

Establishing Socioeconomic Baselines of Sustainable Fishing Communities

A Study of the Fishermen of Palito and Montero

Interactive Qualifying Project



Sponsored by La Fundación MarViva

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Abstract

This report, sponsored by MarViva, presents a socioeconomic profile of the towns of Palito and Montero on Chira Island in Costa Rica. We conducted surveys and interviews with the community members to help MarViva understand the effects of sustainable fishing on the local economies and the lifestyles of the people. Through our field work, we gathered the necessary socioeconomic information to provide an analysis for each town and developed recommendations for MarViva and the townspeople about approaches to improve the socioeconomic conditions of the two towns.

Executive Summary

In Costa Rica, Chira Island is home to a rural community of people who have been largely isolated from the rapid economic and cultural changes that have occurred in the rest of the nation. The inhabitants of Montero and Palito rely heavily on fishing as a source of food and income, and their way of life faces present and future threats from declining fish catches. To combat this problem, the people of Palito and Montero have taken the initiative to promote the use of sustainable fishing methods. In 2009, these communities were the first locations to establish an Área Marina de Pesca Responsable (AMPR) with the help of INCOPECA (Costa Rica's Institute for Fisheries and Aquaculture). An AMPR creates a protected marine area that is governed by specific regulations about which fishing methods may be used. The goal of an AMPR is to prevent the use of unsustainable fishing methods, such as those that damage the ocean floor or catch unwanted fish species. In addition to protecting diverse marine life, the AMPR is also designed to protect the people by ensuring that there are enough fish for future generations to catch.

One non-governmental organization that has taken an interest in the communities of Palito and Montero is MarViva, whose mission is to encourage fishing communities to maintain and improve regulations regarding commercial use of marine resources within an AMPR. MarViva has worked with Palito since June 2010, providing training and support for the fishermen, as well as monitoring the affected fish species. They have only recently begun collaborating with the fishermen of Montero. In particular, they have worked with the fishing associations of ASOPECUPACHI (La Asociación de Pescadores Cuerderos de Palito de Chira) and ASOMM (La Asociación Mixta de Montero). All of MarViva's previous work done with these communities has been focused on sustainable fishing methods and the conservation of fish species.

However, investigations into the socioeconomic impacts of sustainable fishing are lacking, and MarViva wants to understand the effects of sustainable fishing practices on the fishermen of these towns. The goal of this project was to establish a socioeconomic baseline for the fishing communities of Palito and Montero, and provide recommendations about how the people of the two communities could work to improve their socioeconomic status. To accomplish this goal, we first created interview questions that allowed us to assess the local perceptions of the AMPR program and the work of the fishing associations. We then collected social and economic data from the fishermen and non-fishermen of both towns. Finally, we

asked the people about what approaches could be taken to improve the socioeconomic conditions of their towns. These data were collected during two separate trips to Chira Island.

In order to achieve our first objective of assessing the perceptions of residents towards the AMPR program and the work of the fishing associations, we conducted interviews with the presidents of ASOPECUPACHI and ASOMM as well as with the fishermen of the communities. The interview questions asked the presidents about the role of their organizations, the history of sustainable fishing on Chira Island, and the reasons for membership in a fishing association. To gain the perspectives of the fishermen, we interviewed both members and non-members and asked about their feelings towards the AMPR and its effects on the environments and the economies of the towns.

Of the eleven fishermen who were interviewed, both members and non-members of the fishing associations (six from Palito and five from Montero), all of them feel the AMPR is a necessity for the community, because it allows them to conserve many species of fish for future generations. In Palito, this viewpoint is evidenced by the predominant use of *cuerda de mano* (hook and line), the only fishing method that is permitted within the AMPR. However, most fishermen in Montero still commonly use *trasmallos* (gill nets). *Trasmallos* are prohibited in the AMPR because the nets catch fish of all species and sizes, including juveniles. One of the roles of the members of ASOPECUPACHI and ASOMM is to assist in patrolling the AMPR and ensuring that *trasmallos* or other harmful fishing methods are not used within its limits. According to the president of ASOPECUPACHI, Eugenia Fernández Díaz, the association also supports community development and helps the people to see the need for the AMPR to protect the marine environment. In addition to community development, she believes the fishing associations can provide training, support, and a potential means of negotiating better fish prices for members. ASOPECUPACHI is currently building a fish processing center to allow the fishermen to store large amounts of fish, bypassing the need for a middleman. The association has also started an oyster farm. The presidents of both associations hope to work out business deals with interested buyers in sustainable seafood products in the future.

We analyzed the economic viability of fishing for the communities by accomplishing our second objective: to collect economic data from fishermen and those involved in other industries. These data were gathered through a survey that was composed primarily of questions requiring numerical or categorical responses. The survey was conducted with fishermen from both towns who are members of their respective fishing associations and those who are unaffiliated. Non-fishermen from both towns were also surveyed with the intent to determine whether families involved in other industries, such as tourism, have a higher

socioeconomic status than those who reported only income from fishing. Our participant pool from Palito included eight families of fishermen who are members of ASOPECUPACHI and eleven families of fishermen who are unaffiliated. Our participant pool from Montero included eight families of fishermen who are members of ASOMM and six families of fishermen who are unaffiliated. For non-fishermen, we surveyed three families from Palito and three from Montero, including store, restaurant, and hotel owners. Survey participants were questioned about their demographics, economic activities, training, education level, household finances, and their profits from either fishing or from their business (in non-fishermen survey). As an additional approach to gather socioeconomic information, we collected observations about the houses and other material possessions of the residents.

The survey responses revealed that in both towns, the prices of the different species of fish are the same, regardless of membership in a fishing association. The fishermen of Montero use *trasmallos* to catch shrimp, which have a higher selling price than any of the fish caught by *cuerda de mano*, but they do not have a substantially higher income than the fishermen of Palito. For Montero, we estimated the mean gross monthly incomes from the sale of fish to range from 202,500 to 517,234 colones, compared to the estimated mean gross monthly incomes in Palito, which range from 165,714 to 240,267 colones. From our survey, we found that most of the fishermen are in debt and that nearly everyone lacks any savings. We also obtained responses for the monthly income of the non-fishermen from both towns, which were reported as between 150,000 and 450,000 colones. In addition, we questioned survey participants about their education levels and discovered that although most adults in Palito and Montero have only obtained a primary school education, many of their children are graduating from high school and attending university. Even though the fishermen had received little education, nearly all of the fishermen in Palito and several fishermen in Montero affirmed they had taken training courses related to food handling and processing, boat safety, first aid, tourism, and a variety of other topics.

We also designed several interview and survey questions to complete our third objective and assess local perceptions of potential mechanisms to improve the socioeconomics of the communities. These questions asked participants how they felt the socioeconomic conditions of the communities could be improved and what industries could be developed to supplement fishing. To evaluate the prospective direction of the island, we were particularly interested in the future of the children. One of our survey questions asked parents what they expected their children to be when they grew up, whether that meant being a fisherman on Chira Island or leaving the island to pursue a university education. To gain another perspective,

we asked children of the local elementary school to draw a picture of what they thought their future would look like. From these responses, we hoped to see whether the hopes of the children matched their parents' hopes for their future. We did not look for an exact alignment in career paths, but we found it important to note whether both the parents and children had similar expectations for staying on the island and becoming a fisherman or leaving the island to pursue an education or a career elsewhere.

To gain one viewpoint of the prospective direction of the island, we used interview questions to ask fishermen whether or not they felt fishing is a sustainable industry as well as what other industries should be developed on the island. Most respondents stated that fishing alone cannot sustain a family and that other industries such as tourism, agriculture, and cattle ranching should be developed to economically enhance the island. Currently, 58% of the families of fishermen in Palito and 50% of the families of fishermen in Montero rely solely on fishing. In addition, one of our survey questions asked parents about the hopes for the futures of their children. All of the parents surveyed reported that they hope that their children will attend university, but admitted that there are no jobs for educated adults on Chira Island. Through our activity with the local elementary school children, we found that their future career aspirations align with those of their parents. Many desire a career that requires a university education, such as a doctor, a veterinarian, a teacher, or a pilot. Although several students expressed an interest in joining the Coast Guard and patrolling for illegal fishing methods, only three of the twenty eight children surveyed expressed any interest in fishing for a living, despite the fact that nearly all of their parents are fishermen.

After detailed analysis of the results collected in Palito and Montero, we developed recommendations so that the people and MarViva can help create a more economically sound future for Chira Island. In order to improve their socioeconomic statuses, we recommend the people of Palito and Montero form an effective organization that will be tasked with economic development on the island. Ideally, this organization would contain representatives from all towns and work to serve the best interests of the entire island. It would also encourage entrepreneurs to start small business and help them to reach customers on the mainland. It is imperative for the people of Palito and Montero to set aside previous differences and work together to improve the economy of the island. They have had difficulties in the past due to prejudices held by community members, but if they all work together, they may be better placed to achieve common goals and advance economically. The development of additional industries and opportunities for employment on the island as a means to supplement fishing would greatly benefit the people. For example, agriculture and cattle ranching industries could be established.

The creation of new sources of employment can allow the families of Palito and Montero to earn a higher average monthly income and have access to a greater quality of life. We recommend that they also develop the tourism industry further and promote the island, beginning with the creation of an attractive cultural identity for all of Chira Island. The people must develop an attractive cultural identity to determine the appeal of traveling to Chira Island and different strategies to promote it. They should create a more informational website to publish transportation to the island as well as tours to endorse their businesses. Finally, the people would benefit from attending a financial workshop held by an outside organization. If they learn how to keep track of debts owed or how to save a small amount of money each month, they could possibly improve their current financial situations.

To our sponsor MarViva, we recommend that they establish relationships before starting projects with other communities in order to educate the community about its role and to build relations with important community members. They should host events with each of the communities to allow for the creation of trust and an understanding of the beneficial role that MarViva hopes to play in the community. MarViva should also establish socioeconomic baselines before starting projects in other communities, to gain perspective on the most important needs of the people and to know exactly what problems face the community. After two years, MarViva should evaluate the progress within the community to ensure that the results of their work are still being seen throughout the community. In order to improve the tourism on the island as well as help the fishermen, MarViva should promote activities that link fishing and tourism together. These tours could draw visitors to the island and provide another source of income for the fishermen. Finally, MarViva should act as mediator between the fishermen and the middleman of Palito, Abelardo Brais, to help manage the debts of the fishermen and obtain fairer prices. This involves revealing the prices that Brais gives to the fishermen and the profit that he receives. If MarViva can work with Product C or another interested buyer in sustainable seafood products, they may be able to offer Brais a better price for the fish he sells, provided that the profits get passed on to the common fishermen.

In conclusion, this project found that Palito and Montero are in vulnerable positions due to the unsustainable nature of fishing as an economic enterprise. The income from fishing is not adequate to support a family without going into debt. In order to raise themselves to a higher socioeconomic status, the people of Palito and Montero must develop additional industries and create more employment opportunities. Without additional industries, it is possible that the towns' younger generations will leave Chira Island for job opportunities on the mainland. We

hope that these recommendations serve as a catalyst for economic development in these towns.

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Authorship Page

Each member of this group contributed equally to the production of this report and to the project's overall completion, which includes, but is not limited to, the collection, processing, and analysis of data and information.



From left: Johanna Hartmann, Katelyn Cabral, Kristin Poti, and Amy Babeu

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List of Acronyms

ACG – Guanacaste Conservation Area

AMPR - Área Marina de Pesca Responsable (Marine Areas for Responsible Fisheries)

ASOMM- Asociación Mixta de Montero

ASOPECUPACHI – Asociación de Pescadores Cuerderos de Palito de Isla Chira

FAO – Food and Agriculture Organization

ICT – Costa Rica’s Tourism Institute

INCOPECA – Costa Rica’s Institute for Fisheries and Aquaculture

IUU – Illegal, unreported, and unregulated (fishing catches)

MINAET – Costa Rica’s Ministry of the Environment

MOPT – Costa Rica’s Ministry of Transportation

MPA – Marine Protected Area

MSC – Marine Stewardship Council

NOAA – National Oceanic and Atmospheric Administration

NGO – Non-governmental organization

Chapter 1: Introduction

Over the past few centuries, an increase in the human populations of coastal areas and an improvement of fishing technology has led to an increase in the demand for marine resources. As a result, there has been an overexploitation of many fish and shellfish species. This overexploitation is not sustainable, and its negative effects on both the fish and human species are observable. For many communities around the world, the disturbance of these marine ecosystems impacts the local residents, both socially and economically. The overexploitation of resources has led to a decrease in fish populations, and subsequently, has led to a decrease in the amount of fish caught by fishermen. Some communities have acknowledged the connection between overexploitation of the local fish population and their fishing practices. Consequently, they have taken a larger role in enforcing their fisheries management practices.

Costa Rica is attempting to improve its practices for community fishing regulations. In order to enforce conservation of its marine environment, Costa Rica has established Marine Protected Areas (MPAs). The MPA designation restricts human use of the ocean in that region. In April 2008, INCOPECA (Costa Rica's Institute for Fisheries and Aquaculture) created a new category of MPA called the Área Marina de Pesca Responsable (AMPR), or the Marine Areas for Responsible Fisheries. This program is used for zoning purposes to regulate fishing activities within these areas. The AMPRs require the enforcement of specific regulations that guarantee sustainable fishing within these areas.

The MarViva Foundation is an organization that aims to encourage active fishing communities to maintain and improve regulations regarding commercial use of marine resources within an AMPR. It is a non-profit, non-governmental organization (NGO) that operates in Panama, Colombia, and Costa Rica whose mission is "to encourage the conservation and sustainable use of marine and coastal resources, by backing Marine Spatial Planning processes" such as MPAs and AMPRs (MarViva, 2011). Moreover, MarViva strives to "improve technical and scientific support to governments, communities, businesses and other decision makers for the formulation of policies and actions" regarding marine welfare (MarViva, 2011).

Jorge Cole (2012) of MarViva believes that the first step in MarViva's work with a fishing community should be to establish a socioeconomic baseline. There is much information available on the impacts of fishing regulations on fish populations. For example, MarViva has

been collecting data on several fish species that inhabit the AMPRs in Costa Rica. However, in this and other regulated marine areas around the world, investigations into the impacts of regulations on local communities are lacking. This socioeconomic baseline can be compared to research that will be gathered in future years, allowing MarViva to analyze the effects of their work in communities that have adopted sustainable fishing practices. Fishing is irrevocably intertwined with the economies of these communities, and therefore it is necessary for MarViva to understand how a change to sustainable fishing could affect the local community.

MarViva is currently working with the residents of Palito and Montero on Chira Island, the location of the first AMPR in Costa Rica (Alvarado et al., 2011). Although MarViva has worked with the town of Palito for a few years, it has only studied the effects of sustainable fishing on fish populations. Montero, a nearby town that shares the AMPR with Palito, has only recently started working with MarViva. In both towns, fishing is a major economic activity and almost every family is involved in fishing, whether it is strictly for their own consumption or to sell for profit. The people in these communities have a thorough understanding of the environmental benefits of sustainable fishing, and many are dedicated to this type of fishing (Cole, personal communication, 2012). Fishing associations in these towns have been created with a mission to promote sustainable fishing practices. MarViva wants to understand the possible socioeconomic impacts of sustainable fishing efforts on Chira Island.

Since little was known about the economies of these communities, the goal of this project was to establish a socioeconomic baseline for the fishing communities of Palito and Montero and provide recommendations for how the socioeconomic conditions of the communities could be improved in the future. These recommendations were given to MarViva and shared with the people of Palito and Montero. To accomplish this goal, we first assessed local perceptions towards the AMPR and the fishing associations that encourage sustainable fishing. Next, we gathered socioeconomic information from the towns through surveys of both fishermen and non-fishermen. Through interviews, this project also assessed the local perceptions of the approaches that community members could take to improve their own socioeconomic conditions. We collected these data through two visits to Chira Island; the first visit focused primarily on Palito and the second visit focused on Montero. Through our field work, we were able to gather the necessary socioeconomic information to provide an analysis for each town in terms of demographics, income, savings and debt, education levels, and future outlooks for the economies of the towns. We hope that using our analyses, MarViva will be able to monitor the economic advancement of these communities and help them to create a bright future for the inhabitants of Chira Island.

Chapter 2: Literature Review

This chapter presents the relevant background research to describe the context for our study. We introduce the evolution of sustainable fishing both globally and in Costa Rica, and then provide an overview of governmental efforts to protect marine environments. This is followed by an explanation of the utilization of a co-management strategy to bring about change in a community. We then delve deeper into the central problem of our project by examining the importance of socioeconomics in evaluating resource management in fishing communities. Finally, our focus narrows to specifically discuss the setting of our field work, Chira Island.

2.1: Human Threats to Marine Environments

In recent decades, the harvesting of marine resources has negatively impacted many species of fish and their respective ecosystems. Prior to the 19th century, fishing fleets generally lacked the technological resources required to overexploit targeted fish populations. With the introduction of steam trawlers by English fishermen, industrial-scale fishing began to compete with small-scale or artisanal fishing. Led by a growing demand for fish, overfishing of specific species occurred for decades. To counteract this exploitation, the United Nations founded the Food and Agriculture Organization (FAO) in 1950 in an effort to “collect global statistics” on fish catches (Pauly et al., 2002, p. 689). In 1971, the Peruvian anchoveta was the first recorded overexploited species to cause global repercussions. Instead of evaluating their own overfishing practices as a cause for the collapse, many fishermen attributed it to natural causes, such as changes in weather patterns (Pauly et al., 2002). Despite these collapses, the trade of fish products across the world has continued to increase, as seen in official catch statistics through the 1990s, shown in Figure 1.

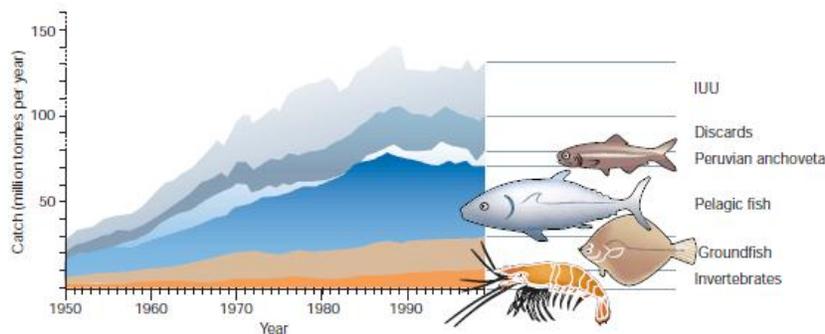


Figure 1: The catch statistics recorded by the FAO for various species of marine life from 1950 to 2000. The number of catches is raised by other “illegal, unreported, or unregulated (IUU) catches” (Pauly et al., 2002).

According to researchers, “more than 70 percent of the world’s fisheries have become overexploited or significantly depleted” since the 1950s (Kingsbury, 2010). These alarming statistics have led to the creation of federal regulations and enforcement in countries around the world, including Costa Rica. The government of Costa Rica has been concerned with human threats to its diverse ecosystems, especially its extensive coastlines on both the Pacific Ocean and Caribbean Sea. Its marine environments are varied and include ecosystems such as “beaches, rocky intertidal areas, mangroves, soft bottoms, estuaries, seagrass beds, coral reefs, a tropical fjord, coastal islands, and oceanic islands” (Wehrtmann et al., 2009, p. 3). The Pacific Coast is home to the Gulf of Nicoya, which is one of the world’s most productive estuaries and one of the most important fishing grounds of Costa Rica. Home to a plethora of species of fish and other marine animals, the Gulf of Nicoya contains many small-scale fisheries. However, due to overfishing, several species have become endangered or are on the verge of local extinction (Wehrtmann et al., 2009). One of these species is *Anadara tuberculosa*, a blood cockle found in mangrove estuaries along the Pacific coast of the Americas that is the most “important commercially harvested mollusk along this coastline” (Stern-Piriot et al., 2006, p. 87). This species is just one of many marine species whose population declines indicate that conservation measures are necessary.

2.2 Sustainable Fishing

According to the United Nations (1987), sustainable development “implies meeting the needs of the present without compromising the ability of future generations to meet their own needs.” Therefore, seafood can be considered sustainable when it is regulated to meet the current needs of the population while also preserving these species to meet the needs of future generations of the population. This is a difficult task to achieve; thus, some countries have established governmental regulations to mitigate the worldwide problem of commercial overfishing.

Because technology advances faster than regulation, there has been an increase in overfishing, or the removal of fish from the ocean faster than their rate of replacement through natural reproduction. Certain types of fishing gear, such as large nets or trawls dragged along the bottom of the ocean floor, can result in substantial damage to ecosystems. Furthermore, large nets or longlines often unintentionally catch unwanted species. These species are returned to the sea dead or dying and are classified as bycatch. In order to diminish these environmental strains, several alternative fishing practices are being promoted as sustainable. One such method is hook and lining, a term that refers to the use of a fishing pole and hooks.

Trolling, a type of hook and line fishing, tows fishing lines from a boat to catch a variety of fish at different depths. These methods are considered responsible because unwanted catch can be released soon after capture (MarViva, personal communication, 2012). In remote places such as Chira Island, the adoption of these practices may require the modification of techniques that the fishermen have used for years. Although there have been a number of attempts to promote sustainable fishing, it is a process that will require time and participation to be effective (Monterey Bay Aquarium, 2012, True, 2012).

2.2.1 Incentive for Sustainable Fishing

A major advantage to sustainable fishing is the opportunity to label and promote fish and seafood as such when brought to market. This can increase the demand for the products by environmentally conscious consumers. Consumers around the world are increasing their demand for sustainable products, with more than seventy percent of consumers in China, Brazil, and India reporting that they plan to spend more money on sustainable products (Lanuzzi, 2011). In order to identify sustainable products, household purchasers may simply look for an easily recognizable label, such as a sustainable label on fish products from organizations such as the MSC (National Research Council of the Academies, 2009, Thrane et al, 2009). A relevant example of this phenomenon is the Dolphin-Safe Tuna labeling started in 1990, which gave consumers the opportunity to purchase tuna fished by companies that reduced the risk to dolphins (Thrane et al, 2009, Potts and Haward, 2006). However, despite a thriving ecotourism industry, there is currently no organization in Costa Rica for the labeling of sustainable seafood products. Nonetheless, there are additional ways that sustainably fished products can be profitable. One of the roles of MarViva is to coordinate business deals between fishing communities and businesses interested in purchasing sustainable seafood products. MarViva can conduct research on the fishing practices of the community and assure the business that the products are obtained in an environmentally responsible manner. If a fishing association can work with MarViva to find interested buyers for their seafood products, sustainable fishing methods can dramatically increase the price per kilogram of fish that they receive (MarViva, personal communication, 2012).

Ecotourism is another market that provides incentives for sustainability and allows the community to benefit as a whole. Ecotourism, or travel oriented around nature, is a trend that is becoming more popular in many countries. In 2010, Almeyda et al (2010) carried out an investigation in the Nicoya Peninsula to evaluate how an eco-lodge in Punta Islita affected the economic, social and environmental impacts of ecotourism within the region. Questionnaires

and interviews were conducted with a group of owners and managers working at the lodge as well as employees of Punta Islita who were not working at the lodge. The project found that due to the eco-lodge, the residents were able to receive an increase in educational, empowerment, and employment opportunities. The prices of products and the value of land also increased as a result of tourism within the Nicoya Peninsula (Almeyda et al., 2010).

2.3: Government Regulation and Enforcement of Fishing Practices

In many countries, the conservation of natural resources is a national priority. To accomplish this goal, governments create protected areas and forbid any human activity that may negatively impact the environment or native species. However, this government regulation can cause tension among those whose livelihoods depend on the resources within the environments. This section explores how regulation of marine areas can cause tension between the fishermen and the government. In particular, it details the creation of the Área Marina de Pesca Responsable program.

2.3.1: Marine Protected Areas and Áreas Marinas de Pesca Responsable

Globally, Marine Protected Areas (MPAs) are officially designated ecosystems that are of ecological value and require intervention by the government. These areas, which are usually havens of biodiversity, often have fragile or degrading environments. To protect them, the government enacts laws regulating the human use of resources in these areas. These regulations specify when and where the people can and cannot fish, what equipment they must use if they do fish, and specific species that are prohibited from harvesting within the MPA (Alvarado et al., 2011). Whether an MPA is an area that prohibits all fishing or an area of sustainable fishing, the populations of endangered species and overall amount of fish in the MPA consistently increase after its creation (Ovets, 2006).

