



**Woodwell
Climate
Research
Center**



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Month in Review • December 2025
woodwellclimate.org



Reflecting on a year of progress

A heartfelt message of hope and action

A few weeks ago, as the temperature here in Falmouth really dropped for the first time, I pulled out my winter coat. In the pocket, I found a folded copy of comments I made at a Stand Up for Science rally back in March. It was a stark reminder of just how much has happened—and how far we have come—this year.

Here at Woodwell, our days are long and full. Attempting to recall any year's efforts and events can be head-spinning. This year, there was an added intensity, as everything we did felt like it was happening while riding a roller coaster. And yet, as we approach the end of 2025, I am certain that our organization and our work are stronger and more essential than they were a year ago.

That does not diminish the climate policy setbacks—truly immense—we have seen at the federal level here in the U.S. Withdrawal from the Paris Agreement and the UN climate negotiation process, efforts to roll back the Endangerment Finding, the dismantling of federal climate science programs, the end of IRA incentives for renewable energy and electric vehicles, and a host of regulatory changes that threaten clean air and water—these are just a handful of the moves whose damaging impacts will be felt ever more acutely as we move forward.

Federal actions have also directly impacted Woodwell's operations, from the loss of (a small number of) government grants and collaborations to concerns about future funding priorities and criteria. For a time, even the security of our non-profit status was in question. The first third of this year felt like an unrelenting assault. Uncertainty, even fear, was a constant

theme. But as the months have passed, the frenetic pace has eased and we have shifted from crisis footing to a risk-aware but forward-looking stance.

Through it all, Woodwell's experts have stood strong and spoken up for science—whether in public comments on proposed rule changes or in personal reflections shared at a Moth-style story slam. We have shared our strength in mapmaking with Indigenous communities around the globe—from women's firefighters in the Amazon, to Alaska Native villages, and traditional reindeer herding communities—so that they can leverage the power of geospatial data. We have supported the launch of an innovative new international mechanism to fund tropical forest conservation, the Tropical Forests Forever Facility. And I, along with more than a dozen Woodwell experts, were among those attending COP30 and making sure the rest of the world knows not all Americans have turned away from the UN climate agenda. Indeed, Woodwell's delegation contributed to some of the top items, from forest finance and Indigenous leadership, to increasing ambition and monitoring resilience.

Onward,



Max

Dr. Max Holmes
President & CEO



Follow an Arctic scientist into the changing tundra

Research Assistant Kaj Lynøe marks a decade of Arctic research with a marathon field season. Here's what he experienced.

Kaj Lynøe Research Assistant

2025 marked the first year I went out in the field as a member of Woodwell Climate's Permafrost Pathways monitoring team. I travelled around Alaska to our carbon monitoring sites, maintaining and installing equipment and taking static measurements of greenhouse gases—namely carbon dioxide, methane and nitrous oxide—in various degraded and disturbed permafrost landscapes around Fairbanks and west of Prudhoe Bay by the Arctic Ocean.

In late April this year, I returned to Toolik together with Dr. Jennifer Watts, Dr. Kyle Arndt, Christina Minions, Dr. Kelly Gleason (snow scientist from Portland State University) and photographer Jayme Dittmar to install an eddy covariance tower by a retrogressive thaw slump. Eddy covariance towers monitor and capture fluxes, or the exchange between land and atmosphere, of energy and greenhouse gases. Thaw slumps are areas of tundra that have collapsed due to thawing ice-rich permafrost. When the ice melts, the ground collapses, revealing old, buried carbon rich soils that begin releasing their carbon back to the atmosphere. The towers help us better understand how much carbon these features contribute to calibrate models of Arctic carbon emissions.

Spring is one of the best times to be in northern latitudes. Near endless days, the bright snow, the monochromatic stretches of landscapes, the binary experience of both intensity and complete stillness. Now suddenly, the interruption of a small group of people gathering, pulling around equipment, cords, cables, instruments, and then suddenly there is a new structure in the landscape and the people disappear. Off to a great start, we packed and organized our tools and equipment and headed from the wintry landscape of the north towards the onset of green-up to the south.

