Whenever I stand atop a mountain gazing out at the vast expanse of wilderness below, I am left feeling awestruck at the intricacies of the natural world on display before me. Though my own upbringing was in suburban Chicago, both of my parents were from upstate New York and frequently brought me to the mountains that they once called home. I recall a childhood largely spent losing myself in forests and scrambling up mountainsides. These adventures sparked my curiosity in the world around me; I could not remain a passive observer in the face of so many avenues for exploration. Every rock, bird, and tree was an object of fascination and I sought to comprehend their unique stories. My parents fed my budding interest in science by giving me telescopes, microscopes, and fossils as birthday presents. In this way, I learned to view science as an exciting and fun way to explore the world, a perspective I maintained throughout my young life. In high school, my biology teacher encouraged me to expand my scientific understanding through research, leading me to carry out science fair projects on topics such as fish schooling behavior to carbon sequestration. These gave me my first taste of the excitement of posing questions about the world and finding ways to answer them. I loved learning the how's and why's of the living world and was especially fascinated by the chemistry driving all of life. This fascination led me to pursue a degree in biochemistry at Villanova University.

As an undergraduate, my courses in biochemistry captured my interest but I had no idea what I could or should do with the degree I would eventually earn. Unlike many other students in my program, I had no desire to attend medical school and was unsure of what other options were available. I hoped that some research experience might point me in the right direction, so I searched for a position in a biological laboratory. I applied for a spot in Dr. Melanie Vile's ecosystem ecology research group, despite having no prior experience in the discipline, in hopes of combining my passion for nature with a technical training in the biological sciences. During the summer after my freshman year, I traveled with the members of this lab to boreal Alberta to work as a field assistant. I spent the summer helping to collect and analyze water and vegetation samples in boreal peatlands near the Athabasca Oil Sands Region. Peatland ecosystems store vast amounts of carbon (C) and nitrogen (N), but global climate change and pollution from human activities are altering their chemical functioning in ways that may exacerbate the effects of climate change and result in a positive feedback loop. The most pressing threat currently facing Alberta's peatlands is oil sands mining. The digging of surface mines has already destroyed thousands of hectares of peatlands and boreal forests. Furthermore, the pollution released from daily mining activities has increased N deposition in the surrounding region nearly by tenfold. This significant new input of N to these once-pristine ecosystems may suppress their ability to store carbon; in the future they could even become net carbon sources. My research group worked to monitor ecosystem health in the oil sands region, to establish an N critical load for boreal peatlands, and to determine if the tissue chemistry of certain plant species could be used as a proxy for ecosystem health. Our results have been used by environmental groups, such as the Wood Buffalo Environmental Association and the Cumulative Environmental Management Association, that advocate for Alberta's natural ecosystems and work to regulate the region's oil industry. The widespread environmental devastation I witnessed while conducting field work disturbed me deeply and it was gratifying to know that my work could help curb this destruction. That summer served as my first exposure to rigorous scientific research conducted in the outdoors, previously the setting for more carefree adventures. Exploring how biochemical processes occurring on a cellular scale, which once had seemed confined to textbooks and classroom lectures, could influence the functioning of plants, ecosystems, and the whole

biosphere, added new layers of depth to my interactions with nature. After those first few months, I was hooked.

I continued my research in peatland ecology and biogeochemistry throughout my undergraduate career by continuing to work in Dr. Vile's lab during the school year and as a field researcher in Alberta during the summers. I became more independent in my research efforts as I matured as a scientist. As a sophomore, I began collaborative work with a graduate student in my lab and studied the effects of increased N deposition on *Sphagnum* carbon loss in peatlands receiving chronic N pollution. We found that further increases in N deposition did not change patterns of carbon loss, suggesting a possible adjustment to chronic pollution. During the summer of 2012, I conducted an independent research project funded through a Villanova University Undergraduate Research Fellowship to examine the role of molybdenum (Mo) and phosphorous (P) availability in controlling rates of biological N_2-fixation in peatlands. N_2-fixation is the major input of bioavailable N to pristine peatlands, but almost nothing is known about what factors control this process. I was required to write a research proposal to obtain this grant, which introduced me to the challenge of posing an original scientific question and creating a sound experimental design to investigate that question. This complemented my independent fieldwork in Alberta, which helped me cultivate my resourcefulness and creativity. I worked out of Meanook Biological Research Station, a facility located on a rural nature reserve where it was difficult to obtain scientific equipment and supplies. I often had to improvise equipment that I needed from everyday items: mason jars and utility buckets became airtight chambers for studying gas fluxes and PVC pipes became water sampling devices. That summer I also had the opportunity to present the results of my independent research through a poster at the 2012 BIOGEOMON International Symposium on Ecosystem Behavior. During this conference I began to develop my communication and presentation skills as well as make connections with many scientists in my field. I expanded this research for my senior honors thesis through a year-long laboratory study designed to explore how interactions between the availabilities of N, Mo, and P influenced N_2-fixation rates. I shared my results through a written thesis that is publicly available on the Villanova University Honors Program online thesis archive, as well as through a poster presentation at Villanova University's Sigma Xi poster symposium and an oral presentation at the biology department student colloquium. Furthermore, I am preparing a manuscript for publication based on my thesis research, which I plan to submit to the journal *New Phytologist*. I will also be presenting this work through a poster at the American Geophysical Union 2013 Fall Meeting.

