

FROM SOCIAL INVENTORY TO MANAGEMENT PLAN: LOCAL PERSPECTIVES ON THE PABLO ARTURO BARRIOS WILDLIFE REFUGE



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Thank you notes should be sent to Victor Vera, Irving Vergara, Ruth Metzler, Guillermo Duran, Charli Batista, Ana Lorena Lopez, Marisol Dimas and Ricardo Barrios.

Products for host institutions include a copy of this report in Spanish, a list of recommendations, a spreadsheet of our raw interview data, a sign for the refuge, a presentation of results to the community, and the Earth Day celebration of the Pablo Arturo Barrios Wildlife Refuge.

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NUMBER OF WORKING DAYS

Date	Hours of Work in Panama City	Hours of Fieldwork in Pedasi	Equivalent Days of Work in Panama	Equivalent Days of Fieldwork in Pedasi
January	16	10	2.0	1.3
February	4	37.5	0.5	4.7
March	28	25	3.5	3.1
April	43	66	5.4	8.3
Totals	91	138.5	11.4	17.3
Total Days (per person)				28.7
Total Days (x3 for group)				86.1

*Note that a day of work is equivalent to 8 hours of work.

EXECUTIVE SUMMARY

Although the Pablo Arturo Barrios Wildlife Refuge in Panama's province of Los Santos has existed at a municipal level since 1992, it was only in 2009 that it was listed under the National System of Protected Areas (SINAP) administered by the National Environmental Authority (ANAM). A management plan for the refuge has not yet been created. The Ecotourism Cooperative of Pedasi is proposing to implement a co-management plan with ANAM for the sustainable development of the refuge and is aiming to gather all of the necessary background information to create a management plan over the next two years. This process has been divided into 3 parts: presenting the necessity of a management plan to local authorities, interviewing fishermen and locals on the importance of a management plan for the refuge and soliciting help from universities and scientific authorities to create an inventory of the flora and fauna present within the refuge. As requested by the Cooperative, our project has addressed the second step of this process.

This report outlines the social inventory completed for the Pablo Arturo Barrios Wildlife Refuge. This was done by completing interviews with various interest groups, namely fishermen and local community members. The goals of these interviews included communicating the existence of the refuge, evaluating general knowledge and opinions, and identifying human impacts within this area. In addition, we aimed to identify the most important challenges regarding its conservation and people's interest and willingness to contribute to its protection. Specific questions were also asked regarding the conservation of sea turtles, which goes in line with the Cooperative's future goal of establishing a turtle sanctuary. Once this information was compiled to determine general trends, we formulated recommendations for the future management of the refuge.

We conducted 60 interviews to collect primary data from two interest groups: 30 local fishermen and 30 members of the local community. Our semi-structured interviews consisted of a combination of closed, open-ended and categorical questions to gather both quantitative and qualitative data. Interviews were held in an informal manner to allow respondents to elaborate on any given topic he/she felt more strongly about. Most interviews were conducted in Pedasi, although we did undertake a number of interviews in the areas of Purio, Mariabe and Punta El Tigre to increase the representativeness of our sample.

Results show that 70% of general respondents and 60% of fishermen interviewed had heard of the Pablo Arturo Barrios Wildlife Refuge, although their level of knowledge varied from only having heard the name to knowing its purpose is to protect fauna and flora. According to respondents, the main problems within the refuge include deforestation, pollution

and turtle egg harvesting. Turtle egg harvesting was later confirmed to be a common practice in the area by the majority of respondents, and is done both for commercial and consumption purposes. Turtles were thought to be affected by coastal development, namely through increased activity on the beaches, increased pollution, fishing equipment, such as nets and long lines, and toxic substances thrown in the water. Establishing a turtle sanctuary and having educational campaigns explaining the importance of sea turtles were thought to be the best way to protect sea turtles in the area. Playa El Bajadero, Playa El Toro, Playa Lagarto and Playa Rinconcito were the top four potential locations chosen for the establishment of a turtle sanctuary.

Only 30% of general interviewees and 39% of fishermen had heard of ANAM holding regular meetings relating to the conservation and management of protected areas in the past. Reasons given as to why locals do not attend these types of meetings included but were not limited to the lack of knowledge of these meetings occurring, lack of interest in conservation, lack of time and ANAM's loss of credibility. The most popular ways in which community members and fishermen would like to be involved in the conservation of the refuge is through reforestation projects, a turtle sanctuary project, educational campaigns, developing ecotourism and helping with signage.

The true challenge to address is how to properly protect an area when you have weak institutions. A potential solution to address this is community-based management. In the case of Pedasi, the proper establishment of ecotourism and the protection of sea turtles will be key to its future development. A discussion of these topics along with relevant references has been included and can be consulted by the community when pursuing the next steps of the management of the refuge. We have formulated 9 tangible recommendations that are meant to guide short-term action in the community.

RESUMEN EJECUTIVO

Aunque el Refugio de Vida Silvestre Pablo Arturo Barrios en la provincia de Los Santos en Panamá ha existido al nivel municipal desde 1992, fue solamente desde 2009 que hace parte del Sistema Nacional de Áreas Protegidas (SINAP) administrado por la Autoridad Nacional del Ambiente (ANAM). Un plan de manejo para el refugio todavía no ha hecho creado. La Cooperativa de Ecoturismo de Pedasí propone de implementar un plan de co-manejo para el refugio con la ANAM y tiene como objetivo de recopilar toda la información básica necesaria para crear ese plan de gestión en los próximos dos años. Este proceso se ha dividido en 3 partes: presentación de la necesidad de un plan de manejo a las autoridades locales, entrevistar a los pescadores y miembros de la comunidad sobre la importancia de un plan de manejo para el refugio y solicitar la ayuda de las universidades y las autoridades científicas para crear un inventario de la flora y la fauna para el refugio. Nuestro proyecto entra en la segunda etapa de este proceso.

Este informe describe el inventario social completado para el Refugio de Vida Silvestre Pablo Arturo Barrios. Esto se hizo entrevistando dos grupos de interés: los pescadores locales y otros miembros de la comunidad local. Los objetivos de estas entrevistas incluyen la comunicación de la existencia del refugio, la evaluación de los conocimientos generales y opiniones, y la identificación de los impactos humanos en este área. Además, tuvo como objetivo identificar los desafíos más importantes con respecto a su conservación, el interés de la gente y la voluntad de contribuir a la preservación. También, teníamos preguntas específicas acerca de la conservación de las tortugas marinas que va en línea con el objetivo futuro de la Cooperativa de establecer un vivero de tortugas. Una vez que esta información ha sido recopilada para determinar las tendencias generales, se formularon recomendaciones para la gestión futura del refugio.

Hemos llevado a cabo 60 entrevistas para recopilar los datos primarios a partir de dos grupos de interés: 30 pescadores locales y 30 miembros de la comunidad local. Nuestras entrevistas semi-estructuradas consistieron en una combinación de preguntas cerradas, abiertas y categóricas para obtener datos cuantitativos y cualitativos. Las entrevistas se llevaron a cabo de manera informal para permitir que los encuestados puedan elaborar sobre cualquier tema. La mayoría de las entrevistas se realizaron en Pedasí aunque una seria se realizó en la costa en las áreas de Purió, Mariabé y Punta el Tigre para aumentar la representividad de la muestra.

Resultados muestran que 70% de los entrevistados de la encuesta general y 60% de los pescadores entrevistados habían escuchado del Refugio de Vida Silvestre Pablo Arturo Barrios, aunque sus niveles de conocimiento variaban entre solo haber escuchado el nombre y saber que protege a la flora y fauna del área. Desde los demandados, los problemas más importantes dentro del refugio incluyen la deforestación, la contaminación por basura y la cosecha de huevos de tortugas. La mayoría de los entrevistados han confirmado que la cosecha de huevos de tortugas es un fenómeno común en el área y que se hace por dos motivos, el consumo propio y el uso comercial. Las tortugas están afectadas por el desarrollo costero por la aumentación de actividad en las playas del refugio, la contaminación, palangres de los pescadores y sustancia tóxicas tiradas en el mar. Las mejores maneras de proteger las tortugas son de establecer un vivero de conservación de tortugas y hacer campañas educativas en las escuelas para explicar la importancia de las tortugas. Playa El Bajadero, Playa El Toro, Playa Lagarto y Playa Rinconcito son las cuatro playas más mencionadas como el mejor lugar para ubicar un vivero de tortugas.

Solo 30% de los demandados generales y 39% de los pescadores entrevistados se habían enterados de reuniones del ANAM sobre la conservación en el pasado. Las razones que no van a esas charlas incluyen una falta de conocimiento de las charlas, una falta de interés en el tema de conservación, una falta de tiempo y el hecho que ANAM ha perdido mucho de su credibilidad. La gente quiere ayudar con proyectos de reforestación, un vivero de tortugas, un proyecto de ecoturismo, campañas educativas con los niños y mejor señalización dentro del refugio.

El desafío real es como proteger un área cuando las instituciones de un país son pocas sólidas. Una solución potencial para enfrentar a este problema puede ser un sistema de gestión basada en la comunidad. En el caso de Pedasí, el buen establecimiento del ecoturismo y la protección de tortugas marinas van a estar crucial en su desarrollo futuro. Estos temas son tratados dentro del informe con referencias relevantes que pueden ser consultadas por la comunidad cuando siguen los próximos pasos para el manejo del refugio. Hemos formulado 9 recomendaciones tangibles para guiar acciones a corto plazo a dentro de la comunidad.

1.0 HOST ORGANIZATIONS

Ecotourism Cooperative of Pedasi

Irving Vergara and Victor Vera, who are both members of the Eco-tourism Cooperative of Pedasi, were our main supervisors. The Cooperative was formed in 1996 and is located in Pedasi, Los Santos, Panama. It is composed of 32 members of the community of which 25 are active, such as cattle ranchers, heads of households, young people and students that come together to work towards creating ecological tourism opportunities. They have undertaken various projects in the past several years. For example, they manage a restaurant on Playa Bajadero where they sell traditional Panamanian food to both tourists and locals. They are also developing a reforestation project and experimental garden in the sand dunes on the same beach. They initiated the installation of lights and water access on Playa Bajadero. They have proposed to create an agreement with the National Environmental Authority (ANAM) for the co-management of the Pablo A. Barrios Wildlife Refuge and hope to create a co-management plan for this refuge over the next 2 years. They are also working towards receiving funding to create a turtle sanctuary located on the cooperative's plot of land in Playa Arenal. For them, ecotourism involves care for the environment.

Azuero Earth Project

The Azuero Earth Project, which opened its office, Casa Pasa, in May of 2010, offered logistical support and recommendations throughout our research, all the while welcoming us to the Pedasi community. They are working in the Azuero Peninsula with the broader goal of protecting its sensitive biodiversity through education, restoration and preservation. By

engaging local community members, visiting scientists, and both local and foreign students, they aim to help people make informed decisions, take sustainable actions and share knowledge. Some of their more specific projects include identifying and classifying forest fragments for preservation across the Azuero, exploring and implementing new ideas in eco-agriculture and eco-tourism and serving as the center for environmental information on the Azuero (Azuero Earth Project 2012).

Autoridad Nacional del Ambiente

The National Environment Authority (Autoridad Nacional del Ambiente - ANAM) has been the governmental agency responsible for the management, legislation and politics of natural resources and environmental issues in Panama since 1998. Their office in Los Santos is responsible for the general management of protected areas in the region but a smaller one also exists in Pedasi that is particularly attentive to the Isla Iguana Wildlife Refuge. Both the Isla Iguana and Pablo A. Barrios Wildlife Refuges are registered under the National System of Protected Areas (Sistema Nacional de Areas Protegidas - SINAP) (ANAM 2012).

2.0 BACKGROUND AND INTRODUCTION

General Context

Coastlines worldwide, along with their nearby surroundings, are inhabited by over 60% of the human population. In addition, it is in these same coastal areas that 80% of tourism is concentrated (IUCN Factsheet 2010). People continue to move into these areas and coastlines in even some of the more remote areas that are facing changes associated with coastal development. Evidence of this has been seen in recent years on the eastern coast of the Azuero

Peninsula in Panama where there has been a large increase in tourist activity and development, particularly in the coastal areas surrounding what used to be a simple fishing town: Pedasi. This increase has occurred in a disorderly fashion resulting in serious impacts on the unique natural environment of the peninsula.

Protected Areas and IUCN Categories

Understanding the concept of a protected area is vital in order to comprehend the issue we will be addressing with regards to the Pablo Arturo Barrios Wildlife Refuge (PAB). Though essential for biodiversity conservation, protected areas are also very important for meeting other objectives concerning recreation, education and the investigation of natural and cultural resources. They provide space where natural ecosystems can continue to function and survival of species, as well as ecological processes, can be maintained (Dudley 2008). This is extremely important in a time where landscapes are continuously being destroyed and fragmented. As defined by the International Union for the Conservation of Nature (IUCN) a protected area is:

An area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means (Dudley 2008).

A protected area can refer to land such as national parks, nature reserves, wildlife management areas, wilderness areas and community conserved areas. Each of these corresponds to a slightly different management system. Furthermore, these sites are usually protected areas initially established in each country under its own country's terms, conditions and management systems (Dudley 2008). The IUCN has since created categories for protected areas that can be applicable and comparable on a global scale, namely between countries.

This Protected Areas Categories System consists of the following categories: Ia Strict Nature Reserve, Ib Wilderness Area, II National Park, III Natural Monument or Feature, IV Habitat/Species Management Area, V Protected Landscape/ Seascape and VI Protected area with sustainable use of natural resource (Dudley 2008). This has been instrumental in the development and management of many protected areas, but there are still many designated protected areas within a given country, which do not fall under any of these more global categories.

Protected areas around the world are continuously being established. In 2011, there were 130,709 nationally protected areas and 27,188 internationally protected areas (IUCN and UNEP-WCMC 2012). The total extent of these terrestrial and marine protected areas is increasing, and has now reached over 2.4 billion hectares, an area larger than the size of South America (IUCN and UNEP-WCMC 2012; Dudley 2008). In other words, one tenth of the earth's land surface is part of a protected area (Dudley 2008). In Panama there are approximately 65 protected areas making up 34.43% of the national territory or over 2.6 million hectares declared under the protection of the National System of Protected Areas (SINAP). Amongst these, 12 are internationally recognized, 5 are wetlands recognized as Ramsar Sites, and 2 are declared World Cultural Heritage sites (UN and UNEP 2005).

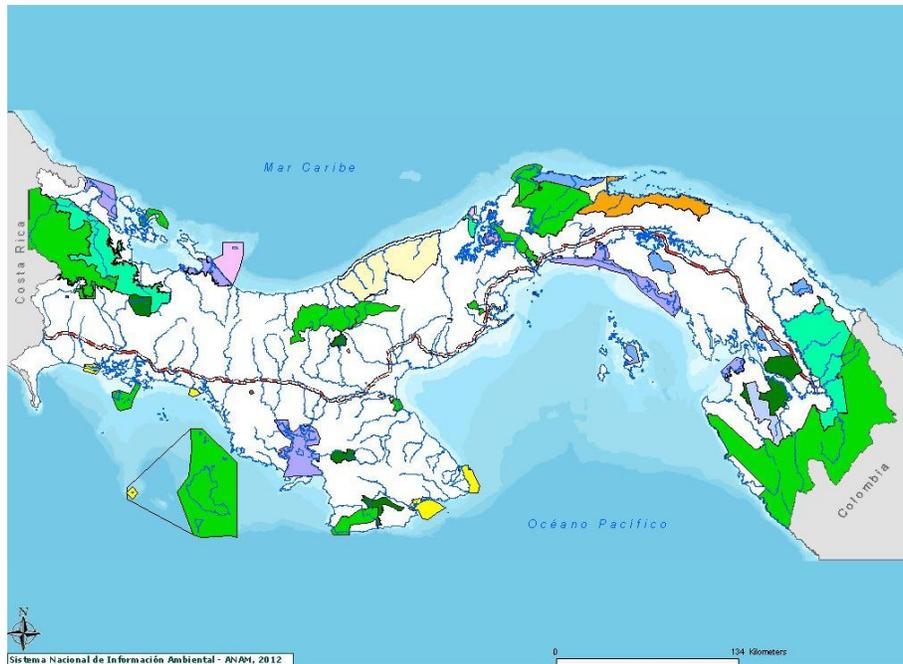


Figure 1. Protected Areas in Panama (Sistema Nacional de Información Ambiental 2012).

Establishment of the Pablo A. Barrios Wildlife Refuge

ANAM officially declared the site along the southeastern coast of the Azuero Peninsula in the province of Los Santos a protected area in 2009; however, it had previously been denoted the Pablo Arturo Barrios Wildlife Refuge by the municipality of Pedasi in 1992 in honour of a great defender of nature (ANAM Gaceta oficial 2009; Consejo municipal del distrito de Pedasí 1992). The community of Pedasi and surrounding region saw the importance in conserving renewable natural resources in order to protect the environment, especially for its mangroves, rare sand dunes and artisanal and touristic fishing opportunities (Consejo municipal del distrito de Pedasí 1992).

In 2008, the mayor of Pedasi at the time attempted to revoke the 1992 declaration. Sabina Barrios, the sister of Pablo A. Barrios to whom the refuge is named after, and Catherine Potvin realized this and immediately contacted the national offices of ANAM (Personal

Communication Potvin 2012). The community of Pedasi then mobilized itself by writing a letter to ANAM signed by over 200 residents; this letter requested that ANAM incorporate the Pablo A. Barrios Wildlife Refuge into the SINAP system (National System of Protected Areas). This would thus change its legal status. A gentleman by the name of Jorge García who worked for ANAM at the time was also involved in this process (Personal Communication Potvin 2012).

The mayor's attempt at revoking the 1992 municipal declaration did not succeed as ANAM lawyers realized that the revocation of the refuge had never been published publicly in the *Gaceta Oficial*, a necessary action to legalize the action (Personal Communication Potvin 2012).

ANAM took the letter from residents of Pedasi very seriously; within three months they had written and created the official law designating the Pablo A. Barrios Wildlife Refuge as a national protected area under SINAP publishing the new status in the *Gaceta Oficial* under No 0313 (ANAM *Gaceta Oficial* 2009). ANAM recognized that the refuge has ecological, economic, and social importance in the development of touristic activities, artisanal subsistence and sport fishing that are an essential part of the local economy. The refuge is also recognized as having fragile conditions due to its rare, narrow sand dunes that protect the coast from erosion and the area inland from salinization. The refuge is important for the conservation and sustainable use of natural resources in order to protect the biodiversity and maintain the ecological processes of the area. Due to its recent establishment as a national protected area, there lacks clear management and protection of the area.