An experimental new category of MPA known as the Área Marina de Pesca Responsable (AMPR), or the Marine Area for Responsible Fisheries, was created in April 2008 by INCOPECA (Costa Rica's Institute for Fisheries and Aquaculture), a collaboration of the Costa Rican government and fishing industry leaders. AMPRs are zoning instruments that regulate the fishing activities within the areas of interest. An AMPR requires the members of the community to switch to a sustainable method of fishing in order to protect both the fish populations and the livelihood of the people. The AMPR provides specific regulations about fishing methods, gear, and allowable sizes of fish that are enforced by both the fishermen and INCOPECA (Alvarado et al., 2011, INCOPECA, 2010). The hope behind the AMPR program

is that sustainable fishing will enable the fish populations to stay constant while providing adequate fish catches for the community to depend on as a source of income and nutrition. In order for an area to be designated as an AMPR, a fishing association of the local community must apply to INCOPECSA for the legal protection of the area. The fishing association provides INCOPECSA with current environmental and socioeconomic data and proposes a plan for the implementation and enforcement of the AMPR. This plan must include the geographic coordinates of the area to be protected, allowable gear and fishing techniques, an enforcement program, a registration program, and a training program. INCOPECSA also requires that the fishing associations develop a code of ethics to ensure compliance amongst the members (Sánchez, 2008). The first official AMPR was created in Palito, a village on the island of Chira (Alvarado et al., 2011; Fonseca, 2009; Sandoval, 2009). In June 2010, the largest AMPR to date was created in Golfo Dulce, a tropical fjord in the south of Costa Rica (Ureña, 2010 and INCOPECSA, 2010). There have also been AMPRs established in the towns of Tárcoles and San Juanillo (see Figure 2) (Guier, 2012).



Figure 2: The locations of the Áreas Marinas de Pesca Responsable currently in place in Costa Rica.

A source of conflict within the AMPR program is that it affects many stakeholders. Each stakeholder, whether it is a government agency, an NGO, or individuals within a fishing community, has different interests and different reasons for making decisions. In a broad view, the program is run by the Inter-Institutional Commission of the Exclusive Economic Zone of Costa Rica. Established in 2004, the Commission works to develop Costa Rica's National Marine Strategy. The idea behind the National Marine Strategy is that the conservation and management of marine resources can best be achieved through a partnership between the government and the coastal societies. Therefore, this Commission is an umbrella organization of stakeholder groups: the Ministry of the Environment (MINAET), INCOPECA, the Ministry of Transportation (MOPT), the Costa Rica Tourism Institute (ICT), the University of Costa Rica, the National University, the National Coast Guard, and four NGOs (MarViva, Conservation International, the Nature Conservancy, and Programa de Restauración de las Tortugas) (Alvarado et al., 2011).

2.3.2 Drawbacks and Potential Solutions to Marine Protected Areas

Conflicts have arisen within the AMPR program due to a lack of communication and trust between the government and the fishermen. Before the establishment of the AMPR in Golfo Dulce, INCOPECA surveyed the people of the surrounding villages and found that many people had negative attitudes toward the AMPR. Some inhabitants were interested in the potential benefits of the AMPR but did not feel that they were sufficiently informed on the matter. Others even filed complaints with INCOPECA about the various agencies involved. A common initial concern was that the AMPR placed too much emphasis on the conservation of the fish and insufficient consideration for the livelihood of the people (INCOPECA, 2010). These negative attitudes can occur when the government fails to fully explain the reasons behind the regulations to the community or sufficiently demonstrate the benefits of the regulations for the people (Agardy et al., 2008). One of the roles of NGOs, such as MarViva, is to facilitate the communication and cooperation between the legislators and those affected by the fishing legislation. NGOs are often involved in educating and engaging the citizens about programs. In particular, MarViva is one of the parties responsible for evaluating the effects of the AMPR on both the environment and the community (MarViva, 2012).

Management of the rules and policies governing the MPAs, including AMPRs, is often flawed and prevents the success of regulating or restoring natural populations of fish. Agardy et al. (2008) state that although MPAs are a powerful tool in the conservation of the marine environment, there are many inherent problems that stakeholders often do not realize initially.

One such failure is that the government often disregards the ecological knowledge of the community in favor of scientific surveys (Espinoza-Tenorio et al., 2008). According to both Salas et al. (2007) and Agardy et al. (2008), the failure of an MPA to protect its citizens and its species can also be due to the inadequate involvement of the community members. This is often because they do not fully understand the benefits of the MPA or there is a lack of trust between the residents and the regulators. MPAs can also fail when there is poor planning, insufficient funding for enforcement and education, or a degradation of the surrounding ecosystem. Another MPA problem is that they can create a false illusion that progress is being made to protect the marine environment. If the MPA is not sufficiently enforced, the resources can deplete very quickly, because there is a general assumption that the problem is already being resolved (Salas et al., 2007 and Agardy et al., 2008).

Agardy et al. (2008) suggest that instead of focusing on MPAs (or subcategories of them such as AMPRs), the government should develop a more comprehensive plan. The “Marine Spatial Plan” (Agardy et al., 2008, p. 230) would coordinate plans for large areas supported by smaller MPAs in areas that have key ecosystems. An ideal Marine Spatial Plan incorporates knowledge from the locals about the ecosystems, adapts to change, and encourages sustainable development. Marine Spatial Planning in Costa Rica could arise out of the existing framework set by the MPAs and AMPRs. It could serve to protect the areas currently unprotected and coordinate the actions being implemented in the MPAs and AMPRs (Agardy et al., 2008). Although this system has not yet been implemented in Costa Rica, MarViva does state that their mission is to “promote the conservation and sustainable use of marine and coastal resources, through the support for Marine Spatial Planning processes” (MarViva, 2011). The trend from Marine Protected Areas to Áreas Marinas de Pesca Responsable shows that Costa Rican policy-making is trying to move from simple conservation to sustainable use, which may indicate the full development of a Marine Spatial Plan in its future.

2.3.3: Case Study: Golfo Dulce Initiative

In June 2010, INCOPECA released a document announcing its creation of an Área Marina de Pesca Responsable in Golfo Dulce, a tropical fjord on the Pacific Coast of Costa Rica. In 2009, six associations of fishermen in Golfo Dulce petitioned INCOPECA to declare an Área Marina de Pesca Responsable for their community. INCOPECA established a task force to test the feasibility of this plan. The goal of the AMPR in Golfo Dulce is to replace non-selective fishing gear with more sustainable gear such as hand lines, traps, and fishing lines. In 2010, INCOPECA expected that the AMPR would lessen the impact on marine biodiversity,

require less effort for enhanced performance fishing, significantly reduce the bycatch, improve the seabed quality, and increase the quantity and quality of the target fish (INCOPECSA, 2010). INCOPECSA also believed that the socioeconomic conditions of the fishermen would improve because the AMPR would create opportunities for fishing-related tourism, as well as allow the fishermen to label their product as being responsibly fished. To better assess the potential socioeconomic benefits of the AMPR, INCOPECSA collected socioeconomic data about the people in the towns surrounding Golfo Dulce. Some of their research topics included home ownership, access to medical care, access to education, access to clean drinking water, and reliance on Social Security (INCOPECSA, 2010). It was important for INCOPECSA to establish a socioeconomic baseline so that future evaluations of the effects of the AMPR can be performed. In 2010, INCOPECSA concluded that Golfo Dulce would benefit environmentally and socially from the establishment of the AMPR. Shortly after this assessment, the AMPR was officially created in Golfo Dulce.

2.4 Community Development

Community development has become an increasingly important topic over the last few decades, especially pertaining to the preservation of natural resources. A variety of approaches have been suggested and applied to developing societies all over the world to improve their quality of life. In the past, the plan for such development stemmed from a traditional top-down approach (Alpizar, 2006). In this strategy, the government plays a principal role in managing the communities to bring about change and preservation of natural resources. It is a very bureaucratic system that involves little to no participation or influence from the resource users themselves (Jentoft et al., 1998). However, a bottom-up approach is now being used to decentralize authority from the government and give the citizens a more active role in stimulating beneficial changes in their community (Alpizar, 2006). Smith (2012) states that resources can be managed more effectively when stakeholders are directly involved in the resource management. The members of the community tend to have knowledge and experience that the government and their organizations lack. Additionally, when the townspeople actively participate, they are more inclined to comply with the regulations.

Through participation, there is direct involvement in the process of identifying a problem, developing a solution, applying the solution, and assessing the results. This empowers the resource users with the ability to make their own decisions with the aid of other organizations and governments. There are different levels of participation that a community can utilize. The first involves a passive approach in which the stakeholders are only given information. A

second, more active level of participation, involves answering interview and survey questions. At the highest level, the population brings about change with little help from outside organizations except for advice and funding. Participation in general benefits a community in many ways. It enables them to make a difference and learn to share their needs, while allowing them to gain an appreciation for the interest of others and the community at large. The stakeholders also develop effective strategies in conflict management and resolution that they can apply to daily life. Finally, they begin to understand group dynamics and how to work cooperatively to manage resources, make decisions, and bring about needed change (Salazar, 2010).

2.4.1: Co-Management

A community management approach that utilizes this bottom-up methodology and extensive participation is known as co-management. In a co-management system, members of the affected group, the government, and other agencies such as NGOs and universities all work together to manage resources (Alpízar, 2006). For such a system to be effective, participation of the resource users is crucial and a participatory democracy is key (Max-Neef, 1991). This participation can take the form of involvement in the decision making processes, attending meetings, discussing management practices, or voting for representatives (Salazar, 2010). The communities are also responsible for preparing and executing the management strategies at the local level and reporting back to the government and other organizations in order to be represented on a national level (Brown et al., 2005). Moreover, both power and responsibility must be shared between all of those involved. Co-management of resources tends to be effective because it bridges the gap between community and government in terms of cultural knowledge and experience and it allows the people to reap the benefits of their own work. Additionally, it enables the community to become self-sufficient in satisfying their own needs, which, according to Max-Neef (1991), is important in human scale development.

Fishing communities could benefit from a co-management approach in regards to the regulation of marine resources. According to Jentoft et al. (1998), fishermen often oppose government control because they see the problem of overexploitation of resources differently and do not always understand the regulations that control their activities. A co-management system eliminates this disconnect, allowing the government and the communities to work together directly to understand one another and see the problems more clearly (Jentoft et al., 1998). This type of management is often used to regulate MPAs and fishing industries in Costa Rica and other areas of the world. In co-management systems, the fishermen work in conjunction with other stakeholders such as the tourism industry, hotels, and boat owners; local

and national governments; and NGOs to manage marine resources. Figure 3 demonstrates the co-management system of fishing communities.

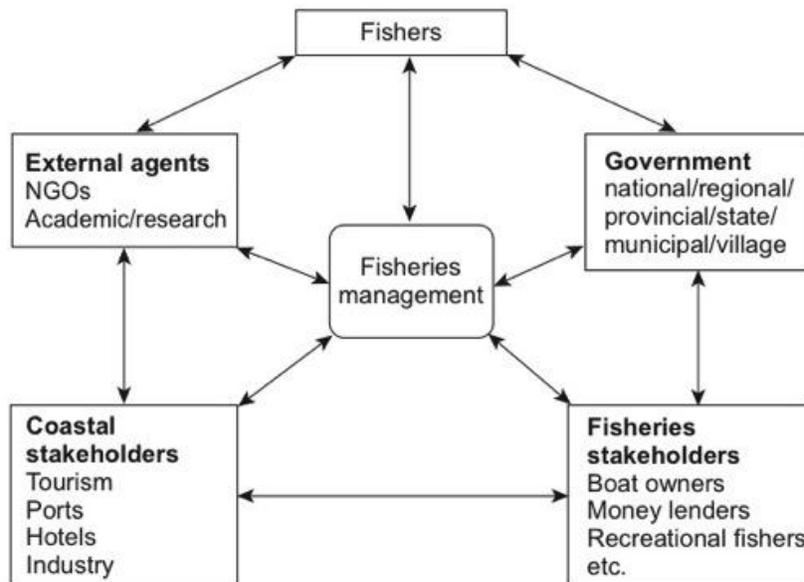


Figure 3: Fundamental organizations, stakeholders and government agencies involved in co-management of fishing communities and the relationships between them (D. Lymer et al., 2008, Asia-Pacific Fishery Commission, p. 47. Copyright 2008 by FAO).

Co-management is the most practical of bottom-up strategies for Costa Rica, because “the central government has a long history of developing and implementing national standards and regulations for natural resource use and management” (Alpizar, 2006, p. 646). The interaction with the central government, especially in the beginning phases of a project, establishes a higher level of trust and understanding with the community. Therefore, it is more practical for the townspeople to evolve a relationship with the Costa Rican government than to ignore the major role it has previously played in such management. Other management strategies such as community-based management seek to eliminate governmental control completely. This would be inefficient in Costa Rica, since it has two coastlines composed mostly of state run natural parks, biological reserves, and MPAs.

2.4.2: Co-Management Theories in Practice

There have been many studies conducted that evaluate the use of bottom-up community development and co-management strategies throughout the world. One particular study was carried out in Cuajiniquil, Costa Rica, which has had problems with overfishing and depletion of

marine resources. This area is located in the Guanacaste Conservation Area (ACG). The ACG has been promoting a no-fishing policy in parts of Cuajiniquil and has been taking away fishing licenses from those who choose not to comply with the new legislations. This has led to conflicts, sometimes violent, between the fishermen and the ACG staff. Furthermore, fishermen are still fishing within the protected areas despite the consequences. This is due to a severe lack of trust between the fishermen and agencies such as ACG and other governmental organizations. INCOPESCA has also been involved in the area to promote sustainable fishing. According to Rowe (2011), the fishermen of Cuajiniquil feel that INCOPESCA is causing more harm than good. They also believe that INCOPESCA is not fully interested in their problems. This community mistrust for INCOPESCA is hindering the co-management strategy being imposed by the ACG.

In a co-management system, the people, NGOs, governmental organizations, and other stakeholders must all work together to be successful. The fishermen must be able to participate and feel as though their voice is being heard. They will be more willing to comply if they feel as though they have a say in the process. For example, Rowe (2011) reported that the fishermen of Cuajiniquil wanted some governmental control and thus a co-management system of controlling marine resources. However, the fishermen felt that the current system in place was not working. They made suggestions on how the government could limit overfishing such as a seasonal fishing ban or regulating fishing gear. Rowe (2011) also suggested that the fishermen come together to regulate fishing by creating their own organizations or associations. This would enable them to form a “collective voice that will allow for much needed negotiations between fishers, the ACG, and INCOPESCA” (Rowe, 2011, p. 87). This case study supports the theory that a co-management strategy can be effective only if the citizens can trust the collaborating agencies and come together as a community to promote their own ideas and suggestions. Rowe (2011) demonstrates that this type of community development is welcomed by the people and is actually desired.

Another case study involving co-management usage in fishing communities was completed in the community of Aby Lagoon in Côte d'Ivoire, Africa, an impoverished area whose economy depends on fishing and agriculture. This area implemented a co-management strategy in 1995, and a study was conducted by Njifonjou et al. (2006) to determine whether this strategy has been effective in promoting sustainable practices and eliminating poverty. This study also sought to examine the relationship between the people and the other major stakeholders in regards to ownership of and access to the resources. In Aby Lagoon, the co-management system is comprised of village fishing committees, representatives from village

fisheries, and the public administrations of the Department of Fisheries Service and Ministry of Territorial Administration (Njifonjou et al., 2006). This strategy of community development created new confidence in the society. Furthermore, the conflict between the resource users and other stakeholders diminished. The new legislation to promote sustainable fishing such as gear regulations, closed seasons, and net sizes, are actually providing positive results. The average size of the target species in the lagoon has increased by 80%, and the average annual harvest has also increased. Moreover, co-management in this area has led to an awareness of the ways in which people can use and benefit from the marine resources. It has created a more organized authority system for each village along with several cooperatives to enable the people to come together and work towards a common goal. Finally, it was noted that the members of the villages obtained a sense of empowerment and felt that their needs were being met by state institutions. Njifonjou et al. (2006) concluded that the co-management system lowered poverty levels and “[improved] livelihoods” within the community of Aby Lagoon.

From this case study, one can surmise that co-management is effective when a working relationship is established between all stakeholders and resource users and there is trust between all constituencies. It has also been shown to be effective in efforts to improve poverty status of a community (Njifonjou et al., 2006).

2.5 Socioeconomics

Understanding the socioeconomic factors of the fishermen in Palito and Montero may hold the key to comprehending the progression of sustainable fishing on Chira Island. Socioeconomics acknowledges that economic behavior is directly affected by the social context of a community. It is an interdisciplinary research area that incorporates both a quantitative and qualitative approach by taking into account cultural aspects. Ashford (2004) states that socioeconomic evaluates economics based on “the assumption that individual choices are shaped not only by notions of rationality [and self-interest] but also by emotions, social bonds, beliefs, expectations, and a sense of morality” (p. 2). Taking these factors into consideration is useful for the assessment of social programs.

2.5.1: Socioeconomics and Fisheries

Several case studies support the importance of understanding socioeconomic factors when promoting change in a society. Cinner and Pollnac (2004) evaluated the relationship between a community’s view of marine resources and its socioeconomic status. They conclude that encouraging sustainable usage of the fisheries proved difficult because of “the various ways

in which people utilize their natural resources are invariably related to a multitude of social, cultural, and economic factors” (Cinner and Pollnac, 2004, p. 481). Moreover, the benefits of any change are determined by community satisfaction, which is culturally defined. Thus, an understanding of socioeconomic indicators is crucial in bringing about change in a society (Cinner and Pollnac, 2004).

Globally, there is limited use of socioeconomic factors in the evaluation of sustainable fishing societies. A sustainable fishery should consider both environmental and socioeconomic factors. Most studies regarding sustainable fishing have solely focused on the environmental impact while ignoring the socioeconomic effects. Moreover, a socioeconomic and cultural evaluation is necessary to correctly strategize the management of resources. This approach allows the citizens to actively participate in the management and make decisions. By integrating the socioeconomic data and cultural aspects into the management process, the sustainable fishing communities will benefit tremendously (Kruse, 2012, Alden et al., 2011, Seung and Zhang, 2011).

2.5.2: Socioeconomic Indicators

Socioeconomic indicators are key to establishing a baseline in the communities we will be investigating. According to Accadia and Spagnolo (2006), an indicator refers simply to a variable related to a criterion. Its fluctuation and trend in respect to reference points can be used to pinpoint the current state of the community. Thus, indicators are useful in determining the most effective actions needed to achieve a specific goal. A list of useful indicators by economic and social dimensions has been compiled based on several case studies, as seen in Figure 4.

Socioeconomic Indicators
Participation
Demography
Education
Consumption of fish
Fishing traditions/culture
Indebtedness
Gender
Fisheries export value
Investment in fishing fleet & processing facilities
Employment
Income (indirectly)
Fishery net revenue
Net profit per vessel
Maintenance cost per vessel
Revenue per vessel
Revenue per day
Average price
Fuel cost per vessel
Landings per crew
Number of fish markets
Number of wholesalers
Fuel cost per day

Figure 4: A list of socioeconomic indicators used in these case studies (adapted from Kruse, 2012, Alden et al., 2011, Seung and Zhang, 2011, Accadia and Spagnolo, 2006).

An accurate assessment of the socioeconomic impact of sustainable fishing in Palito and Montero can be made by comparing many of these indicators between fishermen who have adopted sustainable fishing practices and those who have not. This comparison will provide us with data that can also be used in future studies on the socioeconomics of Chira Island.

2.6 Chira Island

Chira Island, the setting of our project, is the largest island in Costa Rica with a perimeter of thirty miles. It is located in the Gulf of Nicoya, as seen in the map (Figure 5).



Figure 5: A map of Costa Rica, highlighting Chira Island’s location in the Gulf of Nicoya (LatiNOTES: Chira Island, 2011)

To understand the context of our study, it is worth noting that Chira Island has been largely untouched by the globalizing forces of mainland Costa Rica and its location in the Gulf of Nicoya has culturally isolated it from the rest of the country. This isolation, combined with its small population of 1,576 people, has caused Chira Island to become a relatively remote location (González and Cole, 2012). Additionally, much of the island remains undeveloped. The buildings are predominantly residences, along with a few restaurants, stores, and mechanic shops. The island is also technologically behind the rest of Costa Rica—the main road is unpaved, and bicycles and motorcycles are the main source of transportation (González and Cole, 2012). In the map of Figure 6, one can see Chira Island and the white border, which demarcates the AMPR.



Figure 6: Map of Chira Island. The white border off the western coast demarcates the limits of the AMPR. (Map created by Marco Castro).

2.6.1 Sustainable Fishing on Chira Island

The waters of the Gulf of Nicoya provide an abundance of marine resources for the people of Chira Island. The majority of the island's inhabitants participate in small-scale, or artisanal fishing. However, in the late 20th century, the number of fish decreased in the Gulf of Nicoya (González and Cole, 2012). In 1995, the fishermen began to work together to preserve the fish quantities for future generations. This led to the promotion of responsible fishing and the eventual establishment of the island as the first Área Marina de Pesca Responsable in Costa Rica in 2009 (González and Cole, 2012).

The AMPR of Chira Island covers the waters fished by the people of Palito and Montero, and therefore this project is concerned with the lives of the fishermen in these two towns. On Chira Island, fishing associations have been developed to coordinate the responsible fishing activities for both towns. The fishermen of Palito started responsible fishing nearly fifteen years before the law creating the AMPR was passed. Their association is known as the Asociación de Pescadores Cuerderos de Palito de Chira (ASOPECUPACHI). According to González and Cole (2012), there are currently 10 fishermen involved in this association, which is approximately twenty percent of the fishermen in Palito. However, membership has declined significantly in the last few years, in part due to reluctance by the fishermen to patrol the AMPR. An example of a

project that ASOPECUPACHI has started is oyster farming. Participants in this project are comprised of both members and non-members of the association. Over the course of ten months, the oysters are seeded and grown in nets attached to buoys in the waters off the coast of Palito. Members of the project must clean regularly the filter of each oyster so that it survives and can be sold for profit when it reached its maximum size.

On the other hand, in Montero, responsible fishing practices have only recently been adopted. As a result, the people of Montero may be less aware of responsible practices. However, Montero has its own responsible fishing organization, called Asociación Mixta de Montero (ASOMM), which contains 30 members, or more than half of its total number of fishermen. Both associations work with MINAET, INCOPECA, and MarViva to promote and protect sustainable fishing on Chira Island (MarViva, personal communication, 2012)

Due to their close proximity and the waters of the AMPR that they share, Palito and Montero must work together frequently. However, their relationship is complicated and there has been some tension. Since responsible fishing practices were established in Palito fifteen years before the creation of ASOMM, NGOs such as MarViva have tended to give more attention to Palito. As a result, the members of ASOPECUPACHI have received better benefits from their sustainable fishing practices and have had access to more financial opportunities. This has led to jealousy and therefore criticism of ASOPECUPACHI by the members of ASOMM (Erick Ross, personal communication, 2012).

2.6.2 Financial Incentives for Sustainability on Chira Island

This project investigated the ways in which sustainable fishing can have a positive financial benefit on the fishing communities of Chira Island. The fishing associations have already found some financial success through their sustainable fishing methods. In recent years, ASOPECUPACHI has had a business arrangement with a National Geographic cruise line. The cruise line emphasizes ecotourism and environmental protection, and therefore it is desirable to serve only sustainably fished seafood products for their meals. During the cruise season, members of ASOPECUPACHI are able to sell much of their fish to National Geographic, which is willing to pay a higher price for sustainable seafood. This deal has doubled the price of fish paid to the fishermen when the cruise is in season, but the cruise line does not need as much fish as ASOPECUPACHI can produce. The last sale of fish to the cruise line occurred in April 2012, when the cruise season ended (MarViva, personal communication, 2012). Recently, a restaurant in San Jose, Product C, has expressed interest in buying sustainably fished seafood from ASOPECUPACHI. This will further allow the fishermen of

ASOPECUPACHI to reap the financial benefits of their sustainable fishing efforts. However, ASOMM has been reluctant to make such business deals, despite offers from Product C (MarViva, personal communication, 2012).

