

**HOW TOS FOR TURTLE TOURISM:**  
A REVIEW OF SEA TURTLE TOURISM,  
ITS IMPACTS, AND GUIDELINES TO INFORM  
STAKEHOLDERS IN MARTINIQUE

by

Melissa L. Whaling

**Advisor:**

Dr. Lisa M. Campbell

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Nicholas School of the Environment,  
Duke University

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## **EXECUTIVE SUMMARY**

### **Background**

The Caribbean island of Martinique is a popular resort destination, attracting thousands of tourists to its beautiful beaches and diverse landscapes each year. Yet, challenges remain; tourism distribution in the region is unequal, and competition is fierce. Amid recent changes and declines in local tourism, some individuals and groups in Martinique have begun experimenting with new tourism offerings known as sea turtle tourism (STT), often as “add on” activities to other types of tours (e.g. kayaking, diving, and boating). STT can be defined as a niche market of nature-based tourism that involves viewing sea turtles in their natural habitat or in captive enclosures. In Martinique, little is known about the state of STT and its associated developments, or the potential costs and benefits for sea turtles and island residents. As a result, several stakeholders are interested in better understanding local STT and reviewing guidelines for its development. This report is designed to advise local actors and the larger research study, to facilitate informed discussions of future planning and management of STT and related offerings in Martinique.

This report has been created for two main actors:

1. Direction de l'Environnement, de l'Aménagement, et du Logement de la Martinique, or “la DEAL” (Martinique’s Department of the Environment, Planning, and Housing), and
2. Réseau des Tortues Marines (the Sea Turtle Network, a local NGO) in Martinique.

It is in collaboration with a larger research study being conducted by Dr. Zoë Meletis at the University of Northern British Columbia, which seeks to investigate various aspects of emerging STT in Martinique. Other agencies that may benefit from this document are:

- Office de la Chasse et la Faune Sauvage, or “l’ONCFS” (France’s national office of hunting and fishing), and
- Comité Martiniquais du Tourisme (Tourism Committee of Martinique).

### **Research Methods**

The research required for this report consisted of an in-depth literature review and analysis of sources discussing internationally known STT sites, programs, and practices, as well as related impacts and management tools. Three main topics were explored: (1) the scope of STT in and beyond the Caribbean; (2) the environmental impacts of STT, both positive and negative; and (3) how STT tends to be managed in practice. Finally, preliminary recommendations were crafted, to highlight management practices frequently used across STT sites.

### **Summary of Findings**

#### *How and where is STT happening?*

STT is occurring in 59 countries and territories worldwide, in every major ocean basin where sea turtles can be found. The scope of STT offerings is diverse, and can include in-water snorkel or dive tours, boat excursions, guided walks on nesting beaches, and visits to turtle farms or hatcheries. Sea turtles may also be used as “add-on” tourism attractions for other types of tourism offerings, rather than serving as the central theme. STT overlaps with other various tourism sub-industries, including both alternative tourism (e.g. ecotourism and volunteer tourism) and mass tourism.

*How does STT impact sea turtles?*

The literature suggests that STT can either harm or help sea turtles, based on how it is managed. Sea turtles face many STT-related threats, from tourist disturbance (e.g. riding or feeding turtles) to habitat loss (e.g. artificial lighting or pollution), and even serious injury (e.g. boat strikes). These factors can compromise reproductive and foraging success, among other things. Nonetheless, when properly controlled, STT can stimulate environmental awareness among visitors and residents, and provide alternative livelihoods and revenues for sea turtle monitoring, protection, and research.

*What are some ways STT is managed in practice?*

Working to reduce negative impacts associated with STT by implementing suitable policies and management tactics is essential for sustainable STT in the long run. STT can be managed using several different strategies, such as tour guide training programs, collaboration with hotels and NGOs, interpretation/educational programs, and protected areas. Yet the success of these programs depends on the unique context and resource availability of the concerned area.

**Recommendations**

1. Proposals for STT development and management should be considered on a case-by-case basis, in order to consider possible context-specific impacts.
2. Stakeholder interests and community input should be sought when implementing STT programs and management strategies.
3. When conducting in-water sea turtle tours, care must be taken not to disrupt feeding, breeding, resting, breathing, and swimming patterns of sea turtles.
4. When conducting sea turtle tours on beaches, preventative measures should be adopted to minimize harm to sea turtles and their reproductive patterns.
5. It should be ensured that the development of tourism infrastructure more effectively addresses sea turtle impacts, and that their educational efforts support sea turtle conservation.
6. Sea turtle tours should contain an interpretive component, to impart information to tourists about sea turtles and appropriate turtle watching behavior.
7. Regular monitoring of sea turtle populations should be established, to improve understanding of sea turtle presence, and to assess and mitigate negative impacts from tourism.
8. Regulations of in-water sea turtle tours should be informed by studies that identify spatial and temporal patterns of habitat use exhibited by turtles.
9. STT should be developed in close partnership with NGOs or other conservation groups.
10. Strategic, widespread educational campaigns should be initiated in conjunction with STT.
11. A marketing strategy should be prepared and implemented, that promotes STT as a conservation tool and a source of conservation revenues, if applicable.
12. Strategic partnerships should be formed and local involvement with the community should be fostered when developing STT.

**Conclusion**

This document summarizes key findings and notable case studies from the literature regarding STT. It provides a tailored synthesis to inform Martinique's current efforts to begin understanding its unique STT profile, and how it should best proceed in the future. This research will help stakeholders in Martinique mobilize STT in a way that will both benefit the local people and conserve the species. Furthermore, it will be used to expand discussions of the possibilities for sustainable tourism development within the country and throughout the broader region.

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## PART I: INTRODUCTION

### 1.1 | THE STATE OF TOURISM IN MARTINIQUE AND THE CARIBBEAN

Tourism<sup>1</sup> is an age-old industry dating back to the times of ancient Greece. It was not until the Industrial Revolution, which allowed for affordable travel by railway, that tourism took off on a large scale (Roe et al., 1997). International tourism became common even later, when World War I facilitated the development of airplanes and hence overseas travel (Roe et al., 1997). Because of recent reductions in air travel costs, almost every part of the world is now open to tourism (Theng et al., 2015). Coastal destinations, once exclusive to the wealthy elite, have become one of the most popular destinations for all tourist types (Theng et al., 2015). Presently, many Caribbean countries, blessed with beautiful coastlines and warm climates, devote substantial amounts of money to promoting tourism (Theng et al., 2015). Many terms are used in the literature to represent tourism, which is diverse and can take many forms, including mass<sup>2</sup>, alternative<sup>3</sup>, and nature-based tourism<sup>4</sup>.

The island of Martinique is an overseas territory of France, situated in the Eastern Caribbean, with a population of over 400,000 (France.fr, n.d.). The island is roughly the size of New York City at 425 square miles (50 miles long and 22 miles across at its widest point), and is located in the heart of the Lesser Antilles, between Dominica to the north and St. Lucia to the south (France.fr, N.d.). Its climate is characterized by mild tropical temperatures, averaging 79°F (26°C) annually (Dehoorne & Augier, 2011).

Martinique, or the “island of flowers”, possesses a diverse set of landscapes, including all the necessary ingredients for an exotic vacation destination: wide beaches, vibrant coral reefs and shipwrecks, lush banana and sugarcane plantations, dense tropical forests, and scenic mountains and volcanoes (Dehoorne & Augier, 2011). To this, add a culturally diverse population and history to the mix, and a popular resort destination is born. Consequently, the island attracts thousands of general tourists, cruise-goers, yachters, and divers annually (Dehoorne & Augier, 2011). However, these assets can be found throughout all of the Antilles, as well as the rest of the Caribbean, so tourism distribution in the region is unequal, and competition is fierce (Dehoorne & Augier, 2011).

Yet by the end of the 20<sup>th</sup> century, tourism was the most successful industry on the island, employing over 10% of the population, and in 1998, Martinique hosted a record-high 1,039,761 tourists (Dehoorne & Augier, 2011). Meanwhile, as tourism sectors on other Caribbean islands began to progress and diversify their target markets, Martinique remained focused on French markets for its tourism success (Dehoorne & Augier, 2011). As a result, regional competition grew, and the rate of tourism growth in Martinique slowed considerably (Dehoorne & Augier, 2011).

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<sup>1</sup> Tourism is a “social, cultural, and economic phenomenon which entails the movement of people to places outside their usual environment”, either domestic or internationally, for leisure or professional purposes (UNWTO, 2014, p. 1). Tourism usually involves “a stay of at least one night but less than one year away from home” (Roe et al., 1997).

<sup>2</sup> Mass tourism is characterized by large concentrations of tourists in one place and is defined by the volume of tourists as compared with the size and population density of the local area (Theng et al., 2015). It is often sold aggressively as large-scale standardized packages, standing in stark opposition to elite or luxury tourism (Theng et al., 2015).

<sup>3</sup> Alternative tourism, contrary to mainstream mass tourism, is centered on smaller markets and “may not be distributed or relayed by traditional travel agencies” (Theng et al., 2015, tbl. 1). It includes a variety of approaches (e.g. ecotourism, agro-tourism, community tourism, ethical tourism, etc.) (Theng et al., 2015).

<sup>4</sup> Nature-based tourism involves traveling to relatively undisturbed natural areas with the goal of studying, admiring, and enjoying the scenery, its flora and fauna, and any cultural aspects found in the area (Roe et al., 1997).

The current state of tourism in Martinique presents many conservation challenges and opportunities. Martinique has been described as overly dependent on export industries, making it economically vulnerable (Baver & Lynch, 2006). Over the last decade, the country has appeared less able to compete with other Caribbean islands, as shown by the recent deterioration in tourism flows to the island. Seeking to diversify offerings and create new livelihoods, tourism actors and other stakeholders have looked to one of the country's natural assets: sea turtles, and begun developing a new tourism segment known as sea turtle tourism (STT)<sup>5</sup> (Dehoorne & Augier, 2011).

Knowledge about the current state of STT and how it fits into Martinique's tourism profile is limited. STT activities are relatively new and geographically dispersed, and currently, there is no formal, unifying STT policy or set of best practice guidelines for the country. Further, STT offerings are not well understood, and they can include a diverse range of activities, such as sea turtle walks on nesting beaches or opportunities to dive or snorkel in turtle "hot spots", often as an "add-on" tourism draw instead of the main attraction. These types of STT activities are known to be occurring only through local observation and word of mouth. Thus little is known about exactly how or where they are materializing, the threats they might pose to sea turtles, and the benefits they may present for both turtles and people (Z.A. Meletis, pers. comm., 4 Mar. 2016).

The relationship between tourism and sea turtle conservation is complex. Although in many cases tourism can pose threats to the species, it can also create opportunities for increased conservation awareness and revenues (Campbell et al., 2008; Tisdell & Wilson, 2001b; Wilson & Tisdell, 2003). As a result of these complexities, sea turtle conservationists struggle to find a balance between supporting STT, while also working to mitigate undesirable impacts on sea turtles (Margaritoulis 1990; Meletis & Harrison, 2010; Tisdell & Wilson, 2003).

Globally, many well-established sea turtle ecotourism programs and STT best practice guidelines exist, and the literature contains extensive information about Caribbean tourism and international STT. Local tourism, conservation, and government actors in Martinique are interested in using these regional examples to better understand how STT should proceed on the island. Furthermore, the government and several local NGOs are interested in using best practice guidelines and related policies to ensure that STT generates positive benefits for both people and turtles, while minimizing negative impacts to turtles. The objective of this report is to condense relevant information regarding community-supported sustainable STT successes and challenges, into a resource that is easily accessible to stakeholders in Martinique, including two main actors:

1. Direction de l'Environnement, de l'Aménagement et du Logement de la Martinique, or "la DEAL" (Martinique's Department of the Environment, Planning and Housing), and
2. le Réseau des tortues marines (Martinique's sea turtle network).

Additionally, this project will inform a larger research study being conducted by Dr. Zoë A. Meletis at the University of Northern British Columbia, which seeks to investigate other various aspects of emerging STT in Martinique. Other agencies that may benefit from this research are:

- Office de la Chasse et la Faune Sauvage, or "l'ONCFS" (France's national office of hunting and fishing), and
- Comité Martiniquais du Tourisme (Tourism Committee of Martinique).

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<sup>5</sup> Sea turtle tourism (STT) is a specialized niche market of nature-based tourism that involves viewing sea turtles in their natural habitat or inside captive enclosures (Nichols et al., 2014; Wilson & Tisdell, 1999).

## 1.2 | SEA TURTLES AND THEIR MANAGEMENT IN MARTINIQUE

Sea turtles are evolutionarily ancient creatures with complex, well-studied life histories. They are slow-to-grow, late-to-mature, and long-lived, taking a decade or more to reach sexual maturity in the Wider Caribbean Region (WCR) (Frazer & Ladner, 1986; Zug et al., 1996). All sea turtle species experience high egg and juvenile mortality, yet low adult mortality. It has been estimated that one in 1,000 eggs survives to adulthood and successfully reproduces (Lake & Eckert, 2009). Frazer (1989) has described the theory of reproductive value—a measure of one reproductive female’s importance to the population—to emphasize the significance of protecting such large megafauna.