Importance of the Pablo A. Barrios Wildlife Refuge

The Pablo A. Barrios Wildlife Refuge is a legally protected area, yet it does not clearly fall under any one specific IUCN category due to the fact that ANAM's SINAP classification system has a more extensive list of category types than that of IUCN. We hypothesize that the Pablo A. Barrios refuge could fall under category IV or VI within the IUCN system. If it were a Habitat/Species Management Area (IV), then it would involve the proper management of fauna within the area, which may be a goal of the refuge even though it is not currently being practiced. It also seems to have characteristics of (VI) Protected Area with Sustainable Use of Natural Resources as development and extraction of resources continues to occur yet projects undertaken require that an environmental impact assessment (EIA) be conducted. However, in its name alone it seems clear that this area was intended to be protected for the preservation of wildlife and not for the sustainable extraction of resources. Rather, it should provide the protection of specific sites and habitats for the existence and sustained well-being of flora and fauna species.

The location of the wildlife refuge has very special significance as it is situated in a tropical dry forest, which is endangered in Panama. In fact, tropical dry forests are the most threatened tropical forest type (Miles et al. 2006). Unfortunately, at the same time it is the least represented type of habitat in SINAP (Griscom et al. 2011). It is also the least represented type of habitat in SINAP (Griscom et al. 2011). Establishing it as a protected area is a way to restore part of this degraded forest and is crucial due to its high degree of fragmentation. The Azuero Peninsula is a natural dry forest that has faced environmental degradation caused by significant levels of deforestation due the clearing of fields for cattle ranching. Land use is

changing as landowners are no longer buying land for cattle ranching but rather for vacation, development, or recreational purposes (Griscom et al. 2011). Nevertheless, coastal development has its own significant impacts on the environment for which the presence of the wildlife refuge should hopefully mitigate.

This Wildlife Refuge includes 14,000 hectares of marine habitat, which acts as a buffer zone for the Isla Iguana Wildlife Refuge. Other goals include the conservation and protection of the flora and fauna and their associated marine and terrestrial habitats that include the mangrove and sand dune ecosystems. It supports environmental practices that foster the sustainable use of these resources. Moreover, the refuge seeks to encourage scientific investigation in the region as well as citizen participation (ANAM *Gaceta oficial* 2009). In order to reach these goals, proper management of the site must be established.

Management of the Pablo A. Barrios Wildlife Refuge

Many of the world's protected areas are not fully effective as they lack proper management (Dudley 2008). The same applies for the protected areas of Los Santos, where a third of the sites, namely 5 out of 15, do not have management plans (Lopez 2012). The Pablo A. Barrios Refuge is an example of a protected area lacking a management plan (ANAM *Ficha Técnica* 2009). This is of concern because without a management plan, there are only limited guidelines as to what actions will be permitted to take place in the future, which may indirectly result in detrimental activities occurring within the Refuge. This also explains why there has been very little action on behalf of ANAM in the past few years. To this effect, this could be related to the fact that the refuge does not generate money for ANAM in the way that the

neighbouring Isla Iguana Wildlife Refuge does, which could be another reason why less attention is given to PAB.

For these reasons, the Eco-tourism Cooperative of Pedasi has been seeking to address this issue by establishing a system of co-management with ANAM. Once completed, this plan would ensure that the goals discussed above would be reached while only allowing sustainable development that goes in line with these goals.

A management plan also holds a central role as it serves as a guide to what actions can and cannot be undertaken within the protected area. This is very important for the progress of the protected area Pablo Arturo Barrios Refuge because it will develop further the actions that the official gazette of the ANAM Resolution AG-0313-2009 has prohibited in Article 11:

1. The removal, cutting, clearing, filling, drying, extraction of natural resources and any other activity that affects the hydrological flow of mangroves and other coastal marine ecosystems present in the protected area.
2. Slash and burning of weeds and stubble older than 5 years.
3. Fishing, except for artisanal and subsistence duly authorized by ANAM and regulated by the management plan.
4. The collection, capture, hunt, transport and/or marketing of specimens, products of wildlife.
5. The introduction of exotic species
6. The removal or collection of flora and fauna, except for research authorized by ANAM.
7. The exploration and exploitation of metallic and nonmetallic minerals.

8. The extraction of archaeological objects except those authorized by the ANAM and the National Institute of Culture.
9. The establishment of infrastructure and activities that threaten the ecological integrity, for conservation and sustainable use of the protected area, except those permitted by the management plan.
10. The dumping of substances that pollute marine waters and rivers, such as chemicals, hydrocarbons, sewage (industrial, irrigation, agricultural and domestic) and others, without proper treatment and authorization.
11. The deposition of solid waste, organic and inorganic, and waste water anywhere in the protected area, except in places designated for that purpose in the management plan, after treatment and their management in accordance with environmental standards established by ANAM.
12. Any other activity that, based on ANAM technical reports, might damage the protected area, its coastal and marine ecosystems, associated ecosystems or interfere with the actions of the management of the protected area.

3.0 SPECIFIC PROBLEM AND JUSTIFICATION

Discourse regarding a possible management plan for the refuge began once it was established by ANAM in 2009. Article 17 in the Resolution that created the protected area calls for the elaboration of a management plan in the 2 years following its creation. However, no concrete plan is in place at the moment nor is one being created. As a result, there have been problems enforcing the law to protect the area. A consequence of this, amongst other things, is

developers building within limit of the refuge. Many people are not even aware of the existence of the refuge as there has been little action in informing the public on its existence and limits.

The lack of manpower to enforce regulations has resulted in sanctions not being given when the Refuge laws were broken. This has led to people not taking the refuge seriously. The ANAM Resolution AG-0313-2009 has not necessarily been easily accessible to the community which has led to confusion. Many local residents already owned property within the area prior to it being declared a protected area. According to this document, the establishment of infrastructure and activities is permitted as long as it does not threaten the ecological integrity of the location. It is unclear whether local residents who have had seasonal huts on the beach for years are still allowed to do so. Not to mention that the area includes a coastal zone of much importance to marine turtles. At the moment, the only form of protection for these turtles is the fact that turtle egg harvest is illegal; yet this is not monitored or enforced. It is thus common in the area for people to collect turtle eggs to eat or sell them, adding another complex layer to the difficulties turtles face in reaching viable population levels. To this effect, the population of leatherback turtles in the eastern Pacific has been found to have decreased by over ninety percent over the past twenty years (Shillinger et al. 2008). The unsustainable harvesting of turtle eggs and mortality from fisheries by catch were attributed as the two driving reasons behind this substantial decrease (Shillinger et al. 2008). It is clear that a management plan is indispensable.

ANAM Article 3 in Law 24 defines management as “the method by which wildlife and its habitats are manipulated to a favorable end for the welfare of human beings. Its purpose is to achieve a balance that ensures its sustainable use” (Vera 2012). The Eco-tourism Cooperative of

Pedasi has called to establish a system of co-management with ANAM for the wildlife refuge. This project has a timeline of two years and is projected to require a total of USD\$13,420 in funding (Vera 2012). Receiving such funding will be a major step in gaining the ability to implement regulations within the refuge. As part of the management plan, the limits of the refuge will be clearly stated and the activities permitted within the area will be determined. It will also call for a biological inventory on the quantity and variety of species, both flora and fauna, currently existing within the refuge. The steps to reaching this management plan have been proposed as the following:

1. Presenting the necessity of a management plan to the local authorities
2. Interviewing fishermen and locals on the importance of a management plan for the refuge
3. Soliciting help from universities and scientific authorities to create a flora and fauna inventory within the refuge.

Step 1 has been completed. Visits to the mayor and representatives to explain the project as well as workshops have also been done. Our research falls into step 2.

4.0 RESEARCH OBJECTIVES

The objective of this report is to offer documentation of our work to be used as a reference in the continued creation of the management plan. The overall objective of our study was to make a social inventory to gather local perspectives on the wildlife refuge, thus completing step 2 of the co-management process. We accomplished this by completing the following objectives:

- Start a dialogue between the Eco-tourism Cooperative of Pedasi, the fishermen and various local community members regarding the refuge
- Interview different interest groups (fishermen, local community) to evaluate their knowledge and opinions of the refuge
 - Communicate the existence of the refuge (with the help of a map)
 - Identify the most important challenges regarding its conservation
 - Identify the human impacts in the area of the refuge
 - Identify if people are interested in conservation
 - Learn more about the different local fish and turtles species
 - Identify what is most important with regards to turtle protection in the refuge
 - Identify how people can and want to contribute to the creation of the management plan
- Compile results from the interviews to find general trends
- Compile information on the protection of turtles in the Azuero Peninsula.
- Formulate recommendations for the co-management plan between ANAM and the cooperative
- Present our results to the community
- Participate in the organization and implementation of the Earth Day Refuge Celebration

5.0 METHODOLOGY

5.1 Study Site

The Pablo Arturo Barrios Wildlife Refuge is located in the Los Santos Province of Panama. It stretches from Desembocadura del Río Purió (603000.0 N 845450.0 E) to Punta Mala (610326.0 N 825419.0 E) along 22 km of coastline and includes the following beaches: Playa Río Purió, Playa Purió, Playa Piñuela (playa larga), Playa Azul, Playa Rinconcito, Desembocadura del río Pedasí, Playa Bajadero (Arenal), Playa Punta de las Porroca, Playa Ensenada del Toro, Playa el Misterio, Playa del Almendro, Playa la Garita, Playa de la Magdalena, Playa Lagarto, Playa el lanchón, Ensenada de Río Caldera, Punta del Tigre, Playa Mariabé (Figure 2) (Victor Vera Personal Communication 2012). Its limits reach approximately 200 meters inland from the highest tide to 7 kilometers out into the open sea covering a total area of more than 15,000 hectares (ANAM Resolución AG-0313 2009). Nearby towns include Purió, Mariabé and Pedasí.

This refuge plays an important role in maintaining the regional biodiversity as it contains many different ecosystems such as dunes, beaches, mangroves and marshes and is also a buffer zone for the nearby Isla Iguana Wildlife Refuge. Artisanal fishing, but not trawling nor the use of large shrimp boats, are permitted within the limits of the refuge. The bulk of our research was based in Pedasi as it is home to many of the fishermen who fish within the wildlife refuge. Field interviews were also conducted on the beaches of Punta el Tigre, Playa Bajadero and Playa el Toro, all located within the limits of the wildlife refuge (ANAM Resolución AG-0313 2009). These beaches are accessible along roads by car or by foot. People who live or work within the refuge include fishermen, restaurant owners and residents from nearby towns who come to the beaches for leisure. There are also tourists and homeowners, both foreigners and locals.

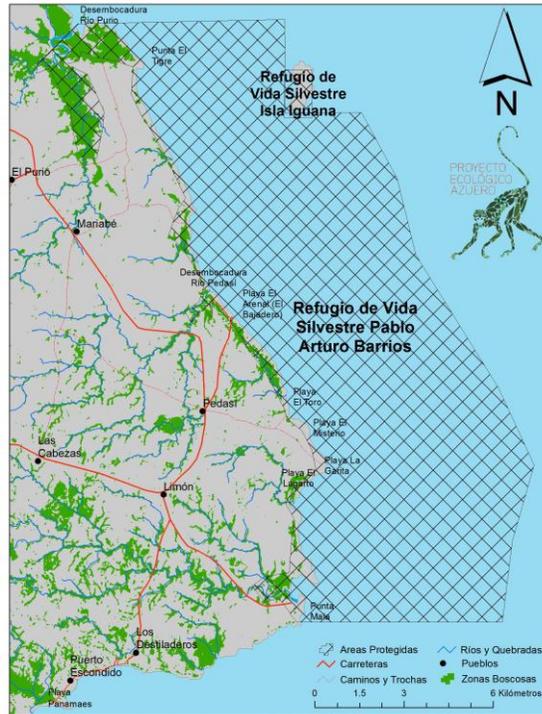


Figure 2. Map of Pablo A. Barrios Wildlife Refuge (Duran 2012)

5.2 Ethics and Protocol

Since the majority of data collection required conducting interviews, the guidelines of the McGill Code of Ethics were followed throughout the course of this study. Prior to each interview undertaken, we stated our affiliations with the Eco-Tourism Cooperative of Pedasí, the Azuero Earth Project, ANAM and McGill University. It was made clear that results would be kept anonymous and that ANAM would only have access to the general results rather than each individual interview form. We presented ourselves as students of McGill University and explained that these results would be used to draft recommendations for the elaboration of a management plan for the Pablo A. Barrios Wildlife Refuge. We sought oral consent from 61 community members and fishermen, 60 accepted. Interviewee names were not recorded at

any time. Some voluntarily chose to introduce themselves yet their information was not written down.

We provided our fishermen interviewees with our names and contact information following each individual interview to ensure that they were in a position to ask us any further questions if need be. This measure was not continued when undertaking our general interviews with community members as we felt it was more appropriate for any questions to be addressed to us through our hosts rather than through our personal contact information. All interviewees were informed that we would share these results with the community upon the completion of our project at the end of April; some were made aware more specifically of our presentation of results to the community on April 21st at the office of Azuero Earth Project once the date had been established. The main guidelines followed throughout our investigation included:

1. **Neutrality:** We ensured we did not take any positions, regardless of our personal beliefs or the beliefs of our partners and affiliations.
2. **Preparation:** Prior to conducting any interviews, we reviewed our questions a number of times with the Cooperative, AEP, and ANAM representatives to ensure all questions were appropriately phrased and relevant to our objectives.
2. **Open-mind:** We entered every discussion and interview with an open-mind and willingness to learn rather than simply looking to extract results.
3. **Respect:** We ensured we remained respectful and attentive in all of our exchanges and interactions with our informants.

4. **Honesty:** We ensured transparency in our research project by directly stating our purpose and ensured respondents were comfortable with the implications their participation entailed.

5. **Informed consent and confidentiality:** We never proceeded without informed consent and respected any refusal to participate.

6. **Inclusion of divergent views:** Although we did not have sufficient time in the field to conduct interviews with all interest groups needed for a proper representation of all views regarding the refuge, we made sure to select quotes representing divergent views.

7. **Management of time:** Dates of our visits were known by our supervisors at the Cooperative, the Azuero Earth Project and our host families. Several dates were also known by the mayor of Pedasi as our transport to other communities to conduct interviews was contingent on his support.

8. **Translation and interpretation:** We did not use any translators as we felt comfortable enough to undertake the full interviews in Spanish on our own; however, when faced with lack of clarity or confusion due to language, we consulted with our supervisors for assistance to ensure answers were properly represented.

5.3 Research Design

Two main methods of research were used to conduct our investigation. The first involved conducting interviews to collect primary data. We then used secondary data collection to address our research question, for both the qualitative and quantitative aspects of our project. The sources we solicited included peer-reviewed literature, academic studies,

municipal and national government reports, reports of interested parties (Eco-tourism Cooperative of Pedasi, Azuero Earth Project and other NGOs and organizations in Panama), geographical data and maps.

We created two sets of interview questions, one for fishermen, and one for general community members (see Appendix V). Our semi-structured interviews consisted of a combination of closed and open-ended questions and also included categorical questions. This model was chosen to gather quantitative data as well as qualitative data. We sought to avoid leading and double-barreled questions, particularly since all of our interviews were conducted in person. We selected 30 fishermen and 30 general community members to interview through convenience sampling. We chose to have a particular focus on fishermen by conducting a separate, fishermen-specific interview as we felt they would be most knowledgeable of the refuge since they work there on a daily basis.

We conducted all interviews by convenience sampling as we were very limited by time, transport, and the number of fishermen available. Most of the general interviews were thus conducted in Pedasi, although, we did undertake 12 interviews from the areas of Purió, Mariabé and Punta El Tigre to increase the representativeness of our sample. Most of the fishermen interviews were done in Playa Bajadero, the beach where they embark and disembark. All interviews were held in an informal, conversational manner to allow respondents to elaborate on any given topic he/she felt more strongly about.

6.0 RESULTS AND DISCUSSION

6.1 Fishermen Interview

The majority of fishermen interviewed were between 25 and 50 years old, with the largest majority in the 35 to 50 ranges. Selection of interviewees was done by convenience as we positioned ourselves in Playa Arenal where most fishermen embark and disembark from their day's fishing. Interestingly, none of the fishermen we encountered were women; this job seems strongly biased towards men in Pedasi. These fishermen were not new to the area; 60% have been fishing here for over 11 years, while 30% have been here for over 20 years.

Our results confirm the hypothesis that fishing occurs throughout the whole extent of the refuge. 80% of these fishermen work 5 or 6 days a week while some work up to 7 days a week. There is no doubt that these men work long days, usually starting early in the morning and continuing until the end of the afternoon when they bring their fish in to be sold in the *cuarto frios*. This explains why most respondents answered that they work 8 to 9 hours per day. Contrary to the most common types of fish seen by general interviewees, the red snapper (*pargo*), panamic graysby (*cherna*), and the mahi-mahi (*dorado*) were the most common species caught by fishermen, although many other species are also fished in the area (see Appendix I and II).

This is a community where the majority of fishermen are organized in a Cooperative or independently sell to cold rooms (*cuarto fríos*), from which they receive logistical support, can buy fishing equipment and most importantly, where they can sell their fish. This provides them with a sense of unity with other fishermen along with providing increased financial security as they know they will be able to sell their fish consistently. We included two interviews of cold

room owners as part of our fishermen sample as these are very resourceful people and there are only a handful of cold rooms in Pedasi. It is relevant to note that being a part of one of these associations does not ensure the fishermen an income as catches fluctuate and there are days where no catches are made. Fishermen are paid based on the amount, type and weight of the fish they catch. There is thus a lot of pressure on fish populations as fishermen are out almost every day of the year.

There are several strict regulations in what is part of the refuge, namely the 7 kilometers of ocean from the shore. One such rule is the prohibition of large fishing nets. 75% of fishermen interviewed use hand lines while 18% used bottom long lines. These are not in any way industrial fishermen; all interviewees use 22 to 23 foot long fiberglass boats with an outboard motor with a speed of 40 horsepower. Both J hooks and circle hooks are used, but at varying degrees. This has important implications for sea turtles in the area, as circle hooks can be detrimental to them if accidentally caught in their mouths. Although turtle fishing is not practiced here, accidents do occur. 97% of fishermen interviewed have spotted turtles in the area, and up to 33% admitted to having caught turtles while fishing. This was said to be a rare phenomenon however, and all claimed to do their best to take out the hook and release the turtles when this occurred.

