Personal Statement
2006 NSF Graduate Research Fellowship Application

The intellectual thrill of discovering solutions to unanswered questions and the personal fulfillment of affecting positive change in society have long been my dual passions. My undergraduate major in Environmental Science and Public Policy at Harvard University enabled me to pursue both passions through a comprehensive and interdisciplinary curriculum that spanned the natural and social sciences. Outside the classroom, I explored research in different scientific disciplines and various facets of environmentalism to gain a broad understanding of the environmental field. My experiences showed me that I could be a strong advocate for the environment as a scientist who had a deep understanding of ecosystem processes and could guide policies by unraveling the complexities of nature. A key goal in my career as a scientist is, therefore, to educate the public, managers, and policymakers so that they are able to understand and use advances in science for environmental protection. I am pursuing a Ph.D. in the Environmental Science, Policy, and Management (ESPM) Department at the University of California-Berkeley to continue framing my scientific interests within a broader social context. I am specializing in biogeochemistry in the lab of Dr. Whendee Silver, so that I can help elucidate the biogeochemical processes that affect and contribute to global climate change.

As an undergraduate, I stumbled upon a powerful way to influence environmental policy—through policy-relevant scientific research. I had sought research assistantships in a variety of research groups to satisfy my desire for intellectual challenge and to get a taste of scientific research on both ecosystem and organismic levels. In Dr. Steven Wofsy's lab, I was immediately drawn to the interdisciplinary nature of biogeochemistry, where atmospheric chemistry met ecosystem ecology and fieldwork was interspersed between time spent in the lab and at the computer. Moreover, the carbon (C) cycling work of the Wofsy lab directly addressed global climate change, an issue that had captivated me in my coursework because it underscores the need for more scientific evidence to spur environmental change. As a member of the Wofsy lab, I wrote my senior honors thesis on the effect of selective logging on the coarse woody debris component of a northern hardwood forest C budget, a neglected aspect of forest management as a strategy for mitigating the accumulation of carbon dioxide in the atmosphere.

I approached my senior thesis experience not only as a rare learning opportunity but also as a personal test to determine if I wanted to attend graduate school. The scope of my project and my dedication to it completely surpassed my initial expectations. The entire research experience—designing the experiment, testing the procedures, conducting fieldwork, performing statistical analyses, and writing the manuscript for peer-reviewed publication—enthralled me. The year in-between college and graduate school, I worked closely with a graduate student as a technician on a rainfall manipulation experiment to gain field and laboratory skills that I am now using in my Ph.D. research. I greatly enjoyed working full-time on the project and learning new skills, but I did not feel intellectually challenged merely collecting data. The experience further confirmed my desire to pursue advanced study in biogeochemistry, so that I can direct my own research and learn the problem-solving and critical-thinking skills necessary to advance the field.

The complex scientific questions about global climate change that I hope to tackle in my career require collaborative research between different scientific fields. For my dissertation, I am developing a new method to measure dinitrogen (N_2) emissions from upland soils as part of an effort to understand anthropogenic nitrogen deposition effects on future greenhouse gas emissions from humid tropical forests. By reading widely in the literature, I found that Dr. Ralph Keeling, an atmospheric scientist, had developed an analytical technique that was critical to the success of my method. My subsequent collaboration with Dr. Keeling has shown me that reaching out beyond my small sphere in the scientific community can help bring new insight into

the questions that I seek to answer. To promote interaction between different fields of scientists in the diverse ESPM department at UC-Berkeley, I have organized weekly graduate student happy hours and monthly graduate student lunches in which students present non-technical talks on their research. This not only serves as an opportunity for students to share their research with each other but also gives them practice in making their research understandable to people outside of their field. Fostering rapport between scientists in different fields will help spur innovation in technology and theory necessary to answer questions not only regarding global climate change but also other intricate environmental issues such as nitrogen deposition and land-use change.

The advances in science that could contribute to environmental protection must be effectively communicated to the public, managers, and policymakers to have any positive impact on society. Scientists often have difficulty distilling their research into simple terms that laymen can understand. I am learning to overcome this obstacle by taking a graduate level class on communicating science to the public. As a class project, I am making a short video featuring a labmate's research that we will post on our lab website. In the era of ubiquitous internet use, this is a powerful way for scientists to convey their research to a wide cross-section of the public. For real world practice of what I am learning in the classroom, I am interning with the Union of Concerned Scientists to create a brochure explaining to the public the causes and consequences of global climate change. I am also helping to review the literature and write about climate change impacts on California agriculture as part of a report commissioned by Governor Schwarzenegger. This experience is teaching me how to translate jargon that is so familiar to me into everyday terms that people of all educational levels can easily grasp.

In educating the public and policymakers about science, I hope to engage and interest them in scientific discovery. As an undergraduate, I taught second graders in a predominantly Hispanic school in Boston about nature in fun and interactive ways. I educated the children about earthworms by teaching them a catchy song and about the greenhouse effect by wrapping a student in successive layers of blankets. I am also mentoring teenage girls from underprivileged schools in the San Francisco Bay Area through the Techbridge Girls program at the Chabot Space and Science Center. We take the girls on field trips and do demonstrations in the lab to make science exciting and accessible. The web video mentioned earlier is designed as detective story so that the viewers can experience the scientific process and the thrill of discovery. Until I fortuitously attended a lecture by Dr. Wofsy that introduced me to the field of biogeochemistry, I never seriously considered a career as a scientist. I cannot know what will resonate with each person that I educate, but my hope is that by exposing people to many different research areas, they might find something that sparks a lifelong passion for science. At the very least, I can help people become more comfortable with scientific concepts and understand the scientific process so that as active citizens, they are empowered to make informed decisions.

My career will not only be devoted to advancing the field of biogeochemistry but also to educating the public, managers, and policymakers about science so that they can choose appropriate actions to protect the environment from threats such as global climate change. The National Science Foundation Graduate Research Fellowship would provide the funding necessary for me to conduct innovative research on N_2O and N_2 production from upland soils to better understand the controls on denitrification. The prestigious award would also lend credibility to the proof of concept for the new method I have developed for measuring N_2 production from denitrification. It will also give me credibility as I educate others within and outside of the scientific community about denitrification, a process that contributes greatly to greenhouse gas emissions in the humid tropics.