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Mapping for Change: Leveraging ArcGIS Tools to Increase Local Knowledge of Marine Protected Areas in the Honduran Bay Islands.

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Mapping for Change:

Leveraging ArcGIS tools to increase local knowledge of marine protected areas in the Honduran Bay Islands

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Master of Advanced Studies – Marine Biodiversity and Conservation
Final Capstone Report – June 2019

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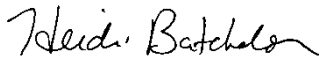
REPORT OF ACTIVITIES

Overview

This document provides a brief report of activities conducted for a final capstone project in Scripps Institution of Oceanography's Master of Advanced Studies graduate degree program in Marine Biodiversity and Conservation. The project leverages Geographic Information System tools to facilitate community engagement with local marine protected areas in the Honduran Bay Islands, and included a three-week visit to the field site to train and educate local stakeholders using the tools that were created. The following report will be divided into a brief introduction, summaries of the activities and methodology utilized prior to the field visit, activities conducted during the three-week field visit, and then final recommendations and future prospects for the project. It will also link to all products and materials created as part of this project, which have been made freely available for public use in local environmental education initiatives.

Capstone Committee

Heidi Batchelor – Chair
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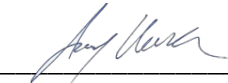*hbatchelor@ucsd.edu*

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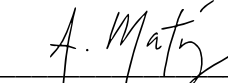*awork@ucsd.edu*

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Introduction

The Bay Islands lie between 25 and 50 km north of the Honduran mainland, and sit on the Mesoamerican Barrier Reef—the second largest barrier reef in the world. The three main islands that comprise the Honduran Bay Islands are Utila, Roatan, and Guanaja. Utila is the smallest of these three, just 11 km long and 4 km wide at its widest point.[1] Of this area, the habitable portion of

Utila is only a fraction, as the majority of the island remains covered with mangroves, savannah, wetlands, and jungle.[2] The surrounding Caribbean reef ecosystem draws the majority of Utila's visitors, and the diving/tourism industry accounts for a large part of the island's economy.[3] Utila was ranked among the top 10 diving destinations in the world by USA Today's "Ten Best" list in 2018,[4] and is also a known hotspot for whale sharks (*Rhincodon typus*) in the Caribbean[5].

The Bay Islands National Marine Park (or PNMIB: Parque Nacional Marino Islas de la Bahía, in Spanish) was created in 1997 after the Bay Islands archipelago was declared a 'Tourism Zone' and later 'Ecological Conservation Zone' by the Bay Islands Department.[6] Two subsequent laws were approved in 2004 and 2010 providing special attention to coastal zone management, and consolidating conservation efforts.[7,8]

Several small conservation organizations are present on the island of Utila and work to implement protections for the unique terrestrial and marine biodiversity there:

Whale Shark and Oceanic Research Center (WSORC)
Bay Islands Conservation Association (BICA Utila)
Kanahau Utila Research and Conservation Facility
Iguana Research and Breeding Station/Bay Islands Foundation (FIB)

Despite the work of these organizations, no communication tools are readily available to describe the legal framework behind the local MPA, or how violations can be reported and enforced. In a Google search for management plans and regulations relating to the Bay Islands Marine Park around Utila, the only management plan available is in Spanish, and most of the information translated to English is posted to websites related to tourism in the Bay Islands in general, or focusing on the neighboring island of Roatan (rather than Utila itself).[9] Given the tourism dynamics prevalent on Utila, many of the people residing on the island at any given time communicate using English and are not fluent in the Spanish language. Websites associated with conservation organizations working on Utila (if these sites exist at all) are either not updated with current information, or have no information relating to nuanced spatial management strategies in this part of Bay Islands. The unique challenges associated with environmental management on the island of Utila warrant high resolution information about marine park management there, beyond the umbrella of the widely-encompassing "Bay Islands National Marine Park".