Back in Fairbanks, the bloom of birches in early June is one of my favorite sights. The dense stretches of light, delicate greenness and resinous fragrance from the new sprung leaves that are drowning in summer sunlight makes me almost feel all the carbon dioxide being sucked out of the air by the trees. This, again, makes me really appreciate the northern latitudes. The vastness that cradles your existence grounds you and at the same time lifts you with the intensity of the surrounding life. It



is an energy that can only be felt at these latitudes. A form of mania that propels you onward without pause.

In late June the trip headed to Nome and Council where I, together with colleagues Dani Trangmoe and Dr. Kelcy Kent, maintain the tower there. With each site visit, not only do I get an improved

grasp of the equipment, but also a better understanding of the surrounding landscapes, now even more chlorophyll-saturated peak green. I shuttled to Anchorage and then back up to Bethel with Trangmoe to join Dr. Jackie Hung and Christina Minions at the two towers located a

40-minute flight northeast of the town. Here, we upgraded solar structures, maintained and swapped equipment and hauled out old and damaged power supplies and miscellaneous materials. I really appreciated the time being out there and the sense of community that comes with remote camps, although we only stayed out for about a week.

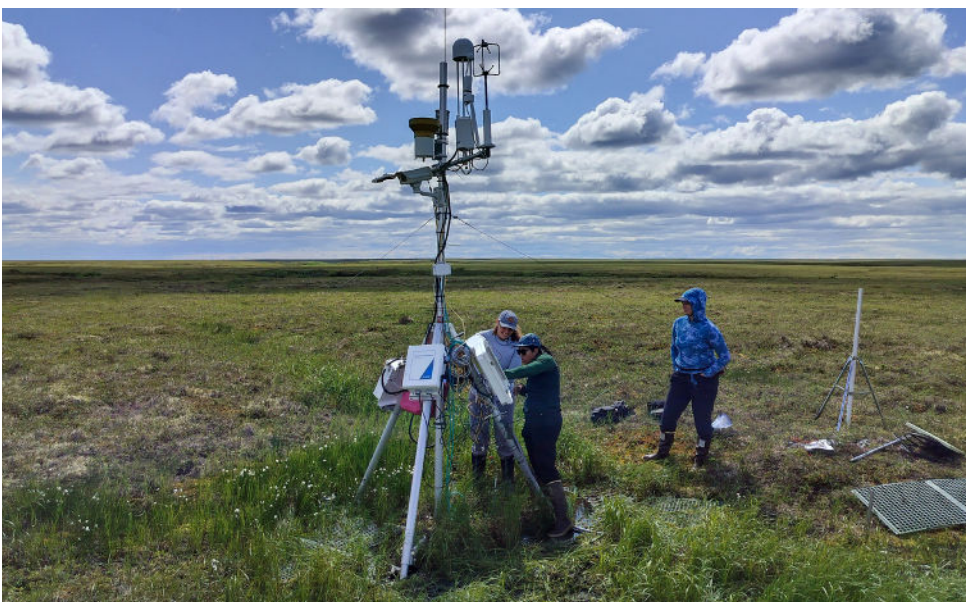
Afterwards we circled through Anchorage again on our way to the very top—the Arctic Ocean. I assisted Hung and fellow researchers from Woods Hole Oceanographic Institute and the Marine Biological Laboratory to collect greenhouse gas measurements from coastal tundra. The contrast of the flora and fauna against the infrastructures from the oil and gas fields makes for a surreal sight. From here I am going southward again, stopping at Toolik to check on the new tower and enjoy the buzzing environment that Toolik is offering during this time of year. The intensity of the arctic summers is reflected in the frantic work of scientists that all gather here to conduct a wide range of work.

At what other place in the world than Toolik would one be able to hike out on the tundra and do maintenance work on an eddy covariance tower in the morning, come back for a snack, go out in a helicopter to search for new areas of permafrost degradation, get a panoramic sight of thousands of caribou, come back to a hearty meal, and finish off the day catching some grayling at the river inlet by the Toolik lake. The beautiful clear light, the humming of mosquitoes, and the rippling sounds of the water give me a sense of belonging, a sense of home.

