

Volunteer and Sea Turtle Tourism: A Case Study of a Social-Ecological Conservation

Project in Matapalo Beach, Costa Rica

Meredith Leigh Barnard

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Marc L. Miller

P. Dee Boersma

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University of Washington

Abstract

Volunteer and Sea Turtle Tourism: A Case Study of a Social-Ecological Conservation Project in Matapalo Beach, Costa Rica

Meredith Leigh Barnard

Chair of the Supervisory Committee:
Professor Marc L. Miller
School of Marine and Environmental Affairs

All species of sea turtles are on the IUCN list as critically endangered, endangered, or vulnerable. Sea turtle conservation efforts are facilitated by volunteer-based social ecological conservation projects. This thesis describes sea turtle conservation projects in Costa Rica and focuses on a case study in Matapalo Beach. The Matapalo Beach project is a success both in terms of conservation and social objectives. Regarding conservation, the hatching success has been consistently high. Regarding social objectives, we found that, in general, college-educated women from Europe are the major demographic group that participates in this project. Selected findings show that regarding motivations, a) few respondents had a history of wildlife conservation volunteering, b) roughly half indicated that volunteering was the main purpose of their trip, and c) most said that sea turtles were important to them. Regarding satisfactions, a) most learned about sea turtle biology, b) most viewed their work as important to conservation, and c) most enjoyed seeing sea turtles, watching hatchlings, handling turtle eggs, and learning about sea turtles. Regarding self-efficacy, the volunteers' environmental education and wildlife interactions were most important. We recommended that social-ecological conservation projects emphasize a positive, personal experience for the volunteers. This will better generate behavioral changes in volunteers to aid in successful conservation efforts.

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Introduction

The field of marine and environmental affairs is set at the intersection of the natural and social sciences, and it deals with contemporary, overlapping issues in marine systems, policy, and management. This interdisciplinary field addresses a variety of marine issues, including: marine resource management, coastal zone management, fisheries management, marine spatial planning, climate change impacts, and ports and marine transportation. Those that practice in this field take a perspective that accounts for the biotic and abiotic factors that influence marine ecosystems, the historical and future use of marine environments, various interest groups that are involved with and the institutions that govern resource use and management.

A central theme in marine and environmental affairs is marine conservation. Humans depend on natural marine resources and the services that are provided by the ecosystem. Therefore, human dimensions of the marine environment must be considered when discussing conservation. These ecosystem services can be used in either a consumptive and/or non-consumptive manner, and they can provide humans with subsistence and/or commercial benefits. Therefore, the dynamic and complex components involved in conserving marine ecosystems are influenced by equally dynamic and complex human activities. Due to the inextricable link between humans and marine resources, in considering conservation, one must look at the interactions between the two distinct components of a marine ecosystem: the environment and humans.

A major concern with regard to marine conservation is how to achieve an effective conservation outcome. In ecological systems, conservation success is dependent on

maintaining and/or improving environmental health. In an ecosystem that considers both ecological and social components, conservation success is contingent not only on environmental health, but also human well-being. With a successful conservation outcome of a social-ecological system, the marine resource will be more sustainable, and at the same time, the lives of those that are dependent on the marine resource will be improved.

There is an inherent human interest in charismatic megafauna (e.g.: dolphins, whales, and sea turtles). Not surprisingly, many people act on this interest by traveling to see and interact with these species. For this reason, charismatic megafauna are often used to convey a need for conservation to the public through tourism. However, people have long criticized the relationship between conservation and tourism, asserting that the presence of tourists not only negatively impact the infrastructure of a human communities, but also can interrupt ecological habitats and adversely influence animal behavior. More recently, researchers and conservationists alike have begun to recognize that tourism can actually provide a foundation for conservation. Tourism, when properly controlled, can help raise awareness to the public, generate funding for conservation science, and sometimes, can provide labor for conservation efforts (e.g.: when volunteers, who are also tourists, travel to work towards a conservation outcome).

Sea turtle conservation efforts are often facilitated by the recruitment of volunteer tourist participation. All species of sea turtles are on the International Union for Conservation of Nature (IUCN) list as either, critically endangered, endangered, or vulnerable. Several organizations have formed to make sea turtle conservation a priority. The ecological

conservation goals fuel the formation of such organizations, but there is also an obligation to understand the dynamics of the laborers that work on these conservation projects. Accordingly, research should be designed to examine both the ecological and human dimensions of social-ecological conservation projects. There have been studies conducted to evaluate the contribution that volunteer tourists have on conservation success, but few studies that incorporate a social impact analysis with regard to the volunteer tourists. By focusing on both the biological and human dimensions of environmental conservation, recommendations can be made to optimize human-environment interactions.

Plan of the Thesis:

This thesis focuses on volunteer and sea turtle conservation tourism of a social-ecological conservation project. This thesis is divided into two parts. Part I discusses key concepts and provides a theoretical background for the study. Chapter 1 focuses on defining social-ecological systems and projects and sea turtle conservation. Chapter 2 is a literature review and explores relevant tourism impacts, types of tourism, and literature with regard to volunteer motivation, satisfaction, and self-efficacy.

Part II of the thesis is a case study of a sea turtle conservation project in Matapalo Beach, Costa Rica. Chapter 3 gives an overview of all the active social-ecological sea turtle conservation projects in Costa Rica. Chapter 4 introduces the research site and describes the location, geography climate of the region, and the biological characteristics of the Olive Ridley sea turtle. The chapter also describes the social-ecological conservation project studied, including the daily duties and expectations of the volunteers. Chapter 5

explains the survey method used in Matapalo Beach and addresses the content of the survey. This chapter also includes the results; it discusses the conservation success of the social-ecological conservation project and the findings of the survey data with regard to volunteer motivations, satisfactions, and self-efficacy. Based on these results, the conclusion offers a discussion of the survey data with regard to the specific social-ecological conservation project studied. Finally, the thesis provides recommendations for volunteer recruitment that can be applied to other social-ecological conservation projects.

Part 1: Background

Chapter 1

Concepts

Since people are more inclined to donate money and time to conserve a species with which they can better relate, several conservation-oriented organizations have elicited volunteer tourist aid (Walpole and Leader-Williams, 2002). The use of volunteer labor to meet environmental conservation goals has several advantages. The recruiting organization is able to use volunteers to collect data that has the potential to directly benefit the organization's conservation goals (Senko *et al.*, 2011; Brightsmith *et al.*, 2008).

The volunteer experience is also advantageous to the volunteers themselves. By participating in conservation efforts, the volunteers are educated with respect to the environmental system in which they are working. This education comes in many forms, from a scientific knowledge of the system and the need to conserve it to a social learning experience where volunteers better understand themselves (Sin, 2009; Ballantyne, R., et al 2010). This chapter defines these social- ecological conservation projects and places them within the context of a social-ecological system. Additionally, this chapter discusses the field of conservation biology, specifically focusing on the conservation of sea turtles.

1.1 Social-Ecological Systems and Projects

In working towards

conservation one

must consider the

dynamics of the

entire social-

ecological system

(Low, B. et, al,

2003, Folk *et al.*,

2003, Folk, 2006).

This requires an

interdisciplinary

framework that

draws from both natural and social dimensions. This thesis presents a 2 component

conceptual model of the environmental and human dimensions, with an emphasis on

ethical concerns (See Figure 1). The interactions among the biological and human

dimensions of the system are critical in evaluating human involvement in the

management and conservation of a system.

The environmental component includes the flora and fauna, as well as the structure and

functions of the non-biotic components of the system. This component, fundamentally, is

the aspect of the system that is attracting the tourists and the part of the system that is

concerned with conservation. The environment is linked to other components of the

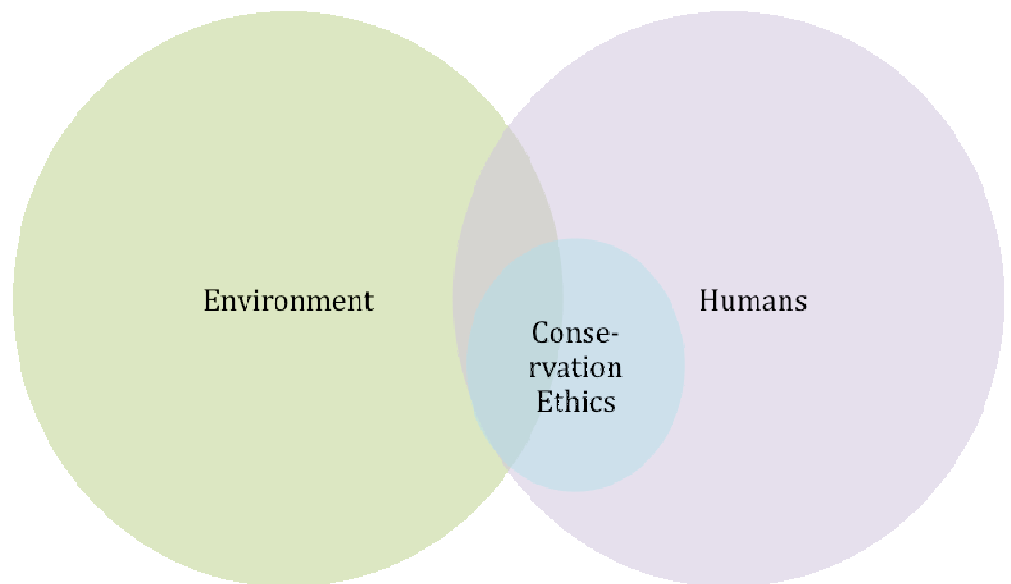


Figure 1: Conceptual framework of a social-ecological system. This model considers the interactions between humans and the environment. Volunteer tourists can be identified at the intersection of the 2 main components and the sub-component of ethics.

system, as it also includes ecosystem services, the benefits that humans receive from the environment (McLeod and Leslie, 2009).

The human dimension considers the dynamics of the demographics of the area. This includes: those that live and work in the area (e.g.: the residents and organizational structures), those that visit the system (e.g.: the tourists), the culture, societal norms, internal and external economies, and technology, to name a few. The sub-component of conservation ethics extends the traditional concept of ethics from just the human realm to include the non-human world, in this case, the environment. Ethical issues are often associated with beliefs, views of various interest groups, and justification of the exploitation of ecosystem services. Aldo Leopold states that conservation is a harmony between men and land (1949). Therefore, conservation ethics, a philosophical differentiation of social from anti-social conduct, has a strong influence in decision-making and actions taken in the human and institutions realm (Leopold, 1949).

Social-ecological conservation projects are concerned with the well-being of the environment. Therefore, these projects overlap all three spheres of the social-ecological framework and are mapped at the intersection of the human component, its sub-component of conservation ethics, and the environmental component. Conservation projects place ecological success as a priority and may have positive social impacts for project participants as a secondary outcome. Conservation projects are diverse; they can be led as both a national or international project, and they can be run by a government organization, a non-government organization (NGO), or within a private sector. Recently, various forms of conservation projects have emerged that allow non-

scientists to partake in activities that aid in conservation efforts (Broad, 2003; Campbell and Smith, 2006; Halpenny and Caissie, 2003). These people are usually volunteers; they are unpaid laborers, and therefore, the use of volunteers is more practical and economically efficient than hired labor (Cousins *et al.*, 2009).

Several conservation projects employ volunteers, and this type of project should be invested in fostering not only ecological success, but also, success with regard to the volunteer labor force. This success can be measured by evaluating the motivations and satisfactions of the volunteers. This is not to say that the volunteer based conservation projects do not place a greater value on ecological success. It is important to note, however, that a project that places an emphasis on the needs and experiences of the labor force, will better retain a constant flow of volunteers, and therefore, be better equipped to operate and meet ecological goals.

1.2 Sea Turtle Conservation

It is commonplace in the world today for people to advocate conservation goals. When most people think about conservation, they think about conserving, protecting, and sustaining the natural environment. The field of conservation science is certainly oriented towards a conservation goal, but it is a multidisciplinary field involving such natural and social sciences as ecology, biology, economics, and sociology (Godfrey and Campbell, 2000). Accordingly, the social world can be conserved just as the natural world. Environmental conservation is a concept widely used by conservation scientists, and it emphasizes a commitment to passing down an inherited ecological system to future

generations, and possibly passing the system along in an improved state (Coppock, 1982; Garibaldi and Turner, 2004).

There is a wide range of threats that have contributed to the decreasing size of the 7 different sea turtle populations. Many threats to sea turtles can be attributed to human activity (Groombridge and Luxmoore, 1989, Lutcavage *et al.*, 1997; Campbell, 2007).

There are threats that humans present to sea turtles at sea. For example, turtles are subject to adverse interactions with commercial fisheries (i.e., bycatch), and habitat pollution, from which turtles may ingest wastes (e.g.: plastics and other pollutants) or become entangled in anthropogenic flotsam and jetsam (Campbell, 2007; Mortimer, 2000; Senko, 2010). The inability of sea turtle populations to recover has been partly attributed to their incidental capture in fisheries (Hillestad *et al.*, 1995; Lutcavage *et al.*, 1996). Sea turtle excluder devices (TED) have been designed and implemented to address the by-catch issue (Mitchell et al, 1995).

