Determining local perceptions and challenges for environmental conservation in Utila, Honduras

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Abstract
The Bay Islands are a group of small islands off the coast of Honduras, comprised of three larger islands - Roatan, Utila and Guanaja - and several dozen cays. Due to the Islands’ Caribbean feel and inexpensive cost they have become a popular tourist destination for thrifty travelers and are a frequent stop for SCUBA diving enthusiasts. Major threats in the region include the destruction of coastal habitats by increasing population and tourism development pressures, increased sedimentation due to extensive use of watersheds and inland deforestation. In particular, Utila has become known as one of the best diving sites in the world, placing further pressure on the island’s fragile marine and terrestrial ecosystems. Declines in island species such as the endemic iguana Ctenosaura bakeri have been documented, along with damaged coral reefs, mangrove deforestation, decreasing coral cover and noted fish declines for several fish species. This last fact may be particularly important given the large fishing community that has existed on the island for decades.

Despite Utila’s small size, its roughly 8,000 residents are a mix of generational Utilians, mainland Hondurans, and Ex-patriates who come from extremely diverse backgrounds, thus often making attempts to engage the community in environmental conservation difficult. In an effort to understand the environmental knowledge, attitudes and behaviors of Utila’s three main populations, an environmental survey was conducted in the summer of 2010. Results from the survey indicate that the majority of islanders recognize, and are concerned with, the decreasing health of the island’s ecosystems and resources. It was also found that though most individuals were aware of the island’s various environmental regulations, they recognize that the majority of people do not follow them, and that this is particularly true for fishing regulations. This finding and firsthand experiences led to an in depth look at the Honduran Fisheries Law and subsequent regulations related to the law. This paper presents the findings from the survey and also explores the possibility of using a community based environmental management approach to protect the island’s resources and monitor local fishing practices.
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**List of Acronyms**

BICA-Utila Bay Islands Conservation Association – Utila Chapter

CBEM Community Based Environmental Management

CBNRM Community Based Natural Resources Management

DIGEPESCA General Directorate for Fisheries and Aquaculture

FAO Food and Agriculture Organization

IDB Inter-American Development Bank

NGO Non-government Organization

PMAIB Programa de Manejo Ambiental de Islas de la Bahia

SCUBA Self Contained Underwater Breathing Apparatus

UCME Utila Center for Marine Ecology

UN United Nations

WSORC Whale Shark Ocean Research Center
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1. Introduction

1.1 Background
The Republic of Honduras is the second largest country in Central America and is home to roughly 8 million people (US Dept of State 2010). It is also one of the poorest countries in Central America and largely depends on its natural resources to generate revenue (US Dept of State 2010, UN 2009). Figure 1 shows some of Honduras’ primary exports which include coffee and bananas, the main exports, as well as shrimp and lobster which are largely exported to the United States (UN 2009). As a democratic constitutional republic, the government of Honduras is similar to that of the United States’ executive, legislative, and judicial branches. The country is split into 18 departments, much like the state system in the United States, with those departments being further subdivided into 298 municipalities. The Islas de la Bahia, or the Bay Islands of Honduras, comprise one of the 18 departments of Honduras with the largest of the islands, Roatan, serving as the capital (US Dept of State 2010).

![Figure 1. Top 10 export commodities 2007 - 2009 (UN 2009)]

The entirety of the Bay Islands consists of three major islands – Roatan, Utila, and Guanaja – along with five minor islands and sixty-five cays (Davidson 1974). The total land area of the Bay Islands is approximately 238 square kilometers (ibid). The Bay Islands are known for their diverse ecosystems including mangroves, seagrasses and coral reefs (Harborne et
al.) In terms of geology, the Bay Islands are a relatively recent formation and exist on the Bonacca Ridge, which is south of the deep ocean Cayman Trench and is oriented east-west (ibid). The Mesoamerican Barrier Reef System (MBRS), which is the longest barrier reef system in the Western Hemisphere, extends over 1000 km from the northernmost part in Yucatan, Mexico through Belize, and ends in the Bay Islands (Kramer et al. 2000).

Traditionally, the Bay Islands population has largely depended on the fishing industry for commercial revenue generation and for small scale subsistence fishing (Ritchie et al. 1965). Though the fishing industry is still important today, the tourist draw to the island has replaced fishing as a top revenue generator (Ortega 2011). The Bay Islands remained relatively remote until well into the twentieth century given the difficulty of travelling to the island from the Honduran mainland by small dories and fishing boats (Keenagh 1937). As the transportation industry expanded, so too did travel to the Bay Islands. In the 1960’s, the Islands began to see both an increase in visitors and new residents, which was largely due to the Honduran government’s promotion of tourism in the islands (Ritchie et al. 1965). However, it was in the early 1980’s when the Bay Islands began to experience a drastic increase in tourism pressure and population growth, led in part by improvements to the airport on Roatan in 1988 (Moreno 2005). From 1990 to 2000 the full-time resident population of the islands grew by 10,000 people to total more than 30,000, a large portion of which were poor ladinos (i.e., mestizos) from the mainland who came in search of work in the tourist sector (Fielding 2000, Moreno 2005, Steffan 2010). During this same time frame, the number of visiting tourists to the islands skyrocketed from less than 10,000 people annually to more than 90,000 (Stonich, 2000). This increasing number of Bay Islands visitors can be attributed to the fact that the Mesoamerican Barrier Reef became increasingly popular as a SCUBA dive destination and began to draw visitors from around the
world (Stonich 2000). In particular, the islands of Roatan and Utila have become popular dive sites and are known for being some of the few reliable places to spot the impressive Whale Shark, the largest fish in the world.

1.1.1 Utila

Utila is the smallest of the major islands of Honduras and is approximately eleven kilometers long and five kilometers wide at its widest point (Davidson 1974). The Utila Cays, which are located off the southwestern end of the island, are composed of twelve populated cays (Currin 2002). Utila is home to roughly 8,000 people and has a wide mix of ethnic groups on the island, including generational Utilians, Garifuna peoples, recent transplants from the mainland, and a large population of Ex-patriates who are mainly from the United States and European countries (Canty 2007, Ortega 2011). As previously mentioned, Utila has a developed dive tourism industry, with sixteen dive shops currently in operation, one of which has their lodging on, and operates from, Jewel Cay (Daniel 2010, divingutila.com). In addition to the tourism industry, artisanal fishing is still prevalent on the island and many people make their living from fishing. The increasing coastal population and subsequent development, lack of infrastructure for sewage treatment, and overfishing around the island have led to degradation of the island’s terrestrial and marine ecosystems (Harborne et al. 2001).

To help address some of the environmental issues facing the island, Utila has several environmental NGO’s including the Bay Islands Conservation Association (BICA-Utila), the Utila Center for Marine Ecology (UCME), the Whale Shark Oceanic Research Center (WSORC) and The Iguana Station. International organizations, such as World Wildlife Fund and Operation Wallacea also have projects throughout the Bay Islands.
1.2 Problem Statement

Over the years, the increase in population and development has led to major issues for the Bay Islands’ terrestrial and marine ecosystems. Key threats in the region are the destruction of natural coastal habitats by increasing coastal populations and tourism developments as well as increased sedimentation due to inland deforestation (Harborne et al. 2001, Arrivillaga and Garcia 2004). In Utila, declines in island species such as the Swamper, a local endemic iguana, have been documented, along with damaged coral reefs from tourism activities and noted fish declines for several fish species (Korda et al 2008, Gutsche and Streich 2009).

Utila’s local NGOs have made significant efforts to curb these issues by spearheading marine and terrestrial patrolling for environmental regulation violators and monitoring the current state of the island’s resources to determine management strategies. Despite these efforts, however, degradation continues to occur and environmental regulations are commonly disregarded. Several BICA-Utila employees have expressed that one important prohibitive barrier to improving conservation and monitoring actions on the island is local NGOs’ lack of understanding of the current environmental knowledge of Utilian locals and their attitudes and behaviors toward conservation efforts on the island. In their view, without a clear understanding of where the island’s people stand on the environment and environmental issues, it is difficult to create targeted environmental education projects and awareness campaigns for the diverse members of the local community.

In order to help eliminate one important conservation barrier and gather information to fill current gaps in understanding, I was enlisted by BICA-Utila to carry out an environmental survey in Utila. The survey was designed to determine knowledge, attitudes and behaviors of the three main local populations – Utilians, mainland Hondurans and Ex-patriates – as well as better
understand where these individuals receive most of their information. This information, along with data gathered on locals’ willingness to participate in future environmental improvement activities, will be used to create targeted environmental education programs and projects encouraging future community member involvement.