I spent my last weeks in Alaska in Fairbanks again, making boreholes in permafrost together with a magnificent team

gathered from across the U.S. We can learn a lot from these seven-meter-deep boreholes. Not only studying the samples that we retrieve, but also how these permafrost soils evolve and change with climate change with sensors that monitor variables such as temperature, oxygen and soil moisture. The drilling was challenging and physically demanding, but at the same time something of a treasure hunt as each of the soil samples we were able to retrieve has the potential to unlock a wealth of information that can help us expand our understanding of the changing permafrost soils in the region. In the end it felt well worth the effort, especially being privileged to work with such a dedicated and knowledgeable group.

2025 also marked my tenth year of working in the Arctic. As a junior scientist, I remember reading and hearing about Woodwell Climate's work in the Yukon-Kuskokwim Delta long before I joined the team. I remember spending a full summer on the Delta by the coast, learning about and experiencing firsthand the effects of both permafrost thaw and coastal erosion. Knowing that Woodwell's first eddy covariance tower was installed in this region around the same time, and that it has been collecting data ever since, has given me a sense of perspective not only on my career, or the Permafrost Pathways project for which this tower was the springboard, but also the future of the Arctic landscapes that I have come to love.



I am grateful to have been given this perspective, and to work in and celebrate all these unique and beautiful places. If it wasn't for the people and the relationships built through this work, we would know much less about these complex and fascinating landscapes. It is through these encounters with people and the environment that we can not only deepen our understanding but also gain connection. These encounters and interactions give a sense of belonging as a part of something bigger.



Mapping the herd: Cartography in the Mongolian Taiga

Senior Geospatial Analyst Greg Fiske explores the power of maps among the Dukha Reindeer herders

Greg Fiske Senior Geospatial Analyst, Senior Research Associate

When I was young, there were always a few horses and ponies on our family farm. I was a pretty good rider. I even showed ponies in the 4-H children's show at the local county fair.

My previous horse experience, however, proved little help for the day-long horse riding treks I found myself on this summer during a spontaneous trip to Northwestern Mongolia with friend and colleague, Marina Tonkopeeva of the International Center for Reindeer Husbandry (ICR). Tonkopeeva leads a collaborative project with the Dukha, funded by the Global Environment Facility, that is focused on reducing land degradation in Mongolian Peatlands.

We were there to visit indigenous Dukha reindeer herders in the Taiga regions near Tsagaannuur, not far from the Russian border. The only access to these remote communities, I quickly discovered, was by riding many hours on horseback. Our journey included two separate horse treks, one to the East Taiga camp, home to about a dozen herder families and a second to the more rugged West Taiga region, higher up in the mountains where we met with two families on a much smaller camp in their autumn location. I was forced to relearn horsemanship on the fly across the Mongolian wilderness and was wishing I still had the resilience and physical toughness of my youth.

