**STATEMENT OF GRANT PURPOSE**

**Sophie Wulfing, Indonesia, Fisheries**

**The effects of mangrove restoration on marine biodiversity Tanakeke Island, Indonesia**

Mangroves provide a key serviceto the surrounding environment such as flood and tsunami protection, carbon sequestration, and fostering biodiversity in their habitats. They are also essential to fisheries as they act as a refuge for many species of juvenile fish due to abundance of feeding resources and reduced predation. About 55% of total fish catch biomass in Indonesia is made up of species dependent on mangrove habitats.However, coastal communities in the country have experienced mangrove degradation due to anthropogenic activity at an alarming rate. To address this issue, the Indonesian government has committed to restoring 600,000 hectares of mangroves in the country by 2024, the most ambitious mangrove rehabilitation program in the world. Since these efforts began, communities where this restoration has occurred have seen the economic benefits of flood prevention and ecotourism. However, very little research has been done to assess the improvements in marine biodiversity and benefits to fish stocks that have resulted from this restoration project. In this study, I propose to work on Tanakeke Island in the Takalar Regency, South Sulawesi. There, mangrove restoration has been continuously occurring since 2015 and has been organized and conducted by the local community.I aim to understand how mangrove restoration is affecting the local marine biodiversity and improving the sustainability of commercially fished species on this island. Namely, I will be doing stock assessments of squid, snappers, groupers, and milkfish, all of which are commercially fished species that have experienced stock declines in recent years due to overfishing but may also be benefitting from this mangrove conservation effort.

I plan to conduct my research in Tompotana village on Tanakeke Island, where mangrove forests were largely depleted due to shrimp aquaculture and charcoal production. Proving to be unsustainable, most shrimp farms were abandoned in the 1990s. As a response, the group Yayasan Hutan Biru (Blue Forests) has been working with the local community on Tanakeke to restore mangrove forests. They have seen tremendous success on both forest restoration and community engagement, however no formal study has been conducted on the role of mangrove restoration on increased catch of commercial species by local fishers. To address this, I will work with Blue Forests to collect data through Baited Remote Underwater Videos (BRUVs), a non-invasive, cheap camera contraption. I will deploy these BRUVs in at three sites Tompotana and will select a site that was restored in the early 2010s, a recently restored site, and a site that still have not yet been recovered from mangrove loss. From there, I will analyze these videos to assess what species are living in each area, and calculate the biodiversity index of the sites, a key metric in assessing ecological health. I will also develop stock-assessment models of species of local and commercial interest with the aid of Fishpath, a software used by researchers to understand what modeling strategies can be used to assess population health and what management decisions will likely result in sustainable fishing. I will also conduct this work with Dr. Rohani Ambo-Rappe from the Universitas Hasanuddin in Makassar and will disseminate this research in the form of peer-reviewed scientific articles as well as to other researchers at Universitas Hasanuddin to help inform their own research on mangroves in South Sulawesi.

Then, with the help of Blue Forests, I will share my findings with the local community, both conservationists and fishers alike, to help inform how effective this mangrove conservation is and if commercially fished stocks are benefitting from these restoration efforts. I intend for this project to help understanding of the benefits of mangrove forests and for Blue Forests to be able to use my findings when convincing locals of the benefits of mangroves. Further, Blue Forests has an annual field school for local children in the communities they work in. I will aid them in programming and running this field school, along with creating curriculum to help with education on the benefits of mangroves on fish stocks.

My timeline for the project: September – November 2023: Focus on Bahasa Indonesia language learning in Java (contingent upon receiving the CLEA award). December 2023 – May 2024: Data collection on Tanakeke Island. This will involve moving to South Sulawesi and beginning to work with Blue Forests. I will deploy a BRUV at three different sites in Tompotana village. Every day I will then analyze these videos and note the species found, how long they remained detected by the BRUV, and time of day they were spotted. June 2024: Data analysis, biodiversity assessment, and using Fishpath to create population models and suggest management strategies. July – August 2024: I will discuss results with Dr. Ambo Rappe, write up our findings, and begin developing conclusions on the benefits of mangrove restoration. This will come in the form of a report with the goal of providing information to these groups and allow community members to choose the best course of action given the findings of the project. I will also work with Blue Forests at this time to develop programming for community engagement and help them with their annual field school project.

Dr. Rohani Ambo-Rappe is a seagrass ecologist that has worked extensively in the areas surrounding South Sulawesi with both fisheries researchers and the local community in the region. She can provide expertise in the area, connect me with local fishers, and provide key advice for conducting science in tropical marine areas. Dr. Ambo-Rappe has also helped me identify ways I can help support the local community. To engage with the students at Makassar, I plan on teaching weekly workshops in the statistical programming language R, a common analysis tool in ecology in order to aid university students in their research and experience in conducting scientific analysis. I have run similar workshops both when I was working in Bogotá, Colombia and during my master’s program so I am familiar with the challenges new students face when learning to code. I would gain so much from a Fulbright Grant in Indonesia, and I hope to use this course to foster a mutual exchange of experience and knowledge.

I have conducted fisheries research both in the field and through data analysis. In 2017, I interned for the National Oceanic and Atmospheric Administration where I aided in a research project updating population models of Pacific fishes. Further, I participated in their bottom trawl survey, learning how to identify species in the Eastern Pacific and how fisheries are managed and regulated. I am familiar with coastal restoration research through my time at Louisiana Universities Marine Consortium, where I worked in a lab studying coastal erosion in Louisiana’s marshland. Currently, I am getting my master’s degree at University of New Hampshire’s Department of Biological Sciences where I study mathematical applications in biology. My thesis is in studying small-scale fisheries in Madagascar and I hope to continue this type of research during my Fulbright year. Further, as I have lived abroad before, I understand how language fluency plays an essential role in connecting to the people around you. This is why I will also be applying for the CLEA and have a language learning strategy in place prior to the grant that I have outlined in my supplemental essays.

After Fulbright, I plan to apply for jobs at an NGO or government agency to better understand and quantify the status of our world’s small-scale fisheries. This project will aid me in that goal as it will help me gain a better understanding of the complex relationship between culture and conservation and how the best way to protect the environment is to also understand people’s relationship with it. Despite the growing threats ocean environments face, Indonesia is still home to precious marine resources that require better understanding to protect them.