

THE FOREST THREATNET



November/December 2014



*A gypsy moth caterpillar feasts on a leaf. What are the costs of invasive pests in an urban landscape? See page 3.
Photo by John H. Ghent, USDA Forest Service, Bugwood.org.*



*Danny C. Lee, PhD
Eastern Threat Center Director*

EASTERN THREAT CENTER STRIVES FOR MEANINGFUL SCIENCE IN TIMES OF PLENTY

Message from the Director

Science tells us that one of the most essential functions of the human brain is to filter sensory input. At any given time, we're bombarded with sights, sounds, smells, and other external stimuli. It's up to the brain to sort through it all and pick the most important and relevant items for our attention. It's truly a wonder that we do it so well.

We face a similar challenge in our professional lives, both at an individual and an institutional level. Phrases like, "information overload," "awash with data," and "drinking from a fire hose" are heard with increasing frequency these days. They all reference the flood of data and information that come our way through print and electronic media—including newsletters such as this. For those of us that create and share information, it's increasingly difficult to draw meaningful attention to our work

even as we increase the volume. It's as if we're talking louder and louder in a crowded room where the overall noise level is increasing faster than we can keep up. The net result is that we are talking ever louder and (perhaps) reaching a diminishingly smaller audience.

So what do we do? One response is to simply try to crank up the volume, but I doubt that we can keep up. The other option is figure out how to speak softly but still be heard by those we most wish to reach. I'm not certain how we can do that, but rest assured we're working diligently to improve. We'd love to hear your suggestions. - *Danny C. Lee*

Distinguished Science Honored

Kurt Riitters is mellow and soft-spoken, qualities that might be unexpected for a world-renowned landscape ecologist, but his passion for his work is undeniable. "I've worked for four federal agencies, and

the U.S. Forest Service is the best," he said upon accepting the [Distinguished Scientist Award](#) from Southern Research Station Director Rob Doudrick in October. Riitters is recognized for global leadership in his research field and for the development and application of landscape pattern analysis techniques and tools, many of which have been adopted by other national and international organizations. His contributions to numerous natural resource assessments at the local, national, and global scale have provided a 'big picture' perspective on the causes of changing landscape patterns, the implications for forest processes, and the urgent need to manage lands for sustainability across space and time. [Learn more about Riitters' work...](#)



Kurt Riitters holds the Distinguished Scientist Award outside the Forestry Sciences Laboratory in Research Triangle Park, NC.

INSIDE THIS ISSUE

Eastern Threat Center Highlights. *ForWarn* and the U.S. Climate Resilience Toolkit. Global forest monitoring network. Plant invasions and hybridization. New staff members. Wildfire impacts on water supplies. Invasive pests in urban landscapes. Urban sprawl projections. Native American Heritage Month. Publications, products, and events.

EASTERN THREAT CENTER HIGHLIGHTS

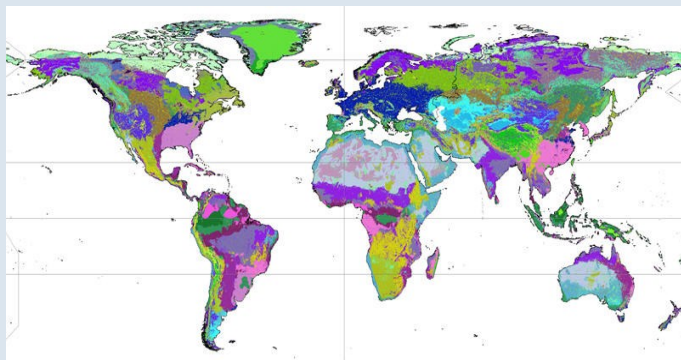
ForWarn Included in National Climate Toolkit

ForWarn, the satellite-based forest disturbance monitoring system developed by the Eastern and Western Threat Centers and partners, was selected as one of the “top 25” tools included in the [U.S. Climate Resilience Toolkit](#). Recently launched for the White House by an interagency team of members from the Forest Service, U.S. Department of Interior, NOAA, and others, the Toolkit “provides resources and a framework for understanding and addressing the climate issues that impact people and their communities.” [Read more in CompassLive...](#)



Landscape Comparison Technique Bridges Data Gaps in Global Forest Monitoring

To understand how forests are responding to global change, a global effort is required. A vast forest research network, known as the Center for Tropical Forest Science-Forest Global Earth Observatory (CTFS-ForestGEO), is advancing this understanding with standardized forest monitoring activities in 59 forests in 24 countries across the world. Since data are not available in every country, researchers must employ methods to reach large-scale conclusions about changing forests. Eastern Threat Center research ecologist **Bill Hargrove** and partners have contributed to CTFS-ForestGEO with a [technique](#) developed to compare similar landscapes based on climate, soils, and topography. Their work has enabled a description of the forest types represented (or underrepresented) in the CTFS-ForestGEO network’s findings, which have been [published](#) in the journal *Global Change Biology* and summarized in a [Smithsonian news release](#).



