

**Community, capital and conservation: A study of  
community response to the egg donation system  
approach to sea turtle conservation in Guatemala**

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## **Abstract**

Focusing on members of rural communities along Guatemala's Pacific coast, this paper examines the effectiveness of the nation's egg donation system strategy to marine turtle conservation. The primary interest of this research is the community's perception on whether or not this situation has benefited them economically, socially or in any other ways. This study has presented some insight into community members' livelihoods and opinions that are affecting participation rates in the DS and its use as a conservation model. Evidence from participants in this study identifies key areas where conservation strategies can easily gain community support. These include, but are not limited to, addressing conservation threats posed by commercial fisheries, working to develop community conservation associations, and ensuring that community members can trust that others are participating fully.

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## Acronyms

ARCAS	<i>Asociación de Rescate y Conservación de Vida Silvestre</i>
CECON	<i>El Centro de Estudios Conservacionistas</i>
CITES	The Convention on International Trade in Endangered Species of Fauna and Flora
CONAP	<i>Consejo Nacional de Areas Protegidas</i> (National Protected Areas Council)
CONAPAC	<i>Comando Naval del Pacífico</i> (Pacific Naval Command)
DIPRONA	<i>División de Protección a la Naturaleza</i> (Nature Protection Division)
DS	Donation System
ENGO	Environmental Non-Government Organization
GTQ	Guatemalan Quetzal
IUCN	International Union for Conservation of Nature
km	Kilometre(s)
m	Metre(s)
MAGA	<i>Ministerio de Agricultura, Ganadería y Alimentación</i> (Ministry of Agriculture, Ranching and Food)
PNC	<i>Policía Nacional Civil</i> (National Civil Police)
PROBIOMA	<i>Asociación de Profesionales en Biodiversidad y Medio Ambiente</i> (Professional Association of Biodiversity and Environment)
TEV	Total Economic Value
UNIPESCA	<i>Unidad de Manejo de la Pesca y Acuicultura</i> (Fishing and Aquaculture Management Unit)
USAC	University of San Carlos of Guatemala
USD	United States Dollar

## 1 Introduction

In response to the recent decline in nesting marine turtles, many developing countries have implemented conservation strategies based on use values and needs of impoverished coastal communities. Focusing on members of rural communities along Guatemala's Pacific coast, this paper examines the effectiveness of the nation's egg donation system strategy to marine turtle conservation. The primary interest of this research is the community's perception on whether or not this situation has benefited them economically, socially or in any other ways. Additionally, I hope to provide insight into factors, such as poverty, that may be influencing their willingness to participate in conservation. Two main hypotheses are examined:

*Hypothesis 1: The present level of enforcement in the Donation System does not sufficiently maximize the participation of egg collectors and buyers in marine turtle conservation.*

*Hypothesis 2: Most egg collectors are concerned about the marine turtle population's sustainability in their area, but low incomes constrain their willingness to participate more in the Donation System.*

The present study comes at a time when hatchery conservation systems are showing mixed success rates in protecting marine turtle populations (Cornelius et al, 2007). Optimism is shown by hatcheries at two sites in India and one in Mexico which may have assisted in sustaining turtle populations (Cornelius et al, 2007) and olive ridleys, at least at one site in Guatemala, have shown some indication of a recent increase in numbers (ARCAS, 2007). Pessimism arises from the fact that after 30 years, no increase in nests has been detected on Honduras' Pacific coast where hatcheries are active (Cornelius et al, 2007). What is more, in February 2009 El Salvador, which had a hatchery programme similar to its neighbour Guatemala, abruptly passed and implemented a full and permanent ban on the possession, consumption, marketing and harvesting of marine turtle

eggs and other products (Álvarez, 2009). Moreover, since late 2006, Guatemala itself has had an annually renewed ban on leatherback egg harvesting due to the almost complete disappearance of the species nesting on Guatemalan shores (ARCAS, 2006).

The remainder of this paper is divided into the following. Section two identifies background information on sea turtles and outlines Guatemala's conservation strategy. Section 3 outlines the framework of analysis drawing from economic and environmental management theories. Section 4 presents the case study area on Guatemala's Pacific. Section 5 discusses the survey methodology used for this research. Section 6 presents findings. Section 7 and 8 analyse and discuss the shortcomings and opportunities in to Guatemala conservation strategy.

## 2 Sea Turtle Conservaton Management

### 2.1 Marine Turtle Species

To assist readers unfamiliar with marine turtle conservation, this section briefly presents information on the marine turtle species nesting along Guatemala's Pacific coast. Readers should note the terms 'marine turtle', 'sea turtle' and 'turtle' are used interchangeably in this paper to refer to these species.

Regular nesting of the olive ridley (*Lepidochelys olivacea*) and leatherback (*Dermochelys coriacea*) marine turtle species is documented on Guatemala's Pacific coast (Muccio, 1998; Sánchez Castañeda et al., 2005) while, during the 2008-2009 season, a single green turtle (*Chelonia mydas*) was recorded nesting near the village of Hawaii (Merida, pers. comm., 2009).

Olive ridleys are classified as 'vulnerable' on the International Union for Conservation of Nature (IUCN) Red List (Abreu-Grobois & Plotkin, 2008). The global distribution of olive ridleys includes both solitary nesting and a few mass nesting sites (NOAA Fisheries, 2009). The primary nesting season for olive ridleys on Guatemala's Pacific coast runs July to December, and peaks from August to October (Handy, 2005). Infrequent nesting is also known to occur through the remainder of the year (Muccio, 1998).

Leatherbacks are classified as 'critically endangered' on the IUCN Red List (Sarti Martinez, 2000). Most of the species' Pacific populations have experienced a decline of more than 80% (Sarti Martinez, 2000). Leatherbacks nest on the Pacific of Guatemala from November to January (Handy, 2005).

Little scientific information is available on the overall status of turtle populations and their habitats in Guatemala (Muccio, 1998; Bräutigam & Eckert, 2006). In recent years,



the majority of the nesting activity on the Pacific coast has come from olive ridleys whereas leatherbacks have become a rarity (Muccio, 1998; Sánchez Castañeda et al., 2005). In 2007, the *Asociación de Rescate y Conservación de Vida Silvestre* (ARCAS, 2007, p.1) described the situation as ‘bleak’ after no leatherbacks nested that year near either of their two hatcheries.

## 2.2 The Use and Commercialization of Marine Turtle Eggs

The use and commercialization of turtle eggs has been documented in over 20 countries ranging from Asia, West Africa, the Middle East, the Caribbean and Latin America (Bräutigam & Eckert, 2006; Campbell, 2003; Cornelius et al, 2007; Romanoff et al., 2008). Throughout Central America, the demand for turtle eggs, particularly amongst men, has partially been attributed to the belief that the eggs allegedly hold an aphrodisiacal effect. This belief has been reported in Guatemala (Muccio, 1998), El Salvador (Romanoff et al., 2008), Honduras, Panama (Bräutigam & Eckert, 2006), and to a lesser extent Costa Rica (Campbell, 2003).

## 2.3 Legal and Regulatory History: Guatemala

Bräutigam & Eckert (2006) note the lack of clarity contained within the laws and regulations on the exploitation and use of turtles and their products in Guatemala has led to complication and confusion. They cite a history of institutional and jurisdictional overlap between agencies, and differing interpretations regarding whether there is any legal protection of marine turtle eggs (Bräutigam & Eckert, 2006). Laws and authorities relevant to the present paper are highlighted below.

In 1971, the first turtle hatchery was initiated in the village of Hawaii (Bräutigam & Eckert, 2006; Sánchez Castañeda et al., 2005). Ten years later, the Government Decree of 17 February 1981 established: (1) a ban on the capture, transport and commercial use of sea turtles in Guatemala; (2) the need to regulate eggs-harvesting; and (3) increased need

in turtle hatchery sites (Bräutigam & Eckert, 2006; Muccio, 1998). Following this, an informal egg conservation quota system, known as the Donation System (DS), was developed to manage egg-harvesting (Muccio, 1998). By 1989, eleven hatcheries had been established (Higginson & Vasquez, 1989).

## 2.4 Responsible Authorities

At present, the statutory authority over marine turtles is shared between the National Protected Areas Council (CONAP) and the Fishing and Aquaculture Management Unit (UNIPESCA) of MAGA (Bräutigam & Eckert, 2006). Nationally, these two agencies are also responsible for surveillance and enforcement, along with the National Civil Police (PNC), the Nature Protection Division (DIPRONA, formerly SEPRONA), and regional support from the Pacific Naval Command (CONAPAC, formerly BANAPAC) and the Atlantic Naval Command (Bräutigam & Eckert, 2006; Chácon, 2002). CONAPAC also manages a hatchery (Muccio, 1998) and 1.6km fully protected nesting beach – the only one in Guatemala (ARCAS, 2007).

## 2.5 Hatcheries

Originally, government funding for hatcheries programme was cut during the 1997-1998 national privatisation initiative (Bräutigam & Eckert, 2006; Muccio, 1998). Hatcheries are now operated by an assortment of actors including: schools, private companies, CONAPAC, and other non-governmental entities (Bräutigam & Eckert, 2006; Muccio, 1998). The number of functioning hatcheries can vary from year-to-year, but up to twenty-seven have been in operation in a season (Sánchez Castañeda et al., 2005). Overall, the hatchery management situation has been described to be under-funded, under-staffed, highly decentralized, uncoordinated, lacking in scientific knowledge and weak in conservation practice (Muccio, 1998; Handy & Lucas, 2008; Juarez & Muccio, 1997).

Under funding can lead to a redirection of conservation priorities. For instance, in various tourism areas, hatcheries have been known to hold ‘hatchling races’ (Muccio, 1998; Handy & Lucas, 2008). The advantage to these activities is the tourism revenue for budget-constrained hatcheries, but it could also be argued to offer the benefit of conservation awareness opportunities for tourists (Muccio, 1998; Handy & Lucas, 2008). However, there is concern regarding the effects of keeping hatchlings for a few days until the tourists arrive because hatchlings limited energy supplies which are needed for their ‘frenzy’ swim to feeding grounds (Handy & Lucas, 2008). Further, some hotels are replicating the races ‘as a means of attracting more clients and claiming to be “eco friendly” by “helping the sea turtles”’ (Handy & Lucas, 2008, n.p.). There is also the potential for such practices to further complicate the monitoring and enforcement of sea turtle conservation.

There have been some positive outcomes from hatcheries that have justified their use in Guatemala. First, there is some indication that the local nesting populations may not recover under natural conditions (Handy et al, 2006; Sponsor a Nest Guatemala, n.d.). Second, a sense of community ownership can be argued to exist in some communities, particularly where pride is taken in their hatchery’s contributions and spirited competitions over total nest incubated will sometimes arise between hatcheries (Juarez & Muccio, 1997; Muccio, 1998). For instance, at one hatchery a ‘dramatic’ increase in egg numbers occurred after their nest sponsorship programme was started for the purpose of purchasing eggs from collectors (Sponsor a Nest Guatemala, n.d.). From a policy perspective, this latter example shows how the flexibility of decentralized hatchery structure can offer a space for creativity in the development of conservation management programmes.