2. Utila Environmental Survey

2.1 Survey Instrument and Sampling Frame

In order to reach the following objectives to (1) Determine environmental knowledge, attitudes and behaviors of Utilian locals and tourists and (2) Aid in the creation of a targeted communications plan for BICA’s future educational and outreach activities, I administered a survey in the summer of 2010.

To begin, I created two paper-based surveys, one for the local population and one for visiting tourists. Each survey was designed to gather needed information regarding knowledge, attitudes and actions of respondents. The tourist survey has a total of 32 qualitative and quantitative questions designed to gain information on tourists’ knowledge about the state of Utila’s environmental resources and their own personal actions while visiting the island (Appendix B, Section 2). A tourist was defined as any person who was staying on the island for a finite amount of time (lengths varied) and who foresaw leaving the island permanently in the future. The survey of locals is comprised of 25 quantitative and qualitative questions to gauge locals’ knowledge, attitudes and behaviors toward environmental conservation efforts in Utila (Appendix B, Section 1). Because the survey of locals is the more pertinent survey for this particular study, the focus will be placed on those results.

Working with my partners at BICA-Utila, I determined the general population of the study to be all residents of Utila Island (excluding the Utila Cays due to difficulty in sampling).
In particular, it was desirable to get survey responses from the three identified main groups on the island: Utilians, mainland Hondurans, and Ex-patriates, given their diverse backgrounds and the high likelihood that their views on the topic would vary greatly among groups. A local was defined as any person who has a permanent residence on the island and who lives in Utila for greater than 6 months out of the year. With this sampling frame in mind, potential respondents were randomly selected to participate in the study.

2.2 Survey Formation and Implementation

The first draft of the locals survey was created in April of 2010 prior to arrival in Utila. Once in Utila, an expert group comprised of one Utilian, two mainland Hondurans, and one Ex-patriate was set up to review the survey to provide feedback on potential needed changes. A number of changes came from this expert review, including rewording some phrases to increase comprehension and adding more open-ended questions to encourage engaged responses. The survey was revised twice in this way, with three additional individuals (friends of BICA employees) who looked over the survey upon its first revision from expert review.

Following the expert review, the survey was then pre-tested to determine if there were common problems that needed to be fixed or frequent confusion from respondents regarding certain questions. Because pre-testing is one of the most important aspects of survey implementation (Rhea and Parker 2005), two rounds of random pretesting took place with a total of 9 pretests being completed. A formal pretest was not set up, but rather surveys were conducted with random individuals in the same manner that the true survey was to be administered to help ensure that any potential issues with the survey would surface. Through pretesting, I eliminated inconsistencies and further clarified the questionnaire. Following the pretests, the expert review group did a final review of the survey before it was officially administered.
Prior to beginning official surveying, four volunteers from BICA-Utila were trained to help administer the surveys. Each surveyor received an introduction to the survey purpose and format, completed two test surveys in my presence, and was given a period to ask questions about the survey. I reviewed each test survey to determine potential inconsistencies with response methods before proceeding. Despite the length of the survey, a convenience sample\(^1\) was obtained by conducting intercept surveys\(^2\) (Rhea and Parker 2005) due to the favorable social atmosphere of Utila Town and also the need to get respondents from each of the four target groups (Utilians, mainland Hondurans, Ex-pats, and tourists).

The first survey was administered orally on June 22\(^{nd}\), 2010 along with a brief introduction of myself, the purpose of my study, and also my affiliation with Duke University. Slips of paper with my contact information were on hand to give to respondents should they have any questions in the future. Surveys were carried out by me and the trained BICA-Utila volunteers over a period of five weeks. Surveyors went out in groups of two whenever possible and all surveys were reviewed by me at the end of the day to ensure that any needed clarifications about survey responses were gathered immediately after the survey was administered. Surveys were intended to last no longer than 15 minutes, although they often ran longer depending on the respondent. Though no official response rate was recorded, the majority of locals who were approached agreed to participate in the survey given that no personal information that could identify them (name, workplace, etc) was recorded. Those individuals who declined to take the survey cited time commitment as an issue as well as a few instances where they stated that they did not want to fill out a survey for BICA-Utila specifically. Though

\(^1\) A convenience sample is defined as a sample that is easily accessible to the researcher.
\(^2\) Intercept surveys are conducted on-site and usually involve “intercepting” people as they are on their way from one place to another. In this case, intercept surveys took place along the main road of Utila Town and in several other locations on varying days and times of day to eliminate bias.
the latter reason was at times an issue, overall 64 surveys of locals were completed. The design and implementation of the Utila Environmental Survey took approximately 2 months and data analysis took place following my return back to the United States.

2.3 Data Analysis

The survey respondent data was coded and then analyzed using a number of approaches. To begin, each survey was entered into a master excel spreadsheet with an ID # to identify the respondent, given that their identities were not recorded. In order to analyze information by each of the three target locals groups – Utilians, mainland Hondurans, and Ex-pats – responses were sorted by the first question which identified where respondents were from geographically. Quantitative responses were then analyzed using frequency counts and displayed using bar graphs and pie charts. The measure of central tendency (mean, median) was calculated in order to better describe the trends in responses. Due to the ordinal nature of the majority of the survey questions, Mann Whitney Rank Sum Tests were performed to identify if there were significant differences in answers among the three sub-groups and those with a p value <.05 show significant differences. Open ended questions were entered into, and hand coded in, NVivo 9 qualitative data analysis software.

2.4 Error Structure

With survey sample research, there are a number of possible sources of error that can potentially bias findings and reduce the accuracy and effectiveness of the survey results obtained. These potential sources of error include sampling, coverage, and non-response error which will be discussed here (Dillman 2007).
2.4.1 Sampling Error
Sampling error is virtually unavoidable when conducting a survey. Because sampling error refers to the error obtained when using only a portion of the sampling frame rather than covering the entire population, it is often present in survey work (SMRQSD 2001). This is due to the fact that the population mean (μ) and the sample mean will rarely be the same. Therefore, no matter how scientifically the sample has been selected and implemented, sampling error will still exist (Rhea and Parker 2005). While the sampling frame for this survey did include the majority of the population (~6000 out of ~8000), the low sample size obtained (64) can affect the representative nature of the survey results. The desired sample size for a 6000 person population with 95% confidence and ±10% margin of error is 100 respondents (Rhea and Parker 2005). Given that a little over half that number was achieved, it is likely that there is sampling error in this survey. It is important to note, however, that a relatively even number of individuals was obtained from each group of interest.

2.4.2 Coverage Error
Coverage error can come in two forms: under-coverage and over-coverage. When individuals in the sampling frame are unable to take the survey, this results in under-coverage. Over-coverage may result if the survey was taken more than once by any respondent. For this survey, it is possible that under-coverage may have occurred and is unlikely that over-coverage took place.

Because the survey was administered in person, it is unlikely that it was taken more than once by any of the respondents. I acknowledge, however, that it is possible that a person could have taken the survey with more than one surveyor who was unaware that person had previously completed the survey. The potential for under-coverage is more likely, given that the survey was administered only in Utila Town and a few randomly selected residences in Camponado in order to obtain more Spanish-speaking individuals. People who are unable to come into Utila Town
would not have been able to take the survey, thus resulting in under-coverage. In order to minimize coverage error, the survey was conducted in several locations along the main road in Utila as well as at several places of business. The time of day surveys were administered was also varied regularly from early morning through early evening to minimize under-coverage. Though the potential for under-coverage is recognized, there is little that could have been done to reduce this coverage error aside from visiting each home which was not feasible for this study.

2.4.3 Non-response Error

Non-response error concerns the individuals in the sampling frame who did not attempt the survey, as well as those individuals who began the survey but did not complete all of the survey questions. This can result in increased variance as well as a potential bias in the results obtained (SMRQSD 2001). Of the 6000 possible individuals in the sampling frame, 64 attempted the survey. This is a very low response rate of .11% which can largely be attributed to resource and time restrictions. However, given that opinions were typically favorable regarding the survey, more time would have likely yielded more overall respondents. In addition, out of the 64 attempted surveys, 58 were completed. The highest non-response was for the knowledge section of the survey where many individuals did not know an answer and thus did not attempt to answer the question.