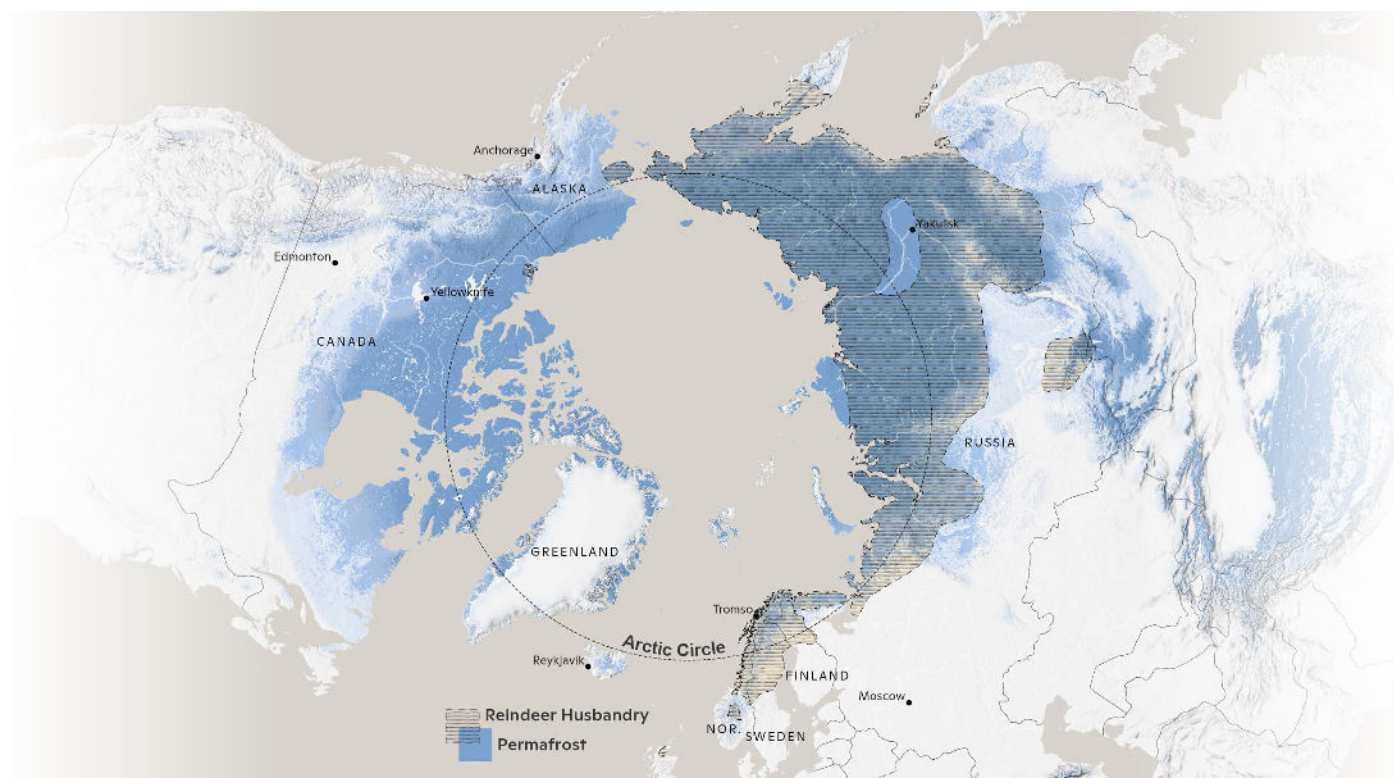
The goal of this trip was exploratory. I hoped to connect with herders, introduce cartography as a powerful tool, and gain first-hand knowledge about the lands I would be mapping. From many other field trips in the past, I've learned that there is true inspiration in taking the time to travel to a field site. It allows me, as a cartographer, to build relationships and make connections between my virtual world of geospatial data and reality. Experiencing things like natural colors and landscape dynamics all help with making maps, post-trip.

My goal was also to co-produce maps with the Dukha herders. Co-production of maps essentially means combining Indigenous knowledge with western science and cartography to communicate

a story, based on mutual understanding and trust. Through the process of co-production, I can learn about the intended audience of our proposed maps, about how the maps will be used, and what story we will tell with the maps we make together.

With the help of our host and colleague, Khongorzul Mungunshagai, we met with many reindeer herding families and shared detailed satellite images inside their teepees. Over reindeer milk tea and cheese, we discussed migratory paths, seasonal camp locations, and shared stories about regional changes.

Indigenous communities across the planet have adapted to climate variability for millennia; however, the combined impacts of rapid warming and resource development are



top left: A trail ride through the Taiga with Dukha reindeer herders. / photo by Greg Fiske • top right: Greg Fiske (center), Khongorzul Mungunshagai (right), and Dukha herder Gambat (left) examine maps of important reindeer pasture and migration routes. / photo by Marina Tonkopeeva

having an unprecedented impact on Indigenous peoples and their lands. Reindeer husbandry, which has been practiced for thousands of years, constitutes the modern-day livelihood of tens of thousands of Indigenous people who tend millions of domesticated reindeer on lands that span the Eurasian permafrost region. Traditional reindeer husbandry practices are now being challenged by loss of land due to development, conservation, and climate change.

