



**Woodwell
Climate
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All eyes on the US (and Brazil)



Dr. Michael Coe
Tropics Program Director &
Senior Scientist



André Guimarães
Executive Director, IPAM
Amazônia



As leaders from forty nations gather for President Biden's Earth Day Leaders' Summit next week, many eyes will be on the promised announcement of "an ambitious 2030 emissions target" that will form the backbone of the US Nationally Determined Contribution under the Paris Agreement. It is a critical step forward. But we will also be watching for the Biden Administration to make good on another promise—of a plan for US aid to halt deforestation in the Amazon. These two goals very neatly address the key aspects of the carbon balance: reducing one of the largest carbon sources (the US) and protecting one of the world's largest carbon sinks (Amazon forests).

Early this year, a study co-authored by our colleagues Dr. Richard (Skee) Houghton and Dr. Alessandro Baccini elegantly showed just how important tropical forests are for global climate. But at the same time, it clearly showed how at risk we are because of their continued destruction. The first eye-opening point the authors made was that, since 2001, tropical forests have been responsible for about 55% of the gross carbon uptake by all terrestrial vegetation. The vast majority of that uptake is occurring in Brazil, Indonesia, and the Congo. It is hard to overstate the importance of that service for humanity. As much as we talk about technologies for removing carbon from the atmosphere, the only working one we have right now is photosynthesis by plants.

The second eye-opening point is that deforestation and forest degradation in the tropics are responsible for 78% of all global forest emissions. Deforestation and degradation in the Amazon are particularly egregious, releasing almost exactly as much carbon as the forests absorb. In Brazil, emissions actually exceeded uptake on average since 2001. Thus, the authors estimate that globally, forests are net removers of more than 7.5 gigatons of carbon dioxide (GtCO₂e) each year, but the forests of the Amazon, despite being half of all tropical forests, contribute only 1.3 percent of that!

This is a massive lost opportunity, which is quickly becoming a massive risk for the whole planet. By allowing deforestation

and degradation to continue almost unchecked in the Amazon we are foregoing 1.1 GtCO₂e each year in carbon removal. And it doesn't have to be this way.

In our own work over the past few decades, we have seen—and shown—that it is possible to reduce deforestation if you work closely with the stakeholders to create solutions. Between 2003 and 2012, Brazil was able to reduce deforestation in the Amazon by more than 80 percent, reaching 4,500 km², the lowest level in several decades, and a number never matched again. This was a direct result of (i) creation of protected areas and Indigenous territories; (ii) integration between federal and state-level command and control activities, (iii) a series of disincentives, such as credit access limitations for farms not complying with the Forest Code and (iv) science, including several findings from our team. All of these instruments are still available, but an element is missing: political will.

Over the past two years, deforestation and fire have risen dramatically to the highest levels in over a decade. Our work shows that more than 90% of the deforestation in the Brazilian Amazon is illegal, promoted by landgrabbers, illegal loggers, and other criminals. The rise in illegal deforestation can be tied clearly to policies of the Bolsonaro Administration—reducing the budget for command and control activities, diminishing personnel in federal environmental agencies, and generally weakening the response of the State against deforestation.

In this context, a dialogue between administrations in the US and Brazil is a very positive first step, with the potential to generate the necessary political environment to protect the Amazon for future generations. But that conversation must focus on concrete results. Involving local government and civil society, and setting (and achieving) concrete goals in reducing the deforestation rates must precede any financial support to the current government of Brazil to cope with the Amazon deforestation challenge. Brazil has shown, in the recent past, its capacity to reduce deforestation. It can and must be done again, and we will continue to do all we can to enable that.

Congressional testimony

The cost of inaction on climate change

On April 15, 2021, the US Senate Committee on the Budget heard from a panel of experts on The Cost of Inaction on Climate Change. Among those providing testimony was Dr. Robert Litterman, Chair of the Commodity Futures Trading Commission's Climate-Related Market Risk Subcommittee and a member of Woodwell Climate's Board of Directors. This is not Dr. Litterman's first Congressional testimony on this topic. Last year, he testified before the House Special Committee on the Climate Crisis regarding the economic risks of climate change.

Below is his oral testimony to this week's Senate Budget hearing:

Department, and later managed the Quantitative Strategies Group in our Asset Management Division.

Financial risk management has several simple principles that apply to managing climate risk.

Most important, risk management requires imagining "worst case" scenarios. A risk manager's job is not to just maximize returns, but to prevent extremely bad, but very plausible, scenarios. Identifying those scenarios is especially hard for climate risk because we are performing this experiment for the first time, it is irreversible, and the impacts will be felt for many

decades to come. David Wallace Wells has done a commendable job illustrating the scientific research on worst-case scenarios.