Similarly to respondents of the general interview, 87% of fishermen said that turtle egg harvesting was common in the area, while 30% claimed that they eat turtle eggs. One interviewee explained that 4 turtle eggs are sold for \$1 nowadays, whereas a dozen used to go for the same price. This could be an indication that eggs have become increasingly rare, causing their price to rise. Of course this is an illegal practice hence many choose to avoid it entirely by

fear of receiving a fine. The majority of fishermen thought that those who did search and collect eggs were local residents who went at night during the rainy season.

According to our sample fishermen, turtles are clearly affected by coastal development and increased activity within the refuge, namely through pollution, loss of habitat, fishermen's long lines, and toxic substances being released in the water. Various methods raised to address turtle conservation include: the establishment of a turtle sanctuary, beach monitoring, prohibition of egg harvest, increased fines and enforcement of regulations, more regulated boat traffic and the elimination of trammel nets and longlines.

Fishermen were most interested in assisting with the first two initiatives listed above. Similarly to what was said in the general interviews, fishermen listed Playa Arenal, Playa Lagarto and Playa El Toro as the top three beaches for a turtle sanctuary.

60% of fishermen interviewed had heard of the refuge; this is a surprising figure due to the fact that all of these men work within the refuge limits on a daily basis. This reinforces the point that there seems to be a lack of communication regarding the refuge and what it entails. The general opinions on the refuge were that it has certain laws regarding deforestation, hunting, fishing and turtle egg harvesting yet construction has continued within the area and very few people are aware of its existence. Furthermore, although ANAM is meant to protect it, they have allowed developers to deforest large amounts of trees for foreigners to have a view of the ocean; this goes against what the refuge is meant to be.

This hints towards another issue that may be at hand; ANAM's role in truly ensuring this remains a protected area for the fauna and flora. Although Environmental Impact Assessments are mandatorily done for any project within the refuge, fishermen felt this area was often not

treated as a refuge as construction and deforestation continue to be permitted. To reinforce this point, deforestation, coastal development, sand extraction, turtle egg harvest, garbage and water pollution and hunting were all commonly listed as problems within the wildlife refuge. Fishermen are concerned that the costs associated with fishing have increased, especially the cost of gasoline. Some associated this higher cost of living with the arrival of foreigners settling in the area as well as tourism in the past 5 to 10 years. Fishermen claimed that many men have gone to work in construction rather than continue their tradition of fishing.

9 out of 10 fishermen stated they wanted to participate in the sustainable development and conservation of this refuge. Undertaking a reforestation and eco-tourism project as well as help create a turtle sanctuary were amongst the most popular ways in which this could be done.

A management plan was thought to refer to the control and prohibition of certain activities such as deforestation, fishing, and turtle egg harvesting. It would also ensure beaches were kept free of garbage. Some viewed this as a tool to implement conservation projects such as a turtle sanctuary. Finally, others stated that it reinforces regulations into something more official, more legitimate.

When speaking of other management plans ANAM has established across the country, interviewees ranged from thinking they were effective to believing they were completely ineffective. Some believed they worked most of the time but a small minority of people would always create problems by not respecting the laws. Others felt that they were not strict enough as they did not truly protect the natural environment. Lack of staff and enforcement on the part of ANAM was brought up as a reason that these were ineffective; one example given was that

people still fish in the corals in Isla Iguana, which is a protected area in itself. Some felt very strongly on the matter and claimed that corruption and self-interest often lead these plans rather than them being focused on environmental conservation. 63% of fishermen interviewed were not aware that ANAM must meet regularly with the community to discuss the management of the protected area. Approximately the same percentage was not aware of such meetings occurring in the past. The fact that they are not made aware was noted as the main reason why they do not attend such meetings; however, fishermen also admitted that people are often not interested or do not feel affected by conservation. Some are afraid they will be told to stop hunting and thus avoid these meetings entirely.

Fishermen held similar views as other community members regarding how to achieve greater community participation. Brochures, posters, presentations, education, representatives, and word of mouth were all listed as means to elicit greater participation. Other various techniques to share a message or communicate an event were also touched upon (see Appendix II).

6.2 General Interview

Over 60% of our respondents were above the age of fifty, while the rest were distributed amongst other age groups. This was not done intentionally, as we conducted the interviews by convenience with no preference given to any age group. The majority of informants have been living and/or working in the area for over 20 years. This is very insightful as locals who have been there for a longer time period can better acknowledge how the community has changed over time.

Most interviewees worked 7 to 8 hours a day. Just below 20% of our respondents do not work. This may be indicative of a portion of the population of Pedasi being unemployed or many families depending on one spouse for their income. Due to most work opportunities in the region being limited to construction, fishing, agriculture, cattle ranching and tourism, it would not be surprising that there is a gender bias in terms of work opportunities.

The most common species of fish seen in the area were red snappers (*Pargo*), yellowtail fish (*Jurel*) and sea bass (*Corvina*). Just over half of the respondents have seen turtles. Turtles are generally spotted in the rainy season between the months July to October. This may suggest that turtles are fairly common in the area. There seem to be two particularly common turtle species in the wildlife refuge: *Caretta Caretta* (Caguama) and *Eretmochelys imbricata* (Carey). It seemed common knowledge amongst most respondents that Isla Cañas was the place with the most turtle nesting in the area yet when asked which beaches within the Pablo A. Barrios Wildlife Refuge had high densities of nesting, answers were mixed. The top three beaches chosen for a turtle sanctuary were: Playa Arenal, Playa El Toro, and Playa Rinconcito. 57% of suggestions included at least one of the three beaches named above. Fishing of turtles is clearly against the law here and people are aware of it as all respondents claimed that this is not practiced in this area.

On the other hand, harvesting turtle eggs does occur, as 80% of respondents confirmed. This is done both for consumption as well as for commercial use, being sold illegally for profit. Based on informal comments we received from our interviewees, this practice has been part of the local culture for a very long time hence it is hard to stop. However, most explained that there is only a small portion of the population doing this and that those who do it regularly for

money tend to be those with limited work opportunities. Some explained that this is not an easy task and thus it is only when fishing is unsuccessful that fishermen look towards alternative means of making money such as turtle egg harvesting. In fact, up to 37% of respondents said they eat turtle eggs. This leads us to question how turtles may indirectly be affected by overfishing; if fish populations decrease, this will possibly result in increased harvesting of turtle eggs. The insight we received from our interviewees suggests that a majority of those harvesting turtle eggs are residents of Pedasi.

Various aspects of recent coastal development have been stated to be detrimental to the turtle populations. These include fishermen's long lines, plastics, lights on the beach, loss of habitat due to construction, and as previously mentioned the harvesting of their eggs. In response to these issues, the most appropriate measures to protect them were noted to be the implementation of a turtle sanctuary and educational campaigns to reduce consumption and harvest of turtles within the community. Implementing this turtle sanctuary and monitoring beaches within the wildlife refuge were also the most popular answers when asked how they would like to help in these conservation efforts. Playa Arenal, Playa El Toro and Playa Rinconcito were said to be the most appropriate locations for the establishment of a turtle sanctuary.

Some tradeoffs must be considered when choosing the appropriate site. There is no doubt that the site should be free of construction, large densities of people, noise and light distractions as these could disrupt the turtle's nesting. Some respondents thought rocks could help protect the turtle's nesting while others warned of the presence of too many rocks as a barrier for turtles to leave the water. Interestingly, a study conducted in Costa Rica found that there was no correlation between the density of turtles nesting and the quality of a given beach

(Richard and Hughes 1972). Their results indicated that offshore currents were much more influential and in fact correlated to turtle nesting sights (Richard and Hughes 1972). This being said, there are many unofficial accounts of turtles nesting both on sandy and rocky beaches. Regardless, ANAM and Authority of Aquatic Resources (ARAP) should support the project and the chosen site should be sufficiently accessible for people to monitor and care for the sanctuary.

70% of the general community members interviewed had heard of the Pablo A. Barrios Wildlife Refuge before. Their level of knowledge on this protected area varied from only having heard the name to stating that it helps conserve the fauna and flora of the area. It was clear that many are either not aware of the laws governing the area or claimed that few people respect them.

Our results show that only 13% of respondents knew of the physical limits of the refuge. This is strongly indicative of the fact that the official adoption of the area as a wildlife refuge by ANAM 3 years ago may not have been shared at large with community members, residents or business owners within the limits of the refuge. Furthermore, we hypothesize that there has been very little implementation of the regulations of the document since its establishment in 2009.

Respondents were asked to select which problems they believed were most present from a prescribed list (see question 21 in appendix 2). The two most frequent problems stated were deforestation and beach contamination from plastic. There was not a high margin of difference between these and other problems however, as turtle egg harvest, hunting, coastal development, water pollution, and sand extraction were all listed as present in this specific

region as well (see question 21 in Appendix II). 70% of respondents claimed that activity within the refuge increase in past years, especially fishing and tourism. This is reinforced by the fact that large-scale gated communities and other development projects are being built throughout the area and within the refuge.

It is interesting to note that although respondents did not hesitate in mentioning these various problems as present within the refuge, they did not seem to associate any of these with increased tourism in the area. In fact, many spoke of the positive aspects of tourism, especially focusing on the benefits for the local economy. This particular asset seemed to override the fact that increased construction was resulting in increased deforestation. As is true in any other part of the world, there is no general statement that can be applicable to all when speaking of tourist impact in this area; some interviewees said tourists are very helpful by being environmentally conscious and initiating reforestation and beach clean up projects. Others were said to throw garbage on the beaches and be uncooperative with the community.

In general, tourists were seen as positive for the community as they support the local economy but come for short enough periods that they do not cause any negative impacts. Developers and foreign homeowners were seen in a different light; their construction destroys natural habitats rather than positively contributing to the area.

There is clearly an openness of mind towards the possibility of assisting with the sustainable development and conservation of the refuge; 80% of respondents said they would be interested in doing so while 10% had an interest but could not due to lack of time. The most popular way in which interviewees wanted to help was in creating posters and signs identifying the limits of the refuge and conducting or participating in educational workshops on

conservation with children. Other popular activities included: forming a turtle protection group, monitoring beaches, and implementing an eco-tourism project. This information demonstrates that these activities should be taken on by different actors to get momentum going on concerning conservation in the area.

A management plan had varying levels of significance amongst our respondents. Some felt it meant a document that helps protect and conserve marine and terrestrial fauna and flora. This document also determines the agent in implementing various rules in a given area by stating who is responsible for taking care of the area. It was also noted that this type of plan could seek international donations to help the area while establishing a system of sustainable tourism. This type of plan was also thought to include specific delimited areas for the observation of the high diversity of animals and plants found in the area. Finally, such a plan would reinforce educational campaigns.

One very insightful comment we received during our interviews was that it was a very good idea to make the refuge, but there is a lack of communication to get people to support and respect what they have. Generally, respondents felt that the refuge was a good idea yet it did not affect them personally in any way, as if its presence made no difference to their lives. Over half of the respondents felt ANAM employees would be most appropriate and effective at implementing the law within the refuge; 16% deemed the police would be effective and 16% listed community members as a viable option.

As much as 43% of respondents were completely unaware that ANAM is required to hold regular meetings with community members and an even lower figure of 30% represents the number of respondents who were aware of ANAM meetings occurring in or near Pedasi in

the past. This either suggests that there is a strong lack of knowledge of these meetings due to poor communication or that these meetings are simply not happening at all. When asked how this problem could be addressed, interviewees recommended increased communication through the use of flyers and presentations in schools. Other concerns raised were the lack of interest in conservation in the community, the inconvenient timing of meetings, the lack of time, the lack of credibility ANAM holds in the area, and people's lack of motivation. Once again respondents felt that increased communication through the use of posters, flyers, presentations, education, representatives and word of mouth would all be instrumental in creating a shift towards increased participation.

It is clear that if increased participation in the effective management of the Wildlife Refuge is to occur, this has to be driven by community members rather than external actors attempting to enforce regulations. As stated by one of the interviewees, if put in the mayor's position, she would not pass more laws since no one respects them. Alternative solutions have to be found to instigate change; this begins with increased education, communication, community participation, clear laws on fishing and hunting in the area, incentives for participation in conservation and increased support from ANAM.

6.3 Comparing and Contrasting

Many similarities and differences exist between the two sample groups. Both the fisherman and the general interviewees had a positive outlook on tourism in the area. Each believed that tourists care for the beach and initiate reforestation projects. Similarly, both groups held the view that building infrastructure for tourism can have a negative impact in the area.

97% of fishermen have seen turtles in the area, while only 60% of the general interviewees had seen turtles. This difference is most likely due to the fact that fishermen work in the refuge as opposed to most general interviewees. The presence of turtle egg harvest was confirmed both by fishermen and general interviewees, with 87% and 86% respectively.

The general awareness of the refuge was similar, although slightly lower for the fishermen with 60% of fishermen familiar with it as opposed to 70% of general community members. For both sample groups, 43% of interviewees said they knew where the limits were yet slightly more fishermen knew the correct limits (20%) compared to the general respondents (13%).

6.4 Ecotourism

Tourism plays an important role in Pedasi's economy. Developing the current tourism sector to create a stronger emphasis on ecotourism would be a good opportunity to raise awareness about the ecosystems of the Pablo Arturo Barrios Wildlife Refuge. This would involve the community in conservation and sustain local economic livelihoods while developing low-impact tourism. Ecotourism is defined as "responsible travel to natural areas that conserves the environment and improves the well-being of local people." (International Ecotourism Society 2012).

Ecotourism can present itself as an alternative to large-scale industrial tourism and development along the coast. For example the Amadiba Horse and Hiking Trail ecotourism initiative was created in South Africa's Eastern Cape. This community-based ecotourism project has been designed to involve the Amadiba people in all aspects of planning, implementation,

management and decision-making (Ntshona and Lahiff 2003). The Pablo Barrios Wildlife Refuge is named after a cherished Pedasieño who was a strong defender of nature and important member of the community. The memory of Pablo Arturo Barrios has stimulated further involvement from the part of the community. This is not only an emotional attachment but also a cultural one as this area holds important cultural value.

Ecotourism can also help in a way that compliments rather than replaces existing livelihood strategies by providing direct financial benefit for both local people and conservation projects, as it has in the Amadiba project. Participatory methods of organization are essential but professional management and administrative skills, particularly regarding the tourism market, must be integrated at some point. This could undermine the participatory aspect of the project (Ntshona and Lahiff 2003). Difficulties can also occur if ecotourism operators do not ensure that projects meet the expectations of tourists and are consistent in their quality (Ntshona and Lahiff 2003).

Within the broader goals of effective management of the refuge, a dialogue should be established between developers and the community to ensure that their collaboration and participation is maintained throughout this process. Developers should be encouraged to display information regarding the refuge both on their website and on their property so that buyers are made aware of their proximity with the refuge. Working hand in hand with investors is important because the knowledge, experience and structures from their developments can be used for other projects and can attract other initiatives to the area that focus more on conservation and ecotourism (Ntshona and Lahiff 2003).

Hastings et al. explain that the “effectiveness of coastal management in developing countries is widely perceived to be inhibited by a lack of scientific data on the coastal zone” and that this need for information is increasingly being filled by donors and large international non-governmental organizations (2011). Lack of scientific information can inhibit the possibility of funding for potential ecotourism projects in the refuge making the case for a scientific inventory of the flora and fauna even stronger. Ntshona and Lahiff discuss the benefits of external donor funding with community-based tourism initiatives but warn that such funding can lead to new requirements that could change the spirit of local projects (2003).

The current Ecotourism Cooperative runs a restaurant and has already created a reforestation project and experimental gardens in Playa Arenal, a very popular beach. The Cooperative should take advantage of these already existing infrastructures to give guided tours of their projects as well as educational walks through the sand dunes. Mangroves and wildlife should also be shown during these walks. These visits will provide a positive experience for both visitors and the local community by providing a unique opportunity for tourists and direct financial benefits for locals while preserving the natural habitat. Information regarding the refuge should be available in a kiosk with staff available to explain the nature and history of the site, activities and the guided tours suggested above. Considering Playa Arenal is a departure point for Isla Iguana, a popular tourist destination, this would be a strategic point to develop these projects. Visitors should be encouraged by the Tourism Office and local businesses in town to support these initiatives.

Once the management plan is completed, a small entrance fee or donation should be suggested at Playa Arenal for visitors, particularly non-residents, similar to the fee in Isla

Iguana. This will also help monitor the tourist activity in the refuge. In addition, a Visitor Satisfaction System should be implemented, as it is important to have feedback from visitors to understand if they are satisfied with the services and their experience in the wildlife refuge. For example, Nuva and Shamsudin created a study of Willingness to Pay towards the conservation of ecotourism at Gunung Gede Pangrango National Park in Indonesia (2009). Gathering information on Willingness to Pay on an ecotourism project in Pedasi would help better gauge what attracts tourists to the area to improve the experience on the longer term.

Throughout our interviews, it was difficult to get a concrete understanding of who lived in the refuge and what activities occurred within it. To help gather more information, the population census should include a question regarding who lives within the limits of the refuge permanently, and who lives there seasonally. ANAM could also track some of these numbers from development owners who will have this information for their projects, especially in gated communities.

A volunteer distribution network of both local and foreign volunteers is a necessary tool to help manage and implement effective change within the refuge. Efforts should be made to build a larger and more active volunteer base as well as have concrete task opportunities for volunteers to take on. Rattan et al. explain volunteer-tourism as involving travelers contributing their time and income to a project that can be qualified as being part of wildlife tourism and ecotourism (2011). Volunteer tourism would be a viable type of tourism in the area of Pedasi. Tourists having lived a positive experience could also help promote its appeal to other potential volunteers.

6.5 Community-Based Management

This refuge is a good example of a protected area with limited management that is facing the consequences of being located in a fragile state. According to Karsenty and Ongolo, a fragile state can refer to a state where “all forms of law enforcement are undermined”. They add that in fragile states “governments are unable to deliver on commitments made under international agreements or conventions that relate to natural resource management” (2012). Based on our interviews, it seems that many of the problems in the area were due to such lack of law enforcement.

It is important in this case that, because the government cannot be fully relied upon, the protection of the refuge should be undertaken by the community. Community members of Pedasi have already shown strong leadership as they played a pivotal role in ensuring the incorporation of the refuge in ANAM’s SINAP. This demonstrates the potential for mobilization on the part of local community members when an important issue is to be addressed. On a similar note, Molar et al. define community-based forest management as, “management, by communities or smallholders, of forests and agro-forests they own, as well as the management of state-owned forests [...] by communities” (2011). Ellis and Bolland’s study in the Central Yucatan Peninsula of Mexico shows that community-based forest management has an effective role in forest conservation. Furthermore, they explore the argument that, “protected areas are more effective when local communities participate in decision-making regarding conservation and resource management, especially within surrounding lands or buffer zones” (2008). Due to high levels of deforestation in the refuge, a similar system of community-based forest management could be put in place.