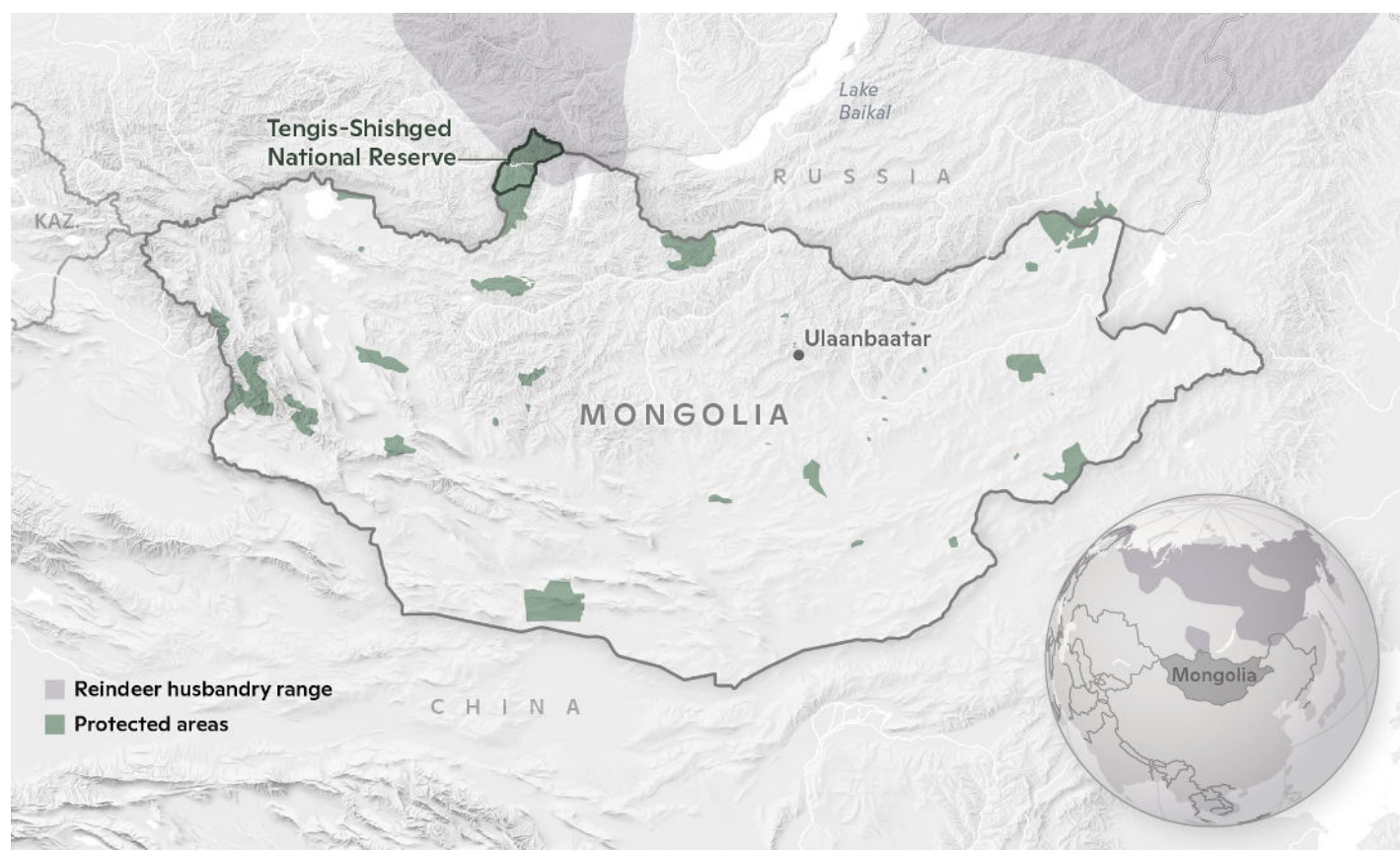
The Dukha people of Mongolia, like other indigenous peoples, have lived respectfully and in harmony with the land since time immemorial; however, their lifeways are being challenged by land use decisions that have been implemented without proper consultation and consent. Impacts of these land use changes on traditional grazing lands are being further exacerbated by landscape and landcover changes associated with climate change including increased fire, permafrost thaw, and shrubification. This is of particular concern in Mongolia, where the rate of summertime warming is three times faster than the average for Northern Hemisphere lands, resulting in land degradation from permafrost thaw and changes in vegetation cover due to desertification.

Additionally, the Mongolian government's new national parks have created unmarked boundaries and land-use restrictions that are essentially invisible lines of attack on the Dukha's traditional lifestyle. They are being forced to alter ancient

migration routes or grazing sites, and they often unknowingly cross park borders because the government hasn't provided any clear, useful maps.

