A large Parkia tree on the Tanguro Ranch in Mato Grosso, Brazil.  

Photo: Chris Linder.
Climate Solutions Depend on Science

Woods Hole Research Center (WHRC) conducts science for impact. Our team is on a mission to investigate the causes and effects of climate change, and to create opportunities for conservation, restoration, and economic development around the world.

There is little time left to prevent the worst consequences of global warming, but we know that nature can be a large part of the solution. Our work is centered on land-based carbon: where it is stored, where it is at risk of being released, and how we can manage land differently to remove greenhouse gases from the atmosphere.

We believe that the Paris Climate Agreement, which was adopted by 195 nations, is humanity’s best hope for a healthy climate and economic future. Science can make it possible, and WHRC is determined to lead the way.

*WHRC has been recognized for three years running as the world’s #1-ranked independent climate change think tank by the International Center for Climate Governance.*
WHRC’s pantropical biomass map showing the amount and distribution of aboveground carbon.
Restoring Forests, Soils, Grasslands, and Wetlands

WHRC scientists research and promote strategies that harness the power of nature to slow climate change. But these nature-based solutions can only be pursued if policy makers are equipped with sound science.

Forest Monitoring

WHRC is a recognized leader in the design and application of forest monitoring systems at local to global scales. Our scientists combine field measurements, satellite imagery, and computer models to track changes in the amount and distribution of the planet’s forest carbon stocks across tropical, temperate and boreal ecosystems.

In partnership with governments, conservation organizations and indigenous groups, we help to monitor forest health and inform sustainable land management practices. Most importantly, WHRC’s forest monitoring program seeks to produce the transparent and independent measurements needed to support inter-national climate policy frameworks like the Paris Agreement.

Soils

Many of the land use practices being proposed as climate mitigation measures can also lead to improved soil health as well as farm resilience, productivity and profitability, and as such are being widely promoted as effective climate solutions. Our scientists specialize in understanding the capacity of soils and coastal sediments to absorb greenhouse gases and reduce the amount of carbon in the atmosphere.

Mapping the Potential

WHRC and its partners are leading a collaborative research and communications campaign to identify and monitor high-priority landscapes for climate-smart restoration across the globe. Using field and remote sensing data, WHRC scientists are determining which regions have the greatest biophysical potential for increasing land carbon storage.
Villagers plant potatoes in a field near Volcanoes National Park in Rwanda.  Photo: Wayne Walker
Preventing Tropical Deforestation

Tropical forests are an integral component of the global climate system, serving as massive terrestrial storehouses of carbon, cycling water, and serving as a home to rural communities and a vast diversity of species. WHRC scientists work in key tropical regions studying sustainable agriculture techniques and piloting green economic development strategies that prevent deforestation.

Democratic Republic of the Congo (DRC)

WHRC’s Projet Equateur aims to prevent deforestation in the Congo Basin by working with community leaders to implement forest-friendly economic opportunities. We train leaders on agroforestry, agricultural production and marketing techniques, high-efficiency charcoal production, and end-user technologies, such as fuel-efficient stoves. Named after the DRC province where the project is located, Projet Equateur aims to regenerate forests, improve livelihoods and promote economic development in the DRC.

Brazilian Amazon

Our Amazon team is at the forefront of understanding how deforestation and forest degradation is impacting the regional and global climate and threatening the viability of agriculture. Much of this work takes place at Tanguro Ranch, a 200,000 acre working farm in Mato Grosso State. Our scientists collaborate with local partners to reduce deforestation and its environmental consequences, while allowing for continued economic growth. Twelve hundred miles away in the state of Acre, flooding and forest fires are impacting everyday life. There, WHRC scientists assist government leaders in developing strategies for adaptation and resilience to extreme environmental events.

The Amazon rainforest stores 125 billion metric tons of carbon
A layer of thawing permafrost exposed in Cherskiy, Siberia.  
*Photo: John Schade*
Global Impacts of a Warming Arctic

The threat of climate change in the Arctic is clear; warming is occurring twice as fast in this region than anywhere else. Consequences are already occurring through global sea level rise, widespread wildfires, permafrost thaw, and extreme weather.