2.4.4 Summary of Error Structure

In total, though there is likely some error from sampling, under-coverage, and non-response, steps were taken to minimize this error whenever possible. Despite the fact that the desired 100 respondents was not obtained, the 64 survey respondents who were obtained represented a relatively even number of individuals from each group of interest. This will hopefully reduce the bias that may stem from having an uneven number of representatives from
each group. Additionally, I attempted to address under-coverage by varying my survey locations and the time of day that I administered the surveys with the intention of surveying a wide range of individuals. The non-response error was particularly high and can be attributed to the short time frame in which to collect data. For these reasons, it is important to note that survey data is not meant to be extrapolated to an entire population, but rather is only used to describe responses from those interviewed.

2.5 Findings
In total, 64 locals surveys were completed and their responses are organized into (i) demographics, (ii) knowledge, (iii) attitudes and (iv) personal actions. Descriptive statistics are the most useful method for analysis for this study and will be the primary statistics presented here. The pertinent findings from the survey will be presented in this section and will often be separated into the subgroups – Utilians, Mainland Hondurans and Ex-patriates – as well as presented in aggregate when appropriate. Those survey results that are not presented in this section, such as locals’ opinions on harmful activities and additional demographic information can be found in Appendix A.

2.5.1 Demographics
For this survey in particular, it was important to ensure that there was a relatively even number of respondents among the three target groups – Utilians, Mainland Hondurans and Ex-patriates—so that the results from each sub-group could be compared. This outcome was almost achieved with roughly 33% of the total respondents coming from the Utilian group, 25% from the Ex-Patriate group and 42% from the Mainland Honduran group (Figure 2, Appendix A). Out of the total 64 local respondents, 58% were male and 42% were female (Figure 1, Appendix A).
Some of the most important demographic information obtained from this survey regards where people generally get their information and their preferred avenues for receiving environmental information. It is important to note that each of the three sub-groups chose different avenues for both questions. When asked how they get general information, mainland Hondurans and Utilians said “television” and “word of mouth” were their main information sources while Ex-patriates most often chose “internet” followed by “word of mouth” (Figure 2). Regarding sources that they would most likely pay attention to for environmental information, the top choice for Mainland Hondurans was by far TV (15), Utilians chose posters (15), commercials and pamphlets (14) and Ex-patriates chose posters as well as flyers (14) (Figure 4, Appendix A).

Figure 2 shows the number of respondents in each age group, where clearly the age group 18-34 years old had the majority of respondents (29 out of 64). Along that same line, it is important to show the number of years that respondents in each subgroup have been living in Utila. From Figure 4 it is clear that the largest number of recent migrants to the island were from the...
Mainland Honduran group, while not surprisingly generational Utilians have spent the most time on the island. It is worth noting that none of the Ex-patriates in the sample have been living on the island for more than twenty years.

**Figure 3. Age range of survey respondents**

![Age Range of Respondents](image)

**Figure 4. Respondent years spent in Utila**

![Respondent Years Spent in Utila](image)
2.5.2 Knowledge

One of the main objectives for this survey was to determine the current knowledge level of the sampling frame as it pertains to Utila’s environment and the health of local ecosystems. Additionally, it is important for this survey to assess locals’ awareness of certain environmental issues on/around the island and to determine their understanding of how their own personal actions may contribute to these issues. In order to assess this knowledge, I asked questions regarding locals’ perceptions of the current state of Utila’s environmental resources and their awareness of current environmental regulations and gauged their opinion on the most prevalent environmental issues on the island.

**Figure 5. Prevalence of environmental issues in Utila**

Figure 5 shows the median of respondents’ answers to the question: “Please state how big of an environmental problem each of the following is in Utila: Rank from 1 to 5 in importance, 1=not a
problem at all and 5= a big problem.” With a median response of five, it is clear the majority of respondents view “lack of enforcement of regulations” to be a big problem in Utila. In addition, overfishing, damage to reefs, land clearing and land pollution all ranked as major environmental issues in Utila according to many respondents. The majority of respondents did not view tourism development as an important environmental issue and restricted resources, such as freshwater and energy, were also not seen as important issues by two of the three groups. For most of the listed choices there seemed to be at least a baseline understanding that the given environmental issues may be important in Utila. Mann-Whitney Rank Sum tests were also performed to determine if there were any significant differences among these responses for each group. There were no significant differences between Mainlanders and the other two groups, but there were significant differences between Utilians and Ex-Pats regarding their opinions on the importance of overfishing (p=.037) and restricted resources (p=.023) in Utila.

In gauging respondents’ environmental knowledge, it was also important to determine their view of the health of Utila’s environmental resources. Each respondent was asked to rank their opinion of the health of Utila’s coral reef, mangroves, fish populations, island animal populations and forests as “Good (3), Fair (2) or Poor (1)”. Each of the resources, aside from fish populations, were viewed as fair by all three groups (Figure 3, Appendix A). Fish populations were viewed as “poor” by both Utilians and Ex-patriates and “fair” by Mainland Hondurans.

When asked whether they were aware of the existence of regulations, respondents were remarkably aware of the existence of regulations pertaining to hunting iguanas (91%) and catching marine animals (80%) (Figure 6). However, only 50-60% of respondents said they were aware of regulations pertaining to tree cutting and cutting mangroves, despite the existence of such regulations.
In addition to indicating whether they are aware of certain environmental regulations, space was also provided for respondents to add additional comments on the subject if they chose. Out of the 64 respondents, 27 opted to provide additional comments on regulations, of which 59% indicated that while regulations are in place, they are not enforced. Other notable comments provided include that some regulations regarding hunting and catching animals are not good for the people (n=2) and that there is no place to get information regarding licenses and regulations (n=1).

**Figure 6. Awareness of Environmental Regulations**

![](image)

Lastly, to gain an understanding of what activities locals think are potentially harmful to environmental quality in Utila, they were asked to rank a number of activities from “not harmful” to “extremely harmful” on a 5 point scale. Activities such as littering, anchoring in the
reef and burning materials were deemed “extremely harmful” and respondents knew generally which activities were harmful (Figure 5, Appendix A). When asked what fishing practices in the area may be harmful, many respondents listed fish pots, lobster pots, gillnetting and trawling.

2.5.3 Attitudes
To determine respondents’ attitudes toward the importance of protecting the environment, five statements about the environment were provided for locals to indicate their level of agreeance or disagreeance (Figure 7). These questions were set up in the Likert scale format (Rhea and Parker 2005) with answer choices ranging from strongly disagree (1) to strongly agree (5). Most respondents strongly agree with the statements “It is our responsibility to protect the environment for future generations” and “It is important to protect the environment”. Though the desired response for statements A and B would be disagreement, two of the three groups agree with the statements, indicating that Mainland Hondurans and Utilians believe it is too difficult for them to personally improve the environment and that these actions are pointless unless done collectively (Figure 7). Additionally, the majority of respondents agree or strongly agree with the statement “I believe that my actions can have a direct effect on the environment”, indicating that many locals may be aware of the potential direct relationship between human activities and environmental quality.

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3 The main issue cited for fish and lobster pots is “ghost fishing” in which a pot/trap will still continue to fish when it is lost by the fisherman. Because many of these apparatuses do not have an escape panel, the pot becomes a permanent death trap.
2.5.4 Personal Action

Respondents were asked how often they do the following actions in Figure 8. The answer choices were (1) never, (2) rarely, (3) sometimes, (4) often and (5) always. The median response for each group indicates that most people throw their trash into a trash can all the time. The lowest frequency (3 = sometimes) for all other activities was received by the Mainland Honduran group. The majority of individuals from the other two groups indicated that they consider the environment and try to do what is right for the environment often. The only significant difference found among groups was between Utilians (x = 4.45) and mainland Hondurans (x = 3.5) with the statement “I try to do what is right for the environment, even when it may be more difficult” (p=.007).
Discussion

Survey results indicate that Utila’s residents are concerned with the environmental state of the island and many respondents possess at least a baseline understanding of the issues facing the island’s resources. Of the sub-groups of interest, there is clearly a need to educate those individuals who have moved to Utila from the mainland given that their relative knowledge of the island’s resources, regulations, and issues facing the island is low, which may in part be due to the fact that many of them have been on the island less than five years. Attitudes toward protecting the environment in Utila are favorable and many respondents indicated that they would be willing to participate in future environmental improvement activities (Figure 8, Appendix A). The responses from the questions on general and environmental information resources provide local NGOs with needed information on the avenues through which to target certain audiences on the island. Though unexpected, one of the most interesting findings from the survey is the seemingly high knowledge of regulations on the island and the concern
expressed by residents that these regulations are in fact not being followed. Given that the coral reef surrounding the island is an important revenue generator for the dive industry and for the health of local fish, it is important that regulations such as preventing mangrove deforestation and prohibiting fishing of certain species are followed. The fact that the public generally recognizes the existence and importance of such regulations offers hope that there are future actions that can be taken to improve monitoring for regulation violators that will include the community.

