How—and why—to limit warming to 1.5°

Dr. Philip B. Duffy
President & Executive Director

Earlier this month the Intergovernmental Panel on Climate Change released a special report, discussing the advantages of limiting global warming to 1.5°C (instead of 2°C), and the challenges of meeting that stricter goal.

The advantages are many: every known manifestation and societal impact of climate change is less in a 1.5°C world than in a 2°C world. These include extreme weather and its consequences, impacts on agriculture, human health, ecosystems, water scarcity, and so on.

Perhaps the most important difference between a 1.5°C world and a 2°C world is in the amount of sea level rise. More and more science suggests that sea level will be 5–10 meters higher in a 2°C world than it is today. Even though this would probably take centuries to unfold, it is no light matter to condemn our descendants to the abandonment of coastal cities and low-lying island states. Limiting warming to only 1.5°C might well result in substantially less ultimate sea level rise, although the science is still imprecise on this point.

In terms of what we’d need to do to limit warming to 1.5°C, it’s daunting. The IPCC outlines four scenarios that meet the goal. Each uses a different mix of the four tools at our disposal: decarbonization of the energy system, energy efficiency, removal of CO₂ from the atmosphere, and controls on non-CO₂ greenhouse gases. I can’t resist pointing out that all of the scenarios involve substantial removal of CO₂ from the atmosphere through restoration of natural systems—a central focus of our work at WHRC. All require that humanity be “net neutral” by 2050–2060, meaning that at that point we’ll need to be removing as much CO₂ from the atmosphere as we are adding.

The bottom line is that while it may be technically feasible to limit global warming to 1.5°C, this would require a massive, multi-front, global scale effort, undertaken immediately. The political will for this is not now detectable. This means that we all, especially those outside of government, need to do more. I am proud of the important contributions that WHRC is making:

- Developing the science behind “natural climate solutions”—using natural pathways to remove CO₂ from the atmosphere, and working with public and private sector partners to implement those solutions.
- Engaging decision makers at state, national and international levels to debunk the myth that burning wood to generate power is “carbon neutral.” To support this,

LIMIT continued on next page
WHRC, Tufts sign on to support Ethiopia’s emissions reductions goals

by Dave McGlinchey

On October 2nd, WHRC joined officials from Tufts University and the Ethiopian Ministry of Environment, Forest, and Climate Change in signing a memorandum to help that country reduce its greenhouse gas emissions, and ultimately meet its Paris Agreement goals.

Dr. Kelly Gallagher—director of the Center for International Environment and Resource Policy at Tufts—orchestrated the partnership, which will deliver assistance on carbon emissions monitoring and climate policy development to Ethiopia and other regional governments.

“The new partnership with the government of Ethiopia creates a wonderful opportunity to experiment with new policy approaches, to apply new methods for policy evaluation and measurement of emissions, and to conduct training of government officials across the African Union and Least Developed Countries group,” Gallagher said.

WHRC and Addis Ababa University in Ethiopia are named in the agreement as key collaborators in executing the partnership. The memorandum calls for developing training programs on climate diplomacy and international negotiation, as well as domestic climate policy design and implementation.

The partnership is designed to support “collaborative experimentation with novel approaches to national climate policies so that Ethiopia can continue to be a model that other ... countries can learn from,” the agreement says. This would include new methods to measure progress on climate-related goals, developing strategies for mitigation, adaptation, resilience, and disaster risk-reduction, and regional workshops “to facilitate an exchange of climate policy best practices.”

WHRC will send scientists to Addis Ababa in early 2019 to lead the regional workshops.

“Ethiopia and other developing countries are not presently big emitters of greenhouse gases, but they have the potential for future growth in emissions,” said WHRC President Dr. Phil Duffy. "The work we plan to do with our partners at Tufts has tremendous importance in terms of avoiding future greenhouse gas emissions."
Forests in indigenous territories store significantly more carbon than was previously known, according to WHRC research that was released during the recent Global Climate Summit in San Francisco. Land held by indigenous people around the world is now understood to store five times more carbon than previously thought.