Human threats are also present on beaches. Turtles are particularly vulnerable during the reproductive stages, and there are several threats presented to nesting turtles. A major indirect threat is the anthropogenic manipulation of coastal nesting areas; this limits the space the turtle has to nest and could negatively alter the turtle's nesting behavior.

Humans present a direct threat to nesting sea turtles through the exploitation of reproductive adults and their eggs (Lutcavage *et al.*, 1997, Witherington, 1996). On beaches where there are large numbers of nesting females, the locals use the sea turtles for meat and consumption of their eggs, for example, in developing nations. Additionally, marine turtles are still taken for souvenir markets, despite bans put in place by CITES

(Convention on International Trade in Endangered Species) (Campbell, 2007; Lutcavage *et al.*, 1997; Tisdell *et al.*, 2002). For this reason, the protection of nesting sites is critical for sea turtle conservation projects. Sea turtle populations can only be conserved when the populations maintain sufficient survival rates in all life stages (Lutcavage *et al.*, 1997, Mortimer, 2000). Therefore, successful conservation projects are contingent on not only minimizing exploitation of individuals, but also the protection of nesting habitat (Mortimer, 2000).

Human population growth rates in developing countries are much higher than the global average, and an increased population density places a heightened pressure on the environment (Diaz, 2006). With increasing human populations, there is an increasing concern that the decline in sea turtle populations (along with populations of other megafauna species) will have unanticipated consequences for the long-term use of the world's coastal and marine ecosystems (Jackson *et al.*, 2001). Provided that sea turtle populations are declining due to increasing threats, it seems evident that there is a need to focus on conservation to mitigate the threats that increasing human populations present (Groombridge and Luxmoore, 1989, Lutcavage *et al.*, 1997; Campbell, 2007).

With that in mind, there are several social-ecological conservation projects that have formed to conserve our declining sea turtle populations. These organizations vary in size; they range from large federal agencies (e.g.: National Oceanic and Atmospheric Administration and United States Fish and Wildlife), to national non-governmental organization (e.g.: The Nature Conservancy, Sea Turtle Conservancy, World Wildlife Fund), and even to local non-governmental organizations for a particular region (e.g.: Sea

Turtle Preservation Society of Florida, South Carolina Marine Turtle Conservation Program, The Asociación de Voluntarios para el Servicio en Area Protegidas de Costa Rica). Regardless of size and their consequent financial and political capital, all of these organizations aim to facilitate successful conservation outcomes. Often times, these organizations employ volunteers, many of whom happen to be tourists.

Chapter 2

Literature Review

There is extensive academic literature that focuses on the tourism industry and its negative impact on the environment, yet there are fewer studies that examine the beneficial impacts that tourism can have on the environment and on the tourists themselves. This literature review considers the defining characteristics of tourism as an industry, tourism impacts, and the development of distinct branches of tourism over time. Finally, it presents literature on the social impacts that volunteer tourism can have on the tourists, with regard to motivation, satisfaction and self-efficacy.

2.1 Tourism as an Activity

The United Nations' World Tourism Organization (UNWTO) defines tourism as the activities of a person that is traveling to and staying in places outside their usual environment for leisure, business and other purposes, and the trip does not last for more than one consecutive year. A tourist can be described as a visitor who stays at least one night in the location visited (UNWTO, 1995) and who, at some point, returns home.

Tourism is inherently a controversial topic, yet people partake in touristic activities in all parts of the world (Miller, 1993). With such widespread involvement, the tourism industry has lasting implications for globalization, poverty, the economy, and the environment of the destination location (Spencely, 2005). For this reason, several branches of tourism have emerged to help mitigate the presumed negative impacts. For the purposes of this thesis, it is important to note the rapid development of the field of coastal and marine tourism (Miller *et al.*, 2009; Miller *et al.*, 2011). The widespread appeal of the beach experience and the increasing demand for marine touristic activities

(ie: fishing, SCUBA diving, windsurfing, yachting, etc.) has increased the pressure placed on our coasts. As with all natural ecosystems, coastal and marine ecosystems are highly dynamic, and development that interferes with natural system may have long-term impacts in terms of the stability of the system (Hall, 2001)

2.2 Tourism Impacts

The impacts of tourism can be divided into 3 areas: 1) economic, 2) social and cultural, and 3) environmental. Tourism can have both negative and positive impacts, but for tourism to be sustainable, the economic, social and cultural, and environmental benefits should be maximized, while their negative impacts should be minimized (“Global Sustainable Tourism Criteria”, 2011).

2.2.1 Economic Impacts

Despite being a fast growing industry, there are few studies that accurately indicate economic impacts. This is probably due to the fact that tourism involves a wide range of industries; yet distinguishing the combined output from those industries is difficult. Within the past few decades, however, measured economic impacts of tourism have been directed to employment and income (Tooman, 1997).

Tourism is a labor-intensive industry. Therefore, from an economic standpoint, tourism has the capability to increase the number of jobs available to people of the host community. The industry has the potential to improve people’s livelihoods in the host communities, especially for the poor who can rely on income from tourism as their primary source of income (Ashley *et al.*, 2000; Tooman, 1997; Ap and Crompton, 1998).

According to the world travel and tourism council's most recent economic impact report, in 2011, tourism contributed to 9% of global GDP and accounted for 255 million jobs. The industry is expected to continue to grow, and by 2022, it is estimated that tourism will account for 328 million jobs (WTTC, 2012).

However, it is important to note that variation in the climate and temporal attractions determine the time that people will tend to travel, and host communities tend to see a boom and bust pattern in terms of employment and local business development (Opperman and Chon, 1997). With such a dependency on tourism, an economic strain may be placed on the community during times when visitation from tourists is low. Also, the economic benefits from tourism tend to be reserved for a select few, and not necessarily the poorest people (Opperman and Chon, 1997, Ashley *et al.*, 2000).

2.2.2 Social and Cultural Impacts

Tourism has social and cultural benefits and costs (Swarbrooke 1999), yet much of the literature has not focused on the social effects of tourism (Krippendorf, 1987). Murphy (1985) classifies tourism as a socio-cultural event for both people of the host community and the tourists. Social and cultural impacts are identified as those that have an effect on the quality of life on both tourists and host communities; this may be a long-term change in a community's values, beliefs and practices (Brunt and Courtney, 1999). Mathieson and Wall (1982) suggest that the social and cultural impacts of tourism are dynamic and will change in response to structural changes of the industry, and also to the extent to which the host community is exposed to tourism development.

When people partake in touristic activities, there is opportunity for cultural exchange. Both the tourists and the locals of a destination community are exposed to new information, languages, and lifestyles. Also, the tourists have the opportunity to learn about the historical and cultural heritage of the place that they are visiting (Sawkar *et al.*, 1998; Andereck, 1993). Conversely, the addition of foreigners can disrupt the culture and even lead to co-modification of traditions (Burns and Holden, 1995; Cohen, 1988; Shephard, 2002). Additionally, tourism has the potential to diminish perceived aesthetic value of a destination through the destruction and subsequent development of the surrounding environment (Shephard, 2002).

2.2.3 Environmental Impacts

Tourism is dependent on the environment; the main source of tourism comes from both natural resources (beaches, oceans, mountains, rivers, etc.) and man-made resources (historic sites, heritage structures, statues, monument, etc.) (Koncul, 2008). Tourism consumes resources, and therefore, the negative environmental impacts of tourism can be extremely diverse and is contingent on the various types of touristic activities taking place in differing environments (Andereck, 1993; Gartner, 2006; Kobcul, 2008; Sawkar *et al.*, 1998). Planning, construction, and operation of tourism activities all have potential negative impacts on the environment. Several areas of negative environmental impact have been identified and include: air, water, geology and soil, landscape, habitats, and wildlife (Pandey *et al.*, 1995; Spenceley, 2005; Andereck, 1993; Gartner, 2006). Various activities that contribute to adverse environmental impacts include: use of transportation systems, pedestrian and vehicular traffic, disposal of wastes, clearing of land for

development and the subsequent erosion, and harassment, hunting, and/or fishing of wildlife (Pandey *et al.*, 1995, Gartner, 2006).

Despite being greatly over-looked, tourism also has the potential to positively impact the environment, and this potential benefit has been noted in the works of several conservation biologists (Skewgar, *et al.*, 2009; Brightsmith *et al.*, 2008; Durbin and Ratrimoarisaona, 1996, Andereck, 1993). Tourism, when it is well managed and properly located, can be considered a positive activity, and it has the potential to foster conservation and the preservation of natural, cultural and historical resources (Andereck, 1993).

2.3 Types of Tourism

General perceptions of tourism are associated with the idea of ‘mass tourism.’ This type of tourism can be characterized by a high concentration of tourists in a particular region, and, often times, is viewed as negative. This negative image of mass tourism is attributed to the combined materialist nature, ignorance, style, and insensitivity of people in groups (Miller and Auyong, 1998). This high number of tourists tends to limit the ability to effectively manage the environmental and social pressures (ie: excessive use of local transportation, food, water, electricity, etc.) that the tourists place on the system. For this reason, mass tourism is labeled as the least sustainable form of tourism (Britton and Clarke, 1987; Bryden, 1973; Hills and Lundgren, 1977; Lea, 1988; Turner and Ash, 1975; Spencely, 2005). However, Miller and Auyong (1998) maintain that mass tourism is a multidimensional concept and evokes different images and dissatisfactions (or

satisfactions) for different people, and in some instances, may be considered in a positive light.

In recent years, a branch of tourism has arisen as an alternative to the general negative concept of mass tourism. This branch allows for the simultaneous enjoyment and protection of nature has been, and it has several names including nature-based tourism, sustainable tourism, ethical tourism, community-based tourism, and ecotourism to name a few (Fennell, 2001, Valentine, 1993). We will refer to this branch of tourism, ecotourism, and define it as tourism that is primarily concerned with the appreciation of nature with no negative impacts from the tourists.

This shift to ecotourism can be attributed to an increase in ‘environmentally conscious travelers.’ Ecotourism attracts this growing group of tourists, and it is centered on activities that, at the very least, do not have negative impacts on the environment and the local community, and, if possible, acts to benefit the system (Jacobson and Lopez, 1994, Fennell, 2001). Also, many countries have recognized that mass tourism can have damaging effects on the environment and on the local community. Therefore, ecotourism, a sustainable alternative to mass tourism, has recently become a priority (Jacobson and Lopez, 1994; Spence, 2005).

2.3.1 Volunteer Tourism

Volunteer tourism is a type of ecotourism in which agencies recruit volunteers to provide funding and labor for projects. Similar to the overarching branch of ecotourism, volunteer tourism acts as an alternative to mainstream tourism experiences. Volunteer

tourists can work towards either humanitarian or ecological goals. Hence, this branch of ecotourism links tourism with ethical concerns, but it also detaches itself from the problems that tend to be associated with the general concept of mass tourism (Gray and Campbell 2007, Tisdell and Wilson, 2002, Tisdell and Wilson, 2003).

With growing numbers of organizations and activities recruiting volunteers, it is evident that there has been an expansion of volunteer sector of tourism, which has seen significant growth since the 1970's (Ellis, 2003, Wearing, 2001). This increasing interest in volunteer tourism can be associated with the growing desire of travelers to make a contribution to society and/or the environment while on vacation (Brown and Morrison, 2003). Tourists that partake in this branch of tourism do so to have an experience that mutually benefits themselves and the place in which they are volunteering; the volunteer activities contribute to the volunteers' personal growth, and also directly benefits the social, natural, and/or economic dynamics of the destination community (Cousins *et al.*, 2009, Sin, 2009; Wearing, 2001; Wearing and Neil, 2000).

Volunteer tourists pay to actively participate as a volunteer of some projects (Cousins *et al.*, 2009). Social-ecological conservation projects are defined as an organized activity with a set conservation goal in mind. Several conservation projects have recruited volunteers to aid in achieving their main goal of environmental conservation. Social-ecological conservation projects that employ volunteers aim to foster an improved state in the ecological realm of the framework presented in this thesis. Volunteers pay funds that are used towards the organizations' conservation goals, and the individuals may aid in collecting data (Cousins *et al.*, 2009; Brightsmith *et al.*, 2008). By combining the

scientific expertise of conservation biologists with the volunteers that are partaking in ecotourism, this emerging branch of tourism has the potential to aid in conservation of ecosystems (Brightsmith *et al.*, 2008).

There is some debate with regard to the value of the scientific data collected by tourists (Darwell and Dulvy, 1996; Saunders, 2002). This brings some to question why organizations would recruit people who are not specifically trained to carry out the tasks at hand. Provided that conservation programs are under-funded, but nonetheless, costly, there is a disparity between the organizations' needs and the manpower and financial resources required to meet those needs. Additionally, while the research to reach conservation goals is labor intensive, it is not necessarily technically and methodologically explicit (Foster-Smith and Evans, 2002). Accordingly, it seems apparent that volunteers have the ability to make important contributions to conservation efforts, while not draining the organization financially. For this reason, the sector is growing, and there are several environmental organizations that promote and utilize volunteers (Ellis, 2003; Wearing 2001, Wearing 2004, Wearing and Neil, 2001).

Provided that volunteers are free laborers that allow for the ongoing conservation efforts of such social-ecological projects, it is imperative that the employing organizations express an interest in what motivates tourists to volunteer, ensuring a satisfactory experience for the volunteer, and whether the volunteers' efforts are impacting their own actions towards conservation.