Because of the survey responses regarding the blatant disregard for regulations and my personal experiences patrolling in the marine area for violators, I thought it important to take a more in depth look at one particular law in Honduras and its subsequent regulations. This in-depth look enabled me to better understand the regulatory and enforcement process of such a law in Utila and to determine potential future steps to increase compliance. The following sections of this paper will provide a broad overview of the Honduran fishing industry and a look at the Honduran Fisheries Law. Additionally, the focus will be narrowed to look at the fishing industry and subsequent regulations and their enforcement in Utila.

3. A Closer Look

3.1 Fishing Industry in Honduras

Historically, Honduras has had a longstanding tradition of artisanal fishing throughout its coastal regions such as in the Bay Islands and in the Gulf of Fonseca (Mackenzie and Stelik 1996). This small scale subsistence fishing has largely been the main way of life for much of the country’s coastal population although this has changed in some places with newer, larger commercial operations and in areas where the tourism industry has taken the place of fishing for revenue
generation (Mackenzie and Stelik 1996, Canty 2007). Despite the various changes that the country has undergone, artisanal, commercial, and recreational fishing each play an important role in the country’s economy.

Honduras and its surrounding waters are included in the UN Food and Agriculture Organization (FAO) identified Western Central Atlantic area for fishing, which extends from Cape Hatteras in North Carolina to just south of Cape Recife in Brazil (FAO 2005). In terms of their ocean claims, Honduras claims 12 nm of territorial sea, 24 nm in the contiguous zone, 200 nm of exclusive economic zone and natural extension of territory or to 200 nm for the continental shelf. The Western Central Atlantic region, or Area 31, is responsible for the largest marine catch share (measured in million tons) in the world (FAO 2005).

Industrial fishing in Honduras started in the 1950’s and has steadily grown since that time. The industry is spearheaded in the Bay Islands and has been an important provider of jobs and revenue for the islands and the country. The most common captures in the country’s waters are of spiny lobster, three shrimp species, giant conch, finfish (grouper and snapper) and queen conch (FAO 2004). Increases in available technology coupled with increasing demand for these species both domestically and abroad have led to their rapid exploitation since the 1980’s (Dendinger and Gritzner 2008). The most popular of Honduras’ marine species exports are shrimp and lobster of which the vast majority is shipped to the United States (FAO 2002, Table 1). As of 2007, Honduras had the highest production of spiny lobster in the Mesoamerican barrier ecosystem and in 2003 harvested 1360 tons of lobster tails, generating US 30 million dollars in exports and consumption (Hernandez 2006).
### Table 1. Fishing exports of Honduras 1989 - 2000 (FAO 2002)

<table>
<thead>
<tr>
<th>YEAR</th>
<th>CATEGORY (thousand MT)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Shrimp</td>
</tr>
<tr>
<td>1989</td>
<td>3,432</td>
</tr>
<tr>
<td>1990</td>
<td>4,176</td>
</tr>
<tr>
<td>1991</td>
<td>5,878</td>
</tr>
<tr>
<td>1992</td>
<td>7,621</td>
</tr>
<tr>
<td>1993</td>
<td>9,512</td>
</tr>
<tr>
<td>1994</td>
<td>9,048</td>
</tr>
<tr>
<td>1995</td>
<td>8,444</td>
</tr>
<tr>
<td>1996</td>
<td>8,872</td>
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<tr>
<td>1997</td>
<td>8,177</td>
</tr>
<tr>
<td>1998</td>
<td>8,614</td>
</tr>
<tr>
<td>1999</td>
<td>7,402</td>
</tr>
<tr>
<td>2000</td>
<td>7,880</td>
</tr>
</tbody>
</table>

Additionally, aquaculture, which is defined as “cultivation of aquatic life within controlled environments or the commercial production of certain aquatic species by managing the major part of their life history under strict control” (FAO 2005) has become increasingly important for revenue generation in the country since the late 1970’s. Aquaculture production in Honduras has reached as much as 55 million tons in one year (Figure 9). Exports from shrimp and tilapia farming alone exceeded $1.75 million in 2004 (Central Bank of Honduras).
The large fishing industry that spans both industrial and artisanal sectors in Honduras provides jobs and livelihoods for many of Honduras’ people. Both men and women work for industrial fishing operations doing packing, technical and administrative work (FAO 2002). Specifically, the Bay Islands are home to both industrial and artisanal fishermen who are dependent upon fish populations for both subsistence and an income. Despite the growing tourism sector in the Bay Islands, this dependence on marine resources is ever-present in the Utila community and further outlines the need for sustainable fishing practices and adequate protection for marine species.

### 3.2 Honduran Fisheries Law

In addition to understanding the importance of the fishing industry to the Honduran population, in particular those who live in the Bay Islands, it is also important to understand the laws that govern fishing practices in Honduran waters. These laws and their subsequent regulations
provide the framework for the nation’s fishing practices but also set restrictions such as closed seasons to protect those resources as well.

In Honduras, any fishing practices are governed under the Honduras Fisheries Law, National Congress Decree No. 154-1959, which was created in 1959 and “aims at the conservation and propagation of the nation’s fluvial, lacustrine and marine fauna and flora, its use, commercialization and transformation.” According to the Fisheries Law, the activity of fishing includes any action “intended to extract, possess, preserve and use biological elements that normally live in water and the overall exploitation of these elements as well as all other acts connected with it”. The Fisheries Law itself outlines few actual regulations to be followed to protect the nation’s marine resources. However, among the regulations that are included in the Law are closed seasons, fines to be assessed to those who do not cooperate, and the requirement for fishing licenses. In terms of permitting and licensing, the law states that “All Hondurans and foreigners residing in Honduras may fish freely in the territorial waters, rivers, lakes, etc., for public use when it refers to sport, domestic consumption and scientific purposes. But for exploitation or financial profits, permits or fishing licenses can only be given to Honduran residents and Honduran companies in which at least fifty-one percent (51%) of the capital is owned by Hondurans. Tourists, when they wish to fish for sporting purposes, may fish in accordance with the provisions of this Law” (Article 20).

Article 32 states that “Fishing craft in general must be registered in the manner provided by this Law’s regulations; it must obtain a license and use a distinctive that identifies it” thus indicating that the fishing gear and crafts when used for commercial gain must be registered. Among the closed seasons are: 112 lunar days for mature and spawning shellfish and chelonians.

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4 Unless otherwise noted, any direct quotations or citations in the section titled “Honduran Fisheries Law” are directly taken from the Honduran Fisheries Law, 1959.
and 84 lunar days for fish, crustaceans and sponges. Shrimp and lobster have a set closed season from December 1 - April 30 of each year, although these closed seasons can be modified on a yearly basis (Article 41, 42).

For the purpose of this paper, it is important to note that a season closure includes the ban on fishing, transport, sell, deposits, dead or alive, chilled, or imported species (Article 44). The Fisheries Law also includes stipulations for actions that could potentially harm marine species, such as the disposal of “ashes, garbage, oil tank wash, honey, or wasting materials of any kind” in bays and harbors, but these actions can take place five miles offshore (Article 51). The clearing of mangroves and other trees on river banks, mouths, channels, estuaries, lagoons, seashore and other places used by fish and oysters is also prohibited by law (Article 52).

The Executive Authority, by means of the Ministry of Agriculture and Livestock (formerly called the Ministry for Natural Resources) is the highest authority for “fishing affairs and its relations” (Article 5). The sanitary standards and any regulatory measures included in the Law are carried out by the Game and Fisheries Department, which currently operates under the Fisheries and Aquaculture General Directorate (DIGEPESCA) although at the time of the creation of this law was under the Natural Resources General Directorate. The Game and Fisheries Department holds most of the actual responsibility for carrying out the Law’s mandates and has the authority to: suspend any fishery that may be depleting a species, settle any inquiries or clarifications relating to fisheries and inspect any fishing vessel or operation including nurseries (Article 8, 9). The Game and Fisheries Department must provide the staffing to carry out the law’s mandates. In many areas, such as in Utila, the local governing body tasked with carrying out said regulations is the local municipality (Ortega 2011). The Game and Fisheries Department and the General Directorate for Customs are the agencies with sufficient authority to
implement fines (Article 74). The Ministry for Finance and Economics, throughout the Merchant Marine Section, must collaborate when needed (Article 77).