My time at Villanova also awakened a passion for service that changed the way I viewed the world. I served as a teacher for urban youths in Philadelphia, which brought me face-to-face with the social and economic issues that disadvantaged my students. On a more global scale, I worked with Catholic Relief Services to advocate for the adoption of fair trade products on my campus by organizing documentary screenings and bringing in speakers. Later in college, I sought out opportunities for leadership, such as leading a group of college students on a week-long trip to build houses in North Carolina through Habitat for Humanity, working to establish a campus community garden, and serving as a student facilitator of the Environmental Leadership Learning Community. As I was exposed to the injustices that harm both humans and the environment, I also became aware that I could do something about these issues, a realization that inspired me to merge my love of research with my passion for service.

Continuing my research in ecosystem function gave me one way to engage with the world, and I began to seek out opportunities to engage on a different level and to share my work with a

broader audience, particularly younger students. To encourage younger students to get involved in research, I have presented my work at various campus events, such as Villanova's accepted students' day and the biology department open house. During these presentations, I shared the results of my research and explained the many benefits of pursuing research with prospective college students. My goal was to demonstrate to younger students that research is fun, rewarding, and open to anyone with interest and passion. I have also been involved with female students participating in the WISEST (Women in Scholarship, Engineering, Science, and Technology) Summer Research Program, a University of Alberta program for high school students. The goal of this six-week summer program is to allow girls to complete scientific research projects and expose them to careers in science and engineering in order to increase women's representation in these fields. To reach an even wider audience, I contributed blog posts and photographs to my Villanova research team's science blog, The 55th Parallel (www.55parallel.blogspot.com). The goal of this blog is to educate the public about facts of peatland science and communicate to them the beauty of these ecosystems. By sharing our personal insights and daily experiences as scientists, we hope to inspire readers to do their part to conserve the natural world.

These experiences as an undergraduate convinced me to pursue a career as a researcher and enter a graduate program. I am now a first-year doctoral student in the Soils & Biogeochemistry Graduate Group at UC Davis, where I am working with Dr. Ben Houlton. I am continuing my studies in ecosystem N cycling and the factors that control N cycling processes; in particular, I plan to explore various controls of N_2-fixation, an important source of plant-available N. Through my research, I intend to further current knowledge of how human activities and global climate change alter the way ecosystems cycle N. This understanding is crucial, because N cycling can have feedbacks on C cycling, and therefore global climate change. I will make the results of my research publicly available through Dryad, an online database for the long-term storage of ecological data, so that my findings can be incorporated into global climate models. Throughout my graduate education I will continue my involvement in service. I currently participate as a mentor in the Student and Landowner Education and Watershed Stewardship program (SLEWS), a program that engages Sacramento-area youth, many of whom come from disadvantaged backgrounds, participate in hands-on environmental restoration activities. I will also participate in the SEEDS/EnvironMentors program, which my advisor leads. This program targets ethnically diverse high school students, pairs them with undergraduate and graduate mentors, and provides them with opportunities research in ecology. I will mentor a high-school student on a project studying N_2-fixation in crop plants at UC Davis's Russell Ranch.

My eventual aim is to work in academia as a principle investigator. I will continue both my research in biogeochemistry and my dedication to student outreach. It was serendipitous that I began working in an ecology/biogeochemistry lab early in my undergraduate career and discovered a field that truly resonated with me. However, most students are not exposed to this exciting and relevant field, and I intend to rectify this issue through student outreach programs similar to the ones I am currently involved with. Along the way, I hope to serve as a mentor for younger girls who are interested in science. I have been lucky to have strong female scientists, both in my family and in academic environments, as role models who have been crucial in shaping my initial interest in science and helping me grow as a researcher. I would not be where I am today without the support of such dedicated mentors. An NSF Graduate Research Fellowship will provide me with the support I need to continue my education and research in a globally relevant field while providing a younger generation of students with the same support that was so vital to my own development.