This project aims to address this lack of high resolution information by communicating information about the legal structure, management schemes, and regulations of the marine protected areas around the island of Utila to permanent and temporary residents on the island. In a manual containing laws related to coral reef management in the Mesoamerican region, the authors note that, "*one of the key elements in the fight for the preservation of the reefs is the knowledge of the laws related to this topic*."[10] With a similar consciousness, this project is intended to be a first step to increase accountability and effective management for the protected spaces around the island of Utila via the power of knowledge.
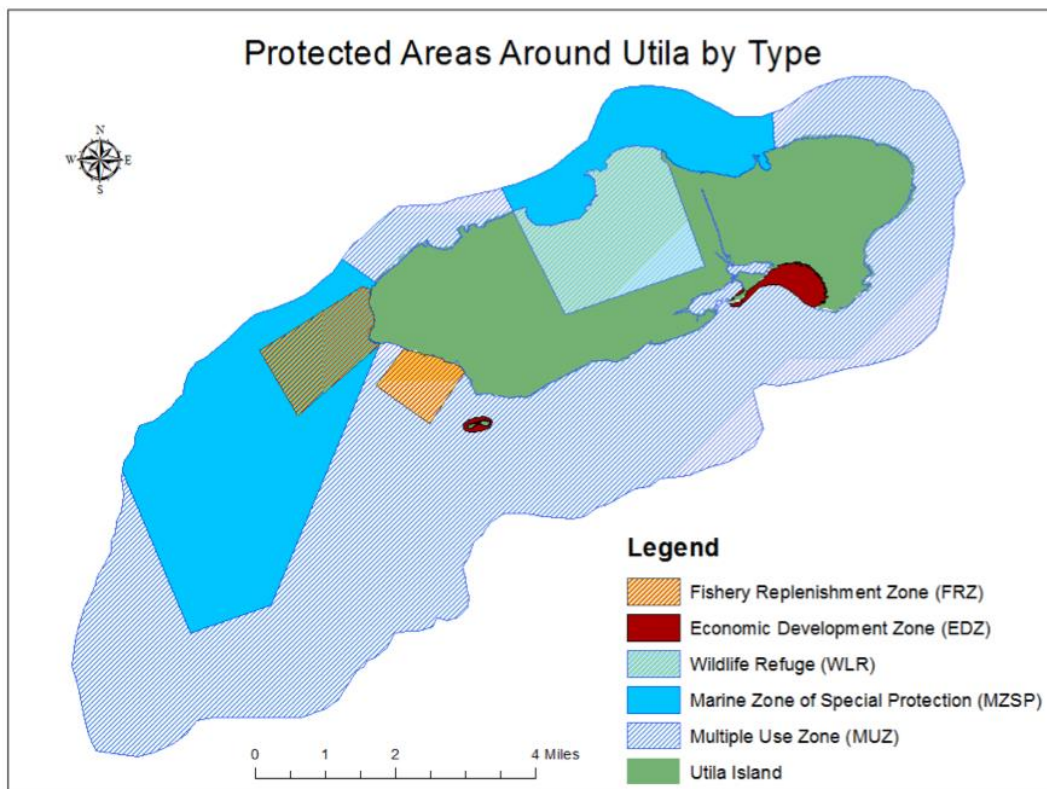
<u>Pre-field Activities</u>

The first 5 weeks of the 10-week capstone project were dedicated to accessing, compiling, and displaying targeted information in a comprehensive manner. This information on the legal schemes, regulations, and management plans of the various protected areas around the island of Utila was compiled from multiple sources during the first several weeks. Primarily, the following sources contained the relevant information:

1. [Plan de Conservación del Parque Nacional Marino Islas de la Bahía](#) [6]
2. [Normas Generales Para el Control del Desarollo de las Islas de la Bahía](#) [7]
3. [Ley Especial de las Áreas Protegidas de las Islas de la Bahía](#) [8]
4. [Manual de Arrecifes Coralinos en Honduras: Normas Jurídicas y Procedimientos](#) [10]
5. Plan de Manejo del Refugio de Vida Silvestre Turtle Harbour [11]

Although these documents do contain all relevant management information, the information from each document is in Spanish only, and provides only a broad geographic resolution. The information from each document was thus manually "filtered" to represent only information relevant to the island of Utila, and translated from Spanish to English for the first stage of this project.

