

Statement of Purpose

For admission to the University of Oklahoma Department of Microbiology and Plant Biology

Russell Doughty

I've trekked the Appalachians, bow-hunted for elk in the Rockies, summited the Sky Islands of Arizona, interned in the Sierra Nevadas, and inhabited the Cascades for months – but nothing compares to the mystique of the Kiamichi basin and the Ouachita highlands. For me, it is easy to see why my great-grandfather moved from Altus, OK to the Kiamichi basin in the midst of the Dust Bowl of the early 1930s. This place is special, unique, and beautiful. Our country's finest jewel perhaps; it is my passion.

I didn't quite realize how special our forested landscape is until I had an opportunity to study it in depth at Oregon State University. For two years I lived in the library, pouring through all the published information I could find about SE Oklahoma. Subsequently, I'd post my research papers online hoping that they could be of use to the public and water managers.

As I progressed through the master's program, I began applying some of the same questions that were being asked about biogeochemical nutrient cycles of the Cascadian region to the Ouachita highlands. The carbon cycle, carbon sequestration, and carbon modeling were heavily emphasized at Oregon State.

However, when I took a serious look at the role of the Ouachita highlands in biogeochemical nutrient cycling, I realized that our forest must be playing a large role in the water cycle. Our nitrogen cycle would be modeled very differently, too; tons of nitrogen are being fixed in Oklahoma by lightning, whereas lightning is a very rare occurrence in Cascadia.

Authors Nallapareddy, Shapiro, and Gourley (2011) hint that the forested landscape must be playing a role in climate, "It is plausible that the combination of a forested land surface along with complex topography created shielding conditions that promoted enhanced surface cooling in advance of the mixing. An explanation for the site-specific maxima in warming frequencies and magnitudes, including the possible role of the surrounding terrain and vegetation, is a topic for future research."

What is the role of the forested landscape in our climate and has it changed over time? This question has never been more important given that Oklahoma's drought and flood events are becoming more intense. Could the forested landscape be managed to help mitigate the impacts of climate change, or perhaps even reduce the severity and frequency of drought?

My internship at Sequoia National park gave me insight into how we may be able to answer some of these questions. With ground-based sensing, we can sometimes detect to the hour when phenological changes occur. The [PhenoLapse](#) feature I assembled during the internship combined the park's PhenoCam photos with site-specific weather data in a time-lapse format. This approach allows the park's biologists to most accurately document when phenological changes occur, and hypothesize why by simultaneously comparing the photos to weather and climate data.

After meeting Professor Xiao, I was very excited to learn about the use of the green chromatic coordinate to investigate the greenness of photographs. I'm interested in exploring what other ecosystem processes can be investigated through PhenoCams and other remote sensing methods so that we can perhaps model the role of ecosystem processes in our climate.

My experience, education, and background are highly eclectic and interdisciplinary. If I had three feet, they would be firmly planted in the areas of social, natural, and computer sciences. At initial glance, it might seem that an economics major from Grinnell is out of place in the department – but perhaps I'd be an interdisciplinary resource for the department in the areas of economics, policy, sociology, and computer science.

That said, I'd happily take any course the department feels necessary for the remediation of my knowledge in the biological sciences. I'm also particularly interested in the unique geology of SE Oklahoma and what role it could play in forest ecosystem processes and biogeochemical nutrient cycling.

I've come to realize that many of my professional goals and pursuits cannot be accommodated by my current employer. The organization simply does not have the capacity to execute the research grants for which I've prepared proposals. Perhaps with guidance from OU's faculty, I can develop winning proposals and obtain funding for the University.

My extensive background in education and preparing materials for youth at all levels exemplifies my passion for teaching. I'd be happy to help the department fulfill any of their research or teaching needs.

My long-term goal is to help Oklahoma obtain the funding, conduct the research, and design the educational programs it needs to best manage its natural resources for future generations.

I've attached to my application several examples of my work in hopes of highlighting my attention to detail, leadership skills, desire to help others, and passion.

Thank you so graciously for your consideration.

Bibliography

Nallapareddy, A., Shapiro, A., & Gourley, J. J. (2011). A Climatology of Nocturnal Warming Events Associated with Cold-Frontal Passages in Oklahoma. *Journal of Applied Meteorology and Climatology*, 50(10), 2042-2061.