Woodwell Climate has recently awarded a Fund for Climate Solutions grant to continue this work. We plan to work closely with Dukha reindeer herders using GIS tools to map land use and land cover changes in Mongolia and their impacts on grazing lands. We will co-produce maps to support climate change research and advocacy for environmentally and culturally-just land management practices. This work would build on past co-production successes working with ICR and Sámi reindeer herders in Norway and with Indigenous communities in Alaska.

It's clear that maps are a powerful medium for clearly communicating information and important stories. Whether I'm visiting politicians, working with scientists, or gathering in a teepee on the taiga, I've found that maps are always a welcome addition to the conversation and they help grease the wheels of communication. Leaving the Taiga and enduring the long trip home, I was physically worn out, but the vision of the Mongolian landscapes and the clarity in the work that lies ahead gave the long trip back purpose. I took home not just memories of making new friends (both two legged and four) and of a stunning ecosystem, but a commitment to help map a path forward with our partners at ICR and the Dukha.



above: location map with protected areas within the country and range of reindeer husbandry. / map by Christina Shintani
left: Overlap of reindeer husbandry and permafrost. / map by Greg Fiske

Takeaways from the 30th annual climate COP

A Woodwell delegation attended this year's conference in Belem, Brazil to advance science-backed policy.

Matti Goldberg Director of Government Relations-International

Jamie Cummings Policy Analyst

November 2025 marked the 30th convening of the United Nations climate conference (COP). Woodwell Climate has been a pivotal player in the annual COP since our founder, Dr. George Woodwell and early staff members, played an instrumental role in the creation of the United Nations Framework Convention on Climate Change (UNFCCC) which enacts the annual conferences. This year was an important milestone for Woodwell due to its focus on tropical forests and nature-based solutions. Woodwell Climate sent 17 staff and scientists to Belem, Brazil, where they spoke at 52 events, and continued the Center's legacy of advancing science-informed climate policy. Here are 4 takeaways from this year's conference.

1. COP30 was Brazil's time to shine

As host country, Brazil used COP30 to vault themselves into global leadership, to press the importance of international cooperation, and to build bridges between the global north and south. COP30 served as the launchpad for several forest-centered initiatives spearheaded by Brazil, including the Tropical Forests Forever Facility, a new financial solution that would pay tropical countries to keep their forests standing. Woodwell Senior Policy Advisor Frances Seymour and Associate Scientist Dr. Glenn Bush provided input and technical assistance to help launch the TFFF. In addition, Brazil launched a global initiative on wildfire resilience and a global coalition to harmonize carbon markets. Brazil also announced that they will publish two roadmaps in 2026: one to chart the course towards ending halting and reversing deforestation, and another for transitioning away from fossil fuels.

2. NDCs were one of the trickiest issues at COP30

Nationally Determined Contributions (NDCs) are the promises each party country to the UNFCCC makes every five years, to reduce their emissions. Ahead of COP30, countries were supposed to submit their third round of NDCs to raise their



ambition. However, many NDCs were missing by the start of the conference, and those presented would reduce emissions only by 10–12% from 2019 levels by 2035, a far cry from the 60% the IPCC says is needed to limit global warming to 1.5 degrees Celsius. The European Union, Latin America, and small island nations attempted to advance this conversation but this was opposed by major emerging economies, who view the NDCs as a commitment to be worked out at the national level.

During several speaking events, Woodwell Senior Research Scientist Dr. Christina Schaedel emphasized the importance of including growing emissions from Arctic permafrost thaw in NDCs and estimates of the global carbon budget. Schaedel's research has focused on modeling the contributions of permafrost-thaw emissions to sea level rise, temperature increases, and damage costs.

Given strong opposing interests, the issue of NDCs was not resolved by the end of the conference. The UNFCCC instead set up two workstreams to discuss NDC ambition: the Global Implementation Accelerator and the Belem Mission to 1.5. Details about what shape these discussions will take is still forthcoming.

3. Climate finance took center stage

During COP29 in Baku, Azerbaijan, countries agreed to mobilize \$1.3 trillion per year by 2035 for climate adaptation and mitigation. Many hoped COP30 negotiations would identify funding sources to reach that goal: developing countries wanted public finance from industrialized countries, while industrialized countries insisted that finance must also come from major emerging economies and non-governmental sources. Again, the official outcome was to launch work programs to address the issue outside of conference. The programs created will tackle questions of finance obligations and climate-friendly investments.