Collaborating researchers developed a technique to compare similar landscapes, known as the Landscape Characterization and Representativeness Analysis, and created maps of global forest types.

The Role of Humans in U.S. Plant Invasions

As exotic introduced plants spread into areas where they weren’t wanted, plant biologists and others looked closely at the effects of human activities on plant hybridization. Over half a century ago, two scientists came up with the “disturbance hypothesis,” which proposes that disturbances from human activities promote hybridization by creating habitats hybrids can persist in. Though the hypothesis is widely accepted and proven in small-scale studies, the connection between human disturbance and hybridization hasn’t been satisfactorily corroborated at regional or national scales. Until now, that is.

Eastern Threat Center research ecologist **Qinfeng Guo** analyzed huge datasets from plant, population, weather, and other sources to reveal that hotspots of hybrid plants occur in areas with large human populations and with many years of European settlement, supporting the disturbance hypothesis. In an [article recently published in the journal *Biodiversity Research*](#), Guo reports findings from his study, which is the first to analyze the richness and distribution of hybrid plants at the county level across the contiguous United States. [Read more in CompassLive...](#)



Bell's honeysuckle is a hybrid between two exotics. Unlike many exotic hybrids, it is included on the invasive plants lists of 14 states. Photo by Joseph Berger, Bugwood.org.

Eastern Threat Center Welcomes New Staff Members

- **John Cobb** interned with the Center while pursuing his bachelor’s and master’s degrees at North Carolina State University (NCSSU). He recently returned as an IT specialist.
- Through the Oak Ridge Institute for Science and Education, **Bjorn Brooks** and **Dennis Hallema** joined the Center as an ecologist and hydrologist, respectively. Brooks is investigating new ways for using satellite data to reveal forest resilience following disturbance. Hallema is studying the relationships between large wildfires and streamflow.
- Extension and technology transfer specialist **Sarah Workman** is developing new strategies to enhance and exchange Center research, products, and tools.
- **Chunwei Liu**, visiting from Nanjing University of Science and Technology, is developing evapotranspiration models.
- **Sealy Chipley** is assisting national forest planning efforts using the Template for Assessing Climate Change Impacts and Management Options (TACCIMO) as a primary data source.
- NCSU research assistant **Maxwell Wightman** is supporting research on the impacts of management activities on forest water and carbon cycles.

HOW DO WILDFIRES — AND EFFORTS TO ABATE THEM — AFFECT THE NATION'S WATER SUPPLIES?

More than 180 million people across the United States rely on forest watersheds to store, filter, and deliver the water that flows from their taps. Unfortunately, in many parts of the country, these watershed functions face an increasing risk of severe wildfire.

Prescribed burning is one treatment that can reduce forest fuels and wildfire's threats to municipal areas, but how does fire—planned or not—impact water quantity across the landscape? Can forest thinning, which causes forests to take up less water, reduce fire risk and also increase water supplies? U.S. Forest Service researchers are beginning a first-of-its-kind study to explore these questions.

Most previous research on this topic has taken place at a relatively small scale, so little is known about the effects of wildfire and fuel treatment strategies on water flow and yield over regional areas. "This is significant because there is an immediate need to identify high priority watersheds and to optimize limited resources for managing them based on the effectiveness of prescribed fuel treatment options," says **Ge Sun**, Center research hydrologist and principal investigator of the study, which is being funded by the [Joint Fire Science Program](#). "Our study will extend the Forest Service's research capacity and understanding of fire-water relationships to

a much larger scale compared to traditional research methods."



A watershed is transformed following the 2011 Wallow Fire in Arizona. Photo courtesy of Apache-Sitgreaves National Forest.

Over the course of the three-year study, researchers will use computer models, including the [Water Supply Stress Index](#), to simulate and quantify water supply changes in response to wildfire and fuel treatments across 88,000 U.S. watersheds. The study's findings could have important implications for local forest management decisions that ultimately affect water quantity as well as quality. Researchers plan to share results throughout the study period and will engage forest managers in training workshops to support sustainable, science-based management practices that ensure water supplies can meet demand. More than 180 million people are counting on it. [Read more in CompassLive...](#)