Another principle of financial risk management, which is perhaps not as obvious, is that our objective is not to minimize risk, but to price risk appropriately. For example, at Goldman Sachs we placed a risk-based charge on traders to force them to take risks only where the firm would be more than compensated by the expected returns on their trades.

A third principle of risk management is that time is a scarce resource. If we have enough time, we can solve almost any problem. It is when time runs out that a risk breeds catastrophe. The risk from climate change is increasing as we fill the atmosphere with greenhouse gases. We do not know how much time we have before we cross a

tipping point, after which the increased extent of such disasters becomes irreversible. This is an extremely urgent matter.

More colloquially, we are barreling toward a hazard of our own making, now we need to brake hard.

We must act decisively today so that, even in a worst-case climate scenario, the costs to society are manageable. These costs include: more extreme weather, sea level rise, wildfires, threats to national security from failed states and climate-induced mass emigration, and biodiversity loss. But addressing these effects will not reduce risk at the systemic level, when everything goes wrong.

For that we must reduce emissions and move rapidly to a net-zero emissions economy. The scale and urgency of that transformation require that financial markets immediately



Chairman Sanders, Ranking Member Graham, members of the committee. Thank you for inviting me to address the risks that climate change poses and my suggestions for how to deal with them. Climate change is real, and the risks that it imposes on our society are extraordinary. Though there are tremendous uncertainties about exactly how climate change will play out over time, that risk demands an immediate, ambitious, response.

My name is Bob Litterman. I am an economist by training and have spent my career managing financial risk. I chair the Commodity Futures Trading Commission Climate-Related Market Risk Subcommittee which published its report on Managing Climate Risk in the U.S. Financial System last fall. I worked at Goldman Sachs for 26 years, where I finished as a partner in 2009. I led the Firmwide Risk Management

and dramatically increase the flow of capital toward investments that will reduce emissions. Then, we will almost surely need to follow that by removing significant quantities of greenhouse gases out of the atmosphere. Making those investments profitable and fostering the innovation necessary requires putting a price on carbon. Whether it is the National Academies of Sciences, the Business Roundtable, the American Petroleum Institute, or Nobel-winning economists like Professor Stiglitz—to cite some recent examples—experts and interested parties agree.

Congress needs to become the risk manager here. The most straightforward manner to price carbon is placing a tax on fossil fuel production. The risk management component of the carbon tax is the incentive it creates to reduce emissions; any revenues are available for other purposes.

The Climate Leadership Council, which I co-chair with Kathryn Murdoch, has developed the Baker-Schultz carbon dividend plan. There the revenues of a tax on fossil fuel producers would be returned directly to households. Several members of this committee have introduced carbon pricing legislation in the past or actively support it now. The exact policy construction varies between proposals, but there are other experts who can help Congress understand those policy questions and any resulting tradeoffs. I recognize that there are a variety of opinions about carbon pricing and their design, but leadership and compromise can help build strong coalitions of support.

To manage climate risks, the key would be to create a price immediately, set it high enough to reflect the risks imposed by greenhouse gas emissions, and apply it to emissions across the entire economy.

I and my colleagues stand ready to help you deliberate between these policies and do what is best for Americans and the future. Thank you.

Senator Ed Markey visits Woodwell Climate

by Heather Goldstone
Chief Communications Officer

Senator Ed Markey (D-MA) visited Woodwell Climate Research Center's Falmouth, MA campus on April 6, 2021. The visit came just days before the Senate is set to take up President Biden's \$2 trillion infrastructure proposal; low-carbon infrastructure and climate risk and resilience are expected to be key components of the debate around the plan.

This was Sen. Markey's first visit to the Center, although he is a long-time friend and contributed a message of congratulations for the launch of the new name in August 2020. Deputy Director Dr. Max Holmes and David McGlinchey, Chief of External Affairs, led Sen. Markey on a tour of Woodwell's environmentally-friendly campus.

"Sen. Markey has been a national leader on climate change for more than a decade, so it was a real honor to have him finally visit the Center," McGlinchey said. "He understands the scope and scale of the challenge we are facing, he understands the urgency. We're looking forward to continuing our work with him, and finally making substantive progress on climate change."

Despite relatively low activity on campus due to COVID restrictions, Sen. Markey was able to speak with research assistant Charlotte Rivard about her work on soil carbon and with postdoctoral researcher Dr. Scott Zolkos about permafrost thaw.

"Learned a lot visiting @WoodwellClimate Research Center, which has produced some of the most important climate research in the last 30 years," Sen. Markey said later on Twitter. "We must listen to the science and have it guide our climate policy."

Sen. Markey has a long track record of championing climate legislation, from the American Clean Energy and Security Act of 2009 (widely known as the Waxman-Markey Bill) to the Green New Deal. He recently authored an environmental risk mapping bill with Representative Cori Bush (D-MO).