Included in these documents were classifications of the various protected areas around the island of Utila, differentiated into five zones based on the regulations within each, and the GPS coordinates further delineating boundaries of each zone. The "Special Marine Zone" around the island of Utila
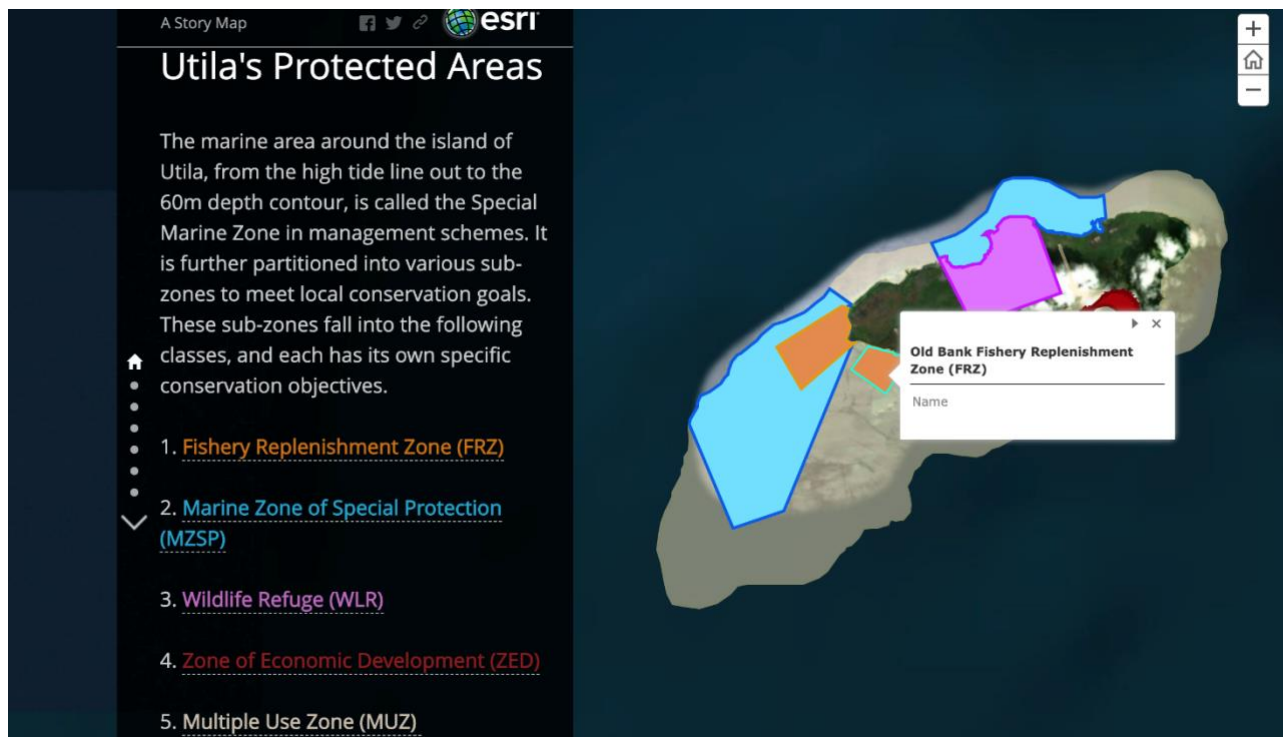

A map of the five classes of protected areas within Utila's Special Marine Zone. Kate Meyer, 2019

extends from the High Tide Line outward to the 60-meter depth contour, and is where the five sub-zones (the island's protected areas) are contained. The protected areas within this Special Marine Zone are the focus of my project.

With all relevant text filtered and translated, the laws, management schemes, and regulations for the five zones of Utila's Special Marine Zone were integrated into a Story Map (an Esri ArcGIS tool for communicating map data to wide audiences). Shape files for the protected areas were either received via personal correspondence with the Bay Islands Conservation Association – Utila, or created using GPS coordinate data within ArcGIS 10.6 for desktop. These files were then integrated into ArcGIS online, and used in the Story Map alongside relevant management information.

Prior to departure for the field site, the Story Map products were published as websites, in English and Spanish, accessible to anyone with an internet connection. QR codes were created linking to the websites so that the interactive maps could be further accessible around the island. All links and QR codes are copied below, in the "Products and Materials" section.

A screen grab of the home page to the interactive map site. Kate Meyer, 2019

Field Activities

On site in Utila, Bay Islands, Honduras, three main efforts were realized:

1. Collaboration with **government officials** and national marine park **co-managers** to socialize the updated PNMIB **management plan** (week 6)

2. **Environmental education** efforts in local schools on the topic of **marine protected areas** (week 7)
3. **Workshops** with **conservation organizations**, **businesses**, and **dive shops** on the island on how to use the interactive mapping tool to **increase stakeholder engagement** with local marine protected areas (week 8)

*Collaboration with **government officials** and national marine park **co-managers** to socialize the updated PNMIB **management plan***

During the first week on site (week 6 of the capstone project), Honduran government officials were on the island along with the marine park's co-managers as part of efforts to socialize the final version of an updated management plan for the Bay Islands National Marine Park. I was able to join the group in three workshops they conducted: one in the Pigeon Cay fishing village, one in Utila town for residents, and one in Utila town for dive shops and conservation groups. The first two workshops were in Spanish, and the final one was in English. My interactive mapping tool was used alongside the government's planned presentation to help the audience understand the delineations of the various protected areas that were being discussed, and the associated QR codes were presented on-screen at the end of the workshops allowing participants to access the maps on their individual devices. I also interviewed with the local news station talking about my project and the interactive mapping tools I created. The interview aired on Thursday May 9th at 7pm across the island.