The presence of many cooperatives in Pedasi demonstrates their strength of working in groups to work towards a variety of objectives. For example the ecotourism Cooperative of Pedasi has been in function since 1996 and has a total of 25 active members. This could be used as a strong base to develop a community oriented form of management. In order to effectively manage an area, it is important to have a proper understanding of legality issues to ensure its long-term survival. At the moment, Pedasi lacks such legal support.

In order to achieve successful community-based management, effective communication must take place between stakeholders. A small group of individuals should be established as a liaison between ANAM and the ongoing within the Pablo A. Barrios Wildlife Refuge. This group would work towards increasing general cooperation with ANAM by helping announce ANAM meetings and by expressing the community's concerns and conservation goals. This would ensure that the decisions taken are not detrimental to the conservation of the area nor the well-being of people living within the refuge. There should be increased communication and collaboration with Pedasieños from the part of existing cooperatives and community groups to build a sense of community and pride around the work that they do.

Stronger efforts should be made to communicate directly with fishermen and local members in the community on the part of ANAM; personally addressed invitations, direct phone calls and announcements in the cold rooms and local newspaper should be used to increase attendance and participation in meetings. Students, local youth groups and scouts should be involved in this process. Results showed that the preferable time for meetings in order to increase attendance should be held in the afternoon or evening on weekends.

Local leaders such as involved young people that have demonstrated leadership in the community should be supported and encouraged. These are individuals motivated and excited about the proper management of the Pablo A. Barrios Wildlife Refuge or other relevant conservation projects. For example, logistical support should be given to them to implement projects and motivate other community members to take on leadership roles.

6.6 Turtle Conservation

Sea turtle populations have been decreasing worldwide; this can be attributed, amongst other reasons, to the expansion of human populations (Witherington and Martin 2003). As the majority of human settlements are located in coastal areas, this increase in human populations has clear repercussions on marine fauna such as sea turtles. Other important consequences of human presence include the harvesting of turtle eggs in coastal communities and mortality due to fishing bycatch, especially through the use of nets and longlines.

Monitoring of sea turtle nesting has become an increasingly common phenomenon, however there still lacks a global standard, which allows all data collected around the world to be compared (SWOT 2011). Furthermore, there is still very little known about turtle's migration patterns as well as their use of the marine habitat (Shillinger et al. 2008). As a means to fill this gap, the State of the World's Sea Turtles (SWOT) has been established (SWOT 2011). This database includes information about turtle nesting and migration patterns (SWOT 2011). Last year, there were over 5,700 individual data records coming from over 2,800 different beaches around the world included in this database (SWOT 2011). It is currently very difficult to assess densities of nesting on different beaches, as there could be strong biases towards those with

increased monitoring, rather than representing the true state of the turtle populations. SWOT has raised this as an issue, as a beach with increased monitoring could appear to have more nesting than a beach with the exact same nesting densities but lower monitoring efforts. Beaches that lack monitoring are not included in the dataset.

For these reasons, it is very important that the Pablo Arturo Barrios Wildlife Refuge establishes a turtle sanctuary and turtle monitoring system to ensure the conservation of sea turtle populations in the area. Other such projects have been implemented in the Azuero Peninsula, namely in Playa Mata Oscura, Playa Marinera and Playa Camboutal. In order to establish a turtle sanctuary, morphological measures and nesting data must be collected (Turtle Symposium Panama 2012). The month of September was said to be the period with the highest levels of turtle nesting of the year.

Interestingly, the turtle sanctuary project in Playa Mata Oscura only had a 65% hatching success rate, which they believe to be associated with high precipitation levels. This is a lower success level than that of the turtle sanctuaries implemented in Playa Marinera and Camboutal (Turtle Symposium Panama 2012). If humidity does in fact negatively affect turtle nesting, beaches in the area of Pedasi would be very good locations to implement such a project due to the dry climate characteristic of the area. In the case of Playa Marinera, Ozzy Vaquez explained that the turtle sanctuary was implemented 2 kilometers from Playa Guanico Abajo; they then separated the beach in different sections (Turtle Symposium Panama 2012). Different local community members monitored each section through a pre-determined schedule.

A Turtle Sanctuary Working Group, with the assistance of the Ecotourism Cooperative of Pedasi, ANAM and ARAP, should be established in Pedasi. This Working Group would be

responsible for finding the most appropriate model for a turtle sanctuary in one of the beaches located within the Wildlife Refuge. A system should also be implemented to monitor the number, type of species and behaviour of turtles nesting within the refuge. Based on our results, the most appropriate sight for this sanctuary should be one of the following options: Playa Arenal, Playa El Toro, Playa Lagarto, Playa Rinconcito or Playa Los Destiladeros.

Fishing hooks can also have important repercussions on turtle mortalities. An informal, six year study undertaken by Angel J Vega in the Parque Marino of the Golf of Chiriqui showed that 3 turtles were caught out of every 1000 hooks used in that area. Several fishermen interviewed did admit to have accidentally caught turtles in the past. J hooks are much more devastating to turtles than Circular hooks as they tend to be harder to remove. Our results have shows evidence that both types of hooks are used in the area.

In the case of Costa Rica, the only extractive actions towards sea turtles allowed is the selective harvesting of turtle eggs in Playa Ostional, on the Pacific side of the country (Chacón et al. 2007). This is only allowed due to the fact that turtles arrive in the thousands and nest on the beach; the following days many more turtles arrive and crush the eggs from the previous day to be able to nest their own. This is the only reason why this is permitted (Tröeng, 2001).

A turtle awareness program is another crucial element to the conservation of sea turtles since the main goal within the Pablo A. Barrios Wildlife Refuge is to avoid that eggs be harvested whilst creating an appropriate management plan. Residents of Pedasi will be much more likely to stop the harvesting of turtle eggs if they truly understand the importance of turtles within the ecosystem and can personally see and experience a turtle's lifecycle. Workshops in the community and in schools could be very effective at transmitting this

message. Volunteers of all ages could also be involved in the establishment of the turtle sanctuary.

7.0 SHORT-TERM RECOMMENDATIONS

Biological Component

- *Inventory of Fauna and Flora and Ongoing Monitoring:* An inventory of fauna and flora as well as a species profile is needed in the refuge. This will help provide opportunities for scientists to pursue research on specific species and the local ecosystem which will further the knowledge base. This could be done by a variety of local and foreign actors such as scientists and university students. Having a good understanding of the specific species in the area can also lead to increased funding opportunities. This inventory should be made available to the general public both online and within the community. Mapping the occurrence of this flora and fauna will also be important to continue to create a biological corridor within the Azuero. Basic ongoing monitoring of both the marine and terrestrial fauna and vegetation, ecosystems will be needed to detect change within the refuge and will be important in helping decision makers assess change in the area.

Communication

- *Better Signage:* Signs should be installed to indicate the physical limits of the refuge according to ANAM's official document – this brings legitimacy, pride and a sense of belonging to the community. These should be located at the entrances of the main beaches and access points to the refuge. Informative signs about the refuge should be

placed at important landmarks in Pedasi, Purio and Mariabe including the mayor's office, the main town plaza, and other prominent businesses.

- *Access to Information and Visibility of Refuge:* The Pablo A. Barrios Wildlife Refuge should be listed on ANAM's official list of protected areas on the SINAP website and all other relevant websites. Other relevant information such as the management plan with a statement of all non-permitted activities in the refuge should also be shown here and be accessible in neighbouring community locations. For example, Pedasi locations could include the ANAM office, the Cooperative office, Azuero Earth Project Office, and the library.

Projects

- *Turtle Sanctuary Working Group:* This group should be formed by local volunteers who would like to help plan the implementation of a turtle sanctuary. They would be in charge of preparing the particular site, building the sanctuary, seeking funding with the help of the Cooperative, and provide volunteers to transport and care for the turtle eggs during the nesting season.
- *Waste and Recycling System:* There should be garbage and recycling bins available at the most popular beaches. These should be collected regularly.

Logistics

- *Permanent ANAM Staff:* These employees would be in charge of collecting visiting fees, tracking numbers of visitors, serving as a resource on the refuge and ensuring laws are respected within the refuge by monitoring the beach.

Education

- *Educational Workshops:* Various themed workshops should be offered throughout the community as well as within schools for all age groups to raise awareness in regards to the history and conservation of the wildlife refuge. Guest speakers could be incorporated into the curriculum. Driven young people should be sought out to teach younger children. Workshops could take place in places such as the local library where students go regularly to do their homework.
- *Integration of Pablo A. Barrios Refuge in High School Curriculum:* Due to the fact that the local high school has endorsed a curriculum based on tourism, this is an ideal opportunity to have a particular focus on the refuge through projects, competitions, volunteer work and more detailed upper-level initiatives.

Events

- *Conservation Fair/Party:* Due to the large numbers of cultural festivities that occur in this region, these should be used as a tool to promote the importance of the coastal ecosystem, fauna and flora of the Pablo A. Barrios Wildlife Refuge. Various contests may be held to promote participation in such events with prizes emphasizing recognition in front of the broader community, as this seems to increase the appeal for many local citizens, especially teenagers and young adults. These events could expand on the idea of the Earth Day party undertaken on April 22nd 2012.

8.0 REFLECTIONS

8.1 Difficulties, Limitations and Lessons Learned

The first difficulty encountered at the beginning of our research involved understanding how to best address the needs and interests of each of the stakeholders involved in our project to be able to have results that would be beneficial to all but not be too broad. This research would also have to be achievable within our time constraints. We therefore spent time meeting with each group (ANAM, Cooperativa de Pedasi, Azuero Earth Project and our McGill supervisors) to create a set plan and ensure we were on the right track.

Originally, two projects were assigned to us, both fitting under the future management plan for the refuge; a social inventory of the refuge and environmental education on marine turtles. Given our time constraints and the broad nature of these projects, we decided upon consultation with our supervisors that it would be most realistic for us to focus mainly on the social inventory of the refuge. This being said, we would attempt to gather information on marine turtles by including questions regarding turtles in our interview and by exploring the idea of implementing a turtle sanctuary within the refuge.

Though the Pablo Barrios Wildlife Refuge has existed for 20 years since the municipality of Pedasi first created it in 1992, there is very little literature existing and few studies have been done in the area. Much of our data is the first of its kind for the refuge. This was both a benefit and a drawback. We started from a clean slate but were not able to use other projects as models. In the beginning, it was unclear as to what the actual physical limits of the refuge were as well as what was legal or illegal within its limits. Talking to more people and gathering information from different sources helped overcome this, but the process was not as clear as it

could have been in other protected areas with a stronger history of protection (i.e. Isla Iguana). There are significant challenges to the protection of an area when laws are not properly implemented. This provided an important lesson on finding alternative methods of protection through leadership of the community rather than the dependency on legal documents.

Other difficulties arose while writing and performing our interviews. Although we were comfortable enough in Spanish to conduct these interviews on our own, there is always the possibility that some nuance could have been lost in translation. To avoid this as much as possible, we were careful to have our interview reviewed by a local contact that was able to give us suggestions and most importantly introduce us to the local vocabulary regarding fishing and turtles. Language barriers are real, but with care can be overcome for the purpose of these types of projects.

We found it difficult to decide on a format for our interview regarding whether we should concentrate on qualitative or quantitative data. In the end, we opted for a mix of both given the goal of our project was to gather the most information and opinions possible. Although we reworked our open-ended questions to try and make them as clear and simple as possible, there were still times when people were unable to answer. To avoid these situations as much as possible, we tried to rephrase the question to create more of a conversation. As we were trying to document opinions and challenges revolving around conservation, it became challenging when many people interviewed were not interested or knowledgeable on this matter hence we had to be very careful not to lead anyone into an answer. In this context, we learnt that having no answer can also be insightful.

Unfortunately, we were not able to conduct our interviews at random but rather by convenience; in a way this is a drawback yet it was the most realistic method to reach our objectives given our time and logistical constraints. Of course, as for any project, additional time would have allowed for a more extensive undertaking of an eventual project centered on turtles as well as the completion of a greater number of interviews. We would like to note that while undertaking the fishermen interview, a few of our interviewees no longer fish but bring tourists to Isla Iguana. They did, however, answer from the perspective of a fisherman. This could have had minor influences on our results.

We experienced first hand that no matter how organized you can be, everything is harder in practice. It is therefore always necessary to be flexible in order to resolve problems as fast as possible. Given that we were also completing coursework in Panama, other obligations sometimes overrode our internship plans and caused us to have to rework our schedule. We were fortunate to work with many people from different backgrounds who were able to bring to the table their past experience, perspectives and inputs, reminding us of the importance of collaborative effort towards a greater goal.

The most important lesson learned during our project, is that these types of difficulties and limitations encountered are normal. Being flexible and open is key to help you realize that in the end adversity can sometimes lead you to an even better outcome.

8.2 Next Steps

Our recommendations for the better management of the Pablo Barrios Wildlife Refuge can be found in the Recommendations section. We would like to specify that we think that

continuing the now already existing relationship between McGill University, the Cooperative and the Azuero Earth Project would be a great idea and could lead to the completion of other strongly needed projects within the refuge. Relevant future projects could include having students establish a turtle sanctuary, students assisting in the drafting of the management plan and students leading an environmental education program on marine turtles in the community.

The information collected in this social inventory will be shared with ANAM, the Ecotourism Cooperative of Pedasi, the Azuero Earth Project and other stakeholders in the community upon completion of this report.

9.0 ACKNOWLEDGEMENTS

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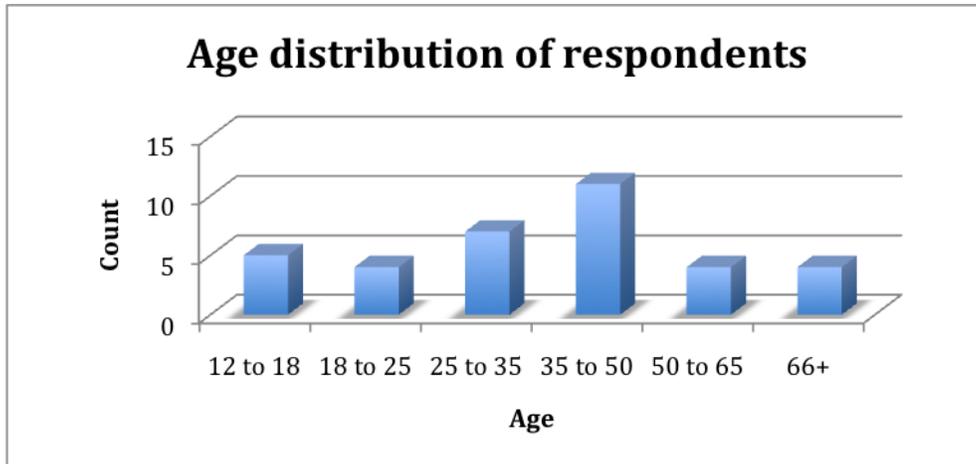
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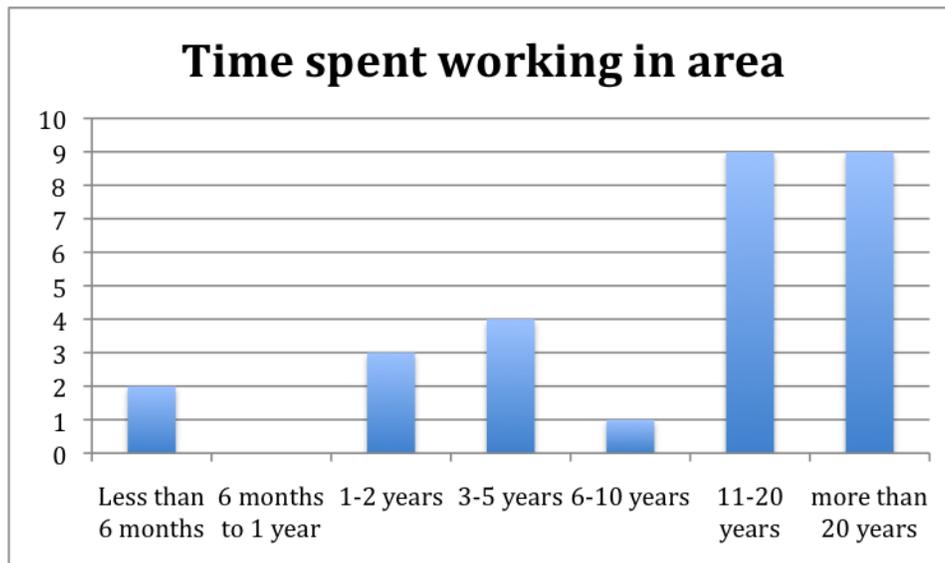
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APPENDIX I: Fishermen Interview Results

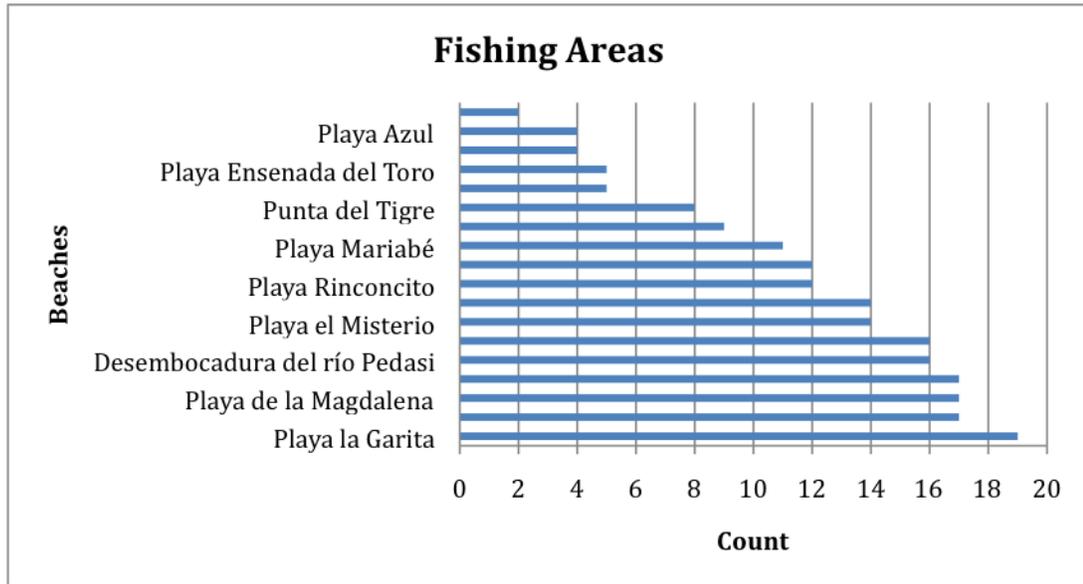
Question 1: How old are you?