## 2.6 Donation System

Hatcheries primary function is to receive and incubate ‘donated’ eggs from local collectors and buyers. In theory, the harvesting, sale and transport to markets is granted

under the DS, providing the necessary quota of eggs has been given to a hatchery and a CONAP certified receipt has been issued (Bräutigam & Eckert, 2006; Muccio, 1998; Sponsor a Nest Guatemala, n.d.). This system is also supposed to ensure an accurate recording and monitoring of the number of eggs traded and protected. The key steps required in the DS are summarized in the following:

1. An egg collector finds and harvests a nesting turtle's eggs (Muccio, 1998).
2. One of the following steps occurs next:
  - a. Egg collector gives a donation to the hatchery directly. A donation receipt is issued to the collector who then brings it to a local buyer when she/he goes to sell the rest of the eggs (pers. obs); or
  - b. Egg collector sells the entire nest directly to a buyer, who discounts the portion of the nest that will later be donated to the hatchery (Muccio, 1998).
3. Either the buyer brings the eggs for donation to the hatchery or the hatchery sends a representative to the buyer to collect donations. Once the donation is accepted, a receipt is issued to the buyer indicating the date, nest size, and number of donated eggs that have been received (Sponsor a Nest Guatemala, n.d).
4. The hatchery documents the donation and buries the eggs for incubation (Sponsor a Nest Guatemala, n.d.). Eggs from multiple turtles of the same species will often be buried together (Higginson & Vasquez, 1989) because the eggs donated are less than the full nest and to save on limited hatchery space (pers. obs.). (Weeks later once a nest has hatched, the hatchery records the total number of hatchlings and releases them on the beach.)
5. Once a buyer is ready to transport the eggs to a market, she/he obtains the transport receipts from the hatchery for the equivalent number of donations (Sponsor a Nest Guatemala, n.d.).
6. If a buyer's items are searched while on route to a market in Guatemala City, Mazatenango, or elsewhere, she/he must produce receipts indicating the corresponding number of eggs otherwise they are confiscated and taken to the CONAPAC hatchery (Muccio, 1998).

In actuality, there are many exploitable loopholes and other flaws that appear to have prevented this programme from achieving its full objective. Most importantly, there is not always a guarantee that the donation quota is fully met. When donations are taken from buyers, they are based not on the *actual* nest size, but on the *average* size of 100 eggs (Bräutigam & Eckert, 2006). However, the actual nest size of olive ridleys is known to vary substantially: from 30 to 170 eggs (Bonin et al., 2006). Until mid-1998, the quota was set at one dozen eggs per nest (Muccio, 1998), however if a buyer received two or three smaller nests she/he could minimize the number of donations given by simply combining the nests and stating they were just one nest of a 100 eggs. In 1998, a workshop was held by CONAP and the former BANAPAC (CONAPAC) wherein it was decided to increase the quota to 20% per nest (Muccio, 1998). The set percentage of 20%, if properly enforced, would at least ensure more equitable calculations in the overall donation quantity taken per nest. However, it should be noted that there has been no scientific assessment in the setting of quota levels (Bräutigam & Eckert, 2006). Moreover, in a correspondence with Bräutigam & Eckert (2006), Muccio indicated that this proposed increase remains controversial and has not been practiced.

In part, the DS is strategically designed to assist conservation efforts in a country with low capacity. For logical reasons, regulating the transport rather than collection of eggs has helped to minimize complexity. Muccio (1998) notes that requiring a few buyers to obtain transport receipts directly for donations has saved hatchery staff from having to locate the more abundant number of individual collectors. Although, there are other areas where capacity issues have been more problematic, producing a lower level of compliance. For example, most of Guatemala's enforcement efforts remain confined to the southern Pacific coast (Muccio, 1998). CONAPAC has previously established periodic road checks that provided key enforcement pressure along the southern Pacific coast (Muccio, 1998). However, the navy has no legal mandate and limited resources for these controls, so any organization desiring these checkpoints is required to fund transportation and food for the soldiers (Muccio, 1998).

Recently, DIPRONA performs routine patrols on buses, which are often used to transport eggs to the market, but this level of enforcement is not considered to be enough to regulate the egg trade (Sponsor a Nest Guatemala, n.d.). CONAP's capacity on the Pacific coast is limited to three employees (Bräutigam & Eckert, 2006). Data on the number of eggs donated per season was not even collected by CONAP until 1999-2000 (Bräutigam & Eckert, 2006). Nor has much information been available on the sale of eggs in markets because once they have reached the market there are no further controls on their commercialization (Muccio, 1998). Eggs from Guatemalan beaches have been documented alongside illegally imported Mexican and El Salvadoran eggs (Muccio, 1998).

There is at least some indication of positive impacts on several communities as a result of the DS. First, the DS functions as a participatory approach to conservation. Handy et al. (2006) argue its viability as an alternative to stricter conservation measures on the basis that it ensures the much-needed income generation from egg harvesting and has secured support for turtle conservation in some communities. Second, the flexibility within the DS and hatchery management allows for the development of complementary programmes and income sources. For instance, increased interest in ecotourism can help hatcheries promote the establishment of local sea turtle watching and related tours to increase long-term, sustained income sources (Handy et al., 2006). Finally, there are potentially positive outcomes for younger generations. Juarez & Muccio (1997) observe that many collectors and buyers enjoy donating eggs because they recognize the need to conserve this natural resource for their children. An added benefit for youth is the potential development of environmental education programmes such as the one in the village of Hawaii that tailors to youth from egg trader families (Lucas & Handy, 2008).

## 2.7 Recent Improvements

There have been recent signs of increasingly coordinated strategy development around hatcheries and the egg trade. In 2002, CONAP, UNIPESCA, and MAGA consulted

numerous stakeholders and produced a National Strategy for the Management and Conservation of Marine Turtles in Guatemala (Bräutigam & Eckert; 2006). In 2003, an NGO called *Asociación de Profesionales en Biodiversidad y Medio Ambiente* (PROBIOMA) was created to coordinate different stakeholders in conservation management (PROBIOMA, 2007). It has subsequently reported on the country's hatcheries and turtle population management (Sánchez Castañeda et al., 2005). However, there continues to be a lack of information on the level of opportunity available to egg collectors and buyers to be involved in the development of conservation strategies.

### 3 Framework

This section offers an overview of literature related to poverty and the degradation of natural resources. It establishes key concepts and terminology that form the basis of this paper's analysis.

#### 3.1 Poverty and Natural Resource Use

The complex relationship between poverty and natural resource degradation is well documented (see Neumayer, 2003; World Bank, 2008). For a start, the World Bank (2008) draws a distinction between *resource use* and *resource dependence*, the outcomes of which can differ substantially. They expand that '*Resource use* generally refers to the amount of resources consumed or collected by subsistence households; *dependence* refers to the contributions of resources to overall household income' (World Bank, 2008: p. 12). These resources can play a beneficial insurance role during periods of financial stress (World Bank, 2008). However, continued dependence on natural resources for household income can lead to intense degradation of the environment. Freese & Trauger (2000) warn that economic incentives can result in the overharvesting of either open-access or privately managed wildlife resources. They state the following:

If no one owns the wildlife resource, there is no economically rational incentive for individual harvesters to conserve the resource for future use. However, because of the perversity of the discount rate, secure private ownership of a wild species population does not ensure that it will be economically rational for the owner to harvest it sustainably. (Freese & Trauger, 2000: 43)

Related to this, Neumayer (2003) identifies the issue of poverty lock-in that can arise from the 'very high' time preference rates associated with poverty and peoples' exploitation of natural resource exploitation (p. 79). In the case of marine turtles and their products, Campbell (2003) notes that in impoverished communities the transition from subsistence to market-based economies has resulted a depletion of global turtle stocks.



### 3.2 Natural Resource Uses and Values

The use of wildlife such as turtles can be divided into two general categories: consumptive and non-consumptive (Campbell, 2003; Freese, 1998; Freese & Trauger, 2000). Freese (1998) defines these terms as follows:

*Consumptive use* occurs when an entire organism is deliberately killed or removed or any of its parts are utilized, either as a goal in and of itself (e.g., recreational hunting and fishing) or for a product (e.g., pets, timber, food, leather). (p. 11)

And:

[T]he term *nonconsumptive* is applied when use does not involve such direct and deliberate killing or removal (e.g., bird-watching and other forms of nature tourism). (p. 12)

A more detailed categorization of environmental resource values is the Total Economic Value (TEV) framework that has been applied by environmental economists to calculate the costs and benefits associated with ecosystems and their services (Pearce et al., 2006; World Bank, 2004). Using definitions adapted from Pearce et al. (2006) and the World Bank (2004), the breakdown of TEV is outlined as follows:

- Use value
  - *Direct use values* are the values derived from actual use of ecosystem goods. Both the consumptive and non-consumptive uses, outlined in Freese (1998) definitions above, fall under this category.

- *Indirect use values* are the beneficial ecosystem services gained from an ecosystem's natural functions. For instance, the global benefits of carbon sequestration that comes from a forest.
- *Option values* are the values associated with preserving something for the future with the purpose of having the option to draw from it in the future. There is an agreement that this can be to the benefit of oneself (*option*).
- Non-use value
  - *Existence value* comes from the value of keeping a resource in existence in a context where 'the individual expressing the value has no actual or planned use for his/herself or for anyone else' (Pearce et al., 2006: p.86)

The TEV definitions vary somewhat on where *bequest/altruistic values* – no present use for the benefit of others or heirs in the future – is included. The World Bank (2004) also includes this under option values while Pearce et al. (2006) places it under the non-use value category. This paper uses the World Bank definition on the grounds that a person who considers something to hold bequest value, is only indicating its temporary non-use and may even derive future value from someone else's use of it.

The purpose of TEV is to consider all possible economic values that the environment can hold. Environmental economists acknowledge that, as an anthropocentric framework, TEV is only part of environmental decision-making and that any intrinsic values attached to the environment should be considered through other means (World Bank, 2004). Nonetheless, when considering the combined socio-economic and conservation concerns that are needed to be addressed in situations where poverty has an effect on natural resource degradation, the anthropocentrism in TEV can be an essential component for identifying the environmental priorities of community members.

### 3.3 Marine Turtle Conservation in Areas of Poverty

One advantage present in the existence of a market for a natural resource is the increased number regulatory and incentive-based strategies available for conservation programmes. Some of the more common economic approaches to turtle conservation include ecotourism projects and harvest quotas, both of which are often complimented with community development projects.

In her review on the international uses of marine turtles, Campbell (2003) identifies two main conservation and management strategies: *sustainable use* and *community-based conservation* (CBC). *Sustainable use* is meant to achieve both biological and socio-economic goals. In theory, biological sustainability occurs when human extraction rates equal any rate low enough to ensure the resource's long-term survival (Campbell, 2003). Socio-economic sustainability is also defined in theoretical terms to be achieved once 'users are provided with adequate incentives (economic, social, legal, institutional, political, and so on) to respect extraction rates dictated by the biology and life history of the species in question' (Campbell, 2003: p.305). From a more realistic perspective of the challenges in meeting these conditions of sustainability, Campbell (2003) refers to sustainable use as the *desired state* of a conservation strategy, not the existing reality. Based on this definition, the DS in Guatemala can roughly be considered a sustainable use strategy insofar as compliance in the system would likely promote a more biologically and socio-economically sustainable condition over time.

The term 'community-based conservation', like 'sustainable development', is highly subjective. For the sake of consistency with Campbell's observations of trends in turtle conservation, and due to the fact that she is perhaps the most prolific writer on the specifics related to turtle management (e.g. Campbell 1998, 2003, 2007), her definition of CBC is incorporated here. Campbell (2003) states that although there are likenesses between sustainable use and CBC the former is focused on the use of the species itself, while the CBC 'is concerned with the local economic, social, and cultural context in which conservation takes place, and with the role of communities in conservation

projects' (p.322). In reality, there are obviously problems. Three main obstacles are found in CBC turtle projects: (1) operationalisation of consistent community participation; (2) inadequate contextual understanding and development experience of environmental NGOs; and (3) CBC has not adapt to related issues in participatory development (Campbell, 2003).

Regardless, between sustainable use and CBC practices improved outcomes can produced. Both strategies have been incorporated at Ostional, Costa Rica, which is well-noted for its successful turtle management on a mass-nesting beach (Campbell, 1998, 2003, 2007; Bräutigam & Eckert, 2006). Following years of conflict between community members, conservationists and authorities over the egg harvesting, a community association was formed and the three sides came together in developing a legal harvest quota based on a scientific impact assessment (Campbell, 1998; Cornelius, 1985). Harvest periods and quotas are controlled and the eggs are shipped to national markets in legally certified bags (Campbell, 1998). The government recovers its costs by charging a licensing fee, and the remainder of the money is distributed equitably amongst active, limited (e.g., pregnant women) and non-active (e.g., retired) members of the association as well as uses to fund community development projects such as school, electrical gridlines, and a tourism centre (Campbell, 1998).