2.3.1.1 Motivations

Those that choose to partake in volunteer work have varying motivations for such participation (Markus and Blackshaw, 1998, Bradford, 2003; Campbell and Smith, 2005; Clary *et al.*, 1998). Some have asserted that the volunteer tourist primary motivation is altruism; these individuals have an interest in helping others (Zahra and McIntosh, 2007; Mustonen, 2006). Wearing (2001) states, however, that since a tourist may choose to volunteer for various reasons, this implies that not all volunteer tourists are motivated solely to help others. To emphasize, Wearing (2001) continues to say that the volunteer tourists usually expect their experience to contribute not only to the natural or social environment in which they are working, but also to the volunteer's personal development (Lo and Yee, 2010; Wearing, 2001).

In talking about motivations, it is important to note that with a group of volunteer tourists comes a wide range of personalities and, therefore, varying motives. Not all volunteer tourists are altruistic. An individual's personal history, economic status, and exposure to past volunteering opportunities may affect their desire to be a volunteer tourist (Brown and Lehto, 2005).

2.3.1.2 Satisfaction

Once on site, the volunteer tourist experiences a range of educational and social benefits as a result of their service. Traveling abroad and immersing themselves in a new lifestyle and culture broadens the tourists' horizons; they are able to meet new people and experience different ecosystems. Their participation in volunteer work raises their

awareness of the cause for which they are working, and they may have an increased feeling of responsibility towards the system. Volunteer tourists' whose volunteer work fulfills personal desires and needs have been shown to have a higher sense of satisfaction (Zahra and McIntosh, 2007). This improved sense of satisfaction corresponds to the volunteers' level of confidence in their own abilities (Stebbins and Graham, 2004; Zahra and McIntosh, 2007). An increased confidence level, and consequent increased level of self-efficacy, has the capability to change behaviors to foster the goals of the volunteer project even after their service. (Gilmour and Saunders, 1995; Evans and Birchenough, 2001).

2.3.1.3 Self-efficacy

Attitudes have cognitive, affective, and behavioral components; all of these can be associated with stages of learning. At the cognitive stage the person is exposed to information and is, therefore, made aware. During the affective stage, the person develops an opinion with regard to the information; this stage sets the person up with the intent to act. Finally, the behavior stage can begin when the person's awareness and attitude align with their perceptions of self-efficacy to generate a behavioral change (Ostrom, 1969).

Self-efficacy is defined by Bandura as being concerned with the judgments of how well someone perceives their ability to carry out a course of action required to cope with future situations (1982). The manner in which a person views their own efficacy influences their thought patterns, emotions, and actions. Different people process information and experiences that correspond to their capability differently, and their behavioral choices follow appropriately (Bandura, 1977). Despite being exposed to the

same information, the affective stage will differ. For that reason, perceptions of self-efficacy, and, therefore, future actions taken in the behavioral stage will vary.

Accordingly, if a person acts based on a misjudgment of self-efficacy, they may see unwanted results and, therefore, may have misguided attitudes towards their effort (Bandura, 1982). It is pertinent, therefore, to consider self-efficacy with regard to volunteer conservation tourism. In studies of self-efficacy of volunteer tourists, the research should consider surveying volunteers who are exposed to the same experience (ie: all individuals have worked at the same site). Evaluating how the volunteers perceive their experience, and, in effect, their self-efficacy, one will be able to examine the potential for behavioral changes with regard to conservation efforts (Bandura, 1977; Bandura, 1982).

2.3.2 Sea Turtle Tourism

Miller (2008) defines marine wildlife tourism as a special case of tourism that takes place in regions encompassing the open ocean and coastlines along with all manner of associated bays, harbors, inlets, and estuaries. Miller (2008) continues to define wildlife as the non-human component being visited and appreciated with minimal violence to the integrity of the ecological system. Sea turtle tourism therefore falls within the category of marine wildlife tourism.

As charismatic megafauna, sea turtles have the ability to capture human interest and evoke a desire to conserve and protect the species. Provided that ecotourism and wildlife tourism stems from human interest in wildlife interactions, we define sea turtle tourism as

a branch of ecotourism that is non-consumptive and based on human-sea turtle interactions. Some studies have shown that sea turtle tourism has the potential to not only generate income and provide employment for coastal communities, but also support the conservation efforts. The tourists' interactions with the sea turtles are educational; this increases awareness and can aid in promoting conservation efforts to protect sea turtles for future generations. Additionally, volunteer tourists in sea turtle conservation projects can provide funding for the conservation efforts, effectively improve the conservation success of the project, and may have potential social benefits to the tourists themselves (Campbell and Smith, 2006; Tisdell and Wilson, 2002; Tisdell and Wilson, 2003; Wilson and Tisdell, 2001, Senko *et al.*, 2011; Brightsmith *et al.*, 2008)

Part 2

Case Study

We provide an exploratory case study of a volunteer-based sea turtle conservation program in Costa Rica. The research was conducted from a participant's perspective in the conservation efforts of Asociación de Voluntarios para el Servicio en Area Protegidas de Costa Rica (ASVO, 2009) at a place-based program in Matapalo Beach on the Pacific coast of the country.

Chapter 3

Overview of Sea Turtle Conservation Projects in Costa Rica

The National System of Conservation Areas of Costa Rica (SINAC) is a corporate management system that integrates decentralized and participatory projects in forestry, wildlife and protected areas. SINAC works with the Ministry of Environment, Energy, and Technology (MINAET) to dictate policy, planning and implementing processes for sustainable natural resource management in Costa Rica (Costa Rica Biodiversity Act, 1998). Accordingly, all social-ecological sea turtle conservation projects on Costa Rica's beaches are either run by or in conjunction with both SINAC and the MINAET. The MINAET is responsible for coordinating with the ministry of public education (MEP) the Ministry of Economy, Industry and Commerce (MEIC), and with the Costa Rica Tourism Institute, as well as other institutions that promote touristic activities for turtle observation. All projects enlist volunteers and must be authorized through MINAET to limit impact and ensure the protection of the species (The protection and conservation of sea turtles act, 2002).

The following sections detail the various sea turtle conservation projects in Costa Rica. There are three government managed sea turtle conservation projects and six additional sea turtle conservation organizations. The latter projects are funded and co-managed by a non-profit biological research organization. The project summaries provide insight to the location, conservation goals, and the conservation initiatives taken to achieve their goals².

² *All information was collected through an extensive web search. All of the projects' corresponding websites are cited in the references section.*

We then report the availability of the project's research to the public. Data reports that are accessible to the public are especially informative for potential volunteers. When researching projects to participate in, available data makes the project conservation goals tangible and may lead more people to choose those projects for their volunteer service. A summary table is in Appendix 1.

3.1 Government Managed National Wildlife Refuge Projects

Under the combined management system of the MINAET and SINAC, the National Refuges fall under the control of the Tempisque Conservation Area (ACT), and a wildlife ranger represents each government managed conservation project. Provided that these projects are run solely under the Costa Rican government with no outside funding, there is limited information available to the public.

3.1.1 Camaronal Wildlife Refuge

The Camaronal Wildlife Refuge was created in 1994 in an effort to protect mangroves and wildlife, including the species of sea turtle that nest along Camaronal beach. The sea turtle conservation project is located on a 3km stretch of the beach in the Guanacaste Province of the Nicoya Peninsula. The project works to conserve the flora and fauna of the region with a particular focus on the protection sea turtles that come to nest on the beach.

The project enlists volunteers that participate in nightly patrols to collect biometric data and to work in the hatchery. There is no available data report to the public with regard to their conservation outcomes.

3.1.2 Ostional Wildlife refuge

The Ostional National Wildlife Refuge is located in Guanacaste province in the Nicoya Peninsula. The refuge was created in 1983 with the primary purpose of protecting the mass nesting of olive ridley (*Lepidochelys olivacea*). The project's strategic objectives are to conserve and protect sea turtles and their breeding habitats, conservation and protection of coastal marine ecosystems, and the sustainable use of natural resources by local communities organized and residents.

The project differs from many sea turtle conservation projects in Costa Rica, in that there is no direct protection of sea turtle eggs. In this way, the conservation initiatives involve nightly patrols to collect biometric data, but the project does not remove eggs to be placed in an enclosed hatchery. The main sea turtle that nests at this beach, the Olive Ridley, exhibit synchronized mass nestings in which hundreds to thousands of Olive Ridley sea turtles nest at the beach each month. This phenomenon is known as the 'arribada', the Spanish word for arrival (Volunteer Ostional Sea Turtle Refuge Project). For years, these mass-nesting events provided incentive for an illegal egg harvest. In 1981, a group of locals formed a cooperative to determine a rational and scientifically backed justification for a legal egg harvest. This group became known as the Asociación Desarrollo Integral de Ostional (AIDO), and they allow the sale of eggs from a protected refuge given well-studied justification of the egg use; this is called the egg harvesting plan (EHP) (Campbell *et al.*, 2007).

There is published research that indicates that, during an arribada, the nesting numbers are so high that individuals run out of space to nest. Given limited beach space, already

formed nests are destroyed by the subsequent influx of nesting turtles. The loss of oviposited eggs during the arribadas due to over-nesting was the driving factor for EHP (Campbell *et al.*, 2007). There are no available data reports to the public, however, with regard to the organization's conservation goals.

3.1.3 Playa Hermosa Wildlife Refuge

The Hermosa Beach Wildlife Refuge was created in 1999 and is located on the central pacific coast close to the beach town of Jaco. No organized turtle tours take place at this beach, however, Playa Hermosa Wildlife Refuge accepts volunteers on an as-needed basis. The conservation initiatives of the project include nightly beach patrol, egg collection and transfer to a hatchery, and hatchling release. There is no available data report to the public with regard to their conservation goals.

3.2 Non-Profit Biological Research Projects

The collaboration of the Costa Rican government and private, non-profit organizations has led to the formation of several social-ecological sea turtle conservation projects. The project information is more readily available to the public, this better informs potential volunteers.

3.2.1 ASVO

The Asociación de Voluntarios para el Servicio en Area Protegidas de Costa Rica (ASVO) is a non-profit organization that participates in conservation efforts in protected wildlife areas, beaches, and communities in Costa Rica. This organization is the focus of the case study and one, and the organization and one of their sea turtle conservation

projects is further detailed in a subsequent chapter. All of the ASVO projects conservation initiatives involve nightly patrols to collect biometric data, transfer eggs to a hatchery, and release hatchlings. The projects involve scientific based conservation activity that aims to increase the amount of sea turtle hatchlings. There are no available data reports to the public with regard to their research.

3.2.1.1 Buena Vista

The Buena Vista conservation project is located in the Guanacaste province of the Nicoya Peninsula about 3.5 kilometers north of Samara Beach. This project aims to generate scientific information that can be used to mitigate threats to nesting females.

3.2.1.2 Gandoca-Manzanillo

The Gandoca-Manzanillo conservation project is located in the southern Caribbean coast of Costa Rica in the Limón province. The project was founded for the protection of marine turtles, and at the same time to improve of the quality of life of the local community who used to rely on sea turtle eggs and sea turtle meat for subsistence.

3.2.1.3 Playa Matapalo

Matapalo Beach is located in the Puntarenas province on the pacific coast of Costa Rica. The sea turtle conservation Project in Matapalo Beach was created to protect the female sea turtles, their nests and their against poachers and natural and introduced predators by using a man-made hatchery. This project was examined in the case study, and it is further detailed in the next chapter.

3.2.1.4 Romelia

Romelia is located on the southern tip of the Nicoya Peninsula in the Puntarenas province and, it is about 5 km to the popular beach town of Montezuma. This project began in 2009 with the aim of evaluating and protecting populations of sea turtles that nest on the adjacent beaches. The research is focused on the number of turtles that come to lay eggs and the anthropogenic and natural threats that alter the hatching success.

3.2.1.5 Quelonios

Three species of sea turtles nest at Quelonios del Caribe: leatherback, hawksbill, and green. The project was created together with the people of Barra de Pacuare (the local township and its surroundings) so that the project could not only to conserve sea turtles, but to also generate permanent work for the locals.

3.2.2. Cano Palma Biological Station

The Cano Palma Biological Station is supported by the Canadian Organization for Tropical Education and Rainforest Conservation (COTERC), the Sea Turtle Conservancy, and Widecast. It is located on the Caribbean coast, and is about 8 km north of Tortuguero. This beach has 3 species of sea turtles that nest: green, leatherback, and the hawksbill.

The main objective of the sea turtle monitoring and tagging program are to improve the understanding the marine turtle nesting patterns; increase awareness and improve conservation education among local residents and businesses, decrease the rate of poaching and human disturbance, and share monitoring results and conservation success

stories with governments and conservation organizations. The organization releases yearly reports that are accessible on their website that describe track and nest distribution, biometric data, and the nest fate (hatching success and emergence success) of all nests.

3.2.3 Corcovado Foundation

The Corcovado Foundation Sea Turtle Conservation Program is located in Drake Bay in the Osa Peninsula. The program recognizes the importance of achieving a balance between conservation objectives and local socioeconomic development, and its main goal is to promote the conservation and sustainable recovery of sea turtle populations that nest in Drake Bay. This effort will enhance sea turtle survival, while simultaneously attending to the needs of the community with which it interacts.

