

# **The Impact of Research-Based Tourism on the Tortuguero area, Costa Rica: the Case Study of Caño Palma Biological Station**

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All findings and recommendations in this report are expressly those of the researchers involved  
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## EXECUTIVE SUMMARY

Seen in nearly every community across the globe, tourism is a continually rising industry that brings ever-increasing numbers of humans to variable natural and socio-scapes. With growing curiosity to understand these variable-scapes around the globe, some individuals seek out a more environmentally friendly way to visit and positively impact developing regions, giving rise to a newer form of tourism, mainly ecotourism. The development of ecotourism has expanded even further into more humanistic ways of travel: volunteerism and research-based tourism. Research-based tourism (RBT) will be the focus of this study. The effects of RBT are examined in the Tortuguero region of Costa Rica, with the case study of Caño Palma Biological Station (CPBS). To understand these impacts, literature reviews and preparatory research was conducted prior to field work. During field work, participant observation, and semi-structured interviews with hosts and guests at the station were conducted. These methods allowed insight into the hosts (managing staff at CPBS) and the guests (interns and volunteers who are classified as RBTs), who were broadly examined across economics, sociocultural, and environmental aspects.

Findings revealed that guests gained important experience in field research while supporting conservation work in a developing nation. The CPBS hosts had positive impacts on the guests at the station including aiding in the guests developing skills in carrying out fieldwork in difficult physical conditions. San Francisco, a newly established village which lies in close proximity to CPBS, benefitted from the ecotourism boom in this region by providing both services and products to the incoming ecotourists.

Historical examination into trends of visitors to CPBS revealed that the type of guest remains similar over the 25 years of the station with an increase in the numbers and international visitors, for longer stays with the inception and building of long term monitoring programs in 2004. The guests assist in data collection and the rigor in training and overcoming language barriers through due diligence allows for assurance of quality of data collection despite the use of 'citizen science'.

CPBS hosts aim to be as sustainable as possible, while providing basic living standards to guests who are accustomed to a different standard of living. Guest learned ways to minimize waste in the station environment but lacked detailed knowledge on how their waste impacts their environment. The hosts took measures to have minimal impact on the environment and brought this message to the guest via their actions and required methods of resource conservation (eg. use of rain water for toilet flushing, reuse of zip sealing commercial food packaging for multi-use packaging, etc.).

Caño Palma Biological Station is a research centre that hosts research-based tourist training and field experience. As 'citizen scientists', the guests are provided with rigorous training to collect data in various long term monitoring projects. The hosts use the data to provide reports to the Costa Rican Ministry of Environment and the scientific community at large.

## **ABBREVIATIONS**

COTERC - Canadian Organization for Tropical Education and Rainforest Conservation

CPBS - Caño Palma Biological Station

ELF — English as a lingua franca

MINAET - Ministerio del Ambiente, Energía y Telecomunicaciones

RBT – Research-Based Tourism

STC – Sea Turtle Conservancy

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## PREFACE

This report will be delivered to two organizations: the Canadian Organization for Tropical Education and Rainforest Conservation (COTERC), the Goodman School of Mines. COTERC was founded in 1991. It is registered as a Canadian non-profit charitable organization that is committed and working actively to protect tropical rainforests in Costa Rica. This organization's Board of Directors consists of anthropologists, biologists, accountants, educators, environmentalists, zoo professionals, and media professionals. The organization also runs in Costa Rica, at the Cano Palma Biological Station located in the Tortuguero region. COTERC's (n.d.) mission is to provide "leadership in education, research and conservation and the educated use of natural resources in the tropics". The Goodman School of Mines is a branch of Laurentian University in Sudbury, Ontario Canada that is dedicated to Post-Secondary Programs as well as Professional Development. Their focus is on mineral exploration, mining and environmental studies. Their contribution to this project also helps the School work toward their own goal of making a positive impact on communities, environments and economies, which were some of the key areas studied in this paper.

## INTRODUCTION

A continually rising industry, tourism is a phenomenon that “involves travelling and a temporary and voluntary visit to a place away from home,” (Burns, 2004 p.5). Growing with increasing popularity since the 1970s, tourism is now an industry that has impacted nearly 100% of human societies (Stronza, 2001). While the tourism industry can be found all across the globe, some forms of tourism claiming the developing nations include ecotourism, volunteer tourism (volunteerism) and scientific expedition. A promising alternative to general tourism, ecotourism is said to be “the responsible travel to natural areas that conserves the environment and sustains the well-being of local people,” (Stem et al., 2003b, p387). Promoting a genuine exchange between hosts and visitors, and increasing local sustainability and environment, volunteerism benefits both traveler and developing villages by showcasing the locals’ cultures and values. Taking both of these forms into account, scientific expedition is research reformed at the local level, with the goal to gain knowledge and to educate the audience on a given subject. Tourists looking to relax in a hot climate may go to the Caribbean, but the Southern areas of the Caribbean Sea offer a much more unique experience. Those seeking an area rich in biodiversity and an abundance of wildlife might seek the lowland rainforests, or the seemingly endless mountain ranges of Costa Rica.

Costa Rica has a long history of using tourism as a means to develop their economy (Seales and Stein, 2011). The pristine jungles and ecosystems have helped draw in tourists, and money, to the country. Ecotourists, and nature lovers alike come to the Costa Rican tropics to experience all this thrilling country has to offer. Throughout the years, impacts on their economy, their culture and their environment have become increasingly evident with the increasing number of tourists. Surpassing the banana trade in 1992, the tourism industry became the primary source for foreign exchange in Costa Rica (Narayan, 1998), forcing the locals to rely heavily on this outside trade. This increasing interaction can cause a conflict of cultural interest when a tourist’s culture influences that of the host country.

Due to the increase in ecotourists in Costa Rica, there has been an increasing strain on the country's natural resources; this illustrates that although conservational efforts are intended, the process of doing so comes with an environmental cost (Koenigs, Dieperink, and Miranda, 2009). Through raised awareness of these environmental concerns, locals took action into their own hands. Starting with the implementation of the National Parks in Costa Rica in 1945, to then being systematically managed in the 1970s, environmentally conscious tourists have the opportunity to visit the country’s protected areas (Schelhas and Pfeffer, 2005). Completely surrounded by Tortuguero National Park, Tortuguero remains one of the few places in which national park and ecotourism come together to benefit both the economy of the village and the efforts in forest conservation (Honey, 2008).