It is noted that what works as a conservation strategy at one site does not necessarily work elsewhere. For one, Ostional has the advantage of being located on a mass-nesting beach. An attempt of a similar programme at a mass-nesting beach in Nicaragua was short-lived due to political and ideological conflicts (Campbell, 2007). Ostional's case indicates the benefit of having community members organized and involved in the development of local conservation policy. In sum, Campbell (2007: p.36) states, 'Political, social, cultural, and legal structures provide an important context for understanding use and conservation [of turtles]'.

### 3.4 The Economic Value of Egg Commerce

It is worth discussing how much the trade turtle eggs is actually worth in Guatemala. Unfortunately, this is challenging because the lack of comprehensive data has made it difficult to determine the actual market value of this industry. Information that does exist is contained within various reports that have estimated the market's value in recent years (see Muccio, 1998; Chácon, 2002, Sánchez Castañeda et al., 2005; Sponsor a Nest Guatemala, n.d). Selected cases are presented below. All figures presented below have been calculated and converted from the Guatemalan Quetzal (GTQ) to U.S. dollar (USD) by their respective authors.

Chácon (2002) drew from national hatchery data on donations received during the 1999-2000 and 2000-2001 seasons to approximate a combined total of 11,399 olive ridley and leatherback nests for both seasons. He applied an average price of US\$2.57 per dozen taken from data collected in his market surveys to estimate a minimum value of US\$214,835 for eggs sold over both seasons – US\$107,417 per season.

Sponsor a Nest Guatemala (n.d.) combined 2004 nesting data from 8km of beach, near Hawaii, with the local hatchery's total donation intake for the season to breakdown the market's profit distribution. Accounting for potential losses from expired or damaged eggs, they estimate the 7,539 dozen eggs transported to the market to be valued at US\$82,000. Sponsor a Nest Guatemala breaks down the profit distribution as follows:

- US\$20,104 to egg collectors (profit: US\$3/dozen);
- US\$5,026 to buyers (profit: US\$0.75/dozen); and
- US\$56,542 to market vendors (US\$0.62/egg)

These figures are not absolutes, but give an idea of the potential economic importance for both the local community and the whole market. As the latter organization's breakdown illustrates, the majority of the profits are earned at the final point of sale and not in the rural harvesting area where poverty is high and income sources are few.

## 4 Case Study: Guatemala

### 4.1 Research Location

Two main reasons are behind the selection in research location. First, personal familiarity with the area simplified data collection in the short period allotted to the field study.

Second, even with the relatively close proximity between hatcheries, each site presents a unique example of the varying conditions that could affect the success of the donation system. The following section outlines demographics and hatchery operations in the area.

Between 1999-2005, the number of sea turtle hatcheries across all seven coastal departments of Guatemala totalled at twenty-seven, but only nine were reported to be in operation for all six nesting seasons in this period (Sánchez Castañeda et al., 2005).

Sánchez Castañeda et al. (2005) document that 74% of the 354,816 sea turtle eggs saved for conservation were reburied at hatcheries located in the southern Pacific coast Department of Santa Rosa, making it a critical site for sea turtle conservation and research in Guatemala.

Poverty affects the majority (57.9%) of people living in Santa Rosa (Instituto Nacional de Estadística, 2006). In fact, the percentage of people living in poverty in Santa Rosa is 6.9%<sup>1</sup> higher than the national poverty rate (Instituto Nacional de Estadística, 2006).

Four villages in Santa Rosa were selected for this research: Monterrico (13° 53'26"N and 90° 28'56"W), La Curvina (13° 53'6"N and 90° 27'48"W), Hawaii (13° 51'51"N and 90° 24'30"W) and El Rosario (13° 50' 49"N and 90° 22'7"W). The villages are situated between the mangrove Canal of Chiquimulilla and the Pacific Ocean. The main coastal road ends in Monterrico. From Monterrico a smaller road connects to the other villages. The section of the road between Monterrico and La Curvina was recently paved, but the remainder is a dirt road which is often partly submerged during the rainy season (May to

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<sup>1</sup> Own calculation.

October) causing transportation challenges. In total, ten villages are contained within the 6,457 hectare Monterrico-Hawaii area where this research was conducted. Eisermann (2006) calculates an estimated 9,000 people live in the area. Of the four villages selected, hatcheries have been established in Monterrico, Hawaii, and El Rosario, but La Curvina uses the Monterrico hatchery which is a 2 kilometres distance.

## 4.2 Monterrico Hatchery

The villages of Monterrico and La Curvina are part of the 2,800 hectare area declared the 'Monterrico Nature Reserve for Multiple Use', which is administered by *El Centro de Estudios Conservacionistas* (CECON) of the University of San Carlos of Guatemala (USAC) (CONAP, 2006-2010, 2007). The local hatchery is also operated by CECON. Sánchez Castañeda et al.'s (2005) documentation of the six seasons between 1999-2005 notes the Monterrico hatchery operated in all seasons and collected 9.2% (n=32,555) of the eggs conserved nation-wide. A combination of factors has contributed to the success of this hatchery. Muccio (1998) notes that USAC provides steady funding to the project and additional benefits have arisen from being located in a popular tourism village. Tourists' donations are used to buy 25% of the eggs at the hatchery and further funds come from regular hatchling races (Muccio 1998).

## 4.3 Parque Hawaii

The hatchery in Hawaii (Parque Hawaii) is the oldest hatchery in the country (Muccio, 1998). It is managed by ARCAS and relies on the support of volunteers – mostly international. Volunteers participate in nightly beach patrols where they search for nesting turtles and receive egg donations from collectors. Additionally, financial donations from volunteers and other tourists are also collected through a 'sponsor a nest' programme which has helped increase egg numbers. During the six seasons documented by Sánchez Castañeda et al. (2005), Parque Hawaii had the highest number of egg

contributions nationally. In total, 26.6% (n=94,529) of the eggs conserved in the country came from Hawaii's seasonal activity. (Sánchez Castañeda et al., 2005).

Other programmes at Parque Hawaii include: annual mangrove reforestation; a youth environmental education programme; and supporting local small businesses. ARCAS has submitted a application to CONAP proposing the establishment of a 3,657 hectare 'nature reserve for multiple use' status which would connect to the Monterrico Reserve (ARCAS, 2004a).

#### 4.4 El Rosario Hatchery

In the village of El Rosario, ARCAS also manages a smaller, less active, and more remotely located hatchery which has been operating consistently since the 2001-2002 season (Sánchez Castañeda et al., 2005; ARCAS, 2002, 2007). Staffing and volunteer capacity is considerably lower than in Hawaii, as ARCAS does not own housing infrastructure in El Rosario and presently works from a small lodging run by a local egg buyer. A local fisherman is often hired to manage the hatchery, and additional support has come from long-term volunteers (ARCAS 2002, 2003, 2007). During the seasons studied by Sánchez Castañeda et al. (2005), the El Rosario Hatchery contributed 3.8% (n=13,393) of the nationally protected eggs. This makes it the lowest egg contributor of the three hatcheries included in the present research.

El Rosario is situated within the proposed Hawaii Reserve (ARCAS, 2004a).



## 5 Methodology

### 5.1 Survey

The questionnaire design was informed by the researcher's previous volunteer experience, in late 2007, and additional discussions with individual currently and previously involved at Parque Hawaii including staff, researchers and a volunteer. Most response options were pre-coded to simplify the recording and subsequent data analysis. Simplicity in the recording of data was preferred because (1) it minimized the time respondents were asked to give when they could otherwise be involved in economic or household activities, and (2) a portion of the interviews were to be conducted on the beach at night, occasionally in the rain, using only a (low) red light from a headlamp thus making extensive data recording difficult. To capture unanticipated responses, many questions included a blank 'other' option where responses could be written if necessary. Two versions of the survey were produced: (1) an egg collector version and (2) an egg buyer version (See Appendix). The same 26 questions appeared in both versions, plus several other questions were designed specifically for either the collector and buyer versions – six and five, respectively. Questions were divided into sections that focused on demographics, egg trade involvement and other economic activity, and sections that measured perspectives on turtle conservation, the DS, and willingness to accept alternative conservation programmes. Once written and reviewed by my supervisor, the survey was then translated into Spanish with the assistance of two Latin American peers.

ARCAS graciously provided an intern – fluent in the local Spanish dialect – as my primary translator and further translation assistance from the new volunteer coordinator. A combination of opportunistic and snowball sampling methods were used to solicit interview participants. A small promotion for the study took place at the turtle nesting season inauguration ceremonies in both Hawaii and El Rosario where an announcement was made to the community members in attendance regarding the opportunity to participate in my research. The initial aim was to gather the majority of egg collector interviews by approaching people during night beach walks because that is when the majority of nesting and, consequently, egg collecting occurs. In fact this was the method

used to obtain the majority of collector interviews near Hawaii, however a combination of factors led to some changes in the overall sampling strategy. First, a limited amount of collectors could be found on the beach during the research period. Second, the distance between and each village proved to be a barrier, especially because transport was extremely limited after 17:30 when the bus system stopped running for the day. Lastly, the two hatchery organizations, research translator and the director of Monterrico's Spanish school assisted in finding and establishing contact with the egg workers that they knew, and who could sometimes refer us to others involved in the trade. This latter method was also used to obtain interviews with egg buyers who would be less likely to walk the beach unless they were also a collector.

During my previous experiences in the area I had observed heterogeneity amongst egg collectors and their level of involvement, therefore the objective was to try to capture a portion of this diversity in the data. The one exception to this principle was during the first night of piloting the survey on the beach when only one of a pair of collectors was asked to contribute. Throughout this interview the other person remained in close proximity and would occasionally add commentary and opinions. This demonstrated that it made sense for both my translator and I to simultaneously document (on separate survey sheets) each of the respondents from future pairs approached – providing their consent, of course. In four cases, two interviews (total: 8 participants) were conducted simultaneously on the beach when collectors were together on the beach. In these situations respondents would sometimes agree the other's response and answer similarly. While I realize that these respondents would have been influenced by each other, it should be noted that due to their familial relationship and/or friendships – some appear to regularly search for turtles in pairs – they would be likely to already share opinions and experience. For these reasons, I consider their responses equally important to the data and have made the decision to include them in the analysis.

Interviews were conducted between the 4<sup>th</sup>-21<sup>st</sup> of July 2009. Seventy-five interviewees participated in this research including sixty-one egg collectors and fourteen egg buyers. The largest portion of respondents came from Hawaii (n = 37) followed by Monterrico

and La Curvina (n = 22) then El Rosario (n = 16). Of the potential interviewees approached, only two were unable to participate. Respondents' answers were recorded on the survey sheet directly by either the translator or researcher. Interview times averaged approximately fifteen minutes. Once each interview was completed, respondents were given small packaged food items as gratitude and in recognition of the time they had given to participate. Overall, participants' impressions of the research appeared positive.

The data presented below was input and analysed using SPSS 16. Due to the sampling method, the data is not considered to be representative of the wider population. Rather,

## 5.2 Survey Limitations

It is important to acknowledge one unforeseen issue a from survey question. This question asks, *'In your opinion, what is the value, if any, of having sea turtles nesting in this area?'* It was intended to measure the types of use and non-use values that respondents attached to having turtles nesting in the area. Unfortunately, the meaning of the word 'value' (Spanish: 'valor') in this question was not always clear to participants and often required further explanation or the substitution with the word 'benefit' (Spanish: 'beneficio') for sufficient clarity. It is believed that the question can only be said to provide information on the primary values or benefits that came to respondents' minds when surveyed and does not offer conclusive evidence as to whether these are all the values respondents associate with turtles nesting. A more comprehensive examination of this subject matter would require a detailed enquiry on the different types of market and non-market values.

