



## Center Hosts 10 International Scholars for Tropical Forest Mapping and Monitoring Training



*(From left) Sophyra Sar and Andréana Paola Mekui Biyogo work with WHRC Research Associate Mindy Sun during the scholars visit. Photo by Max Nepstad.*

Forest and carbon monitoring in the tropics is becoming increasingly important as international climate policy efforts to slow the rates of tropical forest loss advance. Understanding forest mapping methods is critical to developing country forestry administrations as well as the traditional forest communities and indigenous groups who are stakeholders in policies designed to reduce tropical deforestation. As part of its Pantropical Forest and Carbon Mapping and Monitoring initiative, the Woods Hole Research Center hosted 10 forest scholars from the tropical regions of Africa, Asia and Latin America for an intensive two-week instructional training on forest and carbon mapping techniques and data management from Monday, September 20, to Friday, October 1.

According to Josef Kellndorfer, WHRC scientist co-leading the pantropical effort, “With many tropical nations aiming to reduce greenhouse

gas emissions from deforestation and forest degradation, accurate mapping of forest cover and its associated carbon stock in detail is crucial. One goal is to share expertise we have gathered in some novel approaches for large scale forest mapping from integrating field and satellite image data.”

This is the second year WHRC has hosted a group of pantropical scholars. Those attending included:

Eric Armijo, Friends of Nature Foundation (FAN), Bolivia

Edward Ssenyonjo, Uganda National Forest Authority, Uganda

Abel Siample, Zambia Forestry Department, Zambia

Sitwala Wamunyima, Zambia Forestry Department, Zambia

Nguyen Hanh Quyen, Vietnamese Academy of Science and Technology, Vietnam

Peter Ndunda, Green Belt Movement, Kenya

Andréana Paola Mekui Biyogo, Gabon Forest Service, Gabon

Sophyra Sar, Forestry Administration, Watershed, and Forestland Management Office, Cambodia

Edersson Cabrera, Instituto de Hidrología, Meteorología y Estudios Ambientales (IDEAM), Colombia

Mukund Srivastava, India Forest Survey of India, India

WHRC scientists are working with governments and tropical forest stakeholders, including indigenous and traditional forest communities, to transfer the knowledge and skills behind monitoring tropical forest loss, with the goal of building the technical capacity of countries and communities to map and monitor their own forest resources and inform policy solutions.

Ned Horning, a project collaborator from the American Museum of Natural History’s Center for Biodiversity and Conservation, explains, “The training provides skills to the scholars that will allow them to use satellite imagery to map forest

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# From the President

## *Pandora's Box Revisited*

Pandora opened her box (it was actually a jar), and all the evils escaped before she could close it. Only Hope remained. We need to revisit the box and open it again.

Climate change is a plague of human making on the world and links all the work at WHRC. And take note, in tackling climate, we also address a host of Earth's needs and challenges including biodiversity, water, energy, food, disease, poverty, population, and security.

The connection between climate and these issues is evident on reflection. To the extent that work on climate change is successful in reducing emissions and warming, we will help to prevent the forecasted disruption of food production, the spread of infectious diseases such as malaria, and the continuation of unsustainable and dangerous energy production. We will lessen the negative impacts of extreme weather events and sea level rise on standard of living. We will help to avoid conflicts over diminished resources, such as allocation of water flowing across national boundaries whose quantity is reduced by drought or glacial melting, as is acutely the likely future of the Indus watershed in Pakistan and India. We will reduce the harm now on its way in the clash between population growth, reduced resources, and fewer safe places to live.