This new analysis appears in a policy brief published by the Rights and Resources Initiative, WHRC, and five other partner organizations (bit.ly/2PQY8Z3). According to WHRC scientist Dr. Wayne Walker, who is an author on the paper, global carbon maps suggest that recognizing indigenous land rights can be an important strategy to mitigate the effects of climate change.

“Indigenous leaders feel as though that they are the best stewards of the land,” Walker said. “This carbon data provides evidence of that.”

Walker, who monitors worldwide carbon storage, says that indigenous tribes do not deforest or repurpose land in ways that disturb natural carbon cycles. When protected from industrial use, the carbon stored in indigenous forests and soils face a lower chance of being released into the atmosphere.

The policy brief calls for more official recognition and protection for indigenous land ownership, as a way to preserve forest carbon. However, gaining this protected status in some parts of the world can be difficult for indigenous communities.

The Amazon, for example, is one of the best-mapped regions of indigenous territories in the world. However, many of these communities are unable to prove ownership of their land to receive protected status from South American governments.

Walker says that indigenous advocates are using the carbon data to argue the benefits of recognizing and protecting tribal land. He and other climate scientists were approached about their work by tribal leaders from the Amazon, at the United Nations’ 2009 climate change conference in Copenhagen.

“They knew we were working on this map of pan-tropical carbon stocks,” Walker said, “because a lot of our capacity-building and field data collection was in the Amazon at the time. They wanted to know how much carbon was stored on their land.”

Since that encounter in 2009, Walker and his colleagues have delivered several studies about indigenous carbon data on a global scale, with the most recent finding that 17 percent of all forest carbon is managed by indigenous communities. He said that data, which is cited in the recent policy brief, is the most complete carbon mapping effort of its kind.

With the international community recognizing the protection of forests as a key contributor to reducing carbon emissions, indigenous communities may be able to leverage climate science in their favor.

“For indigenous people, this is ultimately about land title,” Walker said. “The carbon data supports that purpose, from a climate change standpoint. Why not recognize this key role that they play?”
Dr. Jennifer Francis, an expert on Arctic climate change impacts and their resulting global weather effects, joined WHRC scientific staff as a senior scientist on October 18.

“I'm very excited to welcome Jennifer Francis to WHRC,” said WHRC President Dr. Phil Duffy. “She is a renowned scientist, and her work on the effects of Arctic change on mid-latitude weather is central to our goal of understanding and communicating the global consequences of climate change in the Arctic.”

Dr. Francis’ research has focused specifically on the connection between the rapidly warming Arctic and a weakened jet stream. At a time when these changes are intensifying weather events, her work provides valuable information that impacts people around the world.

“I feel like we are just scratching the surface in understanding how a warmer Arctic is affecting weather patterns at mid-latitudes,” Francis said. “There’s a whole lot more to do on that and that’s really where I plan to focus, with the ultimate goal of knowing what to expect in the future, in the next decade to four decades. That’s really the window where policymakers need to think about decisions they have to make. For example, decisions about infrastructure. Really expensive decisions that have to be made and they shouldn’t be made in a vacuum. They should be made with good information.”

Francis is also an accomplished science communicator, speaking to both audiences and national media on a regular basis. She said that she works to communicate the overarching story of climate science, and not just her own research.

“There is the communications side that I spend a lot of my time doing these days. Taking these complicated research results and weaving them into story that people can understand,” Francis said. “I see that as a really important part of my job. I didn't plan on that, I kind of got thrown into it. But I really like it.”

Dr. Francis comes to WHRC from the Rutgers University Department of Marine and Coastal Sciences. She received her Ph.D. in Atmospheric Sciences from the University of Washington and her undergraduate degree from San Jose State. Before becoming a senior scientist, she served on the WHRC President’s Council.

Agricultural activities have caused the loss of 143 billion tons of carbon from soil worldwide (about 14 years of global emissions at current levels). This means there is great potential to sequester carbon in soils. science by Dr. Jonathan Sanderman and colleagues; map by Greg Fiske
Arctic fieldwork brings climate change to classrooms
by Connor Murphy

Climate change is a scientific challenge with life-changing effects for the future of young people. High school teacher Kim Young wants to prepare her students now.