3.3 Fishing, Regulations, and Enforcement in Utila

In addition to the provisions set forth in the Honduran Fisheries Law, the Bay Islands have Municipal regulations that are particularly pertinent in the area. These include the fact that throughout the Bay Islands it is completely illegal to harvest conch, due to the fishing restriction agreement posted by the Secretaria de Agricultura y Ganaderia. In addition, the lobster season is between July 1st and February 28th, and only those that have permits can collect legal sized lobster (tail length greater than 14.5 cm or 5.5 inches) outside the marine reserves (RoatanMarinePark 2010). Additionally, the use of spearguns, harpoons, and nets is prohibited throughout the Bay Islands by Honduran Law.

A census of fisherman conducted in Utila as part of the Programa de Manejo Ambiental de Islas de la Bahia (PMAIB 2000), found that there are approximately 165 fishermen on the island that fish at least some part of the year for commercial gain (Ortega 2011). Many of these are commercial fishermen, or have been at some point, although a large majority is small-scale, artisanal fishermen who catch fish to sell locally or for personal consumption (Interviewee # 49). Though these artisanal fishermen are supposed to get fishing permits, this is not regulated in any way so they often fish without it. In recent years, BICA-Utila has carried out the registration of fisherman and has tried to engage in fishing vessel registration with DIGEPESCA who does not have an office in Utila (Ortega 2011). Though some fishermen do register their gear and vessels
a large majority of them do not given that they do not find it to be a high priority and that the government is only really concerned with larger fishing vessels.

The presence of the tourism industry in Utila fuels the need for various types of marine species, such as lobster, conch, snapper, and tuna to be caught and sold to local stores and restaurants. Despite the established open and closed seasons set forth by the Game and Fisheries Department which says that no catching, freezing, or selling of species in closed seasons is allowed, the closed seasons are often overlooked and many popular species, such as conch and lobster, can be found in restaurants year round. Though restaurants are supposed to only sell lobster of legal size during the open season, lobster tails often get stockpiled and frozen and local restaurants primarily sell undersized tails (in any season) as the majority of legal sized lobsters are exported to the US market (UN 2005). Additionally, conch, which is illegal to harvest in the Bay Islands at any time during the year, is often harvested in large quantities despite the laws because it is particularly lucrative. For people in Utila who are not making a lot of money and need to feed their families, harvesting 1 or 2 dozen conch can bring in several hundred lempiras and is a broken law that is often overlooked. Though there are laws in place to prohibit such behaviors, the monetary benefits for harvesting such species are much higher than the potential costs, especially when little enforcement takes place.

In Utila, the municipal police are tasked with carrying out regulatory enforcement for all of the Honduran environmental laws and regulations, including those in the Fisheries Law. This is different than what takes place in Roatan, which receives much more funding and support from the local government and community. In Utila, the municipality issues a yearly plan de arbitrios, a document that contains a list of prohibited actions, outlines actions that need permits, and assesses fine amounts for illegal actions. For instance, the most common fine for actions
such as fishing during the closed season is a fine of 300 lempiras or 300 days imprisonment (Article 70), though neither of these happens frequently. The *plan de arbitrios* is not all encompassing and only provides vague and minimal protection (Ortega 2011). For instance, the plan may say that a person cannot “take or sell critically endangered species” such as sea turtles, but if someone is raising and keeping sea turtles in small bays around their home (which is currently taking place in the Utila Cays) the municipality does not feel inclined to deal with it (Ortega 2011). It is clear from the survey responses, firsthand accounts, and personal experience that there is not really an established regulatory process in Utila. Though the municipal police are responsible for enforcing laws, patrolling for violators and turning those violators in to the local police, and fining violators for illegal actions, they rarely carry out these responsibilities.

It is partially for this reason that local NGOs such as BICA-Utila take it upon themselves to monitor the current status of many of the island’s terrestrial and marine resources and also to patrol for regulation violators. With help from outside funding, BICA-Utila has daily marine patrols and frequent terrestrial patrols to help ensure that people are not harvesting species such as conch or iguanas (two of the most commonly exploited species). During my two month stay in Utila, there were at least four instances where BICA-Utila found people harvesting conch and undersized lobster as well as spearfishing for reef fish. Additionally, there was at least one instance where an individual was caught with a bag full of the Utila Swamper, an endemic and endangered iguana.

Though it is positive to have NGOs such as BICA-Utila that are working to fill the regulatory void on the island and protect the island’s resources, the lack of power to penalize those who disobey regulations makes this difficult. If BICA-Utila finds someone harvesting species illegally they can confiscate those species and if they are still living, return them to
Turtle Harbor Protected Area. Though technically violators should be punished by law, BICA employees have no authority to bring these individuals in to be fined or jailed unless they are accompanied by a policeman. Occasionally, the preventative police will assist BICA on patrols and will assess a punishment if violators are found at that time. This is sporadic, however, and thus there is really no impetus for local violators to desist their actions given that there is rarely a punishment.

Additionally compounding enforcement issues is the often negative view of NGO employees by locals. In the case of BICA-Utila, the acting Director is an ex-pat and most of the staff members, save two, are from mainland Honduras. Though it is unclear from my position where this negative view stems from, I did experience several instances where people expressed that BICA-Utila’s actions (keeping people from fishing, etc) are hurting the people and even had people refuse to take my survey when they learned of my affiliation with BICA-Utila. It is likely that there is some animosity towards outsiders who are keeping people from making a commercial profit and sometimes in their view, collecting food for their families, especially given that the local municipality has failed to take an interest in this type of enforcement.

It is clear that though there are concerned organizations and citizens in Utila, there is a lack of regulatory pressure and true protection for the island’s resources. Though there are regulations in place, these are often violated, and there are few repercussions for violators. Utila, like many other coastal regions in Central America, needs additional help in order to protect its marine species. There are many successful examples of community based and/or participatory based fisheries and natural resource management projects that serve as useful examples of what can be done to accomplish this in Utila (Verheij et al. 2004). Involving locals in the monitoring and protection process could be positive in a number of ways, in particular in alleviating some
tension surrounding enforcement. That being said, the formulation of the Bay Island Marine Park provides a unique opportunity to incorporate collaborative environmental management techniques that will protect the Islands’ natural resources and allow locals to get involved with this protection.

The following sections of this paper will explore one potential solution to Utila’s regulation, enforcement and protection issues through a collaboratively administered program to carry out a newly formed Bay Islands Environmental Management Plan.

3.4 Finding a Solution

3.4.1 The Bay Islands Environmental Management Program

The Programa de Manejo Ambiental de Islas de la Bahia (PMAIB) or the Bay Islands Environmental Management Plan, was carried out by the Honduran Institute of Tourism and completed in 2008. In 2002, the Inter-American Development Bank approved a $12 million loan to the government of Honduras for the program whose purpose is threefold: to (i) strengthen the regional framework for environmental management and sustainable tourism, (ii) expand sanitation services, (iii) and strengthen municipal and land management (IADB 2002). The first phase of the program provided funding for much needed data gathering and monitoring efforts and included several projects to increase sustainable development (Ortega 2011). The program lapsed for period of time due to unknown reasons, however, and funding has been sporadically given to NGOs to carry out the plans of the program (ibid).

Despite several issues, a marine park designation was achieved (Decreto 75-2010) which makes the Bay Islands, and the 12 nautical miles surrounding each island, a protected marine park (Ortega 2011). Currently, the task of creating a management plan for the park is underway and is set to be completed within the year. The responsibility for carrying out the management
strategies outlined in the plan will largely be that of local NGOs. The creation of this plan provides an opportunity for these local NGOs and other governing bodies to collaborate and develop sustainable management strategies to protect the Bay Islands. In particular, the development of this plan provides the impetus and the government backing to create a community based environmental management program to achieve the goals of the management plan, especially in Utila where the local populous has expressed concern.

Data from PMAIB provides baseline data for a management plan and the new marine park designation provides the impetus to create a functional environmental management plan for the marine park area. No specific management guidelines have been created and the task of developing tailored local strategies has been left to those who will be carrying out the management process – likely NGOs. Judging from the aforementioned survey results and the fact that a local management strategy needs to be developed for resource protection in Utila, a community based environmental management program may be both a viable and desirable environmental management strategy for the island.