WHRC is also directly engaged in these issues. For example, in the Amazon we work on food supply and poverty alleviation by helping to sustain the fishery for the Pirarucu, a big,

reddish fish, through management that provides for catch and also conserves fish stocks. Our research and policy contributions to land-use zoning in Brazil help to manage human settlement and population growth in sensitive areas. We address these same issues in Africa through cooperation with logging enterprises in finding ways to feed workers without destroying forests and through other initiatives to limit human settlement within parks and adjacent buffer zones. Through remote-sensing combined with fieldwork, WHRC has mapped the distribution of malaria and schistosomiasis vectors in Africa, and has also provided satellite imagery for monitoring and law enforcement concerning human spread into wetlands of the Chesapeake Bay here in the United States. These examples noted, climate change remains the centerpiece of WHRC's goal to address the great needs and challenges for a planet that can support the health and welfare of mankind.

We and others engaged in climate work must make it a point to communicate how climate connects to the full range of vital human interests and requires action now.

Opponents of climate action have been able to marginalize our concern. Much of this stems from the unfortunate search by media for controversy, combined with a taste for point and counterpoint, irrespective of the facts. In consequence, climate change has been painted with uncertainty that the data do not warrant, and has been designated as someone else's problem. The truth of it has been set into a closed box, and the plain sight of a world of hurt coming our way is hidden. Yet, Pandora's menagerie is out and on us, whether we like it or not. We need to open the box created by those who would deny this, to release truth, and with it, just maybe, hope.

*Bill Brown*



## In the Field

One goal of the Woods Hole Research Center's work in the Arctic is to quantify the magnitude and variability of carbon exchange, assess the mechanisms by which fire disturbance influences these processes, and characterize how changes in these ecosystems respond to and are influencing climate. By synthesizing results from direct field measurements, satellite remote sensing and ecosystem modeling, Center scientists study the processes driving changes in the boreal forest to inform assessments of how those changes will be expressed under a future climate regime.

During a research trip to Alaska in Summer 2009, a documentary crew from the American Museum of Natural History followed Senior Scientist Scott Goetz and colleagues to learn more about boreal forest study sites. To view the video, visit [www.whrc.org/ecosystem/boreal](http://www.whrc.org/ecosystem/boreal)

*At left: Senior Scientist Scott Goetz, on a research trip to Siberia in July 2010, cores a tree, to get a core sample and count ring widths. Image courtesy of Michael Loranty.*

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*Continued from cover*



*Peter Ndunda speaks of his experiences with the Green Belt Movement. Associate Scientist Nadine Laporte listens. Photo by Max Nepstad.*

biomass. When the scholars return home, they teach colleagues from their region of the tropics to further build capacity.”

Eric Armijo, a returning scholar from the Friends of Nature Foundation (FAN) in Bolivia, adds, “This program offers me the opportunity to learn new techniques. I especially value that the tools, which are non-commercial products, and data, which is freely accessible, that we are working with here are readily available to me once I return home. This means that I can share them with colleagues and truly use what we’ve learned here. Also, the connections that I make here – both with the other scholars and with the WHRC staff – offers me a network of professionals dealing with the same issues I’m working on. Even though our home countries may have varying circumstances in landscapes and resources, those relationships are a very important result of my time here.”

The initiative is a three-year endeavor funded by Gordon and Betty Moore Foundation, Google.org, and the David & Lucile Packard Foundation. In addition to the scholars program, WHRC sponsors in-country workshops with national governments and forest stakeholders as a forum for exchanging information on forest monitoring tools and techniques and their relevance for improved forest and carbon management policies. The next workshops are being held this fall in Ecuador and in Indonesia.

Regional, national and pantropical mapping products are also under development to include the distribution of forest cover across the tropics at a resolution of 15 meter as well as a pan-tropical map of above-ground biomass (carbon) at a resolution of 500 meter using a combination of satellite and field-survey data. Once completed, these maps are expected to provide the highest resolution and most consistent pan-tropical data sets against which changes in forest cover and carbon stocks can be measured.

## Center Celebrates 25 Years at Community Open House

On August 27, 2010, Woods Hole Research Center hosted a Community Open House to celebrate our 25th Anniversary, as well as commemorate the Wind Turbine and newly renovated Carriage House. The event took place from 2:00 – 5:00 pm on WHRC’s Gilman Ordway campus, beginning with tours of both the Woodwell Building and Carriage House. Guests touring the Carriage House were given the unique experience of a guided tour by South Mountain’s President, John Abrams and Lead Architect, Ryan Bushey. South Mountain Company, located on Martha’s Vineyard, was the designer and builder of the newly retro-fit renovated Carriage House.