## 6 Findings

### 6.1 Demographics

The sample population was comprised of sixty-one egg collectors and fourteen egg buyers – totalling seventy-five participants. Table 1 breaks down the sample population by location. Participants were predominantly male (n=73), while females represented two buyers. A wide age range of participants, from age 16 to 75, was included with a mean of 42.6 (N=75). The highest percentage of participants was age 30-39 (25.3%), followed by those age 16-29 (24.0%), 60 and over (22.7%), age 40-49 (18.7%), and 50-59 (9.3%). The majority of participants (64.9%) had been born in the area, while 16.2% moved before age 20, 9.5% between age 20-29 and the remaining 9.5% moved at age 30 or older (N=74). Including present generations, more than a third (n=27) of participants had family born in the area for the last 4 or more generations, 28.0% (n=21) had 3 generations, 17.3% had 2 generations, 12% had only 1 generation, and the remaining 6.7% had no family (including themselves) born in the area. Nearly everyone lived with family, but 4 lived own. The majority lived in larger household, including, 41.6% (n=31) living with 4-6 family members and 33.8% living with 7 or more, while only 18.9% lived with 1-3 others.

**Table 1**

**Participants by Location**

Participants	Location			
	Monterrico/La Curvina	Hawaii	El Rosario	Total
Egg collector	18	31	12	61
Egg buyer	4	6	4	14
Total	22	37	16	75
% of interviews	29.3%	49.3%	21.3%	100.0%

Most participants had only received a low level of formal education. The majority, 57.3%, (n=43) either completed or obtained a portion of primary schooling, while nearly

one third (n=24) had received no formal education. Four people had reached or completed secondary school, two had post-secondary experience, and one had gained some basic skills from the local church's bible study.

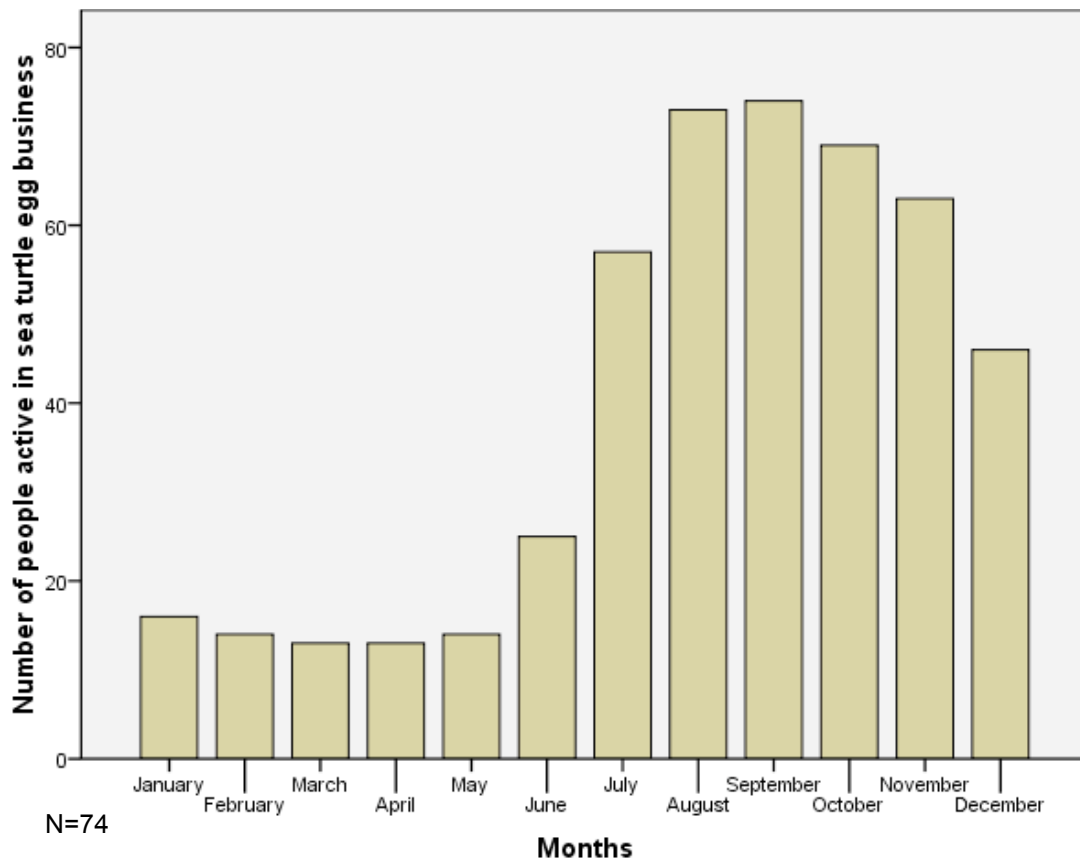
## 6.2 Egg trade involvement

Not surprisingly, all 75 participants had seen olive ridleys in the area (includes ocean area). Additionally, most (n=62) had seen leatherbacks, others had seen greens (n=12) and hawksbills (n=10), while one mentioned loggerheads and a few cases (n=4) of unknown or mythical species were also described. Asked which of these turtles' eggs are collected in the area, all again identified olive ridleys, however 5 people also mentioned leatherback eggs. It is unclear if these latter cases were from respondents referring to the present or speaking historically.

Figure 1 shows the number of participants active in the egg trade each month. The highest levels of involvement took place during the peak nesting months of August (n=73), September (n=74), October (n=69), but the majority of people remained active in the other three months of the season: July (n=57), November (n=63), December (n=46). Thirteen people indicated that they continued some level of egg trade activity throughout the entire year, while one participant indicated that he used to collect eggs year-round, but he has stopped since finding full-time employment as a property guard so now he just finds the occasional nest unintentionally.

Egg collecting can require a considerable amount of time walking and waiting on the beach. On average, during the months that individual egg collectors were active, a majority (50.8%, n=31) of them went searching for eggs 5-7 nights per week, while 39.8% searched 2-4 nights, and a small portion (9.8%) searched less than twice a week. Egg collectors were also asked the average number of hours spent per night on the beach. Applying this data to the number of nights per week each person was active, I calculate a mean average of 20.5 hours per week spent on egg collection (N=57), which indicates

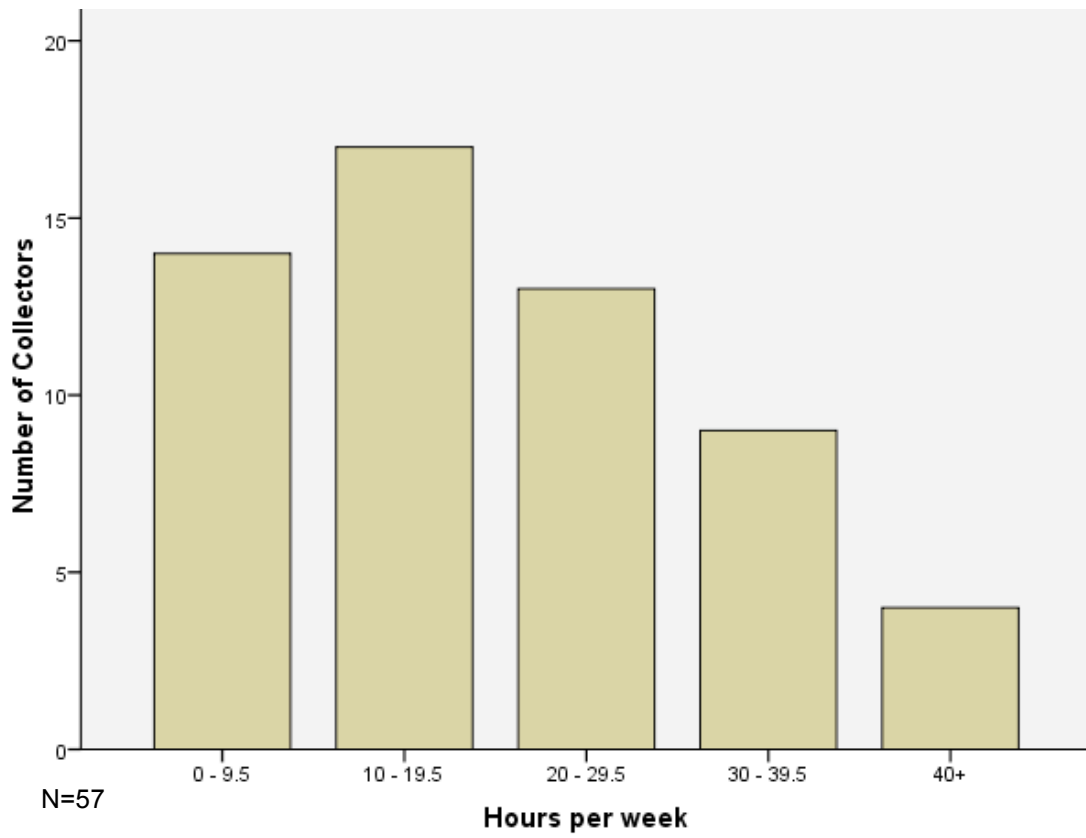
**Figure 1**  
**Number of Participants Involve in the Egg Trade Each Month**

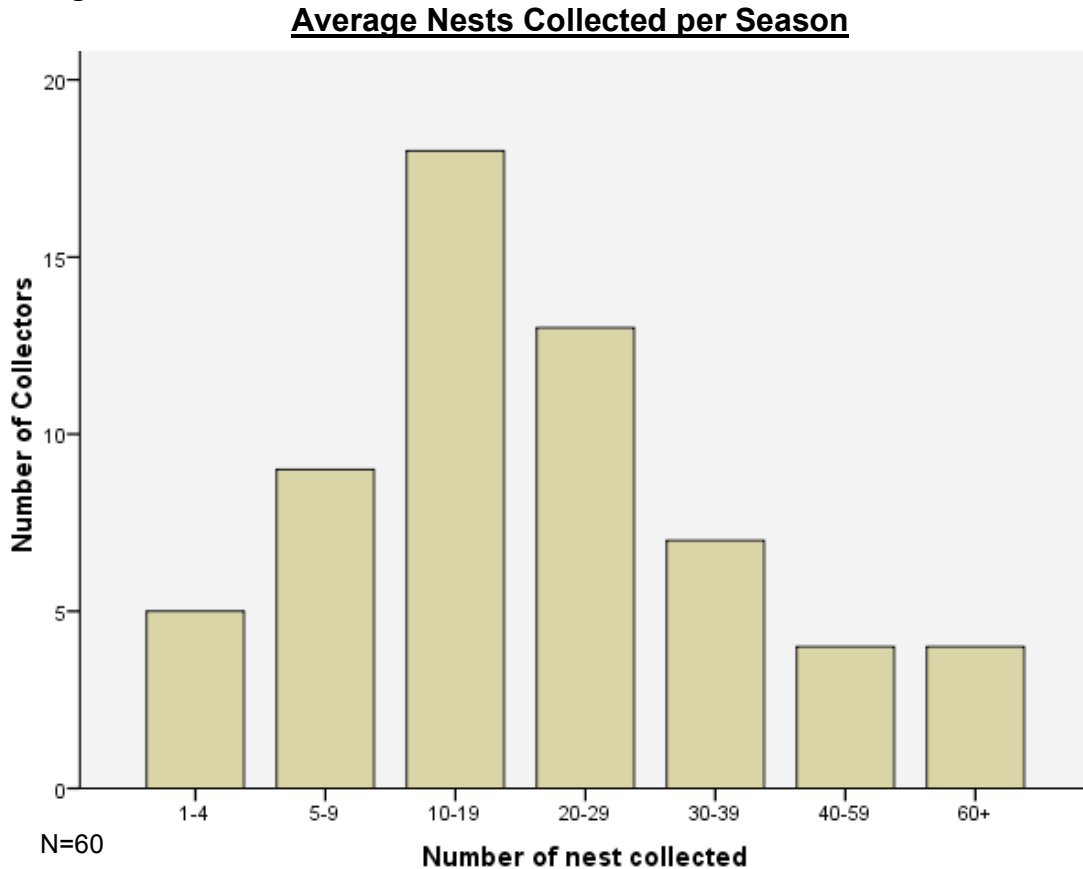


most participants spend the equivalent number of hours as a part-time job. Figure 2 divides time use into categories to show the distribution. If we were to consider 30 hours or more as roughly equivalent to a full-time job, then we find that only 22.8% (n=13) of egg collectors invested this amount of time. Further, multiplying the number of hours per week by the number of months per year produces a mean of 142.9 hours (N=57) spent on egg collection each year. Figure 3 shows the collectors average number of eggs found per season. The mean (N=60) was 22.7 nests, while the majority (53.3%) are showed to collect less than 20 nests. Dividing the total number of nests by the annual hours spent searching shows that egg collectors (N=56) found an average of approximately one nest per every 4 to 5 hours spent searching (mean=0.26, median=0.19).

