tribal relocations.

A feature story in *The Boston Globe* describes how Chicopee's planning director reached out to Woodwell Climate for a flood risk assessment—and quotes Dom Dusseau on how the area's levees aren't prepared for flooding caused by rainfall.

Inside Climate News quoted Dr. Chris Neill about how restored cranberry bogs are reducing nutrient pollution in Cape Cod watersheds.

Morris Alexie was featured on *Short Wave*, a radio program on NPR station WAMU, speaking about managed retreat and Nunapitchuk's relocation efforts.

In an article about the community landslide forum in Homer, AK, *Homer News* quoted Dr. Anna Liljedahl's welcome to "curious" community members brought together to talk and take action.

CNN Brazil covered recent research by Woodwell Climate, which found that the capacity of the Amazon to capture carbon will decline dramatically by 2030 if deforestation controls aren't strengthened.

cover: Dr. Christopher Schwalm participated in a panel discussion, with Dr. Matti Goldberg as moderator, on “Building Climate Resilience through Risk Assessments, Finance, and Local Capacity” at the Ethiopian Pavilion COP30. / photo by Hand Photography

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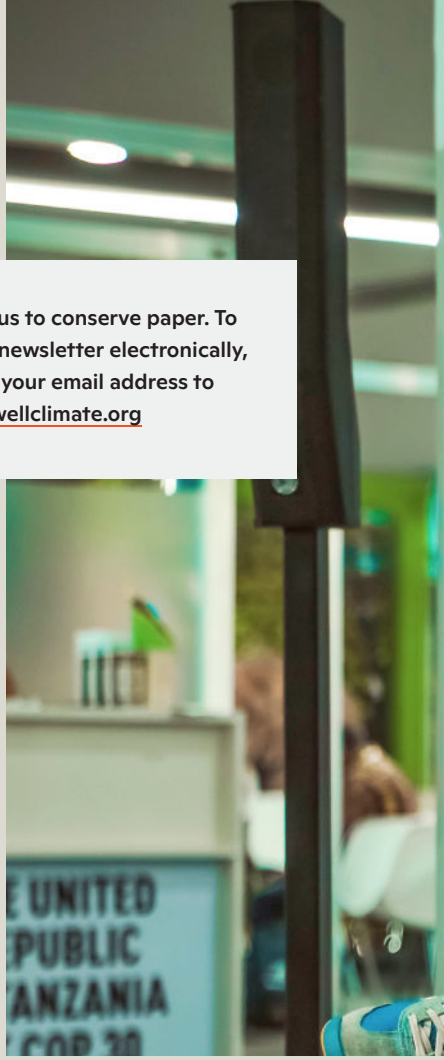

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