Approximately 125 people attended the open house event. The afternoon program began with an introduction from Chairman of the Board, Larry Huntington, followed by welcoming remarks from Bill Brown, current WHRC President and CEO, and George Woodwell, WHRC Director Emeritus. The 25th Anniversary celebration concluded with keynote speaker, Ian Bowles, a Woods Hole resident and Falmouth High School graduate, who is the Massachusetts Secretary of Energy and Environmental Affairs.

Desserts for the celebration were generously donated by Dana’s Kitchen of West Falmouth and Pie in the Sky Bakery and Café of Woods Hole.

# Experimental Fire Research Completes Final Burn



*Low-intensity fires like these characterize much of the burning seen in the state of Mato Grosso, Brazil. The impacts of these fires on the forest above been the subject of study by WHRC scientists and collaborators for the last 6 years.*

the ground (stems and leaves) and also on groups of animals (insects and small mammals). After the fire, all this information is collected again for comparison on how the environment reacts to fire. The local temperature and humidity are also monitored before and after the fire to detect changes in the microclimate of the forest. The soil moisture is measured to see how these changes affect the availability of water.

In this project, researchers built a complex technological infrastructure for data collection. This included various types of sensors to measure temperature, humidity in the area, and the flow of water in the soil. Some of these sensors are installed in pits up to 10 meters deep. Equipment is also used to measure coverage of the forest canopy. Special collectors of leaves and seeds are used to check the productivity of the forest. In the experimental area over 10,000 trees were surveyed. Besides the monitoring of regeneration and tree mortality, the parameters of canopy openness, tree growth and microclimate are measured over the years.

Preliminary results show that the transition forests are extremely vulnerable to recurring fires. Scientific observations show that the mortality of trees and vines increased between 80% and 120% respectively in comparison to the controlled area. Moreover, they concluded that forest fires diminish the number of species by 50% compared to forests not affected by fire. These areas become more susceptible to invasion by non-native grasses, hindering the natural regeneration of vegetation. In addition, a third of all living biomass of the forest is lost after the first fire, making a major threat to the stock of carbon stored in these forests.

To better understand the impacts of fire on the forest, scientists from Woods Hole Research Center (WHRC) and the Amazon Environmental Research Institute (IPAM) conducted an experimental fire from August 17 to 20. This burn – part of a multi-year, large-scale research project – encompassed 100 hectares of forest in the transition zone between savanna and forest, in the state of Mato Grosso, Brazil. The region is known for high rates of deforestation and frequent occurrence of large fires of human origin.

According to Michael T. Coe, a WHRC scientist leading part of the project, “We have found that the forest is resilient, we see a lot of mortality but there is rapid regrowth of many of the core species and grasses are slow to invade. We have also found that fire frequency is extremely important. If the forest burns every few years, there is a lot of fuel build-up between fires that causes very intense fires compared to forest that burns every year.”

The first experimental fire was held in 2004, and has been the largest experiment with controlled fire in tropical areas of the world. The total area for experimental fire has been 150 hectares, or approximately 371 acres. The experimental area was divided into three plots of 50 hectares each. In one, the scientists control the area so no kind of burning happens. This “control area” serves as a parameter for future comparisons. Another 50 hectares were burned only once every three years. The remaining 50 hectares were burned annually to obtain data for research.

Before burning, researchers from both WHRC and IPAM collected many types of ecological information such as tree species, size and abundance, forest structure (canopy openness), number of seedlings, measurements of combustible material in

# Board of Directors Establishes New Library Fund

This past June, Mary Lou Montgomery, a member of the Woods Hole Research Center Board of Directors, encouraged the entire Board to establish the *Skee Houghton Library Fund*. This fund was created as a way for the Board to recognize and honor R. A. Houghton, who goes by “Skee,” for his role as Acting Director, a capacity in which he served from December 2008 through February 2010, in the interim between John Holdren, who left the Center to become the Director of the White House Office of Science and Technology Policy for the Obama Administration, and the Center’s current President, William Brown.