Sustainable fishing alone may not be sufficient to raise the entire island population above the poverty line. Thus, ecotourism has also been suggested as an alternative industry to provide Chira Island with new financial benefits. Incentives to visit the island, such as fishing tours and attractive hotels, could bring more tourists to the area, generating more revenue. This would also create more opportunities for employment for the residents of Chira Island. The fishermen could then acquire an additional source of income to better provide for their families. As a result, this could improve the overall economy of the island, allowing members of the community to have access to a better quality of life (MarViva, personal communication, 2012).

2.7 Summary

In sum, a review of the literature reveals that the increasing demand for fish has endangered many species and caused fishermen to depend on certain fishing techniques that harm the environment. This is seen in Chira Island, where artisanal fishing is very common. In order to protect overfished areas, the government has created the AMPR program in Costa Rica. This program strives to promote a manner of fishing that is both sustainable for the environment and for the local community. However, government regulation of the areas can cause tension with those whose livelihoods depend on the resources within the environment, so a co-management approach is often used. This allows the resource users to bring about change with assistance from outside organizations. In particular, the literature reveals that co-management is the most practical strategy for environmental management in Costa Rica, because it permits the government to establish a level of trust and understanding with the community. Furthermore, the awareness of socioeconomic factors is crucial in bringing about change in a society. The research associated with these topics aided in the development of our methodology and the completion of our field work on Chira Island.

Chapter 3: Methodology

The goal of this project was to establish a socioeconomic baseline for the fishing communities of Palito and Montero of Chira Island and provide recommendations about how the people of the two communities could improve their socioeconomic status. In order to achieve our goal we have accomplished the following three objectives:

1. Assess local perceptions of the AMPR program and the work of the fishing associations
2. Collect social and economic data from the families of Palito and Montero
3. Assess local perceptions of potential mechanisms to improve the socioeconomics of the communities

We gathered our data through two separate trips to Chira Island: the first trip was from November 4th to November 9th, 2012, and the second trip was from November 26th to November 30th. In the first trip, we began our field work with an informal event at the headquarters of ASOPECUPACHI (see Figure 7), designed to inform the fishermen of Palito and Montero about our study and the work of MarViva. It was also used to gather participants for our surveys and interviews.



Figure 7: The event held on our first day of field work at ASOPECUPACHI.

Also during our first trip, we implemented all surveys with the families of Palito, visited the elementary school shared by the two towns to survey the children, and conducted key

interviews with the president of ASOPECUPACHI and a hotel owner. We also made initial contact with the fishermen of Montero, who have only recently started working with MarViva. In the second trip, we conducted surveys with the families of Montero, interviewed the president of ASOMM, surveyed non-fishermen from both towns, interviewed fishermen from both towns about the approaches they could take to improve the socioeconomics of the community, and interviewed a United States Peace Corps volunteer who is working on socioeconomic development on Chira Island. Throughout both trips, we made observations of the socioeconomic status of the island and took photographic evidence.

3.1 Objective 1: Assess Local Perceptions of the AMPR Program and the Work of the Fishing Associations

The first task concerning this objective was to interview Eugenia Fernández Díaz, the president of ASOPECUPACHI, and Osvaldo Sequeira, the president of ASOMM. We planned to complete these interviews (Appendix A-4) first, so that we could use their responses to modify our interview questions for other members of the community. These interviews were designed to provide information about ASOPECUPACHI and ASOMM, as well as the history of sustainable fishing on Chira Island. Another intent of these interviews was to learn more about why fishermen choose or refuse to join the sustainable fishing associations and the relationship between fishing association membership and socioeconomic status.

In addition to the interviews with the presidents, we also gathered information through interviews of fishermen in Palito and Montero (Figure 8). These interviews, which were used to gather a variety of information related to multiple objectives, followed a semi-standardized format. A semi-standardized interview starts with a list of predetermined questions but is allowed to change with the flow of conversation (Berg, 2009). These interviews (Appendix A-5) engaged fishermen of various ages, experiences, and skill levels. Interview subjects were identified as people who had expressed interest in our project during the survey stage (described in Section 3.2) and willingness to participate in longer interviews. Moreover, both members and non-members of the fishing associations, ASOPECUPACHI and ASOMM, were included in the sample. To inform our first objective, we asked the fishermen about their feelings toward the AMPR, sustainable fishing, and the role of the fishing associations. To inform our third objective, we asked the fishermen about their thoughts for the future of their town and what industries could be developed on the island. This is further described in Section 3.3.

The interviews conducted were recorded using an iPad application but notes were also taken. In order to ensure that all relevant information was considered, we listened to the

recordings after each day of field work. We looked at trends in the overall attitudes of the interviewees and drew comparisons between the various responses.



Figure 8: Two team members in the process of interviewing a fisherman in Palito.

3.2 Objective 2: Collecting Social and Economic Data

According to MarViva, the environmental impacts of local sustainable fishing practices are evident and the island residents are aware of these positive effects. However, before this project, economic impacts on the local residents had not yet been evaluated. MarViva requested that we collect social and economic data that would allow us to establish a socioeconomic baseline. These data were gathered from Palito and Montero quantitatively through a survey composed primarily of yes/no and multiple-choice questions. This survey (shown in Appendix A-1) was designed so that sensitive subjects such as income were asked indirectly. Our target sample size was forty fishermen in total (for each town, we planned to survey ten families in the fishing associations and ten who were unaffiliated). This target sample size was chosen because it is roughly half of the families in each town. We identified our first set of survey participants from the townspeople who attended the informal event held at ASOPECUPACHI on our first day of field work. To gain additional participants, we used snowball sampling, in which previously surveyed fishermen introduced us to other fishermen willing to participate in our study.

For the sake of efficiency, we split the team into two groups to implement the survey, as seen in Figure 9. Since not every resident of Chira Island is literate, we read aloud all survey

questions in Spanish in order to be consistent. For each two-member team, one member read the questions, while the other recorded the participants' answers on data sheets. These data sheets (Appendix A-2) were designed so that the relevant data could be easily organized and analyzed. In addition to the quantitative data sheets, we also used a separate piece of paper (Appendix A-3) to record the answers to open-ended questions and any additional comments that the participants had. We surveyed the fishermen on their demographics, economic activities, training, education level, household finances, and their profit from fishing. These socioeconomic indicators were then compared between those who are members of the fishing associations and those who are not. We also made comparisons between the fishermen of both towns.



Figure 9: Two team members conducting a survey with a member of ASOPECUPACHI at the ASOPECUPACHI headquarters.

Although most residents of the island are involved in fishing, not every family depends on it for their main source of income. In order to assess whether fishing is an economically viable occupation for the majority of the townspeople, we also surveyed families who are not directly involved in the fishing industry. This included store, restaurant, and hotel owners. The survey, data sheet, and open-ended data sheet can be seen in Appendices A-7, A-8, and A-9, respectively. Our goal was to see whether families involved in other industries, such as tourism, have a different socioeconomic status than those who rely solely on fishing. We also felt that this was necessary in order to create an accurate socioeconomic baseline for both Palito and Montero. The non-fishermen survey was based on indicators similar to those of the fishermen survey, but these indicators were adjusted to reflect a variety of other economic activities.

To analyze the survey data, we first compiled the data from our surveys with the fishermen into Excel (Appendix D, separate file). A second team member checked the computer

data against the original data sheets to minimize any data entry error. These data were then analyzed using mixed techniques such as bar graphs, pie charts, and tables. Next, we used the type of fish caught, current fish prices, and catch per week to estimate the gross monthly income of the fishermen before fishing expenses. We used one equation with three cases because the fishermen did not indicate how often they caught each common species of fish. The four most common fish species grouped into two price categories: *Corvina* and *róbalo*, which share the same relatively higher price, and *bagre* and *pargo*, which sell for the same relatively lower price. Additionally in Montero, a third case was also added to account for *camarones*. Therefore, for each respondent, we calculated the gross income once assuming that the fishermen solely caught *corvina* and *róbalo* and once assuming the fishermen caught only *bagre* and *pargo*. In Montero, a third gross income was calculated assuming the fishermen caught only *camarones*. The true gross income of the fishermen would lie between these gross incomes calculated by the different cases. The equation that we used was:

Equation 1:

$$\text{Gross Income} = (\text{Price today})[(\text{Amount of kilos caught during the cuarto menguante}) + (\text{Amount of kilos caught per week for the rest of the month} \times 3 \text{ weeks})]$$

Similarly, the survey data gathered from non-fishermen was analyzed using Excel to create charts, graphs, and tables. Since income was asked directly in these surveys, there was no need to calculate it. The data from non-fishermen were then compared to the data collected from the fishermen to determine if those who participate in other industries and economic activities have a higher socioeconomic status than those who rely only on fishing.

As an additional way to gather socioeconomic information, we made observations about the towns of Palito and Montero and gained a better understanding of different issues that exist within the towns. We also observed details about the houses and material possessions of the residents and took pictures to support our survey evidence.

3.3 Objective 3: Assess Local Perceptions of Potential Mechanisms to Improve the Socioeconomics of the Communities

From our interactions with the people of Palito and Montero, we found that they are generally content. However, a recurring theme in our survey responses is the need for improvements in the economies of the towns. To gain a better understanding of possible improvements that could be made, we designed interview questions for the presidents of the fishing associations as well as members and non-members of the fishing associations. We also

wanted to conduct informal interviews with any person who was willing to share their insight on this problem. Additionally, some of the survey questions were centered on this topic. To gain another perspective, we also surveyed the local children about their future career aspirations.

For an accurate assessment of the possible socioeconomic benefits of the adoption of sustainable fishing practices in both Palito and Montero, it was important to obtain the opinions and perceptions of the fishermen. In the interviews described in Section 3.1, we also asked about whether the fishing associations were beneficial to the socioeconomic status of their members and the community in general. Finally, the interviews asked the participants how they felt the socioeconomic conditions of the communities could be improved and what industries could be developed to supplement fishing.

One aspect of the island's socioeconomics that we were particularly interested in was the future of the children. An important survey question asked parents what they expected their children to be when they grew up, whether that meant being a fisherman on Chira Island, leaving Chira Island to pursue a university education, or working on Chira Island "*como un profesional*" (as a professional worker), as one interviewee stated. To gain another perspective, we asked children to draw a picture (Appendix A-10) of what they thought their future would be like, as seen in Figure 10. This activity was coordinated with the elementary school of Palito and Montero. Our target sample size was 50 children, including children from both towns. The children surveyed ranged in level from kindergarten to 4th grade. From these responses, we hoped to see whether the goals of the children matched their parents' goals for their future. Our team analyzed the data from the survey with the children of Palito and Montero, by first dividing the students by town and then by what they drew for their future career aspirations. We looked at overall trends showing the popularity of different careers and categorized similar careers together. For example, all of the drawings depicting medical careers were combined. These data were then compared to the survey answers that were received from the fishermen detailing their future hopes for the education and occupations of their children.



Figure 10: A team member interacting with kindergarten students during the activity with the local children.

Since the community may not be able to advance economically while depending on the fishing industry, we also asked other community members who are not involved in fishing about their thoughts toward improving the socioeconomic conditions of the communities. This was primarily done through surveys. However, since tourism is a growing industry on the island, we also interviewed Lilliana Gonzalez, owner of Posada Rural La Amistad Inn in Palito. In order to gain additional insight, we conducted an informal interview with Danny Gallant, a Peace Corps volunteer who is working on projects to improve the socioeconomics of the communities of Chira Island.

Chapter 4: Results

This chapter begins with an overview of our field work, which involved two trips to Chira Island. Next, we present the results relevant to our first objective, which was to assess local perceptions of the AMPR program and the fishing associations. This is followed by the socioeconomic data collected from the surveys completed with families of Palito and Montero. We then address the hopes that the community members have for the future of their towns. As a summary, we analyzed the data for each town and addressed the similarities and differences between them. Finally, we conclude with a brief discussion of some of the challenges and limitations we faced in this project.

We analyzed the results in the following section assuming that all of the responses we received were true. However, there is a possibility that some of the participants gave inaccurate or exaggerated answers if they felt uncomfortable reporting the truth.

4.1 Field Work on Chira Island

For our first trip, the team arrived to Chira Island on Sunday, November 4th, 2012 along with two employees of MarViva, Jorge Cole and Karol Alpízar. That afternoon was a planned activity at the ASOPECUPACHI headquarters in Palito. Fishermen from Palito and Montero were invited, both those who are in fishing associations and those who are not. However, only fishermen from Palito attended. The planned activity consisted of a free lunch, a short video about MarViva, and gifts from MarViva given to all the fishermen in attendance. After this activity, our sponsor, Jorge Cole, gave a presentation explaining our study. After introducing ourselves and answering questions, the meeting came to an end.

The next day, we began surveying the fishermen of Palito. The six of us, including Jorge Cole and Karol Alpízar, split up into two groups. Cole and Alpízar introduced us to the fishermen before we surveyed them to ensure that they fully understood the study. We completed ten surveys in Spanish, surveying five members of ASOPECUPACHI and five non-members. We also interviewed the president of ASOPECUPACHI, Eugenia Fernández, and Lilliana Martínez, the owner of the hotel where we stayed. On November 6th, we continued our surveys on Chira Island with the help of Eugenia Fernández and her grandson Kelvin. We completed another nine surveys, which included three members of ASOPECUPACHI and six non-members.

The remaining two workdays of our trip proved problematic. Our initial plan was to survey the fishermen of Montero. However, due to lack of initial contact with the president of ASOMM, we were unable to complete this task. MarViva does not have as much experience

working with Montero as they do with Palito. It seemed that the fishermen of Montero were more hesitant to work with MarViva than the fishermen of Palito, most likely because they did not have a full understanding of the study. We were, however, able to complete one survey and set up times to survey other Montero fishermen during our next trip. During these two days, we also spoke with members of the Artisanal Women's Association. We left early Friday morning, November 9th, 2012.

Our second trip to Chira Island began on November 26th, 2012. We arrived early that morning and began conducting interviews with the fishermen of Palito. The plan was to interview six fishermen in total: three from ASOPECUPACHI and three that were unaffiliated. Our interviewees were composed of only those fishermen that we had surveyed during the first trip. During our first day of field work, we spoke with two fishermen in the association and one unaffiliated fisherman. An additional task that we began on our first day of field work was the surveys with non-fishermen that were used to gain additional insight on the socioeconomics of the island. We hoped to survey three non-fishermen from each town. We started with Palito, and surveyed a hotel/store owner and a secretary at the *pescadería*, or local fish market. We also surveyed the owner of an ice cream store in Montero. On the second day of field work, we completed our interviews with the fishermen of Palito. We also conducted an informal interview with Danny Gallant, a Peace Corps volunteer working to improve the socioeconomics of Chira Island.

Our third day of field work began on November 28th and involved surveying and interviewing the fishermen of Montero. One member of the fishing association of Montero, Franklin, led us to the homes of fishermen that were willing to participate in our study; this included both members and non-members of ASOMM. We surveyed six fishermen in total: three members and three non-members. If the participant was willing to partake in an interview after the survey was complete, we asked them six additional questions and recorded their responses. By the end of the day, we had interviewed two non-members and one member of the fishing association. We also surveyed one non-fisherman in Palito, a convenience store owner, concluding our field work with that town. Two non-fishermen from Montero, the owner of a convenience/grocery store, or *pulpería*, and the owner of a bar, were also surveyed. The field work with Montero was concluded the following day, November 29th, with surveys of four additional members of the fishing association and three additional non-members of the association. Two interviews were also completed with members of the fishing association. As we had done with the president of ASOPECUPACHI in Palito, we also conducted an interview with the president of ASOMM, Osvaldo Sequeira. Due to the challenges faced when attempting

to work with Montero during our first week of field work on Chira Island, we were unable to obtain the desired sample size of twenty fishermen, ten affiliated and ten unaffiliated with ASOMM. Instead, it was reduced to six unaffiliated fishermen and eight members of ASOMM, for a total of fourteen fishermen. We returned back to San José in the early morning on November 30th, 2012. The sample sizes for our surveys and interviews are listed in Table 1 below.

Table 1: Overview of Sample Sizes for Surveys and Interviews conducted.

	Surveys with Fishermen	Surveys with Non-Fishermen	Interviews	Interviews with Presidents of Fishing Associations
Sample Sizes from Palito	8 Members	3	3 Members	1
	11 Non-members		3 Non-members	
Sample Sizes from Montero	8 Members	3	3 Members	1
	6 Non-members		2 Non-members	
Total	33	6	11	2

4.2 Perceptions on the AMPR and the Fishing Associations

This section discloses the perceptions of the fishermen towards the AMPR program and the fishing associations. We gathered this information using particular questions on the surveys and interviews, which was supplemented by observations of people fishing. This section first describes the need for the AMPR and responsible fishing in Palito and Montero, and continues with a discussion of the fishing methods used by both members and non-members of the fishing associations. Finally, it concludes with additional insight from the presidents of the fishing associations and possible advantages to membership in these associations.

4.2.1 The Need for the AMPR and Responsible Fishing

Eugenia Fernández Díaz, the president of ASOPECUPACHI, believes that the Área Marina de Pesca Responsable and the use of responsible fishing techniques are necessities for the community, because they allow the people to conserve many species of fish for future generations. The fishermen of Palito also shared this opinion, as seen from their answers to the interview question asking whether the AMPR program was a positive or negative addition to

their community. Of the six fishermen interviewed (three affiliated and three unaffiliated with ASOPECUPACHI), they all stated that the AMPR was a positive addition to their community. They attributed the improvements in quality and quantity of fish and better production of marine resources to the creation and management of the AMPR, as well as the use of responsible fishing methods. They noted that the AMPR, by prohibiting all fishing methods except *cuerda de mano* (hook and line), provided the necessary legislation against the use of harmful fishing methods such as large nets or trawling. Therefore, they attributed the AMPR to the protection of the marine environment. Two of the unaffiliated fishermen and one member of ASOPECUPACHI felt that the quality of fish had improved in the AMPR but that the quantity of fish has increased very little. One participant felt that even though responsible fishing was occurring within the AMPR, the damages from the other fishing methods used outside the area were still causing problems. He even expressed a desire to expand the AMPR beyond Palito and Montero. Even though direct benefits of the AMPR could not be seen at this time by all fishermen, many noted that production of fish is better than it was before the creation of the AMPR and that this will only improve in the future.

Additionally, in order to ensure that only the responsible fishing method of *cuerda de mano* (hook and line) is used within the AMPR, members of ASOPECUPACHI help in the patrolling of this area, with the assistance of INCOPESCA and the Costa Rican Coast Guard. The AMPR is clearly demarcated by buoys, so those fishermen who use nets are aware of where they are not allowed to fish. However, in the past, there have been problems with fishermen sneaking into the AMPR at night and using nets to get a large amount of fish very quickly. Therefore, members of ASOPECUPACHI also perform nightly patrolling of the area. Recently, five unaffiliated fishermen have offered their assistance with the patrolling of the AMPR, which shows that the people of Palito are concerned with the sustainability of their fishing industry whether they choose to join the association or not. From this desire to protect the AMPR and the positivity the fishermen expressed towards the program in our interviews and surveys, we concluded that the fishermen of Palito feel that the AMPR, along with the use of responsible fishing methods, is needed in their community. Since our pool of interviewees had both supporters and detractors of ASOPECUPACHI and its work, we felt that there was little bias in the responses that we received on this topic.

In general, the fishermen of Montero did not report such strong opinions on the subjects of the AMPR and responsible fishing. The five fishermen that were interviewed (two non-members and three members of ASOMM) reported that the AMPR was a positive addition to their community and allowed for protection of fish species that were being depleted. The

president of ASOMM, Osvaldo Sequeira, also shared this viewpoint and felt that the quality of fish and life of the members have been improved due to the area's creation. However, when surveying the fishermen, ten out of fourteen (71%) of the fishermen reported that they use nets, or *trasmallos*, which can cause harm to the environment and are not responsible fishing methods (MarViva, personal communication, 2012). It was unclear if they are aware that *trasmallos* are not considered to be responsible fishing methods. Of those who use *trasmallos*, some specified that they were using these nets outside of the AMPR. However, three fishermen stated that they use the nets in the Gulf of Nicoya, either refusing to specify or unable to specify whether this was inside of the protected area. We also observed many fishermen in Montero leaving to go out fishing with nets in their boats. It is possible that they are unaware of the regulations governing the AMPR. The AMPR limits in Montero are not clearly demarcated, as in Palito. This is not due to any fault of Montero, but rather poor communication between the stakeholders of the AMPR in terms of who is responsible for AMPR maintenance (MarViva, personal communication, 2012). In addition, ASOMM is a new organization and may need time to spread awareness of responsible fishing methods and the rules of the AMPR. It is also possible that the fishermen did not want to report that they were not following such regulations.

4.2.2 Fishing Methods

The surveys asked the fishermen what fishing methods they used and whether they fish inside or outside the AMPR. The fishermen surveyed in Palito use four fishing methods: *cuerda de mano* (hook and line), *línea* (a line connected to other lines containing hooks), *trasmallo* (gill net), and *gancho* (large hook used by hand). Only *cuerda de mano* is allowed for use within the AMPR. The other techniques can be used outside this designated area. However, some community members feel that the other methods are still causing harm to the ecosystems, because the holes of the *trasmallos* are small enough to retain fish of all species and sizes, including juveniles. All surveyed members (n=8) of ASOPECUPACHI reported that they use only the technique of *cuerda de mano* and only fish within the AMPR. The non-members showed some variety in the fishing methods that they use and the area where they fish (see Figure 11). The non-members use *cuerda de mano* in the AMPR area but six also use *trasmallo*, *gancho* or *línea* outside of the protected area. From our survey responses, we can infer that people in Palito are generally aware of the proper methods to be used in the AMPR and are following that legislation. However, non-members are still using other fishing methods outside the AMPR, and it is currently unclear whether this is detrimental to local fish

populations. If the AMPR was expanded or a new area was created, current fishing practices would be interrupted, which could be a cause for later concern.

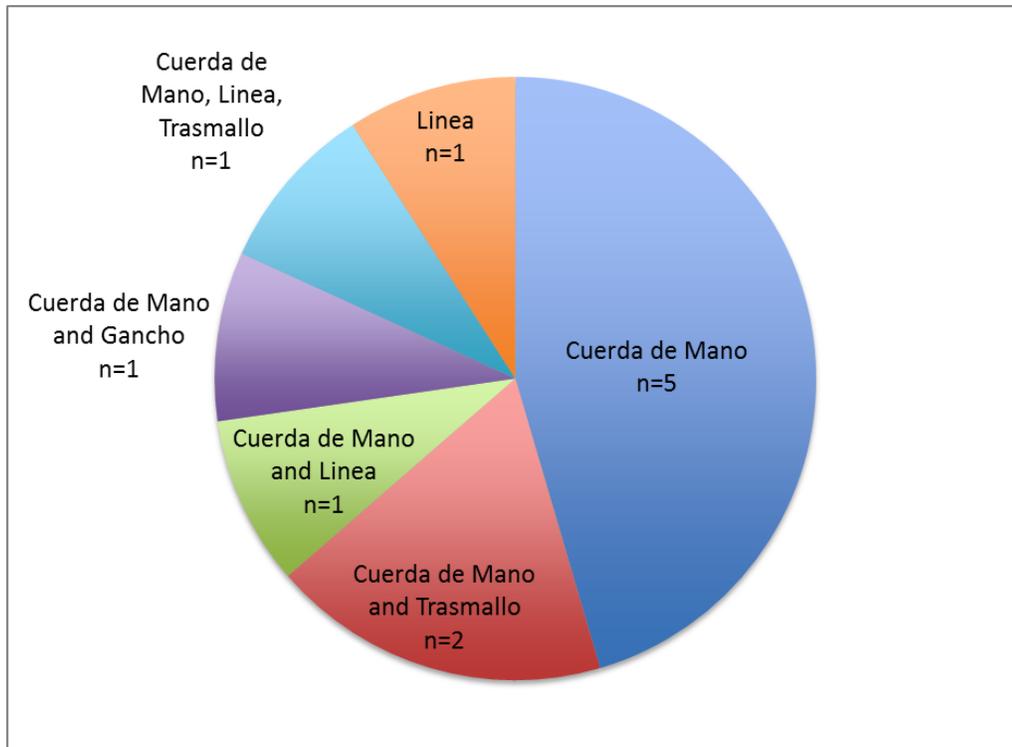


Figure 11: The types of fishing methods reported by unaffiliated fishermen surveyed in Palito. Some fishermen reported more than one method (n=11).