Oftentimes, ‘ecotourism’ can be interpreted as completely beneficial to the region. However, as outlined by Boo et. al (1990) and more recently by Stem et. al (2003a) ecotourism is not always so ‘eco’. These reports, as well as others, go over the impacts of ecotourism (including scientific expedition and research-based tourism) on the local inhabitants of Costa Rica in particular.

Building on past research on the effects of ecotourism on regions of Costa Rica, this study will be assessing and discussing the potentials and pitfalls of a growing ecotourism sector here in Tortuguero, Costa Rica. Specifically, the report will cover the environmental, economic,

cultural, and language-related impacts visitors of Caño Palma Biological Station (CPBS) can have on the area. It is known from past research that Costa Rica has one of the fastest growing ecotourism industries. From not-for-profit organizations ie. COTERC (the site of this particular study) to corporate owned resorts, the region is home to a multitude of outlets for ‘ecotourism’ and volunteerism. For this reason, it is important to assess the impacts that each means of ecotourism can have on the surrounding area.

## **SITE DESCRIPTION**

Caño Palma Biological Station (CPBS) is the focal point of this study. It is located at the most southern tip of the Barra Del Colorado Wildlife Refuge, in Limón, just 3 kilometres north of the Tortuguero National Park. Established in 1991, the approximately 40-hectare station has been host to a number of researchers, interns, students and volunteers aiding in the conservation efforts put forth by the Canadian Organization for Tropical Education and Rainforest Conservation (COTERC). The Ministerio de Ambiente y Energia (MINEA), permits the station to conduct it’s on going scientific research. CPBS oversees projects collecting data and coordinating census patrols, on various plant and animal species, as well as climate trends, which are tied in to the station’s nine long-term monitoring programs.

In addition to CPBS, this study relies on data collected from the village of San Francisco, a small community that lies across the canal from CPBS. After visiting the community, the workings of a small economy can be seen. The residents of San Francisco have various jobs; most work in the growing ecotourism industry in the region, others own small shops, bars, and bakeries or earn money doing other services (carvings etc.). The village also houses an elementary school and a library, the latter being where CPBS offers various programs for the village’s children. For high school, teenagers must make the twice-daily 30-minute trip by boat to Tortuguero which boasts a much stronger tourism industry. It offers many restaurants, lodges and little souvenir shops to the visiting tourists. It also has a National Park and several tour companies across Costa Rica will include a visit to the Tortuguero region in their package. One of the attractions offered in the Tortuguero region is a hike up the Cerro. The Cerro, located in the village of San Francisco, is the highest point in the region and offers a great view of the area. Although San Francisco is privy to having it close, it receives very little in terms of tourism revenues, likely due to a lack of tourist amenities.

## **METHODS**

Both quantitative and qualitative data was collected in the form of formal, sit-down interviews with the guests and hosts at the Caño Palma Biological Station. The questions were open ended but followed a general script covering a range of chosen topics (Bernard, 2002). A total of 36 questions were asked to 14 guests, as well as additional questions for the four hosts, taking place over two consecutive days so as not to allow any skewed results or duplicated answers. The interview questions, conducted at the CPBS, were designed to establish the interaction and expectations of guest to host and of host to guest (Blackman and Benson, 2010). The general approach of Grounded Theory, as laid out by Glaser (1998), being the discovery of theory from data systematically obtained from social research was utilized. The interviews were conducted in English, the common language between all interviewees, and the responses were

recorded by hand and then coded to obtain a reoccurring theme; this theme explains the common behaviour shared by most participants (Campbell and Smith, 2006).

Volunteers were only interviewed after having spent a minimum of two weeks at the station. The reason for this being to allow time to become acquainted with their surroundings. Pilot interviews conducted by Campbell and Smith (2006) suggested volunteers experience culture shock upon arrival and was associated with anxiety, and expressing these to an interviewer heightened these feelings. The interview was used to gain understanding into the volunteers' motives. The interviews were conducted to a) understand the various reasons for participating at the station, b) their contribution to the economy of the San Francisco area, c) their cultural expectations of the station and finally, d) how they feel about their environmental footprint during their stay at CPBS can be obtained.

Data was also collected through participant observation. This method consisted of several weeks in the field working alongside the volunteers in question, taking part in the various projects run by the station. This involves researchers getting close enough to the participants that they feel comfortable with your presence, allowing you to observe and record information about their lives (Bernard, 2002). This gives first-hand experience of how participants feel while embarking on these programs, and the positive and negative effects these programs have on the volunteers.

## **DISCUSSION**

Since its inception in 1991, Caño Palma Biological Station has seen its trend in visitors change over the years. The organization's main focus in the early years was spent on networking with other institutions and research organizations in order to build strong ties within the conservation and research communities. During those years, the guests at CPBS consisted mainly of researchers, professors, occasionally with students, and Canadian Organization for Tropical Education and Rainforest Conservation (COTERC) Board Members. The guests originated mainly from Canada and the United States. CPBS always prided itself on providing a research-based type of tourism, similar to ecotourism but more engaged with its guests.

A definite shift in the types of guests choosing to come to CPBS was established around 2004 when various long-term monitoring projects were introduced. Resident and migrant bird monitoring has been ongoing since the station's beginning but slowly, other monitoring projects saw light: marine turtle monitoring, large mammals, and more recently (2015) shore bird monitoring. A variety of other projects are also conducted at the station and include: caiman census, plant phenology and of course, environmental education. As the projects developed, a more varied assortment of research-based tourists from around the world made their way to CPBS. As the station matured, so did data collecting and processing methods and the experience provided became more widely recognized. Soon, many researchers, interns, and people from mixed background yet with common interests in environmental conservation were requesting a stay at this research-based biological station.

Today, Caño Palma Biological Station is host to multifarious research-based tourists from around the world. In a one year period, it often sees scores of people from Canada and USA but also from Latin America, Australia, New Zealand, Africa, Lithuania, France, Spain and the Netherlands, just to name a few. Although not all of them have a background in biology or the environment, they all have one thing in common: a passion in tropical conservation. The numerous published articles that derive from the data collected from research projects further

contribute to conservation and education of the tropical forest and in particular, this region. Reports on the many projects conducted at CPBS are provided to the COTERC Board and to MINEA to help implement changes in this area. All of these activities ensure to make CPBS a place sought-after by universities, researchers, and other research-based tourists from around the world. As many as 150 research-based tourists pass through the station each year, some returning faithfully year after year. For a small non-profit and not-government funded organization, this is considered an exceptional accomplishment.