Sea turtle life cycles are characterized by a predictable yet poorly understood series of ontogenetic shifts, or drastic changes in location and habitat (Frazier et al., 2001; Heppell et al., 2003). The cycle begins when hatchlings emerge from the nest, orient towards the sea, and engage in a prolonged, energetically costly “swimming frenzy” towards open ocean, where food and shelter awaits (Frazier, 2001, p. 5). At sexual maturity, it is believed that adult females return to the general vicinity of their natal beach<sup>6</sup>, a feat that often involves long-distance migration across many oceans (Frazier, 2001). Consequently, sea turtle populations may cross dozens of geographic and political boundaries, complicating their management and conservation (Bräutigam & Eckert, 2006).

Among the seven global species of sea turtles, five are found in Martinique: the hawksbill (*Eretmochelys imbricata*), the green (*Chelonia mydas*), the leatherback (*Dermochelys coriacea*), the loggerhead (*Caretta caretta*), and the olive ridley (*Lepidochelys olivacea*) (Dow et al., 2007). Hawksbill, green, and leatherback turtles use the island to both nest and feed, while the loggerhead and olive ridley turtles only forage in Martinique’s waters (Dehoorne & Augier, 2011). The largest human threats to sea turtles on the island are artificial lighting, beach armoring, exotic vegetation, seagrass and coral degradation, fisheries bycatch<sup>7</sup>, pollution from cruise ships, and marine debris (Dow et al., 2007).

Today, all five sea turtle species are protected in Martinique, at all stages of their life cycle, by the Decree of October 14, 2005 (Dehoorne & Augier, 2011). Martinique shares restoration plans for sea turtles with Guadeloupe, a nearby French overseas territory (Dehoorne & Augier, 2011). La DEAL is now responsible for implementing the plans (formally in the hands of P’ONCFS), which includes public communication and data collection (Z.A. Meletis, pers. comm., 26 Apr. 2017). A small section within the Decree is devoted to protecting sea turtles as an asset for ecotourism, and calls for stakeholder engagement, public awareness campaigns, and turtle watching plans. However, none of these actions has been implemented in a top-down fashion to date. Rather, a diverse range of sea turtle tourism activities have materialized, usually integrated with more general tourism offerings. For example, glass-bottom boat tours may use images of sea turtles to lure customers in (Dehoorne & Augier, 2011).

The sections to follow will explore: (1) the different types of STT that exist, and where they are occurring globally; (2) the various ways STT may impact sea turtles; and (3) management strategies being used to address these impacts. Finally, a set of recommendations for stakeholders in Martinique will follow, along with an annotated bibliography of sources that may be of particular use to the clients, as discussions of STT continue to develop in the country.

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<sup>6</sup> This phenomenon is known as “natal homing” or “natal beach homing” (Frazier, 2001, p. 7).

<sup>7</sup> Bycatch, or the “unintended capture of non-target organisms during fisheries operations”, is a central issue for marine turtles both in the Caribbean and around the world (Wallace et al., 2010, p. 131).



## **PART II: METHODOLOGY**

The research for this report consisted of an in-depth literature review and analysis of peer-reviewed, as well as non-academic, sources. The methods described here were used to explore three aspects of sea turtle tourism (STT), as detailed in written texts: (1) its scope in the region, (2) its environmental impacts, and (3) its management in practice. Finally, recommendations were crafted for the clients based on the literature review, to inform discussions about how to best guide sustainable development and management of STT in Martinique.

To focus my literature review, I established the following four research questions:

1. What are the various types of STT and where are they occurring?
2. What are the environmental impacts of wildlife tourism and STT?
3. Which management strategies have been used to prevent or mitigate undesirable impacts?
4. How can STT in Martinique be developed to benefit both people and turtles?

The search for relevant literature was performed from September 2016 to January 2017, while the analysis occurred from January 2017 to March 2017. The complete methodology can be broken down into four steps: (1) search, (2) selection and categorization, (3) organization and analysis, and (4) synthesis. Details of each step are summarized below.

### *Step 1: Literature Search*

Initial searches for documents required a broad reach across many literatures. First, the following databases were used to locate relevant literature: Web of Science, Google Scholar, and Duke University Libraries. Sources were also found through several sea turtle publications: Wider Caribbean Sea Turtle Conservation Network (WIDECAST), Marine Turtle Newsletter (MTN), the State of the World's Sea Turtles (SWOT), and the International Sea Turtle Society (ISTS). Search terms included "sea turtle tourism", "sea turtle viewing", "sea turtle watching", "Caribbean tourism", "wildlife tourism", "nature tourism", "sea turtle policy", "sea turtle management", "sustainable tourism", "ecotourism", and "sea turtle conservation". Additionally, "marine turtle" was used in place of "sea turtle" for additional searches. Materials collected included peer-reviewed scientific articles, technical reports, student dissertations and theses, conference papers and proceedings, magazine articles, newsletter articles, educational handbooks, government management plans, and books in print. Secondly, additional sources were identified by investigating internal citations within the documents retrieved during the initial search. To supplement the search, I consulted expert opinions for search recommendations from my advisor.

### *Step 2: Literature Selection and Categorization*

Once articles were located, they were skimmed for content, and were selected if any part of the article answered any of the above-mentioned research questions. Relevant sections were flagged, highlighted, and labeled based on geographical region, document type, and which research question they answered. This made it simple to later quickly filter out articles of one subject (e.g. articles about STT in African countries), for the forthcoming analysis.

*Step 3: Literature Organization and Analysis*

After articles had been selected and categorized, they were entered into an EndNote library database. I documented the following information for each source: author, year, title, journal, and other necessary citation information. These resources were then “grouped” according to the research question (see p. 6) that they addressed. For analysis, each source was then labeled again, with a more detailed category within each research question. For example, if an article addressing one STT type (research question #1) discussed how sea turtle tours are conducted in water, that article was labeled “in-water STT”. This methodology made it simple, when the analysis was finished, to access articles based on *what* research question they answered and *how* they answered it.

*Step 4: Literature Synthesis*

Finally, the information from every source was compiled into a “typology” for each research question (e.g. for research question #2, every type of environmental impact resulting from STT found in the literature). If multiple sources contained the same information about a topic, I chose the source that was the most recent and/or peer-reviewed. The synthesis resulted in 130 articles being taken into account, which were used to inform the overall report and the resulting recommendations.

## PART III: SEA TURTLE TOURISM TYPES

Sea turtles are excellent subjects for wildlife tourism<sup>8</sup> in many ways. They are charismatic, photogenic, and relatively harmless to humans, and their predictable behavior makes them easy tourist attractions (Nichols et al., 2014). Moreover, sea turtles have long held great cultural and spiritual significance for many coastal communities (Álvarez-Varas et al., 2015). Consequently, they are often referred to as a ‘flagship’ species for both tourism and conservation, since they can capture public concern, fascination, attention, and imagination (Campbell & Smith, 2006; Montero, 2010; Tisdell & Wilson, 2003). Most people find the sea turtle’s life cycle to be mysterious, complex, and puzzling, attracting even those who might not naturally possess environmental values (Campbell & Smith, 2006; Montero, 2010). Closeness and physical contact with this emblematic species is desired by many, and sea turtle tourism (STT) is widespread and growing (Eagle et al., 2016; Gerigny et al., 2016). When properly managed with both sea turtle and tourist in mind, STT can offer memorable experiences with nature (Nichols et al., 2014). This section will discuss the various types of STT occurring globally, as well as where each type has materialized.

### 3.1 | SEA TURTLE VIEWING (IN WATER)

Sea turtle viewing can occur during both the marine and terrestrial portions of the turtle’s life cycle. The easily accessible, warm coastal foraging and breeding habitats of juvenile and adult sea turtles make them frequently targeted species for wildlife tourists (Landry & Taggart, 2009). Aquatic turtle tourism can involve a variety of activities serving many audiences, including SCUBA diving, snorkeling, and boating, and can provide virtually unrestricted access to sea turtles (Landry & Taggart, 2009; Penié et al., 2015). These types of tours are typically conducted with the sole purpose of witnessing turtles in their natural habitats, as opposed to “add-on tourism”, discussed later in this section (see p. 13). Tourism websites often explicitly advertise approachable turtle encounters (e.g. “Come swim with the turtles in Barbados!”<sup>9</sup>, “‘Turtle town’ is a snorkel area easily accessible for all ages and abilities.”<sup>10</sup>) (Landry & Taggart, 2009). Snorkeling attracts enormous crowds of visitors and has experienced the rapid growth over the years (Penié et al., 2015).

Aquatic turtle viewing occurs in shallow, nearshore coastal habitats frequently occupied by foraging or breeding turtles (Landry & Taggart, 2009). Sea turtles depend on year-round access to certain “home ranges” that provide them with enough food for adequate growth and health (Landry & Taggart, 2009; Slater, 2014). Within home ranges, they may occupy certain core areas, or “hot spots”, more frequently than others (Landry & Taggart, 2009). In these hot spots, turtles may be found feeding and resting in large numbers, which attracts tour operators looking to maximize tourism benefits (Landry & Taggart, 2009; Slater, 2014). This phenomenon has been seen in Akumal Bay, Mexico<sup>11</sup>, for example, where seagrass hot spots for juvenile green turtles can be found just a few meters from shore (Penié et al., 2015; Slater, 2014). Snorkel-based turtle tourism there has thus increased exponentially in recent years (Slater, 2014). In-water sea turtle encounters are also easily accessible by snorkel trip in Hawaii (Landry & Taggart, 2009; Meadows, 2004).

<sup>8</sup> The principle aim of wildlife tourism is “the consumptive and/or non-consumptive use of wild animals in natural areas. It may be high volume mass tourism or low volume tourism, ... sustainable or unsustainable” (Roe et al., 1997, p. xii).

<sup>9</sup> See <http://www.barbados.org/swimming-turtles-barbados.htm>.

<sup>10</sup> See <http://sailhawaii.com/turtles.html>.

<sup>11</sup> See <http://akumaldiveshop.com/bay-snorkeling-tour/>.

Turtle viewing in water may also include boat tours, either small-scale (e.g. kayaks and small rented motorboats) or large-scale (e.g. catamarans and glass-bottom boats) (Schofield et al., 2015). Tours of this nature are typically led by tour guides, who possess knowledge about how to lead tourists to optimal turtle viewing areas (Schofield et al., 2015). Turtle watching vessels will frequently slow down and encircle turtles, ushering passengers to one side of the boat to observe a turtle, and the use of flash photography, binoculars, and telescopes is common (Schofield et al., 2015). Aggregations of multiple boats are also common, especially when sea turtle numbers are seasonally high, as is the case in Zakynthos, Greece<sup>12</sup> (Schofield et al., 2015).

In-water sea turtle viewing may also involve human feeding of sea turtles, as seen in Barbados (Stewart et al., 2016). This practice began when fishermen inadvertently provided foraging turtles with discarded fisheries bycatch, which quickly became a popular visitor attraction. Demand for this activity subsequently increased, and fishermen began directly provisioning turtles with fish, hot dogs, chicken, bread, and other food scraps. As a result, “Swim with Turtles” tours involving feeding opportunities became widely advertised (Stewart et al., 2016). Stewart et al. (2016) speculate that that this series of events is also occurring in other parts of the world; such cases are indicative of the potential risks to turtles associated with sea turtle tourism. The repercussions of such practices will be discussed in later sections (see p. 14).

### 3.2 | SEA TURTLE VIEWING (NESTING)

As discussed previously, the flagship status of sea turtles means that tourists can experience great satisfaction and excitement when observing sea turtles, particularly during up-close encounters (Chaverri, 2001). The relatively easy access to nesting habitat and predictability of nesting behavior offers an unparalleled opportunity for close and “safe” encounters with wild sea turtles. This helps to explain why this type of sea turtle viewing is the most popular form of sea turtle tourism (see Appendix, Table A-1, p. A-2) (Godfrey & Drif, 2001). On a typical night during sea turtle nesting seasons, beaches worldwide are flooded with tourists anxious to witness nesting and hatching events (Chaverri, 2001). Furthermore, since some beaches are frequented by several species of sea turtles at staggered times of the year, there may be opportunities for multiple nest tours, creating a longer sea turtle viewing season (Chaverri, 2001).