**Figure 2**

**Average Hours Spend Searching for Nests per Week**



**Figure 3**

The amount of eggs purchased by buyers varied considerably. The lowest amount was 40 nests, while the highest was 750, with a median of 112.5 nests (N=14).

The majority of respondents (n=65) indicated that they had started working in the egg trade due to financial necessity. Respondents were allowed to indicate more than one response. Other reasons included: ‘easy’ (n=9) or ‘good’ (n=6) source of money; family tradition (n=5); like the work (n=1) or seeing turtles (n=1); and 6 other miscellaneous responses.

For 64.0% (n=48) of respondents, the income generated from eggs was ‘less than half’ of what they earned in a year. Egg income represented ‘approximately half’ of total earnings for 16.0%, ‘more than half’ for 6.7%, ‘all’ for 4.0% but ‘none’ for 9.3%. Although the survey did not include an additional category between ‘less than half’ and ‘none’, it is speculated that a considerable number of those in the former category would have stated



'less than a quarter' if the option had been included. Asked if they were able to live off the income earned from the egg trade, only 12% (n=9) indicated that they would be able. It is interesting to note that 4 of the 9 who indicated this were buyers.

### 6.3 Other economic activity

To assist in determining what other opportunities there were in the area, respondents were asked questions regarding their own and family members' other income sources. A list of the job types is compiled in Table 2.

Looking specifically at all other primary income opportunities available to participants during the nesting season, Table 3 is divided accord to location. The question asked for all other primary sources of income during the season. All participants from the most rural village, El Rosario (n=16), are shown to be involved in local fisheries and, while a smaller percent of participants from Monterrico-La Curvina (54.5%) and Hawaii (54.1%) indicated fishing was a primary source of income for them. Access is not a factor here, as mangrove canals and the ocean are easily accessible in all locations. In the latter two areas, especially Monterrico-La Curvina, there was a larger percentage of participants who recorded work in agriculture, construction, mangrove logging, and tourism and beach properties.

**Table: 2****Other Income Sources for Respondents and Family**

Industry	Job type
<b>Fisheries</b>	Artisan Commercial Seafood vendor
<b>Agriculture</b>	Labour Rent land (700m <sup>2</sup> or more) Household garden for selling Commercial livestock owner: 5 or less animals
<b>Construction</b>	Labourer
<b>Tourism and beach homes</b>	Boat tours Hotel worker Small accommodations rental Property guard General household help
<b>Mangrove logging</b>	Logger
<b>Other</b>	Local shop owner or worker  Bank teller  Teacher  Miscellaneous  <b>Only egg trade (including students)</b> No other income

**Table: 3****Other income sources during nesting season by location**

Industry	Location			
	Monterrico/La Curvina	Hawaii	El Rosario	Total Number
Fisheries	54.5%	54.1%	100.0%	48
Agriculture	22.7%	24.3%	18.8%	17
Construction	31.8%	16.2%	6.2%	14
Tourism and beach homes	27.3%	16.2%	6.2%	13
Other	13.6%	16.2%	18.8%	12
Mangrove logging	9.1%	8.1%		5
Only egg trade	4.5%	5.4%		3
<b>Total Number</b>	22	37	16	75

## 6.4 Marine Turtle Egg Use and Value

To fully understand the egg market it is important to consider what collectors and buyers are doing once they have received eggs. Indeed, almost all (95.1%) of the 61 collectors indicated that they sell eggs to buyers. However, 47.5% indicated they had also sold to hatcheries. A few (n=3) indicated they kept them for household consumption, but only one of these participants stated his egg collection was to limited to household consumption. Sale quantities to the market versus a hatchery were not recorded, however several participants in Monterrico-La Curvina and Hawaii indicated that they had a preference to sell to the hatchery whenever possible. The Monterrico Hatchery was said to sometimes pay higher prices than buyers.

A question asked respondents to indicate the values that they attribute to having turtles nest in the area. The 'Limitations' section identifies some issues with this question. The interpretation of these results is limited to the primary values and/or benefits that

respondents identified without extensive discussion of each potential result. The respondents primarily considered use values. At 82.7%, personal or community member income from the egg trade (consumptive use) was the main value considered important by respondents (N=74). However, it was also observed that 52.0% identified the conservation of turtles for future personal or community use (option value) to be important. Less commonly mentioned values included: ecosystem balance (n=6 – indirect); non-consumptive values – attracting tourism (n=4), watching them (n=3), and present enjoyment for Guatemalan (n=3); and turtles right to existence (n=1).

Most respondents (n=69) believed that the local turtle population was being threatened. Table 4 list the types of threats identified by respondents. Table 5 shows these respondents concerns according to category. Fisheries (86.6%) were the most acknowledged threat to turtles, followed by human beach activity (31.3%). It is interesting to note that only two respondents indicated egg collection related threats.

Table: 4

**Types of Threats to Turtles Identified by Respondents**

<b>Category</b>	<b>Threat</b>
<b>Fisheries</b>	Commercial boats
	Shrimp trawlers
	Shark fishers using turtles for bait
	Long-lining
	Turtle fishing
<b>Human Beach Activity</b>	Quad/motorbike use
	Property lights/lighting used on beach
	Turtle harassment
	Tourists presence
	Domestic dogs
<b>Turtle Killing</b>	Turtle kills on beach
<b>Garbage</b>	Beach garbage
	Ocean garbage
<b>Egg Collection</b>	Egg collection in General
	Non-donations
<b>Natural Predators</b>	Birds
	Fish
	Sharks

**Table 5****Threats to Turtles Identified by Respondents**

Threats	Responses	Percent of Cases
Fisheries	58	86.6
Human Beach Activity	21	31.3
Garbage	3	4.5
Egg collection	2	3.0
Natural Predators	2	3.0
Turtle Kills on Beach	8	11.9

N=67

In a series of separate questions, respondents were asked to rate how much of a role should be played by the following groups to ensure the survival of turtles: (1) hatcheries, (2) community members, and (3) government and authorities. Most participants (n=66) stated hatcheries should continue doing the 'same' level of work as present. The other 9 responded that 'more' should be done by hatcheries. Interestingly, responses regarding the roles of community, and government authorities appear to show a more complex situation. In comparison, most respondents (n=56) considered government should play a more active role than those that stated community should play a more active role (n=33). Sorting these numbers by location, shows that the more rural the location, the more desire there was for an increased role from government. When examining the same conditions for the role of community members, the reverse relationship appears present amongst participants – less rural, more of a role seen for community. These relationships are seen when comparing the percentages horizontally in both Tables 6 and 7.

**Table 6****Respondents Perspectives on the Role of Government and its Agents in Ensuring the Survival of Sea Turtle Populations by Location**

Government's Role	Location			
	Monterrico/La Curvina	Hawaii	El Rosario	Total Percent
More	86.4%	70.3%	68.8%	74.7%
Same	9.1%	29.7%	31.2%	24.0%
Less	4.5%			1.3%
Total Number	22	37	16	75 100.0%

**Table 7****Respondents Perspectives on the Role of Community Members in Ensuring the Survival of the Sea Turtle Population by Location**

Community's Role	Location			
	Monterrico/La Curvina	Hawaii	El Rosario	Total Percent
More	72.7%	40.5%	12.5%	44.0%
Same	27.3%	59.5%	87.5%	56.0%
Total Number	22	37	16	75 100.0%

## 6.5 Perspectives on the Donation System

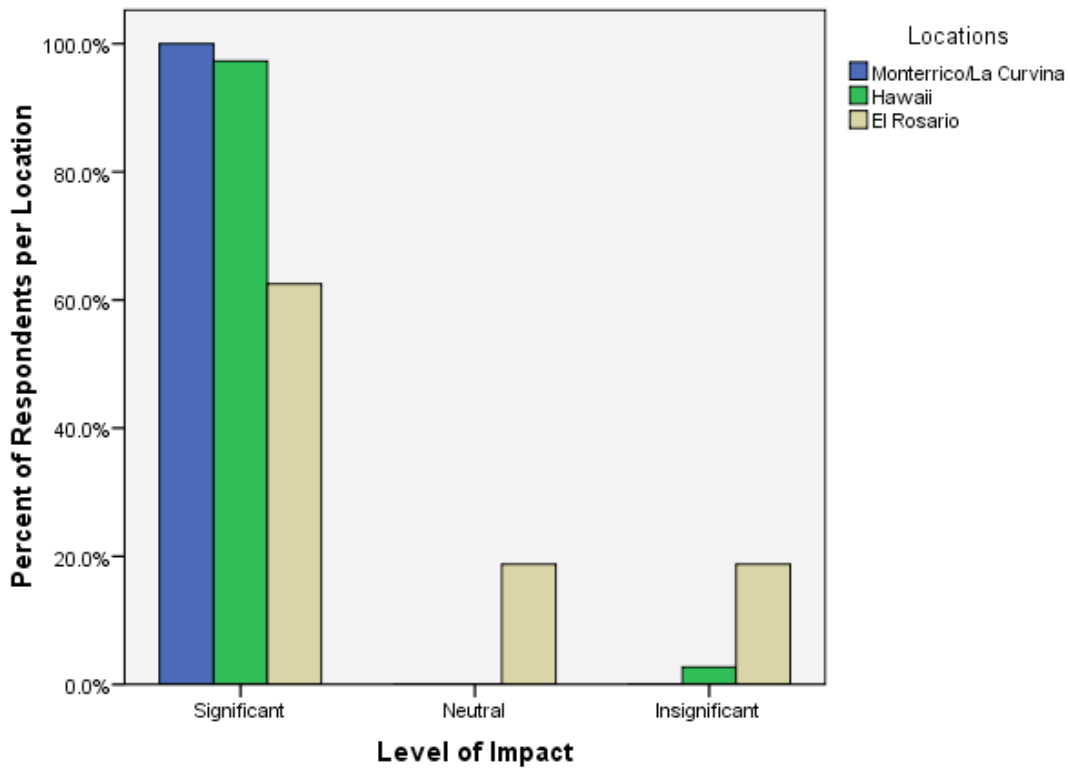
Respondents were asked to identify positive and negative aspects of participating in the DS. Almost all respondents (n=72) mentioned the 'conservation of turtle for future' to be a positive aspect of the DS. Other comments included being able to still collect/sell eggs (n=10) and 8 other individual comments such as increased tourism (n=1) and that the DS is voluntary (n=1). One respondent did not know of any positive aspects. On negative aspects, most regarded the DS as having no bad aspects. Yet 30.7% (n=23) identified the existence of 'Free-Riding' to be negative, and a few (n=8) other miscellaneous aspects were noted. Asked if they thought the DS has had a significant impact on turtle survival, 90.5% (n=67) stated either a 'slightly significant' or 'very significant' impact, while only 4.1% (n=3) considered the impact to be 'neutral', 5.4% (n=4) stated either a 'slightly insignificant' or 'very insignificant' impact. Dividing the responses by location, (see Figure 4) shows that the majority of the 'neutral' impact and 'negative' impact responses had come from El Rosario respondents.

To gauge whether or not the 20% donation quota is followed, respondents were asked to state the average quantity of eggs they donated. This question was only asked to buyers and those collectors who stated they donate directly to the hatchery (N=55). Overall, only 23.6% (n=13) said that they typically donate 20%. In El Rosario, where the buyers handle most of the donations, all participants (n=5) said that they gave an average of one dozen per nest. This was also the case with 90% (n=27) of responses from Hawaii. Monterrico, on the other hand, was divided 50/50 (N=10) between those who gave an average of a dozen and those who gave an average of 20%.