The project is run in collaboration with Widecast, a non-profit organization, and its conservation initiatives call for a team of investigators and volunteers to participate in night patrols, relocation of nests to the hatchery, recording of scientific data, tagging of turtles, looking after the hatchery, nest exhumations, liberation of hatchlings, construction activities, and taking part in environmental education. There is no available data report to the public with regard to their conservation goals.

3.2.4 Reserva Playa Tortuga

Reserva Playa Tortuga is located 3 hours from San Jose, in Ojochal de Osa on the southern Pacific coast Of Costa Rica. This is a non-profit biological research and education center formed by community members and Costa Rican scientists to create a culture of environmental conservation in Costa Rica. This organization's sea turtle

project has 5 main goals. 1) Identify which sea turtles species are using Playa Tortuga as a nesting area. 2) Establish when and where nesting occurs. 3) Know the human impact and what other factors would affect the sea turtles population to ensure better management practices 4) Obtain and maintain the support of the community to reach the established objectives. 5) Educate and inform to the community and communities closest to the project about the issues and importance of protecting sea turtles and their habitat (Reserva Playa Tortuga, 2011).

The project's conservation initiatives involve the care and protection of the hatchery, cleaning and maintenance of the nesting beach, data collection on nightly patrols, tagging the turtle for monitoring, relocation of eggs to the hatchery. This project releases seasonal reports that articulate the biological data collected and a statistical analysis with regard to the number of hatchlings that emerged, and ambient temperature, the incubation time, salinity between precipitation, and the number of turtles that arrived monthly (Reserva Playa Tortuga, 2011).

3.2.5 The Leatherback Trust

The Leatherback Trust is a non-profit foundation established to save the leatherback turtle and other sea turtles from extinction. The formation of this foundation was instrumental in the creation of the national park, Parque Marino Las Baulas, an important leatherback nesting beach on the Pacific coast. The main goals of this project are to 1) identify the size and status of the nesting leatherback turtle population, 2) to protect nesting female turtles and their nests from poachers and predators, 3) to provide scientific information to the Costa Rican authorities to develop effective management and

conservation strategies, a 4) to improve understanding of leatherback biology through quality scientific research.

The project's conservation initiatives involve patrolling the nesting beach each night and identifying all turtles which nest, assisting park guards in control of tourists and other people on the beach, meeting with local and government National Park authorities and members of the local communities to distribute conservation information, and undertaking a variety of research projects to investigate reproductive biology, population genetics, physiology and other important areas of biology. Apart from the biological work, the Las Baulas leatherback project conducts other activities in the park and within the local community including an on-going education program.

The Leatherback Trust produces seasonal report that shows a day by day record of the Leatherbacks' nesting activities on the beach. The report also shows a summary report of number of turtles observed nesting for each season. Of the reports posted to the Trust's website, there is none that include data on areas of biology that is stated in their initiatives. The biologists working at Las Baulas are collecting a variety of data, for many different research projects, and some of the data presentation may be published elsewhere and not directly linked to the project's available information.

3.2.6 The Sea Turtle Conservancy

The Sea Turtle Conservancy (STC) is an international non-profit organization, and it is the world's oldest sea turtle research and conservation group. The STC works in conjunction with Widecast, another non-profit organization, on the 21-mile stretch of

beach in Tortuguero, and has an overall goal to conserve the area's nesting green and leatherback turtle populations.

The project employs volunteers and takes the following research initiatives to achieve it's goal: 1) turtle tagging, 2) turtle track surveys, 3) collection of biometric data, 3) fibropapilloma examination, 4) determination of nest survivorship and hatching success, 5) collection of physical data, and 6) collection of data on human impacts to the nesting beach and the turtles. The organization provides extensive seasonal reports on both the leatherback and green sea turtle (in both English and Spanish). These reports detail the data collected for each of the states research initiatives.

3.2.7 Widecast

Widecast is a non-profit organization that combines the expertise of biologists, managers, community leaders, and educators to ensure the recovery and sustainable management of sea turtle populations globally. This organization works in 40 nations and territories in the Caribbean and has several conservation projects along Costa Rica's beaches.

Widecast has aided the efforts of other non-profit sea turtle conservation projects in Costa Rica. The following sections detail the projects that are run solely under Widecast and the local refuge. The Widecast website library has seasonal reports on data collected from this project.

3.2.7.1 Parismina

Parisminia is located about halfway between Tortuguero and Limon on the Caribbean coast. Four species of sea turtle come to nest on this beach: leatherback, green, hawksbill

and loggerhead. In April 2001, the Costa Rican Coast Guard and volunteers from Parismina initiated the formation of Save the Turtles of Parismina (ASTOP). This community-based, non profit, conservation organization is dedicated to protecting sea turtles and their eggs from poaching, while initiating sustainable development and providing a viable alternative economy to poaching in the small Caribbean community of Parismina.

The conservation initiatives include nightly patrols to guard nesting turtles, counting the number of eggs, recording tag numbers and assisting with relocating eggs to a hatchery. There is also a focus on monitoring the hatchery, cleaning the beach of debris, safeguarding the hatchlings on their first journey to the ocean, and participating in nest exhumations.

3.2.7.2 Cahuita National Park

The nesting beach at Cahuita extends from a total of 8.1 km, and three species of sea turtles that nest here: leatherback, hawksbill, green. In response to a beach survey that indicated that the area received significant numbers of nests from critically endangered leatherback and hawksbill sea turtles, Widecast started the conservation project.

The project's conservation initiatives include nightly patrols of the nesting beach to keep poachers away, gathering biometric data, hatchery monitoring, and ensuring that hatchlings reach the ocean.

Chapter 4

Matapalo Beach Research Site

4.1 Study Area

Matapalo Beach is located in the Puntarenas province on the pacific coast of Costa Rica (9.317 N 83.967 W) (google maps). It is approximately 155 km west of the country's capitol, San Jose. The beach spans about 10 km from the northward Protalion River to the southern Hatillo River (Figure 2).



Figure 2: Map of the Pacific Coast of Costa Rica. Matapalo Beach is located on the west coast and is 155 km west of San Jose. Costa Rica (Google Maps, 2012)

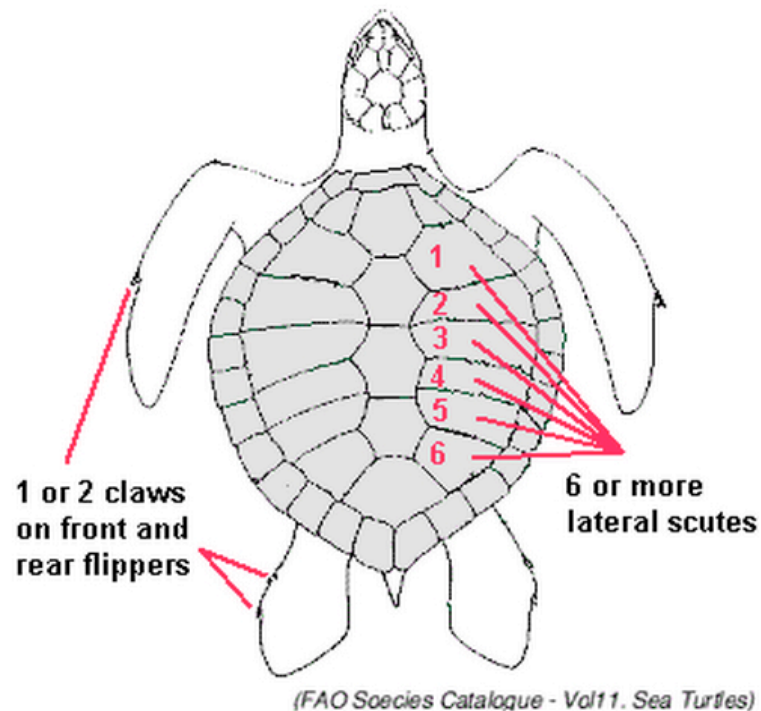
4.2 Geography and Climate

Matapalo beach is a sandy beach made of deposits originating from the Partolon and Sevegre rivers. The beach has a low slope that does not exceed 15°. The beach ranges from 0-300 meters above sea level. Matapalo beach exhibits a climate similar to that of a tropical rainforest with an annual rainfall of about 3600 mm. The dry season is from

January to March; February is the driest month. The wet season is from April to December, with the greatest amount of rainfall in October. The temperature ranges from 22°C to 27°C, with warmer months in the dry season. The area has a relative average humidity of about 85%, with higher values in the wet season. (ASVO, 2009).

4.3 Olive Ridley Sea Turtles

The olive ridley (*Lepidochelys olivacea*) is one of the smaller species of sea turtles; the average adult carapace length is 25-28 inches and the average adult typically weighs between 75-110 lb (FWS, 2012). They can be identified by their dark green/gray coloration, a distinct number of plates on the carapace (6-9 pairs of non-overlapping lateral scutes), and by one or two claws present on all four



flippers (Figure 3) (FWS, 2012; Lutz *et al.*, 2003; Plotkin, 2007).

Figure 3: Depiction of an Olive Ridley sea turtle that illustrates the defining characteristics used in identifying the species (Sea Turtle Conservancy, 2011)

L. olivacea occurs in tropical waters around the globe. They are migratory, and travel up to 2,400 miles between pelagic feeding and coastal breeding grounds. The species is omnivorous and feeds on a variety of marine life including algae, lobster, crabs, mollusks, shrimp, and fish; the species is known to dive to depths of 500 feet to feed on benthic invertebrates (FWS, 2012; Lutz *et al.*, 2003; Plotkin, 2007).

L. olivacea has females become sexually mature between 7 and 9 years and, subsequently, nest annually (FWS, 2012). Individuals may come ashore to nest anywhere from 1 to 3 times each nesting season, although they typically will nest twice (FWS, 2012). For each nesting event, a female will lay about 100 eggs, on average, which have an incubation period between 50 and 70 days (FWS, 2012; Lutz *et al.*, 2003; Plotkin, 2007)

4.4 ASVO Sea Turtle Conservation: A Social-Ecological Project

The Asociación de Voluntarios para el Servicio en Area Protegidas de Costa Rica (ASVO) is a non-profit organization that participates in conservation efforts in protected wildlife areas, beaches, and communities in Costa Rica. ASVO is an organization that promotes the involvement of civil society; lay people contribute to the conservation activities. The organization states their mission as “To manage the national and international volunteers to contribute to the conservation activities and development of preservation initiatives of natural resources to facilitate the involvement of civil society” (ASVO, 2009). ASVO has articulated 5 strategic objectives:

1. Support the protection and conservation of natural resources in Costa Rica
2. Increase the economic income of the association
3. Achieve a higher position of partnership and customer loyalty
4. Maintain and possibly increase the value of services provided
5. Determine and achieve the strategic capacity of the association that is consistent and adaptable to the environment.

Over 1800 volunteers support ASVO each year; the volunteers provide financial support and assist in conservation projects. Additionally, more than 600 local volunteers work with the national authorities to fight and prevent commercial exploitation of wildlife in protected areas. On average, the ASVO volunteers contribute 6,000 hours of labor in the wildlife refuges each year. Volunteers typically work full days, with one free day a week (ASVO, 2009).

The projects are focused in 30 areas of the country, promoting the responsible use of nature and natural resources by Costa Rica's ecotourism industry (Figure 4).

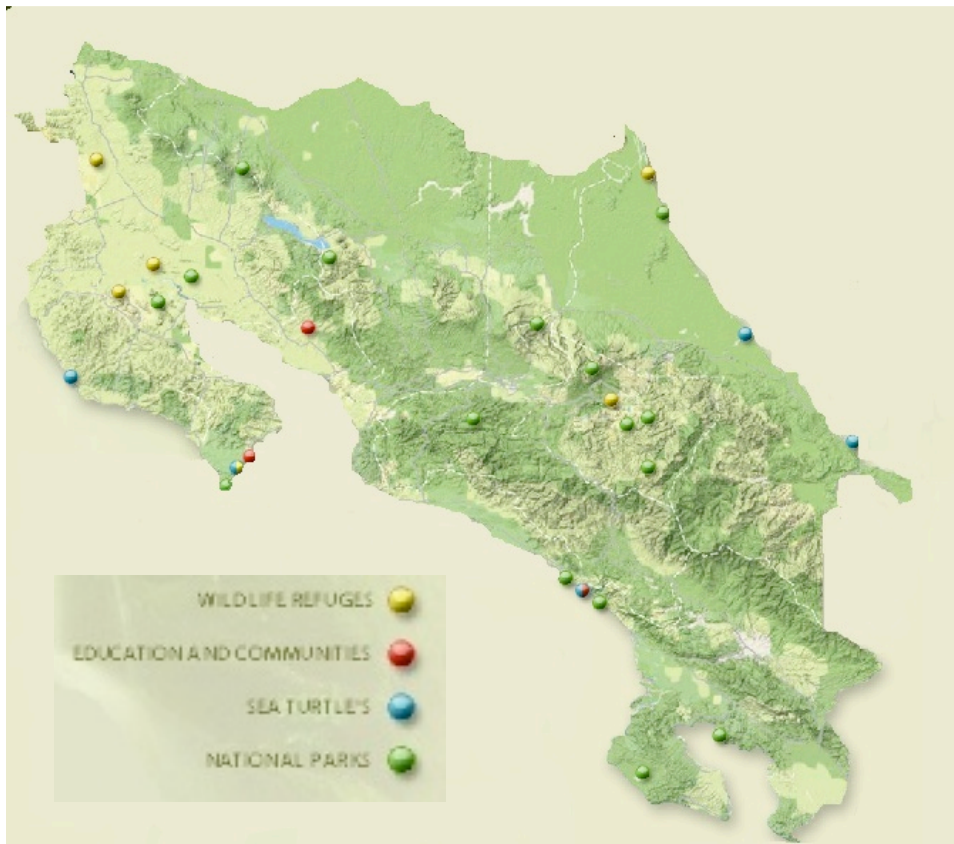


Figure 4: Map indicating the locations of ASVO's active projects (Modified from ASVO, 2009)

ASVO recruits volunteers to work in 4 areas: Wildlife Refuges (6), Education and communities (3), Sea Turtles (5) and National Parks (16). The five sea turtle projects are split into two groups: Pacific coast (Playa Buena Vista, Romelia Refugio de Vida Silvestre, and Playa Matapalo) and Atlantic coast (Quelonios Reserva Biologica and Gandoca-Manzanillo Refugio de Vida Silvestre).