Question 2: For how long have you been a fisherman?



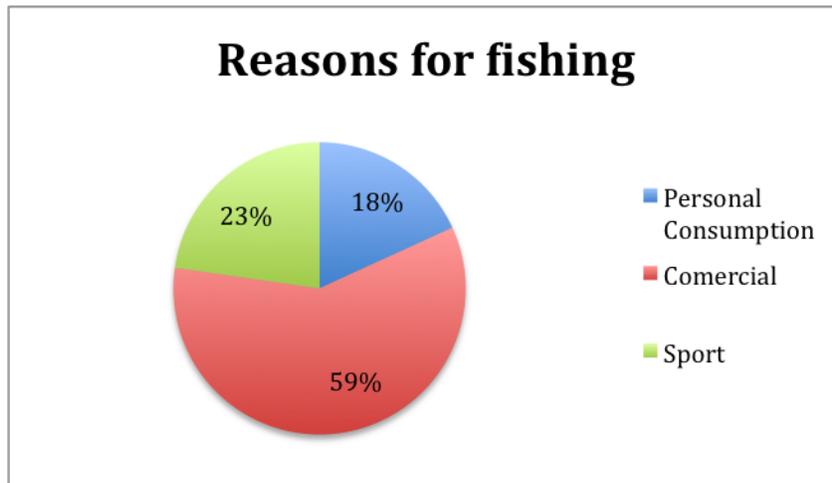
Question 3: Where do you fish?



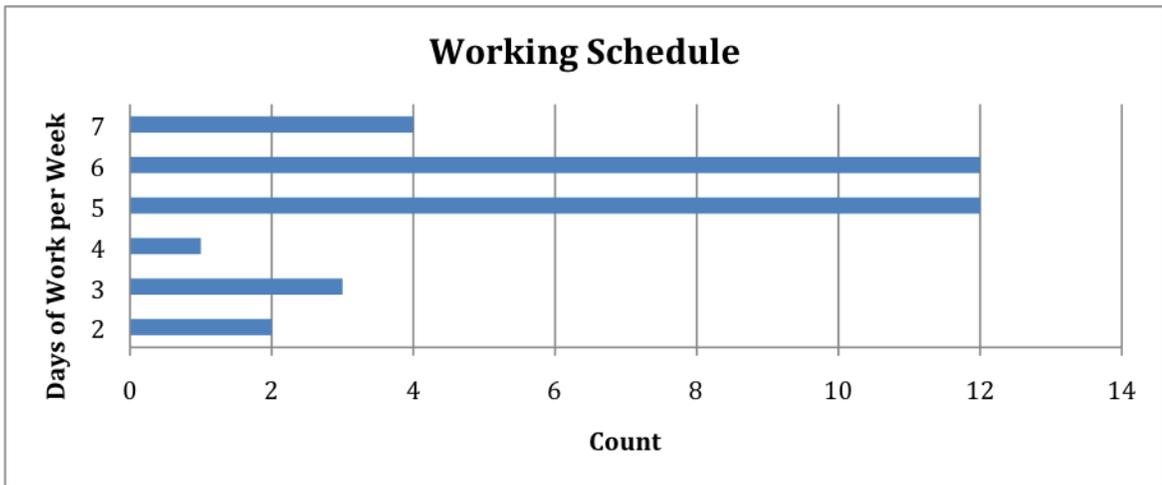
Question 4 & 5: Where do you embark and disembark during the dry and rainy seasons?

The majority of fishermen embark or disembark in Playa Arenal. Depending on the season and weather conditions, they also occasionally embark at the mouth of the Pedasi river, Punta Mala or Punta El Tigre.

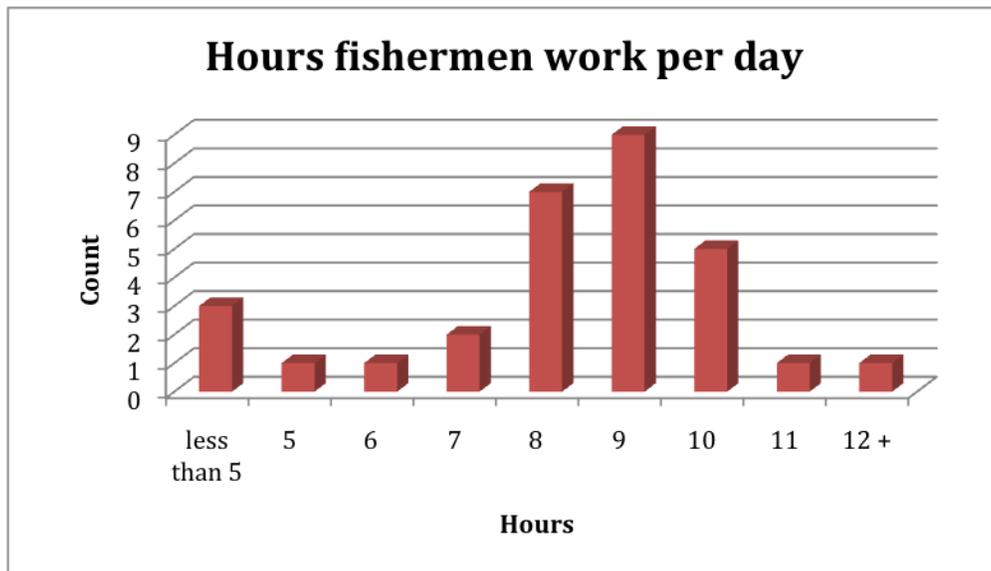
Question 6: Why do you fish?



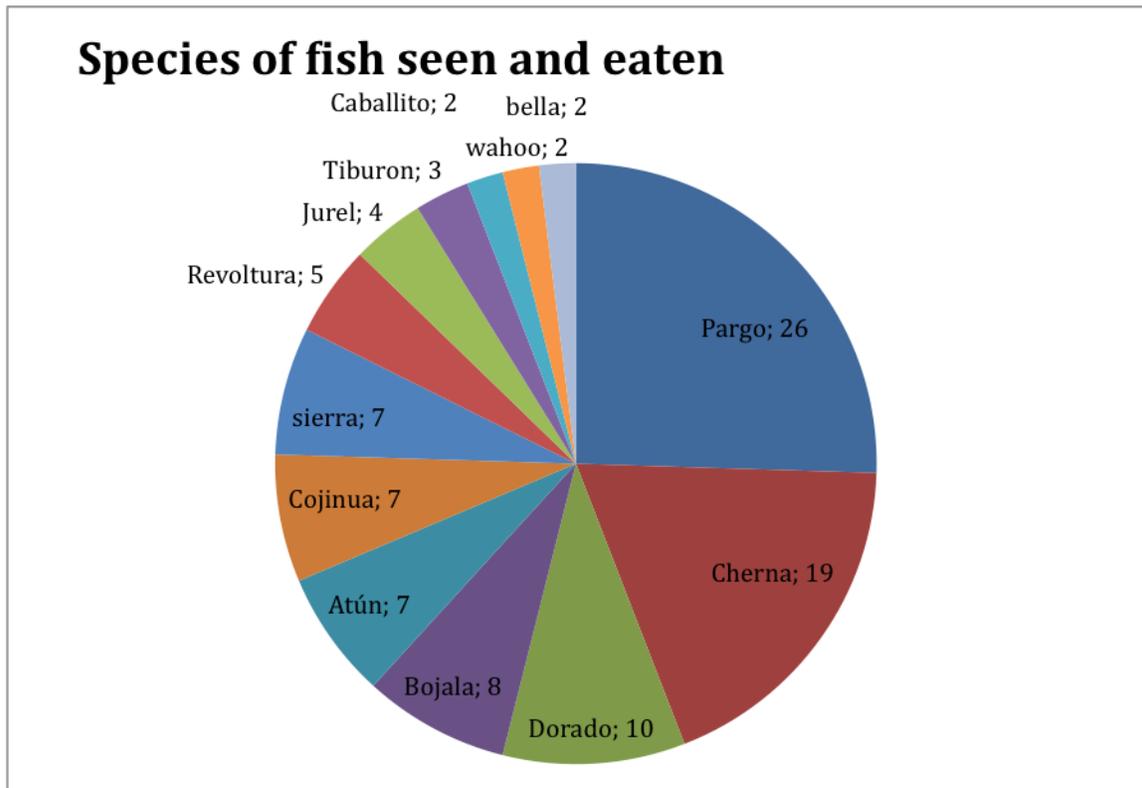
Question 7: How many days a week do you work?



Question 8: How many hours a day do you work?



Question 9: What types of fish have you seen or fished in this area?



Question 10 & 11: Do you work with any "cold room" association? Which one?

Of the 30 interviewed, most worked for Edwin at Mariscos y Pesca de Pedasí, followed by the Asociación de pescadores de Katy, Productos Andreas de Mar and the Cooperativa de Carmen.

Question 12: Where do you sell your fish?

The majority of fishermen interviewed sell their fish to the "cold room" fishing associations. A few are independent from these associations.

Question 13: What tools do you use to fish?

Most fishermen (75%) use a hand line. 18% use a bottom longline.

Question 14: What type of boat do you use?

All the fishermen interviewed use a 22-23 foot long boat with an outboard motor that has a speed of 40 hz.

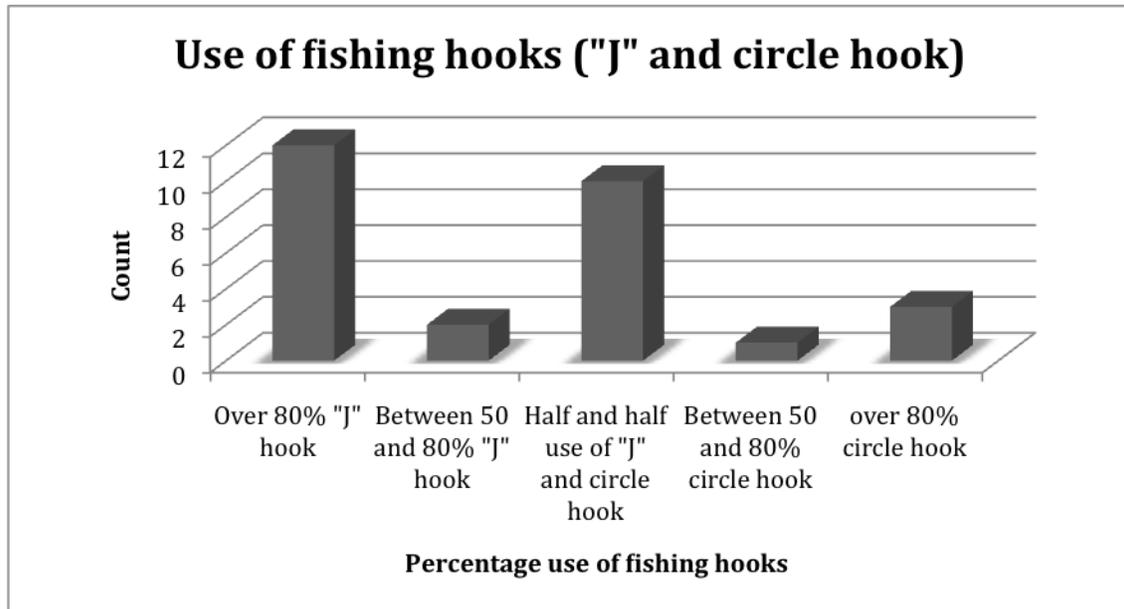
Question 15: What types of hook do you use?



J Hook



Circle hook



Question 16 & 17: Where did you buy this type of hook? Where can you buy circular hooks in this region?

Hooks are sold at the different fishermen associations in Pedasi. Circular hooks are sold in the fishermen associations as well as in Casa Maro in Chitré and in Abernati.

Question 18: Have you ever caught a fish that you did not want to keep?

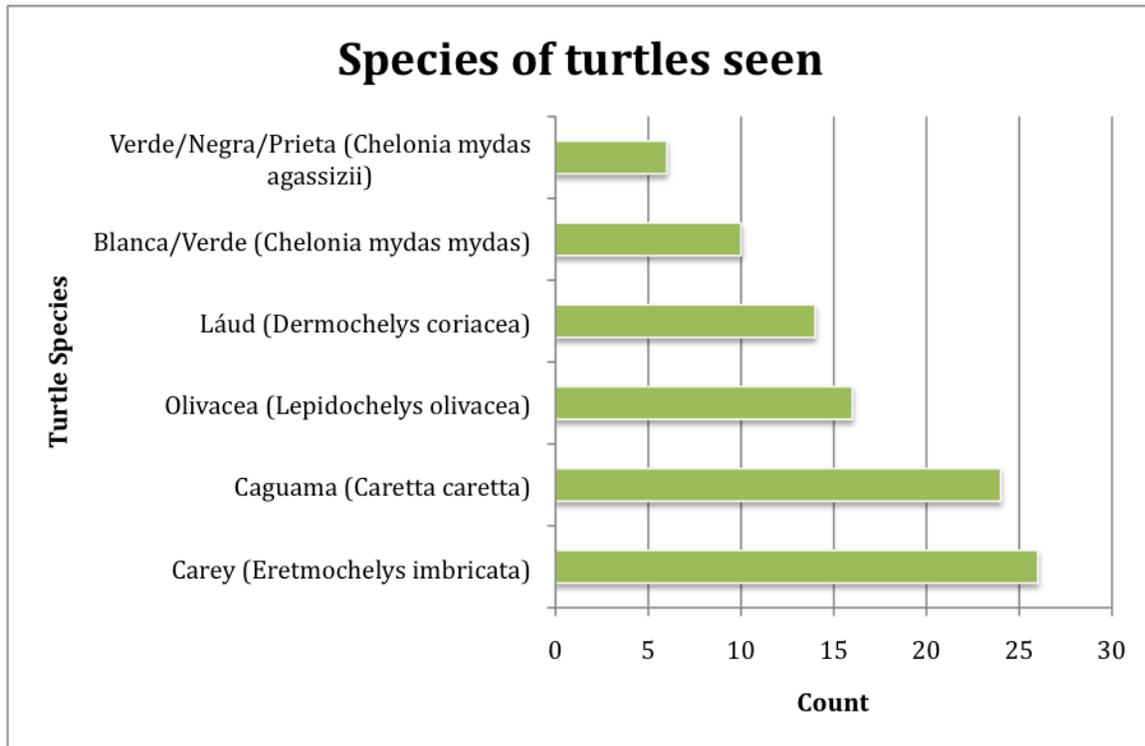
Question 19: What species was it?

Question 20: What did you do with it?

Only 40% of fishermen had already caught a species that they did not want to keep. These have included marlin, revoltura, congo and cojinua. Most fishermen let the fish go, however, some will eat or sell them claiming that they are bad quality.

Question 21: Have you seen turtles in this area?

97% of respondents have seen turtles in the area.



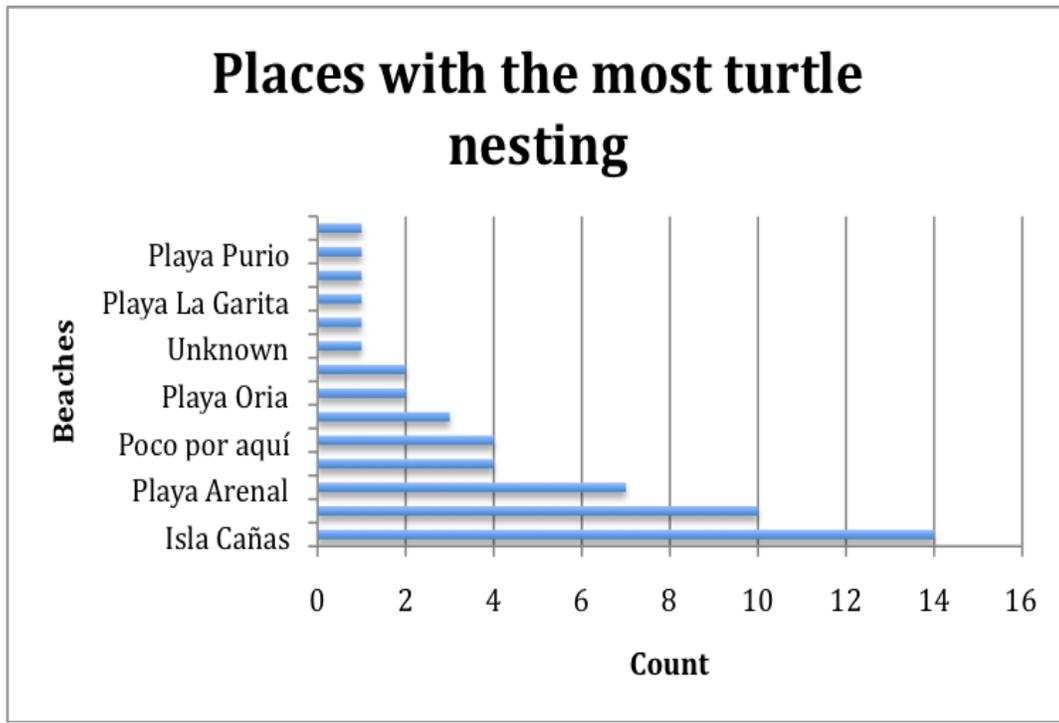
* We have decided not to include the 2 counts of golfina in the graphs as this region is not part of this species distribution; it may be that the golfina was confused for the olivacea. Based on current scientific, there is a very rare chance that this species has been spotted in this area.

Turtles have been seen in the following beaches: Playa La Garita, Playa Arenal, Isla Iguana, Playa El Toro, Playa Lagarto, Playa El Lanchón, Punta El Tigre, Playa Los Destiladeros, Los Sedors, La Guaca, Los Palmas

Question 22-25: Have you ever captured a turtle? How often? What do you do with it? How do you release it? Do you leave the hook inside or remove it? Do you cut the line?

The majority of fishermen, 60%, have never caught a turtle while fishing. 33% have, but claim that it is very rare (occurring 2-4 times a year). They free the turtles back into the ocean after taking out the fishhook.

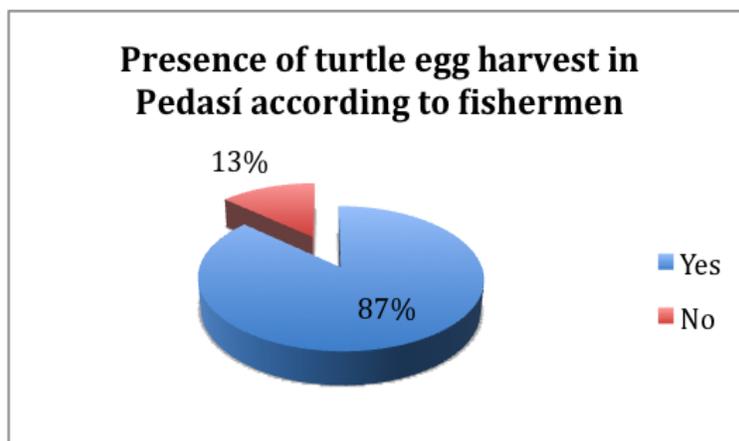
Question 26: Where is there the most turtle nesting?