**Figure 4**

**Opinions on Level of Conservation Impact of Donation System by Location**



N = 74

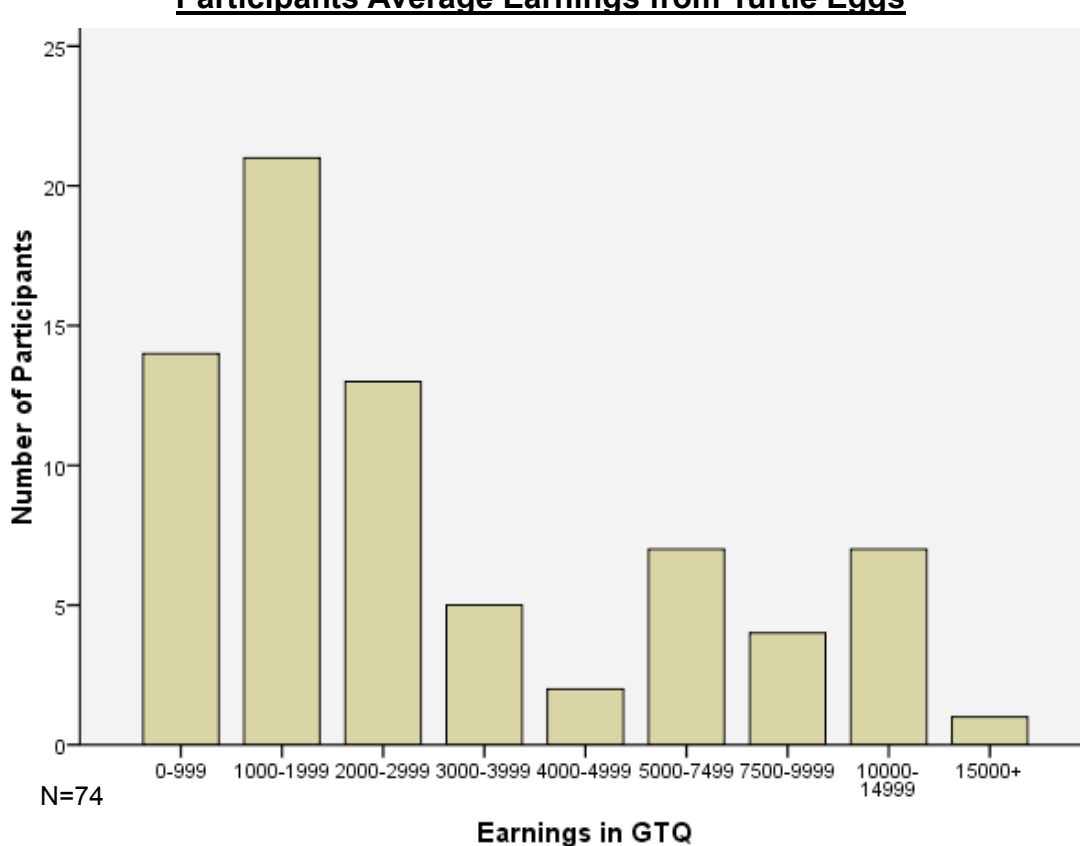
## 6.6 Willingness to Accept Alternatives

In one section, respondents were asked their average annual income from the egg trade. In another section, they were presented a hypothetical scenario where the government fully bans egg collection and implements new employment opportunities. Respondents were asked how much money they would need to accept a departure from the egg trade. The results of both the actual egg trade income and willingness to accept an alternative income are presented in Figure 5 and Figure 6, respectively. In order to accept the alternative scenario, 70.7% (n=53) indicated an amount higher than they earn from the egg trade. The average that respondents' (N=74) stated in earnings from the egg trade

were a mean of 3,613 Guatemalan Quetzals (GTQ) (US\$470<sup>2</sup>) and a median of 2000GTQ (US\$260). Whereas the average amounts respondents (N=75) were willing to accept in the scenario were a mean of 10,560GTQ (US\$1,375) and a median of 9,000GTQ (\$1,172) – respective differences calculated at US\$905 and US\$912. When asked why they chose the amount, their response fell into the following categories: 42.7% (n=32) offered family or financial needs explanations; 22.7% considered it equivalent to their *existing* egg earnings; 10.7% considered it equivalent to their *potential* egg earnings; another 10.7% indicated that they required a good enough incentive to stop collecting (one person stated he would still collect for personal consumption); 9.3% desired a stable income source; and 4.0% justified that it was the normal pay for the area.

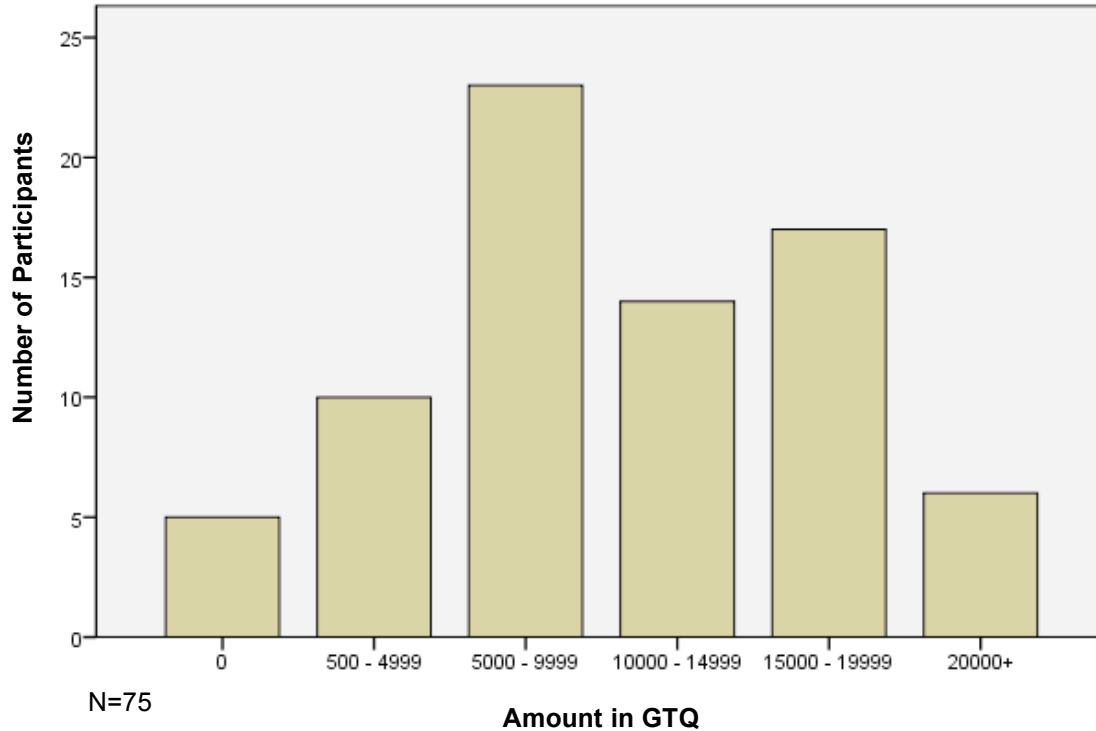
**Figure 5**

**Participants Average Earnings from Turtle Eggs**



<sup>2</sup> US\$ conversion is based on the 2007 international currency rate: US\$1 = 7.68GTQ.

**Figure 6**  
**Income Needed to be Willing to Accept a New System**



Finally, respondents were asked to choose from a list provided of any policies or project they believe would be best for turtle conservation in Guatemala. The most frequent choice 84.0% (n=63) was the creation of ‘more jobs in the area’; tourism and ecotourism were also favoured 73.3% but a few others (6.7%) identified that they only favour ecotourism, not other kinds; CBC (29.3%) and ‘more enforcement of the present’ (28.0%) were still popular, but not as highly valued. A few people (n=6) also suggested specific jobs types and assistance programmes.

## 7 Discussion

In summary, the average amount of time used by egg collectors (20.5 hours) is considerable in hopes to find a few nests that won't even earn them half their income. The majority of respondents indicated that financial needs were their primary reason for entering the egg trade and that they would need to be offered a higher income to accept an alternative livelihood. As the local turtle populations remain low, community members are locked-in to a continued dependence on a potentially decreasing resource. This has meant that many respondents have remained minimally compliant with the DS's 20% quota.

However, the single case of the respondent who stopped searching for nests regularly after he received a (higher paying) job as a property guard shows that there is potential for some community members to adapt when they are presented with alternative income solutions. Additionally, in the case of Monterrico and La Curvina, many community members saw that there is an increased role needed from them if turtle conservation is to be successful in the area. This might make it a good site to establish a community turtle conservation association as part of a more participatory CBC approach. The village clearly is at an advantage of having more income opportunities, which may help explain why they are more willing to take an active role in contributing more to conservation. This could be a factor in explaining why they are more likely to follow the 20% donation quota. Sponsor a Nest Guatemala (n.d.) has indicated that at the DS's present level of enforcement, a 'good relationship' must be maintained by the hatchery and egg traders in order to maximize collaboration rates. On this account, it is also worth noting that the Monterrico Hatchery offers more competitive buying prices for eggs – likely because they earn additional revenues from tourism.

In the more rural villages, Hawaii and, particularly El Rosario, where resources are more scarce, respondents clearly identified that there is a need for increase government participation in order for community members to increase their compliance with the system. One strategy might be to work with these communities to develop solutions on

conservation issues that egg traders are concerned about (e.g. commercial fisheries killing turtles or beach lighting disrupting nesting activities).

Perhaps the most positive finding in this research is that most community members recognized the value of conserving sea turtles for a number of reasons, not least for their own future income. This is important for any CBC or sustainable use programme and it is also a good indicator of ways to break the locked-in of poverty and resource depletion. Referring back to my initial two hypotheses, I hold that the data presented in this study has indicated that while many respondents were concerned about conservation, the present enforcement levels have not maximized opportunities to engage more extensively with egg traders. Further, the present dependence on egg income suggests that community members have mostly not acted to address their conservation concerns beyond their means.

## 8 Conclusions

This study has presented some insight into community members' livelihoods and opinions that are affecting participation rates in the DS and its use as a conservation model. More comprehensive research is certainly needed. For instance, it is possible that a combination of the research's timing at the beginning of the season and the use of male informants to obtain interviews in households led to this uneven sex ratio. During previous experiences in the area I had encountered several female egg collectors (though far fewer than males), yet at the time of the field study only one female – who was unintentionally missed – was seen on the beach. To ensure female egg traders opinions are considered, further research is required on this issue.

Overall, there are indications that the DS in its present form lacks a strong foundation in either sustainable use or CBC. This is concerning for both ensuring biological and socioeconomic sustainability. What is more, there is evidence that community participation is lacking in the conservation management strategy. Evidence from participants in this study identifies key areas where conservation strategies can easily gain community support. These include, but are not limited to, addressing conservation threats posed by commercial fisheries, working to develop community conservation associations, and ensuring that community members can trust that others are participating fully. Hatcheries appear to have the advantage of wide community support. It is recommended that they are used in the facilitation of any future conservation initiatives. It is my hope that this research is used to inform more comprehensive studies.

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# **APPENDIX**

### Questionnaire: Egg Collectors

Questionnaire # \_\_\_\_\_

Interviewer: \_\_\_\_\_

Location: \_\_\_\_\_

Date: \_\_\_\_\_ July 2009

#### Instructions to Interviewer

Instructions are presented as either WORDS IN ALL CAPITAL LETTERS or *ITALICS* and ARE NOT to be read to interviewees.

#### Introduction to Research

PRIOR TO EACH INTERVIEW READ THE FOLLOWING STATEMENT AND ANSWER ANY QUESTION THAT THE PARTICIPANT MAY HAVE BEFORE CONSENTING.

*Hello, my name is \_\_\_\_\_. I am conducting a survey about sea turtle egg collection and buying. This is an anonymous survey so your name and physical description will not be included. This will be used for dissertation research for Neil Ladell’s masters at the London School of Economics and there is also a chance that it will be published in an academic journal. The main purpose of this research is to learn more about how the egg collection system works and about the people who are involved in it.*

*Your participation in this survey is requested because you have self-identified as an egg collector or buyer. Your participation is completely voluntary. You may refuse to participate altogether, in parts of the study, or withdraw from the study at anytime during the interview process. While participation is voluntary, if you choose to participate a small gift is available for you as a thank you.*

*Do you have any questions about this research or what it means to participate in it?*

*Are you willing to participate in this research?*

#### Demographics

1. Sex:  Male  Female

2. Age: \_\_\_\_\_

3. Education level

No formal education

Secondary

Some Primary School

Some Post-Secondary

Primary School

Post-Secondary

Some Secondary

Other: \_\_\_\_\_

4. Do you live in this area?  Yes  No

**IF YES** a) How long have you lived in the area? \_\_\_\_\_ Years

b) How many other people live in your house with you? \_\_\_\_\_ People

c) What is your relationship with the people in your house?  
(Check all that apply)

Family

Other: \_\_\_\_\_

Friends

d) Including yourself, how many generations of your family have been born in this area?

