Pine trees may shed light on global warming

In the lab and on the Appalachian Trail, graduate student Constance Bolte studies ecology, evolution and climate change: How have pine trees adapted, and what will happen if they die off?

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What can pine trees tell us about climate change? A lot, says VCU graduate student Constance Bolte.

She has been conducting research at “the intersection of ecology and evolution,” focusing on three species of pine trees: the loblolly, the pitch pine and the table mountain pine. Using temperature and precipitation data, Bolte has been forecasting and “hindcasting” the species’ distribution across North America.

Graduate student Connie Bolte

If the table mountain pine dies off, Constance Bolte says, 'We may have erosion problems.'

"Preliminary data shows that this species is contracting," she said, referring to the table mountain pine.

By showing how the area covered by certain pine trees has shrunk and migrated since the last ice age, her research may shed light on climate change and global warming. Bolte also is studying whether or how these plants have adapted and what happens to the environment as pine trees die off.

"I'm not only interested in trees," she said. "I'm interested in ecosystems and how they work."

Bolte is at the tail end of her second master's degree, which she plans to turn into her research project for a Ph.D. She has been working in the lab of Dr. Andrew Eckert, an assistant professor in the VCU Department of Biology.

But Bolte is not just crunching numbers in the lab. This summer, she will embark on an expedition along the Appalachian Trail to gather data and record observations about pine trees.

"I hope to bring more attention to table mountain pine," she said. "If they were to go, and no other species has the ability to grow in that area, we may have erosion problems."

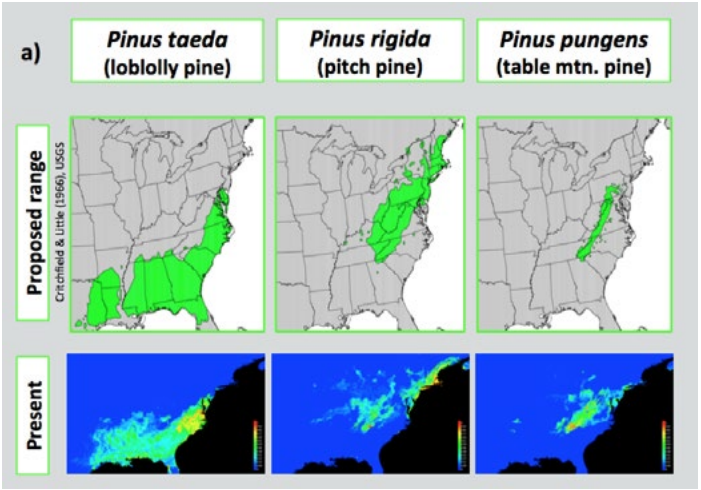
Bolte has been looking all the way back to the last interglacial period. She has tracked the distribution of pine trees and their migration, which she refers to as hindcasting.

Bolte also uses forecasting to predict how the distribution will change in the future.

"We can take where I think the distribution is going to be, and we can overlay impervious surfaces, which is essentially urbanization," Bolte said. "If they (trees) don't co-evolve with the

Connie Bolte in the forest doing research on pine trees

Mass transit, bike and pedestrian infrastructure, and mixed land use are 'important to reducing greenhouse gas emissions.'



Bolte is mapping the areas where different pine trees grow. (Image courtesy of Constance Bolte)

climate, they're going to have to migrate."

It's possible that the pine trees will diverge into new species as the climate changes. But Bolte predicts, "Statistically it's not going to happen – probably not going to happen fast enough – based off of how much carbon we're putting into the atmosphere and how accelerated that is."

As Bolte continues working toward her Ph.D., she questions how growing urbanization, combined with climate change, will impact our ecosystem. Participants at a recent environmental meeting at VCU also pondered such issues.

The Renewable Energy Summit drew professors and members of groups such as the Climate Reality Project and Environment Virginia.

At the event, a panel of experts discussed the technologies and advancements being made in the renewable energy field.

The panelists included Damian Pitt, an assistant professor in the L. Douglas Wilder School of Government and Public Affairs.

As urbanization increases, what should cities do to deal with climate change?

They should invest more in mass transit and bicycle and pedestrian infrastructure and promote mixed land use patterns, Pitt said. "Those things are just as important to reducing greenhouse gas emissions as solar and wind energy are."

Bolte agrees that action is needed to address the challenges of climate change: "I don't think there's anything that any one person or even a collection of people can do … other than lower your carbon footprint." •