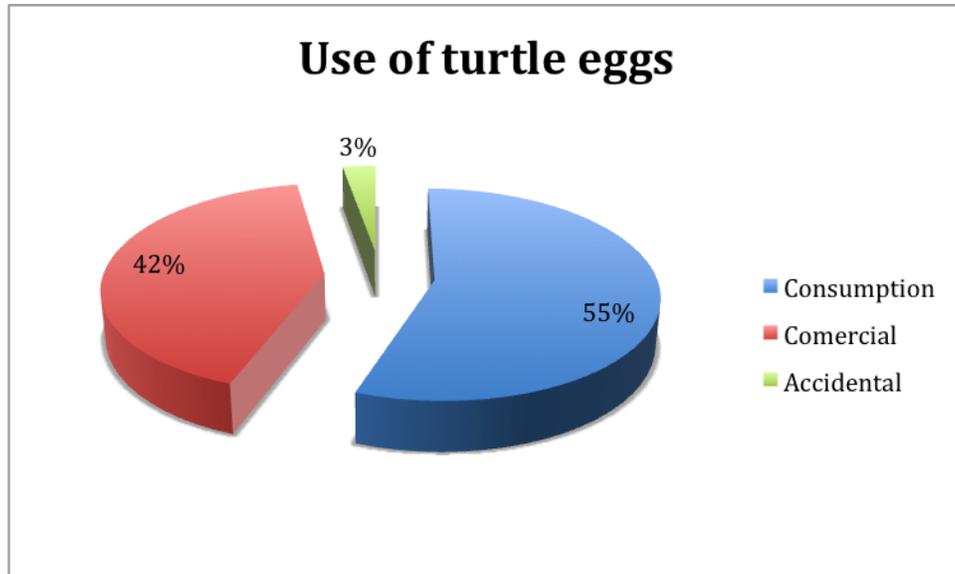


Question 27: Is there turtle fishing in this area?

100% of respondents claimed that there was no fishing in the area. Most explained that it was not done because it was illegal.

Question 28: Do you think turtle egg harvesting is common here?





Question 29: Do you harvest turtle eggs?

9 people (30%) said they eat turtle eggs. You can buy 4 turtle eggs for \$1, but before you could buy 12 for the same price

Question 30: How would you identify those who do it?

87% of respondents identified them as residents from nearby towns. Only 6% claimed that they were fishermen. The rest did not know or did not believe it to be practiced in the area.

Question 31: When is it best to harvest turtle eggs? In what season and at what time of day?

The most common answer was during the rainy season at night.

Question 32: How do you think turtles are affected by coastal development?

"This affects them very much as they are caught in long lines and trawlers, the presence of many tourists scares the turtles away. There are also people who hunt them and eat their eggs"

"They cannot reproduce anymore"

"Less come out of the water now compared to before"

"Tourists help; they take photos, help with conservation, education and the care of beaches"

"They are affected by the toxic garbage and substances dumped on the beaches and water which then intoxicates them"

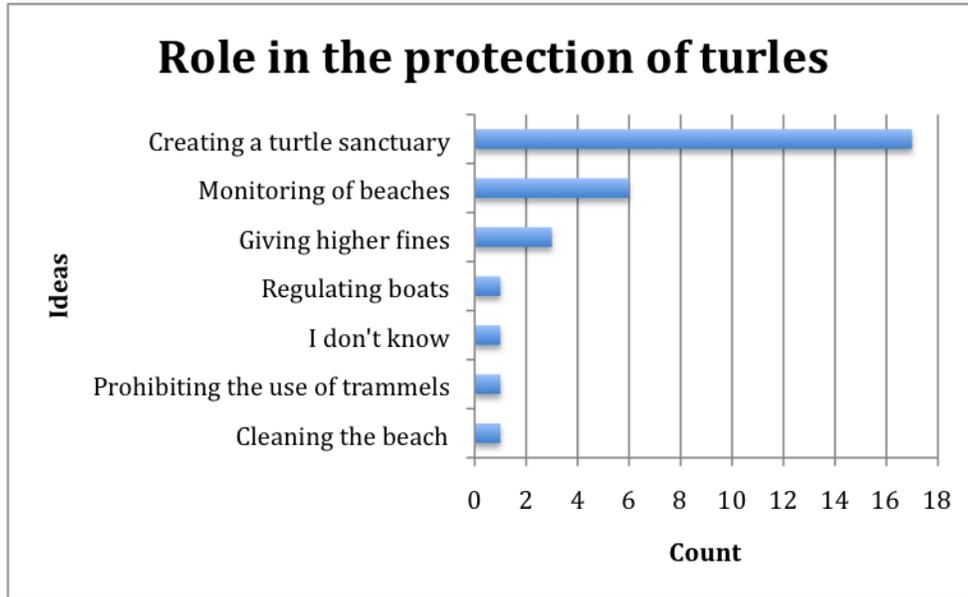
"It is detrimental to them because it takes away their natural areas; people walk on the beaches and destroy their eggs"

Question 33: What do you think would be the best way to protect turtles here?

Most people agree that a turtle sanctuary is the best way to protect the turtles of the area. Other suggestions included monitoring the beaches and keeping them clean, prohibiting or having selective egg collection, giving out fines to those collecting eggs or killing turtles, eliminating the use of trammel

nets because they are the most common cause of turtle death and finally regulating boat traffic (for example having some areas designated for fishing and others solely for turtles).

Question 34: How do you see your role in the protection of marine turtles?



Question 36: Where would be the best location for a turtle sanctuary?

The top three beaches chosen for a turtle sanctuary were: Playa Arenal, Playa Lagarto and Playa El Toro (in that order). The following criteria were stated as being important when choosing a location:

- Some rocks so turtles can hide
- Police presence to protect the sanctuary
- Low traffic area where there are less people

Question 37: Have you heard of the Pablo A. Barrios Wildlife Refuge? What have you heard about it?

60% of people interviewed have heard of the refuge.

“Not much”

“There is a lot of deforestation because the foreigners want a view of the ocean”

“Pablo Barrios fought to create this refuge and to clean up the area. After that there were people who built lots and no one helped with anything.”

“It is prohibited to cut down trees, hunt animals, take eggs or use trammels”

“It is protected by ANAM”

“Turtles come to the beaches in this refuge”

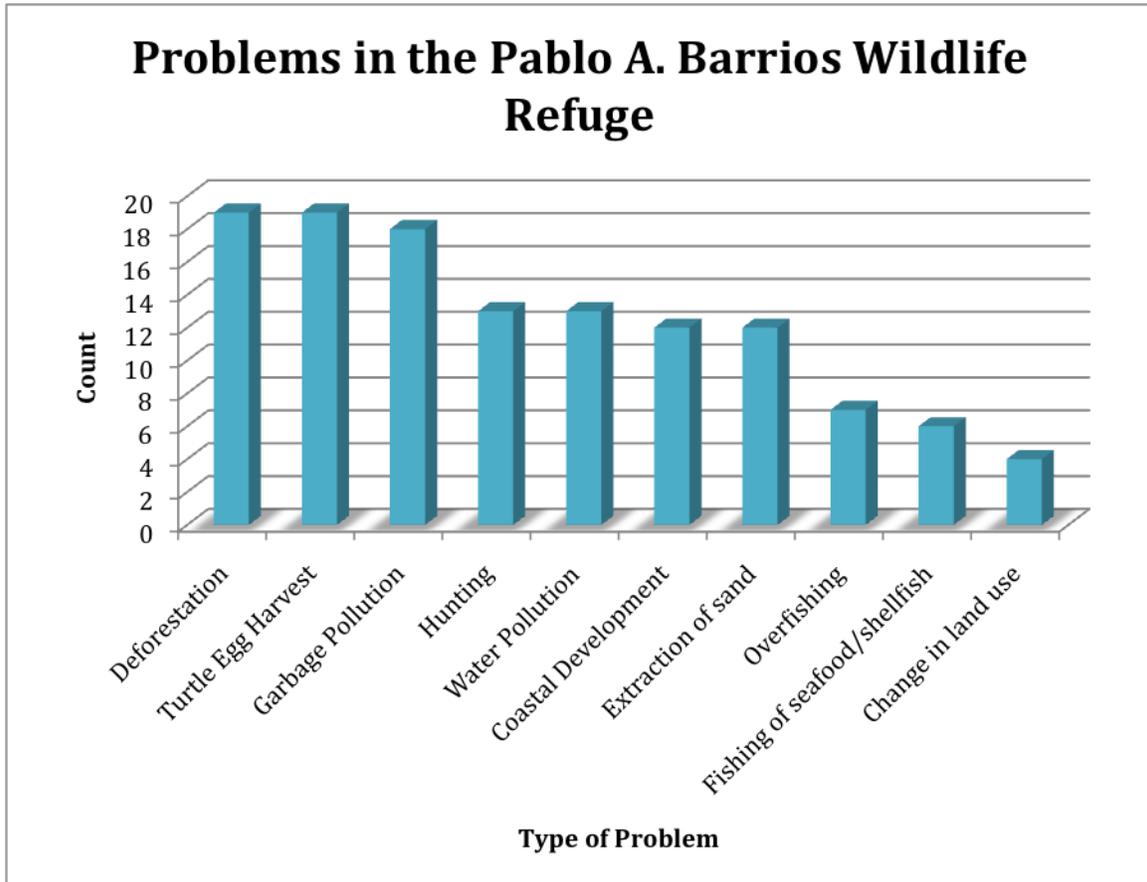
“It is along all the beaches of Pedasi”

“People abandoned the idea, very few are aware of its existence”

Question 38: Do you know the limits of the refuge?

Only 43% of those interviewed said they knew where the limits of the refuge were. However, when presented with a map, only 20% actually knew the correct limits. It is relevant to note that those who claimed to know the limits often described the limits on the coast but not how far the refuge goes inland or out to sea.

Question 39: What are the biggest problems regarding conservation of the refuge?



Question 41: Do you think activity within the refuge has increased or decreased? There is more coastal development, more construction, more people who work in construction and more tourism. The costs associated to fishing have risen, gasoline costs more, things in general cost more since Europeans and Americans started to arrive about 5 years ago. Some say that there are more fishermen, others say there are less.

Question 42: How has tourism affected conservation?

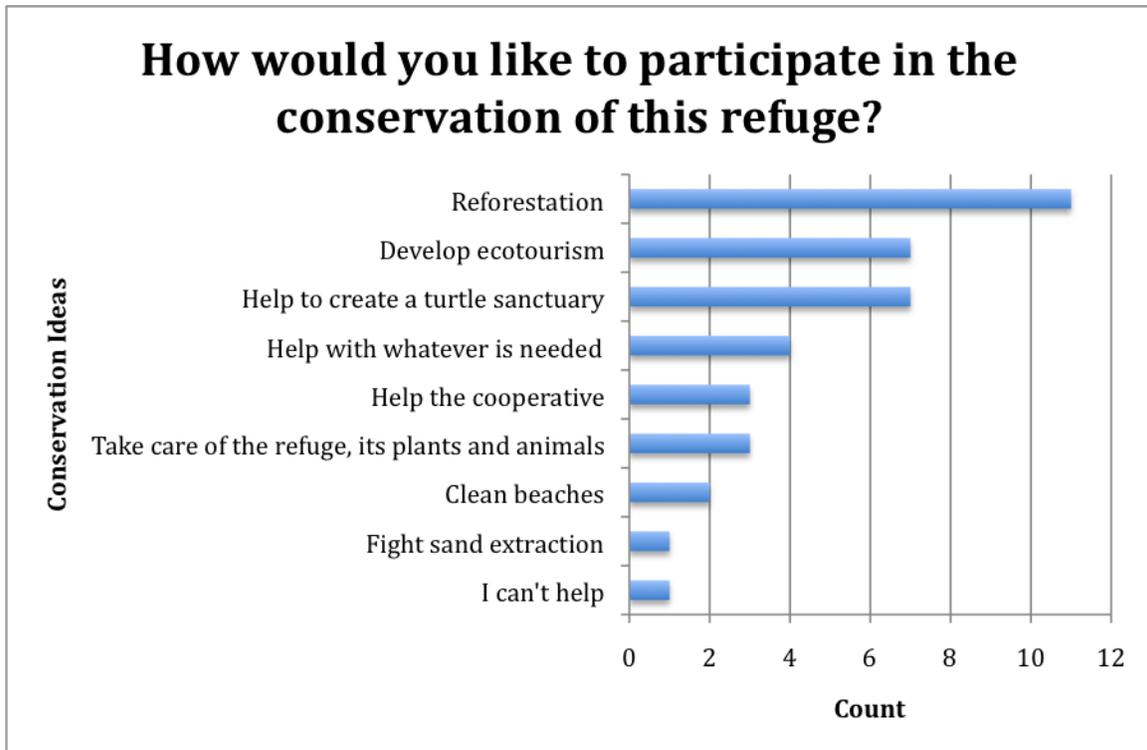
70% of fishermen think that tourism has a positive effect on conservation whereas 7% believe it has negative impacts. 12% explained that it was both positive and negative. Tourists like to see clean and 'green' areas. They help clean and care for the beaches, plant trees, conserve nature and are generally more concerned about the environment than local Panamanians. The negative views were based on the fact that they bring in more people and activities in the protected area, some build houses and start

other projects that harm the refuge by impacting the wildlife both on land and in the sea.

Question 43: Would you like to participate in the sustainable development and conservation of the refuge?

90% of people would like to participate in the sustainable development and conservation of this refuge.

Question 44: In what way?



Question 45: What do you think a management plan for a protected area is?

“Prohibits many things such as cutting down trees; it ensures beaches are kept clean, controls long-line fishing and sport fishing as well as the harvesting of turtle eggs”

“Discusses how turtles will be treated if they come out of the water and what will be done with their eggs; also addresses management of fish”

“Care of the refuge because if there is no support, the refuge will be gone”

“Controls what can be done, the numbers and statistics of what occurs within the area, and implements a turtle sanctuary project”

“It does not have any meaning to me”

“It serves to say "This cannot be done"”

“It is something serious; people are more respectful of something that is serious and official”

Question 46: How do you view the management plans that ANAM has implemented in other protected areas?

“I am not impressed by ANAM. It is the same every time, everything is for their benefit”

“They are good and work well - some do, but some do not. When it doesn't work, it is because of a problem with the implementation of the law”

“It doesn't work. They do not have enough staff; there is no one to gives fines. People are still going to fish in the corals in Isla Iguana.”

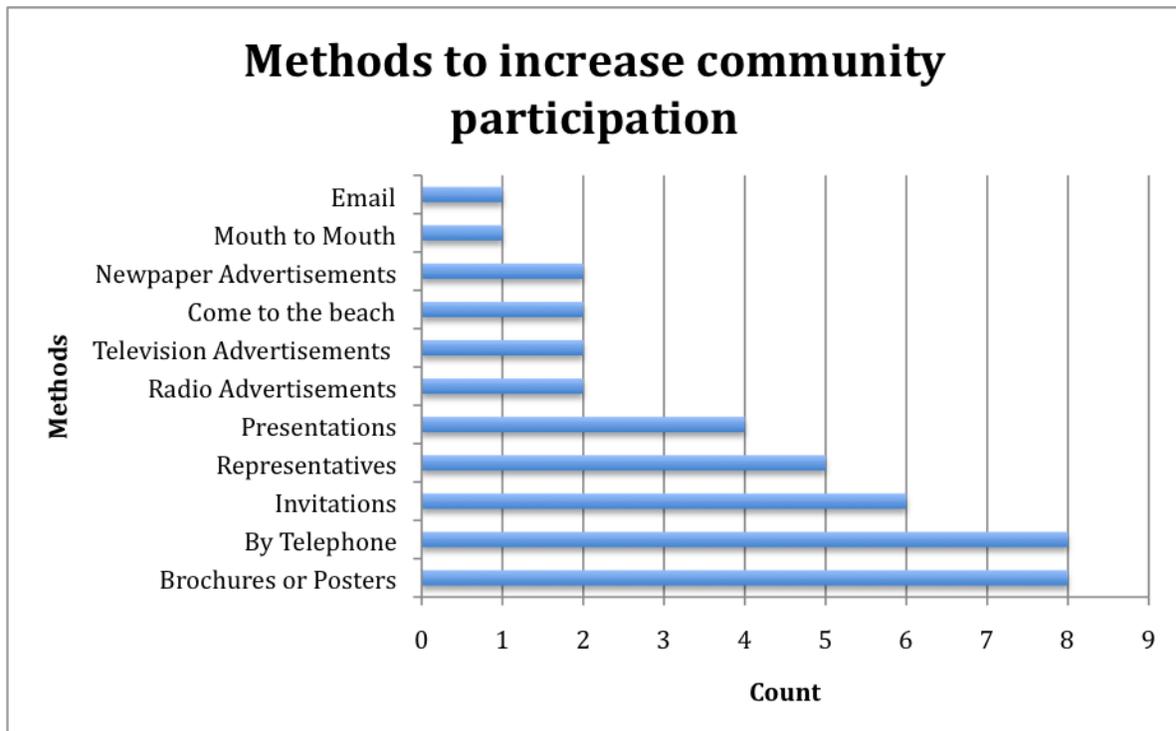
“Yes, they are good; 80% of the time people respect the protect areas, but 20% of the time they do not respect them.”

“They are not so good because the people are still hurting the environment, we need more reinforce them more.”

Question 49: Did you know that ANAM is required to hold regular meetings with the community to discuss and ask for recommendations regarding the management of the protected areas?

63% of respondents did not know that ANAM must meet with the community regarding the management of the protected area.

Question 50: How do you receive your event notifications? What recommendations to you have to gather more participation?



Question 51: Were you made aware of any meetings in the past?

39% of the 31 fishermen interviewed were aware of such meetings in the area of Pedasi in the past, 61% were not.

Question 52: Why do you think people do not go to these meetings?

