

Personal Statement

I had a hard time sitting through classes in high school and college. I learn best by doing projects where there is a tangible outcome from my work. Consequently out-of-class experiences in college were most important in motivating my interests in ecology and environmental science.

I became interested in ecology as a career while participating in the NSF funded Research Experiences for Undergraduates program at the Cary Institute of Ecosystem Studies in Millbrook, New York. There I applied time series analysis and non-linear regression analysis to long-term data from the Hudson River. I showed that the river is warming due to increased air-temperature despite increased freshwater discharge. Two aspects of the REU program were particularly influential: I thought that it was exciting to uncover new results, and more importantly I enjoyed working with the other students and the scientists that I met at the Cary Institute.

After completing the Cary Institute's REU program, I obtained competitive funding from the Hudson River Foundation to continue working with Dr. Michael Pace, my REU advisor at the Cary Institute. The work I did with Dr. Pace as an undergraduate laid the basis for the work I am currently doing as a graduate student. For example, the use of conditional heteroskedasticity as a leading indicator of ecological regime shifts described in my research proposal was an idea that stemmed from work on lake size-distributions that I started during my senior year at the University of Vermont. The leading indicator work will be the central focus of my dissertation. The lake size-distribution work was completed during my first year as a graduate student and is now in press at the journal *Limnology & Oceanography*.

While an undergraduate at the University of Vermont, I participated in a number of activities outside of ecological research. For several years I tutored students individually in *Field Ecology and Natural History* offered by the School of Natural Resources and *World Food Population and Sustainable Development* offered by the Department of Community Development and Applied Economics. I hosted group review sessions for *Field Ecology and Natural History* as a Supplemental Instruction leader for the school. In the social sciences I was a teaching assistant for courses in the Department of Sociology and Department of Community Development and Applied Economics.

Following the completion of my undergraduate degree at the University of Vermont I decided to pursue a PhD in ecology at the University of Virginia (UVa) because of the opportunity to continue working with Dr. Pace and to begin working with his group of collaborators on the CASCADE project. The opportunity to join an established research group was exciting because I am able to attack questions that I would not be able to approach without the resources of an established, funded group. The CASCADE group is currently experimentally manipulating a lake to cause a regime shift. The lake is heavily instrumented and I can evaluate new approaches to regime shift analysis and early detection using data collected in this real world whole-system setting.

While working on the CASCADE experimental regime shift manipulation this past summer, I advised an undergraduate from the University of Wisconsin-Madison on a research project in fisheries management. We used a unique long-term census of anglers from a trout fishery in New York to show that anglers do not become more skilled over time. This is important because angler experience is often used as a surrogate for skill in the fisheries management because skill is difficult to measure. Thus, the study calls into question a fundamental assumption of much this literature. This winter we will prepare a manuscript based this work for submission to a fisheries journal. I want to continue working with undergraduates

on research. This spring I am applying for competitive funding from UVa to support a joint research project between myself and an undergraduate. We will make direct high sensitivity measurements of ecosystem respiration in lakes using a membrane inlet mass spectrometer. The work that I will propose will evaluate key assumptions about daytime respiration in aquatic ecosystems.

Outside of my work on the CASCADE project, I have worked on several other projects. One current project explores inequality in water use between nations. Over 80% of the world's population is thought to live in regions with threats to water security. A more equal distribution of water use will be necessary to support growing human populations because safe, accessible freshwater is finite. Global trade might help alleviate water scarcity because crops can be grown in water rich nations and shipped to water scarce populations. The water scarce populations can use their available water for household uses instead of agriculture. However, we have shown that the trade of agricultural and industrial products actually makes the distribution of water use less equal and that the volumes of embodied water traded (known as virtual water) are not large enough to overcome inequalities imposed by regional differences climate. Thus virtual water is not a viable approach for ensuring that all populations receive sufficient freshwater, a need recently declared as a human right by the United Nations. I am currently preparing a manuscript on this work with my advisor and UVa hydrology professor Dr. Paolo D'Odorico.

Beyond research, I have taken a leadership role by serving as co-chair of the UVa Department of Environmental Sciences Graduate Student Association. In this position I manage a \$6000+ budget and am responsible for two Department socials per week. I am also responsible for the Department's annual fall pig roast, a winter holiday party, a formal research symposium for graduate students, a spring awards ceremony and spring party.

Last spring I started cultivating a relationship with local media outlets when, with other graduate students, I founded a faux research organization to "study" a large snow pile next to a Chipotle restaurant deemed the 'Mt. Chipotle National Research Observatory.' Our science satire led to no less than six local newspaper articles including several front cover stories. More seriously, we were able to leverage this relationship with the local media to draw attention to the baseless attacks Virginia's Attorney General is making on my Department and on academic freedom over former faculty member Dr. Michael Mann's research on climate change. For the first time this spring, we will invite journalists to our Department for a panel discussion aimed at improving the way faculty and graduate students interact with and make use of the media. I hope that with the knowledge we gain from this session, both the graduate students and the faculty will be better able to communicate with the media and thereby enhance outreach to the public.

This spring I will apply to the UVa Teaching Resource Center's *Tomorrow's Professor Today* program. *Tomorrow's Professor Today* is a professional development program designed to facilitate the transition from being a graduate student to being a professor with a particular focus on improving the quality of teaching. The program includes training on teaching techniques, developing course materials and co-teaching a course with a professor, developing a teaching statement, and seminars on obtaining a job in academia and the institutional responsibilities of professors and administrators. I also hope to attend short courses for graduate students on ecosystem ecology and likelihood method in ecology hosted by the Cary Institute of Ecology in Millbrook NY. An NSF Graduate Research Fellowship will provide me with the support to become an active and successful member of the scientific community by enabling me to focus on research as well as allow me to pursue additional academic and professional training outside my department.