Tours that focus on viewing the nesting process, typically known as “turtle walks”, occur in many parts of the world. In such areas, walks can begin once a female sea turtle hauls out on a nesting beach and begins to dig her nest chamber in the sand, but tour guides typically wait until the turtle is laying her eggs, for closer approaches (Nichols et al., 2014). The entire nesting process typically takes around 45 minutes, while the total length of a turtle walk depends on how long it takes to locate a nesting female, and how the tour is organized (Nichols et al., 2014). Because many scientists believe that nesting sea turtles succumb to a trance-like state while laying their eggs, onlookers can get relatively close without disturbance, unlike turtle viewing in water (Nichols et al., 2014). Other notable differences from in-water turtle viewing include that turtle walks typically take place at night, and are seasonal in nature (Tisdell & Wilson, 2001a). Organized tours to later witness hatchling emergence also exist, in Florida and Costa Rica, for example (Draper, 2016; Krumholtz, 2015). Many turtle walks also incorporate educational sessions, during which a trained tour guide discusses information about sea turtle life history and threats to their survival (Choi & Eckert, 2009). Educational material may also include cultural or other information about the destination (Meletis &

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<sup>12</sup> See <http://nefis-travel.com/nefis-travel-services/tours/vip-eco-friendly-turtle-spotting/>.

Harrison, 2010). Additionally, the guide or expert will typically explain appropriate tourist behaviors at the start of or during the turtle walk (e.g. no flash photography) (Choi & Eckert, 2009).

According to some, witnessing a sea turtle during a vital part of its life cycle can be a special experience and can contribute to feelings of closeness or empathy with turtles, unable to be replicated by an aquarium visit (Tisdell & Wilson, 2001a). For this and other reasons, it is no surprise that turtle nest watching is growing in popularity as a tourist pastime, or that it can provide viable livelihoods for tour guides during nesting seasons in some cases (Clovis, 2005). Three noteworthy turtle viewing programs of this nature include the Brazilian Sea Turtle Conservation Program (Projeto TAMAR) in Brazil<sup>13</sup>, Mon Repos Conservation Park in Queensland, Australia<sup>14</sup>, and Tortuguero National Park in Costa Rica<sup>15</sup> (Marcovaldi & dei Marcovaldi, 1999; Meletis & Harrison, 2010; Wilson & Tisdell, 1999).

### 3.3 | SEA TURTLE HATCHERIES

In some regions, sea turtle hatcheries exist as another form of sea turtle tourism, especially in conjunction with sea turtle nesting tourism. The most common hatchery model, known as “open-cycle”, entails collecting turtle eggs from vulnerable beaches, and subsequently incubating them in a safer environment before releasing the hatchlings to the sea (Tisdell & Wilson, 2005). The less common, “closed-cycle” hatchery model (also known as a “turtle farm”) does not recruit wild eggs, but rather maintains a self-contained reproductive cycle (Tisdell & Wilson, 2005). Turtle farms are rare, the most famous example being the Cayman Islands Turtle Farm, and the degree of openness in hatcheries may differ (Bell et al., 2009; Tisdell & Wilson, 2005). The justification for establishing open-cycle hatcheries is based upon the claim that they result in a larger number of turtles surviving to adulthood, by giving juveniles a “head start” (Tisdell & Wilson, 2003). Some hatchery staff members may purchase turtle eggs from egg collectors, who would otherwise sell them for cash to those who eat them (Tisdell & Wilson, 2005).

Sea turtle hatcheries are commonly seen in Sri Lanka and other Southeast Asian countries (see Appendix, Table A-1, p. A-2). Hatcheries are used as tourist attractions, and tourism revenue is said to be used for turtle conservation and to continue to purchase eggs from local people for re-burial and later emergence (Shanker & Pilcher, 2003). Some hatcheries also retain a few juvenile or adult turtles to act as additional attractions (Amarasooriya, 2001). Although some hatcheries can be considered sustainable, this practice is quite controversial (Tisdell & Wilson, 2003, 2005), and its potential negative impacts are discussed in the next chapter (see p. 16).

### 3.4 | SEA TURTLE ECOTOURISM

According to Dehoorne and Augier (2011), “ecotourism is emerging as a complex, multifaceted concept defying any one definition.” It has been justified globally as a means of facilitating natural resource preservation and to combat against social issues like poverty (UNWTO, 2003). A precise definition for ecotourism remains absent from the literature, yet a few key themes have been defined. First, ecotourism aims to have fewer negative impacts on the physical and cultural environment than traditional mass tourism (Dehoorne & Augier, 2011; Dias et al., 2014).

<sup>13</sup> See <http://www.tamar.org.br/interna.php?cod=367>.

<sup>14</sup> See [https://www.npsr.qld.gov.au/parks/mon-repos/turtle-centre.html#mon\\_repos\\_turtle\\_encounters](https://www.npsr.qld.gov.au/parks/mon-repos/turtle-centre.html#mon_repos_turtle_encounters).

<sup>15</sup> See [http://www.tortugueroinfo.com/usa/sea\\_turtles\\_tortuguero.htm](http://www.tortugueroinfo.com/usa/sea_turtles_tortuguero.htm).

Usually, this is achieved through accommodating smaller groups of tourists—compared with larger numbers of mass tourists—who, in theory, demand less of the host area’s natural resources (Dehoorne & Augier, 2011; Dias et al., 2014). Ecotourism sites and offerings are, in theory, designed to have smaller ecological footprints on the places and communities hosting them (Ceballos-Lascuráin, 1996). Ecotourism also typically includes an educational component, about local surroundings and the species within them (Ceballos-Lascuráin, 1996). Some argue that over the years, educational topics have expanded to also include tourism impacts, with particular attention paid to visitor consumption, emphasizing the need to recycle, and involving discussions about water resources, energy, and reducing waste (Campbell, 1999; Dehoorne & Augier, 2011; Dias et al., 2014).

Second, revenue derived from ecotourism should be used to fund resource management, conservation efforts, economic stability, and local cultural preservation (Dehoorne & Augier, 2011). In theory, this means that greater proportions of ecotourism benefits are retained within the local community and contribute to environmental protection. Third, community participation is fundamental to the ecotourism concept; some argue that a community-based approach to planning and decision-making helps to ensure that traditional livelihoods and community values are respected (Campbell, 1999). When ecotourism programs are capable of attracting sizeable revenues, governments may become interested in overseeing development; however, community input must be maintained (Campbell, 1999).

Overall, when implemented properly, ecotourism can also be an immensely successful management strategy because it goes beyond standard conservation tactics to incorporate the human dimension (Dehoorne & Augier, 2011; Dias et al., 2014). Conservationists have realized that involving the community in tourism planning and development is essential to achieving conservation goals (Airaud et al., 2016). It is theorized that when stakeholders are included in the development of policies and guidelines, they assume responsibility for their actions and subsequently begin to advocate for natural resource conservation (Landry & Taggart, 2009; Sorice et al., 2006). Fostering a sense of natural resource ownership is fundamental to ecotourism success; if local communities can benefit from tourism, they will have an incentive to protect against its associated negative impacts (Sammy et al., 2008). Community involvement also can be a means to avoiding conflict and instead enabling team-building (Sammy et al., 2008).

By the early 1990s, ecotourism was the fastest growing tourism segment (Campbell, 1999). The use of ecotourism for sea turtle conservation is now occurring on every continent that sea turtles inhabit (see Appendix, Table A-1, p. A-2). The Marine Turtle Specialist Group (MTSG) of the International Union for Conservation of Nature (IUCN) has endorsed ecotourism on a global scale as a possible solution for reducing the common problems plaguing sea turtle conservation (Godfrey & Drif, 2001). Sea turtle ecotourism programs can combine sea turtle viewing (both in water and on land) with the sustainable principles discussed above.

The ecotourism framework has received a number of critiques within the literature. According to Luderer (2008, p. 15) the “ideal ecotourism scenario is frequently oversimplified and has proven difficult to achieve in practice for a variety of reasons.” For instance, it is commonly implemented without best practices or guidelines, resulting in unintended negative impacts to both socioeconomic stability and species conservation (Godfrey & Drif, 2001). The term “ecotourism” is also used to falsely market some tourism types as environmentally sound when they are not. Such “greenwashing”, or inappropriately calling something sustainable, runs rampant in the industry (Carrier & Macleod, 2005; Luderer, 2008; Meletis, 2007; Scheyvens, 2002). Further, the lack of a

global ecotourism authority contributes to confusion about the true meaning of ecotourism, making visitors struggle with determining which operators are actually sensitive to environmental and social issues (Luderer, 2008). Therefore, just because a tourism program refers to itself as “ecotourism” does not necessarily mean its practices align with the basic tenants of ecotourism as discussed here. Because it is so challenging to achieve a true “win-win” ecotourism scenario in practice, the implementation of ecotourism initiatives should be informed by a set of comprehensive guidelines (Luderer, 2008). It should also be understood that sea turtle tourism takes place in different ways, and that not all STT should be considered ecotourism.

Additionally, ecotourism enterprises frequently overlook the dynamic political and economic climate of rural communities, which are often falsely perceived as homogenous or unsophisticated (Agrawal & Gibson, 1999). For example, it can be difficult to inspire environmental values among residents if ecotourism profits do not adequately replace the earnings formerly received from traditional, extractive industries (Berkes, 2004). Moreover, local environmental values and assumptions about ecotourism as an alternative livelihood may not align with those desired by sea turtle conservationists. For example, in some places, local people may still want to consume sea turtle meat while also contributing to species conservation (Peskin, 2002). Other challenges may also arise if ecotourism revenue is not evenly distributed among community members; leakage of tourism revenues can exist, even with local involvement (Meletis, 2007; Mycoo, 2006). Despite its challenges, sea turtle ecotourism is widespread and thought to be increasing.

### 3.5 | VOLUNTEER, RESEARCH, SCIENTIFIC, & EDUCATION TOURISM

Volunteer tourism (or “voluntourism”) is a form of alternative tourism in which tourists spend vacations or parts of their trips volunteering in an organized fashion towards a certain cause, in order to provide community assistance or environmental support (Gray & Campbell, 2007). Volunteer tourism can overlap substantially with ecotourism, educational tourism<sup>16</sup>, and scientific/research tourism<sup>17</sup>, and it is important to note that such tourists cannot be placed definitively in any specific category (Benson, 2007; Gray & Campbell, 2007). Nevertheless, the volunteer tourism model is becoming increasingly common, and is highly transferrable between communities (Bell et al., 2009; Campbell & Smith, 2006). Volunteers can provide the labor and funding necessary for conservation projects and research studies, while enjoying an alternative to mainstream travel experiences (Gray & Campbell, 2007).

The volunteer tourism sector usually appeals to young, active tourists on a restricted budget, often students, with low expectations for service and accommodation (Gray & Campbell, 2007; Nahill, 2012). However, because it exists as a niche market of alternative tourism, voluntourism is also known to attract high-spending tourists, which can, in some cases, label it as “elite” and “exotic” (Benson, 2007; Lyons et al., 2012; Weiler & Richins, 1995). Depending on the program, sea turtle voluntourists are responsible for a wide variety of duties, like assisting with nest counts, beach patrols, measurements, tagging, and population monitoring (Campbell & Smith, 2006; Gray & Campbell, 2007; Senko et al., 2011). Participants typically stay for extended time periods with host families and are provided living and transportation expenses in exchange for their efforts, yet they

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<sup>16</sup> Educational tourism is a form of voluntourism, which provides student groups with educational credit for participating in volunteer programs abroad (Benson, 2007).

<sup>17</sup> Scientific or research tourism can be one type of volunteer tourism, in which volunteers contribute to the research needs of the area, through participation in data collection or scientific monitoring (Bell et al., 2009).

are usually responsible for airfare and other miscellaneous costs (Benson, 2007; Campbell & Smith, 2006). The majority of volunteer tourism experiences are offered and managed by NGOs (Campbell & Smith, 2006; Coghlan, 2006; Lyons et al., 2012).

Volunteer tourism offers enormous conservation potential, especially in rural developing areas where livelihood opportunities are inadequate and resources for scientific monitoring and research are limited (Bell et al., 2009; Gray & Campbell, 2007). If managed wisely, tourism benefits are controlled and distributed locally, making it a widely supported tourism strategy (Gray & Campbell, 2007). Increased research activity can supply sea turtle data and significantly contribute to national and regional policymaking, at very little cost, resulting in stronger sea turtle protections (Bell et al., 2009). Yet barriers to its success can include difficulty obtaining permits, producing marketing materials, and convincing local people they are receiving enough of the resulting economic benefits (Senko et al., 2011). Yet, volunteer STT continues to grow in worldwide popularity, and numerous opportunities are now readily available throughout Africa, Asia, Latin America, Australia, the United States, and the South Pacific (see Appendix, Table A-1, p. A-2) (Senko et al., 2011).

### 3.6 | MASS TOURISM, CRUISE TOURISM, AND ADD-ON SEA TURTLE TOURISM

In contrast with the sea turtle tourism types described in sections 3.1-3.3, sea turtle interactions may not always be the primary purpose of a tourist excursion, but may add value. Considerable attention should also be given to incidental, “add-on” STT, as this is a widespread occurrence around the world. This type of supplementary STT mainly occurs in mass tourism and cruise tourism markets. For example, sea turtles can be spotted by tourists taking general “wildlife watching tours” in coastal environments—on glass-bottom boats, for instance—, which are increasingly common in mass tourism markets (Davenport & Davenport, 2006). Additionally, hatchling emergence may be accidentally discovered by tourists on nesting beaches. While these tours are not necessarily executed with the primary goal of viewing sea turtles, it may occur and be utilized in advertising schemes as a way of incentivizing participation (Godley & Broderick, 1996).