Study Puts a Price Tag on Invasive Pest Impacts in an Urban Landscape

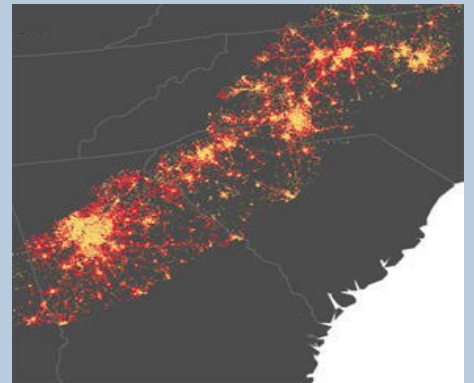
Picture a sizable city invaded by non-native insects. Hundreds of thousands of trees are threatened. Authorities must act to control the situation, but it's going to cost them—a lot—say collaborating researchers, including **Mark Ambrose**, a North Carolina State University scientist working with the Eastern Threat Center. Using Baltimore City as a case study, the researchers examined the urban tree landscape and envisioned scenarios of gypsy moth outbreaks. Given that the majority of the more than two million trees in this city would be susceptible to this leaf-munching pest, suppression efforts, tree removal and replacement, and lost ecosystem benefits would be substantial. Costs could range between about \$5.5 million to almost \$64 million, according to the researchers' estimates. This study, [recently published](#) in the journal *Urban Forestry and Urban Greening*, provides a framework that other cities can apply to estimate the costs associated with an outbreak of gypsy moths or other invasive pests.

EASTERN THREAT CENTER HIGHLIGHTS

In 50 Years, Will Urban Sprawl Create a "Southern Megalopolis?"

The rapid pace of human population growth in the southeastern United States is a useful predictor of land and infrastructure development. But researchers are looking beyond increasing population density to examine recent trends in urban sprawl—the low-density development that stretches beyond a city's core—to project future changes in the region's land cover patterns.

Jennifer Costanza, a North Carolina State University (NCSU) scientist working with the Eastern Threat Center, is a co-author of a [recently published](#) urban growth modeling experiment that simulated the spatial pattern and extent of urban sprawl in 2060, if current development trends continue. Results suggest that urban sprawl could double or nearly triple, creating a metropolitan area that stretches from Raleigh, NC, to Atlanta, GA, along with unprecedented challenges to forest ecosystem conservation in the Southeast.



By 2060, the Piedmont region could be a connected urban landscape, or "southern megalopolis," according to modeling results. Image courtesy of PLOS ONE.

Costanza discusses the study and implications for urban planning and natural resource management in [an article](#) published in *The Post and Courier*. The [Global Change Forum](#) at NCSU compiled additional media coverage generated by this study.

Center News, Publications, Products, and Events

- USDA and the nation celebrated [Native American Heritage Month](#) in November (right), themed “Native Pride and Spirit: Yesterday, Today, and Forever.” Events across the country honored contributions from American Indians and Alaska Natives that strengthen and enrich communities and society.
- The Southeast Regional Climate Hub, hosted by the Eastern Threat Center’s Raleigh, NC, office, released a new online resource with information and tools to help farm and forest land owners and managers, extension agents, and other partners adapt to stressors from a changing climate. [Read more in CompassLive...](#)
- In partnership with Project Learning Tree, the [PINEMAP](#) project has developed a secondary education module, [Southeastern Forests and Climate Change](#). Several Center researchers and cooperating scientists support PINEMAP with models and information about carbon and water cycles in managed forests.
- The [Climate Change Resource Center](#) features a new [case study](#) of the science and management partnerships that guided the Francis Marion National Forest through revision of its Land and Resource Management Plan, including support from the [Template for Assessing Climate Change Impacts and Management Options \(TACCIMO\)](#).
- Visit the [First Friday All Climate Change Talks \(FFACCTs\) webpage](#) for archived resources and upcoming FFACCTs topics.
- [New Publications and Products](#) (search [Treesearch](#) for all pubs and abstracts):

Guo, Q.F. 2014. Plant hybridization: the role of human disturbance and exotic invasion. *Diversity and Distributions* 20:1345-1354.

Potter, K.M. and **F.H. Koch.** 2014. Patterns of forest phylogenetic community structure across the United States and their possible forest health implications. *Forest Science* 60(5):851-861.

Mátyás, C. and **G. Sun.** 2014. Forests in a water limited world under climate change. *Environmental Research Letters* 9:085001.



A painting by Onondaga Snipe Clan artist Brandon Ganyada:kda Lazore featured on a USDA poster illustrates the connection between the wellbeing of the land and that of the next seven generations.

CONTACT US

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The interdisciplinary Eastern Threat Center develops new technology and tools to anticipate and respond to emerging forest threats. The Eastern and Western Threat Centers are a joint effort of the USDA Forest Service Research and Development, National Forest System, and State and Private Forestry. The Eastern Threat Center is headquartered with the Southern Research Station in Asheville and has offices in Raleigh and Research Triangle Park, NC.

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