My first experience with scientific research was as an undergraduate in Molecular and Cell Biology (MCB) in the Levine lab, a genetics and development research lab at UC Berkeley. Working closely with a doctoral student, I was responsible for a project exploring a cis-regulatory region in *Drosophila*. Through this project I not only acquired rigorous molecular protocols and experience managing sensitive assays, I also experienced first-hand the application of the theory I was learning in my courses and truly understood the relevance science theory. The work that I did was incorporated into a larger project and later published with the supervising doctoral student as author[i].

Though my experience in the genetics lab was interesting, I wanted a more applied and interdisciplinary focus. So, rather than finishing my baccalaureate in MCB and going on to graduate school in the same field, I majored in Public Health within the School of Public Health at Berkeley. Through this change I was able to broaden my training in interdisciplinary applications of science, exploring relationships between humans and the environment. I declared an emphasis in Environmental Health Sciences in my final year and sought out a position with the Schistosomiasis Group under the guidance of Dr. Robert Spear. I worked closely with one of the researchers in the group, Dr. Edmund Seto, to analyze novel data he had collected in China, a project that directly implemented the tools and theory to which I had been exposed, namely geographic information systems (GIS), statistical modeling, and complex relationships between humans and ecological systems, which contributed to a journal article published last year[ii].

Because of this experience, I was recruited into the masters program in Landscape Architecture and Environmental Planning in the College of Environmental Design by the department's GIS professor and director of the Geographic Information Science Center (GISC), Dr. John Radke. I fell in love with spatial data analysis and digital mapping. Just before starting the masters program and being hired at the GISC as a technical consultant and researcher, Hurricane Katrina hit the southeast US coast (2005). A working group on Berkeley's campus, comprised primarily of engineers and system analysts, was formed at the start of the semester to tackle some of the issues surrounding levee construction and related environmental factors. The GISC, through the involvement of Dr. Radke, was asked to provide digital geographic data to the group for use in analyses. I was responsible for acquiring all relevant data, converting it to a usable form, and organizing and cataloging the data for the work group to access.

While the data-mining and cataloging portion of the project was somewhat tedious, the investigation into what the data represented and how to make it compatible in a geographic database was not. In particular, I had to fully understand geographic transformations projections and coordinate systems. The branch of geodesy that investigates how to model the earth is a fascinating topic, primarily because it explains why two-dimensional maps can be so varied in their depictions. Through this quality-control process, I better understood one path by which maps could inform or mislead. The Katrina project provided robust training in geographic data fundamentals and has provided me invaluable tools for both research and teaching. My understanding of coordinate systems, fundamental to data quality control, is critical for translating these concepts to students and for preparing and organizing data for analysis, particularly international data.

In parallel to my work with the GISC, I engaged in smaller research projects as part of the studio courses within my master's program. The program focused on professional training which resulted in numerous field experiences working on projects involving diverse stakeholders. One project stood out above the rest: Mauna Kea. Our client was a group of environmental scientists, environmentalists, and native Hawaiian practitioners all with a common

concern regarding industrial development on the summit of Mauna Kea (on the island of Hawaii). There are a number of observatories on Mauna Kea due to its unique environmental conditions that make it a fantastic location for astronomical research. However modern astronomical research can be at odds with native practices and there was evidence of poorly understood and potentially damaging environmental impacts on the summit. It was the job of my team to travel to Hawaii, meet with our client group, collect environmental and social data, and then design a collection of management proposals over the following month that would assist our clients in their ongoing negotiations with the managing agencies of the site.

This was where field work came to life for me: studying new social and environmental processes, working with community groups and using "citizen science," and working in challenging conditions (e.g. the summit is at nearly 14,000 feet elevation). I was personally responsible for collecting modern and (known) ancient Hawaiian uses on the mountain and incorporating them into our group analyses. Within our week in the field we toured each of the ecotones on Hawaii, visited the observatories, hiked to an ancient adze quarry with a modern-day adze maker, collected some of the only historic data on the endangered Wikiu bug, and attended a sweat lodge in our honor by a member of the Native American Church and the Royal Order of Kamehameha. It was an incredibly challenging and exhilarating experience, and it made it hard to imagine doing research that was not grounded in a place with context, complexity, and the opportunity to translate the results back to the community. This project taught me that research should serve more than simple curiosity; it should inform decisions made outside of laboratories.

Though I was in a primarily professional program, I chose to write a thesis instead of a professional report to further challenge myself by exploring theory and asking broader questions. Articulating the central thesis was one of the most difficult endeavors I experienced, partly because it did not happen in a neat, straight-forward way: I read the literature, formed a hypothesis, read additional literature, revised the hypothesis, and repeated the process. It was frustratingly iterative. However, after I completed the analysis and the document, I received high praise from my committee and I am currently revising it for publication. From this experience, I gained both technical analysis and writing skills, and a commitment to research that I now bring to my doctoral program. My proposed research topic (e-waste recycling) is only going to increase in importance as technology advances. Thus, my commitment to scientific study, publication, and teaching stand to make significant and broad impacts in this area.

My research experience has been characterized by my love of scientific inquiry and attention to context and applications. The skills and analytical training I have developed through my previous research projects make me an excellent candidate for my proposed research. Additionally, my experiences working independently and in teams make me well-suited to interdisciplinary collaborations with researchers, policy makers and communities. My ability to translate scientific results to diverse stakeholders will ensure that my research and training will add knowledge and value to the community at large. Lastly, I will continue to teach what I learn to my students and my children so that their scientific leaps push greater boundaries.

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[i] V.C. Calhoun, M. Levine, *Long-range enhancer–promoter interactions in the Scr-Antp interval of the Drosophila Antennapedia complex*, Proc Natl Acad Sci U S A. 2003 August 19; 100(17): 9878–9883.

[ii] Seto, Edmund Y.W., **Freyja Knapp**, Bo Zhong, Changhong Yang; *The use of a vest equipped with a global positioning system to assess water-contact patterns associated with schistosomiasis.* Geospatial Health 2, 2007, pp. 233-241