4.5 Day Labor

Volunteers are assigned work to complete in the morning and afternoon. Every morning volunteers share the duties of house cleaning, and each volunteer is assigned a specific task. The morning and afternoon work varies each day. Some of the common tasks include: beach clean ups, relocating driftwood in and around nesting areas, re-enforcing the hatchery fence, digging out old nests in the hatchery, and aiding in construction/maintenance of the base house.

4.6 Beach Patrols

As a part of their service work, volunteers participate in nightly beach patrols to search for nesting sea turtles. Each patrol must have a patrol leader, a writer, and an assistant. The duties are divided among both staff and volunteers each night. The worksheet the volunteers fill out is attached in Appendix 2.

The patrols are in 3 hour shifts: 19:00 to 22:00, 22:00-1:00, and 1:00-4:00. An additional morning patrol counts the number of tracks present on the beach, from 4:00-6:00. These hours depend on the tide. ASVO has divided the tidal pattern at Matapalo into 8 stages to identify the timing of most turtle visitations:

1. Low tide
2. Rising to medium
3. Medium rise
4. Medium to full
5. High tide
6. High to medium
7. Medium fall
8. Medium to low

To collect data efficiently in groups, the beach is separated into 3 sectors. Wooden markers designate 100 m stretches of the beach (Figure 5), and these wooden markers

identify the sectors: Sector one reaches from the first wooden marker to the sixth, Sector two reaches from wooden marker six to 12, and the third sector is from wooden marker 12 to 18.

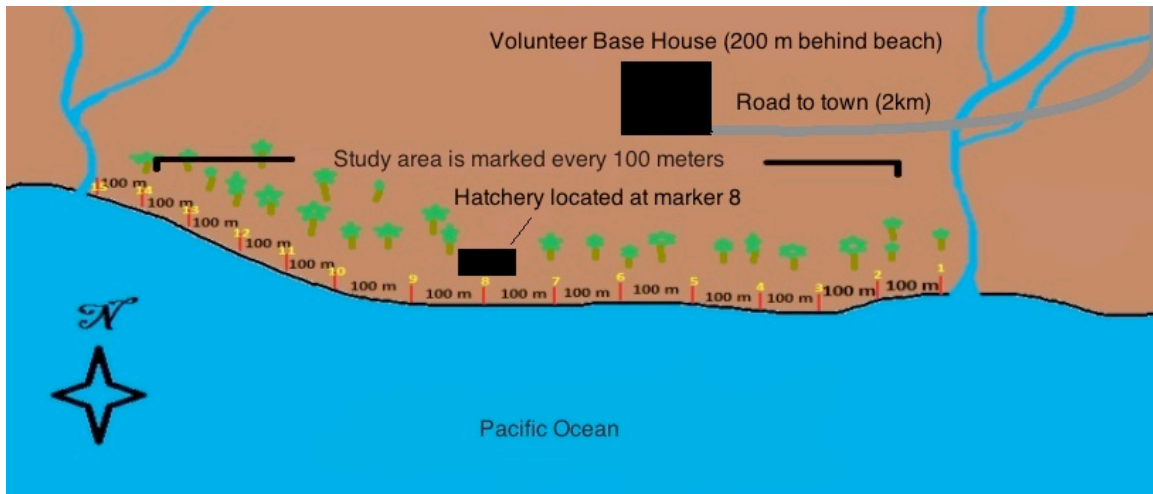


Figure 5: An artist's rendition of Matapalo beach indicating where the wooden markers are located along the project area, location of the volunteer base house, and the project's distance to town (Adapted from Solano and Fallas, 2011)

Patrol groups and sector assignments are made by staff and posted at the base house every morning. Once on patrol, the patrol leader (either staff or trained volunteer) is responsible for identifying both entry and exit turtle tracks. If an entry track is found, the patrol leader must also identify the turtle's nesting stage. There are 8 stages:

1. Leaving the ocean
2. Cleaning the nesting area
3. Digging the nest
4. Depositing the eggs
5. Covering the nest
6. Camouflaging the nest
7. Returning to the ocean
8. Nesting female is no longer present

The stage of nesting is used to measure the effectiveness of patrolling in ASVO's research efforts. ASVO categorized the patrolling effort as excellent if a stage one, two, or three is found, good if a stage four is recorded, fair if a stage five, six, or seven is determined, and poor if no female is present, a stage eight (Solano and Fallas, 2011).

Patrol participants collect biometric data. Turtles are measured: the curved carapace length (LCC) and the curved carapace width (ACC). The LCC is the measurement from the midpoint of the anterior to the midpoint in the posterior portion of the carapace (Figure 6). The ACC is measured at the widest point along the carapace (Figure 7). Once measurements are taken and the turtle has finished depositing the eggs, untagged turtles are then tagged (Solano and Fallas, 2011).

After the turtle has returned to the ocean, the patrol leader relocates the disguised nest and digs it up. The eggs are collected in a clean plastic bag, and the person handling the eggs must wear sterile latex gloves. Once the bag is full of eggs, the handler holds the bag closed with both hands and walks while holding the bag in the front of their body; this is to make sure that the eggs endure the least amount of disturbance. The empty natural nest is measured and the wooden marker that is associated with the next location is noted.



Figure 6: How to measure the curved carapace length (LCC) (Solano and Fallas, 2011)



Figure 7: Figure 5: How to measure the curved carapace width (ACC) (Solano and Fallas, 2011)

4.7 Hatchery Duties

The hatchery is a fully enclosed site on the beach located at wooden marker number 8.

The number of nests in the hatchery is variable, and is determined by the number of nests relocated to the hatchery throughout the season. Each nest in the hatchery is dug out by hand on a 1 square meter section. The

circumference of the nest is lined with a wire netting that is covered with a tinted mesh fabric; this is meant to contain the hatchlings when they emerge from the nest and to protect the hatchlings from the sun (Figure 8).

The hatchery has an observer at all times. As part of the daily volunteer schedule, hatchery shifts are assigned to the volunteers. The volunteer must check every nest every 15 minutes for emerging

hatchlings. The volunteer is also required to check nests that are about to come due every 5 minutes. These shifts alternate by day with patrol shifts; that is to say that if a volunteer is assigned to a hatchery shift at anytime in one day, they are not required to work a patrol shift that evening. The hatchery shifts range from 2-4 hours, and the longer shifts usually have 2 volunteers that share hatchery watch tasks.

On the nightly patrols, volunteers collect eggs on the beach and transfer them to the hatchery. The nest in the hatchery is meant to mimic the humidity, temperature, and gas exchange of the natural nest to support the healthy development of the embryos. The patrol volunteers pass off the bag of eggs to the volunteer on duty in the hatchery. This



Figure 8: Occupied nests inside the hatchery at ASVO's Matapalo Beach project. The circumference of the nest is lined with a wire netting that is covered with a tinted mesh fabric to contain the hatchlings and protect them from the sun once they emerge.

volunteer uses the nest measurements from the patrol to dig a nearly identical nest inside the hatchery.

When hatchlings emerge, the volunteer must make note of the time and date of the event. The volunteer, wearing latex gloves, counts the number hatchlings and transfers them to a large bucket filled with wet sand. If it is mid-day and the sun is too strong to release the hatchlings, the volunteer places a towel over the bucket and leaves the bucket in the enclosed hatchery. At a time of day when the sun is not as strong, the volunteer on duty brings the bucket of hatchlings to the wooden marker number that corresponds to the natural nest from where the eggs were collected. The hatchlings are placed, one by one; on the sand no more than 15 meters from the water line. The volunteers observe newly released hatchlings to ensure they all successfully enter the ocean.

Chapter 5

Methodology and Results

Ecotourism, specifically sea turtle tourism, and volunteer tourism are united at ASVO's project site in Matapalo Beach. This research was conducted as an exploratory case study on site during the months of August and September of 2011.

5.1 Methodology

Empirical data were collected from the case study organization to address the hatching success rate of the sea turtle conservation project. Regarding the social aspect of this thesis, a detailed questionnaire was written to determine the impacts that the volunteer tourism experience has on participant. The questionnaire was divided into several subsections. The first section of the questionnaire was designed to obtain the background information of each of the volunteers that came to work on the project for the duration of the study. The remaining sections of the questionnaire included questions regarding volunteer motivations, satisfaction, self-efficacy. The questionnaire is attached in Appendix 3.

The questionnaires were distributed to every volunteer that came to work on the conservation project during the study period. The questionnaire was provided to the volunteer at the end of their volunteer commitment. Each participant could have been filled out the questionnaire on site, or they could have retained the survey when they left the project to send to the researcher at a later date. Of the 41 questionnaires distributed, 37 were returned and used for analysis in this thesis.

All of the survey data was tabulated and described qualitatively. For the questions studied, demographic variables did not account for significant differences in volunteer motivations, satisfactions, and self-efficacy; this may be attributed to the size of the sample group. The frequency of answers for the specific sample group studied is reported in this chapter.

It should be noted that there might be a bias in the surveys returned; those volunteers that completed the survey may be more emotionally invested in the conservation efforts, and therefore, this could result in more favorable responses to conservation.

5.2 Results

This section reports both the conservation and social outcomes of the social-ecological conservation project.

5.2.1 Conservation Outcome

From analyzing ASVO's past reports, data on the numbers of eggs collected, the average percent of hatched eggs per nest, and the numbers of released hatchlings are summarized in a table (Table 1).

Table 1: Summary Table of eggs collected, hatched, and released

Year	Total Number of Eggs	Percent Hatched	Number of Hatchlings released
2010	15,737	91.8%	14,439
2009	13,049	88.6%	11,474
2008	16,069	74.4%	11,954
2007	17,573	89.9%	15,798
2006	10,111	76.7%	7,746

The average percent of hatched eggs per nest for the past 5 seasons has remained

consistently high; it has not fallen below 70%. The reports analyzed provided no raw data, but most reports indicated a standard error with the associated season. By examining the overlapping standard error bars, it is evident that there is no significant difference among the hatching success rate over the 5-year period. A graphical representation of the hatching success rate can be seen in Figure 9.

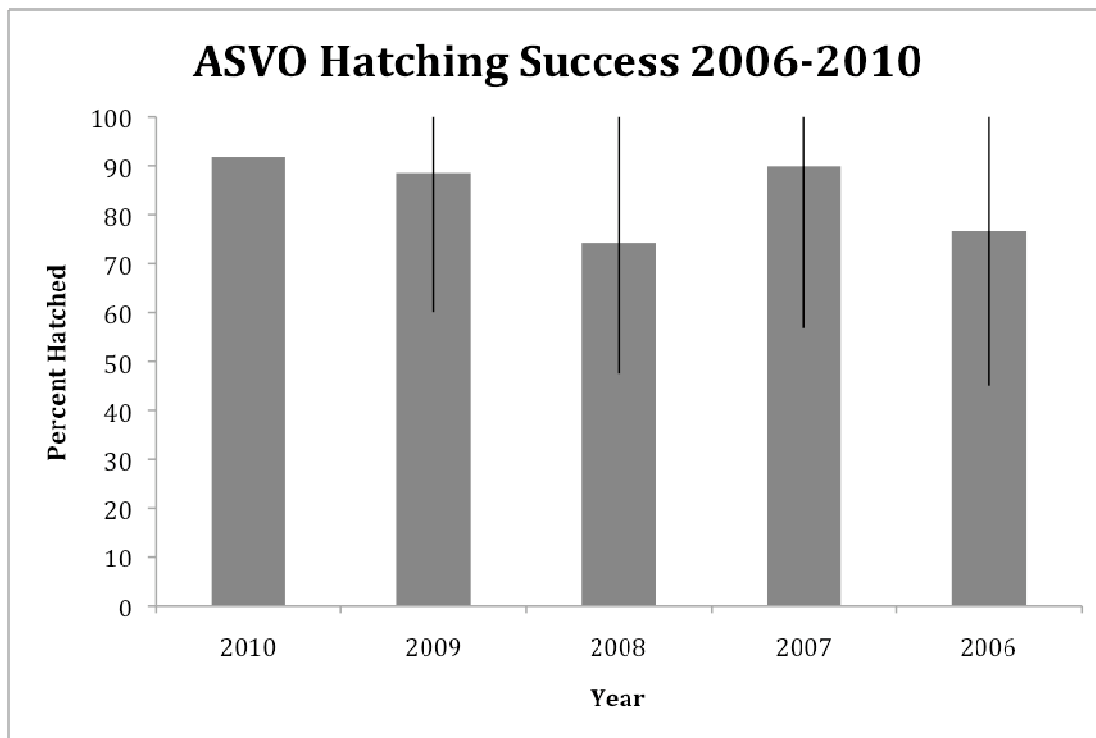


Figure 9: Graphical representation of the hatchling success in the ASVO hatchery over a 5-year period.

