**Summary, including major objectives – 140**

We aim to understand how mangrove restoration is affecting biodiversity and the sustainability of fished species on Tanakeke Island, Indonesia. We will use Unbaited Remote Underwater Video (URUV) to assess the marine biodiversity of mangrove habitats and compare them to the biodiversity of areas that have not undergone mangrove rehabilitation. Further, we will collect temperature and light data to create a statistical analysis of which variable is the most important when fostering biodiversity in mangroves. Our research objectives are to 1) determine the effect of mangrove restoration on the fishery production on Tanakeke Island, 2) Uncover what aspects of mangrove cover are most beneficial to juvenile fish populations (i.e. water temperature, shade, or plant biomass), and 3) Demonstrate the benefits of mangroves to the local community on Tanakeke as well as to potential funding sources for the NGO Blue Forests.

**Background information – 220 (please place your project in the context of existing work in this field and provide a succinct justification of why this project is interesting, innovative or of potentially high impact)**

Mangroves’ contribution to flood protection and extreme weather mitigation is vital to the safety of many of Indonesia’s inhabitants. As a response to extreme habitat loss, the Indonesian government has committed to the most ambitious mangrove restoration project in the world. On Tanakeke Island in South Sulawesi, 70% of historical mangrove cover has been converted into aquaculture ponds since the 1980s (Brown et al., n.d). However, the community has seen great success in public engagement and mangrove rehabilitation with the help of the NGO Blue Forests (Blue Forests 2012).

Mangroves provide refuge for about 55% fish catch biomass in Indonesia (World Bank 2022). Small-scale fishing is an essential part of peoples’ livelihoods on Tanakeke, as it is the main source of protein on this island and fisher income has been shown to be negatively affected by mangrove loss (Blue Forests 2012; Yamamoto 2023). Many species of fish are harvested on this island, but some common species we expect to encounter are *Lutjanus bitaeniatus* (Snapper), *Epinephelus fasciatus* (Grouper), *Chanos chanos* (Milkfish), *Sardinella lemuru* (Sardine), and *Rastrelliger kanagurta* (Mackerel). While these mangrove restoration efforts have resulted in flood prevention and ecotourism on Tanakeke, little research has been done to assess the improvements fished stocks. This project serves to demonstrate the benefits of mangroves to both the local communities and potential funding sources for Blue Forests’ efforts.

**Methodology – 420 (please summarise study design, sampling methodologies and likely sample size, intended analyses, and how these will achieve the research aims)**

## Site description:

Pulau Tanakeke is situated about 40 km southwest of Makassar in South Sulawesi, Takalar Regency. The island is a coral atoll covering about 3,930 hectares. About 392.25 hectares of mangrove has been restored. Access to the island presents a challenge as rough seas make sea crossings difficult during rainy seasons (October-January). The island comprises of five villages: Balangdatu, Maccinibaji, Mattirobaji, Rewataya, and Tompotana. Historically, the island was populated with about 1,776 hectares of Mangroves, most of which has been destroyed for aquaculture.

## Data Collection:

In this project, we plan on selecting three different sites across the island. Within each site, we will locate a recently restored mangrove, mangroves that were restored over ten years ago, and an area where mangroves have not been rehabilitated yet. Recently restored mangrove sites will be in Lantangpeo, where Blue Forests is currently working on mangrove rehabilitation. Sites that have been restored over ten years ago and unrestored sites will be located in Tompotanah and Ujungtanah. At each site, we will place two cameras at 1m depth facing horizontally at a 7 degree angle from one another in order to measure fish length and water visibility. Next to the cameras, we will place the light and temperature loggers which will collect throughout the duration of filming. With two cameras per location, this will total 18 cameras deployments per month for nine months between February 2024 and September 2024. Cameras will record for 1 hour, resulting in about 180 hours of footage total at the end of the project. After which, the cameras and loggers will be extracted from the site, the recording will be downloaded, and then the cameras will be moved to the next site where we will conduct the same experiment. Sampling of each site will occur monthly.

## Analysis:

We will measure biodiversity using the MaxN calculation method, as it is the most robust calculation for relative abundance. Further, we will use the data collected from the temperature and light loggers to create a statistical model of fish abundance to determine if fish abundance is more attributed to decreased water temperature or the shaded areas provided by mangrove habitats. As has been found in previous literature, we expect the sites with older, more established mangroves to foster the most biodiversity of juvenile fishes due to better shelter from predators and cooler temperatures. We expect the areas with no mangrove restoration to exhibit the least amount of biodiversity due to the exposure of these environments to predators and higher temperatures.

**Anticipated impact of the proposed study – 140**

The main outcome of this project is to disseminate its results to the local community with the aid of Blue Forests. With their help, we will incorporate this study into their curriculum for educating the public on the benefits of mangroves. This NGO is also in the process of seeking funding from the Indonesian government and private donors. We aim to demonstrate the value of their efforts to these potential funding sources so they can continue their mangrove restoration. Further, I have partnered with Dr. Ambo Rappe, a professor of marine fisheries at Universitas Hasanuddin. I will assist her lab by leading data science and coding seminars for students to help them learn data organization and analysis for their own research. Finally, Dr. Ambo Rappe and I intend on publishing this research in an international journal.