In Montero, the fishermen generally reported using either or both *cuerda de mano* (hook and line) and *trasmallo* (gill nets). As was stated previously, *cuerda de mano* is the only fishing technique allowed within the limits of the AMPR. Unlike ASOPECUPACHI in which all members use *cuerda de mano*, only four of the eight members of ASOMM surveyed reported exclusively using *cuerda de mano*. Two members of ASOMM reported using both *cuerda de mano* and *trasmallo* (see Figure 12), while another two members of the association exclusively use *trasmallo*. The members of ASOMM responded to the survey that they fish both inside and outside of the protected area. However, only one of those members that use the nets could not specify that he did so outside of the AMPR, only specifying that he fishes in the Gulf of Nicoya. The others reported that they used the nets outside of the AMPR.

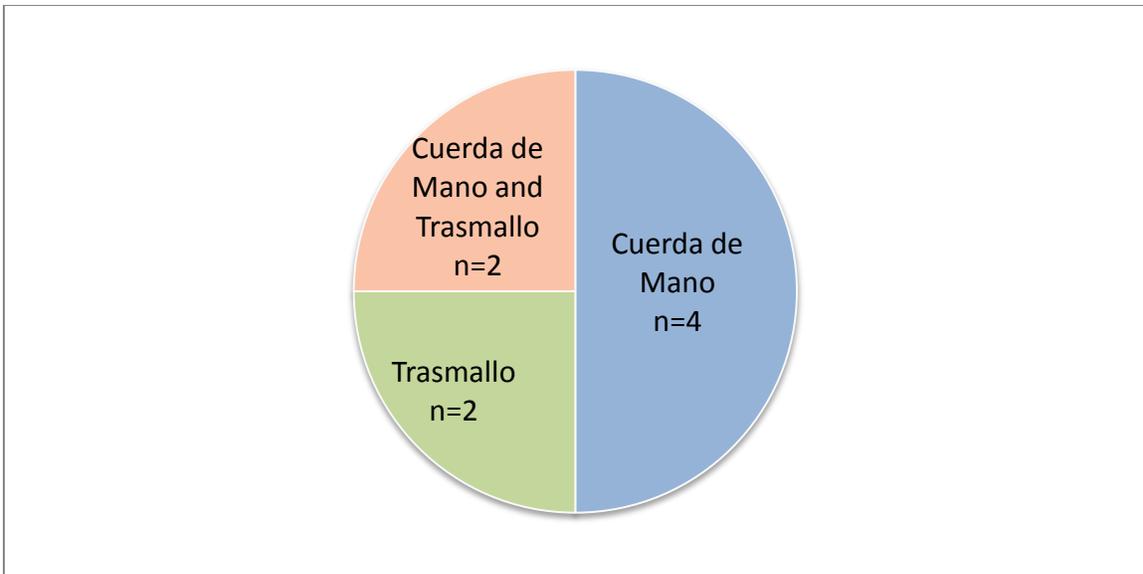


Figure 12: The types of fishing methods reported by fishermen who are members of ASOMM in Montero. Some fishermen used more than one method (n=8).

All six non-members of ASOMM that answered our question reported that they used the fishing technique of *trasmallo*, while some also used *cuerda de mano* (see Figure 13). The three unaffiliated fishermen who all stated that they used the nets did not specify whether they fished within or outside of the AMPR, only stating that they fished in the Gulf of Nicoya. We were unable to conclude if they are fishing illegally or if they were simply unaware of the location of the AMPR, because the AMPR is not clearly demarcated in Montero. Some of the non-members did say that they used the method of *cuerda de mano* inside the AMPR and the method of *trasmallo* outside. We also witnessed two fishermen bringing *trasmallos* onto their boat, as seen in Figure 14.

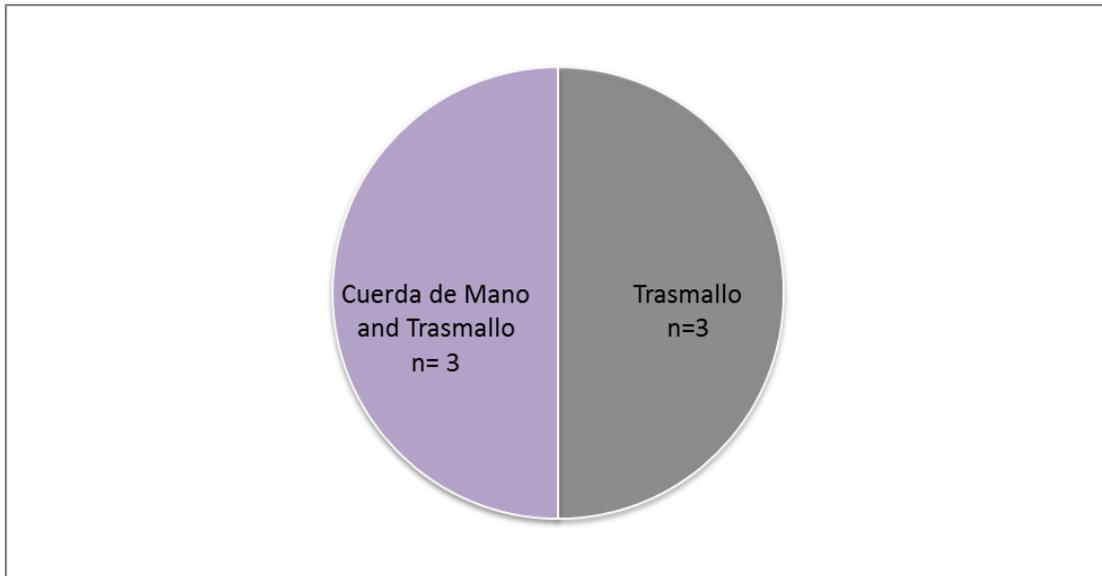


Figure 13: The types of fishing methods reported by fishermen who are non-members of ASOMM in Montero (n=6).



Figure 14: Two fishermen bringing a *trasmallo* onto their boat while within the limits of the AMPR.

From the data gathered in both towns, we could conclude that the fishermen in Palito, both members and non-members of ASOPECUPACHI, were more likely to use the responsible fishing method of *cuerda de mano*. Moreover, our surveys indicate that the fishermen of Montero primarily caught shrimp, which requires the use of *trasmallos*, which is not considered responsible under the regulations of the AMPR. However, it is legal for them to catch shrimp with *trasmallos* outside of the AMPR limits. Shrimp tends to receive a higher price than other

types of fish, which may be why the fishermen of Montero usually use the *trasmallo* when fishing.

4.2.3 The Sale of Fish

In Palito, nearly all of the fishermen reported that they sell their fish to a middleman named Abelardo Brais. The Brais family is influential throughout the island; family members own most of the stores and fish markets on the island, as well as the buses, which is the only public transportation available. The fishermen of Palito sell their fish to Brais since they are currently unable to refrigerate and store large amounts of fish. They also lack the business connections to find their own buyers. However, MarViva has provided funding to ASOPECUPACHI to help them create their own fish processing center (Figure 15). The completion of this fish processing center will provide additional options for the sale of their fish. In addition, ASOPECUPACHI is also creating business connections with restaurants and other interested buyers of sustainable seafood products (MarViva, personal communication, 2012). ASOPECUPACHI hopes to provide its members with access to additional buyers, who could provide them with higher prices than Brais. However, even when the fish processing center is completed, some of the fishermen may still have to sell a portion of their fish to Brais because they are indebted to him. Many of the surveyed fishermen were not even aware of exactly how much money they owed. Due to this situation, Brais has remained the only middleman in Palito (MarViva, personal communication, 2012).



Figure 15: The fish processing center currently being built at ASOPECUPACHI headquarters.

Unlike in Palito, there are multiple *pescaderías*, or fish markets, in Montero for the fishermen to sell their catch. The most popular fish market used by the fishermen surveyed was known as *Pescadería Kiara*. Some also sold their fish to Brais or other middlemen in Montero. Other fishermen were not specific about exactly where they sold their fish other than to state that it was to a fish market. During our surveys, some fishermen were unable to tell us the prices they currently receive for the fish they catch and even more fishermen were unable to specify the best price that they had ever received. If the fishermen were able to monitor the prices given by each buyer, they could play the market to their best advantage.

4.2.4 Interviews with the Presidents of the Fishing Associations

We interviewed Eugenia Fernández Díaz, the president of ASOPECUPACHI. Fernández stated that the mission of ASOPECUPACHI is to allow the quantity and quality of the available fish populations to improve, after having been depleted in previous years. Fernández also stated in her interview that the association works to improve the price of the fish that the fishermen receive. She said that ASOPECUPACHI supports community development and helps the people to see the need for the AMPR to protect the marine environment. When asked whether she believed that the association had a positive socioeconomic impact on its members, she responded that like any organization, ASOPECUPACHI has its “highs and lows” (Fernández, personal communication, 2012). Despite the best efforts of its members, poor weather or other forces out of their control can diminish the amount of fish caught. However, ASOPECUPACHI does have several projects in development that could improve the income of its members. A few months ago, the association started a project to farm oysters (seen in Figure 16) and opened it up to everyone in the community to participate. Although the oysters will not be ready to harvest for a few more months, the project members hope to get a good price for the oysters when they are ready to be sold. ASOPECUPACHI plans to sell the oysters to Product C, a restaurant in San José that is interested in sustainable seafood products. ASOPECUPACHI would also like to sell their fish to Product C, but this may not happen until their fish processing center is completed. Fernández believes that ASOPECUPACHI is necessary because it is difficult for one fisherman to accomplish projects such as these on his or her own, especially when legal matters such as the AMPR are involved. By this time next year, she believes that ASOPECUPACHI will have completed their fish processing center, allowing them to bypass the middleman and obtain better prices for their fish. Fernández believes that the members of ASOPECUPACHI can achieve anything they desire. Despite

problems with membership and other difficulties, she believes that the association has a bright future.



Figure 16: One member of ASOPECUPACHI and one unaffiliated fisherwoman cleaning the oysters from the oyster farm.

We also conducted an interview with Osvaldo Sequeira, the president of the fishing association in Montero, ASOMM. ASOMM has been an official association for three and a half years and Sequeira has been the president since its creation. He did not elaborate on his role as the president, but described himself as “the head” and stated that he is always available to speak with members when they have a problem or need anything (Sequeira, personal communication, 2012). He is also responsible for starting new projects and ensuring that the projects run smoothly. He spoke positively about the AMPR program and specifically mentioned that it has improved the economic states of the members. Sequeira also reported that he felt ASOMM has been effective in promoting responsible fishing and protecting the environment, which had been a problem in the past. In terms of membership in ASOMM, anyone who expresses a desire to be a part of the association and cares about the protection of the AMPR and the use of responsible fishing is welcome to join. Sequeira concluded the interview by mentioning future hopes for ASOMM and projects they are currently trying to start, such as the construction of a venue in which to hold meetings. He also hopes that in the future the use of responsible fishing will greatly improve the socioeconomics of the community of Montero. Unlike Fernández of ASOPECUPACHI, Sequeira did not provide a mission statement for ASOMM or discuss in great detail the advantages of being an associated member.

4.2.5 Advantages to Membership in Fishing Associations

Eugenia Fernández Díaz believes that the fishing association can benefit anyone who chooses to participate, and she hopes that more people will participate in the organization. Currently, there are ten members of ASOPECUPACHI, only eight of whom are active members. However, membership was higher under the previous two presidents. Fernández hopes that people will join the association for the benefits of support, better quality fish, training, and better prices. In order to become a member, a fisherman must only use *cuerda de mano* (hook and line) both within the AMPR and outside its borders. This is because *cuerda de mano* is the only fishing method allowed for use within the AMPR and is therefore believed by ASOPECUPACHI to be the most responsible fishing method. A fisherman must also obtain a fishing license from INCOPECA, a process that is time-consuming but not very expensive. However, even those who are not members of ASOPECUPACHI still receive some benefits from the organization, such as improved fish quantity and quality in the AMPR, ability to participate in the oyster project, and business from ecotourism.

The survey participants in Palito were asked about their choice to become members of ASOPECUPACHI. Interestingly, not all of the members of ASOPECUPACHI believed that there were significant benefits to membership. Two participants felt that there were very few benefits to being a member, and two others felt that the only benefits were that the fish were conserved. In contrast, other members felt that the association was important to help everyone work together towards a common goal. These members felt that there were many advantages to working together in a team. One credited the work of ASOPECUPACHI for allowing her family to stay together, instead of having her husband work in San José to pay the bills. This is because the AMPR has not only increased the size and quality of the fish, but it also provides enough fish for people to fish every day, instead of only during the *cuarto menguante* , or the eight days surrounding the third quarter moon, typically the best time of the month to fish.

For those who were not members of ASOPECUPACHI, most of the feelings towards the association were negative and most people did not feel that there was any reason for them to join. Several participants stated that they do not like ASOPECUPACHI and feel that the organization has many problems with disorganization and ineffectiveness. Others felt that fishermen simply do not work well together in this type of organization. The unaffiliated fishermen generally thought that there were few or no benefits to membership in ASOPECUPACHI. However, there were two participants that expressed an interest in joining

ASOPECUPACHI in the future. Unfortunately, not all of the unaffiliated fishermen chose to answer this question.

Unlike the fishermen in ASOPECUPACHI, both members and non-members of ASOMM generally felt positively towards the association, although many did not have strong opinions. The unaffiliated fishermen of Montero were mostly ambivalent towards ASOMM. Two of the unaffiliated fishermen said that they did not know why they were not members. One unaffiliated fisherman said he just did not want to join, and another said that he was not a member because he is not required to be one. Only one non-member expressed any negativity towards ASOMM, stating that he used to be a member but was unhappy with unspecified recent changes in the organization. The members of ASOMM stated that the main benefits of membership in ASOMM are increased support from other fishermen and training opportunities. One member also credited ASOMM with the protection of the AMPR. The overall attitude amongst the members of ASOMM was that the organization allows the fishermen to work together, which in turn allows them to help themselves and the community at large.

4.3 Socioeconomic Data

Since little has been previously known about the socioeconomic conditions of Palito and Montero, it is essential for this project to develop a socioeconomic baseline. Our research will form a template for future studies with other communities that MarViva plans to work with. In addition, these results will be compared to future socioeconomic data gathered from Palito and Montero to analyze the progression of the communities after continued use of sustainable fishing practices.

4.3.1 Demographic Information

In order to gain a better understanding of the towns, we also collected demographic data (seen in Appendix D) by asking each fisherman surveyed for the first names, family relations, and ages of every member of his family who lived in his house. The mean ages for adults, children, and mean family sizes were similar in both Palito and Montero. It should be known that the adults included the fishermen surveyed, their spouses, and any other adult relatives living in their households. A child was defined as someone who lives with his parents and depends on them economically. Table 2 shows the means and standard deviations for the demographic data collected during our surveys with the fishermen of Palito and Montero.

Table 2: The demographic data for families that participated in surveys in Palito and Montero, with means and standard deviations (SD) for the age of adults, age of children, and family size.

Town	Age of Adults (years)			Age of Children (years)			Family Size (people)		
	N	Mean	SD	n	Mean	SD	n	Mean	SD
Palito	36	44	11	46	14	6.3	19	4.3	1.7
Montero	29	44	16	27	15	7	14	4.1	1.9

4.3.2 Reported Fish Prices

Most Palito fishermen surveyed catch the same type of fish, which includes *róbalo* (seabass), *bagre* (catfish), *pargo* (snapper), and *corvina reina* (queen seabass). No one in Palito reported that they caught *camarones* (shrimp), even though they are found in waters where they fish. There are also a few fishermen who catch a type of fish or shellfish that is not included in the previous list. This includes *almejas* (clams) and *ostras* (oysters). We also encountered some limitations with this survey question for fish prices. For example, some fishermen were not exactly sure of the prices they received, whereas others responded that the prices vary greatly and would not respond with an exact number. In addition, we received more responses for the prices of fish today, because some fishermen could not recall the best price they had ever received. We used the responses for the fish prices today to calculate the average price per kilogram in colones, which can be seen in Table 3. The table is divided into members and non-members of ASOPECUPACHI and is based on responses from the fifteen fishermen out of nineteen who answered the survey question. However, the average price for each type of fish is not based on fifteen responses, because not all fishermen catch every fish type that is listed in the table and some catch more than one species. By looking at the data, we observed that the price of the fish depends on its desirability in the market. Almost every fisherman in Palito who answered the fish price question reported that they catch two species of more desirable fish, *corvina* and *róbalo*, and two species of less desirable fish, *pargo* and *bagre*. Nearly all of the fishermen reported that they generally receive the same prices for *corvina* and *róbalo*. Similarly, most fishermen reported that they receive the same prices for *bagre* and *pargo*. Using the Mann-Whitney U test, we found no significant difference in the mean reported selling prices for members and non-members of ASOPECUPACHI for *corvina* ($p=0.53$, $df=1$, $U=30.0$), *róbalo* ($p=0.66$, $df=1$, $U=12.5$), *bagre* ($p=0.88$, $df=1$, $U=19.0$) and *pargo* ($p=0.71$, $df=1$, $U=11$). We considered $p<0.05$ to be significant. Therefore, we can conclude that in Palito, membership in a fishing association currently does not affect the price received for all species of

fish. This is may be because most of the fishermen on Chira Island sell their fish to Brais, who serves as the middleman and transports the catch to places outside of the island. One fisherman, who is not a non-member of ASOPECUPACHI, sells his fish directly to a buyer in the city of Puntarenas and receives a substantially higher price. No other fisherman sold directly to Puntarenas, and therefore we feel that this fisherman is not representative of the population. Therefore, we removed him as an outlier from Table 3.

Table 3: Average prices for the most popular types of fish caught in Palito. SD=standard deviation

Types of Fish	Members of ASOPECUPACHI			Non-Members of ASOPECUPACHI		
	Number of Responses	Prices (Colones per Kilogram)		Number of Responses	Prices (Colones per Kilogram)	
		Average	SD		Average	SD
Corvina	7	1600	283	7	1800	277
Róbalo	7	1600	283	3	1467	416
Bagre	7	1057	79	5	1020	217
Pargo	6	1067	82	3	1033	58

Most fishermen surveyed from Montero generally catch the same type of fish, which includes *corvina reina* and *camarones*. Four fishermen reported that they catch *róbalo*, and there were also two fishermen surveyed who catch *bagre* and *pargo*. As previously mentioned, we encountered similar limitations with this survey question in the town of Montero. We used the responses for the fish prices today to calculate the average price per kilogram in colones, which can be seen in Table 4. The table is divided into members and non-members of ASOMM and is based on responses from fourteen fishermen who answered the survey question. Like the data gathered from Palito, the average price for each type of fish is not based on fourteen responses, because not all fishermen catch every fish type that is listed in the table and some catch more than one species. Using the Mann-Whitney U test, we found that for *corvina* ($p=0.79$, $df=1$, $U=15.5$), *róbalo* ($p=0.50$, $df=1$, $U=2.5$), *bagre* ($p=1$, $df=1$, $U=0.5$), and *camarones* ($p=0.25$, $df=1$, $U=22$), there was no statistically significant difference between members and non-members of ASOMM. We were unable to make any determinations for *pargo* because no non-members caught *pargo*. We concluded that for Montero, membership in ASOMM does not affect the fish prices received for *corvina*, *róbalo*, *bagre*, and *camarones*.

Table 4: Average prices for the most popular types of fish caught in Montero.

Types of Fish	Members of ASOMM			Non-Members of ASOMM		
	Number of Responses	Prices (Colones per Kilogram)		Number of Responses	Prices (Colones per Kilogram)	
		Average	Standard Deviation		Average	Standard Deviation
Corvina	7	1729	340	4	1775	320
Camarones	5	5200	447	6	4833	408
Róbalo	3	1667	351	1	2000	0
Pargo	2	900	141	0	0	0
Bagre	1	1000	0	1	1000	0

We compared the fish prices of all fishermen who responded in Palito to the fish prices of all fishermen who responded in Montero, as seen in Table 5. Using the Mann-Whitney U test, we found that for *corvina* ($p=0.98$, $df=1$, $U=77.5$), *róbalo* ($p=0.30$, $df=1$, $U=27.5$), *pargo* ($p=0.15$, $df=1$, $U=15.5$) and *bagre* ($p=0.55$, $df=1$, $U=16.0$), there was no significant difference between the fish prices of the two towns. We were unable to compare the price of *camarones*, because no fisherman in Palito reported that he caught *camarones*.

Table 5: Average prices for the most popular types of fish for all fishermen in both towns. SD=standard deviation

Types of Fish	All Fishermen in Palito			All Fishermen in Montero		
	Number of Responses	Prices (Colones per Kilogram)		Number of Responses	Prices (Colones per Kilogram)	
		Average	SD		Average	SD
Corvina	14	1700	288	11	1750	317
Róbalo	10	1560	310	4	1750	332
Bagre	12	1040	144	2	1000	0
Pargo	9	1060	72.6	2	900	141
Camarones	n/a	n/a	n/a	11	5000	447

4.3.3 Income

In order to evaluate gross monthly income levels (before fishing expenses) of the fishermen, we created a simple equation to analyze the data obtained from the survey questions. Three different cases of the same equation (Equation 1) were used since it was impossible to tell what percentage of the fish caught consisted of the more desirable fish species and what percentage consisted of the less desirable fish species. In Palito, only two cases were applied, since no fishermen reported catching *camarones*. The first case assumed that all fish caught consisted of *corvina* and *róbalo*, and represented the highest income possible for the data received. Meanwhile, the second case assumed that all fish caught consisted of *pargo* and *bagre*, and represented the lowest income possible. The third case assumed that the fishermen solely caught *camarones*, which represents the highest possible income if the fisherman only caught shrimp. The actual income levels of the fishermen lay somewhere in between the different income levels calculated. This equation took the following format:

Equation 1

$$\text{Income} = (\text{Price today})[(\text{Amount of kilos caught during the cuarto menguante}) \\ + (\text{Amount of kilos caught per week for the rest of the month} \times 3 \text{ weeks})]$$

The gross monthly incomes found through these equations are extremely broad approximations. Three assumptions had to be made in order to estimate these incomes. First, each income level assumed that the monthly income was based on a four-week period. Another important assumption involved the kilograms of fish caught per week. It was necessary to ask the fishermen for the amount they caught specifically during the eight days surrounding the *cuarto menguante* (third quarter moon), since it is the peak fishing period of the month. If no amount was given for the period of the *cuarto menguante*, it was assumed that they caught the same amount of kilograms for that period as they did per week during the rest of the month. This assumption applied to three out of nineteen fishermen surveyed in Palito and only one out of fourteen fishermen surveyed in Montero. Moreover, if the fisherman only gave an amount for fish caught during the period of the *cuarto menguante* and no amount for the rest of the month, it was assumed that they only fished during this period. We applied this assumption to three fishermen in Palito and one fisherman in Montero because one fisherman told us that people only fished during this period in previous years, when the fish populations were smaller. The third and final key assumption dealt with the amount of catch sold for profit reported by each

fisherman. Ten out of fourteen fishermen surveyed in Montero and thirteen out of nineteen fishermen surveyed in Palito reported that they sold the majority of their catch. Since this represents 70% of the fishermen surveyed (23 out of a total of 33), we decided it would be valid to assume that all fishermen sold their total catch for profit in order to estimate an income.