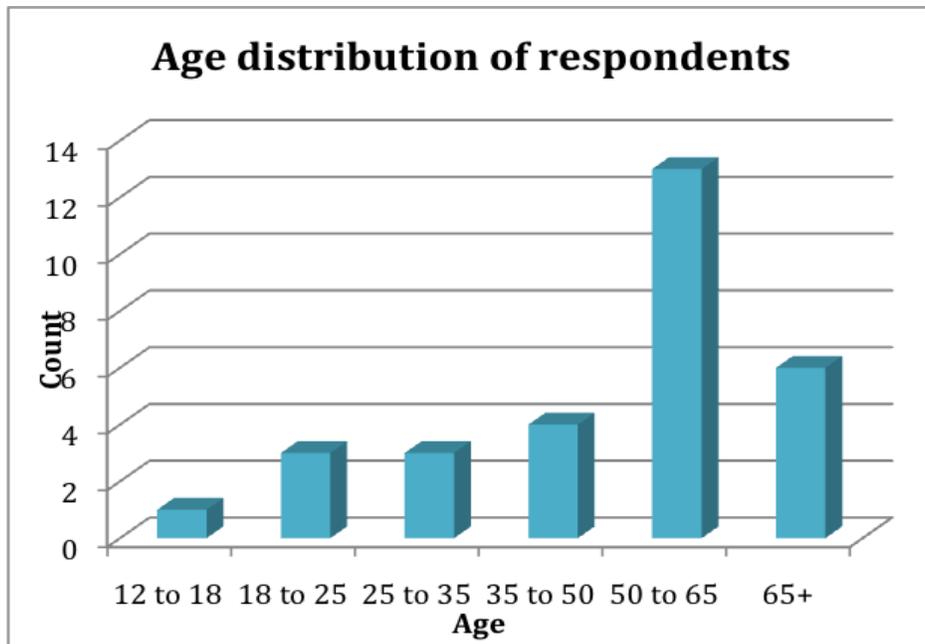
The most common reasons why people do not go to meetings are because they are not made aware of them, because people are not interested, and because do not feel affected by conservation.

Question 53: Do you have any recommendations to motivate the people that work and live within the refuge to help in its conservation?

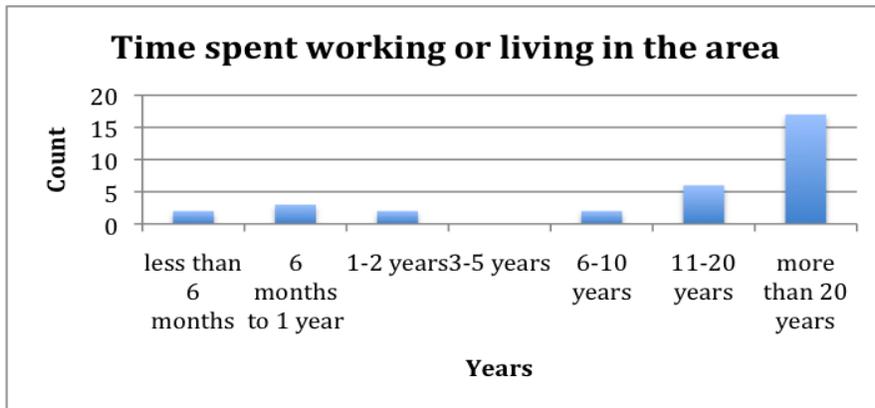
Different ideas included motivating people through education and workshops, having more communication among community members and representatives or community leaders who support the refuge, educating children so they become more aware as they become adults.

APPENDIX II: General Interview Results

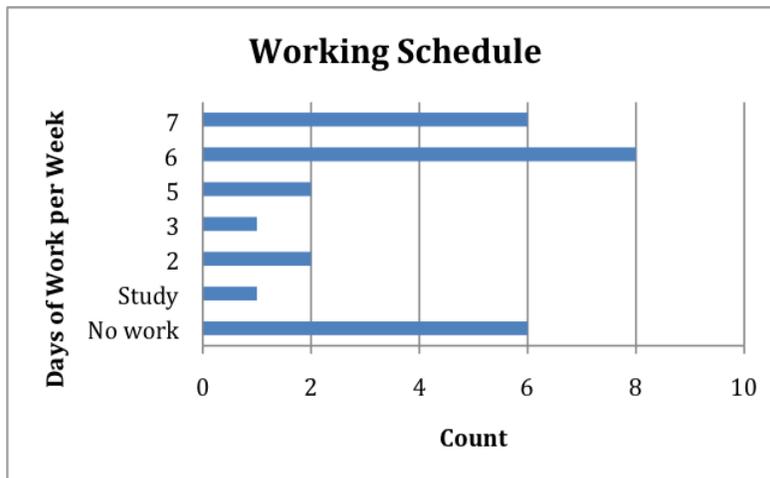
Question 1: How old are you?



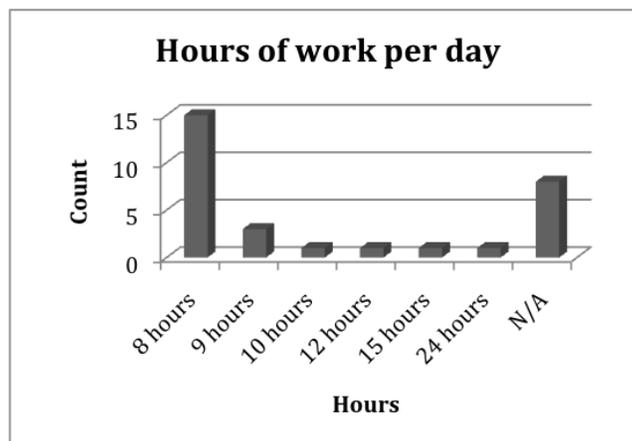
Question 2: For how long have you lived or worked here?



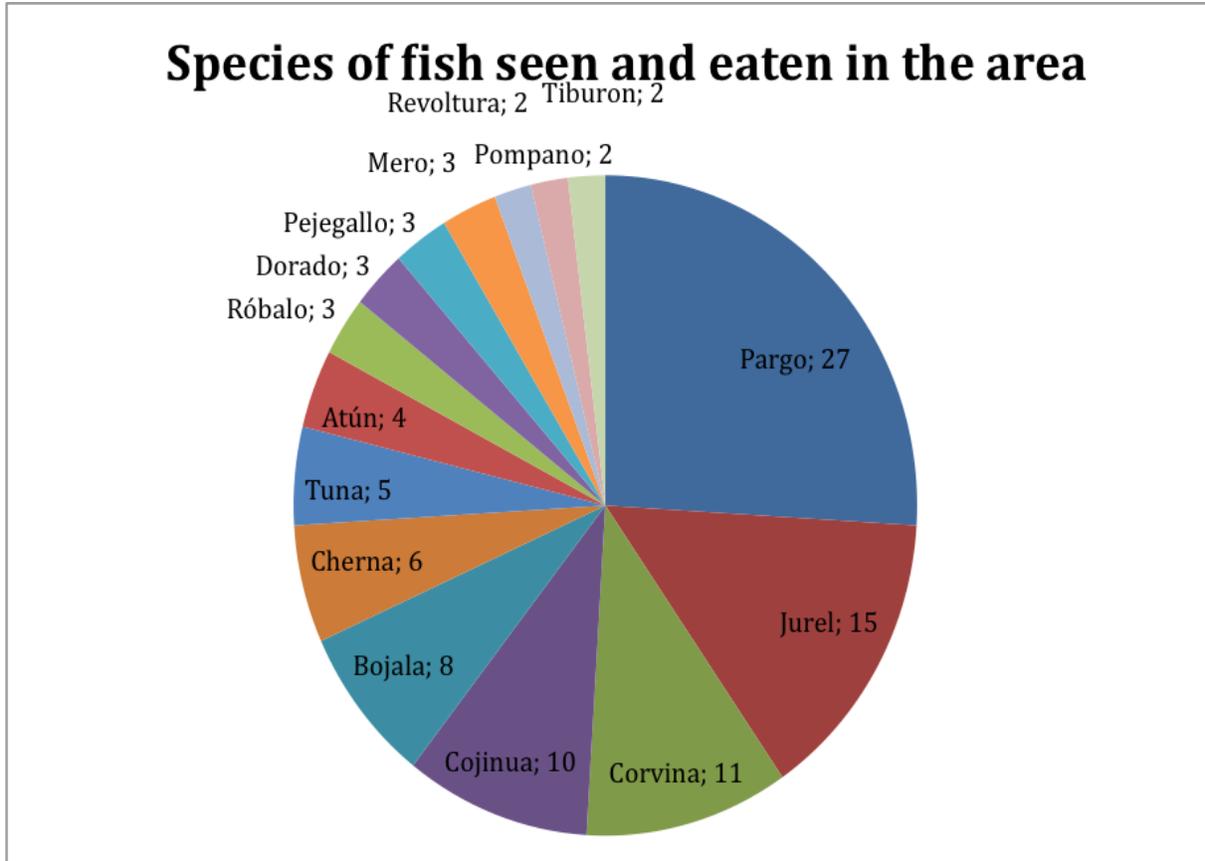
Question 3: How many days a week do you work?



Question 4: How many hours a day do you work?

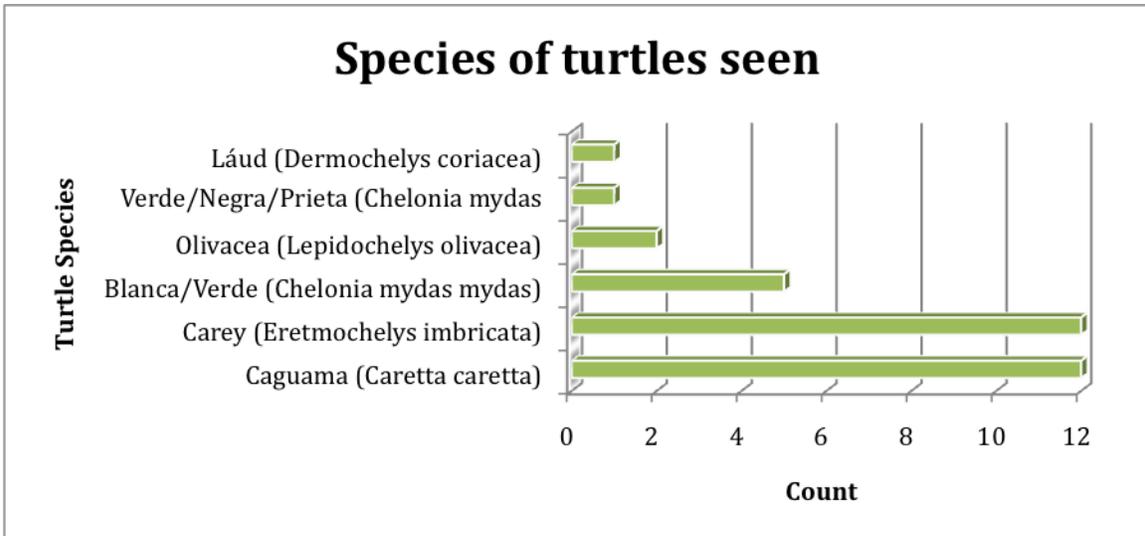


Question 6: What types of fish have you seen or eaten in this area?



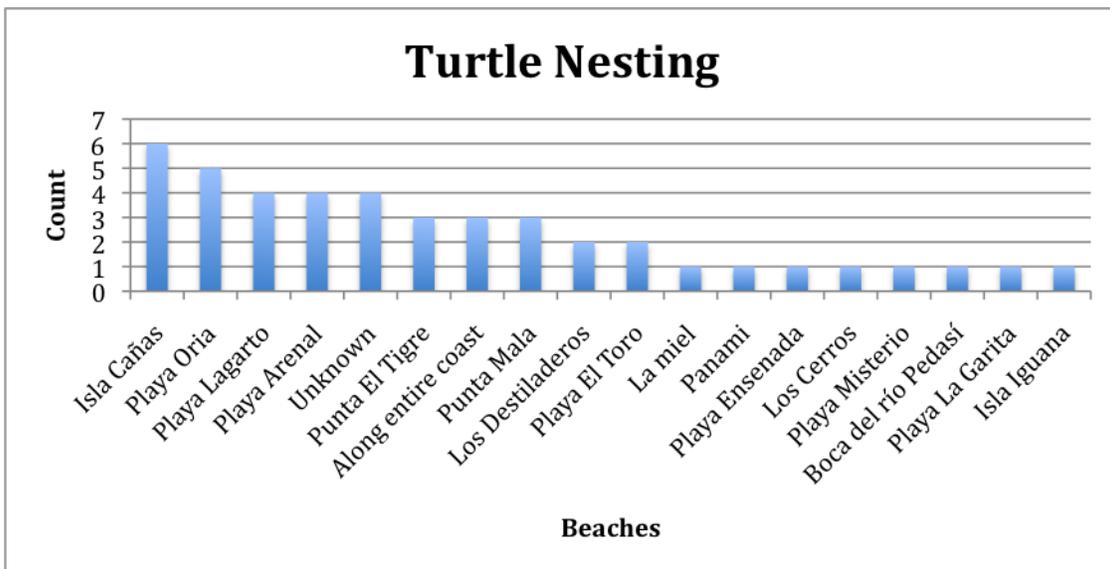
Question 7: Have you seen any turtles in this area? Which species?

60% of respondents have spotted turtles in the area.



Turtles have been seen in the following beaches: Playa Arenal, Orea, El Toro, Lagarto, El Toro, Punta Mala, Misterio, Rincón, Los cerros, Destiladeros, Punta El Tigre, Ensenada del Río Pedasí.

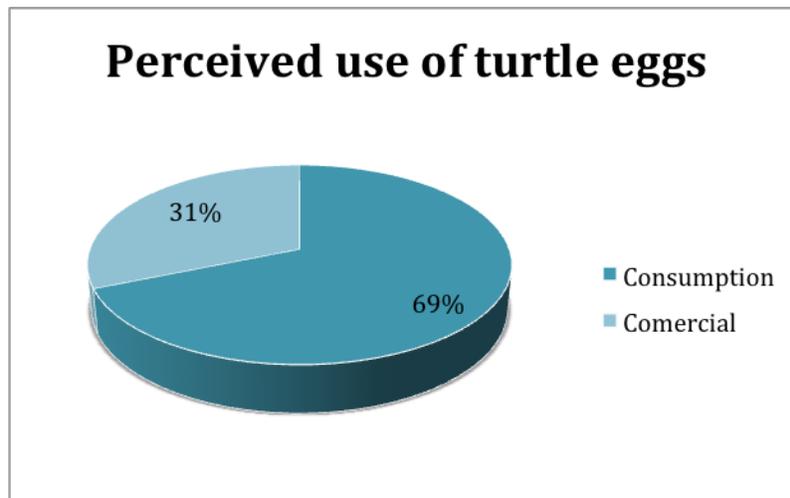
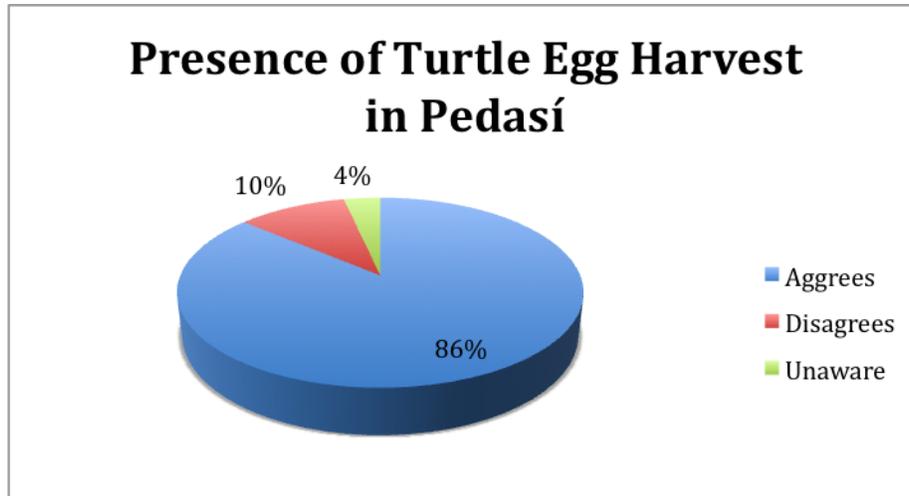
Question 8: Where is there the most nesting?



Question 9: Does turtle fishing exist in this area?

Only 1 person responded 'I do not know', while the 29 others (97%) said there was no turtle fishing in the area.

Question 10: Do you think egg harvest is common here?



Question 11: Do you eat turtle eggs?

37% of those interviewed said they eat turtle eggs.

Question 12: How would identify those that do it?

The majority of people (83%) identified them as residents from nearby towns. 10% said they were fishermen, 3% claimed them to be tourists, and 3% did not know.

Question 13: How do you think turtles are affected by coastal developments?

“Yes, they are affected. They used to come out in large numbers; now they don’t due to the lights on the beach”

“They are affected by the harvesting of their eggs and are killed by the fishermen’s ropes and motors.