Just Me

3 Generations

1 Generation

4 or more Generations

2 Generations

None

**IF NO** e) What is your main reason for visiting this area?

Second House

Turtle Egg Buying (for Market)

Vacation

Business Related

Visiting Family

Other: \_\_\_\_\_

Turtle Egg  
Collecting

f) How many years have you been coming to this area? \_\_\_\_\_

g) How often do come to this area each year? \_\_\_\_\_

### Egg Collection

5. How many years have you been collecting sea turtle eggs? \_\_\_\_\_ Years

6. What types of sea turtles have you seen in this area?

Parlamas

Baulas

Negras (parlamas)

Otras: \_\_\_\_\_

7. Which of these types of sea turtles do people in this area collect eggs from?

Parlamas

Baulas

Negras (parlamas)

Otras: \_\_\_\_\_

8. On average, which months do you search for sea turtles nesting? (Check all that apply)

June

Nov

July

Dec

Aug

Jan

Sept

Feb

Oct

Others:

9. On average, how many nights per week do you search for sea turtles nesting?  
\_\_\_\_\_ Nights
10. On average, how many hours a night do you search for sea turtles nesting?  
\_\_\_\_\_ Hours
11. **(PILOT QUESTION)** On average, how many nests do you collect during the nesting season?  
\_\_\_\_\_ Nests
12. Why did you start working in the sea turtle egg trade? (*Check all that apply*)
- |   |  |
|---|--|
| <input type="checkbox"/> Family Tradition     | <input type="checkbox"/> Like Seeing or Being Near Turtles |
| <input type="checkbox"/> Financial Necessity  | <input type="checkbox"/> Like the Work                     |
| <input type="checkbox"/> Easy Source of Money | <input type="checkbox"/> Cultural Beliefs: _____           |
| <input type="checkbox"/> Good Source of Money | <input type="checkbox"/> Other: _____                      |
13. What do you do with the eggs that you collect? (*Check all that apply*)
- |   |   |
|---|---|
| <input type="checkbox"/> Sell to Buyer            | <input type="checkbox"/> Keep for Personal or Household Consumption |
| <input type="checkbox"/> Sell to Local Households | <input type="checkbox"/> Other: _____                               |
| <input type="checkbox"/> Sell to Hatchery         |   |
14. In your opinion, what is the value, if any, of having sea turtles nesting in this area?  
(*Check all that apply*)

*Use Value:*

- Direct Use:* Egg Collection Income
- Direct Use:* Tourism Money Now
- Direct Use:* Like to See Them
- Indirect Use:* Ecosystem health/balance

*Option Value:*

- Future Use:* Conserving Them Ensures My Future Use/Income

*Non-use Value:*

- Altruistic:* Important that current generations of Guatemalans can see them
- Altruistic:* Important that current generations of foreigners can see them
- Bequest:* Important to have them for next and/or future generations
- Existence:* Turtles have the right to exist here
- Other:* \_\_\_\_\_

**Income**

15. During the nesting season, what are your primary income activities? (*Check all that apply*)

Turtle Eggs:

- Local Collector
- Local Buyer
- Other: \_\_\_\_\_

Agriculture:

- Labourer
- Farm landowner – Approx size: \_\_\_\_\_
- Household Garden – Approx size: \_\_\_\_\_
- Subsistence

Livestock Farming:

- Labourer
- More than 5 animals – Types: \_\_\_\_\_
- 5 animals or less – Types: \_\_\_\_\_
- Subsistence

Fishing:

- Artisan
- Fish farming: \_\_\_\_\_
- Commercial: \_\_\_\_\_

Other:

- Grocery shop (owner?): \_\_\_\_\_
- Restaurant or bar (owner?): \_\_\_\_\_
- Tourism (specify): \_\_\_\_\_
- Other Subsistence (specify): \_\_\_\_\_
- Other sector: \_\_\_\_\_

16. **(PILOT QUESTION)** On average, how much do you make from egg collecting during the season?

\_\_\_\_\_ Quetzales

17. Outside of the nesting season, what are your primary income activities?  
(Check all that apply)

Agriculture:

- Labourer
- Farm landowner – Approx size: \_\_\_\_\_
- Household Garden – Approx size: \_\_\_\_\_
- Subsistence

Livestock Farming:

- Labourer
- More than 5 animals – Types: \_\_\_\_\_
- 5 animals or less – Types: \_\_\_\_\_
- Subsistence

Fishing:

- Artisan
- Fish farming: \_\_\_\_\_
- Commercial: \_\_\_\_\_

Other:

- Grocery shop (owner?): \_\_\_\_\_
- Restaurant or bar (owner?): \_\_\_\_\_
- Tourism (specify): \_\_\_\_\_
- Other Subsistence (specify): \_\_\_\_\_
- Other sector: \_\_\_\_\_
- Unemployed/No income source

18. (PILOT QUESTION) During an average year, what portion of the money that you earn comes from sea turtle eggs?

- |     |                   |                 |                   |      |               |
|-----|-------------------|-----------------|-------------------|------|---------------|
| All | More than<br>Half | Approx.<br>Half | Less than<br>Half | None | Don't<br>Know |
|-----|-------------------|-----------------|-------------------|------|---------------|

19. Is the money you earn from the sea turtle egg trade enough for you and your household to live off each year?

- Yes
- No
- Don't know

20. What do other people in your house do to earn money? (*Check all that apply*)

Turtle Eggs:

- Local Collector  Other: \_\_\_\_\_
- Local Buyer

Agriculture:

- Labourer  Household Garden – Approx size: \_\_\_\_\_
- Farm landowner – Approx size: \_\_\_\_\_  Subsistence

Livestock Farming:

- Labourer  5 animals or less – Types: \_\_\_\_\_
- More than 5 animals – Types: \_\_\_\_\_  Subsistence

Fishing:

- Artisan
- Fish farming: \_\_\_\_\_  Commercial: \_\_\_\_\_

Other:

- Grocery shop (owner?): \_\_\_\_\_
- Restaurant or bar (owner?): \_\_\_\_\_
- Tourism (specify): \_\_\_\_\_
- Other Subsistence (specify): \_\_\_\_\_
- Other sector: \_\_\_\_\_
- Unemployed/No income source



**Conservation**

21. Do you believe that there is anything threatening the sea turtle population in this area?

- Yes
- No
- Don't know

**IF YES** a) What do you believe is threatening them?

Fisheries:

- Shrimp Trawlers
- Turtle Fishing Boats
- Artisan
- Other: \_\_\_\_\_
- Tuna Fishing Boats

Beach Activities:

- Egg Collecting in General
- Private Property Development
- Egg Collecting in Community
- Beach Lights
- Egg Collecting in Other Communities
- More Tourists at Night
- Turtle Kills on Beach
- Other: \_\_\_\_\_

Conservation Strategies:

- Poor Enforcement of Laws
- Hatchery Poorly Managed
- Laws Not Strong Enough
- Other: \_\_\_\_\_
- Wrong Laws

Environmental:

- Garbage on Beach
- Water pollution
- Garbage in Ocean
- Climate Change
- Coastal erosion
- Other: \_\_\_\_\_
- Logs and natural debris on beach

**IF NO b) Why not?**

- Lots of turtles
- Don't Care
- Hatcheries well managed/effective
- Other: \_\_\_\_\_

**Donation System**

22. Are you aware of the sea turtle egg Donation System?

- Yes
- No
- Don't know

23. Do you ever donate eggs to a hatchery directly?

- Yes
- No
- Don't know

**IF YES** a) How many eggs from a nest do you donate?

- 1 Dozen
- 2 Dozen
- 3 Dozen
- More than 3 Dozen
- Other: \_\_\_\_\_
- Don't Know

**IF NO** b) How many eggs from a nest, if any, does your buyer donate?

- 1 Dozen
- 2 Dozen
- 3 Dozen
- More than 3 Dozen
- Other: \_\_\_\_\_
- Don't Know

24. What do you believe to be the positive aspects in participation in the Donation System?

- Can Still Collect/Sell Eggs
- Conservation of turtles for Future
- Not Strictly Enforced
- Voluntary
- All Collectors and Buyers have to Contribute
- Increased Tourism
- Other: \_\_\_\_\_

25. What do you believe to be the negative aspects in participation in the Donation System?

- Takes Away Potential Income
- Others Free-Riding
- Not enough for Conservation
- Not Strictly Enforced
- Voluntary
- Doesn't address other threats to sea turtles
- Other: \_\_\_\_\_

26. Do you believe the Donation System has a significant impact on the survival of the sea turtle populations for the future?

- |                  |                    |         |                           |                         |            |
|------------------|--------------------|---------|---------------------------|-------------------------|------------|
| Very Significant | Mildly Significant | Neutral | Mildly Insignifi-<br>cant | Very Insignifi-<br>cant | Don't Know |
|------------------|--------------------|---------|---------------------------|-------------------------|------------|

27. What, if anything, would make you participate more in the Donation System?  
(Open-ended Question)

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**Policies and Alternatives**

28. Given the current conditions, how much do you think the government, navy, police and CONAP should be doing to make sure the sea turtle populations survive for the future?

Much More                      More                      Same                      Less                      Much Less                      Don't Know

29. Given the current conditions, how much do you think the people living in this area should be doing to make sure the sea turtle populations survive for the future?

Much More                      More                      Same                      Less                      Much Less                      Don't Know

30. Given the current conditions, how much do you think the hatchery organizations should be doing to make sure the sea turtle populations survive for the future?

Much More                      More                      Same                      Less                      Much Less                      Don't Know

31. Imagine that the Government of Guatemala passed a law that fully enforced a complete ban sea turtle egg collection. The law would also mean that new jobs in this community would be created for you and all the former collectors and buyers that would guarantee the exact same amount of money that you currently make collecting eggs.

a) In order to accept this new situation, how much money per week during the nesting season months, July to December, would you need to be paid to consider yourself as well off as at present?

\_\_\_\_\_ Quetzales per week

**(Instructions for interviewer:** Multiply this number by 25 for total)

b) The amount that you have stated is equal to approximately \_\_\_\_\_ Quetzales for the season. Is this amount correct?

Yes                       No                       Don't know

**IF NOT CORRECT**                      What amount is correct? \_\_\_\_\_ Quetzales for season

c) Is this amount more, less, or the same as you currently make?

More                       Less                       Same                       Don't Know

d) Why is this the amount you have chosen?

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32. In your opinion, what types of sea turtle conservation policies and projects would work best for Guatemala? (*Check all that apply*)

- Tourism/Eco-Tourism
- More jobs in the Area
- More Enforcement of Present System
- Community-based Conservation

Candidate Number: 75790

GY: 499

Other: \_\_\_\_\_

### Questionnaire: Egg Buyers

Questionnaire # \_\_\_\_\_

Interviewer: \_\_\_\_\_

Location: \_\_\_\_\_

Date: \_\_\_\_\_ July 2009

#### Instructions to Interviewer

Instructions are presented as either WORDS IN ALL CAPITAL LETTERS or *ITALICS* and ARE NOT to be read to interviewees.

#### Introduction to Research

PRIOR TO EACH INTERVIEW READ THE FOLLOWING STATEMENT AND ANSWER ANY QUESTION THAT THE PARTICIPANT MAY HAVE BEFORE CONSENTING.