Deputy Director and Senior Scientist R. A. Houghton

Portrait by Gigi Gatewood.

According to Montgomery, “I think we recognize that Skee filled in perfectly as acting director. When you combine his personal amiability, his internationally recognized scientific contributions to the understanding of the carbon cycle and his 25-year tenure at the Center, it’s a great time to say thanks.”

Over \$10,000 was raised for the Skee Houghton Library fund in support of the Robinson Library. The mission of the Robinson Library has been the acquisition of old and new books that are destined to become or already are “environmental classics.” The books should be non-technical, fall within the WHRC’s realm of interest, and have the potential to endure. The realm is huge, of course, including WHRC’s usual subjects, plus others such as politics, reference, travel, and photography.

This new Skee Houghton Library Fund will not be permanently endowed, but will instead be a Board-designated fund that may be used to support library acquisitions for the next several years.

# Experimental Fire Research Completes Final Burn

*Continued from inside center panel.*

The results also reveal that the transition forest may be relatively resistant to forest fires of low intensity, but not to the recurrent fires of greater intensity. In a few years of experiment, the fires have highly degraded the forest due to the increased tree mortality. Most surprising was the manner in which this transformation occurred in a nonlinear manner.

“We’ve seen dramatic increases in mortality of large trees just after the fires conducted during the drought of 2007,” says IPAM researcher Paulo Brando. This indicates that more intense and more frequent droughts possible in the region will have serious consequences on the dynamics of these forests.

Future stages of the study will track how the forest recovers from these repeated fire events.



*One of the burn plots just prior to this year’s experiment.*

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# Walk the Talk: Ordway Campus Buzzing with Activity



*Research Associate Paul Lefebvre tends to the hive on WHRC's Gilman Ordway Campus*

Renovation projects generally hold at least a few surprises along the way, and the Center's recent deep energy retrofitting of the Carriage House was no exception. One of the most notable unexpected findings was a colony of bees living in the eaves of the structure. Fortunately, the Center has an in-house beekeeper on staff - Research Associate Paul Lefebvre, who has worked on projects in the Amazon for nearly 20 years. Beekeeping is one of his hobbies.

Lefebvre says, "I took up beekeeping about 4 years ago because I wanted to have local honey for its allergy benefits. Currently, I tend 6 hives - 3 at home, and 3 elsewhere, including the one on campus."

The hive in the eaves needed to be moved before the extensive renovation work could continue. Lefebvre, who is considered a bit of a MacGyver by many of his colleagues, rigged up a modified Shop-vac and on August 4, 2009, successfully sucked the hive from the eaves with minimal harm to the bees. He soon returned the colony to the woods of the Ordway Campus in a beehive built from shelving salvaged from the room where the bees were found.

He says, "Much as our two buildings use many reclaimed and reused wood resources, our bees live up to the same standards."

When he moved the hive, he estimates that the total population was around 7,000. At the height of this summer, he estimates that the number had grown to over 40,000.

Lefebvre adds, "I call these bees 'mutts' because although they're descendents of European honeybees, we don't know their pedigree, and their colors and sizes vary quite a bit. They were doing fine on their own, resisting all the troubles that are plaguing domestic honeybees. I think their diversity makes them more resilient. To me, this makes them a very special find, because our local beekeepers' club is working to raise cold-hardy, disease-resistant strains of bees so we can stop importing new bees from the South every spring to replace winter losses, exposing all the other bees to the problems these imports bring with them."

He adds, "If this colony survives the coming winter, and I expect it will, I'll try to raise some new queens from it next spring to strengthen other hives and contribute to the club's efforts. These are the gentlest bees I've seen, and I want more like them."



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