Caribbean countries in particular are four times more dependent on tourism for their economies than any other region (Davenport & Davenport, 2006). The cruise industry specifically continues to grow at unprecedented rates, appearing to be the most flexible to market fluctuations due to its mobility (Caric & Mackelworth, 2014). The Caribbean region is the world’s leading market for cruise tourism with two dominating corporations (Caric & Mackelworth, 2014). Unfortunately, while large-scale tourism is often a critical source of income for small, isolated communities, local management plans to protect sea turtles from the undesirable impacts of uncontrolled mass tourism and cruise tourism are rare (Álvarez-Varas et al., 2015; Caric & Mackelworth, 2014). The associated impacts of incidental sea turtle tourism can be devastating, as discussed in the next section.



## PART IV: ENVIRONMENTAL IMPACTS OF SEA TURTLE TOURISM

As examined in the previous section, sea turtles are widely considered a main attraction of wildlife tourism (see p. 8). In some cases, this considerably hinders conservation of the species, while in other cases, it has positively contributed to sea turtle protection. Negative effects can result from ignorance and lack of tourist guidelines or supervision, among other things (Tisdell & Wilson, 2003). The environmental implications—both positive and negative—of all types of sea turtle tourism (STT) are discussed in this section.

### 4.1 | NEGATIVE ENVIRONMENTAL IMPACTS

#### 4.1.1. Negative Impacts from Sea Turtle Viewing (In Water)

##### *Boat Strikes and Vessel Disturbance*

Tourism boats, which are often needed to reach in-water turtle viewing areas, can pose a high risk of direct injury or mortality of turtles from collisions (Penié et al., 2015). Boat strikes have been identified as one of the largest sources of direct mortality of sea turtles in nearshore habitats worldwide (Denkinger et al., 2013). Since sea turtles are slow swimmers and require frequent surfacing to breathe, they are vulnerable to fatal injury by impact with boats, propellers, jet skis, and other tourism-related forms of transportation (Davenport & Davenport, 2006). Boating impacts become even more common when tour guides are concentrated in small areas or intentionally seeking out turtle “hot spots”, which can affect foraging and behavioral patterns (Roe et al., 1997). Some effects are immediately obvious, while other such disruptions to sea turtle behavior are more subtle or delayed, but can have long-term implications for ecological relationships (Roe et al., 1997).

##### *Provisioning*

Animal provisioning<sup>18</sup> is very popular on wildlife tours, because it attracts animals for close viewing (Foroughirad & Mann, 2013). Normal feeding patterns may be disrupted by sea turtle tours that include feeding turtles as an attraction, like those currently occurring in Barbados (see p. 9) (Stewart et al., 2016). Sea turtle provisioning by guides or tourists can also alter the behavior of sea turtles around humans, such as attracting them to boats (Roe et al., 1997). Supplemented turtles spend more time at the surface near watercrafts, exposing them to a higher risk of boat strikes and associated disturbance (Stewart et al., 2016). Turtle-feeding operations can also have detrimental impacts on growth rates and overall health of the local turtle populations (Stewart et al., 2016). Since feeding turtles in the wild offers a new and readily available source of calories, less activity is required for foraging, resulting in obesity and dehydration, and placing turtles at a higher risk for liver disease, gout, and heart problems (Stewart et al., 2016).

##### *Disturbance in Water*

In-water turtle watching activities can have several negative impacts on sea turtle survival, as a result of human disturbance. Frequent disturbance from divers and snorkelers may prevent sea turtles from foraging successfully (Landry & Taggart, 2009). For those sea turtle species that are grazers, their feeding behavior includes keeping their head down, unable to scan their surroundings

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<sup>18</sup> Animal provisioning is the practice of people feeding wildlife in their natural habitats (Maréchal et al., 2016).

(Slater, 2014). If a turtle feels threatened by the presence of tourists, it will become less interested in foraging and likely spend more time avoiding the area (Slater, 2014). Turtles in Hawaii and Baja California have altered their behavior as a result of certain human activities, now feeding during the night instead of the day, and changing movement patterns to avoid snorkelers (Penié et al., 2015). Therefore, while activities such as swimming or snorkeling with sea turtles may be marketed as “non-consumptive” or benign, the literature suggests otherwise.

In-water tourist behaviors such as approaching, crowding, touching, and riding turtles are observed on some turtle viewing tours, and in some areas, tourism companies even use pictures of such practices in pamphlets and websites to promote their services (Penié et al., 2015; Slater, 2014). Disturbance of this kind can decrease the length of time sea turtles spend searching for food or surfacing to breathe, which could hinder long-term species conservation goals (Hayes et al., 2016; Landry & Taggart, 2009). It is currently unknown if the impacts of in-water sea turtle viewing have long-term cumulative impacts on turtles (Hayes et al., 2016). However, as the scope and frequency of in-water turtle tours increases, turtles will spend less time undisturbed, and any impacts of disturbance will likely increase (Landry & Taggart, 2009).

#### 4.1.2. Negative Impacts from Sea Turtle Viewing (Nesting)

##### *Disturbance on Beaches*

Tourism can also impact sea turtles when they are on land, when attempting to nest or emerging from nests. Nesting is both an accessible and vulnerable part of a sea turtle’s life cycle; therefore if unregulated, turtle nest viewing can result in decreased reproductive success (Choi & Eckert, 2009). Tourists waiting for turtles to emerge on the beach at night can be loud, start fires, and use flashlights, all of which can deter turtles from nesting on a particular stretch of beach (Tisdell & Wilson, 2003). Tourists have been seen disrupting nesting female turtles by moving too close, prodding flippers, or even climbing on top of a turtle, and using flash photography (Tisdell & Wilson, 2003). Visitors have also been seen blocking turtles from returning to the sea after attempting to nest (Tisdell & Wilson, 2003). Some tours, however, present viewing guidelines prohibiting these behaviors, as discussed in the next section (see pp. 22-24).

Disturbance to nesting females has been known to compromise reproductive output, since avoidance behavior increases energy costs (Schofield et al., 2015). More frequent “false crawl” events, in which a female emerges on a beach and returns to the water without nesting, have been reported at beaches with large numbers of turtle viewing tourists (Gerigny et al., 2016). Nesting females may subsequently select a less-preferred beach to lay their eggs, leaving them exposed to inundation or predation, or even release their eggs at sea (Tisdell & Wilson, 2003).

Sea turtle viewing during a hatching event may also hinder reproductive success. In some places, unrestricted onlookers will collect or intercept hatchlings and destroy the nest cavity, or undertake a misguided attempt to “help” hatchlings by carrying them to sea, further exposing them to human disturbance (Ballantyne et al., 2009; Choi & Eckert, 2009; Gerigny et al., 2016). Hatchlings could also become disoriented from a large tourist presence when entering the sea, increasing their risk of predation or energy overuse (Tisdell & Wilson, 2003). Since the survival rate of hatchlings to adulthood is low, any reduction in reproductive output can have detrimental consequences for the conservation efforts of the population (Schofield et al., 2015).

Additionally, seasonal changes in local turtle population numbers may worsen the effects of disturbance on nesting females. At the beginning or end of a nesting or breeding season, when fewer turtles are available for viewing, tour companies still experience pressure to satisfy tourists. Consequently, operators may disproportionately target individuals arriving early or late in the season (Schofield et al., 2015). This high-intensity wildlife viewing may place additional pressures on these turtles, resulting in exaggerated avoidance behavior, further preventing a female's ability to reproduce (Schofield et al., 2015). In Malaysia, such high-intensity tourism has coincided with the demise of local nesting leatherback populations (Tisdell & Wilson, 2003).

#### 4.1.3. Negative Impacts from Sea Turtle Hatcheries

##### *Decreased Reproductive Success*

There are unique concerns arising from raising or otherwise holding sea turtle hatchlings in captivity, especially when tourists are involved. Thus sea turtle hatcheries are considered a controversial conservation measure. One reason for the controversy is that some hatchery managers might be more interested in tourism profits than species protection (Amarasooriya, 2001; Rathnayake, 2016; Tisdell & Wilson, 2003). Numerous other problems with hatcheries are possible, depending on the way they are constructed and managed. These include: (1) skewed sex ratios from improper control of sand temperature during clutch incubation; (2) increased transmission of disease or injury within enclosures; and (3) loss of hatchling imprinting mechanisms that allegedly contribute to nesting females' natal homing abilities (Higgins, 2003; Shanker & Pilcher, 2003; Tisdell & Wilson, 2005). Additionally, predators may become disproportionately fixated on hatchlings being released in large numbers at set times (Tisdell & Wilson, 2005). Furthermore, releasing hatchlings from fewer beaches could affect nesting distribution and species composition in the long term (Tisdell & Wilson, 2005).

As with other forms of sea turtle tourism, hatchery tourism greatly increases the opportunity for human disturbance and its associated impacts. Handling of eggs and hatchlings during their transportation can result in more frequent hatchling mortality, especially when traveling long distances (Tisdell & Wilson, 2005). Also, since delaying hatchling release can increase profits for hatcheries by making them available for tourist viewing for longer periods of time, hatchlings may be kept in tanks longer than they should be, weakening them and increasing other associated risks (Rathnayake, 2016; Tisdell & Wilson, 2005). Moreover, to save money, holding tanks are often small and overcrowded, which exacerbates the abovementioned consequences (Tisdell & Wilson, 2005).

#### 4.1.4. Negative Impacts from General Tourism Development

Threats to sea turtles do not only occur in association with turtle viewing activities. General tourism growth and activities also harm sea turtles and their habitats. While these impacts are often problematic in their own right, this section will focus on negative impacts to turtles.

##### *Habitat Alteration*

Human alteration of the landscape can threaten the sea turtle survival in many ways, during both the marine and terrestrial portions of their life cycle. First, coastal development and recreation can inflict significant harm to marine vegetation, which is vital to the sea turtle survival (Choi & Eckert, 2009). Many Caribbean sea turtle species feed primarily on seagrass and organisms

associated with both coral reef and seagrass ecosystems, and they also use these habitats for sleep and shelter (Choi & Eckert, 2009). In tourist areas where the presence of cruise ships, yachts, and other recreational boats is concentrated, anchoring can do a great deal of physical damage to coral reef and seagrass habitats (Horrocks, 2001). Dredging, chains, and propellers can uproot seagrass, destabilize sediments, scar the seabed, and degrade water quality, which, in turn, inhibits plant recovery (Choi & Eckert, 2009). Careless divers and snorkelers may touch, collect, or step on corals, which can degrade essential sea turtle habitat (Hayes et al., 2016). Tourism companies have also been known to remove seagrass or rubble to improve areas for swimming (Horrocks, 2001). Once seagrass roots or coral structures are damaged, recovery is slow, and dive areas may have a low disturbance limit before irreversible damage is inevitable (Bell et al., 2009; Williams, 1988). In some places, repetitive, uncontrolled tourist activity has considerably reduced sea turtle habitat cover, as seen in the U.S. Virgin Islands (Williams, 1988).

Habitat alteration can also pose significant problems at nesting sites. Growth in human visitation and foot traffic can destroy fragile nesting beaches by trampling and compacting the sand, causing nesting females to move to other locations to nest (Godfrey & Drif, 2001). Sand compaction is also a problem in places where beach driving is a common tourist activity, and vehicle tracks in the sand are sometimes deep enough to act as traps, preventing turtle hatchlings from reaching the sea (Davenport & Davenport, 2006; Katselidis et al., 2013). Mechanized beach cleaning, a common practice performed in front of resorts and in touristy areas, can alter the natural profile on nesting beaches, and has threatened sea turtle survival in places like Cuba, Guadeloupe, and Mexico (Davenport & Davenport, 2006; Dow et al., 2007). Tall resorts and beach furniture (e.g. umbrellas) can shade nests enough to prevent turtle eggs from receiving adequate heat to incubate, resulting in skewed sex ratios or elimination of nesting sub-populations (Katselidis et al., 2013; Tisdell & Wilson, 2001a). Finally, the presence of tourism infrastructure along a coastline can exacerbate beach erosion, degrading or destroying nesting habitat (Schroeder, 2001).

### *Artificial Lighting*

Artificial lighting adjacent to nesting beaches is common in many coastal towns and cities, especially where tourism-driven development exists (Clovis, 2005). Hotels and other tourism-related infrastructure are often built as close as possible to the shoreline, to maximize vistas and visitor access to the beach (Clovis, 2005). Lighting these areas to keep them on display, accessible, and safe often introduces a significant amount of light pollution to the beach environment, particularly in rural areas (Clovis, 2005). In addition, when roads are built adjacent to coastlines and tourists are permitted to drive on beaches, vehicle headlights exacerbate the problem (Roe et al., 1997).