WHRC scientists investigate the urgent issue of the warming Arctic and educate policy makers and the public. In pursuit of this goal, we are leading a coalition of scientific, policy, and public interest organizations who have joined forces to communicate the global consequences of unmitigated climate change in the Arctic.

Permafrost

Locked within ancient frozen soils, known as permafrost, is more than twice the carbon than has been emitted through fossil fuel combustion to date. The potential release of greenhouse gases from thawing permafrost constitutes a major global threat. Our scientists work to identify how much carbon is contained in permafrost, how fast emissions are occurring and how these emissions will affect the climate.

Arctic Great Rivers Observatory

Permafrost thaw, fires, and other effects of climate change impact rivers in the Arctic and the people who depend on them. WHRC scientists are improving the understanding of how climate change is impacting rivers and their watersheds. Much as human health can be evaluated by analyzing blood chemistry, so too can watershed health be assessed by monitoring water chemistry.

Fire and the Arctic Climate

Warmer winters and reductions in precipitation are fueling a major increase in fires in the Arctic. These trends are expected to worsen with climate change, particularly in the high-latitude boreal forests of North America and Eurasia. These forests are an integral part of the Earth’s ecosystem with important influences on the global cycling of energy, carbon and water. WHRC scientists are working to understand the vulnerability of these forests to climate change and to communicate the impacts of growing fire disturbances.

Within the next century, permafrost could decline by up to 50%.
We help community and government groups to manage forest resources by training them in forest and carbon mapping and monitoring methods.

Our scientists work with producers to test and implement sustainable agriculture techniques.
Education on the Front Lines of Climate Change

We offer practical experiences for bright young students from a diversity of backgrounds, propelling them on career trajectories to solve scientific and societal challenges.

Our Visiting Scholars Program has welcomed researchers from around the world for over 25 years.
Dr. Wayne Walker with local leaders in the Congo, mapping out the boundaries of their territories. Photo: Eva McNamara
Turning Science into Solutions

**Mexico**

“WHRC played a critical role in supporting the development and implementation of a national forest monitoring system in Mexico. Thanks to the technology and training WHRC provided, the Government of Mexico is now empowered to monitor and better manage its forests. Undoubtedly, WHRC’s contribution will result in the conservation of much of Mexico’s natural landscape for generations to come.”

— José María Michel Fuentes, MRV officer responsible for technical support of the national forest monitoring system in Mexico

**Amazonia**

“In 2015, we partnered with WHRC to find that over 20% of tropical forest carbon is stored in indigenous territories. These findings have allowed our organization to better demonstrate the critical role indigenous peoples play in climate change mitigation. We continue to use this information not only to bring attention our role as guardians of the forest, but also to negotiate more forest management rights for indigenous communities in Amazonia.”

— Edwin Vazquez Campos, Coordinator General of the Coordination of Indigenous Organizations of Amazonia (COICA)

**Siberia**

“When I was an undergrad, I was fortunate to take part in WHRC’s Polaris Project, an educational program which gives students an opportunity to conduct research in the Siberian Arctic. This experience greatly helped me to develop as a scientist and has lead me closer to reaching my dreams. Now as a doctoral student, I have no doubts that without the Polaris Project, I would be on a completely different academic track.”

— Nigel Golden, PhD student in Environmental Conservation, University of Massachusetts, Amherst

**Democratic Republic of Congo (DRC)**

“Working with WHRC has enabled our community to have a deep understanding of the research and mapping methods that allow us to participate in the REDD+ program [a United Nations framework which enables communities in the developing world to be compensated for their standing forests]. Personally, scientists have helped me build my capacities to gather data on the causes of deforestation, and they also gave me a chance to take part in high-level United Nations conferences.”

— Joseph Zamba, Provincial REDD+ Focal Point in Equateur Province, DRC
Arial view of the Sete de Setembro River in Mato Grosso State, Brazil.  Photo: Chris Linder
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...for the Earth.

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Leadership
Philip B. Duffy, President and Executive Director
Wilhelm M. Merck, Chairman

Contact
Alison Smart, Chief Development Officer
508-444-1545 • asmart@whrc.org

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