**STATEMENT OF GRANT PURPOSE**

**Sophie Wulfing, Indonesia, Fisheries**

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

Mangroves provide key servicesto the surrounding environment such as flood and tsunami protection, carbon sequestration, and fostering by acting as a refuge for many species of juvenile fish due to abundance of food 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 alarming rates of mangrove degradation due to anthropogenic activity. 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 have seen the benefits of flood prevention and ecotourism. But little research has been done to assess the improvements in marine biodiversity and benefits to fish stocks that have resulted from this restoration project. I aim to understand how this restoration is affecting local marine biodiversity and the sustainability of commercially fished species on this island. I will conduct this work with Dr. Rohani Ambo Rappe from the Universitas Hasanuddin in Makassar (see Letter of Affiliation) and will disseminate my findings through peer-reviewed scientific articles and presentations to other scientists at Universitas Hasanuddin to inform their own research on mangroves in South Sulawesi. I will also be working with the non-profit group Blue Forests as they conduct mangrove conservation research in South Sulawesi and can introduce me to the community and help me communicate findings to local decision makers (see Letter of Affiliation). I have extensive background in fishery assessment and have lived in several coastal communities where I have learned how important the relationship between researchers and stakeholders truly is. After my Fulbright year, I plan on continuing research in small scale fisheries and hope to gain a deeper understanding of how conservation has tangible effects on local fishers.

Dr. Rohani Ambo Rappe is a seagrass ecologist who has worked extensively in South Sulawesi with both fisheries researchers and the local community in the region. She will provide expertise in the area, connect me with local fishers, and provide guidance in conducting science in tropical marine areas. I will work in Tompotana village on Tanakeke Island, South Sulawesi where mangrove forests were largely depleted due to shrimp aquaculture and charcoal production. To address this, mangrove restoration has been led by Blue Forests and the local community since 2010. Specifically, I will be doing stock assessments of squid, snappers, groupers, and milkfish, all of which are commercially fished species that have experienced declines recently due to overfishing but may also benefit from this mangrove conservation effort. I will work with Blue Forests to deploy Baited Remote Underwater Videos (BRUVs), a non-invasive and inexpensive camera contraption. This method has not been utilized in the area and does not require catching or killing fish to collect data. I will also develop stock assessments of species of local and commercial interest with Fishpath, a software used by researchers to evaluate different management scenarios.

Project Timeline: September – November 2023: Focus on Bahasa Indonesia language learning in Java (contingent upon receiving the CLEA award). December 2023 – May 2024: Data collection. With the help of Blue Forests, I will deploy a BRUV at three different sites in Tompotana village: a site that was restored in the early 2010s, a recently restored site, and a site that still has not yet been recovered from mangrove loss. The BRUVS will have been purchased prior to the start of the grant using personal funds. Every day I will analyze these videos and note

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the species found, how long they remained detected by the BRUV, and time of day they were spotted. June 2024: I will clean and formalize the data for analysis, calculate the biodiversity index (a key metric in assessing ecological health), and use Fishpath to create population models and evaluate different management strategies. July – August 2024: I will discuss results with Dr. Ambo Rappe and begin writing our conclusions on the benefits of mangrove restoration. In this time, I will also work with Blue Forests in creating research presentations aimed at the local communities in which they work so that they can utilize the findings in their efforts.

When conducting research, it is essential to connect with the stakeholders of this work as this contextualizes findings and fosters mutually beneficial conservation decisions. To engage with Dr. Ambo Rappe’s students at Makassar, I will teach weekly workshops in the statistical programming language R, a common analysis tool in ecology. 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. Blue Forests will also be a key component in helping me connect with the community. I intend for this project to aid Blue Forests in their understanding of the benefits of mangrove forests and to use my findings in presentations to local communities about 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.

I have extensive experience conducting fisheries research. In 2017, I interned for the National Oceanic and Atmospheric Administration, developing population models of Pacific fishes and identifying species in the Eastern Pacific. Currently, I am getting my master’s degree at the University of New Hampshire. As a quantitative ecologist, my master’s thesis addresses data deficiencies in small-scale fisheries and analyzes the process and outcomes of decision making by stakeholders. I hope to continue this field of research, which is why I plan to partner with Blue Forests during my Fulbright year. My past field experiences have also taught me when living in coastal communities, it is essential to build relationships between scientists and stakeholders. At Louisiana Universities Marine Consortium, I worked in a lab studying coastal restoration in Louisiana’s marshland where coastal erosion is threatening the homes and livelihood of the local community. The goal of this project was not just to understand the impacts of coastal erosion, but to effectively communicate those impacts to the communities most affected. I got to work with a team of scientists trying to understand the drivers of this erosion and communicate this to those who live there. Having seen firsthand how marine conservation research impacts people living in coastal areas, I understand the importance of fostering relationships with the local community not only to build trust but also to incorporate local knowledge to better institute practical conservation practices.

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 Fulbright project will be a building block toward that goal as it will give me hands on experience in addressing the issues that small scale fisheries face. Most crucially, I will learn how to communicate these findings to the people most affected by environmental change. Further, as many NGOs work with global datasets, I hope to utilize the relationships and connections I make in Indonesia to help bridge the gap between small-scale fisheries and these large-scale databases. Indonesia is home to one of the largest networks of small-scale fisheries in the world, and to better understand how conservation efforts are affecting fisheries here would be a vital understanding that could be applied to fishing conservation around the world.