Of all the threats sea turtles face worldwide, light pollution is one of the most researched, predominantly on the beaches of Florida, USA (Clovis, 2005; Robertson et al., 2016). Consequently, the effect of anthropogenic light on the navigational behavior of sea turtle hatchlings is well understood. Hatchlings rely almost exclusively on brightness cues (i.e. from the moon) to locate the sea after emergence. Artificial lighting can compromise a hatchling's ability to orientate in a certain direction, resulting in it crawling in circles or away from the ocean (Lake & Eckert, 2009; Robertson et al., 2016). This disorientation may cause a hatchling to wander without a clear path, ultimately becoming fatigued and dehydrated, exposing them to predators and depleting their energy reserves, which are vital for the initial offshore swimming frenzy (Robertson et al., 2016). Artificial lighting on beaches can also have a negative effect on adult turtles, preventing females from finding appropriate nesting sites and returning to the sea after a nesting event (Lake & Eckert, 2009). Due

to hatchlings' low survival rate to adulthood, effective laying and hatching of turtle eggs is critical to sustaining healthy sea turtle populations (Lake & Eckert, 2009).

### *Pollution*

Another concern is tourism-associated pollution, which exists in many forms. Plastics and other forms of marine debris are considerable hazards to marine turtles (Eagle et al., 2016). Turtles occasionally consume plastic bags, confusing them with jellyfish, which can have fatal consequences (Roe et al., 1997). Although the plastic problem is not exclusive to tourism, it may be substantially worsened by it. In one study, researchers found that sea turtles frequenting tourist beaches and waters were more susceptible to plastic ingestion and entanglement, and that 70% of the beach litter they encountered originated from tourism sources (do Sul et al., 2011).

Tourism activities can also lead to an influx of nutrients (e.g. nitrogen and phosphorus) into delicate marine ecosystems like coral reefs and seagrass beds, upon which many sea turtles depend (Sanchez et al., 2013). Reduced water quality is possibly the most significant threat to shallow marine ecosystems (Horrocks, 2001). Fringing reefs and seagrass beds, often in close proximity to the coast, are maximally exposed to runoff (Horrocks, 2001). Tourist input of nitrogen from sewage and fertilizers from golf courses can cause excessive algal growth, which inhibits the growth of both corals and benthic plants (Roe et al., 1997; Sanchez et al., 2013). One decade of tourism growth in Barbados decreased the percent coral cover by 40%, and species diversity by 35%, resulting from increased turbidity from tourism development (Horrocks, 2001).

Ocean pollution and its associated impacts are particularly severe where cruise tourism is present. Cruise ships have been identified by the United Nations (UN) as one of the principal sources of marine pollution (Caric & Mackelworth, 2014). They emit many forms of waste, sewage, ballast water, hazardous materials, noise, and light, all of which threaten the survival of sea turtles (Caric & Mackelworth, 2014). Cruise ships disembark large numbers of tourists for short time periods, including onto remote sites that may not otherwise be easily accessible (Davenport & Davenport, 2006). Such high-density pollution can breach the carrying capacity of the host environment, and impacts may be inadequately managed without advanced infrastructure, especially in developing countries (Caric & Mackelworth, 2014). In this way, sea turtle health and habitat integrity could be compromised due to pollution caused by tourists.

### *Demand for Turtle Products*

Another tourism element that poses a potential threat to sea turtles is the market for turtle souvenirs and food products (Roe et al., 1997). Sale of curios and jewelry made with turtle shells is sometimes seen in the Caribbean<sup>19</sup> (e.g. in Sint Maarten and Columbia) (Bräutigam & Eckert, 2006), and turtle meat and egg consumption in local restaurants frequented by tourists has also been reported, in other places like Sri Lanka and Easter Island (Álvarez-Varas et al., 2015; Tisdell & Wilson, 2003). Some community members may also collect corals and reef-associated organisms for sale to tourists, damaging essential reef habitats (Horrocks, 2001). While tourists indeed contribute

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<sup>19</sup> The trade of sea turtle products has become less problematic as a result of the Convention on International Trade in Endangered Species of Wild Fauna and Flora ("CITES"), established in 1973. CITES prevents the trade of threatened or endangered species by prohibiting the entrance of related products into countries that are contracting parties (CITES, n.d.-a). As of 2016, there are 183 contracting parties of CITES (CITES, n.d.-b).

positively to local economies by purchasing locally produced crafts, a demand for turtle products can contribute to the direct take of sea turtles for such purposes.

While tourism is often an important economic force for the local community, inadequate tourism planning and management, or uncontrolled tourism growth can do significant damage to sea turtle habitat, both in water and on beaches. Such damage has been observed globally, within South Pacific, Caribbean, Western Africa, and Mediterranean nations, especially when little about the importance of sea turtle conservation is made known to tourism actors (Álvarez-Varas et al., 2015; Boura et al., 2014; Cozens, 2014; Harold & Eckert, 2005).

## 4.2 | POSITIVE ENVIRONMENTAL IMPACTS

### 4.2.1. Positive Impacts from Sea Turtle Tourism (In Water, Nesting, and Hatcheries)

Despite the numerous negative consequences associated with all types of sea turtle tourism, the evidence in the literature that STT creates environmental benefits is also extensive. Such benefits include opportunities for alternative livelihoods, greater pro-environmental awareness and behavior, increased revenues and research for species conservation, and expanding political support for wildlife management. It is important to note, however, that these benefits depend on sustainable tourism planning and operation, as well as sound management of animal encounters (Schroeder, 2001; Zeppel & Muloin, 2009). Information about the importance of species conservation should also be incorporated into sea turtle viewing (Zeppel & Muloin, 2009).

#### *Creating Alternative Livelihoods*

STT can be especially powerful in conserving the species when alternative livelihoods can replace direct removal of wildlife (e.g. tourism instead of poaching). In many communities, the poaching, trade, and consumption of marine turtle meat and eggs is contributing to population decline and is a cause for concern (Bräutigam & Eckert, 2006). If properly managed, a shift towards less-consumptive sea turtle use in the form of wildlife tourism can sustain the turtle population while still contributing the income that poaching and trade once provided. STT can provide alternative income sources by hiring local residents to be tour guides, and partnering with local businesses and hotels catering to tourists (Nahill, 2012). Projeto TAMAR, a sea turtle conservation initiative in Brazil which incorporates tourism, has successfully achieved a nationwide prohibition of sea turtle capture and egg collection, while providing alternative sources of income to the community (Marcovaldi & dei Marcovaldi, 1999).

STT can also help to revitalize local communities by incentivizing natural heritage preservation for visitor enjoyment and related profits. Sustainable tourism management encourages residents to appreciate their natural resources in new ways, by rebuilding environments once degraded by extractive industries and stimulating economic activity (Roe et al., 1997).

#### *Conservation Awareness, Attitudes, and Behavior*

Guided visits to sea turtle nesting sites or foraging areas can be good mechanisms for environmental education and public awareness about sea turtle biology and conservation, as they help to inspire pro-environmental attitudes among tourists (Gerigny et al., 2016). Studies suggest that even months after a turtle visit, tourists demonstrate increases in knowledge about marine turtle

threats and overall positive attitudes towards protecting wildlife and nature (Hughes et al., 2011; Tisdell & Wilson, 2001a). To some, this increase in public education about sea turtles is critical because it can inspire conservation-driven behavior. Months after their visit, tourists from Mon Repos Conservation Park in Queensland, Australia reported behavior changes such as picking up beach litter more frequently, donating money to sea turtle conservation efforts, boycotting turtle products, reducing plastic consumption, reducing the use of beachfront lighting, and minimizing their overall environmental footprints (Hughes et al., 2011; Zeppel & Muloin, 2009). They also admitted to educating their friends and families about turtles, reporting turtle strandings, releasing bycaught turtles, and volunteering for turtle-related causes (Zeppel & Muloin, 2009).

Some critics, however, counter that claims of improved environmental attitudes and behaviors resulting from wildlife tours are unsubstantiated (e.g. Waylen et al., 2009). Significant gaps in our understanding of how tourism experiences shape human behavior in the long run remain. While claims of positive behavioral changes exist (e.g. Ballantyne et al., 2011; Hughes et al., 2011; Tisdell & Wilson, 2001a; Zeppel & Muloin, 2009), some may point out methodological challenges to following up on post-tour tourist behaviors and actions. Reported behavior changes may or may not reflect actual behavior changes, yet the above results are nonetheless promising for the potential of STT in aiding conservation goals.

#### *Revenues for Sea Turtle Conservation*

A notable benefit that STT can bring to conservation is the opportunity to generate revenues that could be used for sea turtle conservation and management. Studies have shown that tourist willingness to pay (WTP) for sea turtle viewing can represent sizeable revenue gains<sup>20</sup> from visitor fees, souvenir sales, and turtle “adoption” programs (e.g. Abas et al., 2016; Meletis & Harrison, 2010; Rathnayake, 2016). These revenues can then be used to fund conservation actions, such as:

- 1) habitat restoration, predator control, artificial lighting mitigation, and education campaigns, as seen at Mon Repos Conservation Park, Australia (Tisdell & Wilson, 2003);
- 2) incentives for community involvement, as seen in Rekawa, Sri Lanka (Rathnayake, 2016); and
- 3) sea turtle population monitoring, as seen at Tortuguero National Park, Costa Rica (Meletis & Harrison, 2010).

STT can also attract additional human capital in the form of labor and expertise to an area. This means a greater trained human presence on nesting beaches, which can lead to more frequent sea turtle conservation behaviors (e.g. reporting stranded turtles or beach clean-ups), and deter undesirable behaviors such as poaching (Schroeder, 2001). For example, when large numbers of residents, volunteers, or tourists are involved in turtle viewing or monitoring, nesting beaches may be under increased surveillance, which has the indirect effect of helping to guard nesting females and

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<sup>20</sup> Many studies have quantified the potential and/or actual gains in revenue from STT. A study by Rathnayake (2016) estimated foreign visitor WTP for turtle tours in Rekawa, Sri Lanka to be about \$15-19 per person. Turtle tours in Penang National Park, Malaysia cost \$11-23 per group, but Abas et al. (2016) suggests this price could be higher. Tisdell and Wilson (2001a) found that the WTP for turtle watching at Mon Repos Conservation Park in Australia among all visitors totaled almost \$200,000 in one season. Cazabon-Mannette et al. (2017) estimated recent annual values of turtle encounters on dive tours in Tobago to total approximately \$863,000, with an individual WTP of \$62 per dive for at least one turtle encounter. STT in Tortuguero, Costa Rica generates a great deal of revenues from Park and visitor center fees (\$1-5 each for entrance and brochure packages) and guiding charges (up to \$30 per person), and gains additional funds from gift shops and adoption opportunities, according to Meletis and Harrison (2010) and Troëng and Drews (2004).

hatchlings against predators or other threats (Tisdell & Wilson, 2001a). Additionally, this may attract scientific interest and expertise to the area, providing for more accurate research and population monitoring (Schroeder, 2001). In Brazil, Projeto TAMAR has achieved total control of all beaches within its boundaries, which has resulted in more frequent successful nesting and hatching events (Marcovaldi & dei Marcovaldi, 1999). In addition, major nesting beaches in Trinidad and Tobago are under continuous watch as a result of their ecotourism programs (Sammy et al., 2008). Similarly, local youth in Goa, India are paid by the country's Forest Department to protect nesting beaches and report nesting and hatching events daily, as a way of promoting sea turtle conservation to tourists (Kutty, 2000). However, such increased human capital may lead to conflicts if some actors disagree about such presence and associated power or influence (Finkbeiner, 2009).

#### *Public Support for Sea Turtle Conservation*

Sea turtle tours are also believed to increase public support for species conservation. This can be a result of potential increases in pro-environmental attitudes among both tourists and locals, combined with local realization of the socioeconomic benefits STT can bring to the community (Montero, 2010; Wilson & Tisdell, 2003). Tourists often depart turtle visits convinced that more should be done to mitigate sea turtle threats (Tisdell & Wilson, 2001a). While this does not necessarily translate to actual and sustained political activism, such inspiration can be framed as an important step in attaining longer-term advocacy for sea turtle conservation among both tourists and locals (Eagle et al., 2016). Furthermore, scientific data assembled or improved upon in association with STT (i.e. monitoring programs partially funded by tourism revenue) may inform stronger policies for sea turtle management (Tisdell & Wilson, 2001a). Thus STT can have positive long-term implications for sea turtle conservation by inspiring stronger political protections for the species.