To show the impacts of climate change firsthand, Young accompanied WHRC scientists as they conducted fieldwork on permafrost in Alaska. As a world history teacher at Weston High School, near Boston, Young plans to use her experiences to build a curriculum on climate change for her students.

“It think it was really important for Kim, as a teacher, to experience this in person,” said WHRC scientist Dr. Jennifer Watts, who specializes in Arctic ecosystems. “She’ll be able to take stories of her time there to the classroom and share her experience with students.”

Young made the trip as part of the PolarTREC program, run by the Arctic Research Consortium of the United States. In Alaska, scientists are investigating how rising temperatures are changing Arctic ecosystems. Among those effects is thawing permafrost—carbon-rich soil, frozen underneath the tundra’s surface. Permafrost thaw is a main focus of WHRC’s Arctic research, as the process threatens to release enough CO₂ into the atmosphere to overwhelm any other climate change mitigation efforts.

The fate of permafrost will have a huge impact on future climates. Young says that understanding how Arctic scientists study permafrost is important for telling the overall story of climate change to her students.

“I was functioning as a field assistant would,” Young said. “It was cool to see Arctic science innovation firsthand.”

Young worked with WHRC scientist Christina Minions to measure the depth of permafrost thaw beneath the Arctic surface. They recorded the thaw depth of hundreds of permafrost cores, collected soil samples, and monitored landscape changes from research sites.

“She got to do a little bit of everything,” Minions said. Together, Minions and Young conducted fieldwork across northern Alaska for three weeks. Young also took 360 degree images of the Alaskan field sites, as another way to get her students interested in the story of Arctic science all the way from Massachusetts. Young says she hopes the photos and her stories will start meaningful conversations on climate science.

“I want to bring students on the journey, to show them what I was doing,” Young said. "It's exciting, because they are really curious about the Arctic and issues related to climate change.”

Young plans to work with other teachers at Weston High School to develop a curriculum on climate change.

News briefs

WHRC Senior Policy Fellow Rafe Pomerance spoke to a crowd of over 100 people in WHRC’s Harbouron Auditorium on October 18, detailing the early days of the climate change movement as described by The New York Times Magazine, and the effects of climate change in the Arctic. nyti.ms/2vwsgAj

On October 12, WHRC scientist Dr. Rich Birdsey participated in a panel titled, “Forest Monitoring in the Context of Climate Change,” which was held as part of the Expo Forestal 2018 in Guadalajara, Mexico. Dr. Birdsey’s presentation was “Monitoring, Reporting, and Verification Supports Climate Change Mitigation.”

WHRC Founder Dr. George Woodwell celebrated his 90th birthday on October 23. View our video tribute to Dr. Woodwell. www.youtube.com/watch?v=WkJ5XUROabw

In the news

Data gathered by WHRC scientists in global carbon mapping was referenced in a recent Qrius article this month. October 21. bit.ly/2R6S9zx

WHRC President Phil Duffy was quoted in an article by The Washington Post on the unprecedented warming of the Earth, as outlined in the recent IPCC report. October 12. wapo.st/2z3w3Xd

Work by WHRC Scientist Dr. Richard Houghton on the value of forest integrity was cited in a Yale360 story on global deforestation. October 9. bit.ly/2RI1grB

WHRC Senior Policy Fellow Dr. Rafe Pomerance appeared on PBS News Hour to speak about climate action regarding the recent IPCC report. October 8. to.pbs.org/2pI0hLp

In a recent story published by GreenBiz, WHRC Associate Scientist Dr. Alessandro Baccini spoke about the role of tropical forests in the global climate system. September 25. bit.ly/2AoBKrt
Please join Cape Cod Academy and Woods Hole Research Center for a special screening of Decoding the Weather Machine.

Thursday, November 8 from 5:30 - 8:30 pm
Q&A Session following the Film

50 Osterville West Barnstable Road, Osterville, MA 02655

Climate change is arguably the defining challenge of our time, yet widespread misunderstanding and misinformation have hampered the public’s ability to understand the science and address the issue. NOVA’s documentary, Decoding the Weather Machine, will cut through the confusion and help define the way forward.

Registration is highly recommended to guarantee a seat.
Register at: whrc.org/decoding