### *ECONOMIC IMPACTS*

It has been established that tourism affects the economy, either by strengthening employment opportunities or by increasing reliance on the tourists' dollar (Stronza, 2001). In recent years, the tourism industry has changed its primary focus from experiencing a new culture to providing more economic and ecological sustainability via local participation and conservation education (Stronza, 2001). While both the size and the growth rate of the volunteer tourism market are arduous to determine, Campbell and Smith (2006) suggest this sector is sizeable and steadily increasing.

This research examined a volunteer organization that focuses on research-based tourism (RBT) and how the local community has been impacted by the organization's presence. Caño Palma Biological Station is just across the canal from the small village of San Francisco, and houses the staff and up to 150 guests throughout the year. The cost to run the station varies on the number of volunteers/researchers living at the station, the number of projects being undertaken, and the upkeep required. The station prefers those who can participate in their programs for an extended period of time (three week minimum) to maintain consistent data collection and increase the effectiveness of their programs. The visiting volunteers provide much needed labour and contribute financially to the long term monitoring projects.

The cost visitors pay includes their accommodations, three meals a day, snacks throughout the day, training, and participation in all the programs run by the station, access to Internet, a library, a few dry boxes to house their electronics, and two washing machines. The living standards were described by many participants as "rustic" and "bare minimum." The guests all live in a communal space sharing daily chores, which limits the amount of staffing required. The rooms for the volunteers are equipped with standard single beds, some shelving, and one fan. Guests are asked to bring their own mosquito net and sheets for the mattresses. With no running hot water, air conditioning, or clothes dryer, CPBS is a not-for-profit organization, and provides only what is necessary for the research to be undertaken. A host commented on the living conditions of the station:

Host: "We don't provide westernized standards of living. Being here is a lot more basic than people are used to, were trying over time to replace mattresses – but it is little by little. Rather than try to meet their expectations, we try to prepare the interns for what they are entering into."

The cost interns/volunteers pay to be here varies on their length of stay, in that the longer they stay, the cheaper it will become. The average cost ranged from \$125 per week (based on US currency) to \$300/week, with the cheaper options applying to those who stay for multiple months. The majority of interns staying for six weeks. When asked, based on the cost they paid,

if their accommodations met their expectations, every volunteer replied “yes,” claiming they were not expecting much, being a biological station. One volunteer replied:

Guest: “Yeah, I would say so. I thought it would be a shack in the woods. I was pleasantly surprised.”

Although the accommodations met their expectations, a few interns still felt the cost to be fairly expensive, however, acknowledged the funds to be necessary for research to take place,

Guest: “I’m happy with it, honestly [...]. I mean, it’s a bit pricey but it’s worth it. It’s a volunteer thing and it’s an NGO so I’m assuming it goes to help out... it’s a bit pricey though”

With the finances in question, many volunteers expressed interest in the various experiences offered as opposed to the overall cost, when compared to similar programs. CPBS offers the opportunity to patrol their beach monitoring sea turtles and their nests, and to participate in data collection of local mammals, bats, caiman, and anoles, all among other projects taking place at the station. The CPBS also runs the local library for local students to obtain help with their academic studies, and learn about conservation efforts in the area. Many volunteers who come here are Sea Turtle Interns, coming for the chance to interact with a nesting sea turtle, help forward their conservation, participate in biological fieldwork, and to expand their knowledge of marine biology. There was a mutual agreement that the programs offered by the CPBS were significantly cheaper than other programs; one volunteer claimed to have chosen CPBS specifically because of the lower fees. When discussing other RBT projects volunteers have previously participated on, CPBS showed significantly lower costs,

Guest: “I studied abroad in Peru. I was at a biological station that was pretty much like this...it was [very expensive]. I was there for three months. Tuition was like \$15000 (US currency).”

A mixed-taxa intern at the CPBS participated on a Global Vision International (GVI) project in Costa Rica the previous year claimed,

Guest: “It was more expensive, and it’s more involved in science here. I like it better [here] because I actually learn things.”

GVI is a for-profit organization that provides many international volunteer and internship opportunities. They offer a variety of programs from wildlife conservation in South Africa to teaching youth in Nepal. While many Volunteer Tourism Organizations (VTO) like GVI and CPBS exist, they differ in the types of opportunities they offer, in cost and in their impacts on the sustainable development of the host destination. Similar to CPBS, the Caribbean Conservation Corporation now Sea Turtle Conservancy (STC) is a non-governmental organization dedicated to the conservation of sea turtles through research, education, and training (Campbell and Smith, 2006). The STC hosts a long-term sea turtle monitoring program employing visitors and volunteers to partake in their efforts. Volunteer tourists choose this program for its promise to actively participate in research. When encountering a nesting turtle, the guides led the

volunteer tourists through egg counting, measurement taking, and body checking (Campbell and Smith, 2006). Campbell and Smith (2006, p.93) interviewed a number of the STC volunteers and determined their “pronounced emphasis on science, conservation, aesthetic, humanistic, and experiential values,” is what ultimately drew them to this particular project. The cost of the program, however, differs from CPBS substantially. Compared to the \$300/week (US currency), participants at the STC pay from \$1360 for one week to \$2075 for three weeks, which includes room and board, transportation from San Jose and some weekly excursions (Campbell and Smith, 2006). These researchers found that this organization caters more to the volunteer’s lived experiences, with little involvement in the local community outreach program. They determine that this VTO has the same economic impact as eco-tourism.

A study was conducted by Lupoli et al. in 2014 to examine the impacts of volunteer tourism on local communities. They utilized several indicators in socio-cultural, economic, and environmental aspects to determine how volunteer tourism affects these indicators. The results show the economic and environmental impacts to be more useful in Latin American organizations. This could be due to in-country organizations emphasizing their focus more on beneficial economic and environmental impacts in the local villages, whereas outside organizations tend to focus on satisfying the volunteer’s expectations (Lupoli et al., 2014). Lupoli et al. (2014, p.913) argue that “Latin American organizations value environmental education for the community and local people’s ability to share their ecological knowledge over non-Latin American organizations”. This is demonstrated in the CBPS’s commitment to remain local,

Guest: “We buy anything we can locally, fruits and vegetables, dry goods, construction materials.....When we first came to the station it was all about local, local, local,, but we just can’t anymore.....We have broadened our definition of local. Everything at the station is only from Costa Rica.”