**Table 1. Summary of the Potential Environmental Impacts of Sea Turtle Tourism (STT).**

	<b>Type of Impact</b>	<b>Tourism Type</b>
<b>Negative Impacts</b>	Boat Strikes/Vessel Disturbance	STT (Viewing in Water)
	Animal Provisioning	STT (Viewing in Water)
	Human Disturbance	STT (Viewing in Water and on Beaches)
	Decreased Reproductive Success	STT (Hatcheries)
	Artificial Lighting	General Tourism
	Habitat Alteration	General Tourism
	Pollution	General Tourism
	Demand for Turtle Products	General Tourism
<b>Positive Impacts</b>	Creating Alternative Livelihoods	STT (All Types)
	Conservation Awareness, Attitudes, & Behavior	STT (All Types)
	Revenues for Sea Turtle Conservation	STT (All Types)
	Public Support for Sea Turtle Conservation	STT (All Types)



## **PART V: MANAGEMENT STRATEGIES FOR SEA TURTLE TOURISM**

As seen in section 3.4 (see p. 10), wildlife tourism activities, even when labeled “ecotourism”, are often implemented with insufficient attention to potential environmental and socioeconomic impacts. Such negligence can result in harm to wildlife, damage to cultural traditions, economic instability, loss of local ownership, and eventual resource degradation (Finkbeiner, 2009). Working to reduce such negative impacts by implementing suitable policies and management tactics is essential for sustainable wildlife tourism development in the long run (Ballantyne et al., 2009). However, it can be extremely challenging to provide tourists with engaging and close animal encounters, while safeguarding wildlife, their habitats, and local values (Ballantyne et al., 2009).

Although the rarity of a species can contribute to tourist excitement and short-term demand (Reynolds & Braithwaite, 2001), the long-term sustainability of wildlife tourism depends on how well that species’ populations are preserved. Tourism based on the existence of one or a few species can suffer in the long term when the likelihood of seeing those species drops below a certain level (Bell et al., 2009). If populations are not conserved, then visitor numbers may also eventually decline, triggering additional negative economic impacts, and possible environmental degradation (Wilson & Tisdell, 2003). Thus the future of sea turtle tourism (STT) must include healthy populations of marine turtles, in order for tour operators be able to continue to successfully “deliver” tourists the main attractions, turtles, and to maintain the financial viability of STT as an economic activity, especially in rural, remote, or developing communities (Bachan, 2009).

Tourist profiles are diverse, however, and may have different motivations and interests when engaging in STT. For these reasons, tourist demand and perceptions should also be considered when choosing the right management strategy (Meletis, 2007). If STT operators and managers make an effort to better understand visitor expectations, the needs of both tourists and wildlife can be met with minimal conflict (Ballantyne et al., 2009). This section will examine several options for management instruments that aim to achieve sustainable STT, by minimizing disturbances to sea turtles and maximizing visitor experience. These examples demonstrate that the tourism industry has the potential to play an important role in promoting sea turtle conservation, while allowing for continued visitation and benefits to both turtles and people (Choi & Eckert, 2009).

### **5.1 | BEST PRACTICE GUIDELINES**

The sea turtle tourism management strategy requiring possibly the fewest resources to implement is the use of best practice guidelines (i.e. voluntary “codes of conduct”), which can be used to minimize potential negative impacts of STT, especially when outside enforcement is not feasible (Landry & Taggart, 2009; Sorice et al., 2006). These are typically observed by STT operators and promoted by sea turtle conservation groups (Landry & Taggart, 2009). Such opportunities for controlled and responsible sea turtle viewing can be beneficial when concerns about potential negative impacts from STT are tempered by a strong desire to keep turtle watching accessible to everyone (Bachan, 2009). Additionally, tour operators often prefer such voluntary measures to enforced regulation (Landry & Taggart, 2009; Sorice et al., 2006). Examples of common best practice guidelines found in the literature and in practice are:<sup>21</sup>

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<sup>21</sup> See Choi and Eckert (2009), Appendix V-VI; and Stapleton and Eckert (2008), Appendix III for more examples.

- waiting until nesting turtles begin laying their eggs before exposing them to tourists;
  - prohibiting the use of flashlights, flash photography, or torches during turtle walks;
  - offering night-vision equipment to tourists during turtle walks;
  - restricting tourist movement in the presence of turtles;
  - encouraging divers to approach turtles in a manner that minimizes disturbance;
  - capping group size and reducing crowd intensity by spreading groups out when possible; and
  - forbidding tourists to touch turtles.
- (Ballantyne et al., 2009; Landry & Taggart, 2009; Meletis & Harrison, 2010; Penié et al., 2015; Schofield et al., 2015)

In addition to being more popular among tour guides, some authors suggest that best practice guidelines are also likely to be more successful in minimizing turtle disturbance than other methods (Penié et al., 2015). As Landry and Taggart (2009) describe, when tour operators and tourists voluntarily adhere to best practice guidelines when viewing sea turtles, a positive feedback loop can evolve. Operators offering “turtle-friendly” practices on their tours can begin to differentiate themselves from the competition by attracting tourists who value conservation-driven behaviors, inspiring even more operators to also adopt guidelines in order to compete (Landry & Taggart, 2009). While this strategy is positive and easy to implement, it is sometimes not enough to safeguard the natural capital supporting the tourism sector (Boura et al., 2014). As seen in some areas, best practice guidelines are not necessarily enforced or followed by operators and tourists (Gerigny et al., 2016; Waayers et al., 2006). In addition, tourism operators may market themselves as “turtle-friendly”, “green”, or “eco-aware”, and explain their operations in such a way, but they may not be in reality (Luderer, 2008). Thus this management tool is particularly at risk of “greenwashing” and associated false claims, a well-noted phenomenon in tourism literature (Carrier & Macleod, 2005; Luderer, 2008; Meletis, 2007; Scheyvens, 2002). Other possible shortcomings of best practice guidelines may include local opposition, disagreements, and conflicts, not necessarily because people wish ill consequences for sea turtles or their conservation, but for any number of possible reasons, such as a lack of authority over certain matters, or confusion about jurisdictions or ownership (Meletis, 2007). It should also be noted that potential tourist demand for close encounters with sea turtles, and the potentially lucrative nature of tourist tips, can place tour guide livelihoods at odds with such best practice guidelines (Meletis, 2007).

Best practices guidelines for STT have materialized globally. In Trinidad and Tobago, a community-based initiative known as SOS Turtle Patrol<sup>22</sup> developed field-tested turtle watching guidelines to protect nesting sea turtles while still ensuring an enjoyable experience for viewers (Bachan, 2009). Both regional sea turtle experts and the national government subsequently approved the guidelines; presently, they are used to guide ecotourism development in the country (Clovis, 2005). At Mon Repos Conservation Park in Australia, Park rangers implement tourist management practices in order to minimize negative tourism impacts on nesting and hatching turtles, such as limits on tour group size<sup>23</sup> (Ballantyne et al., 2009; Wilson & Tisdell, 1999). The National Marine Park of Zakynthos in Greece regulates the maximum permitted viewing time for vessels watching an individual turtle in the water<sup>24</sup> (Schofield et al., 2015).

<sup>22</sup> See <http://sos-tobago.org/turtle-talk/responsible-turtle-watching/turtle-encounter-guidelines>.

<sup>23</sup> Mon Repos Conservation Park strictly limits group size to no more than 70 persons (Wilson & Tisdell, 1999).

<sup>24</sup> Current Park guidelines state that vessels may watch a turtle for up to 10 min at a time; yet there is no specification about the number of boats that may observe the same individual (Schofield et al., 2015).

## 5.2 | INTERPRETATION PROGRAMS

Minimizing the negative impacts associated with sea turtle tourism is most likely to be achieved through cooperation between tourists and tour operators. Ballantyne et al. (2009, p. 658) argue that wildlife tourism management strategies that “enlist tourists as conservation partners”, clearly communicating all imposed constraints and presenting a consistent message regarding wildlife interactions, are likely to be the most beneficial to both tourists and wildlife. In order to accomplish this, many successful STT programs contain an interpretation component, intending to increase tourist awareness of sea turtle conservation, while encouraging them to comply with practices that are thought to reduce disturbances to sea turtles or their habitats (Ballantyne et al., 2009; Hughes et al., 2011). Interpretation programs are highly variable, and may exist through visitor information centers, interaction with park staff and trained tour guides (see section 5.3 below), museum displays, pamphlets, or presentations (Roe et al., 1997; Tisdell & Wilson, 2001b). Interpretation efforts have been shown to increase tourist awareness about sea turtles, and are seen as opportunities to help foster support for their conservation (Ballantyne et al., 2009). Furthermore, when combined with observing sea turtles in a natural setting, interpretive facilities can amplify benefits of STT (see pp. 19-21), resulting in donations for sea turtle conservation, stronger pro-conservation attitudes, and increased tourist support for species protection (Powell & Ham, 2008; Tisdell & Wilson, 2001b).

Additionally, Ballantyne et al. (2009) suggest that the solution to balancing the needs of both tourists and sea turtles may be to maintain a great deal of transparency regarding management practices. Some authors believe that clearly communicating the reasoning behind particular regulations enables wildlife tourism managers to achieve stronger control (Ballantyne et al., 2009). Mixed messages between tour guides and tourism sites can undermine the credibility of the information presented, confusing tourists and severely limiting the effectiveness of the interpretation program (Marion & Reid, 2007). For example, when is it appropriate to handle, touch, or feed wild animals? Interpretation efforts should explain the circumstances under which such activities are appropriate, and why, so that rationales and potential impacts are clear to all (Ballantyne et al., 2009).

Mon Repos Conservation Park in Queensland, Australia is an example of a STT site that uses interpretation with a great deal of transparency. The Mon Repos Visitor Centre contains interactive displays and signage about sea turtle conservation, as well as an outdoor auditorium where Park rangers show lectures and videos, with commentary focused on the importance of protecting sea turtles when entering their natural habitat (Ballantyne et al., 2009; Tisdell & Wilson, 2001a). Moreover, Park guides emphasize that sea turtles are wild animals and therefore not guaranteed to appear on any given night (Ballantyne et al., 2009).

Interpretation programs are also used as a STT management strategy in Trinidad and Tobago (Bräutigam & Eckert, 2006), Dominica (Sammy et al., 2008), and Bahia, Brazil (Pegas et al., 2012). However, details about these efforts are not well documented in the literature, and further research should be conducted to identify similarities and differences between such efforts, as well as to better recognize successes and drawbacks.

### 5.3 | TOUR GUIDE PROGRAMS

Another common strategy to manage sea turtle tourism and its impacts is the use of tour guide programs that enable community members to earn wages by actively participating in STT and conservation (Bräutigam & Eckert, 2006). In theory, local people are trained in responsible sea turtle viewing practices (e.g. by an NGO or park staff) and required to communicate those practices to their tour participants, with the idea of decreasing negative impacts to sea turtles and their habitats, while simultaneously supporting livelihoods via fees and tips (Troëng & Drews, 2004). Tour guide programs can therefore represent a management strategy of sorts, since they can be used to mitigate tourism impacts, provide environmental education to tourists and locals, and deliver economic benefits to the local community (Jacobson & Robles, 1992). Quite often, tour guides convey interpretation messages (see section 5.2, p. 24), connecting the two management strategies.

Tortuguero, Costa Rica is often used as an example of a successful sea turtle tour guide program (Peskin, 2002). In this area, guides are trained and certified to lead tourists on nest-viewing tours, which, in some cases diverts guides away from their previous livelihood, which could have included killing turtles for consumption (Peskin, 2002). Overall, the village—arguably almost entirely tourism based—has moved from heavier reliance on extractive economies (lumber; turtle fishing), to one primarily emphasizing tourism and conservation (Meletis & Campbell, 2007). This model has led to an improved quality of life for many tour guides by capturing tourism revenues at the local level (Peskin, 2002). A great deal of revenue leakage to lodge owners and foreign entities still exists, however (Campbell et al., 2008; Meletis, 2007).

Rules associated with the tour guide program in Tortuguero include tour group size limits and a ban of flashlight and flash photography use, which aim to minimize disturbances to nesting turtles during tours (Peskin, 2002). In the early 1990s as a result of program success, the Costa Rican government declared that all tourists must be accompanied by a certified tour guide when viewing turtle nesting on all of Tortuguero's beaches (Peskin, 2002). However, in 2004, the system was reformed to minimize tourist time on the beach, in an attempt to alleviate potential negative impacts that remained (Meletis & Harrison, 2010). Groups now wait on nesting beaches until a turtle is spotted for them, rather than walking to find a nesting turtle, a procedure designed to minimize sand tramping (Meletis & Harrison, 2010). Despite challenges in managing tourism impacts (e.g. Meletis, 2007; Meletis & Campbell, 2009), many local people are successfully employed as tour guides in Tortuguero, and sea turtle conservation has improved. Tourism in the region has grown since its beginnings in the mid-1980s, and increasingly stringent sea turtle conservation policies, rules, guidelines, and practices have accompanied its growth (Troëng & Rankin, 2005).