Even with the application of these assumptions, we were unable to calculate a gross monthly income for some of the fishermen surveyed. This was due to the fact that four of the fishermen surveyed in Palito were unable to report the prices they were receiving for the fish they caught. Furthermore, in Montero, three of the fishermen surveyed did not provide any data for the amount of fish caught. Table 6 shows the estimated maximum and minimum gross monthly incomes calculated for the fishermen surveyed in Palito using Equation 1. The star designates those fishermen whose gross incomes could not be calculated due to insufficient data while the n/a designates that the fisherman does not catch that particular category of fish.

Table 6: Estimated gross monthly income levels calculated and percentage of expenses covered by fishing for fishermen of Palito. Family number refers to the number given to each family in the raw data sheet. (*Participant did not provide sufficient data to compute an income) (n/a - Did not sell these types of fish). All data presented are in the unit colones/month. (n=19)

Family Number	Member of ASOPECUPACHI	Income assuming 100 % of fish caught is <i>corvina</i> or <i>robalo</i>	Income assuming 100 % of fish caught is <i>bagre</i> or <i>pargo</i>	Percentage of expenses covered by fishing
1	No	*	*	Less than half
2	Yes	180,000	120,000	Less than half
3	No	102,000	n/a	More than half
4	Yes	285,000	209,000	Half
5	No	192,000	104,000	All
6	No	264,000	165,000	More than half
7	No	252,000	140,000	More than half
8	Yes	204,000	120,000	All
9	Yes	18,000	18,000	More than half
10	Yes	138,000	102,000	Half
11	No	*	*	Less than half
12	No	880,000	600,000	Half
13	Yes	51,000	30,000	All
14	No	160,000	132,000	Half
15	No	*	n/a	Half
16	Yes	340,000	220,000	All
17	Yes	*	*	More than half
18	No	504,000	230,000	All
19	No	34,000	30,000	All

The mean gross incomes and standard deviations from the first two cases of Equation 1 (*corvina* and *robalo*, and *bagre* and *pargo*) for members and non-members of ASOPECUPACHI were also computed and can be found in Table 7. We identified Family 12 shown in Table 6 as an outlier and opted to exclude it from this computation. This fisherman in this family directly sells his fish to Puntarenas, the closest major city to Chira Island, which is something that no other fisherman surveyed in Palito did. Therefore, it seems that his data inaccurately reflect the

general economic situation of Palito (our survey sample size included nineteen of approximately forty families in the town).

Table 7: Mean gross incomes and standard deviations from the 15 fishermen in Palito who provided adequate data to calculate an income, calculated separately for members and non-members of ASOPECUPACHI, and then for all fishermen. In calculating incomes for each category of catch type, we included only those fishermen who reported income from that catch type, which is why the all fishermen sample sizes in the bottom row do not sum to 15. All data presented are in the unit colones per month.

	n	Mean income assuming 100 % of fish caught is <i>corvina</i> or <i>róbalo</i>	SD	n	Mean income assuming 100 % of fish caught is <i>bagre</i> or <i>pargo</i>	SD
Member	7	173,714	116,600	7	117,000	78,194
Non-member	8	298,500	273,292	7	214,429	187,086
All fishermen	15	240,267	217,539	14	165,714	146,738

In Palito, three non-fishermen were also surveyed: a hotel owner, a convenience store owner, and the secretary from the local fish market, or *pescadería*. Since the majority of the residents in Palito are fishermen, it was difficult to find a large sample of non-fishermen to survey. In the survey for non-fishermen, participants were asked their incomes directly. Only one of the three participants, the secretary at the *pescadería*, reported her income, which was 200,000 colones per month. With such a small sample size, we are unable to compare the incomes of non-fishermen with those of fishermen. However, by using other data gathered through observations, it is possible to compare other socioeconomic variables between fishermen and non-fishermen. We noticed that those who did not rely on fishing had more luxuries such as cars, refrigerators, and motorcycles.

The income levels of the fishermen in Montero were computed in the same manner as in Palito, using the same equation (Equation 1) and assumptions described in the beginning of this section. However, instead of using two instances of Equation 1, three cases were used because the fishermen of Montero also caught *camarones* (shrimp). The first case assumed that all fish caught consisted of *corvina* and *róbalo*, the second case assumed that all fish caught consisted of only *pargo* and *bagre*, and the third case assumed that all of the fish caught consisted of *camarones*. The actual income levels of the fishermen lie somewhere in between these three cases. Additionally, two fishermen in Montero did not report the amount of fish they caught and therefore did not provide sufficient data for their incomes to be calculated. In sum, only eleven

out of fourteen incomes earned by families of fishermen in Montero could be calculated. The gross incomes can be seen in Table 8.

Table 8: Estimated gross monthly income levels calculated for fishermen of Montero (*Participant did not provide sufficient data)(n/a – Did not catch this type of fish). All data presented are in the unit colones/month. (n=14)

Fisherman Number	Member of ASOMM	Income assuming 100 % of fish caught is <i>corvina</i> or <i>róbalo</i>	Income assuming 100 % of fish caught is <i>bagre</i> or <i>pargo</i>	Income assuming 100 % of fish caught is <i>camarones</i>	Percentage of expenses covered by fishing
1	Yes	604,500	465,000	n/a	All
2	Yes	400,000	160,000	n/a	Varies
3	Yes	207,000	n/a	575,000	Half
4	No	105,000	70,000	315,000	All
5	No	131,625	n/a	511,875	All
6	Yes	90,000	n/a	200,000	All
7	No	180,000	n/a	540,000	More than half
8	No	300,000	200,000	216,000	Less than half
9	No	80,000	40,000	330,000	All
10	No	*	*	*	All
11	Yes	n/a	*	1,450,000	More than half
12	Yes	476,000	280,000	n/a	More than half
13	Yes	*	*	*	*
14	Yes	*	*	*	*

The mean incomes and standard deviations from all cases of Equation 1 for members and non-members of ASOMM were also computed. Table 9 displays this data for the eleven out of fourteen fishermen surveyed in Montero that reported adequate data to calculate an income. As specified earlier, the row designated 'all fishermen' reports the average incomes for the fishermen regardless of membership in ASOMM.

Table 9: Mean gross incomes and standard deviations for the 11 fishermen in Montero who provided adequate data to calculate an income, calculated separately for members and non-members of ASOMM, and then for all fishermen. In calculating incomes for each category of catch type, we included only those fishermen who reported income from that catch type, which is why the all fishermen sample sizes in the bottom row do not sum to 11. All data presented are in the unit colones/month.

	n	Mean income assuming 100 % of fish caught is <i>camarones</i>	SD	n	Mean income assuming 100 % of fish caught is <i>corvina</i> or <i>róbalo</i>	SD	n	Mean Income assuming 100 % of fish caught is <i>bagre</i> or <i>pargo</i>	SD
Member	3	741,667	641,450	5	355,500	206,787	3	301,667	153,650
Non-member	5	382,575	138,364	5	159,325	86,930	4	103,333	85,049
All fishermen	8	517,234	403,780	10	257,413	181,806	7	202,500	155,362

To obtain additional information on the income levels in Montero, three non-fishermen from the town were also asked their average income per month. We surveyed the owner of an ice cream shop/ restaurant, or *heladería*, the owner of a convenience store, or *pulpería*, and the owner of a local bar. When sales are high, the woman who owns the *heladería* earns 200,000 to 300,000 colones a month. This income is also supplemented by the income from her husband's occupation as the principal of the elementary school shared by Palito and Montero. The home of this family was also in noticeably better condition than other homes in Montero. For example, they owned a car, a flat screen television, a Playstation 2, and a laptop. The husband is also studying to get his master's degree in education. This household may be one of the few in Montero that relies on two incomes, one of which is likely a salary. According to our data collected and observations, this is uncommon in Montero. The owner of the convenience store reported that his average income was about 450,000 colones. However, it was unclear whether he factored in his business expenses of 300,000 colones per month in his reported monthly income. The owner of the local bar stated that his monthly income was between 100,000 to 150,000 per month. He also reported business expenses that were in the same range. Therefore, we are unsure if his income was reported after all business expenses were taken into consideration. Due to these limitations, a small sample size, and insufficient data, no comparisons were made between the fishermen and non-fishermen of Montero.

We also compared the fishermen surveyed in the towns of Palito and Montero who provided adequate information to calculate their income levels. The graph in Figure 17 compares the average gross monthly incomes calculated for each case of Equation 1 (*corvina*

and *robálo*, *bagre* and *pargo*, and *camarones*) for both Palito and Montero. These average incomes shown in the graph were calculated regardless of membership in a fishing association and the values can be found in the row labeled 'all fishermen' in Tables 6 (Palito) and 8 (Montero) The same outlier, the fisherman from Family 12 of Palito who sold his fish to Puntarenas, was disregarded in the creation of the graph. It is important to note that no fishermen in Palito reported catching *camarones* but that this species accounted for the highest average incomes, because it yields a higher price.

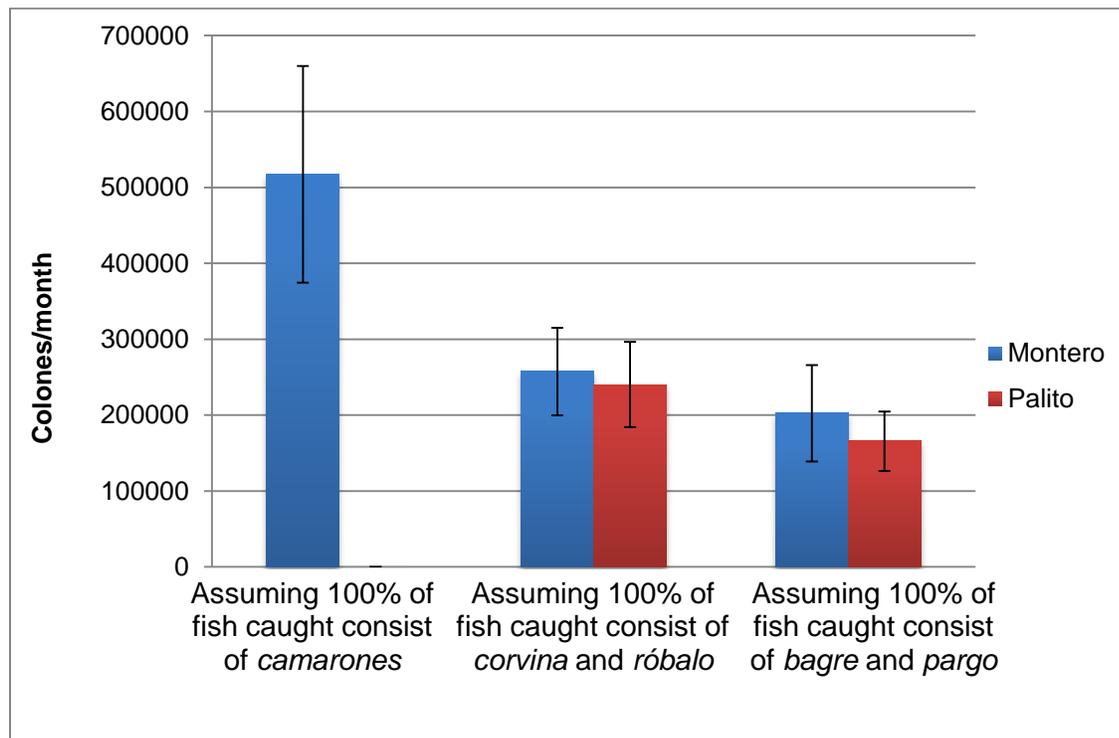


Figure 17: Mean incomes for fishermen surveyed of Palito and Montero who provided adequate data. Error bars indicate standard error.

Despite broad approximations and incomplete data, the gross incomes calculated are still useful. This data can be used qualitatively to compare with data gathered in the future. Since no socioeconomic data exist about either of these communities, it is important to attempt to calculate gross income levels, even if they are rough approximations.

A major issue with this data is that it fails to account for incomes earned from other economic activities of the fishermen and their families or money sent to them from family members living outside of Chira Island. However, it was found that in Palito, 42% of the fishermen (eight out of nineteen) who provided answers rely on income earned from some additional economic activity for half or more than half of their expenses. In Montero, it was

determined that 25% of the fishermen (three out of twelve) who answered rely on other sources of incomes to cover half or more than half of their expenses.

4.3.4 Other Economic Activities

In addition to fishing, we wanted to know more about the other industries that exist on the island. Many people reported that fishing alone did not provide an adequate family income. One person even stated that if someone is only a fisherman, he will sometimes be hungry. This could explain why eight out of nineteen surveys in Palito indicated that they have a second job in addition to fishing, and why only 58% of all survey respondents from Palito reported that their only income was from fishing. Among the fishermen of Palito, there is a mechanic, a hotel owner, a cattle rancher, an artist, and a landscaper. In Montero, seven of the fourteen surveyed families of fishermen relied on another economic activity in addition to fishing. Two families had children in the police force on the Island. An additional two families had wives of fishermen who held jobs such as selling magazines and making and selling soap products. Moreover, two families also worked in agriculture. One family had a pastor as a member. Overall, we found that in both towns, approximately half of the families of the fishermen surveyed reported that they had a second source of income. However, we did not inquire about any income from family members living outside of Chira Island. Due to the fact that fishing may not be an economically sustainable industry on Chira Island, the people hope that there are more opportunities for them in other industries. In particular, three out of five interview participants in Montero and two out of six interview participants in Palito reported that they hope that tourism will continue to be developed on the island, so that more jobs become available in hotels, restaurants, and tourist activities.

An informal interview with one of the owners of Posada Rural La Amistad, Lilliana Martinez Gonzalez, revealed additional information on the need for increased economic development on Chira Island. She spoke particularly about the tourism industry and gave reasons for the slow growth of tourism on the island. She belongs to the group of women that started Posada Rural La Amistad in 2001. The women were highly criticized by other townspeople and they faced some hardships in the beginning. Martinez felt that gender discrimination played a major role in their early struggles. The contractor selling them the land was unwilling to sell to a group of women at first and tried to overcharge them. Additionally, when Martinez and the other women in the group traveled to San José to obtain training in running a business, manipulating and processing food, tourism and other topics, they were criticized as abandoning their families and looked down upon by the local community. After the

hotel opened, the people of Chira Island were unwelcoming to tourism and afraid of its effects on the island. They were afraid that tourists would bring things such as drugs or prostitution to the island. The people were also unaware that tourism can take other forms such as ecotourism, rural tourism, and visits by scientists conducting research on the biology of the island. However, Martinez revealed that after the hotel was running and bringing in money, the people of Chira Island began to see the need for a tourism industry and how this positively impacted their own occupations. With increasing numbers of tourists, more fish needed to be purchased from the fishermen, more supplies were being bought from the local stores, and more people were eating at the local restaurants. Therefore, this interview with Martinez suggests that expanding the economy beyond just fishing on Chira Island would be one path to improving the socioeconomics of the people (Martinez, personal communication, 2012).

4.3.5 Other Financial Information

Of the nineteen families of fishermen surveyed in Palito, none of them indicated that they had savings. Two out of nineteen participants did not own their own house. One of those who did not own his own home lived with his sister. Fifteen of those surveyed did possess health insurance and very few people had boat insurance. Moreover, only one person indicated that he had home insurance. There were only two of nineteen fishermen who said they did not have debts and of those who indicated the amount of their debts, many of them ranged from 800,000 to 900,000 colones. When we surveyed the three non-fishermen from Palito, only one person, the owner of the convenience store, reported that he had savings. Both the owner of the hotel and the owner of the convenience store stated that they had debts but the secretary did not.

The fishermen of Montero reported similar answers to the survey. Just one family out of the fourteen surveyed stated that they had some savings. Similar to Palito, only two fishermen specified that they did not own their home and had loans. Three fishermen did not have health insurance and eleven of a total of fourteen fishermen did not have boat insurance. In addition, no one indicated that they had home insurance and only five people stated that they did not have any debt. While surveying the families of three non-fishermen in Montero, only the bar owner did not have any debts and only the owner of the ice cream shop had any savings.

4.3.6 Involvement in Other Organizations

On Chira Island, there are numerous career-related associations and organizations, including the Development Association, the Educational Board, the Community Bank, and the Association of Artisanal Women. Since it will be necessary for the people of Chira Island to work

together in these types of associations to promote change, we asked the fishermen surveyed if they are involved in any associations other than the fishing associations. If they were involved in another organization, we asked if they had any leadership roles.

In Palito, nine out of nineteen fishermen or their wives were involved in at least one organization that was not ASOPECUPACHI. Five of these fishermen were involved with their local church. Five fishermen, both members and non-members of ASOPECUPACHI, were involved in the project to farm oysters. Three of the wives of fishermen own Posada Rural La Amistad Inn, and are therefore involved in the Women's Association of Chira. One other fisherman reported an involvement in the recycling association. In general, the members of ASOPECUPACHI were not as involved in other organizations as fishermen who were not affiliated with ASOPECUPACHI.

Of the fourteen fishermen surveyed in Montero, there were few fishermen who were involved in an organization. One wife of a fisherman was involved in the Community Bank. One fisherman reported that he was involved in the Association of Chira Island. Another fisherman stated that he was involved in local politics, and was involved with the Chira Island district of the Municipality of Puntarenas. No member of ASOMM was involved in any outside organization.

4.3.7 Education Level of Adults Surveyed

In our survey, the adults were asked about their education level and the education level of their spouses and any other adult relatives that are not children. In Palito, we found that for the members of ASOPECUPACHI and their spouses, fourteen adults attended primary school and two adults had no formal education. There were no members of the association that received an education beyond primary school. The education data for fishermen and their spouses in Palito can be seen in Table 10.

For the unaffiliated fishermen of Palito and their spouses, we found that fifteen adults attended primary school, four adults completed high school, and only one adult had no formal education. No adults, whether a member or not, attended university. Although fishing does not require an education, the lack of education amongst the fishermen of Palito has likely hindered their chances of obtaining a better paying job.

Table 10: The education level of adults surveyed for Palito, including members and non-members of ASOPECUPACHI (n=36).

Education Level	Number of Adults	
	Member of ASOPECUPACHI	Non-Member of ASOPECUPACHI
No Education	2	1
Primary	14	15
High School	0	4
University	0	0

In Montero, we found that for the members of ASOMM and their spouses (and the adult relatives of one member), twelve adults attended primary school and two adults attended high school, which was observed to be the highest level of education for the members. For the unaffiliated fishermen of Montero and their spouses, we found that eight adults attended primary school, and only one adult had attended high school. As seen in the results from Palito, no adults, whether a member or not, had attended university. This information can be seen in Table 11.

Table 11: The education level of adults in Montero, both members and non-members of ASOMM. (n=28)

Education Level	Number of Adults	
	Member of ASOMM	Non-Member of ASOMM
No Education	0	0
Primary	16	9
High School	2	1
University	0	0

In the surveys for non-fishermen, the adults were also asked about their education level and the education level of their spouses. Whereas most adults of families of fishermen had not received an education level beyond primary school, four of six families of non-fishermen had at least one parent who had received a high school education. In Montero, there is one family in which the wife received a high school education and her husband is studying to get his master's degree. He is the only person we met on the island with an advanced degree.

The survey also asked about the education level of the children (anyone who still lives with their parents and depends on them for income). Currently on Chira Island, there are three

elementary schools serving grades kindergarten through sixth and one high school serving grades seven through twelve. In Palito, it was found that the children often have greater access to education and are better educated than their parents. Eighty-nine percent of the adults surveyed received only primary level education or no education at all, whereas most of the children have received or are receiving a level of education that is appropriate for their age. There were only two children who are of high school age but no longer attended school. A total of eight children of fishermen attended or currently attend university, with five of these children belonging to families of members of ASOPECUPACHI in Palito. We noted that the children who are attending university are a great source of pride to the community.

In Montero, the children also have access to more educational opportunities than their parents. One fisherman who is a member of ASOMM has a daughter studying at university, and also has a son who is in the police force on the island. Of all of the children of the families surveyed, only four did not complete the highest level of education possible for their age, and three of these children were from families of non-members. We also observed that two families who are not affiliated with ASOMM had sent two children to university.

We did not ask whether families included adult children who had completed a university degree, nor how many adult children returned to the island versus staying on the mainland once they completed their university education. This information may be useful in future studies.

4.3.9 Training

On Chira Island, many of the residents have previously taken courses or training programs to learn more about certain industries or to acquire additional skill sets. Both members and non-members of the fishing associations were asked about these courses through a survey question. In Palito, it was found that there was an average of five courses per family for members of ASOPECUPACHI and an average of three courses per family for unaffiliated fishermen. It was also interesting to look at the breakdown of courses taken by each group. A course in food handling and processing was the most popular training for both members and non-members. Another significant point is that only families containing a member in the association have taken courses in tourism. Other common training programs among both groups were boat safety, first aid, and forestry. Only a few families had training in fishing and handling oysters and seafood. The majority of training programs involved other industries such as client services, recycling, shop-keeping, cooking, hospitality, marketing, accounting, environmental protection, and biology. However, despite having participated in diverse training

programs and courses, 58% of families still relied solely on fishing, as discussed in Section 4.3.4.

In comparison with Palito, the fishermen of Montero have taken fewer courses and were less specific in their responses to the survey question asking about their previous trainings. Many knew that they had taken courses but could not remember the names of them. The survey responses suggested that non-members of ASOMM may have taken fewer courses than members, but the lack of specificity in survey responses precluded deeper insight. The non-members of ASOMM were less likely to have taken at least one course. It was reported that all eight members surveyed had taken at least one course, but only four out of the six non-members had taken at least one training course. The courses included first aid, tourism, boat safety, forestry law, cooking, hospitality, life guarding, forest safety, agriculture, and computation. One also mentioned that he took a course with MarViva. The most common courses were food and seafood handling and processing. Additionally, as in Palito, despite these training programs and courses, 50% of the fishermen and their families solely relied on fishing as their source of income, as discussed in Section 4.3.4.

4.3.10 Observations

An important task of our field work was to make observations about Chira Island in general, as well as the towns of Palito and Montero. Upon first arriving to the island, we observed that it is largely undeveloped. There is a central dirt road that transverses the island, as seen in Figure 18, with all other roads on the island branching off of it. Furthermore, there are only two buses – one for students and one for public transportation across the island that operates a few times a day. There are few cars on the island and only one gas station. Therefore, the most common forms of transportation are motorcycles, bicycles, and walking.



Figure 18: The central road of Chira Island.

Since many of the townspeople we interviewed reported interest in ecotourism as a potential source of revenue for the island, we wanted to make observations about the current tourism opportunities available on Chira Island. There are only two hotels on the island, the Posada Rural La Amistad and the Cabinas Las Vegas, which can be seen in Figures 19 and 20, respectively. Neither is very large, so at the present time, there is a low capacity for tourists that can visit the island at a time, which therefore limits the potential income that could be generated from tourism. There are several activities for tourists to do on the island, including a workshop with the Artisanal Women's Association to make handcrafted art, a tour of the mollusks growing in the island's mangroves, and artisanal fishing tours. However, we observed that the greatest limitation to Chira Island's tourism is its lack of publicity. In order to get to the island, one must take a boat from Puntarenas or San Pablo, but the times that the boat runs are not readily available. Chira Island has yet to be mentioned in any of the major Costa Rican travel guidebooks, and frequently does not even appear on maps of Costa Rica. Danny Gallant, a member of the Peace Corps working on socioeconomic development of the island, believes that the most important reason for the slow growth of the tourism industry on Chira Island is that it lacks a unique identity. There is no well-defined reason for tourists to visit. It lacks the white sand beaches or volcanoes that make Costa Rica a popular tourist destination. Therefore, the residents of Chira Island must determine why a tourist would be interested in visiting the island, and develop an industry around that niche. It is possible for the residents of Chira Island to develop a better tourism industry, but concerted efforts will need to be made in terms of infrastructure, publicity, and identity in order for this to be possible.



Figure 19: One of the cabins of Posada Rural La Amistad.



Figure 20: The Cabinas Las Vegas, which is made up of a few hotel rooms, a convenience store, and a restaurant.