3.4.2 Community Based Environmental Management

Community based environmental management, also called community based conservation, community based natural resource management (CBNRM), and collaborative environmental management, is a relatively recent strategy that has been employed in the conservation movement in an effort to protect and manage the natural world. Though each of these may have a slightly different name and goals, the most important aspect of these management strategies is the word “community”. Through these management techniques, environmental organizations seek to effectively protect and manage natural resources on the local scale by incorporating community members into the prioritizing, planning, development and implementation stages.
These methods were created in order to decrease tension among conservation organizations and community members and were a response to the less effective exclusionary conservation techniques (Ghimire and Pimbert 1997).

Many evaluative studies have been conducted around the world to assess the relative success of these community based management projects. Participatory techniques and inclusion of community members in management planning can reduce conflicts, improve management, and empowers local communities (Sultana and Abeyasekera 2008, Foucat 2002). Recognizing that CBEM also has its own set of issues in terms of management (Malaio et al 2009), it is important to understand the attitudes and concerns of the local community in order to best determine what type of management program is best in a particular area.

In order to demonstrate the success of collaborative/community based environmental management in coastal communities, the following case study in Tanga, Tanzania will be presented.

3.4.2.1 Collaborative Coastal Management in Tanga, Tanzania
Like Utila, the communities in Tanga, Tanzania have struggled with many environmental issues including reef degradation, harmful fishing practices, and difficulties with local regulation enforcement. In order to address these issues, they implemented a collaborative environmental management program using an approach designed by Picciotto and Weaving (1994). A collaborative approach was quite successful for this coastal community and emphasizes the usefulness of community based/collaborative approaches in coastal environmental management. Though a community based approach is only one method in a number of potential environmental management strategies, it is one that is seriously worth considering employing in Utila. The
presentation of this case study demonstrates how the Picciotto and Weaving approach was carried out in Tanga, Tanzania and the successes that have come from this process.

Verheij et al. present a case study on collaborative coastal management program from Tanga, Tanzania that combined both participatory research and community based management techniques to improve local coral reefs and fisheries (Verheij et al. 2004). The purpose of the program was to “improve management of coral reefs, mangroves, and other coastal resources” (pg 310). In order to carry out the collaborative process, they used the approach outlined by Picciotto and Weaving⁵ which involves: Listening, piloting, demonstrating, and mainstreaming. In the listening stage, priority issues were identified by local resource users. In the piloting stage, proposed actions were tested alongside alternatives. In the demonstrating stage the process was adapted and applied on a broader scale. And finally, in the mainstreaming stage the most viable processes and actions were adopted as normal practice (Verheij et al. 2004). These various stages took place in three phases which spanned more than ten years.

To deal with fisheries and the problem of declining fish catches, a collaborative management area plan was instituted with villages, the village government, district representatives, the private sector and other stakeholders using a participatory approach. The process of this plan included training locals in resource assessment methods, participatory mapping and delineation by various stakeholders, and a draft comment period where locally created Central Coordinating Committees (CCC) would review the plan and it would not be approved until the decision was unanimous (a multi stage process). Important to note with this program is the continued community involvement throughout the entire process. Six Collaborative Management Areas (CMAs) were set up by villagers and other stakeholders along

⁵ Article: “A new project cycle for the World Bank”: Finance and Development; 31(4):42-4. This four step approach was not created for community based management but has been successfully adapted for such projects.
the coast and are managed daily by the CCCs which have community elected representatives. Local villagers handle resource mapping and assessment along with analyzing the data and identifying priority issues. In addition, the villagers called on the help of the local government and the navy to help patrol for illegal fishing practices within the CMAs. Since this program has been enacted, there have been increases in mangrove and coral cover, declines in destructive fishing practices such as fishing with dynamite, and declines in sea urchin densities as evidenced by the recovering triggerfish population.

This case study outlines the usefulness of the four stage approach designed by Picciotto and Weaving and demonstrates what the implementation of such a program looks like. Given the similarity of the environmental management issues between Tanga and Utila, and the concerned populous in Utila, it seems likely that this approach could be successful in Utila as well. The following section will explore this approach further and sketches out what such an approach may look like in Utila. Baring in mind that a collaborative/community based approach is not a panacea, potential considerations and concerns are also discussed.

3.4.3 Community Based Environmental Management in Utila

In addition to the successful case in Tanga, the collaborative management approach created by Picciotto and Weaving has been used in the creation of a number of collaborative management programs and is even used by the IUCN in Marine and coastal protected areas: a guide for managers and planners as a prime model for involving communities in coastal management. The approach’s proven success in coastal areas addressing issues similar to those that Utila is currently facing makes it a potentially useful guide for the creation of a collaborative management process on the island. In particular, Utila seems well suited for a collaborative program at this time given the fact that Utila’s residents have expressed their concern for the
environment and Utila’s natural resources and also their willingness to participate in future projects (Appendix A, Figure 8). This, together with the fact that Utila’s dependence on its resources for income generation and subsistence (especially coral reef and fish) is only going to grow, means that successful environmental management strategies are needed now. A collaborative, community based environmental management approach is likely the most viable long term management strategy for the island and its surrounding cays and waters. The strong NGO base in Utila, coupled with support and participation of local citizens, provides a strong foundation for the development of such a program that will supply sustainable protection for Utila’s environmental resources.

Though sustainable community based environmental management programs are difficult to establish and require a lot of time for laying a foundation, they have the potential to be successful in Utila. Major management goals for the island will need to be developed in a collaborative process involving all interested parties. For this process to take place successfully, steps must be taken to reduce negative perceptions among groups. In many cases, community members may view management authorities as corrupt or not having the community’s interest in mind, while management authorities may view community members as ignorant or greedy with their resource use (Salm et al. 1997). In Utila, numerous survey respondents expressed concern over local NGOs’ (namely BICA-Utila) and the municipality’s ability to enforce regulations fairly and equitably. Open conversations must be held among these groups, with significant time spent changing these perceptions and establishing mutual trust, before any management action can occur. In the Tanga case, this process took eighteen months to complete, so those in Utila may need to be prepared to spend significant time on this as well (Salm et al. 1997). Only once this foundation has been laid can the collaboration process begin. Though this process
undoubtedly looks different among various cases, using the Picciotto and Weaving approach, the following considerations and actions may be incorporated in Utila:

- **Listening** – In Utila, the listening stage will perhaps be the most important stage in the management process given that it is central in establishing community interest and commitment. Those who are interested in being involved in the management process, namely resource users, managers and generally concerned citizens should voice their opinions and concerns regarding local resources and their uses. Through NGO support and recruiting, local feedback should be elicited on the proposed environmental management plan developed by government consultants to provide guidelines to carry out a specific plan in Utila. Priority issues for all those involved should be identified – in Utila these would likely include declining fish catches, decreased coral cover and illegal practices (such as mangrove cutting, harvesting of certain marine species, harvests out of season). Relationships among all parties (community members, managers, government, municipality, local and international NGOs) should continue to be fostered as all of these groups become accustomed to the collaborative process. Resource and socioeconomic assessments should also be completed/taken into account so that goals and priorities are created with complete information.

- **Piloting** – In the piloting stage, proposed environmental management actions should be tested and reviewed for success. These actions include management strategies, potential restoration and any new zoning. Some actions, such as coral reef management alternatives should be tested using an experimental approach, while others, such as new zoning actions should be piloted. This phase will provide local NGOs such as BICA-Utila and UCME, who already do some monitoring of the island’s resources and patrolling for
regulatory violators, to share their expertise and include the local community in data collection and monitoring as well as their other efforts. Multiple action alternatives should be tested in this phase to provide more complete information for what may work best in the Bay Islands. In this stage it will be important to encourage engagement by local community members so that they understand the processes and the relative strengths and weaknesses. Feasibility of management actions should also be evaluated by a number of criteria, including: measured success, community perception, sustainability and resources needed. This stage, especially given that rigorous tests will be taking place, could last a few years. However, given that these actions are being used to develop a long term management program, it is important that initial testing be applicable to future outcomes.

- **Demonstrating** – By this stage, processes and actions should be fine tuned to meet established goals and should realistically be carried out by community members. Additionally, the chosen appropriate actions should also be applied to a wider range of cases which will elicit continued and even increased involvement from community members. Because the purpose of a community based management program is to have management in the hands of community members, in conjunction with help from local NGOs and other interested parties, a sustainable, long term managing group should be established by this stage. This means that those who have participated in, and understand the process, will hopefully be invested for the future. Additionally, if further expertise is needed, individuals that are able to provide them should be brought in. In this phase, it would also be of great importance (as it was in the Tanga, Tanzania case) to establish
cost-sharing arrangements among those entities who have agreed to participate in long term environmental management.