*Hello, my name is \_\_\_\_\_. I am conducting a survey about sea turtle egg collection and buying. This is an anonymous survey so your name and physical description will not be included. This will be used for dissertation research for Neil Ladell’s masters at the London School of Economics and there is also a chance that it will be published in an academic journal. The main purpose of this research is to learn more about how the egg collection system works and about the people who are involved in it.*

*Your participation in this survey is requested because you have self-identified as an egg collector or buyer. Your participation is completely voluntary. You may refuse to participate altogether, in parts of the study, or withdraw from the study at anytime during the interview process. While participation is voluntary, if you choose to participate a small gift is available for you as a thank you.*

*Do you have any questions about this research or what it means to participate in it?*

*Are you willing to participate in this research?*

#### Demographics

33. Sex:            Male                            Female

34. Age: \_\_\_\_\_

35. Education level

- |  |  |
|--|--|
| <input type="checkbox"/> No formal education | <input type="checkbox"/> Secondary           |
| <input type="checkbox"/> Some Primary School | <input type="checkbox"/> Some Post-Secondary |
| <input type="checkbox"/> Primary School      | <input type="checkbox"/> Post-Secondary      |
| <input type="checkbox"/> Some Secondary      | <input type="checkbox"/> Other: _____        |

36. Do you live in this area?  Yes  No

**IF YES** a) How long have you lived in the area? \_\_\_\_\_ Years

b) How many other people live in your house with you? \_\_\_\_\_ People

c) What is your relationship with the people in your house?  
(Check all that apply)

Family  Other: \_\_\_\_\_  
 Friends

d) Including yourself, how many generations of your family have been born in this area?

Just Me  3 Generations  
 1 Generation  4 or more Generations  
 2 Generations  None

**IF NO** e) What is your main reason for visiting this area?

Second House  Turtle Egg Buying (for Market)  
 Vacation  Business Related  
 Visiting Family  Other: \_\_\_\_\_  
 Turtle Egg Collecting

f) How many years have you been coming to this area? \_\_\_\_\_

g) How often do come to this area each year? \_\_\_\_\_

### Egg Collection

37. How many years have you been buying sea turtle eggs? \_\_\_\_\_ Years

38. Are you currently collecting or have you previously collected sea turtle eggs on the beach?

Yes, Currently  Yes, Previously  No  Don't Know

**IF YES** a) For how many years \_\_\_\_\_ Years

39. What types of sea turtles have you seen in this area?

Parlamas  Baulas  Negras (parlamas)  Otras: \_\_\_\_\_

40. Which of these types of sea turtles do people in this area collect eggs from?

Parlamas  Baulas  Negras (parlamas)  Otras: \_\_\_\_\_

41. On average, which months do you buy sea turtles eggs? (*Check all that apply*)
- |                               |  |
|-------------------------------|--|
| <input type="checkbox"/> June | <input type="checkbox"/> Nov           |
| <input type="checkbox"/> July | <input type="checkbox"/> Dec           |
| <input type="checkbox"/> Aug  | <input type="checkbox"/> Jan           |
| <input type="checkbox"/> Sept | <input type="checkbox"/> Feb           |
| <input type="checkbox"/> Oct  | <input type="checkbox"/> Others: _____ |
42. **(PILOT QUESTION)** On average, how many nests do you buy during the nesting season?  
\_\_\_\_\_ Nests

43. Why did you start working in the sea turtle egg trade? (*Check all that apply*)
- |   |  |
|---|--|
| <input type="checkbox"/> Family Tradition     | <input type="checkbox"/> Like Seeing or Being Near Turtles |
| <input type="checkbox"/> Financial Necessity  | <input type="checkbox"/> Like the Work                     |
| <input type="checkbox"/> Easy Source of Money | <input type="checkbox"/> Cultural Beliefs: _____           |
| <input type="checkbox"/> Good Source of Money | <input type="checkbox"/> Other: _____                      |

44. What do you do with the eggs that you buy? (*Check all that apply*)
- |   |   |
|---|---|
| <input type="checkbox"/> Sell to a Middleman or Market vendor | <input type="checkbox"/> Keep for Personal or Household Consumption |
| <input type="checkbox"/> Sell to Local Households             | <input type="checkbox"/> Other: _____                               |
| <input type="checkbox"/> Sell to Hatchery                     |   |

45. In your opinion, what is the value, if any, of having sea turtles nesting in this area? (*Check all that apply*)

*Use Value:*

- Direct Use:* Egg Collection Income  
 *Direct Use:* Tourism Money Now  
 *Direct Use:* Like to See Them  
 *Indirect Use:* Ecosystem health/balance

*Option Value:*

- Future Use:* Conserving Them Ensures My Future Use/Income

*Non-use Value:*

- Altruistic:* Important that current generations of Guatemalans can see them  
 *Altruistic:* Important that current generations of foreigners can see them  
 *Bequest:* Important to have them for next and/or future generations  
 *Existence:* Turtles have the right to exist here  
 *Other:* \_\_\_\_\_

**Income**

46. During the nesting season, what are your primary income activities? (*Check all that apply*)

Turtle Eggs:

Local Collector

Other: \_\_\_\_\_

Local Buyer

Agriculture:

Labourer

Household Garden – Approx size: \_\_\_\_\_

Farm landowner – Approx size: \_\_\_\_\_

Subsistence

Livestock Farming:

Labourer

5 animals or less – Types: \_\_\_\_\_

More than 5 animals – Types: \_\_\_\_\_

Subsistence

Fishing:

Artisan

Commercial: \_\_\_\_\_

Fish farming: \_\_\_\_\_

Other:

Grocery shop (owner?): \_\_\_\_\_

Restaurant or bar (owner?): \_\_\_\_\_

Tourism (specify): \_\_\_\_\_

Other Subsistence (specify): \_\_\_\_\_

Other sector: \_\_\_\_\_

47. **(PILOT QUESTION)** On average, how much do you make from the sea turtle egg trade during the season? \_\_\_\_\_ Quetzales



48. Outside of the nesting season, what are your primary income activities?  
(Check all that apply)

## Agriculture:

- Labourer  Household Garden – Approx size: \_\_\_\_\_  
 Farm landowner – Approx size: \_\_\_\_\_  Subsistence

## Livestock Farming:

- Labourer  5 animals or less – Types: \_\_\_\_\_  
 More than 5 animals – Types: \_\_\_\_\_  Subsistence

## Fishing:

- Artisan  Commercial: \_\_\_\_\_  
 Fish farming: \_\_\_\_\_

## Other:

- Grocery shop (owner?): \_\_\_\_\_  
 Restaurant or bar (owner?): \_\_\_\_\_  
 Tourism (specify): \_\_\_\_\_  
 Other Subsistence (specify): \_\_\_\_\_  
 Other sector: \_\_\_\_\_  
 Unemployed/No income source

49. **(PILOT QUESTION)** During an average year, what portion of the money that you earn comes from sea turtle eggs?

All	More than Half	Approx. Half	Less than Half	None	Don't Know
-----	-------------------	-----------------	-------------------	------	---------------

50. Is the money you earn from the sea turtle egg trade enough for you and your household to live off each year?

- Yes  No  Don't know

**51.** What do other people in your house do to earn money? (*Check all that apply*)

## Turtle Eggs:

- Local Collector  Other: \_\_\_\_\_
- Local Buyer

## Agriculture:

- Labourer  Household Garden – Approx size: \_\_\_\_\_
- Farm landowner – Approx size: \_\_\_\_\_  Subsistence

## Livestock Farming:

- Labourer  5 animals or less – Types: \_\_\_\_\_
- More than 5 animals – Types: \_\_\_\_\_  Subsistence

## Fishing:

- Artisan
- Fish farming: \_\_\_\_\_  Commercial: \_\_\_\_\_

## Other:

- Grocery shop (owner?): \_\_\_\_\_
- Restaurant or bar (owner?): \_\_\_\_\_
- Tourism (specify): \_\_\_\_\_
- Other Subsistence (specify): \_\_\_\_\_
- Other sector: \_\_\_\_\_
- Unemployed/No income source

**Conservation**

52. Do you believe that there is anything threatening the sea turtle population in this area?

- Yes
- No
- Don't know

**IF YES a)** What do you believe is threatening them?

Fisheries:

- Shrimp Trawlers
- Turtle Fishing Boats
- Artisan
- Other: \_\_\_\_\_
- Tuna Fishing Boats

Beach Activities:

- Egg Collecting in General
- Private Property Development
- Egg Collecting in Community
- Beach Lights
- Egg Collecting in Other Communities
- More Tourists at Night
- Turtle Kills on Beach
- Other: \_\_\_\_\_

Conservation Strategies:

- Poor Enforcement of Laws
- Hatchery Poorly Managed
- Laws Not Strong Enough
- Other: \_\_\_\_\_
- Wrong Laws

Environmental:

- Garbage on Beach
- Water pollution
- Garbage in Ocean
- Climate Change
- Coastal erosion
- Other: \_\_\_\_\_
- Logs and natural debris on beach

**IF NO b)** Why not?

- Lots of turtles
- Don't Care
- Hatcheries well managed/effective
- Other: \_\_\_\_\_

**Donation System**

53. Are you aware of the sea turtle egg Donation System?

- Yes
- No
- Don't know

54. Not including any nests that the egg collectors have already received a donation receipt for, do you ever donate eggs to a hatchery?

- Yes
- No
- Don't know

**IF YES** a) How many eggs from a nest do you donate?

- 1 Dozen
- 2 Dozen
- 3 Dozen
- More than 3 Dozen
- Other: \_\_\_\_\_
- Don't Know

55. What do you believe to be the positive aspects in participation in the Donation System?

- Can Still Collect/Sell Eggs
- Conservation of turtles for Future
- Not Strictly Enforced
- Voluntary
- All Collectors and Buyers have to Contribute
- Increased Tourism
- Other: \_\_\_\_\_

56. What do you believe to be the negative aspects in participation in the Donation System?

- Takes Away Potential Income
- Others Free-Riding
- Not enough for Conservation
- Not Strictly Enforced
- Voluntary
- Doesn't address other threats to sea turtles
- Other: \_\_\_\_\_

57. Do you believe the Donation System has a significant impact on the survival of the sea turtle populations for the future?

- |                  |                    |         |                      |                    |            |
|------------------|--------------------|---------|----------------------|--------------------|------------|
| Very Significant | Mildly Significant | Neutral | Mildly Insignificant | Very Insignificant | Don't Know |
|------------------|--------------------|---------|----------------------|--------------------|------------|

58. What, if anything, would make you participate more in the Donation System?  
(Open-ended Question)

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**Policies and Alternatives**

59. Given the current conditions, how much do you think the government, navy, police and CONAP should be doing to make sure the sea turtle populations survive for the future?

- |           |      |      |      |           |            |
|-----------|------|------|------|-----------|------------|
| Much More | More | Same | Less | Much Less | Don't Know |
|-----------|------|------|------|-----------|------------|

60. Given the current conditions, how much do you think the people living in this area should be doing to make sure the sea turtle populations survive for the future?

Much More                      More                      Same                      Less                      Much Less                      Don't Know

61. Given the current conditions, how much do you think the hatchery organizations should be doing to make sure the sea turtle populations survive for the future?

Much More                      More                      Same                      Less                      Much Less                      Don't Know

62. Imagine that the Government of Guatemala passed a law that fully enforced a complete ban sea turtle egg collection. The law would also mean that new jobs in this community would be created for you and all the former collectors and buyers that would guarantee the exact same amount of money that you currently make collecting eggs.

a) In order to accept this new situation, how much money per week during the nesting season months, July to December, would you need to be paid to consider yourself as well off as at present?

\_\_\_\_\_ Quetzales per week

(Instructions for interviewer: Multiply this number by 25 week for approximate total)

b) The amount that you have stated is equal to approximately \_\_\_\_\_ Quetzales for the season. Is this amount correct?

Yes                       No                       Don't know

IF NOT CORRECT                      What amount is correct? \_\_\_\_\_ Quetzales for season

c) Is this amount more, less, or the same as you currently make?

More                       Less                       Same                       Don't Know

d) Why is this the amount you have chosen?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

63. In your opinion, what types of sea turtle conservation policies and projects would work best for Guatemala? (Check all that apply)

- Tourism/Eco-Tourism
- More jobs in the Area
- More Enforcement of Present System
- Community-based Conservation
- Other: \_\_\_\_\_