Our most important observations for this project concerned the socioeconomic conditions of the people. One of the most useful methods for gathering qualitative data for the families of Palito was to observe the condition of their house and material goods. This was possible because we primarily administered the surveys at the participants' homes. We observed that everyone had electricity and some electrical appliances. Very few people owned a refrigerator, because there is a historical tradition on the island of only purchasing enough food needed for the day. We noticed that while many homes were in obvious need of minor or major repair (sagging roofs, gaps in walls, etc.), many of these homes contained electrical

appliances such as televisions and radios. Everyone in Palito had access to plumbing, but we observed that sinks were usually outside the home. Most houses were very open to the elements – many homes had windows without screens or had large gaps between the walls and the roof. An indicator of wealth in Palito is glass windows; we noticed that only a few houses had glass windows, and these houses tended to be larger and better maintained. Another indicator of wealth is found in methods of transportation. In general, only the wealthiest members of the town have cars. Motorcycles are more common than cars but still a sign of a higher than average income. Bicycles and walking are the most common forms of transportation. We used these socioeconomic indicators to develop a general sense of the overall financial conditions for a particular family. A few examples of houses in Palito can be seen in Figures 21 and 22.



Figure 21: A fisherman's house in Palito.



Figure 22: One of the nicest houses that we observed in Palito, with glass windows, several motorcycles in the driveway, and no gaps in the walls or roof.

We observed that although the houses in Montero were similar to those in Palito, they were usually a bit larger and in better condition. They were less likely to have significant gaps in the walls or roof. However, we did witness some one-room houses that had few luxuries. The houses of Montero had more modes of transportation parked in their driveways than those of Palito. Nearly every house had a bicycle, many had motorcycles, and more than a few had cars. Examples of the houses of Montero can be seen in Figures 23 and 24.



Figure 23: A fisherman's house in Montero.



Figure 24: The house of the woman who owns the *heladería*, which she operates out of her own kitchen. It is larger and more luxurious than any other house we observed in Montero.

4.4 Perceptions Towards How the Economies of Palito and Montero can be Improved

Our project not only concerns the current socioeconomic states of Palito and Montero but also the possible future of the towns and ways in which the residents can improve their qualities of life. This section details the data gathered on this topic, beginning with the activity completed with the elementary school children, in which they were asked to draw their future career aspirations. It then moves to a discussion on the expectations of the parents and their hopes for the education and occupations of their children. The section concludes with the ideas gathered from the residents of Palito and Montero, as to ways in which they can improve their own socioeconomic statuses and those of the communities.

4.4.1 Activity with Local Children

We traveled to the elementary school shared by Palito and Montero to determine the perceptions of the local children towards their future. We accomplished this by asking the children to draw a picture under the question, “What do you want to be when you grow up?” (Appendix C) We distributed fifty papers to children ranging from kindergarten to 4th grade. We received twenty-eight responses, because one teacher did not return the papers back to us. Of the twenty-eight students, there were seven students from Montero, fifteen from Palito, three from Pachote, two from San Antonio, and one that lived between Montero and Palito.

We found that most of the students are interested in occupations that require a university education or other training. The medical field was of particular fascination to the students: two students wanted to be doctors (one even specified the field of obstetrics/gynecology), three

wanted to be nurses, one wanted to be a dentist, and three wanted to be veterinarians. Four students expressed a desire to be an airplane pilot. There were two students who wanted to be policemen and five students wanted to be teachers when they grew up.

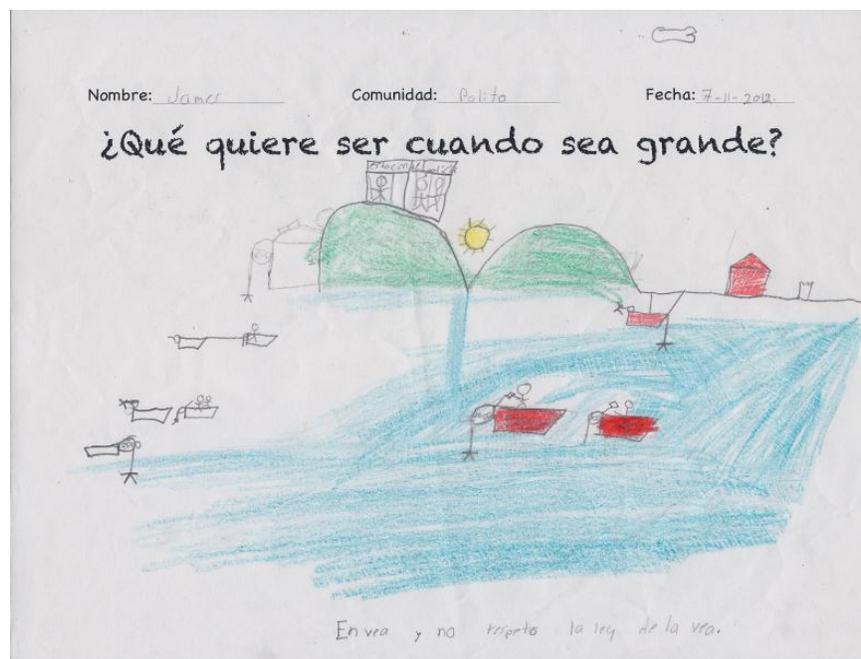


Figure 25: A sample drawing completed by one of the students surveyed. He drew himself sending fishermen to jail who do not “*respeto la ley* (respect the law).”

We also found that the children’s perceptions align with the issues that they see in the community. Five students wanted to be a *patrullero*, or member of the Costa Rican Coast Guard, in order to protect their island from illegal fishing methods, as seen in Figure 25 (above), previously. One student even drew herself as an employee of MarViva. Only three children expressed any interest in fishing for a living, despite the fact that nearly all of their parents are fishermen. In keeping with the physical conditions of Costa Rica, one student drew his future as an earthquake scientist. We also found that one student wanted to be a tourist guide and another wanted to be a cattle rancher, both of which are industries that the people reported are underdeveloped on the island. And, as with any group of children, there was one student who wanted to be a professional singer. The various career choices are shown in Figure 26.

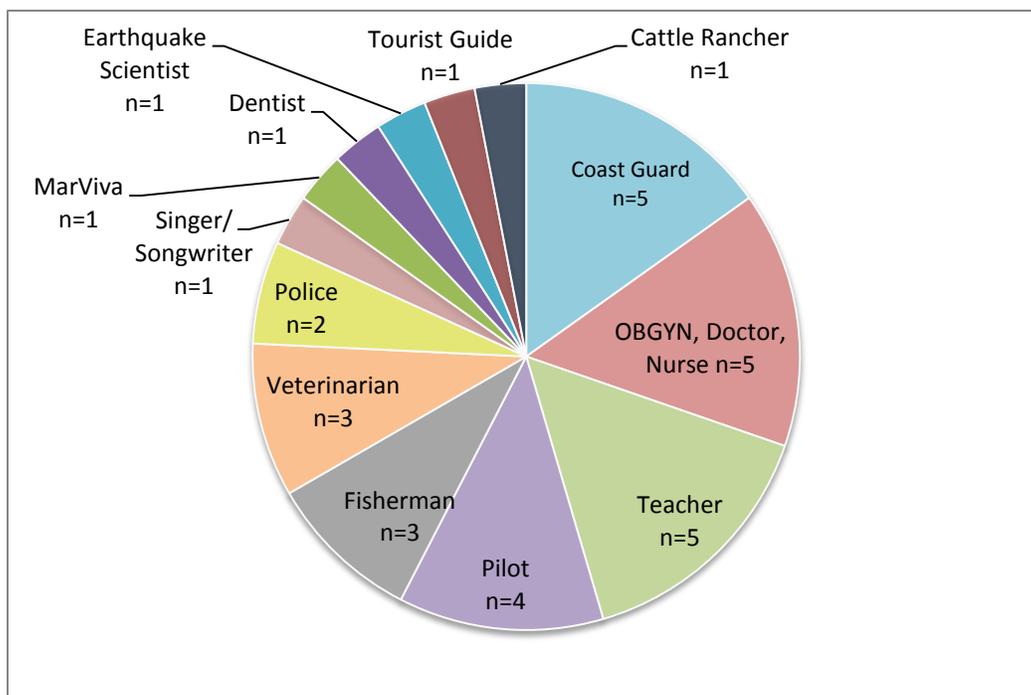


Figure 26: Chosen careers of students from the elementary school shared by Palito and Montero. Some children indicated more than one career (n=28 students but 33 careers).

4.4.2 Parents' Expectations for their Children's Future

We asked our survey participants about the future they wanted for their children. In both Palito and Montero, the overall response was that they did not want their children to become fishermen. More than half of the participants stated that they hoped their children would attend university or currently have children studying in university. Some felt that there were no opportunities for their children on Chira Island and hoped that they would move to somewhere more prosperous. On the other hand, some hoped that their children would stay on Chira Island, but that they would find work as educated professionals. When asked if there were jobs on Chira Island for the children who went to university, nearly all participants responded that there were few to none available for their children.

We found that the parents' hopes for their children's future matched the responses of the children. Despite the fact that nearly all of the parents of Palito and Montero are fishers, none of them want their children to become fishermen, and only three of twenty-eight children expressed any interest in fishing. Overwhelmingly, the parents wanted their children to pursue a university education. Many of the future career aspirations of the children required a university

degree or other training after high school. Most of the people that we surveyed imagined their children would attend university, yet they thought that only the minority of the children in their town would actually be able to attend university.

4.4.3 Perceptions of Residents Regarding Possible Improvements to the Socioeconomic Conditions of the Communities

In order to obtain a better understanding of ways in which the socioeconomic conditions of the communities could be improved, we asked the residents about different improvements they felt should be made. Our interviews with the fishermen asked “if the children of your town return to Chira Island after university, what types of jobs will they have?” and “what other industries should be developed on the island?” Six out of eleven fishermen interviewed in Palito and Montero stated that there were no jobs available besides fishing and that further opportunities for employment should be developed on Chira Island. Moreover, five out of six non-fishermen that were asked the same questions responded similarly. For example, one participant specifically said “it is very difficult to find work on Chira Island.” Another participant stated that “there needs to be other sources of income.”

The people also had mixed feelings on whether fishing was a sustainable industry. Some felt that with the creation of the AMPR, the fishing industry has improved but is still not completely sustainable. Thus, they suggested other possible industries and projects that could be developed in Palito and Montero. Eight out of seventeen participants, including both fishermen and non-fishermen, agreed that tourism needed to be further developed, while three out of seventeen mentioned agriculture and cattle ranching as additional possibilities. All three members of ASOPECUPACHI and one out of three members of ASOMM that were interviewed also suggested projects similar to the oyster project as ways to provide additional income and more employment opportunities. Overall, we concluded from our interviews that the fishermen of Palito and Montero cannot advance economically with only a fishing career. One fisherman even stated that if one relies on fishing, he will go hungry. Therefore, creating more jobs and developing additional industries may stimulate economic advancement of the two towns.

4.5 Socioeconomic Analysis for Palito and Montero

In this section, we synthesize our results to produce an overall analysis of the current socioeconomic conditions of both Palito and Montero. We also provide a glimpse into the potential futures of each town. This will help MarViva and the residents of the towns to change their actions in order to ensure a better future. In future years, this analysis, as well as the data

listed previously in the chapter, will provide a means of comparison so that other researchers can judge the progress made by the towns.

4.5.1 Socioeconomic Analysis for Palito

Through our field work, we have found that Palito is in a vulnerable position. Although there are more fish now than there were in past years, the fish prices remain so low that the fishing industry cannot support all of the residents who currently fish. The estimated mean gross monthly incomes of the fishermen range from 165,714 to 240,267 colones. It is unlikely that this is sufficient to support the average family size of approximately four people. Nearly every fisherman in Palito is in debt, and without a higher income, it is unrealistic that they will be able to pull themselves out of debt. Not a single fisherman in Palito reported having any savings. If an emergency arises or the weather affects the fish catch, the fishermen may have to put themselves further into debt. Nearly all of the fishermen that we interviewed stated that fishing is not a sustainable industry and they hope that their children will go to university instead. It is possible, however, that if the children do go to university, they may stay on the mainland where there are more job opportunities that require higher educations. If the children do return to Palito after university, the fishermen agreed that there are no jobs on the island that would be suitable for their education level. With the exception of a few nurses, teachers, and police officers, all of the jobs available in Palito are that of fishermen and farmers. There simply are not enough other industries on the island. When we asked “what industries should be developed on the island?”, we received responses of tourism, agriculture, and cattle ranching. However, no fisherman elaborated on how these industries would be developed. Since there are no suitable jobs for the younger generation, but a strong community desire to send the children away to university, it is likely that most of the younger generation will leave Palito permanently. This would leave Palito with an aging generation of poor fishermen who are increasingly dependent on money sent from their children who work elsewhere in Costa Rica. The general attitude from the people, as heard during the interviews, was that they wanted the towns to improve economically. One participant stated that he hoped that people will work together to build economic resources for the island. Another general attitude from the participants was that the people did not want the island to die out or lose its culture. For example, Eugenia Fernández Díaz, president of ASOPECUPACHI, stated that it was okay for the children to leave the island for better education or jobs as long as they do not forget the island or their culture. Therefore, it is necessary for Palito to work together to start businesses and create jobs, if the economy of the town and the livelihood of the people are to be improved.

4.5.2 Socioeconomic Analysis for Montero

The town of Montero is not much different from its neighbor, Palito. The most significant difference is that the fishermen in Montero are apparently deriving more money directly from fishing than their peers in Palito, with estimated mean gross monthly incomes ranging from 202,500 to 517,234 colones. This is slightly higher than the Palito range of gross monthly incomes. This income difference is further evidenced by the better quality housing in Montero and the possession of more motor vehicles. However, this income difference is apparently due to the fact that the fishermen of Montero use *trasmallos* to catch large amounts of shrimp, which fetch a high price. This method of fishing is damaging because it results in a large amount of bycatch (see Section 2.2) and if carried out inside the AMPR violates the regulations of the AMPR. Although fishermen may face a difficult choice between obeying the rules of the AMPR and obtaining a sufficient income on which to support their families, continued use of unsustainable fishing methods may cause a decrease in the amount of fish and shrimp that can be caught. If this were to happen, the people of Montero could face sharp decreases in their incomes from fishing. As in Palito, the fishermen of Montero do not have adequate incomes to be considered on the same socioeconomic scale as much of the rest of Costa Rica. Montero is still a poor town, and fishing with current methods does not seem to be a sustainable industry for its future. Montero faces the same challenges for the future as Palito. Although everyone wants their children to go away to university, they all admit that there are no industries on the island that suit a higher education level. As in Palito, much of the younger generation may leave the island to pursue their career. Unfortunately for both towns, this does not leave many people to develop new industries on the island. The residents of both Palito and Montero will have to work together to create jobs on the island that are not dependent on fishing.

4.6 Lessons Learned

Although we were happy with the data that we received, we feel that there could have possibly been a better way to achieve our goal. There are some questions that we wish had been included in our survey. For example, it would have been easier to calculate the incomes if we had directly asked how many kilograms were caught for each type of fish, instead of how many kilograms of fish were caught in total. We could have asked the fishermen for their incomes directly, but this may have led to vague answers or a refusal to speak honestly about their personal information. The non-fishermen were asked income directly, and they may not have been willing to honestly share their personal information. Only four out of the six non-

fishermen surveyed answered the income question. Although we did ask about how much of the expenses of the families are covered by other economic activities, we neglected to ask whether the fishermen received money from their relatives who work in Puntarenas or San José. This question should be asked in any future studies. Another question that should be changed for future studies is about the fish prices. We had difficulties with obtaining data because some fishermen were not exactly sure of the prices they received, whereas others responded that the prices vary greatly and would not respond with an exact number. We recommend that the question be worded differently in the future to obtain more specific and accurate results. We did not ask the buyers of fish (such as Brais) about what prices they give the fishermen, but that would have strengthened our survey data. In order to gain a better understanding of the education levels in the towns, we wish that we had asked how many children went to university and moved away from the island, so that we could compare how many children returned to the island and how many moved to the mainland after completing their education. We also neglected to ask what universities were attended by the students, although a few proud parents told us where their child was attending.

Another issue with our field work was the difficulty of finding participants in Montero. Unfortunately, since we held our introductory event at ASOPECUPACHI headquarters, not one fisherman from Montero came to learn more about MarViva and our project. This made it difficult for us to find fishermen from Montero who were interested in our project. It would have been better if MarViva had hosted two events, or held the event in a neutral location, such as the elementary school shared by the two towns. Additionally, our field work may have gone more smoothly if an employee of MarViva was there for both trips to facilitate introductions and answer any questions about MarViva's role in the community.

Chapter 5: Conclusions and Recommendations

The communities of Palito and Montero on Chira Island are sustainable fishing communities living below the poverty line (MarViva, personal communication, 2012). Their fishing zone comprises the first Área Marina de Pesca Responsable (AMPR) created in Costa Rica in 2009. The AMPR program regulates fishing activities within specified borders, requiring those fishing within them to do so sustainably, in order to preserve the fish species for future generations. It was created to reverse the damages caused by human activities in the sea. Our sponsor, MarViva, works with communities that are managing their marine resources in this manner to ensure that the AMPR program not only benefits the environment but also the socioeconomic statuses of the people. MarViva is currently working with the AMPR on Chira Island, and we aided them by creating a socioeconomic baseline for the towns of Palito and Montero. We also aimed to provide MarViva and the communities with recommendations for strategies that they could use to work towards a higher socioeconomic status and quality of life.

Through surveys, interviews, and observations, we were able to understand partially the economies of the communities. This project found that Palito and Montero are in vulnerable positions due to the unsustainable nature of fishing as an economic enterprise. The income from fishing is not adequate to support a family without going into debt. In order to raise themselves to a higher socioeconomic status, the people of Palito and Montero must develop additional industries, such as tourism, agriculture, and cattle ranching, and create more employment opportunities. Without these other industries, it is possible the towns will lose their younger generations who desire a university education and pursue careers that require a higher education. After detailed analysis of the results collected in Palito and Montero, we have developed the following recommendations so that the people and MarViva can help create a positive and bright future for Chira Island.

5.1 Recommendations for Palito and Montero

In order to improve their socioeconomic statuses, we recommend the people of Palito and Montero:

1. *Form an effective organization that will be tasked with economic development on the island*

According to Danny Gallant, a Peace Corps volunteer working on socioeconomic development on Chira Island, La Asociación de Desarrollo (Development Association) is currently tasked with economic development on the island. Their two current major projects are

a recycling plant in Palito and an Internet café. The Farmworker's Association is currently applying for a grant to support the creation of a low-cost public ferry for the island, which would decrease the cost and inconvenience of moving both people and supplies back and forth from the mainland. The Community Bank was recently formed, and hopes to someday provide loans to people and small businesses. All of the associations are making progress on improving the socioeconomic status of Chira Island. However, we feel that it would be best if there was one major organization that could oversee all of the projects by these smaller associations. Ideally, this organization would contain representatives from all towns and work to serve the best interests of the entire island. This organization would encourage entrepreneurs to start small businesses and help them to reach customers on the mainland. The overall mission of this organization would be to create and support economic development on the island (Gallant, personal communication, 2012). This is similar to the bottom-up approach of community development in which change comes from the people (see Section 2.4). It allows them to actively participate in this organization and reap the benefits of their own work.

2. Set aside previous differences and work together to improve the economy of the island

The people of Chira have had difficulties in the past in establishing the type of organization described above, due to prejudices held by community members. For example, there have been continuous conflicts between different religions. One half of the island is Catholic while the other is Evangelical (Gallant, personal communication, 2012). Conflicts have also arisen between different families and grudges tend to be held. In interviews, we noted indications that gender discrimination (machismo) is another widespread problem. For example, many community members expect that the women will only be housewives. Lilliana Martinez Gonzalez and the other women of Posada Rural La Amistad Inn faced such discrimination when trying to start their hotel. According to Gallant, these conflicts have prevented organizations from working together in the past and have hindered the island in reaching its full potential. Therefore, one of the first steps that must be taken in order for Chira Island to advance economically is for all of the different groups and organizations to work together towards common goals. Although these prejudices may take a generation to fully disappear, the people of Chira Island should attempt to overcome them.

3. Develop additional industries and opportunities for employment on the island to supplement fishing

Interviews with the fishermen revealed that fishing is not a sustainable industry, because fishing according to the rules of the AMPR is not currently allowing fishers to gain a livable income. Some even stated that it could not provide for all the basic necessities a family may need. It is possible that some combination of reduced fish populations and increased costs of living have eliminated a previously viable profession on Chira. To gain further insight on approaches the families could take to supplement their income from fishing, we asked what industries they believe should be. Many participants mentioned the development of agriculture and cattle ranching. There is currently a small agriculture industry on the island. Most farmers only grow corn and beans, but it may be in their best interest to grow other crops. Since there is available land, it would be possible for more people in Palito and Montero to adopt farming as their profession. Cattle ranching is another viable option since we observed large stretches of uninhabited land, including one abandoned farm. We recommend that a study be commissioned to identify what crops or animals could thrive on the island and propose a plan for the development of these industries. There are a lot of trees on the island, and it may be possible for the residents to start a small lumber industry. However, shipping the wood to the mainland may be difficult. One participant stated during an interview that Chira Island lacked a pharmacy, and that this could provide a few jobs. Many participants answered that the island lacked sufficient employment opportunities for its residents and there were no jobs available for their children in the future. Therefore, the development of new industries and sources of employment can allow the families of Palito and Montero to earn a higher average monthly income and enjoy a higher quality of life (Gallant, personal communication, 2012).

4. Develop the tourism industry further and promote the island, beginning with the creation of an attractive cultural identity for all of Chira Island

When the interviewees were asked what industries should be developed on the island to improve its socioeconomic status, almost everyone replied with the further development of tourism. This industry currently exists in a very basic state, but could definitely be improved to generate more revenue. Currently, Chira Island only draws visitors who are doing research on the biology of the island or mission trips that are working with the local churches. There are also very limited places to stay on the island. We observed two of the largest hotels: the Posada Rural La Amistad and Cabinas Las Vegas; however, their capacity is fewer than twenty people each. Furthermore, there are very few activities available that can draw a tourist crowd. These

activities include a tour of the mangroves and the *pianguas* (a type of mussel) project and an Artisanal Women's association shop that sells souvenir crafts handmade from a type of fruit, *jicaro*, grown locally on the island. It is necessary that the people of Palito and Montero, along with the other communities of Chira Island, work to find ways to attract more people so that tourism can become a flourishing industry. Gallant believes that the people must develop an attractive cultural identity in order to achieve this goal of further tourism development. This will enable them to determine the appeal of traveling to Chira Island and different ways to promote it. As a team, we noted that with the development of a cultural identity, Chira Island can develop its tourism industry into a flourishing and successful industry generating the money needed to supplement the incomes earned from fishing alone.

Currently, Chira Island is not well promoted to potential tourists. It is very rarely included in any guidebooks, other than being part of an overall map of Costa Rica. The majority of people traveling to Costa Rica are unaware of its existence. The bus and ferry times needed to travel to Chira Island are not readily available, making visits there even more difficult. The island's website, developed and maintained by Asociación de Turismo de Isla Chira, is not user-friendly and only exists in Spanish. To obtain more visitors, the people of the Chira Island should work to produce a more informative website with updated information, available in Spanish, English, and German (the languages of the most popular tourist groups that have traveled to Chira Island) (Gonzalez, personal communication, 2012). A small section in a guidebook could also boost tourism. One way that some tourist activities on Chira Island are currently promoted is through the Asociación Costarricense de Turismo Rural Comunitando (ACTUAR) program. ACTUAR promotes and publicizes ecotourism and rural tourism in Costa Rica. Tourists can currently schedule trips to Chira Island through ACTUAR. As more tourist activities and hotels are developed on the island, the residents should work with ACTUAR to promote their business (ACTUAR, 2012).

Another option that Chira Island could consider is applying for a Certification for Sustainable Tourism, from the agency Certification for Sustainable Tourism. One benefit of the certification is a listing on this agency's website. This will promote ecotourism on the island and ensure that the natural state of the island would be preserved. Investors are also interested in organizations that have such certifications and are willing to invest in these projects (Certification for Sustainable Tourism, 2010). Furthermore, the International Ecotourism Society offers membership for businesses and organizations involved in ecotourism or rural tourism. This provides a network for businesses with membership, allowing for communication and sharing of knowledge and resources. Additionally, it is a non-profit organization that can spread

the word about Chira Island and its tourist activities through its websites and publications (The International Tourism Society, 2012).