- **Mainstreaming** – Logically, after the most feasible actions and management strategies have been determined, adapted, and applied on a broader scale those actions should be adopted as normal practice. This would mean that networks needed to sustain the management program have been created and that major changes, such as incorporation of actions in law/regulatory measures, take place.

The Picciotto and Weaving approach is meant to be a guide for collaborative management and it should be taken into account that community based programs have different goals, time scales, and success rates based on the specific management area. It is encouraging that community members in Utila have expressed their concern for, and interest in, working to improve local ecosystem health and hopefully there will be enough buy-in from multiple entities (community members, NGOs, government) to see a feasible management program realized. To fully carry out the four stages of the proposed process will likely take several years and will require much adaptive management to form a sustainable environmental management program.\(^6\)

As with any management strategy, community based environmental management should not be seen as a panacea and perfect management strategy. Undoubtedly there will be barriers to the process that will need to be addressed for successful management to take place. As mentioned, many locals’ current perceptions of regulation enforcement and local NGOs is negative – a view that will need to be amended for this process to take place. One respondent said that he wanted “nothing to do with BICA”, illustrating this viewpoint (Interviewee 6). It was also discovered during surveying that many Utilian citizens do not realize that there has been a

complete turnover in BICA-Utila staff. This often means that locals are harboring negative feelings towards a staff that is no longer in place. BICA-Utila would likely increase its effectiveness for reaching local audiences by spending time introducing themselves and their work to the local community in order to gain trust. Additionally, there may be social barriers on the island that will need to be overcome. For instance, the sentiment expressed by many Utilian survey respondents was that the majority of Utila’s problems stem from the presence of “mainland people” or “foreigners” who are using up resources and taking local jobs. This view may make it difficult for some members of the local community to come together for collaboration. Many locals in general expressed concern about how they might be viewed (Interviewees 41, 32, 11) if they openly participate in management and patrolling efforts and one person suggested (Interviewee 52) that a hotline should be set-up for people to report violations because people are afraid of the repercussions should someone find out they were reporting others. Additionally, there are still many community members who are avid resource exploiters who will not be in favor of new management or restrictions. Recognizing and addressing the potential barriers to environmental management on the island will be an essential step in moving forward. Facilitating conversations among various groups will be key in establishing working relationships and lasting trust.

4. Conclusion
Utila has experienced marked increases in population and tourism growth that have furthered the exploitation of many of its resources. Mangrove deforestation has intensified to make way for new development and fish populations have been exploited to feed the rapidly growing tourist population. There have been noted declines in both commercially important and reef fish populations in the past several years along with declines in coral cover. A survey conducted in
Utila in 2010 found that the majority of locals are aware of, and concerned about, the environmental issues facing the island. In particular, survey respondents felt very strongly about the lack of enforcement of environmental regulations in Utila and the frequent illegal fishing of some of the area’s important marine species. Because the government has recently funded the creation of an environmental management plan for the Bay Islands but does not specify how this plan should be carried out, it may be an opportune time to create a community based environmental management plan for the islands in which locals can be involved throughout the process.

Utila relies heavily on its marine and terrestrial resources and those concerned should seriously consider the implementation of a community based environmental management plan to protect and manage these resources. When surveyed in the summer of 2010, many tourists noted the degraded state of the coral reef and said they would likely not recommend Utila to others if the coral quality declined further. Given the increased degradation of the island’s resources along with their simultaneously increasing importance to the local economy, it may be an ideal time to start an environmental management and resource protection program that will work. Because many Utilians said they would be willing to participate in environmental improvement activities, it seems likely that community based management is a viable option. The proven success of collaborative environmental management programs in areas with similar management issues provides hope that this type of management program, if done right, could be very successful in Utila.
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Appendix A. Additional Figures

1. Male and Female respondents

Figure 2. Percentage of respondents from each sub-group
Figure 3. Health of Utila’s natural resources

![Health of Utila's Natural Resources](image)

**Medians**
- **Coral Reef**
- **Mangroves**
- **Fish populations**
- **Island animal populations**
- **Forests**

**Resource Health of Utila’s Natural Resources**

- **Ex-Patriates**
- **Mainland Hondurans**
- **Utilians**

Figure 4. Sources of environmental information

![Sources of Environmental Information](image)

**Sources of Environmental Information**

- **Wouldn't pay attention**
- **Local TV**
- **BICA display**
- **Poster**
- **Flyer**
- **Commercial-Ad**
- **Pamphlet**

**Information source**
- **Ex-pats**
- **Utilians**
- **Mainland**

**Number of respondents**
Figure 5. Potential harm from activities

![Bar Chart: Potential Harm from Activities (median)]

- Littering: 42%
- Swimming/Snorkeling: 58%
- Cutting mangroves: 42%
- Hunting: 58%
- Diving: 42%
- Anchoring in the reef: 58%
- Burning materials: 58%
- Collecting seashells: 42%

Figure 6. Community participation in environmental improvement activities

![Pie Chart: Have you ever participated in environmental improvement activities in Utila?]

- Yes: 42%
- No: 58%
Figure 7. Activities that locals previously participated in

![Bar chart showing activities and number of respondents.]

Figure 8. Willingness to participate in future environmental improvement activities

![Pie chart showing participation in future activities.]

Would you participate in environmental improvement activities in the future?

- Yes: 91%
- No: 9%
Appendix B. Survey Instruments

1. Survey of locals

1. Are you from Honduras?     ____Yes     ____No

   1a. If yes, where are you from originally? ______________________________________

   1b. If no, what is your citizenship? _____________________________________________

2. How long have you been living in Utila? _______________________________________

Environmental Knowledge – Utila

3. During your time here, what do you consider the greatest changes to Utila to be?

___________________________________________________________________________
___________________________________________________________________________

   3a. What do you think has caused these changes?

___________________________________________________________________________

4. Please state how big of an environmental problem each of the following is in Utila: Rank 1 to 5 in importance, 1=not a problem to 5=big problem. Do you think this has an effect on tourism? (*specify type of pollution: oil, trash; resources: water, energy)

   a. ____Overfishing    b. ____Damage to reefs    c. ____Tourism development

   d. ____Land clearing    e. ____Water pollution*    f. ____Land pollution* (trash)

   g. ____Restricted resources*    h. ____Lack of enforcement of regulations

5. Please rate your opinion on the current health of the following on/around Utila:

```
<table>
<thead>
<tr>
<th>Resource</th>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Coral Reefs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Mangroves</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Fish Populations</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. Island animal populations</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. Forests</td>
<td></td>
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</tr>
</tbody>
</table>
```

6. Do you know if there are regulations in Utila about (check for yes):

   a. ____Cutting mangroves     b. ____Tree cutting    c. ____Hunting iguanas
   d. ____Catching marine animals   e. ____Diving      f. ____Turtle Harbor PA

6f. Additional Information (if people elaborate):

___________________________________________________________________________

___________________________________________________________________________

Human Interaction

7. Please provide your opinion on the potential harm these activities may have on overall environment quality. Rank from 1 to 5 in order of importance (1 being “not harmful” to 5 being “extremely harmful”). Leave blank if “Don’t know”).
a. ___ Littering    b. ___ Swimming or snorkeling the sea    c. ___ Cutting mangroves    d. ___ Hunting    e. ___ Diving in the sea    f. ___ Anchoring in the reef    g. ___ Burning materials (trash)    h. ___ Collecting seashells on the beach

8. Do you know of any fishing methods that may be harmful to the environment?

__________________________________________________________________________

9. Please state how much you agree or disagree with each of these statements (1= strongly disagree, 5 = strongly agree)
   a) It is important to protect the environment
   | 1= Strongly disagree | 2 = Disagree | 3= Neither agree nor disagree | 4= Agree | 5 = Strongly agree |
   b) It is our responsibility to protect the environment for future generations
   | 1= Strongly disagree | 2 = Disagree | 3= Neither agree nor disagree | 4= Agree | 5 = Strongly agree |
   c) I feel that my actions can have a direct effect on the environment
   | 1= Strongly disagree | 2 = Disagree | 3= Neither agree nor disagree | 4= Agree | 5 = Strongly agree |
   d) It is too difficult for me to improve the environment
   | 1= Strongly disagree | 2 = Disagree | 3= Neither agree nor disagree | 4= Agree | 5 = Strongly agree |
   e) There is no point in doing what I can for the environment unless others do the same
   | 1= Strongly disagree | 2 = Disagree | 3= Neither agree nor disagree | 4= Agree | 5 = Strongly agree |

