

STATEMENT OF GRANT PURPOSE

Jeffrey Good, Indonesia, Environmental Science

Effect of industrial pollution on the economically important milkfish, *Chanos chanos*

Background and Significance:

Pollution in the aquaculture industry of Central Java, Indonesia is a serious problem that has piqued my interest. Aquaculture, the raising of commercially important fish, is one of the most useful tools to sustain human communities dependent on the ocean for food and is a source of economic growth. As a long established primary resource for food and income for many Indonesian families, aquaculture has become one of the most important economic, cultural and essential parts of Indonesian communities. Indonesia has also collocated sites of large industry with its coastal communities. Large concentrations of industrial pollutants (heavy metals, chemical fertilizers and pesticides) can cause harm to farm-raised seafood. *Chanos chanos*, the milkfish, is commercially and culturally vital to Indonesia and is subject to pollution from upstream industries that may be poisoning the water and sediment of the fish's aquaculture ponds. Because of its frequent consumption, contaminated milkfish may lead to biomagnification as pollutants are passed through to Indonesians and even to populations receiving the food as exports. I propose to study and compare the levels of industrial pollutants in milkfish present in coastal aquaculture facilities. By understanding the effects of pollution in this important aquaculture, safety can be better ensured when eating this cultural necessity and awareness raised of the harm to the aquaculture industries located in Indonesia.

Project Design and Timeline:

Soil samples from different pond sites along the northern coast of Java will be collected. These soil samples will be analyzed for pollutants to understand which aquacultures located downstream from industries receive the heaviest effect. Individual fish will then be collected from selected aquaculture locations. Biomarker assays will be used to understand pollutant content in the muscles, liver, and fat, the most marketed and likely parts of the fish to be consumed by humans. A biomarker assay is the analysis of important biological molecules that signal the presence of a contaminant. Example molecules include glutathione, acetylcholinesterase, and metallothioneins. A proposed timeline of this project is as follows: Background literature and training for project (August-September 2015): Complete detailed scientific literature review, necessary training with instrumentation, protocols, and finalize methodology. Project implementation and data collection (October 2015-December 2016): Field sampling and all data collected for analyses. Data analyses (January 2016-February 2016): Statistical analyses and data presentation will be underway in conjunction with ongoing project implementation. Manuscript preparation (March 2016-May 2016). Dissemination of results (May 2016-June 2016): Presentation of final results will be given at the host university and possibly to national and international conferences to influence decision-makers on the problem. Potential public outreach opportunities will be pursued in order to raise awareness of the project outcomes.

Qualifications:

As a senior at Eckerd College pursuing a Bachelor of Science degree in Marine Science and having participated in several areas of research with different professionals, I am well prepared in skills and training to pursue this proposed research. As a lab assistant to Dr. Jeannine Lessmann's professional research on mangrove restoration ecology, I have been taught valuable skills of lab and field etiquette, attention to detail and quality control. I am experienced in overseas travel to other areas of the Pacific Islands through abroad marine science courses. I was awarded the highly competitive NOAA Holling's Scholarship, where I successfully completed and presented research on the effect of oil dispersing chemicals on commercially important clams at NOAA's Center for Coastal Health and Biomolecular Research in South Carolina. I

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stand out from all students because of my unique competence in the field of ecotoxicology through the utilization of biomarkers and familiarity in titration methods used to assess pollutants in an organism and its environment. I am a fast, adaptable learner with a strong sense of the value of teamwork and diligence who produces quality work under stress. Furthermore, I have been invited to continue my work on my NOAA research project this academic year as a senior thesis and publication.

Affiliation:

Dr. Budi Widianarko of Soegijapranata Catholic University (UNIKA) in Semarang, Indonesia shares my concern for the potential harm of pollutants on aquaculture and has invited me to conduct this research directly with him. A highly reputable researcher in food technology and environmental studies, Dr. Widianarko has previous positive connections with Eckerd College's faculty and students. He is an ideal mentor. As its rector, he has led UNIKA to now be in the top 25 universities in Indonesia. In addition, he has built a strong food technology staff and has the equipment and funding to readily handle the needs of this project. Through our overlapping interests and compatible expertise, Dr. Widianarko and I can bridge scientific enlightenment and cultural cooperation to better understand the consequences of industrial pollutants' effect on Indonesia's aquaculture. With a seafood aquaculture fueling an island culture, Indonesia is the ideal location to conduct this research.

Foreign Language and Culture:

The Indonesian language, although unfamiliar, is an invaluable tool. Indonesian is not needed to complete the project, as Dr. Widianarko and his staff are fluent in English, but I plan to pursue opportunities with the language. I will participate in basic Indonesian language classes planned this spring at Eckerd College for a special summer 2015 program undertaken with UNIKA. Further, there is an intensive language course offered to expatriates at UNIKA in the first month of my arrival. It will provide me with more fundamental language skills to help me communicate in the country in a daily setting. I can continue to enroll in this class until I obtain proficiency in the language. These preparations will assure a smoother transition from my familiar culture to the Indonesian culture. By developing proficiency with the language, I will be a better equipped expatriate and a representative of the U.S. as I personally share our goals of this project with colleagues and the Indonesian public.

Project Outcomes:

Aquaculture plays an important role in the lives of many Indonesians, and any threat to such an important resource must be researched and brought to decision-makers in order to ensure the health of the local communities and environment. This research project allows for the understanding of how to make economically and culturally important seafood items safer for human consumption. It will give the scientific background that pushes for change in industrial polluting legislation and promotion of public health. I excitedly look forward to working with Dr. Widianarko on this project. It satisfies my interest in aquatic ecotoxicology and helps better the health of the ecosystem and the people it supports. Through this project, I will have the opportunity to interact, educate and learn from local aquaculturists and every day citizens to provide a complete review of our studies for important decision-makers. The research of industrial pollutants effect on economically important aquaculture, made possible by the Fulbright Scholarship, has the potential to better the health of the Indonesian people.