5. *Attend a financial workshop to learn more about saving money and managing debts*

The people of Chira Island would benefit from attending a financial workshop held by an outside organization. Almost everyone has debt, however, they are unsure of how much they owe. Moreover, they are continually buying groceries and supplies on credit, which increases their debt (Gallant, personal communication, 2012). Very few people had any savings. Inhabitants of Chira Island seem to be financially naive, which could contribute to low socioeconomic statuses. If they learn how to keep track of debts owed or how to save a little money each month, they could possibly improve their current financial situations. However, they may not be able to pull themselves out of debt without an increased income.

5.2 Recommendations for MarViva

In order to improve the socioeconomic statuses of Palito and Montero, we recommend MarViva:

1. *Establish relationships before starting projects with other communities*

Before starting a project in a new community, it is necessary for MarViva to first educate the community about its role and to build relations with important community members. This can be accomplished in an event similar to the one held at ASOPECUPACHI on the first day of our field work, which included a free lunch, a presentation, and an opportunity to ask questions. These events introduce the members of MarViva to the community members in a casual setting, allowing for the creation of trust and an understanding of the beneficial role that MarViva hopes to play in the community. This would be the first step to establishing a co-management process, allowing the communities to work hand-in-hand with MarViva. Our experiences with Montero taught us that it would have been beneficial if the people of Montero had taken advantage of the opportunity to attend the event at ASOPECUPACHI. However, their lack of attendance is understandable because it was held in Palito, rather than at a neutral location such as the school shared by both towns. The fishermen of Montero have only met with MarViva a few times, and therefore the recent efforts of MarViva to work with ASOMM on finding buyers for their fish have not succeeded. We felt this lack of relationship between Montero and MarViva during our project, and it may have affected our sample size for our surveys, as well as the responses we obtained from one or both towns.

2. *Establish socioeconomic baselines before starting projects in other communities, and follow up with similar surveys and interviews every two years to judge progress in the community*

In order to help communities similar to Palito and Montero in the future, it is essential for MarViva to conduct research about the community before they begin to work with it.

Establishing a socioeconomic baseline by talking to members of the community will allow MarViva to gain perspective on the most important needs of the people. Instead of going into the community blind, this added knowledge will save them time because they will know exactly what problems face the community.

It is important for MarViva to follow up with communities they have worked with so that they know their work is having a positive impact. After MarViva finishes working with a community, the members may be able to adjust their lifestyles through recommendations made by MarViva. However, after some time, they may revert to the lifestyle they have always known. Therefore, it is imperative that MarViva develop a way to evaluate the progress of the community after two years to ensure that the results of their work are still being seen throughout the community.

3. *Assist the communities with linking together fishing and tourism*

In order to improve the tourism on the island as well as help the fishermen, MarViva should promote activities that link fishing and tourism together. These activities could demonstrate the fishermen's use of sustainable fishing techniques in order to attract eco-tourists. For example, fishing tours using cuerda de mano within the AMPR could be established for those tourists who are interested in learning more about the source of their sustainably caught fish. These tours, as well as oyster project tours, could draw visitors to the island and provide another source of income for the fishermen. The residents of Chira Island could learn from other areas that have established sustainable fishing tourism as a means of promoting traditional fishing methods. For example, in the Alfaques Bay in Spain, visitors can schedule tours through La Ràpita Turisme to learn about sustainable fishing methods as they receive training directly from the fishermen. One tour that is offered is *la paupa* (with hands) fishing, in which tourists have the opportunity to catch fish using this traditional method and eat their own catch after it is prepared at a renowned restaurant. This tour greatly contrasts with a sport fishing tour that the company offers, in which tourists can rent a boat for a day of fishing. The tourists are only given the equipment but do not receive any training in how to use them or fish sustainably. All information about the tours is published online, and interested tourists can book

a tour directly through the website (La Ràpita Turisme, n.d.). This type of website would be beneficial for Chira Island because it could provide tourists with information about sustainable fishing tourism that is easily accessible. Information about these tours should also be published in major cities, such as Puntarenas or San José. Tourists who visit the artisanal fishing communities of Chira Island could learn about the importance of sustainable fishing and spread word to other areas in order to increase awareness of the issue.

4. Act as mediator between the fishermen and Brais to help manage the debts of the fishermen and obtain fairer prices

We learned that many fishermen on Chira Island are in debt to the middleman, Brais. Many times, the fishermen are unaware of the amount of money they are receiving from Brais for their fish. Therefore, they do not know how much money they owe him and suffer economically because of this method of business. MarViva should act as a mediator in the fishermen's negotiations with Brais. This will involve revealing the prices that Brais gives to the fishermen and the profit that he receives. If MarViva can work with Product C or another interested buyer in sustainable seafood products, they may be able to offer Brais a better price for the fish he sells, provided that the profits get passed on to the common fishermen.

5.3 The Value of our Socioeconomic Information

Through our study sponsored by MarViva, we have provided a socioeconomic analysis of the towns of Palito and Montero on Chira Island. This information gives MarViva and other NGOs a baseline for these communities and a means of comparison for future studies. Therefore, they can understand if their actions and projects are truly making a difference. Furthermore, the United States Peace Corps also plans to review the data gathered to assist with their socioeconomic project on Chira Island (Gallant, personal communication, 2012). Finally, people can now understand the current statuses of the communities of Palito and Montero and improvements that they can make to achieve a higher socioeconomic status in the future. We hope that our evaluation of the towns will serve as a catalyst for a stronger economy and for marine practices that will sustain generations to come.

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Appendix A: English Version of Survey and Interview Questions

Appendix A-1: Survey Questions

Socioeconomics of the Fishermen of Palito and Montero

We are students from Worcester Polytechnic Institute in the United States. We would like to invite you to participate in our survey that we have designed as part of our research project with MarViva. We are evaluating the socioeconomic impact of responsible fishing in Palito and Montero. We have compiled this survey in order to give us a better understanding of the fishermen. This survey is voluntary, you do not need to participate, and you can skip any question that you do not want to answer. The information given will be kept anonymous but will most likely be published through MarViva as well as in a report for our university.

Please ask any questions you may have about our study before we begin.

1. Who are the family members that live in your house?

Name_____	Gender____	Age_____

2. What is your education level? (asked to all participants)

Elementary School High School University

3. Have you had any training in?

Cooking Tourism Fish preparation INA or university _____

4. Are you involved in local politics? Other associations or organizations? What is your role in the association: president, member of executive board, or common member?

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Asociación de las Mujeres Artesanas Otra

5. How do you imagine the future of your children?

Stay in Chira (fishermen) Move outside of Chira (university)
Stay in Chira (professional)

6. What other economic activities does your family do?

Tourism Farming Businesses Construction Other_____

7. How much of your expenses are covered by the money you make from fishing?
 Less than half Half Majority All
8. Do you have any savings?
 Yes No
9. Do you own your own home?
 Own Rent Other _____
10. Do you have insurance?
 Health Boat House
11. How long have you been fishing?
 0-5 years 6-10 years 11-15 years 16-20 years 21-30 years
 31-50 years
12. Are you a member of ASOPECUPACHI/La Asociación Mixta de Montero?
 Yes No
13. If so, how many years have you been a member?
 Less than 5 years 6-10 years 11-15 years 16-20 years
14. Why are you a member or not a member of ASOPECUPACHI/ASOMM? What are the advantages or benefits of membership?
15. What type of fish do you sell?
 Queen corvina Black seabass Red snapper Catfish
 Oysters Other _____
16. Types of Fish:
- a. For Queen Corvina, what is the price you receive right now per kilogram?**
- First Class:**
 N/A 0-500 colones 501-1000 colones 1001-1500 colones
 1501-2000 colones 2001-2500 colones
- Second Class:**
 N/A 0-500 colones 501-1000 colones 1001-1500 colones
 1501-2000 colones 2001-2500 colones
- For Queen Corvina, what is the best price per kilogram that you have ever received?**
- First Class:**
 N/A 0-500 colones 501-1000 colones 1001-1500 colones
 1501-2000 colones 2001-2500 colones 2501-3000 colones

3001-4000 colones

Second Class:

N/A 0-500 colones 501-1000 colones 1001-1500 colones

1501-2000 colones 2001-2500 colones 2501-3000 colones

3001-4000 colones

b. For black sea bass, what is the price you receive right now per kilogram?

N/A 0-500 colones 501-1000 colones 1001-1500 colones

1501-2000 colones 2001-2500 colones

For black sea bass, what is the best price per kilogram that you have ever received?

N/A 0-500 colones 501-1000 colones 1001-1500 colones

1501-2000 colones 2001-2500 colones 2501-3000 colones

3001-4000 colones

c. For catfish, what is the price you receive right now per kilogram?

N/A 0-500 colones 501-1000 colones 1001-1500 colones

1501-2000 colones 2001-2500 colones

For catfish, what is the best price per kilogram that you have ever received?

N/A 0-500 colones 501-1000 colones 1001-1500 colones

1501-2000 colones 2001-2500 colones 2501-3000 colones

3001-4000 colones

d. For red snapper, what is the price you receive right now per kilogram?

N/A 0-500 colones 501-1000 colones 1001-1500 colones

1501-2000 colones 2001-2500 colones

For red snapper, what is the best price per kilogram that you have ever received?

N/A 0-500 colones 501-1000 colones 1001-1500 colones

1501-2000 colones 2001-2500 colones 2501-3000 colones

3001-4000 colones

e. For clams, what is the price you receive right now per kilogram?

N/A 0-500 colones 501-1000 colones 1001-1500 colones

1501-2000 colones 2001-2500 colones

For clams, what is the best price per kilogram that you have ever received?

N/A 0-500 colones 501-1000 colones 1001-1500 colones

1501-2000 colones 2001-2500 colones 2501-3000 colones

3001-4000 colones

f. For (other type of fish), what is your selling price per kilogram?

N/A 0-500 colones 501-1000 colones 1001-1500 colones

1501-2000 colones 2001-2500 colones

For (other type of fish), what is the best price per kilogram that you have received?

N/A 0-500 colones 501-1000 colones 1001-1500 colones

1501-2000 colones 2001-2500 colones 2501-3000 colones
3001-4000 colones

17. How many kilograms of fish do you catch weekly?

During the cuarto menguante week _____

During the rest of the month _____

18. What types of fishing methods do you use?

Line Rope Gill net Other _____

19. Where do you fish? Inside or outside of the AMPR?

20. Who do you sell your fish to?

Middleman Local Markets Restaurants Cruise

Other _____

21. What percentage of the fish you catch does your family consume each month?

Less than half Half Majority Total

22. Do you have any debts?

Yes No Amount (if given) _____

23. What are your expenses for fishing per month?

a. **Fuel cost:** 0-10,000 colones 10,001-25,000 colones
25,000-50,000 colones >50,000 colones

b. **Cost of Maintaining Equipment:** 0-10,000 colones
10,001-25,000 colones 25,000-50,000 colones >50,000 colones

c. **Boat upkeep:** 0-10,000 colones 10,001-25,000 colones
25,000-50,000 colones >50,000 colones

Observation Guide

1. Refrigerator _____

2. Television _____

3. Phone _____

4. Plumbing _____

5. Separate rooms _____

6. Car or bikes _____

7. Radio _____

8. Other appliances _____

9. Electricity _____

Appendix A-2: Data Sheet for Survey Questions

Family Information

Date:

Town	Family #	Member of family	Relationship	Age	Education	Organizations and roles	Other Activities

Family #	% of Expenses paid for from fishing salary	Savings	Ownership of House	Health insurance	Boat insurance	Home insurance	Refrigerator	Television	Phone	Plumbing

Separate Rooms	Transportation	Radio	Other Appliances	Electricity

Fishing Activities

Family #	Town	Years fishing	Member	Years	Type of fish caught	Price today	Best Price	Amount during half moon	Amount rest of month

Fishing methods	Where	Sell	% of fish consumed	Debts	Cost of Fuel	Cost of equipment maintenance	Cost of boat maintenance

Appendix A-3: Data Sheet for Open Ended Survey Questions of Fishermen

What sort of training have you had? What courses have you taken?

Are you involved in local politics? Other associations or organizations?

Why are you a member or not a member of ASOPECUPACHI/ASOMM?

Do you expect your children to be fishermen when they become adults?

Other notes:

Appendix A-4: Interview Questions for the Presidents of the Fishing Associations

1. How long have you been a resident in Palito/Montero?
2. How long have you been fishing on Chira Island? How long have you been president of your fishing association?
3. What is your role as president?
4. Do you believe that the AMPR is a positive or negative addition to your community? Why?
5. What are your feelings on the relationship between the associations of Palito and Montero?
6. How effective do you believe the fishing association has been in enforcing sustainable fishing?
7. How effective do you believe the fishing association has been in producing positive socioeconomic impacts?
8. How do you encourage fishermen to join the association?
9. Are there any improvements you would like to make to the association?
10. In five years, how do you expect the association to be functioning?

Appendix A-5: Interview Questions for Fishermen

We are studying the socioeconomic differences between fishermen who practice sustainable fishing and those who do not. These responses will remain confidential.

1. Do you believe that the AMPR was a positive addition to the community? Why or why not?
2. Have you seen improvements to the environment or quantity/quality of the fish since the introduction of the AMPR?
3. What have been the economic effects of responsible fishing?
4. Do you think that the fishing associations have helped to improve the socioeconomic statuses of their members? Have they helped the community in general?
5. Do you think that many of the children in your town will go to university? If they return to Chira, what sort of jobs will they have?
6. How do you think the socioeconomic condition of your town could be improved? Is fishing a sustainable industry? What industries should be developed?

Appendix A-6: Interview Questions for Hotel Owner

1. How long have you been living on Chira Island?
2. How long have you owned the hotel?
3. Why did you decide to open up the hotel?
4. Have you noticed an increase in the number of tourists visiting your hotel in the past few years?
5. Do you believe tourism could improve the economy of the island?
6. What other kinds of tourism could be done to draw more visitors to the island?

Appendix A-7: Survey Questions for Non-Fishermen

Socioeconomic Data from Families in Palito and Montero

We are students from Worcester Polytechnic Institute in the United States. We would like to invite you to participate in our survey that we have designed as part of our research project with MarViva. We are evaluating the socioeconomic impact of responsible fishing in Palito and Montero. We have compiled this survey in order to give us a better understanding of the community. This survey is voluntary, you do not need to participate and you can skip any question that you do not want to answer. The information given will be kept anonymous but will most likely be published through MarViva as well as in a report for our university.

Please ask any questions you may have about our study before we begin.

1. Who are the family members that live in your house?

Name_____	Gender___	Age_____

2. What is your education level? (asked to all participants)

Elementary School High School University

3. Have you had any training? What courses have you taken?

Cooking Tourism Fish preparation INA or university _____

4. Are you involved in local politics? Other associations or organizations? What is your role in the association: president, member of executive board, or common member?

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Municipalidad de Puntarenas Asociación de Deportiva

Asociación de las Mujeres Artesanas Otra

5. If so, how many years have you been a member?

0-5 years 6-10 years 11-15 years 16-20 years

6. Why are you a member of that association? What are the advantages or benefits of membership?

7. How do you imagine the future of your children?

Stay in Chira (fishermen) Move outside of Chira (university)

Stay in Chira (professional)

8. What economic activities does your family do?
 Tourism Farming Businesses Construction Other _____
9. How much of your expenses are covered by the money you make from (primary activity)
 Less than half Half Majority All
10. Do you have any savings?
 Yes No
11. Do you own your own home?
 Own Rent Other _____
12. Do you have insurance?
 Health Business House
13. Do you ever fish to feed your family? How often?
 Daily Once a week A few times a month Rarely
14. Do you have any debts?
 Yes No Amount (if given) _____
15. What are your expenses for your business per month?
16. How much income does your family get from (primary business) per month? Does it vary with season?
17. Do you think that many of the children in your town will go to university? If they return to Chira, what sort of jobs will they have?
18. How do you think the socioeconomic condition of your town could be improved? Is fishing a sustainable industry? What industries should be developed?

Observation Guide

19. Refrigerator _____
20. Television _____
21. Phone _____
22. Plumbing _____
23. Separate rooms _____
24. Car or bikes _____
25. Radio _____
26. Other appliances _____

27. Electricity _____

Appendix A-8: Data Sheet for Survey Questions for Non-Fishermen

Family Information

Date:

Town	Family #	Member of family	Relationship	Age	Education	Organizations and roles	Economic activities

Family #	% of Expenses Paid for by Primary Activity	Savings	Ownership of House	Health Insurance	Business Insurance	Home Insurance	How often do you fish?	Debts?

Business Expenses	Income	Refrigerator	Television	Phone	Plumbing	Separate Rooms	Transportation	Radio	Other Appliances	Electricity

Appendix A-9: Data Sheet of Open Ended Survey Questions of Non-Fishermen

Have you had any training? What courses have you taken?

Cooking Tourism Fish preparation INA or university _____

Are you involved in local politics? Other associations or organizations? What is your role in the association: president, member of junta directiva, or common member?

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Municipalidad de Puntarenas Asociación de Deportiva

Asociación de las Mujeres Artesanas Otra

If so, how many years have you been a member?

0-6 years 6-10 years 11-15 years 16-20 years

Why are you a member of that association? What are the advantages or benefits of membership?

How do you imagine the future of your children?

Stay in Chira (fishermen) Move outside of Chira (university)

Stay in Chira (professional)

Do you think that many of the children in your town will go to university? If they return to Chira, what sort of jobs will they have?

How do you think the socioeconomic condition of your town could be improved? Is fishing a sustainable industry? What industries should be developed?

Appendix A-10: Drawing Activity with Children of Palito and Montero

Name: _____

Date: _____

Town: _____

What do you want to be when
you grow up?

Appendix B: Spanish Translation of Survey and Interview Questions

Appendix B-1: Spanish Translation of Survey for Fishermen

Los Datos Socioeconómicos de Las Familias de Pescadores en Palito y Montero

Somos estudiantes de Worcester Polytechnic Institute en EE. UU. Nosotros le invitáramos a participar en un estudio que hemos diseñado como una parte de nuestro proyecto de investigación con MarViva. Estamos evaluando los impactos socioeconómicos de la pesca responsable y sostenible en Palito y Montero. Hemos recopilado este estudio para mejorar nuestro conocimiento de los pescadores. Es voluntario, no necesita participar y puede saltar cualquier pregunta que no quiere contestar. La información va a quedar anónima pero es muy posible que vaya a ser publicado a través de MarViva y en un informe para nuestra universidad de Worcester Polytechnic Institute.

Por favor, pide cualquieras preguntas que tiene sobre nuestro estudio antes de comenzar.

1. ¿Quiénes son los miembros de la familia que viven en su hogar?

Nombre _____	Sexo _____	Edad _____
Nombre _____	Sexo _____	Edad _____
Nombre _____	Sexo _____	Edad _____
Nombre _____	Sexo _____	Edad _____
Nombre _____	Sexo _____	Edad _____
Nombre _____	Sexo _____	Edad _____

2. ¿Cuál es su nivel de educación? (para todo los participantes)

Primaria Secundaria Universidad

3. ¿Qué tipo de capacitaciones ha recibido? ¿Qué cursos ha tomado?

Cocina Turismo Preparación de pescado INA o universidad

4. ¿Está involucrado en las políticas locales? ¿Otras asociaciones o organizaciones?

¿Qué es su papel en la asociación: presidente, miembro de junta directiva, o asociado?

Asociación de Desarrollo Asociación de Pescadores Junta de Educación

Municipalidad de Puntarenas Asociación de Deportiva

Asociación de las Mujeres Artesanas Otra

5. ¿Cómo imagina el futuro de sus hijos?

En Chira, pescador Fuera de Chira, universidad

En Chira, profesional

6. ¿Qué otras actividades económicas hace su familia?

Turismo Agricultura Negocios Construcción Otra _____

7. ¿Cuántos de los gastos familiares se cubren de la pesca?
 Menos de la mitad La mitad La mayoría Todo
8. ¿Tiene algunos ahorros?
 Sí No
9. ¿Posee su propia casa?
 Dueño Aquila Otro _____
10. ¿Tiene seguro?
 De la salud Del bote De la casa
11. ¿Cuánto tiempo lleva pescando?
 0-5 años 6-10 años 11-15 años 16-20 años 21-30 años
 31-50 años
12. ¿Es un miembro de ASOPECUPACHI/ La Asociación Mixta de Montero?
 Sí No
13. Si es un miembro, por cuantos años ha sido un miembro?
 0-5 años 6-10 años 11-15 años 16-20 años
14. ¿Por qué es o no es un miembro de ASOPECUPACHI/ ASOMM? ¿Qué ventajas o beneficios?
15. ¿Qué tipos de marisco vende?
 Corvina Reina Róbalo Negro Pargo rojo Bagre
 Almejas Otro _____
16. Tipos de Marisco:
- a. ¿Para la corvina reina, cuál es el precio que recibe hoy por kilo?**
- Para la clase primera:**
 N/A 0-500 colones 501-1000 colones 1001-1500 colones
 1501-2000 colones 2001-2500 colones
- Para la clase segunda:**
 N/A 0-500 colones 501-1000 colones 1001-1500 colones
 1501-2000 colones 2001-2500 colones
- ¿Para la corvina reina, cuál es el precio mejor que recibe por kilo?**
- Para la clase primera:**
 N/A 0-500 colones 501-1000 colones 1001-1500 colones
 1501-2000 colones 2001-2500 colones 2501-3000 3001-3500
 3501-4000
- Para la clase segunda:**
 N/A 0-500 colones 501-1000 colones 1001-1500 colones
 1501-2000 colones 2001-2500 colones 2501-3000 colones

3001-4000 colones

b. ¿Para el róbalo negro, cuál es el precio que recibe hoy por kilo?

N/A 0-500 colones 501-1000 colones 1001-1500 colones
1501-2000 colones 2001-2500 colones 2501-3000 colones
3001-4000 colones

¿Para el róbalo negro, cuál es el precio mejor que recibe por kilo?

N/A 0-500 colones 501-1000 colones 1001-1500 colones
1501-2000 colones 2001-2500 colones 2501-3000 colones
3001-4000 colones

c. ¿Para el bagre, cuál es el precio que recibe hoy por kilo?

N/A 0-500 colones 501-1000 colones 1001-1500 colones
1501-2000 colones 2001-2500 colones

¿Para el bagre, cuál es el precio mejor que recibe por kilo?

N/A 0-500 colones 501-1000 colones 1001-1500 colones
1501-2000 colones 2001-2500 colones 2501-3000 colones
3001-4000 colones

d. ¿Para el pargo rojo, cuál es el precio que recibe hoy por kilo?

N/A 0-500 colones 501-1000 colones 1001-1500 colones
1501-2000 colones 2001-2500 colones

¿Para el pargo rojo, cuál es el precio mejor que recibe por kilo?

N/A 0-500 colones 501-1000 colones 1001-1500 colones
1501-2000 colones 2001-2500 colones 2501-3000 colones
3001-4000 colones

e. ¿Para las almejas, cuál es el precio que recibe hoy por kilo?

N/A 0-500 colones 501-1000 colones 1001-1500 colones
1501-2000 colones 2001-2500 colones

¿Para las almejas, cuál es el precio mejor que recibe por kilo?

N/A 0-500 colones 501-1000 colones 1001-1500 colones
1501-2000 colones 2001-2500 colones 2501-3000 colones
3001-4000 colones

f. ¿Para otros tipos de pesca, cuál es el precio que recibe hoy por kilo?

N/A 0-500 colones 501-1000 colones 1001-1500 colones
1501-2000 colones 2001-2500 colones

¿Para otros tipos de pesca, cuál es el precio mejor que recibe por kilo?

N/A 0-500 colones 501-1000 colones 1001-1500 colones
1501-200 colones 2001-2500 colones 2501-3000 colones
3001-4000 colones

17. ¿Cuántos kilos pesca por semana?