Above (l-r): Chief of External Affairs Dave McGlinchey, Sen. Ed Markey, and Deputy Director & Senior Scientist Max Holmes.



Staff profile: Dominick Dusseau

by Anabelle Johnston
Communications Intern

Dominick Dusseau is a research assistant in Woodwell's Risk program. He analyzes data from climate models to provide decision-makers with actionable information about physical climate risk. He is most excited by Woodwell Climate's partnerships with cities that don't have the resources to do climate risk assessments themselves. To Dusseau, this type of work is a key part of building community climate resilience.

Why did you pursue a career in science?

I pursued a career in science because I wanted to understand how the world works on a fundamental level. I went into climate science, in particular, because of its impacts on my home—Miami, Florida. Sea level rise is a big issue in the community where I grew up. I was surrounded by that harsh reality and I really wanted to do something about it.

What questions does your research aim to answer?

Most of my work involves extreme precipitation and flood modeling to answer questions like: How will climate change affect society in the future and how will extreme events impact us? How will extreme events change? Where will rainfall intensify and by how much? A lot of my work focuses on identifying the communities that are really at risk, pinpointing where we are underestimating risk, and determining the best way to communicate that information to stakeholders.

What's your biggest challenge or obstacle?

I always need more data—streamflow data, rainfall data, elevation data. I'm always looking for the perfect dataset to complete my flood studies, but that doesn't exist. More personally, I find it challenging to convince people how serious climate change is. My research forces me to think about and plan for how the world is going to change dramatically, and so many people don't understand the consequences or severity.

What brought you to Woodwell Climate?

I first learned about Woodwell Climate in a class in college. My professor showed a video of Dr. Phil Duffy testifying before Congress, staying calm and collected while answering really tricky questions. I kept tabs on what they were doing from then on. When I heard about the Risk group, I was excited by this really unique project. We take climate science knowledge that was

Launch of the Campaign for the Fund for Climate Solutions



Joe Mueller, Chair of the Board and Connie Roosevelt, Vice-Chair, are pleased to announce the public launch of the Campaign for the Fund for Climate Solutions. The Fund enables scientists to pursue their boldest ideas more quickly and nimbly than they could through traditional funding routes and to expedite research on leading-edge, science-based solutions for controlling the climate crisis.

As campaign co-chairs since the beginning of the campaign in 2018, Joe and Connie report that to date \$6.1 million toward the campaign's \$10 million goal has been raised. With the urgency of fueling scientific solutions, funding raised for the campaign has been put to immediate use. The campaign has enabled the awarding of \$3.66 million in grants to fund over 33 projects that have already had remarkable impacts.

The Fund for Climate Solutions helps Woodwell scientists tackle top priority climate research needed in the Arctic, the Amazon, Central Africa, and throughout the U.S. Support for the campaign has been generously contributed by a groundswell of donors led by the Board of Directors, President's Council members and many other generous contributors who want to make a difference now to preserve the future of our planet for generations to come.

To learn more about the projects that the campaign has funded and emerging needs, visit woodwellclimate.org/fcs or contact Leslie Kolterman, Chief Philanthropy Officer at lkolterman@woodwellclimate.org or (617) 939-6284.

traditionally held in the academic world and apply it to investors, government officials, and the public.

What makes Woodwell Climate Research Center special in the scientific community?

We're a think tank and do a lot of academic research, but I think what we do differently is that we actually push that science into something actionable. Instead of just publishing a paper, we present research that stakeholders can actually put to use. Technical jargon and limited access to scientific journals often makes climate science inaccessible, and Woodwell Climate does a good job delivering the science to people that need it most.

If you could work on any climate science topic outside your current research area, what would that be?

Paleo-climatology. The technology they use sounds very cool. I'd like to use their intricate methods to go back thousands of years and piece together the climate of the past.

What's your favorite climate-related creative work (book, movie, artwork, etc.)?

I recently saw a photograph of an iceberg in Curtis Bay by Rawlence Patchingon. It was really unique because it had an iceberg in the foreground and the background was really dark. The intense contrast reminded me of climate change in a scary sense.

APRIL 23, 2021
11 am - 12:15 pm

**A Kaneb Lecture
Earth Day 2021:
Where do we stand?**

The Biden Administration has made climate change a higher priority than any previous administration, and is widely expected to announce new commitments at the Earth Day Summit. This panel will explore those commitments, Biden Administration policy to date, and the Summit, more broadly, through four critical lenses: justice, health, security, and investment.

To register visit
woodwellclimate.org/earthday

In memoriam

John D. Schade

Dr. John D. Schade, 54, died in his sleep at home on March 26, 2021, after a long battle with pancreatic cancer.

John's beautiful spirit, kindness, and enduring sense of humor in the face of such challenges will remain and inspire family and friends who knew and loved him throughout his life. Throughout his life he shared this love through music and writing, with friends and family.