ASVO determined hatching success by calculating the ratio of the total eggs deposited into the nest and the total number of eggs that hatched from that nest. An egg was considered hatched if the baby turtle was released from the shell containing it. This number may differ from the number of hatchlings released; some may have died before release to the ocean (i.e. sometimes hatchlings have not fully developed when released from the shell, which decreases their chance of survival). This percent hatched is hatching success, and is not indicative of the number of hatchlings that survived to become a juvenile or an adult.

During the 2010 season, ASVO released 14,439 hatchlings into the ocean, 2,485 more hatchlings released from the 2009 season. This increase may be attributed to increased egg collection efforts and improvements in the nursery conditions for incubation. In the past 2 seasons, ASVO has worked with 2 incubation conditions in the hatchery, ground level and terrace, or elevated, nests. The terrace nests exhibited a 6% increase in the hatching success as compared to the nests on ground level, which resulted in about 866 more hatchlings that were released.

In 2007, ASVO reported a release of 15,798 hatchlings, with an 89.9% hatched from the total number of eggs collected. This is the highest number of released hatchlings for the 5-year period, but 2007 also exhibited the highest number of eggs collected for the season.

5.2.2 Social Outcome

College educated females from Europe is the major demographic that volunteered at the case study social-ecological conservation project.

5.2.2.1 Demographics

Regarding gender, there was a greater number of female volunteers; of the respondents, 11 were male and 23 were female (Figure 10).

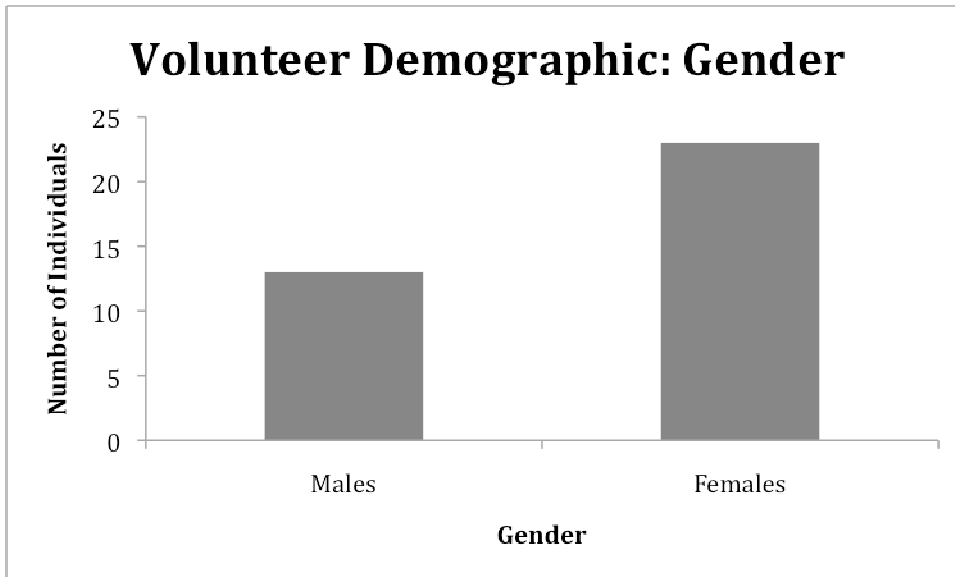


Figure 10: Number of males and females present at the Matapalo project during the study period

Regarding country of origin, there was a greater number of volunteers from Europe; of the respondents, 27 were from Europe and only 10 were from North or South America (Figure 11).

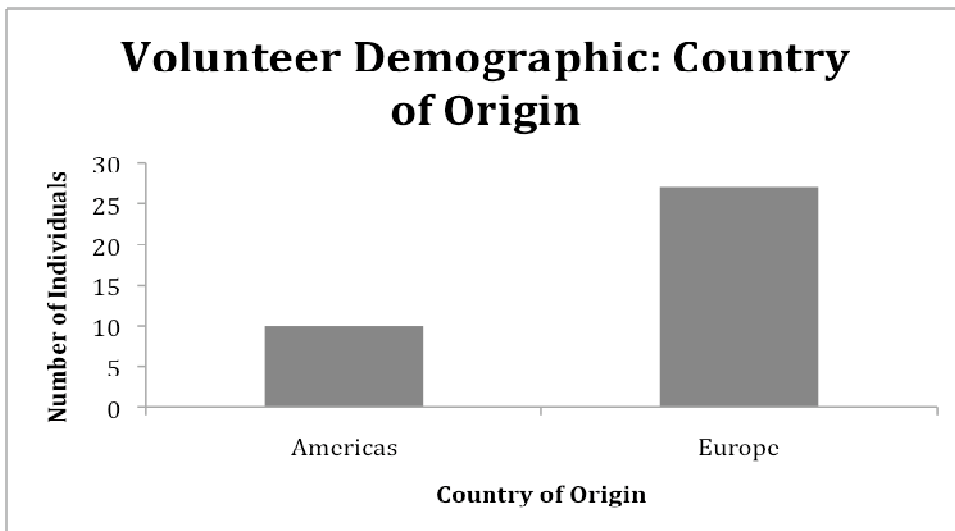


Figure 11: Number of volunteers from Europe and the Americas present at the Matapalo project during the study period

Regarding level of education, most of the respondents indicated that they had finished some college. Of the respondents, there were 11 high school graduates, 21 people with some college, 3 people with a completed college degree, and 1 person who had completed a graduate school degree or higher (Figure 12).

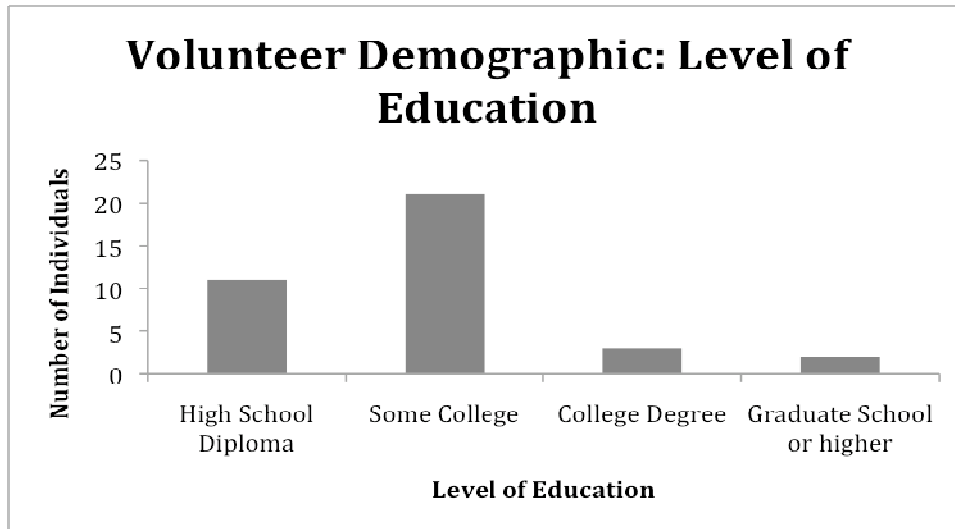


Figure 12: Number of volunteers with varying levels of education present at the Matapalo project during the study period

5.2.2.2 Motivations

Motives to volunteer on the ASVO sea turtle conservation project showed little variation among the participants. There were 3 major survey questions that referred to volunteer motives: purpose of the trip, previous wildlife volunteer work, and sea turtle self-importance.

Question 1: Is volunteering your time with ASVO the main purpose of your trip?

General finding: Of the respondents, about half said that volunteering was the main purpose of their trip.

Internal differences: The survey data showed nearly no difference among any of the demographics with regard to this question. There was a slightly higher number of male respondents and a slightly lower number of females that specifically traveled to volunteer. A slightly higher number of both Americans and Europeans state that volunteering was the main purpose of their trip. In terms of level of education, high school graduates and those with a graduate degree had a slightly higher number of

respondents indicating that volunteering was main purpose of their trip. Those with some college and a college degree showed a slightly lower number of respondents indicating that the main purpose of their trip was volunteering (Appendix 4, Table 1). These data do not necessarily indicate that sea turtle conservation was the main purpose for these groups; solely that volunteering of some kind played a major role when planning their trip.

Question 2: Have you ever volunteered for wildlife conservation efforts before?

General finding: Most respondents had never participated in wildlife conservation projects in the past.

Internal difference: Of the respondents, more than 50% of both females and males had not participated in wildlife conservation projects before. Seventy-five percent of American respondents had participated in wildlife conservation projects in the past. On the contrary, 75% of Europeans had not participated in wildlife conservation projects in the past. More than half the respondents with a high school diploma and some college had not participated in wildlife conservation projects in the past. For those respondents with a college degree or graduate school or higher, there was no difference with regard to this question (Appendix 4, Table 2).

Question 3: How important are sea turtles to you?

General finding: None of the respondents ranked sea turtle self-importance as unimportant. On the whole, most respondents ranked sea turtles as important, regardless of gender, nationality, or level of education (Appendix 4, Table 3).

Internal difference: There was no difference in how the respondents answered this

question with regard to gender, country of origin, or level of education; most respondents chose important. (Appendix 4, Table 3).

5.2.2.3 Satisfactions

Several survey questions asked about volunteer satisfaction. We examined what was educational, whether or not the volunteer learned about sea turtle biology and/or threats to turtles from their service work, the most influential aspect of their volunteer work, and how important the volunteer thinks their work is in conserving sea turtles.

Question 1: What was educational?

General finding: Respondents answered similarly among the following choices:

Introductory session, watching turtles lay eggs, transferring eggs to hatchers, watching hatchlings. There were considerably less respondents that chose hard labor service and/or working with people from other countries (Appendix 4, Table 4).

Internal differences: Males and females, Americans and Europeans, and respondents of all levels of education had a nearly even spread of responses among the four popular answers mentioned above (Appendix 4, Table 4).

Question 2: Did you learn about sea turtle biology and/or threats to sea turtles?

General finding: Regardless of demographic, most of the respondents said they learned about sea turtle biology and/or threats through the volunteer experience (Appendix 4, Table 5).

Internal difference: There was no difference among the various demographic surveys with regard to this question (Appendix 4, Table 5).

Question 3: How important do you think your work was in conserving sea turtles?

General finding: Most respondents ranked the importance of their work to the conservation effort as important (Appendix 4, Table 6).

Internal difference: There was no real difference among the various demographic surveys with regard to this question; both males and females, both Americans and Europeans, and respondents from all levels of education chose important (Appendix 4, Table 6).

Question 4: What were the most influential aspects of your volunteer?

General finding: Most respondents chose among seeing sea turtles, watching hatchlings, handling turtle eggs, and learning about sea turtles. Few respondents chose being in Costa Rica or interacting with locals as the most influential aspect of their service (Appendix 4, Table 7).

Internal difference: In terms of the most influential aspect of volunteer service, females mainly chose watching hatchlings. Males had less disparity in their answers, and were relatively even between seeing sea turtles, watching hatchlings, learning about sea turtles, and being in Costa Rica. The most American respondents chose watching hatchlings, and the most European respondents chose both seeing sea turtles and watching hatchlings. There was no real difference among responses of those with a high school diploma, a college degree or graduate school or higher. Those respondents with some college mostly chose watching hatchlings as the most influential aspect of their service (Appendix 4, Table 7).

5.2.2.4 Self-efficacy

The survey had two major questions that reflect on the participants' self-efficacy with respect to their service: whether or not the volunteer's experience will influence various thought processes and actions, and whether or not their service has convinced them that action should be taken to conserve sea turtles. These questions were compared against the respondents' answers to the survey questions that indicate conservation importance and the most influential aspects of volunteer service.

Question 1: Do you think your volunteer experience will influence the way you: Dispose of plastics, Think about fishing gear, Use lights near or on beaches, Think about purchasing tortoise shell products, turtle eggs, meat, soups, etc.; Use beaches used by sea turtles? v How important do you think your work was in conserving sea turtles?

General finding: Of the respondents who thought their service work was neither important nor unimportant and those that considered their service work important showed an even spread among the choices for the way that their service would influence their thoughts and actions (Appendix 4, Table 8).

Internal difference: The respondents indicating that they thought their service work was important in conserving sea turtles chose that their service work would mostly influence the ways that they dispose of plastics and think about purchasing turtle products, in equal proportions. Those respondents that considered their service very important exhibited a higher response to the ways they think about disposing of plastics (Appendix 4, Table 8).