Durante la semana del cuarto menguante _____

- Durante el resto del mes _____
18. ¿Qué artes de pesca usa?
Línea Cuerda Trasmallo Manual Otro _____
19. ¿Adónde pesca? Adentro de la Área Marina de Pesca Responsable o fuera de la Área Marina de Pesca Responsable?
20. ¿A quién vende su pesca?
Los intermediarios Los mercados locales Los restaurantes
El crucero Otro _____
21. ¿Qué porcentaje de lo que pesca es para consumo familiar?
Menos de la mitad La mitad La mayoría Todo
22. ¿Tiene deudas?
Sí No La Cantidad (Si nos da) _____
23. ¿Cuáles son sus gastos relacionado a la pesca por mes?
- a. **Costo de gasolina:** 0-10,000 colones 10,001-25,000 colones
25,000-50,000 colones >50,000 colones
- b. **Costo del mantenimiento del equipo:** 0-10,000 colones
10,001-25,000 colones 25,000-50,000 colones >50,000 colones
- c. **Mantenimiento del Bote:** 0-10,000 colones 10,001-25,000 colones
25,000-50,000 colones >50,000 colones

Appendix B-2: Spanish Translation for Data Sheet for Survey Questions

Información de Familia

Fecha:

Pueblo	Familia #	Miembro de la familia	Relación	Edad	Educación	Organizaciones y Papeles	Otras actividades económicas

Familia #	% de gastos se cubren de pesca	Ahorros	Propiedad de casa	Seguro de salud	Seguro de bote	Seguro de casa	Refrigerador	Televisión	Teléfono

Plomería	Salas separadas	Coche o bicicletas	Radio	Otros aparatos	Electricidad

Actividades de Pesca

Familia #	Pueblo	Tiempo Pescando	Miembro	Años	Tipos de mariscos	Precio por kilo hoy	Precio por kilo mejor	Kilos durante cuarto menguante	Kilos el resto del mes

Adonde pesca	A quién vende su pesca	% de pesca consumido	Deudas	Costo de gasolina	Costo de mantenimiento del equipo	Mantenimiento del bote

Appendix B-3: Spanish Translation for Data Sheet for Open Ended Survey Questions

Información Adicional para las Preguntas del estudio:

¿Qué tipo de capacitaciones ha recibido? ¿Qué cursos ha tomado?

Cocina Turismo Preparación de pescado INA o universidad _____

¿Está involucrado en las políticas locales? ¿Otras asociaciones o organizaciones? ¿Qué es su papel en la asociación: presidente, miembro de junta directiva, o asociado?

Asociación de Desarrollo Asociación de Pescadores Junta de Educación

Municipalidad de Puntarenas Asociación de Deportiva Asociación de las Mujeres

Artesanas Otra

¿Cómo imagina el futuro de sus hijos?

En Chira, pescador Fuera de Chira, universidad

En Chira, profesional

¿Por qué es o no es un miembro de ASOPECUPACHI/ ASOMM? ¿Qué ventajas o beneficios?

Apuntes Adicionales:

Appendix B-4: Spanish Translation of Interview Questions for the Presidents of the Fishing Associations

Entrevista para los Presidentes de las Asociaciones de Pescadores

1. ¿Cuánto tiempo lleva viviendo en Palito/Montero?
2. ¿Cuánto tiempo lleva pescando en Chira Island? ¿Cuándo se convirtió en el/la presidente(a)?
3. ¿Qué papel desempeña usted como el/la presidente(a)?
4. ¿Cree que el programa de AMPR sea una adición positiva o negativa a su comunidad? ¿Por qué?
5. ¿Qué piensa de la relación entre las asociaciones de Palito y Montero?
6. ¿Cree que la asociación haya sido efectiva en la promoción de pesca responsable y sostenible?
7. ¿Cree que la asociación haya sido efectiva en la producción de impactos positivos socioeconómicos?
8. ¿Cómo alienta a los pescadores a participar en la asociación?
9. ¿Hay algunas mejoras que quiera hacer en la asociación?
10. ¿En cinco años, cómo espera la función de la asociación sería?

Appendix B-5: Spanish Translation of Interview Questions for the Fishermen

Las Entrevistas para los Pescadores (Miembros y No Miembros)

Sus respuestas van a quedar confidenciales.

¿Cree que el programa de AMPR sea una adición positiva o negativa a su comunidad? ¿Por qué?

¿Después de la instalación del AMPR, ha visto mejoras en el medio ambiente y en la calidad y cantidad de la pesca?

¿Cuáles son los efectos económicos de la pesca responsable?

¿Cree que las asociaciones de pescadores hayan ayudado los estados socioeconómicos de sus miembros? ¿Hayan ayudado los comunidades en general?

¿Piensa que la mayoría de los niños en su pueblo vayan a la universidad? ¿Si ellos regresaran a Chira después de la universidad, qué tipos de trabajos tendrían?

¿Cómo se puede mejorar la condición socioeconómica de su pueblo? ¿Es la pesca una industria sostenible? ¿Cuáles otras industrias deben ser desarrolladas?

Appendix B-6: Spanish Translation of Interview Questions for Hotel Owner

1. ¿Cuánto tiempo lleva viviendo en Chira Island?
2. ¿Cuánto tiempo lleva siendo la dueña del hotel?
3. ¿Por qué decidió crear el hotel?
4. ¿Ha notado un aumento en el número de turistas que está visitando su hotel en los años pasados?
5. ¿Cree que la economía de la Isla puede ser mejorado por el turismo?
6. ¿Qué otros tipos de turismo puede ser hecho para atraer más turistas a la isla?

Appendix B-7: Spanish Translation of Survey Questions for Non-Fishermen

Los Datos Socioeconómicos de Las Familias en Palito y Montero

Somos estudiantes de Worcester Polytechnic Institute en EE. UU. Nosotros le invitáramos a participar en un estudio que hemos diseñado como una parte de nuestro proyecto de investigación con MarViva. Estamos evaluando los impactos socioeconómicos de la pesca responsable y sostenible en Palito y Montero. Hemos recompilado este estudio para mejorar nuestro conocimiento de la comunidad. Es voluntario, no necesita participar y puede saltar cualquier pregunta que no quiere contestar. La información va a quedar anónima pero es muy posible que vaya a ser publicado a través de MarViva y en un informe para nuestra universidad de Worcester Polytechnic Institute.

Por favor, pide cualquieras preguntas que tiene sobre nuestro estudio antes de comenzar.

1. ¿Quiénes son los miembros de la familia que viven en su hogar?

Nombre _____	Sexo _____	Edad _____
Nombre _____	Sexo _____	Edad _____
Nombre _____	Sexo _____	Edad _____
Nombre _____	Sexo _____	Edad _____
Nombre _____	Sexo _____	Edad _____
Nombre _____	Sexo _____	Edad _____

2. ¿Cuál es su nivel de educación? (para todo los participantes)

Primaria Secundaria Universidad

3. ¿Qué tipo de capacitaciones ha recibido? ¿Qué cursos ha tomado?

Cocina Turismo Preparación de pescado INA o universidad

4. ¿Está involucrado en las políticas locales? ¿Otras asociaciones o organizaciones? ¿Qué es su papel en la asociación: presidente, miembro de junta directiva, o asociado?

Asociación de Desarrollo Asociación de Pescadores Junta de Educación
Municipalidad de Puntarenas Asociación de Deportiva
Asociación de las Mujeres Artesanas Otra

5. Si es un miembro de una organización o asociación, por cuantos años ha sido un miembro?

0-5 años 6-10 años 11-15 años 16-20 años

6. ¿Por qué es o no es un miembro de una organización o asociación? ¿Qué ventajas o beneficios?

7. ¿Cómo imagina el futuro de sus hijos?

En Chira, pescador

Fuera de Chira, universidad

En Chira, profesional

8. ¿Qué actividades económicas hace su familia?

Turismo Agricultura Negocios Construcción Otra _____

9. ¿Cuántos de los gastos familiares se cubren del dinero que gana desde su actividad económica primaria?

Menos de la mitad La mitad La mayoría Todo

10. ¿Tiene algunos ahorros?

Sí No

11. ¿Posee su propia casa?

Dueño Aquila Otro _____

12. ¿Tiene seguro?

De la salud De su negocio De la casa

13. ¿Ha pescado para alimentar a su familia? ¿Con qué frecuencia?

Diario Una vez por semana Algunas veces por mes Raras veces

14. ¿Tiene deudas?

Sí No La Cantidad (Si nos da) _____

15. ¿Cuáles son sus gastos relacionado a su negocio por mes?

16. ¿Cuáles son sus ingresos que gana de su negocio primario por mes? ¿Varia con las estaciones?

17. ¿Piensa que la mayoría de los niños en su pueblos vayan a la universidad? ¿Si ellos regresaran a Chira después de la universidad, qué tipos de trabajos tendrían?

18. ¿Cómo se puede mejorar la condición socioeconómica de su pueblo? ¿Es la pesca una industria sostenible? ¿Cuáles otras industrias deben ser desarrolladas?

Appendix B-8: Spanish Translation of Data Sheet for Survey Questions of Non-Fishermen

Información de Familia

Fecha:

Pueblo	Familia #	Miembro de la familia	Relación	Edad	Educación	Organizaciones y Papeles	Actividades económicas

Familia #	% de gastos se cubren de la actividad primaria	Ahorros	Propiedad de casa	Seguro de salud	Seguro de negocio	Seguro de casa	Frecuencia de pesca	Deudas?

Gastos de Negocio	Ingresos	Refrigerador	Televisión	Teléfono	Plomería	Salas separadas	Coche o bicicletas	Radio	Otros aparatos	Electricidad

Appendix B-9: Spanish Translation of Data Sheet for Open Ended Survey Questions of Non-Fishermen

Información Adicional para las Preguntas del Estudio:

¿Qué tipo de capacitaciones ha recibido? ¿Qué cursos ha tomado?

Cocina Turismo Preparación de pescado INA o universidad _____

¿Está involucrado en las políticas locales? ¿Otras asociaciones o organizaciones? ¿Qué es su papel en la asociación: presidente, miembro de junta directiva, o asociado?

Asociación de Desarrollo Asociación de Pescadores Junta de Educación

Municipalidad de Puntarenas Asociación de Deportiva

Asociación de las Mujeres Artesanas Otra

Si es un miembro de una organización o asociación, por cuantos años ha sido un miembro?

0-5 años 6-10 años 11-15 años 16-20 años

¿Por qué es o no es un miembro de una organización o asociación? ¿Qué ventajas o beneficios?

¿Cómo imagina el futuro de sus hijos?

En Chira, pescador Fuera de Chira, universidad

En Chira, profesional

¿Piensa que la mayoría de los niños en su pueblos vayan a la universidad? ¿Si ellos regresaran a Chira después de la universidad, qué tipos de trabajos tendrían?

¿Cómo se puede mejorar la condición socioeconómica de su pueblo? ¿Es la pesca una industria sostenible? ¿Cuáles otras industrias deben ser desarrolladas?

Appendix B-10: Spanish Translation of Drawing Activity with Children of Palito and Montero

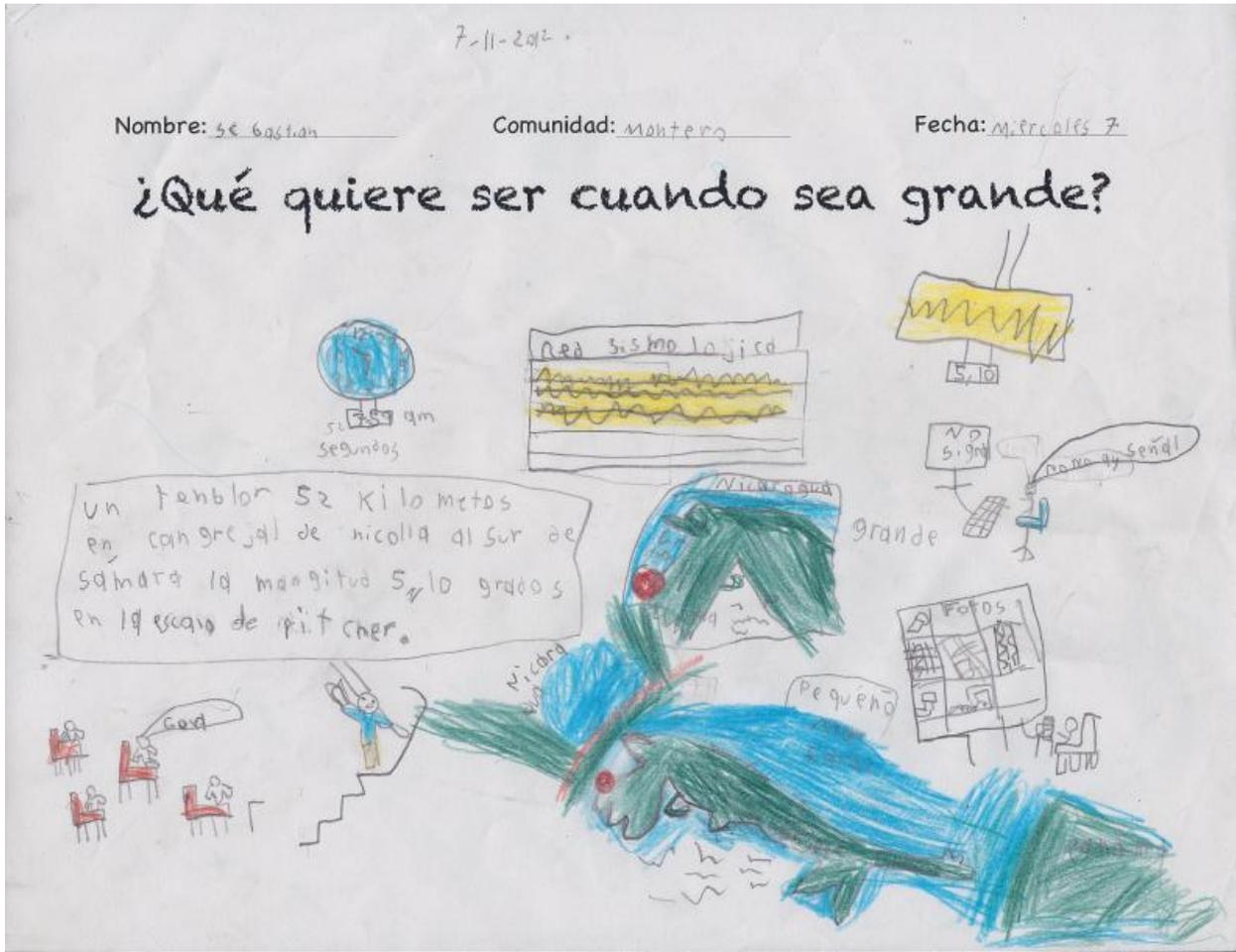
Nombre: _____

Pueblo: _____

Fecha: _____

¿Qué quiere ser cuando sea
grande?

Appendix C: Sample Drawings from Activity with Local Children

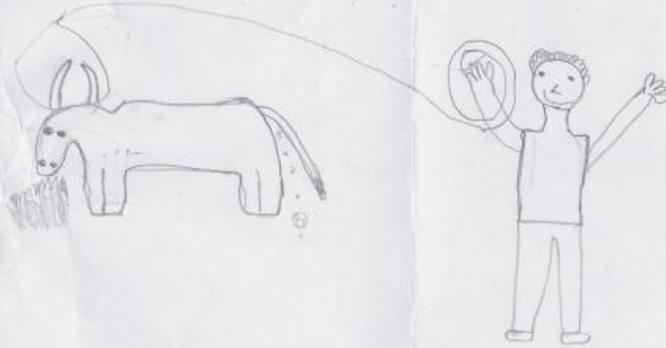


Nombre: Néstor

Comunidad: Palito

Fecha: 7/11/2012

¿Qué quiere ser cuando sea grande?

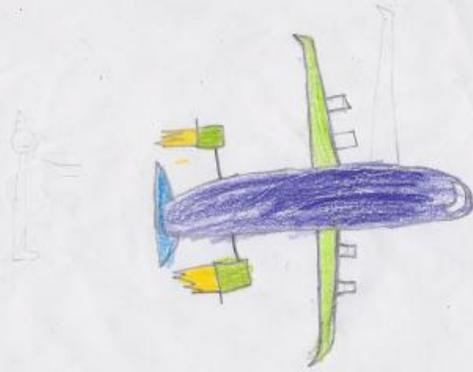


Nombre: Dario

Comunidad: San Antonio

Fecha: 7/11/2012

¿Qué quiere ser cuando sea grande?



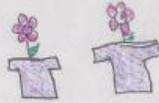
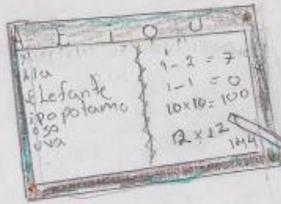
Piloto de Avion

Nombre: Hazel Garcia Cruz

Comunidad: Palito

Fecha: 7-11-2012

¿Qué quiere ser cuando sea grande?

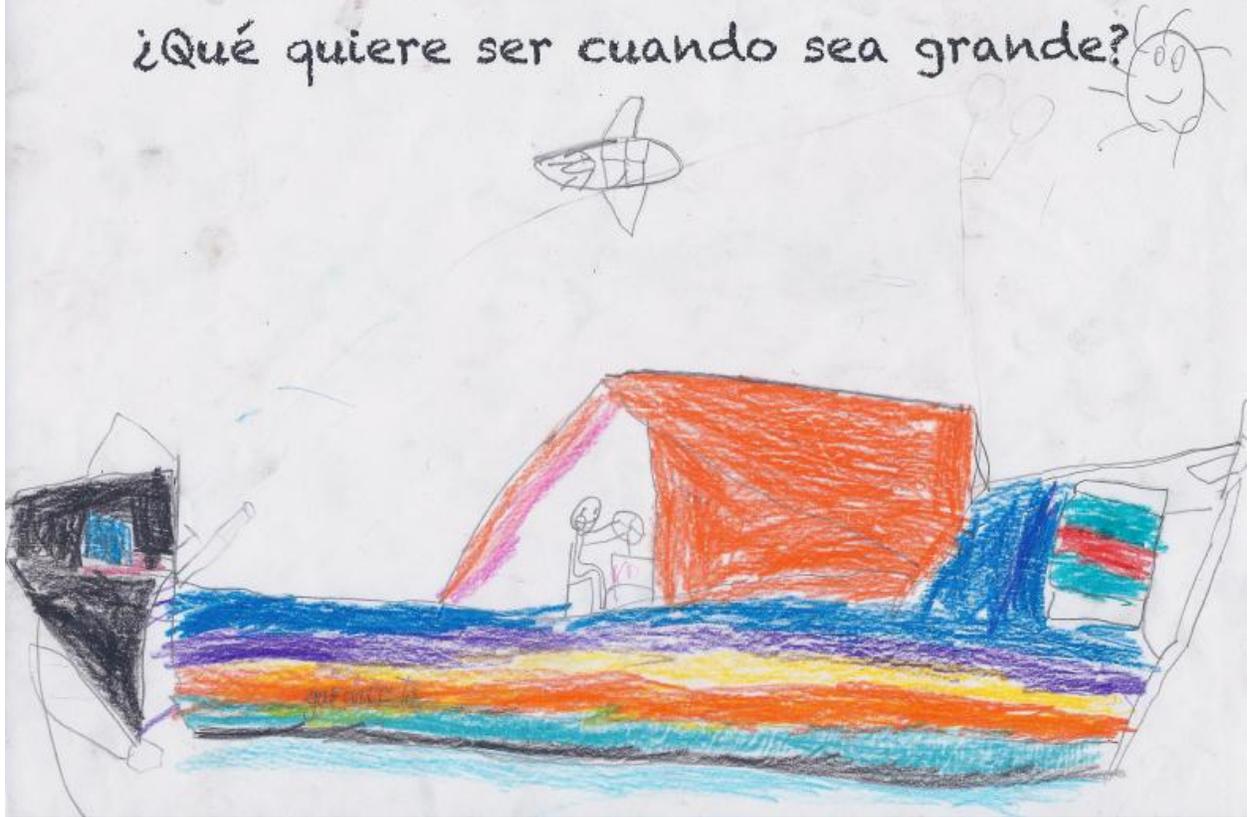


Nombre: Deiver

Comunidad: Mahero

Fecha: 7/11/2012

¿Qué quiere ser cuando sea grande?



Nombre: Jamer

Comunidad: Palito

Fecha: 7-11-2012

¿Qué quiere ser cuando sea grande?



En vea y no respeta la ley de la vea.

Nombre: Krista Itza O.C.

Comunidad: Palito

Fecha: 7-11-2012

¿Qué quiere ser cuando sea grande?



Nombre: Nayerith

Comunidad: Polito

Fecha: 7-11-2012

¿Qué quiere ser cuando sea grande?

en fermera



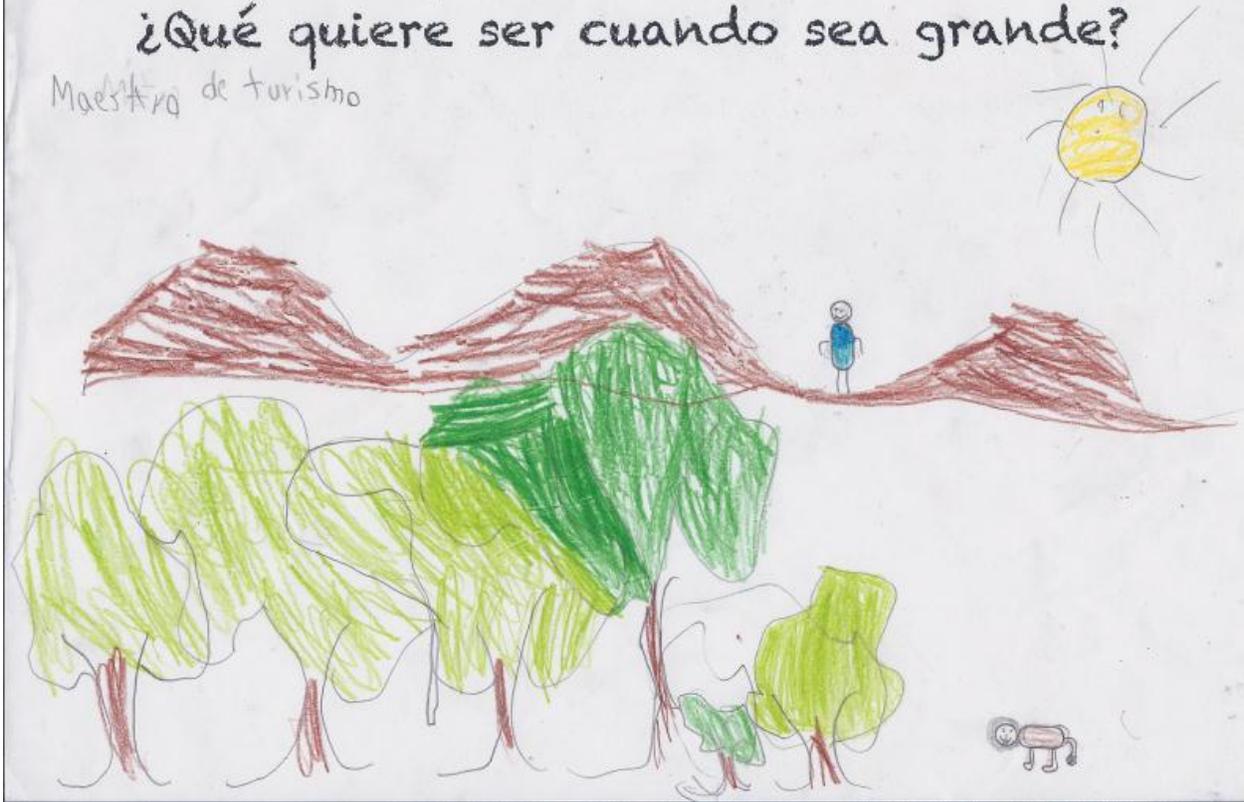
Nombre: Jeremías 012.

Comunidad: Palito

Fecha: 7/11/2012.

¿Qué quiere ser cuando sea grande?

Maestro de turismo



Appendix D: Raw Data Sheets

The raw data collected over the course of this study can be seen in three additional files containing Excel spreadsheets. One file includes the information gathered from the surveys with the fishermen of Palito. The second contains the data collected from the fishermen of Montero and finally, the third file reports the data from the surveys of non-fishermen in both Palito and Montero.