Woodwell experts provided important contributions to the complex climate finance debate: Seymour played a lead role in the Forest Finance Roadmap for Action highlighted by a coalition of 34 countries, and Vice President of Science, Dr. Wayne Walker introduced a roadmap for carbon and biodiversity credits that takes a community-based and Indigenous-led approach for generating climate finance.

4. Measurements of progress towards resilience

Countries did reach an agreement on indicators to help measure progress on adaptation and resilience goals in sectors like water, agriculture, health, ecosystems, infrastructure, poverty eradication, and cultural heritage, as well as on resilience efforts, including risk assessments, adaptation planning, and early warning systems. 59 indicators were identified for countries to use in their future progress reports. Woodwell Climate has been supporting adaptation efforts through the Just Access program, which provides cost-free risk assessments to local, state, and national governments around the world.

Next year's COP will be hosted jointly by Türkiye and Australia in Antalya, Türkiye, and while the agendas are not fixed, the outcomes of this year's conference have indicated that NDCs and climate finance will continue to be high priority issues. In addition, a new global stocktake, a required moment under the Paris Agreement to re-evaluate the state of the planet and progress towards goals, is on the horizon.

WOODWELL IN COP30 NEWS

Dr. Frances Seymour was quoted in a widely-syndicated *Reuters* article, describing COP30 as a "success for forests."

Another *Reuters* article covering how COP30 delivered wins for forests included a number of quotes from Seymour about the TFFF, and what else is needed to reduce tropical deforestation.

Dr. Ludmila Rattis and Gonzalo Muñoz co-authored an article in *O Globo*, which helps readers interpret the outcomes from COP30.

An *African Business* article about how COP30 delivered "mixed results" for Africa quoted Dr. Glenn Bush on the potential of the TFFF to help conserve Central Africa's rainforests.

A story by *Agência Pública* about Indigenous peoples' involvement in COP30 quoted Dr. Wayne Walker describing how Indigenous territories have comparatively lower rates of deforestation, and store large amounts of carbon in trees.

Dr. Matti Goldberg authored an article published in *Carbon Pulse*, making the argument for why COPs need a regular science track.

Selected news coverage

Living on Earth interviewed Dr. Mike Coe about the Tropical Forest Forever Facility, and the importance of forest protection for stabilizing our climate. The show was played on radio stations across the country, and republished on *Inside Climate News*.

In an article about the return of La Niña, *Bloomberg* quoted Dr. Jen Francis about how weather patterns don't always follow expectations.

A press release from Hiroshima University published in *EurekAlert!* announced a new publication co-authored by Dr. Richard "Skee" Houghton, which laid out a comprehensive assessment of Southeast Asia's greenhouse gas balance.

Commonwealth Beacon covered a spike in enrollments in Massachusetts' FAIR program, quoting Dominic Dousseau about the challenges of balancing those enrollments with the private home insurance market.

An article from IPAM announced that CONSERV (a collaborative project with Woodwell Climate) has exceeded its target for the number of hectares of Amazon forest protected in the project's second phase.

An article in *Varadouro* highlighted Dr. Foster Brown's participation in a workshop for leaders of family agriculture, where he presented on the fundamentals of climate change and its impacts (Portuguese).

Northern Journal published an article about the impacts to an Alaska zinc mine of "river rusting," a phenomenon likely tied to permafrost thaw. For additional context, the article quoted Dr. Anna Liljedahl on her research estimating the costs of infrastructure damage caused by thawing permafrost.

Mongabay Brasil covered a workshop to train Indigenous women fire brigade members, which was co-hosted by Woodwell Climate, IPAM, and the Indigenous Council of Roraima.

New research found New England to be one of the fastest-warming regions in the world. *The Boston Globe's* coverage of the study quoted Dr. Jen Francis for context.

The World Resources Institute cited Woodwell Climate research on the carbon storage of forests in an article about how the choices humans make can shift forests from assets to liabilities.

cover: Research Assistant Kaj Lynøe hikes up Tsina Glacier in Alaska
while on field work. / photo courtesy of Kaj Lynøe

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