Question 2: Do you think your volunteer experience will influence the way you:

Dispose of plastics, Think about fishing gear, Use lights near or on beaches, Think about purchasing tortoise shell products, turtle eggs, meat, soups, etc.; Use beaches used by sea turtles? v. What were the most influential aspects of your volunteer service?

General finding: Most of respondents who indicated that their volunteer service was neither important nor important, important, or very important ranked that use of lights on or near sea turtle beaches the lowest with regard to changing thought processes. Overall, respondents identified most with the notion of disposing of plastics over all other options.

Internal difference: Those respondents who indicated that seeing sea turtles and watching hatchlings were the most influential aspect of their work thought that their service work would mostly influence the way they dispose of plastics and think about purchasing turtle products. Those that chose handling turtle eggs as the most influential aspect indicated that they thought their service work would influence the way think about fishing gear. Those respondents that chose learning about sea turtles as the most influential aspect of their service work chose that their service work would influence the way they dispose of plastics, think about fishing gear, and think about purchasing turtle products the most and in equal proportions (Appendix 2, Table 8).

Question 3: Do you think that your volunteer service with ASVO has convinced you that more action should be taken to minimize the threats facing sea turtles? v. How important do you think your work was in conserving sea turtles?

General finding: Most of respondents who indicated that their volunteer service was neither important nor important, important, or very important marked that action should be taken to protect sea turtles. Few respondents chose no or that they were unsure

(Appendix 4, Table 9).

Internal difference: Those who thought their work was very important in conserving sea turtles showed the highest number of respondents that said yes, action should be taken to protect sea turtles (Appendix 4, Table 9).

Question 4: Do you think that your volunteer service with ASVO has convinced you that more action should be taken to minimize the threats facing sea turtles? v. What were the most influential aspects of your volunteer service?

General finding: Most of the respondents indicated that after their volunteer work, they think action should be taken to minimize the threats to sea turtles (Appendix 4, Table 9).

Internal difference: Out of those participants who had a tactile experience with the sea turtles, none indicated that action should not be taken to protect sea turtles. The highest number of respondent indicated that action should be taken if they indicated that watching hatchlings was the most influential aspect of their work (Appendix 4, Table 9).

Chapter 6

Discussion

As charismatic megafauna, sea turtles have widespread appeal. Social-ecological conservation projects, like ASVO's project in Matapalo, are able to take advantage of human interest in such species to aid in conservation efforts. Often times, these social-ecological projects benefit from a branch of ecotourism known as volunteer tourism. Volunteer tourists are people that travel from their home to donate time and effort for some cause. In the case of the Matapalo social-ecological conservation project, volunteer tourists are enlisted to aid in sea turtle conservation. This case study examined the conservation outcomes of the study project. We surveyed the project volunteers working from August and September 2011 to gain insight into their motivations, satisfactions, and self-efficacy with regard to their service. This information reflects the demographic that chooses to participate in such programs and the aspects of the program that influence the volunteers' self-efficacy. It is the notion of the volunteer's self-efficacy that can translate into effectively aiding sea turtle conservation outside of monetary donations and hard labor service.

ASVO's conservation success can be measured by examining various indicators. This thesis focused on the hatching success rate to reflect the organization's success in terms of effective conservation efforts. Over the past 5 years, there has been no significant difference in the hatching success rate. However, considering that the hatching rate is consistently high, the organization's project is successful.

This rate is increased by effectively carrying out all of the needed tasks during both the

patrol and hatchery shifts. Firstly, patrol participants must successfully find the nesting sea turtles and/or the camouflaged nest after the sea turtle returns to the ocean. Accurate dimensions of the natural nest must be noted. The eggs must be carefully placed into a sterile plastic bag and gently carried to the hatchery. The hatchery watch participants must construct a nest in the hatchery that imitates the natural nest using the dimensions acquired on the patrol. The eggs must then be placed into the new nest, and it must be packed, as it would be in the wild. After the standard incubation period, the nests are closely watching for arising hatchlings. Once hatchlings emerge from the nest, they must be transferred into a holding area with wet sand until all of the hatched individuals have arisen. When solar and tidal conditions are favorable, the hatchlings are returned to the site of their natural nest and released to the ocean.

There are other indicators of a successful conservation outcome for sea turtle conservation; the sex ratio, specifically, is an informative indicator. This thesis did not report on the sex ratio of hatchlings; the data was not available in the seasonal reports. The temperature of a nest determines sea turtle sex. Sea turtle conservation projects that involve removing eggs from their natural nest and transferring them to a man-made nest have the potential to greatly alter the sex ratio the hatchlings. If the temperature of the hatchery is cooler or warmer than that of the natural nest, the project may be disproportionately producing one sex. There is a documented case of a sea turtle conservation project in Rancho Nuevo, Mexico where the Fish and Wildlife service determined that the hatchery was producing only male turtles (2006). Therefore, it is important to look at other data besides hatching success to better measure conservation success.

Nonetheless, it is evident that the detailed tasks volunteers carry out are required for a successful conservation outcome. This success is contingent on volunteer contribution; therefore, continued volunteer service is necessary for conservation success. Perhaps, if data is collected over a longer time period, a significant difference may be found between the earlier and later seasons.

The ASVO social-ecological conservation project relies on volunteers to carry out tasks that directly influence the hatching success of the program. Due to this dependence on volunteer participation, the project must take an interest in maintaining positive relations with past, current, and perspective volunteers. This thesis measures these positive relations as social successes. To explore how the organization can optimize the human-environment interaction of their social-ecological project, the thesis questionnaire explored the motivations, satisfaction and self-efficacy of the volunteers.

Of the respondents, college-educated women from Europe represent the major demographic. It may be speculated that, since most European respondents are from affluent first world countries, like Germany, travel is very accessible in terms of both being able to afford to travel and physically traveling across near-by borders. It is not surprising, then, that most respondents came from Europe.

Motivations to participate related to the volunteer activities were nearly consistent among the participants. The thesis questionnaire addressed 3 motivations that could possibly influence the volunteer's motivations. The first motivation survey question asked if

volunteering was the main purpose of the trip. This reflects the volunteers' desire to give back versus the volunteers' desire to travel. The second motivation survey question asks about past volunteer participation in wildlife conservation. This question also reflects the volunteers' desire to give back, but also reflects a desire to continue involvement in giving back. The third motivation question asks about the importance of sea turtles to the volunteer. This reflects the volunteers' ties to the environment and conservation views.

Of the people surveyed, the demographic that expressed a desire to give back were mostly college-educated women from Europe. However, according to the data, the demographic that associated their volunteer work with a desire to travel is also mostly college-educated women from Europe. These data, therefore, confirms that most participants, in general, are college-educated women from Europe, and does not necessarily reflect who actually has the desire to give back.

The majority of the volunteers surveyed have never participated in wildlife conservation efforts prior to this program, and therefore, the notion of continued involvement is not prevalent among the respondents. The survey question that refers to sea turtle self-importance reflects that most of the volunteers have strong ties to the environment and sea turtle conservation; most respondents chose that sea turtles were important to them. One must consider that this question may be the product of a bias. The people that partake in projects like ASVO's sea turtle conservation project, even though the surveys are anonymous, may not choose to disclose their true feelings on the matter. That is to say that even if sea turtles are not really important to the volunteer, they may be hesitant to respond in that way.

The level of satisfaction attained through their volunteer work was addressed by examining the educational components of their service and the volunteers' perceived importance of their service work. Of the respondents, college-educated women from Europe ranked more aspects of their service educational among all the demographics examined. Again, this is attributed to the fact that most of the respondents were college-educated females from Europe.

It is evident that direct contact with the sea turtles was the most influential aspect of volunteer service among all the respondents. This direct contact ranges from seeing adult females laying eggs, handling the turtle egg, and watching hatchlings. This type of interaction is one that allows the volunteer to interact with sea turtles first-hand, and therefore, the volunteer feels a stronger connection to sea turtles, and possibly the environment in general. Sea turtles capture human interest, and interaction further evokes the desire to conserve and protect the species.

Regardless of the demographic, volunteers that participate in conservation projects learn from the experience. If the volunteer considers the service educational and perceives their contribution as important, the experience will increase the volunteers' awareness. This, in turn, influences the volunteers' self-efficacy with regard to the conservation efforts. An increased awareness combined with the person's perception of self-efficacy are the components needed to evoke a behavioral change to act towards conservation.

The survey questions compared volunteer level of satisfaction with self-efficacy

questions. Most respondents considered that their service work would influence the way they dispose of plastics. Disposing of plastics and using lights near or on beaches are activities that the volunteer can identify with closely as they are activities that they partake in more often than the other choices provided on the survey. Therefore, these behaviors are the most tangible among the activities listed on the survey. It is expected that the volunteers' experience will influence behaviors that are tangible. It is surprising, then, that more respondents did not choose using lights near or on beaches.

Of the respondents that found their work important or very important expressed that their service work has positively changed their opinions of the actions that need to be taken to minimize the threats to sea turtles. This exemplifies the importance of a volunteer's self-efficacy in conservation projects. Those that find their work important or very important have a higher level of satisfaction; this increases their awareness to the issues of sea turtle conservation. Increased satisfaction and awareness increases the volunteers' self-efficacy. This survey question refers only to the influence of the volunteers' experience on actions that should be taken to minimize threats; follow-up survey questions should refer to what perceived actions they volunteer will take.

Conclusion

Overall, ASVO's sea turtle conservation project in Matapalo Beach, Costa Rica has a successful conservation outcome. By examining the responses of the surveyed volunteers of the ASVO sea turtle conservation project, this thesis presents a description of motivations, satisfaction, and perceived behavioral response among the respondents. It is evident that college-educated women from Europe frequent this conservation project. It is suggested that ASVO and other conservation projects market their volunteer program to this demographic. This demographic displayed the highest level of satisfaction in terms of importance of their work. This high level of importance directly influences self-efficacy and, therefore, the volunteer's behavioral response with regard to conservation efforts.

In general, social-ecological conservation project volunteers that have an educational experience and partake in first-hand interaction with the wildlife will return home with a higher awareness of conservation project goals. The educational experience combined with first hand wildlife interaction directly influences the volunteers' level of satisfaction with their service. By focusing on the educational components of the volunteer work and assigning tasks that maximize direct wildlife interaction, social-ecological conservation projects will better influence the ways in which volunteers perceive their service experience. This will effectively influence the volunteers' self-efficacy in terms of conservation, and, therefore, these social-ecological projects can better generate behavioral changes of the volunteers that will aid in future conservation efforts.

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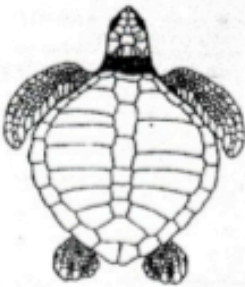
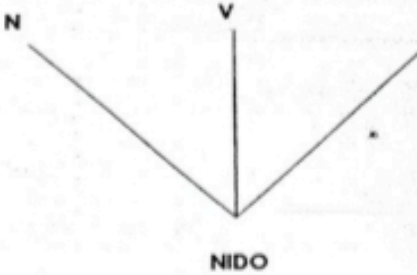
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Appendix 1

Summary Table: Costa Rica Sea Turtle Conservation Organizations			
Government-managed National Wildlife Refuge Projects			
Name	Location	Goals	Available Research/Data
Camaronal Wildlife Refuge	Camaronal Beach, Guanacaste	Conservation	N/A
Ostional Wildlife Refuge	Ostional Beach, Guanacaste	Conservation, community development	Peer reviewed literature regarding EHP
Playa Hermosa Wildlife Refuge	Hermosa Beach, Puntarenas	Conservation	N/A
Non-profit Biological Research Projects			
Name	Location	Goals	Available Research/Data
ASVO	Buena Vista, Guanacaste	Conservation	Internal data not readily available to public
	Gondoca-Manzanillo, Limon	Conservation, Community development	
	Matapalo, Puntarenas	Conservation	
	Romelia, Guanacaste	Conservation	
	Quelonios	Conservation, Community development	
Cano Palma Biological Station	Tortuguero, Limon	Conservation	http://www.cotercc.org/?page_id=194
Corcovado Foundation	Drake Bay, Osa peninsula	Conservation, Community development	N/A
Reserva Playa Tortuga	Ojochal, Puntarenas	Conservation, Community development	Season reports available online (http://www.reservaplayatortuga.org/docs.htm)
The Leatherback Trust	Las Baulas Marine Park, Guanacaste	Conservation, Community development	Limited data available online, possible unreleased internal data. (http://www.leatherback.org/pages/project/results.htm)
Sea Turtle Conservancy	Tortuguero, Limon	Conservation	Seasonal reports available online (http://www.conserveturtles.org/costarica.php?page=season-reports)
Widecast	Parismina, Limon	Conservation, Community development	Seasonal reports available online (http://www.latinamericanseaturtles.org/library.php)
	Cahuitta National Park, Limon	Conservation	

Appendix 2: Night Patrol Worksheet

Departamento de Investigación ASVO				Hoja de Campo							
# Archivo		Libro		Hoja		Correlativo					
Fecha:		Trabaja:									
Responsable:		Escribe:									
ANIDACION											
Especie:		Lo__	Cm__	Hora encuentro:		Etapa del proceso:					
		Ei__	Dc__	Mojón:	1_	2_	3_	4_	5_	6_	7_
Anido:	Si__	No__	N/S__	Destino:	V_	R_	N_	Z. puesta	A__	B__	C__
H. Puesta:	H. Fin puesta:		H. siembra:		T. huevos		# nido				
Codigo Vivero											
MARCAJE											
A. izquierda:	vieja	nueva	#	Cicatriz:	h	d	np	Quien:			
A. derecha:	vieja	nueva	#	Cicatriz:	h	d	np	Quien:			
BIOMETRIA											
LCC		LCC		LCC		Quien?:					
ACC		ACC		ACC		Quien?:					
AMBIENTE											
Marea	1_	2_	3_	4_	5_	Clima	1_	2_	3_	Posición:	N
											O
		Observaciones:									
Triangulación:											
											

Appendix 3: Volunteer Questionnaire

Purpose of this study:

All species of sea turtles are listed as either endangered or threatened under the U.S. Endangered Species Act. This study will evaluate the contribution of volunteers, like yourselves, to the sea turtle conservation efforts of ASVO. This study is being conducted by a master's candidate in the School of Marine and Environmental Affairs at the University of Washington.