Tour guide programs have also been seen on a smaller scale in Ostional, Costa Rica, to serve turtle viewing tourists and provide employment for local youth (Campbell, 1999). This ecotourism program exists alongside legalized, environmentally sustainable egg harvest, which is the preferred economic option for the community (Meletis & Campbell, 2007). Although it exists, tour guiding in Ostional is not as predominant as in Tortuguero, for two reasons. First, turtles can be more easily found in Ostional due to the nature of *arribada*<sup>25</sup> nesting; thus the use of tour guides may be

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<sup>25</sup> While sea turtles normally nest alone, Kemp's ridleys in the Caribbean and olive ridleys in the Pacific exhibit *arribada* nesting, or aggregated/mass nesting, often synchronized with certain moon or tidal phases (Harold & Eckert, 2005). Ostional Wildlife Refuge contains one of the largest sea turtle nesting populations on Earth, with monthly *arribadas*, when tens of thousands of females crawl ashore in just a few days (Troëng & Drews, 2004).

unnecessary (Campbell, 1999). Second, since community members have legal access to egg harvesting and their earnings are substantial, the incentive for expanding the tour guide programs may be lacking (Meletis & Campbell, 2007).

Another sea turtle tour guide training program exists in St. Lucia, which helps local guides collect data while conducting turtle tours. After briefing visitors on proper turtle watching behavior, guides escort tourists to beaches, where nesting turtles are tagged and measured before returning to the sea, generating sea turtle monitoring data (Bräutigam & Eckert, 2006). The group is only allowed to observe this activity according to specific guidelines established by the tour guide program (Bräutigam & Eckert, 2006). This project was formally recognized as an official Heritage Tourism Initiative by the country's Department of Fisheries in 2001 for its efforts in sustainable STT management for the benefit of both people and turtles (Bräutigam & Eckert, 2006).

Another well-established tour guide program exists in the fishing community of Praia do Forte, Bahia, Brazil, implemented by Projeto TAMAR. Every year, 15 local children are selected from a group of 150 to participate in a one-year training program in marine science and tour guiding skills, for a monthly stipend (Pegas et al., 2012). This project is widely supported by the community, who points to greater environmental awareness, personal development, aspirations towards higher education, and greater skills acquisition of the children because of the project's efforts (Pegas et al., 2012). As such, long-term tour guide programs can promote positive, long-lasting socioeconomic and environmental progress towards sustainable STT development.

Other sea turtle tour guide programs exist worldwide and possess their own unique characteristics. "Turtle Watch Rekawa" in Sri Lanka trains local villagers to protect sea turtle nests from tourism threats (Kapurusinghe, 2012). In Cananéia, Brazil, tourists are taken on fishing boats to observe fishermen releasing bycaught turtles in their nets (Dias et al., 2014). These opportunities for STT management have great potential to minimize the consequences of tourist interactions with turtles, while gaining local support and raising revenue for economic well-being.

## 5.4 | MONITORING PROGRAMS

A fourth common approach to managing sea turtle tourism is the implementation of monitoring programs to measure sea turtle population trends and assess tourism impacts. Monitoring programs are a means of tracking sea turtle characteristics, nesting frequency, and movements. Larger data collections lead to a greater understanding of potential negative impacts of STT on turtle populations. Roe et al. (1997, p. lxx) argue that "in order to develop effective policies and plans for wildlife tourism, a greater understanding is required of both its direct and indirect effects." Monitoring programs are most effective when they examine all forms of tourism impacts—both short- and long-term—using qualitative and quantitative data (Roe et al., 1997).

The value of evidence-based management as a tactic for endangered species conservation is well documented in the literature (Hayes et al., 2016; Katselidis et al., 2013). Moreover, scientists are recognizing the growing need to preserve natural capital on which tourism relies, by using regular monitoring to detect and alleviate resource impacts from tourism pressure (Hayes et al., 2016). Sea turtle monitoring efforts, implemented in conjunction with STT programs, can be carried out via the cooperation of scientists, community members, and tourists. The popularity of volunteer tourism can be partly explained by the fact that it often provides labor for population monitoring, while

simultaneously gaining additional revenue from tourism (Senko et al., 2011). The benefits of sea turtle monitoring plans have been realized in multiple locations across the Caribbean.

Trinidad and Tobago has assumed a leadership role for its population monitoring of leatherback sea turtle populations, for example (Bräutigam & Eckert, 2006). In 2008, the Turtle Village Trust, a community body of conservation groups, in partnership with the National Government's Forestry Division, launched its National Sea Turtle Monitoring Programme, with funding from several NGOs and government entities (Bachan, 2009). The main goal of the Programme is to “promote informed decision-making and proactive management to prevent the extinction of sea turtles in Trinidad and Tobago and integrate the well-being and needs of human communities with which they interact”, with one of the objectives being to promote community-led tourism as a tool for conservation, with leatherback turtles as the main focus (Bachan, 2009, pp. 22-23). As a result of the Programme and tourism contributions, more precise data on nest numbers and distribution, hatchlings, and foraging habitats have become available for decision makers in natural resource and tourism agencies (Bachan, 2009). Moreover, the Programme has enhanced the nation's ability as a whole to conserve sea turtle stocks (Bachan, 2009).

Additionally, Projeto TAMAR in Brazil has established a widespread network of monitoring stations on over 1,000 kilometers of coastline (Marcovaldi & dei Marcovaldi, 1999). Recently, TAMAR has developed a tool that “allows for the identification of critical sea turtle habitats and the subsequent implementation of mitigation measures” on those beaches (Lopez et al., 2015, p. 270). The following are other notable STT monitoring programs in and beyond the region:

- 1) The Cayman Islands' “Caribbean Turtle Watch” program was initiated as part of the Turtles in the Caribbean Overseas Territories (TCOT) project, spanning all United Kingdom's Caribbean territories. The program's dive survey component is designed to use recreational divers as volunteer labor to measure in-water populations of sea turtles. (Bell et al., 2009)
- 2) St. Lucia's Desbarras Sea Turtle Watch Group (DSTWG) has undertaken systematic, community-based efforts to involve locals in monitoring of tourism-related activities. Citizens trained as data collectors participate in monitoring activities (e.g. nest observation and flipper tagging), multiple days a week; this data is then used for marine turtle and broader resource management purposes. Participants receive training from WIDECAST, the Department of Fisheries, and the St. Lucia Heritage Tourism Programme in data collection, field techniques, and record keeping. (Bräutigam & Eckert, 2006)
- 3) Costa Rica's ecotourism development at Tortuguero National Park is due in part to its successful long-term monitoring program beginning in 1955. Both short-term (e.g. 1-2 nights) and long-term (e.g. entire nesting season) volunteers with The Sea Turtle Conservancy (formerly the Caribbean Conservation Corporation, or “CCC”), conduct nest, track, and egg counts to monitor nesting trends and to identify human events influencing those trends. Monitoring for this program is partially funded by tourism revenues. (Meletis & Harrison, 2010; Troëng & Rankin, 2005)]
- 4) At Mon Repos Conservation Park in Australia, a popular turtle watching destination, Park rangers collect data on turtle and hatchling numbers, which they believe is an “integral part of the protection and monitoring function of the conservation service” (Ballantyne et al., 2009, p. 661).

## 5.5 | CO-MANAGEMENT WITH NGOS

Designing and implementing management strategies for sea turtle tourism often comes with resource constraints. One way to try to overcome such obstacles is for local communities and governments to form strategic partnerships with NGOs—both foreign and local—which can offer financial, logistical, and political support to meet mutually agreed-upon goals (Bräutigam & Eckert, 2006). This co-management is commonly seen in the Caribbean, as a way of providing communities with the resources necessary for sustainable STT development (Bräutigam & Eckert, 2006). Although collaboration with NGOs is widely described in the literature as being a positive force for achieving sustainable STT, communities and their conservation views should not be homogenized (Campbell, 1999). Local people may feel distrust and disconnect from the conservation NGOs working in their midst, especially if such groups are extra-local (Finkbeiner, 2009).

RED Sustainable Travel<sup>26</sup>, a conservation and tourism NGO, has played an important role in the STT sector across Mexico, by partnering with tour operators to overcome conservation challenges while promoting community development (Pesenti, 2014). RED pursues communication and awareness goals, builds community alliances, fosters local appreciation for natural resources, and raises funds for sea turtle monitoring projects (Pesenti, 2014). The Ocean Conservancy has also initiated co-management efforts through launching its SEE Turtles Campaign, now a stand-alone organization, which “supports and promotes existing community-based sea turtle ecotourism ventures around the world” (Luderer, 2008, p. 16). Examples of localized co-management include Nature Seekers, based in Trinidad and Tobago, and Asociación ANAI, in Gandoca, Costa Rica (Bachan, 2009; Bräutigam & Eckert, 2006). NGOs may also facilitate information sharing between communities where STT is prevalent, through training and workshops. One such regional example is the set of WIDECAST international training workshops that take place in Trinidad and focus on best practices for population monitoring and STT. These would not be possible without partnerships with Nature Seekers (Bräutigam & Eckert, 2006).

## 5.6 | COLLABORATION WITH HOTELS, RESORTS, ETC.

As discussed in section 4.1.4 (see pp. 16-19) tourism and related infrastructure is becoming increasingly problematic for sea turtle habitats. Much of this infrastructure is primarily designed with the tourism industry in mind, and often fails to effectively address possible negative impacts on marine turtle populations (Bräutigam & Eckert, 2006). A high potential for collaboration and information sharing exists within the mass tourism sector (e.g. hotels, cruise ships, and restaurants), which may possess limited awareness of the widespread effect of their activities on sea turtle survival (Bräutigam & Eckert, 2006). These establishments can play a vital role in promoting sea turtle awareness among their visitors, by offering informative programs on sea turtle conservation (Choi & Eckert, 2009). Resorts can adapt such efforts to meet the needs of their visitors, such as offering family-friendly activities (Choi & Eckert, 2009). Other techniques to prevent sea turtle disturbance from tourists can include signs and educational materials diverting beachgoers from sensitive habitat areas, informing guests of nesting seasons, advising wise use of beach furniture (e.g. chairs and umbrellas), and encouraging other appropriate behaviors (Choi & Eckert, 2009). Some hotels may also be willing to mitigate beachfront lighting at night during nesting seasons, by using window

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<sup>26</sup> The Spanish word *red* translates in English to “net”, (i.e. a fisherman’s net or network), which represents the network of fishing communities from which RED began in 2009 (RED, n.d.).

shades and other practices (Bräutigam & Eckert, 2006). Hotels can also refer their guests to turtle centers, and provide opportunities for them to donate to these causes (Reix & Mahir, 2016).<sup>27</sup>

To further enhance awareness among tourism industry actors about sea turtle conservation, particularly with respect to tourism's potential negative impacts, some organizations host workshops to facilitate information sharing across multiple establishments (Bräutigam & Eckert, 2006). For example, national workshops held in Barbados discussed the challenges sea turtles face from light pollution and emphasized available technologies to solve these problems (Bräutigam & Eckert, 2006). As a result, an official Sea Turtle Policy Statement was adopted in the country, which provided hoteliers and other tourism agencies with guidelines for implementing “turtle-friendly” lighting at their facilities (Bräutigam & Eckert, 2006). This widespread and well-known management strategy has been successful at mitigating tourism pressure on sea turtle nesting beaches, especially in Trinidad and Tobago, Antigua and Barbuda, and Aruba (Bräutigam & Eckert, 2006).

## 5.7 | EDUCATIONAL CAMPAIGNS

Public awareness campaigns are another frequent component of sea turtle tourism management, as they create a more informed community and tourist population. Many tourists, including wildlife tourists, are unaware of how their activities affect the environment (Eagle et al., 2016; Meletis & Harrison, 2010). Thus STT may provide an opportunity for behavioral change messaging through social marketing<sup>28</sup> and education-based strategies targeted at both tourists and community members (Eagle et al., 2016). Social marketing offers enormous potential for reducing the impacts of STT by attempting to modify behaviors of tourist operators and tourists themselves (Eagle et al., 2016). However, such a management strategy requires multidisciplinary research to identify both barriers to and opportunities for behavior change, as well as sufficient resources to implement positive change (Eagle et al., 2016).

Approaches to educational campaigns differ tremendously across communities. For example, efforts in Bonaire have used slide-show presentations for tourists, while groups in St. Vincent and the Grenadines have developed fact sheets for distribution to cruise-goers and yachters, as well as informative flyers for placement in customs stations and airports (Bräutigam & Eckert, 2006)<sup>29</sup>. In Martinique, local businesses recently cooperated with the Marine Turtle Network to place informative tablemats in small beachfront restaurants on the island, an effort that educated small business owners and their clients (Z.A. Meletis, pers. comm., 4 Mar. 2016). Finally, a unique approach has been taken in the remote community of Tanoliu, Vanuatu, where a drama production titled “I’m a Turtle” educates visitors about sea turtle conservation (Petro & Fletcher, 2007).

Many education and awareness efforts have also been made by the Sea Turtle Conservancy (STC) and other NGOs in Tortuguero, Costa Rica (Bräutigam & Eckert, 2006; Nichols et al., 2014). Some note-worthy examples include (1) production and distribution of brochures and posters, (2) installation of informative displays in airports, and (3) certification programs for vendors that complete education programs (Bräutigam & Eckert, 2006). Broader regional educational efforts have also been undertaken, such as WIDECAST’s development of an education handbook, to be

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<sup>27</sup> See Choi and Eckert (2009), Appendix IV for more examples.