These things don’t just affect turtles, they affect all forms of wildlife”

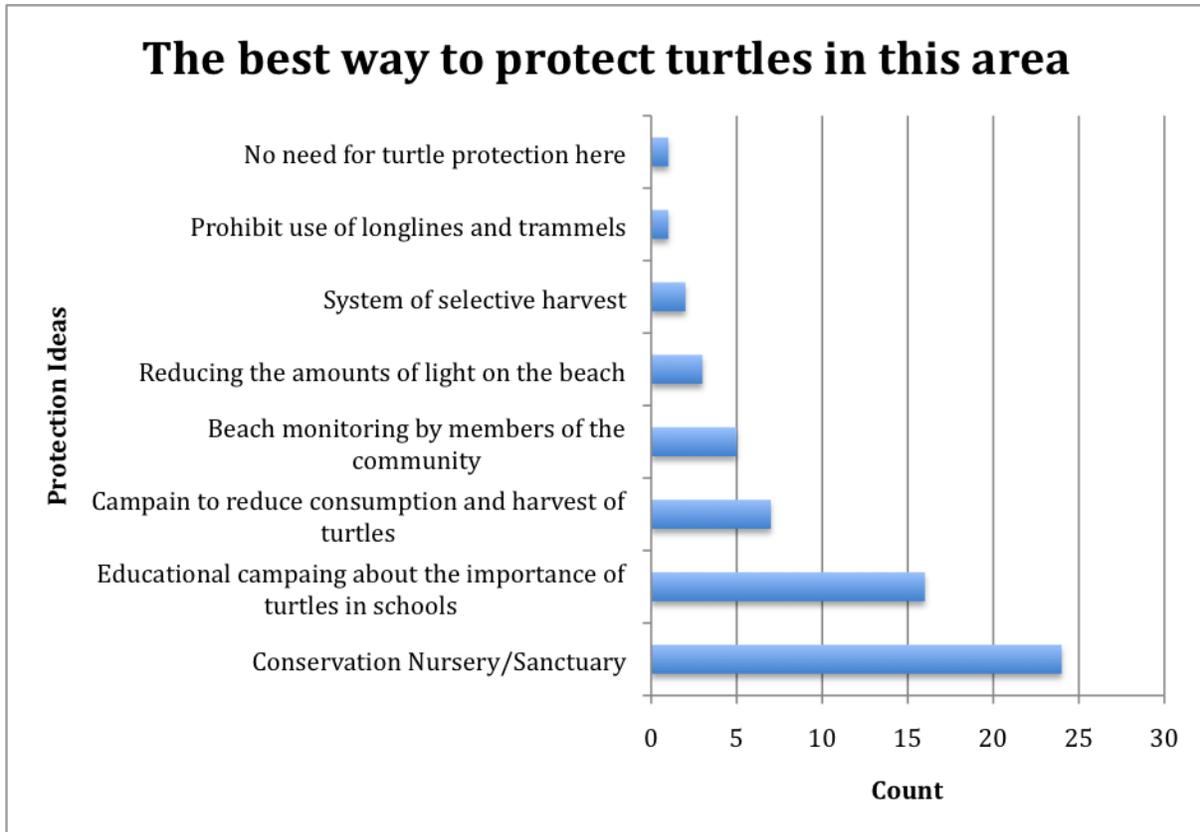
“They are killed by the long lines”

“What affects them most is the plastic on the beaches and in the water”

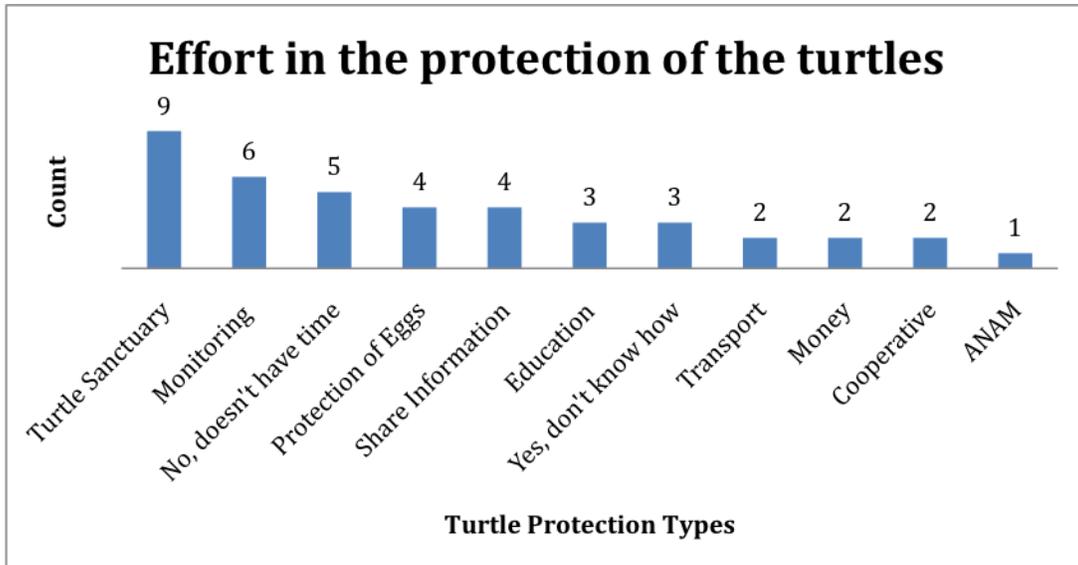
“Coastal development does not affect them because they can still be seen coming out of the water”

“They don’t have space due to the construction so they have to find another place”

Question 14: What do you think would be the best way to protect marine turtles here?



Question 15: Would you like to participate in this effort to protect turtles? How?



Question 16: If a turtle sanctuary were implemented, where do you think would be the best place to have it?

The top three beaches chosen for a turtle sanctuary were: Playa Arenal, Playa El Toro, and Playa Rinconcito. 57% of suggestions included at least one of the three beaches named above. Recommended characteristics of the turtle sanctuary include:

- Presence of ANAM's support
- Protection with rocks but not too many rocks
- Area with lower density of people
- Area free of construction
- Area accessible to community members to ensure they can take care of it

Question 17: Have you heard of the Pablo A Barrios Wildlife Refuge?

Of the 30 interviewed, 21 (70%) had heard of the refuge.

What have you heard about it?

- “I only know the name”
- “It helps to conserve the forest, the flora and the fauna”
- “The Cooperative helps with reforestation in the beach”
- “No one has done anything about the refuge”
- “Few people see the area as a refuge or respect it”

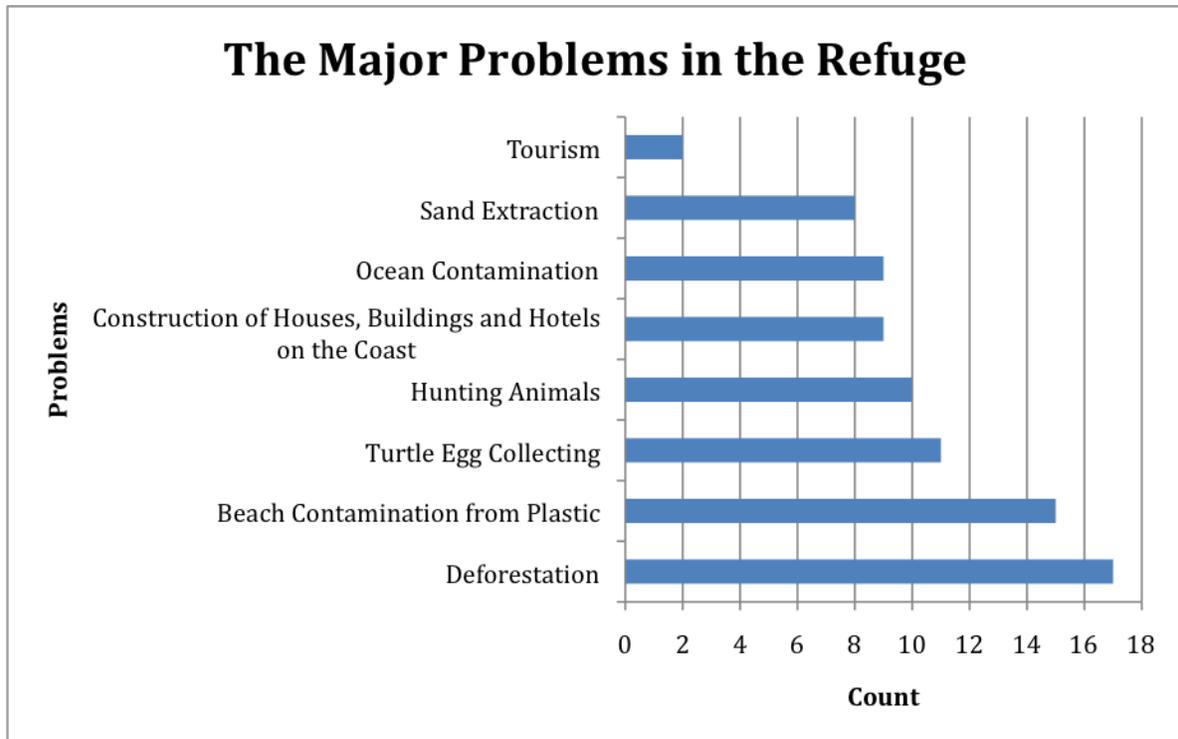
Question 18: Do you know where its limits are?

Only 43% of those interviewed said they knew where the limits of the refuge were. However, when presented with a map, only 13% actually knew the correct limits. It is relevant to note that those who claimed to know the limits often described the limits on the coast but not how far the refuge goes inland or out to sea.

Question 20: Describe your activity within the refuge.

Most people come to the beaches for the day or stay in their lots for a few weeks each year (during summer and Semana Santa), living and fishing. Some people have restaurants on the coast or sell food during Semana Santa.

Question 21: What do you think the most important problems in the refuge are?



Question 22: Do you think activity within the refuge has increased or decreased?

70% of respondents said that activity within the wildlife refuge has increased, 20% claimed it has decreased whereas 10% remained undecided. The majority said that tourism and fishing have increased in the past years.

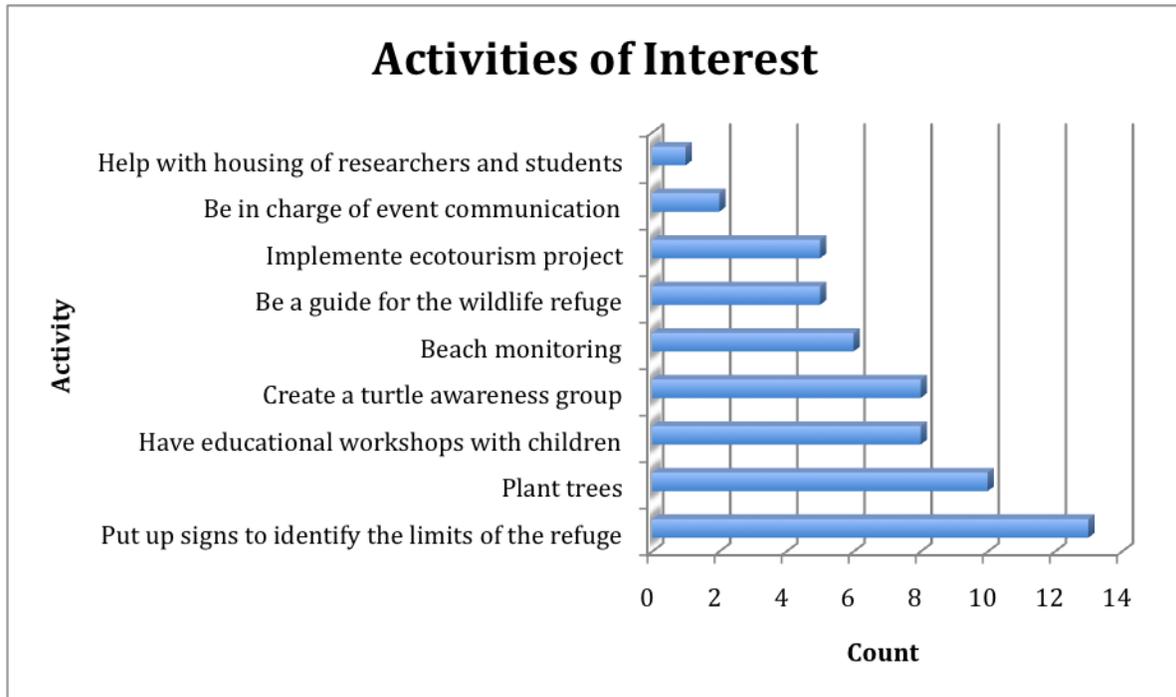
Question 23: Do you think tourism affects conservation positively or negatively?

The positive aspect of tourism is that it helps local businesses and the local economy. Tourists also are more likely to conserve because they take care of the beaches, reforest and protect turtles. However, tourism can also lead to more construction in the refuge and therefore more deforestation. Some people throw trash on the beaches and at times they do not cooperate with the community. Overall, tourism is seen in a more positive light. Developers and investors, on the other hand, who when they build and buy lots often destroy the natural habitat, are viewed more negatively.

Question 24: Would you like to participate in the sustainable development of this refuge?

80% of respondents were interested in participating in the sustainable development and conservation of the refuge. 10% were interested but did not have time. 10% were not interested at all.

Question 25: What would you like to do?



When asked what types of activities they may want to partake in, respondents were mainly interested in organizing educational workshops, especially in schools, forming a turtle sanctuary/protection group and helping with signage identifying limits of the wildlife refuge. Several were interested in some of the other activities listed above.

Question 26: What do you think a management plan for a protected area consists of?

5 of the 30 people could not answer.

For the others, a management plan is something that helps protect and conserve the trees, marine and terrestrial flora and fauna. It identifies which group of people has to take care of the area. It also says more precisely what you can and cannot do within the refuge (laws about deforestation, protecting turtle eggs). It can establish a system of sustainable tourism in the beaches and can ask for international donations to help the area. It can create specific places for people to see the diversity of animals and plants. It looks to establish education campaigns.

Question 27: What is your opinion on the Pablo A. Barrios Wildlife Refuge?

"People don't care much, it more or less helps."

"Many people do not know what is within the refuge, there is a lack of education and a lack of

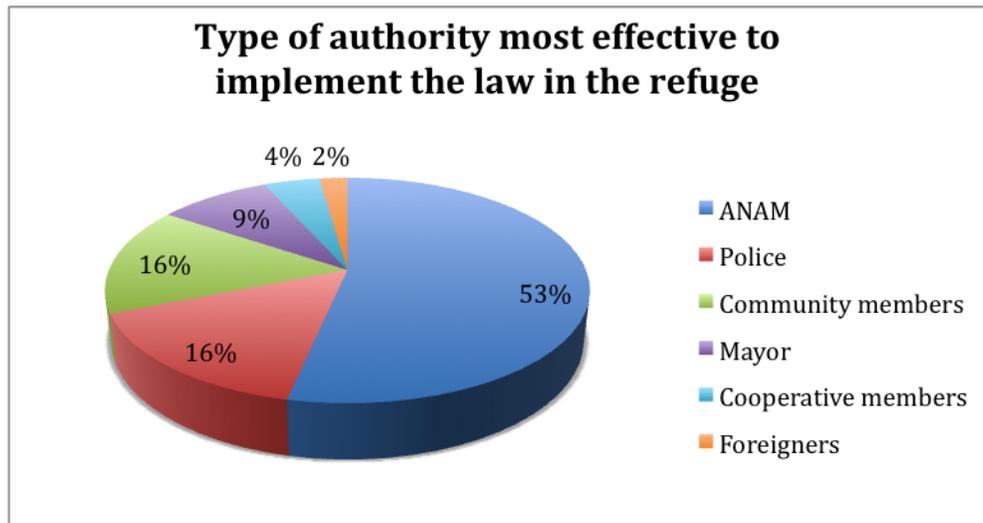
implementation."

"It is good because it helps protect the environment."

"People are building everywhere, Mariabe beach mangroves are being destroyed, it cannot be called a refuge if people are building within the refuge."

"It was a good idea to make it, but there is a lack of communication to get the people to support the refuge and respect what they have"

Question 28: What type of authority would be most efficient and realistic to implement the law within the refuge?



Question 30: Did you know that ANAM is required to hold regular meetings with the community to discuss and ask for recommendations regarding the management of the protected areas?

57% of respondents were aware that ANAM is required to hold regular meetings with community members to discuss the management of the local protected areas. 43% were not.

Question 31: Have you ever been aware of one of these specific meetings?

30% of respondents have been aware of ANAM meetings occurring in or near Pedasí in the past.

Question 32: Why do you think that no one goes to these meetings?

"We are unaware of the meetings and events, there is a lack of communication between ANAM and the community. ANAM should send more fliers and speak in schools" (18)

"There is no interest in conservation" (6)

"If I had known I would have gone" (4)

"The reunions are inconvenient" (1)

"The community is apathetic and does not want to cooperate" (1)

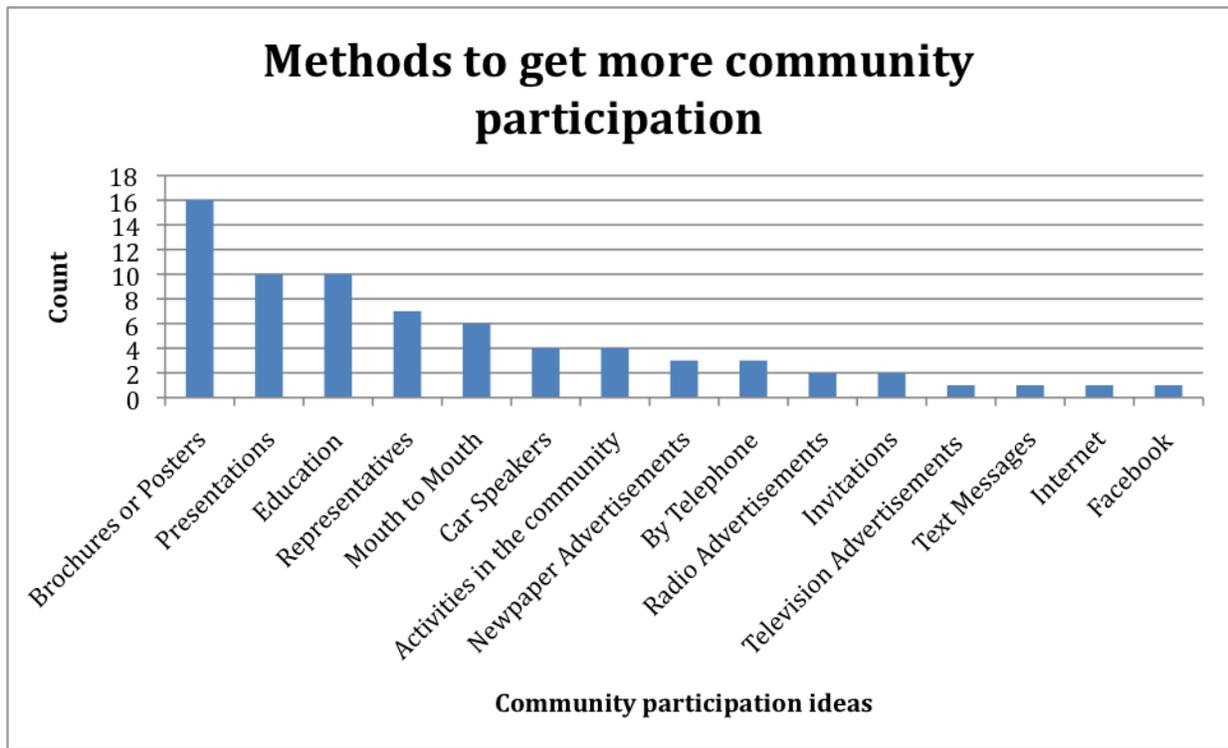
"We do not have time to go" (2)

"The meetings are at inconvenient times, they should be on weekends, Sundays at 5 or 6pm" (2)

“ANAM does not have a lot of credibility in the area” (1)

“The meetings are boring” (1)

Question 33: How do you receive your event notices? What recommendations do you have to increase participation?



Question 34: If you were the mayor, what would you do to motivate people to participate in the conservation of the Pablo A. Barrios Wildlife Refuge?

“I’d give more support to ANAM and hold conservation talks in the community”

“I would implement more civil protection; it’s not worth putting in more laws because no one respects them”

“I would greatly increase education for kids”

“I would say that they have to participate in conservation initiatives or else festivities would be canceled”

“I would increase communication with community members, have stricter laws and eliminate corruption; I would also prohibit long lines and trawlers because these kill turtles”