Future Forest Dynamics Across the U.S.

LANDFIRE Interviews Jennifer Costanza

Jen Costanza is a landscape ecologist with research interests in the ecological effects of global change, land change modeling and landscape conservation. Her Ph.D. in ecology was awarded from the University of North Carolina at Chapel Hill; she is a Research Assistant Professor at North Carolina State University.

Jen's current research involves response to changes in climate, disturbances, land use and land management. She is working to produce future projections of forest conditions for the Forest Service's Resources Planning Act (RPA) Assessment. Additional research spans landscape ecology and conservation biology, including modeling wildlife habitat connectivity in the southeastern U.S., simulating landscape dynamics under scenarios of bioenergy production in North Carolina, and mapping threats to ecosystems in the North American Coastal Plain – the world's newest global biodiversity hotspot.

How did you become involved in LANDFIRE?

I started working with LANDFIRE data in graduate school when I worked for The Nature Conservancy to assess how useful the data would be for informing local decisions in the Onslow Bight landscape in eastern North Carolina. We assessed BpS, EVT, and the fuel models data. It was also during that time that I learned how to use the LANDFIRE BpS models in VDDT. After graduation I did a postdoc focused on vegetation dynamics modeling; we used the LANDFIRE BpS models as a starting point for that.

What LANDFIRE products do you use most often and why?

I use LANDFIRE BpS models and the BpS and s-class spatial data to inform the models and make them spatial. I wish more people knew about the strengths of the LANDFIRE BpS models -- they are an underappreciated resource. That said, like any data set, especially national ones, LANDFIRE's are better suited for some purposes than for others. The trick is to modify the models to suit the needs of your specific landscape, or to address the specific management or research question being asked. That is no simple task, especially for a new user, but there are resources available online from LANDFIRE and the developers of the model software (VDDT or ST-Sim), ApexRMS, that can help.

You have an extensive list of publications. Among the most recent is a piece in which you and your colleagues identify The North American Coastal Plain (NACP) as a global biodiversity hotspot. Please tell us about that.

That study was a fun one. Biodiversity hotspots are regions of the world that have high levels of endemism and have vegetation that is highly modified from natural conditions. Ecologists working in the southeastern US have had a good sense for a while that the North American Coastal Plain

Coastal Plain Floristic Province
Geological Coastal Plain
0   500   1,000 km
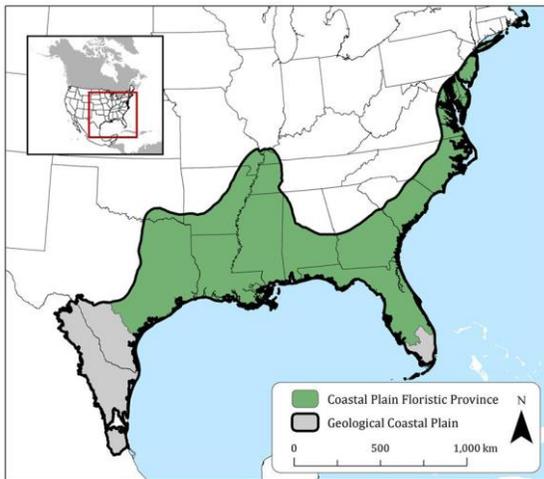
(NACP) would meet these criteria, but the challenge was to provide data to show that. Thanks to my coauthors, we already had excellent data on endemism but we needed a way to show that the vegetation had been highly modified.

LANDFIRE data sets and models are great for that because they span all ecosystems across the region. I compared information on reference conditions in the LANDFIRE BpS data and models with current conditions in the LANDFIRE s-class data. That allowed me to estimate the amount of vegetation change from presumed natural conditions to today. The result of the study, aside from our publication, is that NACP has been designated a global biodiversity hotspot.

That designation means that more people living there will learn how special the NACP region is biologically, which I hope leads to more and better conservation of the plants, animals, and habitats there. Our video, From Fire Comes Light, targeted to a general audience, discusses fire's role in promoting biodiversity in the NACP. It features TNC's Shaken Creek preserve and tells the story about management of the longleaf pine plant communities there.

What other projects have you worked on using LANDFIRE products? Does any particular one stand out the most to you?

I have used LANDFIRE BpS models as starting points for simulating future forest and landscape dynamics under scenarios of climate change, management, and bioenergy production.

Most recently, colleagues and I published two studies* on the effects of potential bioenergy production scenarios on landscapes and wildlife habitat in North Carolina. The state, along with much of the Southeast, has potential to supply wood pellets and liquid biofuels, but we wanted to understand the possible implications on ecosystems and wildlife species. We started with existing LANDFIRE BpS models and modified them to reflect current conditions in a few ways. Then we modified some of the state classes, added transitions to reflect current management and fire suppression, and created new models to reflect anthropogenic systems and land uses. We made them spatial by tying them to current land cover data so that we could simulate spatial changes in vegetation and land use and then ran the model simulations into the future to examine tradeoffs among future alternative bioenergy production scenarios and inform policy makers in the state.

*The two studies are Bioenergy production and forest landscape change in the southeastern United States, and Projected gains and losses of wildlife habitat from bioenergy-induced landscape change.

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