The increase in product price is a sure sign of change in the local economy, along with a substantial increase in living standards within the community.

Guest: “A lot of people I know are better off economically. They have better houses and a better way of living.”

While CPBS continues to maintain positive impacts economically on the community, the growing tourism industry may not contribute the same effects. When asked what percentage of the local village service the tourism industry, a host replied:

Host: “I would say around 80%.....A lot of people come here and struggle for employment. Tortuguero employs a lot of illegal employees, but most who come to San Francisco have no employment. A lot are hoping to gain employment in tourism but there is also some people who come who are running from the law. This results in a lot of continued illegal possession of land, because they have come in, claimed (taken) and then subsequently sold that land.”

CPBS is a station focused on research and conservation, committed to only produce positive impacts on the local community. They ensure to purchase only locally sourced

products and encourage their volunteers to do the same. Greatly differing from many upscale volunteer tourism agencies, CPBS focuses on maintaining the sustainability of their biological station. With the increasing recognition of the Tortuguero area as a prime volunteer tourism destination, it is likely the locals will benefit from this tourism boom, in providing both services and products to the incoming visitors.

### *SOCIAL AND CULTURAL IMPACTS*

Stronza (2001) explains that in order for a study on any form of tourism to be holistic, it must include impacts on both the locals, and visitors. The guests of Caño Palma Biological Station were asked to describe the types of interactions they have had with the locals of San Francisco. There was a general consensus that overall interactions with adults in the community had been positive. They described the people as friendly, fair, and in some cases generous (some guests described one incident where a bar owner gave them rice pudding as they were waiting out a thunderstorm).

Descriptions of the children in the community, however, were mixed. Many of the guests described negative interactions with the children. Some were shocked at the lack of discipline and structure in their lives. For many, interacting with the children was one of the largest culture shocks of the experience. While many of the guests related an understanding of the children's behaviours to a lack of structure in the home, some were still shocked at what they saw.

Guest: "I've worked at the library helping with the children in San Francisco. It was interesting to see how the kids are, they are rougher than back home. You expect it but to see it when you're faced with it, it's more shocking. The kids are more macho and hit on girls more."

Guests: "Mostly it is with the kids, helping with homework. It was weird at first because they didn't listen, but you get used to it."

One community intern was able to see some of the positive changes made on the children. When asked what impact they believe to have had on the programs run by the station, this person was able to describe improvements in the children's ability to speak English, and their desire to continue to help them with their studies in general.

Guest: "Since I'm a community intern, I go every day to interact with kids from 4 to about 18 years old. I haven't had much interaction with adults. At first, it was overwhelming, the kids expect this temporary person to come and experience then leave shortly after. So, I wasn't getting any respect, they would call you ugly, not taking it seriously, they say it to everyone. It was overwhelming but they've come to accept me, I learned they're good kids. They just don't have as much guidance from their parents, so now I can be that role model for them - it's a good place for me."

The length of stay of the average tourist is much shorter than the RBT or volunteer (Gray and Campbell, 2007). At CPBS, the average stay of the guest is 12 weeks. Due to these longer stays, the quality of interactions between guests and locals had time to improve, as evident in the above example. There are times, for example, when tourism limits the contact between locals

and tourists, whereas research-based tourism, and applied anthropology, increased these connections (Koens et al, 2009). One of the hosts was able to better identify the impact the guest of the station, past and present, have had on the San Francisco community.

Host: “There is an increased awareness of things going on... There was a program where we took pictures of poached nests and murdered turtle posted it around town – we saw a significant, decrease in poaching activity. We had every single small business owner in San Francisco asking if they could have one of the posters to display. With snakes... we now have people phone us to come remove snakes, rather than just kill them and often see if we can do something to save snakes that are injured. We saw a kid beating a snake in a classroom and one local woman was screaming kill it – the snake died but the children of the classroom were recognizing that the snake was not harmful.”

The community intern was not the only one to recognize the importance of participation in the station’s programs. Some guests specifically stated their mere participation to be one of their largest impacts on the station. This recognition is important as it shows a true understanding of the purpose of the organization. Similar interview results were shown in the study by Campbell and Smith (2006) when they interviewed participants at the STC. Comparable to participation, they found that the majority of guests listed their data collections as their largest impact to their respective stations. They expressed hopes of moving existing projects forward, as well as collecting sufficient significant data to create new programs. In this way, those who recognized their impacts are differentiating themselves from tourists. Research-based tourists (RBTs) and volunteer tourists are those who are able to recognize the importance of their role, and express a desire to inform the general public with their findings.

Involvement in RBT affects more than the programs, it affects the researchers as well. When asked what the impact their involvement in programs run by CPBS has had on them, the responses were mixed, but leaned toward the positive. Many described the amount of emotional and physical pain they underwent during their time, which was more than they had anticipated. Another common theme was a changed outlook on the concept of field research and what it entails. Other responses included the ability to confidently collect and organize data, which also correlates to conducting field work. A few guests concluded that it was too early to determine how or if they had changed during their stay at CPBS, but many guests claimed to have gained valuable life experience, and how to truly appreciate nature.

Guest: “Its really tested my boundaries. Like doing snakes. I couldn't have pictured myself ever doing them and then two weeks after coming here I had started. I've learned that I can do a lot more than I had thought.”

Guest: “I've learned to appreciate things a lot more, nature and things back home. I think I'll be less materialistic, because I know what little we can live with. I think it's changed me as a person.”

Guest: “I really like the experience of being fully immersed. Think it's fantastic. Just being isolated. Everyone is so involved in their project. They love talking about it. “

A significant part of research-based tourism at Caño Palma Biological Station involves the distribution of information to the Ministry of the Environment (MINEA) as well as the community of San Francisco. This information can alter a place long after the researcher leaves. For example, as pointed out by Meletis and Campbell (2009), due to efforts such as the poster campaign discussed earlier, changes have been seen in the area with turtle harvesting, which was once a large part of Tortuguero's culture. Research can be culturally biased if the tourists doing the research are coming from another culture or focused more on personal growth.

The majority of tourists who visit the Tortuguero region are from North America or Europe (Meletis and Campbell, 2009). The demographics of our study coincide with these findings. People who participate in ecotourist efforts of any sort are often seeking to educate themselves through experience (Jackson, 2015). A large number of guests interviewed were involved in post-secondary education, while a select few were conducting post-graduate work. The people at the station are goal-oriented individuals and along with working on their own research and participating in programs, many people seek to improve themselves as well.

Guest: (when asked about goals of their visit) "Experience as much as I can and in that way contribute as much as I can. So personal goals are leadership and responsibility. Learn as much as I can."

Guest: "One of my goals is to learn about myself. Doing a successful project, managing things by myself, here you're more isolated so it's good for that. "

The guests are not the only people with goals. Aside from improving the station and continuing conservation efforts, the hosts were also able to identify goals they had for their guests. Some are more practical and concise such as wanting to be sure that everyone would leave the station with a new skill in hand, while others much broader.

Host: "Some volunteers seemed to experience the bigger picture without realizing it. Many had to adapt to the living conditions, and in a sense, the culture within the station.

The view points of the guests changed from their initial reactions, mostly demonstrating increased comfort and ease with living at the station. When asked if their impression of the station has changed since their first impression, here is how some of the guests (many indicated no change, but an overall positive first impression) responded:

Guest: "It's not as overwhelming. I got used to travelling by boat and I feel a lot more comfortable with what's going on."

Guest: "Yeah because after 1 month it feels like my home. Everything is new at the beginning and now it's common."

Being comfortable in the station allows the guests to shift their focus fully to their projects and the programs run by the station. In this sense, the guests who could accommodate to the culture of the station were those who could better understand their purpose of being here. No matter how similar to ones' own culture, the environment of the station is its own unique culture, and hosts expect their guests to adapt.

The concept of “giving” and “taking” is not a feature of traditional tourism but is clearly present in RBT, and in the case study of Blackman and Benson (2010), the guests come in with their own expectations of their stay. Many want to gain work experience and discover what it is like to be fully immersed in the field. The hosts also have a set of expectations. They expect the guests to participate in their programs, and follow the standard protocols set by the station. While not explicitly said to one another, this psychological contract is one of the basics of RBT and volunteerism.

#### *CITIZEN SCIENCE /RESEARCH-BASED TOURISM /QUALITY DATA*

Caño Palma Biological Station has been host to research-based tourists over the course many years now. Those that choose to come stay at CPBS are part of several projects run by professionals who collect data under the model of citizen science. Citizen science is not a new phenomenon and has been around for many years (Silvertown, 2009). More commonly known today, it is part of an evolving trend of research-based tourism. It has become increasingly popular again over the recent years and no longer reserved to “just a privileged few” (Silvertown, 2009). Nowadays, people from all walks of life have this opportunity to take part in scientific projects and acquire various skills and knowledge. These many skills have been shown to benefit a person both on a personal level but also in a more globalized one. Not-for-profit and non-government funded places such as CPBS welcome these researchers-in-training, interns and ecotourists, offering them a chance to develop their research skills as well as better their understanding of conservancy. It also benefits their intercultural awareness, communication skills and language proficiency. In return, these citizen scientists offer much needed manpower for the many ongoing projects. At CPBS, when one takes into account only one of their many projects, —the turtle monitoring and tagging program—, between 60 to 70 hours of manpower is required on a daily basis from March to November, the turtle nesting and hatching period of leatherback, hawksbill and green turtles; this excludes data input or analyses of collected data. Morning census continues to run from November to January, the hatching period of green turtles, and requires a minimum of 2 person a day working anywhere from 3 hours up to 6 hours. These long-term data collecting projects could not exist otherwise: they are the “bedrock of biological recording” (Silvertown, 2009). Without them, CPBS could not afford to run so many projects:

Host: “[...] It gives us the power to do things we wouldn't have otherwise [had the manpower to do].”

Collecting data is important for research but accuracy of the data is vital. Lewandowski and Specht (2015, p715) noted that “it is important to consider how the use of volunteers to collect data influences the quality of those data”. They stated that none of the studies in the literature reviewed determined that volunteer data was more variable than professional data, and even suggesting that the quality of the data improved over time.

Lewandowski and Specht (2015, p.717) point to various recommendations made to ensure that quality data is collected. Below are a few that were noted from the various peer-reviewed articles sampled:

“Standardize field protocols across time and space.” (Genet & Sargent, 2003)

“Increase protocol detail.” (Stafford et al., 2010)

“Include field training (until volunteers reach a predetermined level of competency or confidence) or make training more interactive.” (Koss et al., 2009)

So how does CPBS ensure that quality of data collected remains at the highest standard? The research-based tourist must receive training in several different forms to ensure understanding of protocols (level of confidence). First and most important, all protocols are found in written format; this is to ensure all procedures are followed in the same way by everyone involved in the collection of data. The research-based tourist will first be shown a powerpoint presentation with one of the coordinators close-by and available to answer any questions that may arise. Then, as part of the training, there is a hands-on part whereas the guest is put in a mock situation and must respond to it appropriately. At CPBS, a turtle was constructed to help with this field-training experience; the coordinator, with the help of another experienced person and the one receiving the training, will go to the beach where the turtle is set up to imitate a turtle starting its nesting procedure. The trainee must then follow what has just been learned (theory):

Host: “[...] when individuals are being trained, they go through both practical and theoretical training [...]”

Staff at CPBS are very much aware that setting protocols and following them is critical to the quality and accuracy of the data. This practice is evident in their interviews:

Host: “[...] Following protocol is critical. It needs to be done the same way. In the field with an animal, they don't always work in a predictable way. Protocol [is critical for both the safety of the person and the animal].”

Host: “[...] If you run things in a way where the protocols are optional, where the science isn't taken seriously, it gives them a skewed understating of research.”

The data obtained is also sent to MINEA which helps them in the management of the environment. With this data, guidelines are set, and new rules are established. This data is also used by many researchers who then publish scientific articles on a particular research subject. Publications of the data also helps in further knowledge on a particular subject which in turn, helps advance more research:

Guest: “...The more we study, the more we know about them. It's good”

Lewandowski and Specht (2015) recommend strong survey protocols, training the volunteers, appropriate statistical analyses and strong project structures as key elements for data quality and these are exactly the practices that Caño Palma Biological Station has set in place.

## *COMMUNICATION AND OVERCOMING LANGUAGE BARRIERS*

In an environment where communicating directives and ensuring protocols are followed is of utmost importance for quality of data collection, communication needs to be clear. This is especially true when encountering guests of different first languages and where all must use one common language to interact. Baraldi and Luppi (2015) noted how Italian midwives working with migrant patients in an intercultural environment use formulation and reformulation in order to be able to overcome the linguistics barriers ensuring a better understanding between healthcare workers and patients: the goal is to minimize misinterpretations and provide quality healthcare to patients as miscommunication can have a serious impact on service delivery.

Some key elements noted to help address this is for the midwives were to “(1) formulate patients’ previous utterances in order to check their own understanding and then provide explanations or continue their inquiry, and (2) reformulate their own utterances in order to solve explicit or expected problems of understanding on the part of patients” (Baraldi and Luppi, 2015).

CPBS hosts people from around the world and uses English as the common language, the lingua franca onsite. In the course of a year, the ratio of guests who have English as a second language is about 25% but there are periods where this can go higher as is the case presently. The combination of having English as a second language and the difference in how different cultures communicate, regardless of your first language, can be problematic. Clear communication is important to not only ensure quality data is collected but also to ensure the safety of the guests.

When asked if accent/language can be an issue when it comes to communication, several of the guests and hosts at CPBS recognized the potential for this and noted using formulation and reformulation as part of their strategy to ensure the message is understood. Interestingly, some guests and hosts have also mentioned visual cues as part of their strategy of communication. When talking and trying to relay a message, they will pick up on the body language of the recipient, noticing when the message is not quite understood and will probe the recipients by asking them to repeat the message, reformulate, and ensure the message is understood. Recognizing and then adapting to the intercultural differences is also an important tool to ensure communication is clear. All these are noted during the interview and are used whether one is delivering a message or receiving the message.

Host: “Yea, it happens [misunderstanding] - so I just repeat myself. Sometimes I have to ask if they understand.”

Host: “[...] We give them feedback in all sorts of ways, we give both written and verbal feedback; we double check on things and keep trying to rephrase it until we get a level of understanding. With the Dutch, there are certain ways of communication that work [better than others].”

As discussed before in relation to data quality, written protocols are one way of communicating important information and thus ensuring that all guests perform the same required tasks in the same manner. In addition to this, CPBS utilizes many different ways to inform its guests on the daily goings-on while at the station. There can be up to 30 guests staying at one time; this requires a well-organized timetable. For this purpose, CPBS uses a white board

showing a weekly schedule of everyone's tasks. This is one of the main forms of communicate in regards to daily activities, what chores need to be done, who has a day off and who is going off base. Written communication is fairly easily understood: it is in the verbal communication where one is liable to find the misunderstandings. Even when two people speak the same language, miscommunication can happen but misunderstandings can be even more prevalent when you find yourself in an international/intercultural environment like that at CPBS. Language differences can become language barriers.

In order to ensure that directions given are understood and followed appropriately, hosts and guests at CPBS formulate directions clearly. Similar to the study done by Baraldi and Luppi (2015), both hosts and guests are aware of the importance of communication and will use reformulation as one of their communication tools to ensure full understanding.

### *LANGUAGE AND INTERCULTURAL COMMUNICATION*

The use of English as a global lingua franca creates a challenge when trying to understand the relationship between languages and intercultural communications:

“Language users need to be equipped with a general knowledge of the relationships between language, culture, and communication and an ability to apply this to diverse situations” (Baker, 2011)

Today, organizations are often part of a large global workplace and therefore look to hire people with better intercultural awareness. Students with a better developed intercultural awareness have extra competence in communicating with people from diverse cultural and linguistic background (Jackson, 2015). Skill, positive attitude as well as intercultural awareness are required when communicating using English as a lingua franca (ELF). Although one may speak the language, a person still retains the communications skills acquired thru their culture (Jackson, 2015).

Presently more than half the guests at CPBS are non-native speakers of English and must therefore use ELF as a means of communication. A willingness to participate in activities and initiate interactions in the host language improves both the second language and the intercultural awareness (Jackson, 2015) as noted in the interviews.

As an often used lingua franca, students whose first language differs from English stand to gain a number of communication skills when immersed in the environment. One important factor when learning ELF and immersing one's self in an intercultural setting such as CPBS is that it establishes greater intercultural communication skills and contributes to the improvement of the language itself, in this case English.

Host: “I think you gain a different perspective in a mixed setting. I've learned a lot of Dutch culture in specific.”

Host: “You learn on how to interact with different people and different ages. I live with people mostly younger than me. It's funny to see how different we are from different countries and different ages you know? It's made me more passion and open my mind.

Guest: “My English has gotten better, that I know.”

Even the cultural barriers are recognized as noted by these guests of Caño Palma Biological Station during their interviews:

Guest: “I learned that it’s harder to read people than I thought it was.”

Guest: “I feel like I’ve learned a lot about working with other people especially when there's language and cultural barriers.”

Using citizen science as a means for inexpensive manpower to conduct data collection for various conservation projects at Caño Palma Biological Station has brought on a different set of possible obstacles: the first one would be questionable data quality and the second, communication barriers. Fortunately, because the station is aware of these, none of those perceived obstacles are in effect at Caño Palma Biological Station: quality of data collected could be viewed as unsatisfactory if not for the many processes in place to ensure that protocols are followed as well as the verification of the data collected by professionals. As well, hosting citizen scientists from around the world can create communication barriers in light of the difference in the maternal language and culture base. Again, Caño Palma Biological Station’ staff use a variety of ways to ensure communication is clear.

### *ENVIRONMENTAL IMPACTS*

As a form of ecotourism, volunteers and researchers travelling to other regions often do not realize the impacts they can have on the local environment. The definition of ecotourism; responsible travel to other areas encourages this idea. However, research indicates that this is not the case. Environmental impacts are among some of the greatest experienced when we increase visitation to remote areas (Koens et al., 2009).

Honey (1990) explains how increased numbers of visitors calls for waste processing facilities that are often missing. This can cause a buildup of waste without adequate means to dispose of them. A widely documented example of this is the so-called ‘waste crisis’ in Tortuguero. Meletis and Campbell (2009) explain this incident; the local recycling plant was forced to close down for long periods of time, as residents and business owners refused to pay for services and the plants ATV was stolen. As a result, wastes were piled out front of the facility, and were overflowing from local receptacles. This caused residents to begin dumping their waste around the village and on the beach, and some resorted to burning their waste as well. The authors further explain that the location of the so-called ‘recycling plant’ (waste treatment and storage plant). Was located in the center of the village where primarily locals operate. It is important to mention that the hotels and resorts in the area (which produced the majority of these wastes), were situated far from the plant. This disconnection between those who produce the waste and its processing and disposal is explored specifically in our case-study of the effects of visitors to Cano Palma Biological Station on the Tortuguero region.

As noted from our interview responses, the majority of individuals at CPBS feel strongly that they contribute much less waste here at the station than they do at home. Of all of the guests interviewed, only one eluded to producing similar amounts of waste here at the station and back at home. The rest of our guest interviews claimed that they produce much less waste here than they do at home. A strong example of such:

Guest: “Definitely a lot less than at home. I buy a lot less things here, and I’m more careful with recycling than at home. We do (produce) the least as possible.”

Further, the general saturation of responses indicates that the station has either met or exceeded their expectations as an ‘environmentally-conscious’ space. For example, one visitor indicated that:

Guest: “The Station met all my expectations; I can’t think of anything that doesn’t. Even everything we had to bring – shampoo can’t have parabens. I can’t think of anything we shouldn’t be doing.”

The literature indicates that a large proportion of ecotourists; including RBT and scientific expedition, does not pay attention to the impacts they have on the region from their mere presence (Stem et al, 2003a; Stem et al, 2003b). Rather than pay attention to, or acknowledge their negative impacts, visitors focus on the numerous benefits to the environment that they are contributing to. McLaren (1998) offers a critique of eco-tourism that argues that it is an oxymoron in itself, as any travel to new regions is detrimental to the environment via burning fossil fuels, and promotion of highly polluting industries (Jet aircraft etc.). Of all of the guest interviews conducted, just one touched on this subject. When asked if the station had met their expectations as environmentally conscious, one guest explained:

Guest: “I mean with anything you are going to have a footprint – electricity, buildings, and our presence. Overall, I think as far as a facility goes it is very conscious about mitigating these effects. The fact that we all got here using airplanes and driving boats is not positive. Other than that, I think it is relatively sustainable.”

From the interview responses, there are clear differences in traveler awareness. Some guests were oblivious to factors contributing to the sustainability of the station, while others knew more of factors affecting sustainability.

Another point that came up after conducting interview of everyone at the station, was that travelers typically did not consciously purchase locally sourced goods. Rather than seek out goods made in the community, guests were more inclined to buy whatever was cheapest or most readily available. A strong example of this is the purchase of ice cream in the San Francisco community. Of the 14 guests interviewed, 11 stated that they buy ice cream in particular when they go into the San Francisco community. Of those 11 purchasers, only one stated that they buy locally-produced ice cream – the rest were buying commercially produced varieties. Not only does Koens et al. (2009) describe this as detrimental to the economy through economic leakage, but this can be detrimental to the environment as well; through increased demand for transport of market goods to the local store. If locally produced ice cream were purchased by station visitors, there would be less demand to import goods (consuming fuel). Not to mention the support of large scale factory farming would be lessened, as they would no longer be able to supply cheaper ice cream over further distances.

It was apparent that the majority of guests believed that they produced minimal waste, however were largely uninformed about the process in which their waste was disposed of. Few guests were aware that sorting and recycling had been shifted to San Francisco from Tortuguero,

however after conducting host interviews, it was clear that the waste disposal system was far from concrete. When asked about what the actual process of waste removal was for the station, two hosts gave similar responses – however one eluded to their not-so-permanent method of trash disposal.

Host: “It used to go to Tortuguero, now we’re trying to get San Francisco up and running.”

In terms of effects on sustainability of the community, it is often the case that the environment benefits from increased environmental education where ecotourism opportunities exist. Koens et al. (2009) explain that in Tortuguero specifically, tourists and local children benefit from increased environmental education, however adult education is said to be lacking. When asked about the environmental education that the community was offered, one host mentioned that:

Host: “One of the biggest thing is we give hands on experience for the kids. Here, the forest, the beach, lots of areas are private kids don't get up close and personal so they don't understand so we help them see this, to give them a view. High school kids get credits for participating in marine debris. They have to do presentations. It helps them get better grades. With conservation club, we show them when they clean. Difficult attitudes to change. We show them that we can make a difference if we work together. They help sort out, it teaches them it does not solve the problem but helps. At the library, they acquire different skills such as computer skills and such and helps with their view of the environment. “

This reinforces the ideas Koens et al. (2009) proposed in which the host clearly identifies the benefits that children in the community receive from increased environmental education, yet fails to mention any benefits to the adult community. This may be due to a lack of willingness to participate in the community programs that CPBS offers, or that the educational opportunities are much more geared for children. Future investigation into the impacts of child vs. adult environmental education should be examined.

In terms of what the station could do that would contribute to lowering its overall carbon footprint, hosts offered valuable insight, whereas guests were typically satisfied with all that is being done and seldom offered advice as to sustainability improvements. In order to induce future improvements to sustainability of the station, host opinions should be consulted. Areas to be potentially improved include contrite methods for solid waste disposal (garbage, recycling), proper disposal of grey water, and continuing to make use of more compost through incorporation of fruit and vegetable gardening at the station itself.

## CONCLUSION

After several weeks in the field, the underlying impacts of research-based tourism, specifically on the Tortuguero area, Limon, Costa Rica have been determined. Through the means of participant observation and semi-structured interviews, the various volunteers and interns of CPBS, and their contributions to the surrounding village were studied. Established in 1991, the small station has employed several international volunteers to participate in their long-term sea turtle monitoring project, community project, and collecting data on various other types of mammals and reptiles that inhabit this area. As the research station grows in popularity, so does the surrounding village of San Francisco. This has showed to fabricate both negative and positive impacts to the native community.

Economically, CPBS has done its best to benefit the immediate community. By purchasing only local goods the station plays a huge role in the small village's production of produce and overall economy. Piquing the interest of eco-tourists, the station attracts visitors to the area, increasing the demand for locals to service the tourism industry. This has resulted, however, in an amplified drug and crime rate in the emergence of illegal immigrants, coming here in hopes of finding employment.

The hosts of CPBS remarked the striking increase of positive impacts of the station on the community. With the raised awareness of sea turtle protection and other animals of the area, children of the village are now much more conscious of the importance of wildlife and how they can help these disturbing issues. The implementation of the community program run by CPBS involves the volunteers to venture out in to the village and have interactions with the children, allowing us to educate them on environmental issues and solutions.

Hard research-based tourism organizations such as CPBS offers their volunteers to develop their research skills and better their understanding of conservation. The station aims to benefit their intercultural awareness, communication skills and language proficiency. The citizen scientists' presence offers the much-needed human power required for the continuation of their many ongoing projects. Being an international station, their communication and team-work skills are sufficiently tested and continuously improved upon. The volunteers are often faced with language barriers and forced to overcome them when in the field and in the community.

While continually striving to be a low-impact, sustainable research station, volunteers and guests are forced to step out of their comfort zone and embrace their naturalistic surroundings. Benefiting the local recycling plant, the station does everything they can to reduce their carbon footprint. With the implementation of the community program, locals are also more aware of their environmental impacts and what they can do to become more environmentally friendly. As time goes on, CPBS is constantly looking for ways in which they can decrease their environmental impacts and one day hope to be a self-sustainable research station.

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## APPENDICES

### Appendix 1

#### Guest Interview

##### Demographics:

1. How old are you?
2. What country did you grow up in?
3. What is your first language? (if not English, is English your second language)
4. When did you arrive? When will you leave?
5. What's your position at the station?
6. What is your highest level of education? Is your position here connected to your schooling in any way?

##### Economics:

7. How much did you pay to be here? Did you receive any funding to help offset the cost?
8. Did finances play a role in you choosing to come to the station?
9. Based on this cost, did the accommodations meet your expectations? Did you get your money's worth?
10. What do you buy when you go into San Francisco? Tortuguero? Do these items cost the same as back home?
11. Have you made any donations to the station? Have you made any donations to the San Francisco community?

##### Language and Culture

12. When English is used to deliver a message to you, is there a time when you do not understand the message?
13. When you use English to deliver a message, do others understand you?
14. Do you feel the quality of the data you collect is impacted by your language competency (skill)?
15. Did you have any previous knowledge of Caño Palma Biological Station before coming here? (if yes, elicit details)
16. Can you remember your first impressions of the station?
17. Has that impression changed since?
18. Did you know you would be sharing the experience here with people from many different nationalities?
19. Can you describe to me one main difference in the culture of where you are from versus the culture found here at the station?
20. What do you feel you have gained from the mix of culture/nationalities here at CPBS?
21. What kind of interactions have you had with the locals who live in San Francisco? What was that like?

### Program Involvement

22. Have you travelled for research to other locations? (if no, move to question 25)
23. If so, where?
24. Was it for research? - follow up questions on cost, involvement, organization type, environment, language, etc
  
25. Which programs have you been involved with which are run by the station?
26. Can you describe to me how you participated in one of the programs specifically?
27. What are your goals or expectations of this visit? (Internship, volunteer trip etc)
28. Based on your involvement here at CPBS, what impact do you believe you've had on the programs or other operations here at CPBS?
29. And what impact has doing your work here had on you?
30. Prior to coming here, have you have any other training in data collection?
31. Are there any new research practices you've learned here that you intend to use when you return home?

### Environmental (this is our last section)

32. How much waste do you think you've personally produced while here at the station? How does this compare to home?
33. Can you describe to me what happens to your waste at the station?
34. What have you purchased that is produced locally?
35. Do you know what the station purchases which are locally sourced or produced?
36. How has this station met or not met your expectations as an environmentally conscious space?

### Additional questions asked to hosts:

37. What improvements have you seen take place in the programs at the station since you've been here?
  
38. What would you change to make the station more environmentally friendly?
  
39. What's the percentage of people who come here with no background biology knowledge? Do you see a different in their learning capabilities?
  
40. Are the students actively engaged in the programs?

## Appendix 2

### HOST INTERVIEW – who we are, what we are doing (Trends of visitors to CPBS), Statement of confidentiality, openness/ease of questions

#### DEMOGRAPHICS

What is the average age of guest here? Oldest? Youngest?

Is there an age restriction in the programs here? Why?

During your time here at the station, have you seen a change in the countries represented in the guests who come to the station?

Beyond the basic single intern type of guest, what type of guests do you have come to the station? [different agencies, different institutions, different universities, etc]

What languages do you speak? What about when you arrived? How long have you been working here at the station?

When/how were you first introduced to the area?

What is your current position at the station? Have you been in other positions here at the station?

What is your educational background?

#### ECONOMICS

What costs are involved with running the station?

What are the staff salaries like?

Have you encountered additional costs in attempt to keep up the standard of living for staff and guests?

What recent events have you organized to continue fundraising efforts? If any?

What percentage of locals service the tourism industry?

How has the economy in San Francisco changed since 1991?

How has the standard of living in San Francisco changed?

What effect has the creation of the school had on the lifestyle of San Francisco?

#### LANGUAGE/CULTURE

What opinions have the locals had about COTERC in the past?

Has that changed?

After leaving then returning to the station, what changes have you noticed?

What changes have you seen or implemented yourself in how the programs are run by the station and why were they made?

How has the station impacted the community of San Francisco (positively or negatively) based on the research conducted?  
Has everyone at the station has participated in the community program at least once?  
Do you have a specific criteria for selecting community interns? Can you tell us about it?  
Have you seen the station and its visitors having an impact on the San Francisco community?  
What changes have you seen in San Francisco since the opening of the school?  
What impact do you hope to have on the visitors here? Is there a message you want them to take away from their time at the station?

Any additional comments?

Do you think RBT is important to research and conservation? Why?  
Do you find the volunteers are effectively engaged?  
How important is learning procedures for the quality of data collected?

## **ENVIRONMENTAL**

Can you describe what the station buys locally?  
How is our solid waste dealt with? Is this different from waste in San Francisco?  
Do you think the community benefits from the environmental education they are offered? How?  
Has the station considered expanding capacity? If so, what would be the implications of doing such?  
What could the station do to become a more environmentally-conscious space? Why can't this be implemented?

Close interview \_ this completes our questions, do you have any questions for us, request to not discuss questions with others until our presentation