Answering the Call

Making Science Accessible for Forest Planners

by Emrys Treasure

The phone rang.

In the age of email, video conferencing, Twitter and blogs, it's a sound **Steve McNulty**, senior research ecologist and leader of the **Eastern Forest Environmental Threat Assessment Center** (EFETAC) team in Raleigh, NC, hears less and less often.

"Don't get me wrong," says McNulty. "Calls do still come in occasionally from folks like a professor in New England, a scientist out of the Rocky Mountain Station, or a technician from the local soils lab. But this call was different. This call was from a forester, and he wanted answers."

McNulty's been studying climate change impacts on forests for the past 20 years. During this time, he's cranked out over 150 papers, given hundreds of lectures, and participated in more assessments and strategy documents than he can recall. All of these activities had one thing in common: scientists talking to scientists. Since McNulty started with the Forest Service in 1991, "there two things you could count on. First, the climate was getting steadily warmer, and second, only scientists seemed to care."

"So imagine my surprise when a forester wanted to find out if all this talk about climate change was real and if it were real, what should he be doing about it," says McNulty. "After waiting two decades for someone outside the science ranks to ask me about

Tupelo-baldcypress swamp in the DeSoto National Forest in southern Mississippi. (photo by USDA Forest Service)

climate change, I was embarrassingly unprepared to provide an answer."

"It wasn't that I didn't understand climate change or what types of ecosystem impacts could occur," he adds. "The problem was that I had not been talking with land managers, and did not know how to translate science speak into management actions."

That was 5 years ago. Meanwhile the whisper about climate change turned into a low rumble and now is more like a roar. With 2010 cited by some as the warmest year in recorded history—people are starting to understand that the climate is indeed changing.

In forests, climate change ramps up the stress already occurring from extreme weather events, disease and insect outbreaks, catastrophic wildfires, and invasive species. Resilient forests are better able to absorb stress without compromising the services they afford. In the same way that good sleep, healthy diet, and regular exercise make a person resilient (though not immune) to illness, forests can be helped towards resiliency by management practices that focus on sustaining or restoring ecological integrity in relation to future conditions. While neither the many threats to forests nor the management approaches available to abate them are new to forest managers, climate change introduces additional pressure and the need for the rapid translation of emerging science into forest management practice.

In early 2009, a group of researchers led by McNulty partnered directly with forest planners from across the **Southern Region** of the **National Forest System** (Southern Region) to start looking at what needed to be done to address the looming problems posed by climate change. A series of meetings were held to share information and ideas about solutions. The results of this collaboration are captured in the **Template for Assessing Climate Change Impacts and Management Options** (TACCIMO), a Web-based technology designed specifically for natural resource management under climate change.

It's come at just the right time. "There's a pressing need to develop science-based tools to assist land managers in decisionmaking and planning around not only climate change, but also in relation to the dramatic demographic, land use, and resource demand changes also taking place today," says McNulty.

It All Starts with Planning

For forest planners, that "roar" around climate change is about to turn into a deafening din. The proposed Forest Planning Rule released in February 2011 mentions "climate change" 23 times. The Planning Rule, required under the National Forest Management Act of 1976, guides the process the national forests use to develop long- and near-term management plans and mandates the use of best available science and input from the public to guide forest direction.

"Planning is the hub of the resource stewardship wheel," says **David Meriwether**, acting director of planning for the Southern Region, "but the rubber meets the road when we start taking actions." Meriwether goes on to say that "never in my 30-year plus career has the sustainability of forests been threatened by so many simultaneous problems. Our actions need to be guided by even better informed plans."

The current and historic problems that Meriwether refers to include threats to forests from invasive species, forest fragmentation, insects

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The Roadmap and the Scorecard

To implement the goals outlined in the 2010 USDA Strategic Plan for 2010-2015, the Forest Service released the ***National Roadmap for Responding to Climate Change*** in July 2010. The roadmap focuses on the strategic plan goal to "ensure our national forests and private working lands are conserved, restored, and made more resilient to climate change, while enhancing our water resources." The Forest Service implemented a **Performance Scorecard** to measure the progress made by local national forest and grassland units—with support from regional offices, research stations, and national programs—towards this goal.

The scorecard tracks progress in four dimensions—agency or organizational capacity, engagement, adaptation, and mitigation—through a set of 10 questions. The questions are designed to be flexible enough to be addressed through a range of approaches and at different geographic scales. Scorecard assessments began in spring 2011, with a goal of 100 percent of all national forests and grasslands in compliance by 2015.

To download or read the roadmap:
www.fs.fed.us/climatechange/pdf/roadmapfinal.pdf

To view the scorecard:
www.fs.fed.us/climatechange/pdf/Scorecard.pdf

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and disease, loss of imperiled species, and the devastating effects of wildfire.

"National forest planning teams are already trying to address very complex management situations," says **Paul Arndt**, regional planner for the Southern Region. When they factor in climate change, the implications of which can be so far reaching, it's hard to know where to begin."

Answering the Call

TACCIMO engages climate change challenges to forest stewardship head on. Developed jointly through a partnership between EFETAC and the Southern Region, TACCIMO pulls together in one place the science-based information managers need to plan across multiple forests and scales.

TACCIMO leads forest managers through the thought process of assessing what climate change may mean for their specific forests. Based on emerging needs and discussion between scientists and managers, TACCIMO is constantly updated with searchable quotations from peer-reviewed scientific literature that describe impacts and management options. To make the connection between science and management literal, forest plans for all of the national forests east of the Mississippi are provided in TACCIMO as an organized resource. A custom map viewer enables exploration of climate change projections across selected regions.

Before TACCIMO, there was no central resource for national forest planners and managers to turn to. Even more important than putting the information all in one place, TACCIMO provides a visual interface where multiple types of information can be connected or layered with existing forest plans. Forest managers can see what the potential impacts are in a given area, what management options exist, and which aspects of their existing plan might be affected. The TACCIMO experience is captured in exportable science reports that document climate change impacts on forest planning and management, while spatial variability and projected range of future climate are presented in geospatial reports.

Ken Landgraf, planner for the **George Washington National Forest** (GWNF), is well along in the process of revising the plan for the GWNF. "The public has been very interested in how climate change may affect our forest and they want us to consider these potential effects as we develop management direction,"

A team of researchers from the Forest Service Eastern Forest Threat Assessment Center (EFETAC) and the Southern Region received the 2010 Regional Forester Award for Technology Transfer for their work on TACCIMO. (left to right) Steve McNulty and Emrys Treasure from EFETAC; David Meriwether, Paul Arndt, Chris Liggett, and Jerome Thomas from the Forest Service Southern Region. (photo by USDA Forest Service)

Template for Assessing Climate Change Impacts and Management Options (TACCIMO)

TACCIMO is a Web-based assessment and reporting tool that makes the connection between climate change science and forest planning information. A collaborative effort between **Eastern Forest Environmental Threat Assessment Center researchers** and **National Forest System Southern Region** planners and land managers—TACCIMO uses a database of climate change forecasts, direct ecosystem impacts, and management options to generate customized reports that aid with forest planning and management. Users can choose issues of interest such as biodiversity, forest pests, forest land conversion, prescribed fire, recreation, and wildfire. Based on user-defined selections, TACCIMO links direct and indirect effects of climate change with possible management options for lessening climate change impacts in targeted U.S. geographic regions. TACCIMO also allows users to explore future climate projections through an integrated mapping tool.

TACCIMO delivers current, relevant information to a range of users, including Federal and state agencies, nongovernmental organizations, and private landowners. For Federal land managers and Forest Service planners in particular, TACCIMO helps deliver the best available science which fits within the National Environmental Policy Act process.

TACCIMO databases and literature are continually updated and expanded as new knowledge and science emerge and information needs change.

TACCIMO includes resources for training and assistance. In addition to a detailed user guide, TACCIMO provides case studies and quick-start guides with basic instructions for navigating the tools and resources, generating reports, and using its mapping tools.

For more information:
www.forestthreats.org/tools/taccimo

says Landgraf. "While we understand their concerns, responding to an issue as broad as climate change in the analysis for a forest plan revision has been challenging. TACCIMO provided a lot of information for us to use in responding to the issue. The geospatial report allowed us to scale down potential changes in temperature and precipitation to the GWNF, while the science report allowed us to pull together information on effects that are relevant to our area. Both of these sets of information were a great help in preparing the environmental effects section of the required Environmental Impact Statement."

The Future is Here

In addition to the proposed Planning Rule, the ***National Roadmap for Responding to Climate Change*** and a supporting ***Scorecard*** that tracks implementation are driving action on national forests. No longer will the demand for climate change science be limited to those planning for 30 or more years down the road. TACCIMO and the community of researchers and land managers it represents are ready to tackle climate change with 21st-century science and tools. At the end of the day, TACCIMO is about the people behind it—scientists, planners, forest managers, and ultimately, the American public.

Bringing researchers and forest managers together to address problems is nothing new, but the technology stands to make the process more responsive and efficient than ever before. What TACCIMO captures for all to benefit from is the experience of a forest manager picking up the phone and asking a scientist what he or she can do to ready our forests for climate change.

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Recommended reading:

Blate, G.M.; Joyce, L.A.; Littell, J.S. [and others]. 2009. **Adapting to climate change in United States national forests.** Unasylva. 60(231/232): 57–62.

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