**Personal Action**

10. Please state how often you do each of the following actions: (1=Never, 5=always)
   a) I consider the environment when I buy products
   | 1= Never | 2 = Rarely | 3= Sometimes | 4= Often | 5 = Always |
   b) I try to do what is right for the environment, even when it may be more difficult
   | 1= Never | 2 = Rarely | 3= Sometimes | 4= Often | 5 = Always |
   c) I throw my waste into a trashcan
   | 1= Never | 2 = Rarely | 3= Sometimes | 4= Often | 5 = Always |
   d) I recycle used plastic bottles
   | 1= Never | 2 = Rarely | 3= Sometimes | 4= Often | 5 = Always |
   e) I read posted information regarding the environment
11. Are you aware of conservation, environmental education, or environmental improvement efforts on Utila?  
   __Yes ___No

12. What organizations do you know that participate in these activities?
   __________________________________________________________

13. Have you participated in any of these activities (beach clean ups, documenting wildlife, etc)?  __Yes  
   __No
13a. → If so, what did you do?
   __________________________________________________________

14. What is your occupation?
   __________________________________________________________

14a. → (If fisherman) What are your fishing practices?
   __________________________________________________________

15. What do you do in your free time?
   __________________________________________________________

16. Do you make efforts to lessen your garbage at home?  __Yes  
   __No
16a. If yes → What do you do?____________________________________
16b. If no → Would you be willing to take part in free methods to reduce your garbage at home?  __Yes ___No

Demographic Data
17. Gender  ___Male ___Female

18. How old are you?  ___18-34  ___35-44  ___45-64  ___65 and older

19. What is your marital status?
   Married
   Single
   Divorced
   Widowed
   In a relationship
   Other

20. How many people are in your household, including yourself? ________

21. How many of the people in your household are older than 15 years of age, including yourself? ________

22. How many years of education have you completed? ________________________________

23. Where do you get general information? Check all that apply. Indicate top choice with an asterisk.

   a. TV
   b. Internet
   c. Newspaper
   d. Flyer
   e. Word of mouth
   i. Additional Information (certain TV stations, etc)
24. Would you pay attention to environmental information if it were in the form of a: (check all that apply)
   a. ___Pamphlet    b. ___Commercial    c. ___Flyer    d. ___Poster
   e. ___BICA community center display    f. ___Local TV (HQ tv)  h. ___Wouldn’t pay attention

25. Would you be willing to participate in environmental improvement activities? __Yes    __No

   Thank you for your time!

Date:____________________  Interviewers:____________________________________

Notes:
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
8. If you have already dived: Would you recommend diving in Utila to others? Why or why not?

___________________________________________________________________

9. Would you be interested in taking a guided snorkel trip to the north side of the island (protected area)?

   __Yes     ___No

10. How much would you pay per person to do this? __$26-$30  __$21-$25  __$11-$20  __$5 - $10

11. Would you pay more for a product if you knew it benefited the local community directly? If yes, what % more?

____________________________________________________________________

12. Given your experience, do you think there are environmental problems in Utila?  ___Yes  ___No

12a. If yes, what are they?

____________________________________________________________________

13. Please rate your opinion on the current health of Utila’s coral reef in relation to comparable destinations that you have visited.

<table>
<thead>
<tr>
<th></th>
<th>Very Good</th>
<th>Good</th>
<th>Okay</th>
<th>Poor</th>
<th>Very Poor</th>
<th>Don’t know</th>
<th>N/A</th>
</tr>
</thead>
</table>

14. Do you know if there are any marine species that are illegal to fish or in danger in Utila?

____________________________________________________________________

14a. If yes ➔ Which ones? Where did you receive this information?

____________________________________________________________________

Behaviors

15. On a scale of 1 to 5, with 1 = never, 5 = always, please indicate how often you do the following activities: While in Utila, I have:

<table>
<thead>
<tr>
<th>Activity</th>
<th>1 = Never</th>
<th>2 = Rarely</th>
<th>3 = Sometimes</th>
<th>4 = Often</th>
<th>5 = Always</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Tried to conserve energy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Tried to conserve water</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
c. Avoided touching coral

d. Avoided touching marine species

e. Sought recycling opportunities

f. Sought trash receptacles

g. Refilled/Reused water bottles

16. Do you eat seafood?  ____Yes  ____No

16a. If no → What is your reason for not eating seafood? ____________________________

17. If yes → Which of the following have you already eaten here in Utila?  ____None

  a. Kingfish
  b. Barracuda
  c. Lobster
  d. Tuna
  e. Grouper
  f. Shrimp
  g. Snapper
  h. Conch
  i. Wahoo
  j. Mahi Mahi

18. Even if you like them to eat, would you refrain from eating endangered/illegal species if you had that information? (ex. lobster, conch)

________________________________________________________________

19. Have you bought, or do you intend to buy, any souvenirs made of coral or turtle shell while you are here? (Circle which item if “bought” or “intend to buy”)

  ____Bought  ____Intend to buy  ____No  ____Don’t know

BICA

20. Would you be interested in visiting a visitor center on the island? ____________________________

21. If there were a visitor center, what kind of information would you like them to provide for you?

________________________________________________________________________________________

22. Have you heard of the Bay Islands Conservation Association (BICA)?  ____Yes  ____No

22a. If yes → How did you hear about them?

   Newspaper

   Internet

   Posters
Environmental Attitude and Human Effects

23. Please indicate how much you agree or disagree with each of these statements (1= Strongly Disagree, 5=Strongly Agree, 3=Neutral)

   a) It is important to protect the environment
      
      1= Strongly disagree  2 = Disagree  3= Neither agree nor disagree  4= Agree  5 = Strongly agree

   b) It is important to protect species that are in danger
      
      1= Strongly disagree  2 = Disagree  3= Neither agree nor disagree  4= Agree  5 = Strongly agree

   c) I think about the environment when I purchase items
      
      1= Strongly disagree  2 = Disagree  3= Neither agree nor disagree  4= Agree  5 = Strongly agree

   d) I feel that my actions can have a direct effect on the environment
      
      1= Strongly disagree  2 = Disagree  3= Neither agree nor disagree  4= Agree  5 = Strongly agree

   e) It is too difficult for me to improve the environment

      1= Strongly disagree  2 = Disagree  3= Neither agree nor disagree  4= Agree  5 = Strongly agree

   f) There is no point in doing what I can for the environment unless others do the same

      1= Strongly disagree  2 = Disagree  3= Neither agree nor disagree  4= Agree  5 = Strongly agree

24. Would you be interested in volunteering while staying in Utila? ___Yes    ___No

25. If yes, which of the following would you like to do?

   a. Beach clean up

   b. Sea Turtle monitoring on beach

   c. Survey/catalog species

   d. Environmental Education

   e. Anything that interacts with locals

   f. Other (specify)

25. Would you recommend visiting Utila to others? Why or why not?
Demographic Data

26. Gender  Male___  Female___
27. How old are you? ___18-34  ___35-44  ___45-64  ___65 and older
28. What level of education have you completed?  
29. Where do you get general information? Check all that apply. Indicate top choice with an asterisk.  

<table>
<thead>
<tr>
<th>Home</th>
<th>Utila</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. TV</td>
<td></td>
</tr>
<tr>
<td>b. Internet</td>
<td></td>
</tr>
<tr>
<td>c. Newspaper</td>
<td></td>
</tr>
<tr>
<td>d. Flyer</td>
<td></td>
</tr>
<tr>
<td>e. Word of mouth</td>
<td></td>
</tr>
<tr>
<td>f. Poster</td>
<td></td>
</tr>
<tr>
<td>g. Church</td>
<td></td>
</tr>
<tr>
<td>h. Other (please specify)</td>
<td></td>
</tr>
</tbody>
</table>

30. Would you pay attention to environmental information if it were in the form of a: (check all that apply)  
a. ___Pamphlet  b. ___Commercial  c. ___Flyer  d. ___Radio broadcast  
e. ___Poster  f. ___Visitor center display  g. ___Wouldn’t pay attention
31. What citizenship do you have?  
32. What is your current occupation?  

Thank you for your time!

Date:  
Interviewers:  
Notes: