

**Research, Utility, and Communication:
The Trivium for Environmental Management**

A Portfolio Proposal for a Senior Honors Project
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Bachelor's of Science in Natural Resources and Environmental Management
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Table of Contents

Introduction

Description of Project Components

1. Scientific Research
2. Environmental Management Practicum
3. Multimedia Communications

References

Student's Role

Timetable

Available Resources

Introduction:

The philosopher Socrates contemplated at length what he called “the virtuous life”. I translate this concept into a set of values that I use for guidance as a student and that I will seek to demonstrate with this portfolio project. These values are also notably similar to those of the Honors Program.

A second concept that I refer to is the Trivium, an idea originating from ancient Greece. It refers to the study of grammar, rhetoric, and logic as the three core subjects of the liberal arts, one of the oldest systems of education in history. The Latin word Trivium is defined as “the place where three roads meet”. I have appropriated this term for my field of study, environmental management. In this field, the trivium could consist of three essential pursuits: researching natural systems, utilizing management practices for conservation and sustainable resource consumption, and communicating with communities to forge the best path forward.

Environmental management is inherently interdisciplinary as it straddles the natural and social sciences by encompassing ecosystems and policy. As a student of this field, I will require a foundation of knowledge that spans those scientific and social realms, and therefore will need an understanding of such subjects as forest ecology, statistics, environmental history, and communication. The discipline draws on rigorous scientific research, an understanding of economic and political complexities, and a socially sensitive perspective for finding solutions to pressing environmental problems.

A prominent figure who balanced both the natural and social realms was Rachel Carson, best known as the author of *Silent Spring* (1962) – an influential and popular book addressing the subject of pesticide use in the mid-20th century. Her book became one of the catalysts for the modern environmental movement. Carson contributed to scientific knowledge and also instigated a vast increase in public awareness on environmental issues.

Another influential figure whom I greatly admire for his ability to provide context for and insights into contemporary issues is William Cronon, a celebrated environmental historian at the University of Wisconsin at Madison. While not a scientist, Cronon investigates human environmental interactions through the lenses of history and philosophy. My first exposure to his work was through his essay called *The Trouble with*

Wilderness (1995), which challenged my perspective on nature and has fueled much of my interest in the social factors of environmental management and change. This led me to diversify my coursework to include an introduction to environmental history taught by Dr. Frank Zelko. This pursuit reflects my desire for a comprehensive understanding of our environment and its relationship with human history.

Today, the word “environment” tends to be immediately associated with “climate change”. While environmental managers are addressing a host of issues directly related to climate change, there are many additional environmental problems that may overlap or be exacerbated by global warming but remain distinct issues of their own. Those include species extinction, water and food security, resource exploitation, and waste management. The Department of Natural Resources and Environmental Management (NREM) at the University of Hawai‘i at Mānoa (UH) encourages an integrated approach to analyzing and addressing complex ecosystem interactions through the lenses of the environmental and social sciences.

To showcase my development as a student of environmental management who takes a multidisciplinary approach, this portfolio project will exemplify my adapted trivium through a combination of scientific research, experience in environmental management, and communication of environmental issues. The completion of each component will demonstrate proficiency in that particular area through products such as a scientific publication, reflections on in-field and early career experiences, and op-ed pieces. The skills I develop through this work will be employed on a daily basis, whether in an office, forest reserve, or community setting. My ultimate goal is for this portfolio of projects to reflect a well-rounded student of environmental management specializing in plant ecology, conservation, and management.

Description of Portfolio Components:

1. Scientific Research

My undergraduate research project for this component arose through my work as a volunteer collections assistant at the University of Hawai'i Insect Museum (UHIM) where I was exposed to entomology. Since the summer of 2018, I have been collaborating with experts on (and also independently leading parts of) a research project focused on the interaction between a parasitic fungus and several species of fruit flies collected in Australia, Southeast Asia, and the western Pacific. Dr. Camiel Doorenweerd, the curator of the fruit fly collection for the UHIM and a researcher in the Rubinoff Lab (<https://www.ctahr.hawaii.edu/rubinoffd/index.htm>), is my primary mentor for this project. Upon its completion, our study will provide insight into the distribution, prevalence, and phylogeny of this fungus and the respective fruit flies in the region.

At the outset of the project and my foray into entomology, I began reading scholarly articles about the *Stigmatomyces* genus and *Laboulbeniaceae* family of fungi, several different fruit fly species (all of which belong to the *Bactrocera* genus in the *Tephritidae* family), and similar fly-fungus interactions studied by a leading expert, Dr. Walter Rossi of the University of L'Aquila, Italy (Rossi et al. 2011, Rossi et al. 2013, Thaxter 1918). In addition to learning about fly and fungus anatomy and phylogeny, I attended a workshop taught by Dr. Doorenweerd that helped me to begin learning Python (a common programming language in the sciences); armed with this knowledge, I aim to create maps for this research project that show infection prevalence across the region. Having completed much research and data processing over the summer of 2018, I began statistical analysis, creating figures, and drafting a manuscript over this past academic year.

Thus far, this project has led me to become proficient in technical scientific skills, such as using microscopes and photographing specimens. On a broader level, I am also gaining a better understanding of the scientific research process and what a career in research entails. With the final goal of publishing a paper in a peer-reviewed scientific journal, where I am recognized as a co-author, I will demonstrate that I have invested significant effort into a research project, strengthening skills that will make me a more effective environmental manager in the future.

From the start of the project, this experience has been imparting lessons in critical thinking that are invaluable and especially relevant for a student entering a biological or ecological field. My degree's emphasis on plant ecology, conservation, and management makes this research experience particularly important since insects play a pivotal role in any environment.

2. Environmental Management Practicum

A summer internship at the Hawai'i State Division of Forestry and Wildlife (DOFAW) will serve as my environmental management practicum. Hands-on experience in a range of projects, and under the guidance of expert mentors, will help me hone my abilities to work as part of a team, think critically while in the field, and apply knowledge to real-life situations.

The Department of Land and Natural Resources (DLNR) is the government entity at the state level charged with managing natural resources in Hawai'i. DOFAW, under the purview of the DLNR, seeks to "responsibly manage and protect watersheds, native ecosystems, and cultural resources and provide outdoor recreation and sustainable forest products opportunities, while facilitating partnerships, community involvement and education." While the specific details and scope of my work have yet to be determined, I have been communicating with Irene Sprecher (Forestry Program Manager), Philipp LaHaela Walter (State Resources Survey Forester), and Jan Pali (Forestry Watershed Planner) of DOFAW. My summer internship will likely involve work within the topics of environmental policy, watershed management, and conservation.

In addition to the practicum serving as an essential formative experience for a student entering the career field of environmental management, it will also satisfy my bachelor's degree curriculum requirement of completing an internship. The products for this component, written reflections, will therefore meet the specifications of both the Honors Program and NREM 492, the internship course (taught by Dr. Idol) that accompanies the experiential element.

By keeping a weekly journal of my experiences, I will be able to record reflections on what I have learned and how my work supports management projects. Furthermore, journaling will help me examine how a state agency functions, as well as how

professional environmental managers address problems. At the end of the internship, a final reflection on the cumulative learning experience will be the product for this component of the portfolio. Depending on the specifics of my summer work, an additional outcome could be a discrete section of a management project such as writings or fieldwork results.

3. Multimedia Communications

This project will build my skills in communication with the end goal of drawing the public's attention to important environmental issues specific to Hawai'i. The primary product will be a website (built using a platform such as Wordpress) presenting long-form journalistic stories, photo essays, infographics and maps, and visual reportage. This assortment of multimedia takes advantage of each format's strengths in order to best communicate a topic. In addition to building my website, I will be pitching stories to local or regional news outlets and exhibiting my work on the University of Hawai'i at Mānoa campus to communicate with a broad university audience about topics in conservation and environmental management – subjects that are near and dear to me and particularly important in the Anthropocene.

To implement this broad goal, I will begin by investigating several environmental issues to develop “leads”, thereby acquiring background information and piecing together the current media landscape for particular subjects (e.g., Rapid Ohia Death, climate change, sustainability). I will meet with relevant experts to consult with them about communicating issues to the public that may otherwise not receive enough attention. As a result, I expect to find and fill gaps of insufficient information or reporting. Through literature reviews, archival research, and personal interviews, I anticipate being able to identify specifically where educational material is needed in order to develop suitable media products with the goal of increasing public awareness in strategic areas. As an aside, this process (which is similar to what occurs in investigative journalism) will also help me learn about environmental topics in greater depth.

In this wide-ranging field of communication, renowned professionals whom I seek inspiration from include Richard Johnson (<http://newsillustrator.com>), Molly Crabapple (<https://mollycrabapple.com>), Sebastião Salgado (<https://www.amazonasimages.com>),

Tom Patterson (<http://www.shadedrelief.com>), and Alberto Cairo (<http://www.thefunctionalart.com>). Each of these professionals tells stories in different ways, whether through illustrated records of events, artistically conveying sociopolitical issues, cartography, or scientific communication. Specifically, it is the ability of these communicators to distill a complex reality into a powerful message – and then present it visually – that interests me. In the introduction to his book *The Functional Art*, Alberto Cairo describes that “visual communication has not been as intellectually elevated as writing ... [infographics are] treated not as devices that expand our perception and cognition, but as decoration”. Expanding on this misconception that Cairo describes, I would also include reportage, a form of visual journalism that is rooted in sketching and is more related to the arts in that the journalist will use any media (e.g., graphite, ink, paint, collage, photography) to present a subject.

Journalism fits under the umbrella term of communication. As indicated by my description of reportage, I consider journalism to be a broad field that overlaps with narrative writing, visual art (e.g., paintings of trench warfare in World War I), science, and history. Nevertheless, there are countless sources of inspiration from the field of more traditional journalism that include Elizabeth Kolbert and Tim Hetherington. I will also be referring to their work as I develop multimedia stories.

Finally, the communications products from this project component will not only help the general public understand the importance and relevance of particular issues but will enrich their understanding and perspective of science and social problems. An informed citizenry, that embodies the virtues I described in my introduction, is essential for any society. It is my aim to strengthen that foundation of shared knowledge and values through this project.

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Student's Role

Each component comes with its own structure and format. In the case of the entomology research project, I am collaborating with my mentor Dr. Doorenweerd, as well as Dr. Rubinoff. While I have led several aspects of the research, I receive extensive input and guidance from my mentor. The end result is a joint effort to publish scientific research in a peer-reviewed journal. My contribution will be credited through co-authorship. The practicum component will be shaped by DOFAW and UH. The reflection papers will be written by myself; these will follow the guidelines and address the objectives provided by the NREM internship instructor, Dr. Idol. By contrast, my work at DOFAW will be selected and prescribed by state specialists in accordance with the agency's mission. It will likely involve extensive collaboration with other employees, committees, and organizations. Lastly, developing creative communications products such as those outlined in the previous section is the most independent process within this portfolio of projects. Nevertheless, I will again rely on mentorship (primarily from Dr. Gorbach) and advising from several specialists along the way.

Timetable

Academic Terms / Semesters	Honors Program: Senior Project: Portfolio Components		
	Scientific Research	Environmental Management Practicum	Multimedia Communications
Spring 2019	Collaborative research transitioning to supporting the publication of a manuscript for this entomology research project.	Find internship and establish parameters.	Apply for funding from the Undergraduate Research Opportunity Program (UROP).
			Develop leads and begin to specify topics.
Summer 2019		Complete management internship / practicum.	Continue developing leads and specifying topics.
		Weekly journaling and reflections during internship. Final reflection paper, partially completed.	
Fall 2019		Complete final reflection paper.	Purchase equipment from UROP funding.
			Interview, photograph, illustrate, design material products.
Spring 2020			Work toward finalizing components.
			Present at Honors Showcase, library, and Departments or Schools at UH Mānoa.
Graduation			

Available Resources

The Department of Natural Resources and Environmental Management (NREM) and the School of Communications, together with the Honors Program at the University of Hawai'i at Mānoa, provide guidance through extensive advising. In the case of this portfolio project, the support of Dr. Travis Idol, Dr. Julien Gorbach, and Dr. Vernadette Gonzalez have been and continue to be instrumental. It is also through the help of my home department (NREM) that I will be able to foster connections with state agencies, local advisory committees and offices, and non-profit organizations to gain experience and accomplish the projects I have described. Additionally, professional relationships with faculty and graduate students on campus, in fields ranging from geology to history to art, will be eye-opening and influential in shaping the trajectory of this work.

More specifically and beyond coursework, I have training and experience applicable to each component of this project. First, through my work as a research assistant, I received basic lab safety training from the Environmental Health and Safety Office at the University of Hawai'i at Mānoa. This instruction has increased my awareness of workplace safety regardless of the setting. On-the-job training has also increased my attention to quality assurance and control. Second, as a student who has taken a multimedia journalism course, I have learned the basics of photography and have been certified to operate recording and video equipment by the ACM Media Center. Third, I have access to the map and computer facilities of the Geography Department which offers printing services and makes Geographic Information Systems (GIS) software available to students. Fourth, the Map and Government Document section of Hamilton Library stores many historic maps that are useful references.

Lastly, by applying for funding from the Undergraduate Research Opportunity Program (UROP), I hope to acquire desired equipment such as cameras, microphones, art supplies, and software packages (e.g., Adobe Illustrator and Photoshop) to create professional-quality, publishable products for the communications component of the portfolio project.