Environmental education** efforts in local schools on the topic of **marine protected areas

During the week of May 13 – 17, I led environmental education efforts in local schools on the subject of marine protected areas. Collaborating with local educators and NGO staff, we created lesson plans, presentations and activities for a wide range of ages using my maps of protected areas around the island of Utila. In total, we taught 25 lessons in 4 days to kindergarten through high school aged students in local schools reaching almost 500 students. Young kinder-aged students learned the difference between partial-take and no-take MPAs (vs unprotected areas) with animal crackers in differently colored plates, 1st – 6th graders colored maps of protected spaces around their island, and high school students accessed the interactive mapping tool on tablets to understand how the tool could be applied to access information about local regulations.

***Workshops** with **conservation organizations, businesses,** and **dive shops** on the island on how to use the interactive mapping tool to **increase stakeholder engagement** with local marine protected areas*

During the final week in the field, I conducted workshops with all major NGOs on the island, several dive shops/resorts, and eco-conscious businesses. In doing so, conservation-minded residents on the island were given a great deal of information about local marine protected areas and were given access to all materials and tools to educate others about the regulations within them. I presented a 45-minute lecture to each group about the science behind marine protected areas, and then walked them through the online interactive mapping tool giving them suggestions about how the tool could best be used for their individual wants/needs.

Future Prospects

The community expressed incredible gratitude for the tools I provided to them, and for the connections we made during my three weeks on the island. Although this project will be submitted in a "final" form at the end of the Spring Quarter 2019, I have committed to the marine park co-managers that I will update the information contained in the online maps as the new 2019 management plan is finalized with updated information. The co-managers have also inquired about future collaboration on a similar project, seeking grant funding to contract me to create similar products for the rest of the Bay Islands Archipelago and the northern coast of Honduras. Even after they are submitted to the department, I expect my online resources to serve as living documents that are constantly updated as laws and regulations change.

Acknowledgements

This project would not have been possible without the support of Scripps Institution of Oceanography MAS-MBC staff, my Capstone Advisory Committee, and local Honduran collaborators. I want to specifically thank Suriel Dueñas who facilitated my involvement with the Environmental Education program during my time on site, and Andrea Izaguirre and Andrea Godoy without whom the lessons would not have been a success. I am grateful for the support of the Honduran government and co-managers of the national marine park who included me in the socialization workshops during the first week on the island and provided accommodation for me when weather prevented us from returning to Utila from the small fishing cay. I am additionally grateful for the incredible support from staff and interns at the NGOs, dive shops and businesses with whom I collaborated. I am confident this project will live on through your energy and dedication, and am happy to have been able to play a small part in facilitating the great things you will do using these new tools.

Products and Materials

English Story Map: https://arcg.is/v0KOv
English Auto-play StoryMap: https://arcg.is/1La1Lb
English Geographic Orientation Link: https://arcg.is/0nbvqb
English Protected Areas Map: https://arcg.is/10aLrP
QR Code: Full Product (English)

QR Code: Interactive Map Only (English)

Spanish Story Map: https://arcg.is/100Pye
Spanish Auto-play StoryMap: https://arcg.is/HnLvO
Spanish Geographic Orientation Link: https://arcg.is/15WnK00
Spanish Protected Areas Map: https://arcg.is/1qLmLq
QR Code: Full Product (Spanish)

QR Code: Interactive Map Only (Spanish)

Suggested signs for posting:

Want to learn about Utila's Marine Protected Areas?

Scan the QR code to access interactive maps,
or type this short URL into your browser:

https://arcg.is/v0KOv

Quieres aprender sobre las Áreas Marinas Protegidas de Utila?

Escanee el código QR para acceder a los mapas interactivos, o escriba esta URL corta en su navegador:

https://arcg.is/100Pye

¿Quieres aprender sobre las Áreas Marinas Protegidas de Utila?

Escanee el código QR para acceder a un **mapa interactivo** con información sobre las regulaciones locales, o escriba la **URL** corta en su navegador:

https://arcg.is/1qLmLq

Y aprenda más sobre los **espacios protegidos** de Utila aquí:

https://arcg.is/100Pye

Want to learn about Utila's Marine Protected Areas?

Scan the QR code to access an **interactive map** with information on local regulations, or type the short **URL** into your browser:

https://arcg.is/10aLrP

And learn more about Utila's **protected spaces** here:

https://arcg.is/v0KOv

This [Google Drive folder](#) links to **the power point presentations** that were created and used in the Environmental Education initiatives on the subject of marine protected areas around the island of Utila. They are freely available for public download and use.

This [Google Drive folder](#) links to several **maps of Utila's protected areas**, created freely for public download and use.

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