All responses on this survey will be used for statistical analysis only and your confidentiality is guaranteed. Thank you for your participation in this survey. For further information please contact, Meredith Barnard, Barnard1@uw.edu or (239) 682-5747.

Instructions:

Please complete the following questionnaire and return to any ASVO staff or e-mail to Barnard1@uw.edu. You may also print and send a hard copy to:

Meredith Barnard
School of Marine and Environmental Affairs
University of Washington
3707 Brooklyn Avenue NE
Seattle, WA 98105-6715

Background Information

1. Arrival date for the Volunteer position: ___ / ___ / ___
2. Where are you from:
City/Town: _____
State: _____ Country _____
3. How old are you? _____
4. Gender: _____
5. Level of education: _____
6. Occupation: _____
7. Have you ever been to Costa Rica before: ___ Yes ___ No

8. How did you hear about this sea turtle conservation volunteer program?

Online

School

Magazine

Word of Mouth

Previous service

Other (Please specify: _____)

9. How long will you be volunteering? _____

Volunteer work

1. Is volunteering your time with ASVO the main purpose of your trip?

Yes No

2. Have you ever volunteered for wildlife conservation efforts before?

Yes No

3. If yes, what type of volunteer work/where/for how long?

Sea Turtles

1. How important are sea turtles to you?

unimportant

neither important nor unimportant

important

very important

2. How important are sea turtles to the environment?

unimportant

neither important nor unimportant

important

very important

Education

1. Was your service with ASVO informative about sea turtles? Yes No

2. What was educational:

Introductory session

Watching sea turtles lay eggs

Transferring eggs to a hatchery

Watching hatchlings

Hard labor service work

All of the above

None of the above

Other (Please specify: _____)

3. Did you learn about the threats/biology of sea turtles?

Yes No, I already knew No, I still feel uninformed

4. If so, what types of threats?

Conservation

1. How important do you think your work was in conserving sea turtles?

unimportant

neither important nor unimportant

important

very important

2. What do you think was the most influential aspect of your volunteer service:

seeing sea turtles

watching hatchlings

handling turtle eggs

learning about sea turtles

being in Costa Rica

interacting with locals

3. Please rank the following on a scale of 1 to 3 in terms of importance to your service work (1 is the most important and 3 is the least important):

Learning from guides, locals, and other volunteers

Handling turtles/turtle eggs

Seeing the turtle tracks and watching the turtle lay eggs

4. Do you think your volunteer experience will influence you in the ways that you:

Dispose of plastics

think about Fishing gear

use lights near beaches

think about/consider purchasing tortoiseshell products, eggs, meat, soups, etc

use beaches used by sea turtles for nesting

5. Do you think that your volunteer service with ASVO has convinced you that more action should be taken to minimize the threats facing sea turtles?

Yes No Unsure

6. If yes, why?

sea turtles are beautiful, charismatic creatures

sea turtles have been around for generations, and are ecologically important

sea turtles have a high recreational value for tourists like me

sea turtles can help generate income

Other (Please Specify: _____)

All of the above

Appendix 4: Tabulated Data

Motivations:

Was Volunteering the main purpose of your trip?			
Demographic		Response	
		Yes	No
Gender			
	Male	7 (53.9%)	6 (46.1%)
	Female	11 (47.8%)	12 (52.2%)
Country of Origen			
	Americas	6 (60%)	4 (40.0%)
	Europe	14 (51.9%)	13 (48.1%)
Level of Education			
	High School Diploma	6 (54.5%)	5 (45.5%)
	Some College	9 (42.9%)	12 (57.1%)
	College Degree	1 (33.3%)	2 (66.7%)
	Graduate School or higher	2 (100%)	0

Table 2

Have you ever volunteered for wildlife conservation efforts before?			
Demographic		Response	
		Yes	No
Gender			
	Male	2 (22.2%)	11 (40.7%)
	Female	7 (77.8%)	16 (59.3%)
Country of Origen			
	Americas	3 (75.0%)	9 (25.0%)
	Europe	6 (25.0%)	18 (75.0%)
Level of Education			
	High School Diploma	3 (27.3%)	8 (72.6%)
	Some College	4 (19.1%)	17 (80.9%)
	College Degree	1 (33.3%)	2 (66.7%)
	Graduate School or higher	1 (50.0%)	1 (50.0%)

Table 2

Demographic!		Response			
		Unimportant	Neither Important nor unimportant	Important	Very Important
Gender					
	Male	0	3 (23.1%)	10 (76.9%)	0
	Female	0	4 (18.2%)	14 (63.6%)	4 (18.2%)
Country of Origin					
	Americas	0	4 (33.3%)	7 (58.3%)	1 (8.3%)
	Europe	0	4 (17.4%)	16 (69.6%)	3 (13.0%)
Level of Education					
	High School Diploma	0	3 (30.0%)	6 (60.0%)	1 (10.0%)
	Some College	0	5 (23.8%)	14 (66.7%)	2 (9.5%)
	College Degree	0	0	3 (100.0%)	0
	Graduate School or higher	0	0	1 (50.0%)	1 (50.0%)

Table 6

What were the most influential aspects of your volunteer?							
Demographic		Response					
		Seeing sea turtles	Watching hatchlings	Handling turtle eggs	Learning about sea turtles	Being in Costa Rica	Interacting with locals
Gender							
	Male	5 (20.8%)	5 (20.8%)	2 (8.3%)	4 (16.7%)	5 (20.8%)	3 (12.5%)
	Female	11 (20.8%)	15 (28.3%)	6 (11.3%)	10 (18.9%)	8 (15.1%)	3 (5.7%)
Country of Origin							
	Americas	3 (17.6%)	7 (41.2%)	1 (5.9%)	3 (17.6%)	2 (11.8%)	1 (15.9%)
	Europe	12 (20.3%)	13 (22.0%)	7 (11.9%)	10 (16.9%)	11 (18.6%)	6 (10.2%)
Level of Education							
	High School Diploma	6 (22.2%)	6 (22.2%)	2 (7.4%)	4 (14.8%)	5 (18.5%)	4 (14.8%)
	Some College	7 (17.9%)	12 (30.8%)	5 (12.8%)	7 (17.9%)	6 (15.4%)	2 (5.1%)
	College Degree	2 (22.2%)	2 (22.2%)	1 (11.1%)	2 (22.2%)	1 (11.1%)	1 (11.1%)
	Graduate School or higher	1 (33.3%)	0	0	1 (33.3%)	1 (33.3%)	0

Table 7

How important are sea turtles to you?					
Demographic		Response			
		Unimportant	Neither Important nor unimportant	Important	Very Important
Gender					
	Male	0	2 (15.4%)	11 (84.6%)	0
	Female	0	5 (21.7%)	11 (47.8%)	7 (30.4%)
Country of Origen					
	Americas	0	2 (16.7%)	8 (66.6%)	2 (16.7%)
	Europe	0	6 (24.0%)	15 (60.0%)	4 (16.0%)
Level of Education					
	High School Diploma	0	3 (27.3%)	7 (63.6%)	1 (9.1%)
	Some College	0	5 (23.8%)	12 (57.1%)	4 (19.1%)
	College Degree	0	0	2 (66.7%)	1 (33.3%)
	Graduate School or higher	0	0	1 (50.0%)	1 (50.0%)

Table 3

Satisfactions

What was educational?							
Demographic		Response					
		Introductory Session	Watching turtles lay eggs	Transferring eggs to the hatchery	Watching hatchlings	Hard labor service	Working with people from other countries
Gender							
	Male	11 (20.8%)	12 (22.6%)	8 (15.1%)	13 (24.5%)	9 (17.0%)	0
	Female	18 (22.3%)	18 (22.3%)	15 (18.5%)	22 (27.3%)	7 (8.6%)	1 (1.0%)
Country of Origin							
	Americas	10 (25.0%)	7 (17.5%)	6 (15.0%)	11 (27.5%)	6 (15.0%)	0
	Europe	19 (19.8%)	23 (24.0%)	18 (18.7%)	24 (25.0%)	11 (11.5%)	1 (1.0%)
Level of Education							
	High School Diploma	8 (17.4%)	11 (23.9%)	9 (19.6%)	11 (23.9%)	6 (13.0%)	1 (2.2%)
	Some College	17 (23.6%)	15 (20.8%)	11 (15.3%)	20 (27.8%)	9 (12.5%)	0
	College Degree	3 (20.0%)	3 (20.0%)	3 (20.0%)	3 (20.0%)	3 (20.0%)	0
	Graduate School or higher	2 (28.6%)	2 (28.6%)	1 (14.3%)	2 (28.6%)	0.0%	0

Table 4

Did you learn about sea turtle biology and/or threats to sea turtles?				
Demographic		Response		
		Yes	No (I already knew)	No (I am still uninformed)
Gender				
	Male	10 (77.0%)	2 (15.4%)	1 (7.7%)
	Female	17 (63.0%)	2 (50.0%)	4 (80.0%)
Country of Origin				
	Americas	11 (73.4%)	2 (13.3.0%)	2 (13.3%)
	Europe	15 (75.0%)	2 (10.0%)	3 (15.0%)
Level of Education				
	High School Diploma	9 (81.8%)	1 (9.1%)	1 (9.1%)
	Some College	15 (71.4%)	3 (14.3%)	3 (14.3%)
	College Degree	2 (66.7%)	0	1 (33.3%)
	Graduate School or higher	2 (7.1%)	0	0

Table 5

Self-efficacy

Satisfaction Response	Behavioral Response					
	Do you think your volunteer experience will influence the way you:					
		Disposing of Plastics	Think about Fishing Gear	Use lights near or on beaches	Think about purchasing tortoiseshell products, turtle eggs, meat, soups, etc.	Use beaches used by sea turtles
How important do you think your work was in conserving sea turtles?						
	Unimportant	0	0	0	0	0
	Neither Important nor Unimportant	4 (20.0%)	3 (15.0%)	4 (20.0%)	4 (20.0%)	5 (25.0%)
	Important	15 (24.6%)	11 (18.0%)	7 (11.5%)	15 (24.6%)	13 (21.3%)
	Very Important	4 (36.4%)	2 (18.2%)	2 (18.2%)	2 (18.2%)	1 (9.1%)
Most Influential aspects of Volunteer service						
	Seeing sea turtles	11 (25.0%)	9 (20.5%)	6 (13.6%)	9 (20.5%)	9 (20.5%)
	Watching hatchlings	15 (26.8%)	9 (16.1%)	6 (10.7%)	14 (25.0%)	12 (21.4%)
	Handling turtle eggs	6 (27.3%)	5 (22.7%)	3 (13.6%)	4 (18.2%)	4 (18.2%)
	Learning about sea turtles	9 (22.0%)	9 (22.0%)	6 (12.2%)	9 (22.0%)	9 (22.0%)
	Being in Costa Rica	11 (27.5%)	7 (17.5%)	5 (12.5%)	8 (20.0%)	9 (22.5%)
	Interacting with locals	5 (26.3%)	3 (15.8%)	2 (10.5%)	4 (21.1%)	5 (26.3%)

Table 8

Satisfaction Response		Behavioral Response		
		Do you think that your volunteer service with ASVO has convinced you that more action should be taken to minimize the threats facing sea turtles?		
		Yes	No	I am unsure
How important do you think your work was in conserving sea turtles?				
	Unimportant	0	0	0
	Neither Important nor Unimportant	5 (62.5.0%)	0	3 (52.5%)
	Important	17 (73.9%)	1 (4.3%)	5 (21.7%)
	Very Important	3 (75.0%)	0	1 (25.0%)
Most Influential aspects of Volunteer service				
	Seeing sea turtles	11 (73.3%)	1 (6.7%)	3 (20.0%)
	Watching hatchlings	15 (75.0%)	1 (5.0%)	4 (20.0%)
	Handling turtle eggs	7 (87.5%)	0	1 (12.5%)
	Learning about sea turtles	10 (76.9%)	1 (7.7%)	2 (15.4%)
	Being in Costa Rica	10 (83.3%)	1 (8.3%)	1 (8.3%)
	Interacting with locals	5 (83.3%)	1 (16.7%)	0

Table 9