John made immeasurable contributions during his distinguished career in environmental research and education. After graduating from the University of Michigan, he completed his Ph.D. at Arizona State University and began his career as a professor at St. Olaf College in Northfield, MN. He continued his work in climate research and education at Woodwell Climate Research Center in Falmouth, MA, and the National Science Foundation in Washington, D.C., where he served as a Program Officer in the Division of Environmental Biology. John's scientific interests were diverse, ranging from studies of greenhouse gas production in agricultural and Arctic streams, to the impacts of changing snow depth on nutrient cycling in prairie soils.

John was passionate about educating the next generation of scientists, and increasing diversity and inclusivity in the sciences. He was a steadfast student advocate, and the heart of Woodwell's Polaris Project, which integrates Arctic research



and undergraduate education. Undergraduate researchers were frequently co-authors on his scientific publications, and he made sure to note that.

John is survived by the love of his life, Dr. Sue Natali; his mother, Carol Jean Winn (George) of Harbor Springs, MI; his sister, Dr. Lisa Schade Eckert (Greg) of Marquette, MI; his brother, Jeff Schade (Linda VanIngen) of Kearney, NE; two nephews, Jacob Williams (Andriana Puchany) of Lewistown, MT; Elisher Williams (Laurel Wilkey) of Highland Heights, KY; niece Mary Emily Schade of Kearney, NE; and many beloved cousins, aunts, and uncles. Celebrations of John's beautiful spirit will be held at later dates.

Donations made in his honor to Woodwell Climate will be used to establish a fund to honor and recognize John's unwavering dedication to student-led learning and scientific advancement. Donations in his honor to the Pancreatic Cancer Action Network will contribute to pancreatic cancer research.



In the news: highlights

Woodwell Climate's calculation of how much carbon dioxide would be released, should the Joint Cape Cod Base's plan to build a machine gun range be built, is noted in a *Boston Globe* article: The National Guard wants to clear 170 acres of woods on Cape Cod for a new machine gun range, Apr 13

Domenick Dusseau's analysis of flood risk in Nashville was mentioned in an episode of *Radio Ecoshock* about urban heat and flooding: Future Cities: Hot & Flooded, Apr 7

Sen. Ed Markey's visit to the Center is noted in *Politico's* morning news summary: Janey Jumps In — Baker to get Vax — Senate studying Life After COVID — Exit sign Nostalgia, Apr 6

Drs. Christopher Schwalm and Alex Naegele were guests on the inaugural episode of TMP Climate's podcast/YouTube show *I'm Not a Scientist*, Apr 1

Dr. Skee Houghton was quoted in a piece on the latest deforestation numbers from Global Forest Watch that Chris Mooney wrote for the *Washington Post*. It was picked up by several other publications, including the *Seattle Times*, *SFGATE*, *Portland Press Herald*, *Anchorage Daily News*, *The Independent*, and *New Zealand Herald*: Tropical Forests in Brazil and elsewhere are being cut down, making it more difficult to attack climate change, Mar 31

Dr. Spencer Glendon was a guest on Nasdaq's *World Reimagined* podcast: Sustainable Leadership: Creating a Climate for Change with Rebecca Henderson and Spencer Glendon, Mar 31

Woodwell Climate Research Center data was the underpinning of a report and news story on radio station KSTK about the carbon storage of Tongass National Forest: Tongass stores more than 40% of all carbon stored by national forests, Mar 31

A deep dive in *Investment Week* into the potential pitfalls of ESG in emerging markets references our work on lethal heat in the world's breadbaskets: Tread carefully: Ignoring social issues in emerging markets will harm investors, Mar 31

Dr. Mike Coe talked about efforts to provide decision-makers with better data and analyses of Amazon deforestation and fire on *Devex*: Down to a tree: Amazon forest tracking moves to the next level, Mar 22

Dr. Phil Duffy's recent talk at *Sustainability Digital: A Planet in Trouble*, a meeting of asset owners, was written up: Material climate change already here, Mar 22

Dr. Jen Francis was quoted in a *Bloomberg* piece (which was syndicated and excerpted by several other outlets) about drought in the U.S. West: Drought Is the U.S. West's Next Big Climate Disaster, Mar 20

On *Climate Feedback*, Dr. Skee Houghton reviewed *National Geographic* coverage of a study finding that the Amazon is now a net carbon source, rather than sink: Destruction of the Amazon forest very likely contributes to global warming, as accurately described in The National Geographic article, Mar 11

cover: Amazon forest bird's eye view. / photo by Paulo Brando

Donations play an important role in securing the future of Woodwell Climate Research Center's work—and help safeguard the health of our planet for generations to come.

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**Woodwell Climate
Research Center**

149 Woods Hole Road
Falmouth, MA, 02540-1644

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