<sup>28</sup> Social marketing is the “systematic application of marketing (along with related areas such as psychology and sociology) concepts and technique to achieve specific behavioral goals.” (Eagle et al., 2016, p. 330).

<sup>29</sup> See Bräutigam and Eckert (2006), pp. i, 127, 205, 214-215, 223, 242, 369, and 373 for examples and pictures.



used as an outreach tool for a variety of audiences across the Caribbean (Harold & Eckert, 2005). This handbook contains lesson plans, analytical exercises, worksheets, team-building exercises, fieldwork assignments, and enrichment activities (Harold & Eckert, 2005). Such practices create a well-informed local and tourist population, which helps to inspire sustainable STT.

## 5.8 | INDUSTRY CERTIFICATIONS

Certification programs may also encourage sustainable sea turtle tourism development by extending branded recognition to tour operators and affiliates for their efforts towards sea turtle conservation. This differentiates tour operators, and allows conservation-driven tourists to discriminate between programs and make informed decisions when mitigating their STT impacts. Some examples of branded tourism certification programs include Green Globe, which “promotes sustainable tourism throughout the world by providing a framework for environmental and social performance”, and The Blue Flag Campaign<sup>30</sup>, an international voluntary certification system for beaches and marinas exhibiting environmentally sustainable practices (Choi & Eckert, 2009, p. 83).

## 5.9 | PROTECTED AREAS

Another management tool integral to sea turtle tourism success around the world is strict protection of sea turtle habitat through the establishment of parks and protected areas (Landry & Taggart, 2009). Associated sea turtle related regulations and guidelines might include:

- requiring special permits to conduct turtle tours in certain areas;
- enforcing no-take zones, based on site-specific habitat ranges;
- instituting a maximum number of tourists and/or boats per area;
- regulating the location and duration of tourist-wildlife interactions; and
- forming zones with temporary or permanent bans on tourist use, based on seasonality, time of day, mode of transport, or tourist activities.

(Landry & Taggart, 2009; Roe et al., 1997)

Although these measures can contribute to sea turtle conservation and tourism impact minimization, they can also be unpopular, difficult to implement, and dependent on willing participation from multiple stakeholders (Sorice et al., 2006). Ensuring community buy-in may be achieved by embracing incentives for participation, soliciting input from a variety of audiences, and involving tour operators (arguably the group that is most knowledgeable of the situation) more directly in the planning process (Lake & Eckert, 2009; Matarasso, 2009; Sorice et al., 2006). Additionally, extensive research, planning, and political investment is needed to establish a formal protected area. Also, finding the resources for such work, and ongoing management and enforcement, is out of reach for many communities, particularly in the Global South (Campbell et al., 2008). Despite these challenges, Belize has developed one of the most internationally advanced and successful systems of marine protected areas (MPAs) to accomplish a variety of goals, including management of tourism impacts (Bräutigam & Eckert, 2006).

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<sup>30</sup> See <http://www.blueflag.global/>.

## 5.10 | GOVERNMENT INTERVENTION & INTERNATIONAL AGREEMENTS

Occasionally, if stakeholders possess limited power and ability to manage sea turtle tourism on their own, formal planning and outside intervention, specifically government agencies, is necessary (Campbell, 1999). Like NGOs, government-affiliated groups may provide local communities with much-needed expertise and funding to sustainably develop STT. Many communities possess the capacity to leverage government support to ensure formalized tourism planning occurs (Finkbeiner, 2009). Moreover, international agreements can strengthen efforts to promote sea turtle conservation, such as the SPAW Protocol, which prohibits the disturbance of sea turtles during sensitive periods of their life cycle (e.g. breeding, nesting, and migrating) (Bachan, 2009). Similar broad-reaching legislation is common in Caribbean nations, such as the federal law in Mexico prohibiting the disturbance of all stages of sea turtle life cycle; yet, regulations of this kind can be difficult to enforce (Penié et al., 2015). Another example of significant legislation passed for the purposes of STT management is Costa Rica's Law for the Protection, Conservation and Recovery of Marine Turtle Populations, which places strict constraints, fines, and penalties on turtle-human interactions, and requires any STT activity overlapping with nesting turtles to be authorized by the *Ministerio del Ambiente y Energía* (MINAE) (Bräutigam & Eckert, 2006).

However, government intervention or formal legislation may not be appropriate in every case, as some national planners may be unlikely to invest time, energy, or money into STT, especially in small, rural communities (Finkbeiner, 2009). Co-management with NGOs, who can also provide support and formal planning, may be more appropriate in these cases (Finkbeiner, 2009). Regardless, in order to create effective legislation and government partnerships, stakeholder needs must be considered (Lake & Eckert, 2009). It is important to incorporate stakeholder representation in decision-making, as some groups are often underrepresented, such as women and minorities (Scheyvens, 2000). In Guinea-Bissau, for example, all decision-making processes during protected area design involve local communities, which builds relationships, instills stakeholder confidence, and turns locals into spokespeople for their natural resources (Airaud et al., 2016).

## 5.11 | OTHER GENERAL TOURISM REGULATIONS (CONSTRUCTION SETBACKS, LIGHTING ORDINANCES, ETC.)

Other general tourism regulations that address sea turtle tourism impacts are worth mentioning. Some protocols require considerable foresight, such as construction setbacks, while others can be adopted more readily, such as lighting ordinances or beach furniture bans (Choi & Eckert, 2009). Lighting ordinances specifically may include turning off lights after certain hours and blocking lights from reaching the beach (Robertson et al., 2016). Some hotels and restaurants, predominately in the U.S., are required to utilize "turtle-friendly" LED lights, with specified wavelengths that are minimally disruptive to nesting females and hatchlings (Robertson et al., 2016). However, the effectiveness of these lights is still up for debate and should be managed carefully (Robertson et al., 2016).

Construction setbacks for tourism infrastructure are common in the Mediterranean and Caribbean. In Cyprus, for example, 500-meter buffer zones are required between tourism villas and nesting beaches (Boura et al., 2014). In St. Lucia, the Physical Planning and Development Act (No. 29) sets guidelines for environmental impact assessments and coastal setbacks for tourism infrastructure (Bräutigam & Eckert, 2006).

## **PART VI: RECOMMENDATIONS FOR FUTURE SEA TURTLE TOURISM DEVELOPMENTS IN MARTINIQUE**

The following recommendations were informed by the material presented in Parts III-V, as well as practices that have also been recommended elsewhere, as available in the literature.<sup>31</sup> It is important to note that these suggestions have been extracted from the literature, based on patterns across sites and studies, and they are not based on an in-depth analysis of factors on the ground in Martinique. There may be many dynamic practices not captured in the literature analyzed for this review. These are preliminary recommendations, and they should be included in future research and discussions regarding how to proceed with planning for sea turtle tourism in Martinique.

1. **Proposals for sea turtle tourism developments and management strategies should be considered on a case-by-case basis, in order to consider possible context-specific impacts.** The sea turtle tourism industry in Martinique stands to learn a great deal from other successful, well-established STT programs in the region, but it should maintain a cautious approach not to assume that “one size fits all.” It is recommended that tourism guidelines be established before, or alongside, the development of any tourism programs, considering potential environmental, social, and economic impacts that may be unique to a region or site within Martinique, rather than simply mimicking successful ecotourism programs elsewhere. Management actions should also be revisited periodically after implementation, and respond to relevant changes in tourism demographics, practices, and demands. Furthermore, STT management should be sensitive to the scale and type of tourism that is occurring. Management plans and handbooks should be developed for each tourism area (e.g. beaches and villages), with standards for managing visitors, carrying capacity, health and safety, and staff protocols. (Informed by: Godfrey & Drif, 2001; Roe et al., 1997; Sammy et al., 2008)
  
2. **Stakeholder interests and community input should be sought when implementing sea turtle tourism programs and management strategies.** Tourism impacts may vary across communities, and certain management strategies may be entirely suitable for one community, while completely unfit for the next. This is because communities may possess different infrastructure, resources, opinions, and perceptions, as well as different tourism and conservation characteristics. Thus STT must maximize stakeholder involvement, pay close attention to community characteristics, and fit within existing resources. To do so, the needs—real and perceived—of stakeholders must be taken into account. When these actors are included in the development of guidelines, it encourages a sense of ownership, “buy-in”, and compliance, contributing to conservation, advocacy, and successful management. Stakeholders might include government actors, property owners, business owners, residents, and paying guests.

STT developments and management should seek broad participation across the tourism industry (e.g. from tour guides, hoteliers, data collectors, and educators). Fostering a sense of local ownership is fundamentally important. Capacity building can be accomplished through workshops that support tour guide training, small business development, monitoring, environmental education, and other conservation measures. Finally, trade-offs between sea turtle well-being and tourist experience should be balanced. (Informed by: Finkbeiner, 2009; Lake & Eckert, 2009; Landry & Taggart, 2009; Sammy et al., 2008)

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<sup>31</sup> Note: at the end of each recommendation, the specific citation(s) used to inform that recommendation are given.

- 3. When conducting in-water sea turtle tours, care must be taken not to disrupt feeding, breeding, resting, breathing, and swimming patterns of sea turtles.** Several best practice guidelines should be followed and clearly communicated to tourists, such as the following:
- a. Tourists should only be allowed to interact with sea turtles in water under the supervision of trained, certified tour guides. Branded programming and other systems to support this should be established.
  - b. Operators and tourists should be cautioned to never chase, harass, touch, feed, ride, or pursue a turtle in water.
  - c. Vessels and tourists should maintain safe distances from sea turtles, on the order of at least 2-5 meters.
  - d. Operators and tourists should be discouraged from provisioning turtles.
  - e. Operators should design tours so that, ideally, each sea turtle be observed by only one group of tourists—made up of roughly 6 tourists—at a time, and only at a maximum of 2 minutes.
  - f. Instructions given to tourists should include the suggestion that groups of tourists only approach a turtle from one side, to avoid enclosing it, and leave ample room to the turtle for freedom of movement and potential escape.
  - g. Operators should ensure that well-trained guides remain at the center of group of tourists at all times, to encourage compliance, and prevent or mitigate negative impacts.
  - h. When appropriate, several paths should be established for tour groups to follow, in different directions, to minimize congestion.
  - i. Tours concentrated in one area should last a maximum of one hour at a time and require tourists to take 30-minute breaks in between aquatic sessions near turtles. They should also be instructed on how to take breaks in ways appropriate for the environments they are in (e.g. by not standing on coral).
- (Informed by: Choi & Eckert, 2009; Landry & Taggart, 2009; Penié et al., 2015)

- 4. When conducting sea turtle tours on beaches, preventative measures should be adopted to minimize harm to sea turtles and their reproductive patterns.** Several best practice guidelines should be followed and clearly communicated to operators and tourists, such as the following:
- a. Tourists should only be allowed to interact with sea turtles on beaches under the supervision of trained, certified tour guides. Branded programming and other systems to support this should be established.
  - b. Tour operators should ensure that the ratio of visitors to tour guides does not exceed 10:1.
  - c. Tour guides should wait until nesting turtles begin digging their nest before taking tourists onto the beach. Once on the beach, tourists should be encouraged to walk closely together, rather than being scattered about.
  - d. The use of torches, flashlights, campfires, and flash photography should be limited. Should lights be required for any reason, they must be equipped with red or LED bulbs, to reduce light pollution and disorientation for sea turtles.
  - e. Smoking, littering, and loud noises by tourists should be strictly prohibited.
  - f. Beach driving on beaches during nesting seasons should be forbidden, including for transporting tourists to tour locations.
  - g. Tourists should be encouraged to keep movement to a minimum when females are nesting or hatchlings are making their way towards the sea.
  - h. Onlookers should stand behind the nest, at a safe distance, and out of the path of a nesting female or her hatchlings.

- i. Only a trained professional (e.g. representatives from conservation groups, hotel security, or tour guides) should determine when the egg-laying process has begun and ended, and tour groups should be summoned and dismissed accordingly.
- j. The development of nesting beach monitoring should be considered in conjunction with STT, if it is not already in place. It should be undertaken even when tours are not present.
- k. If accompanying monitoring programs are in place, trained professionals should assess the turtle's size and well-being during the egg-laying process. If the situation allows, small groups of tourist may be briefly led closer, in turns, to see the eggs.
- l. Disoriented hatchlings should be released by trained professionals, in a darker place on the beach, closer to the water. If lost hatchlings are found on the beach during the day, they should be kept in a dark, cool place for release that evening, when they will be more mobile and less exposed to predators. Tourists should be discouraged from handling hatchlings, or provided with ample information and resources to know what to do if they encounter disoriented hatchlings or adult turtles.
- m. After a nest has hatched (a process that may take several nights), nest excavation, if practiced at the site, should be done by a trained professional, who can evaluate nest success and release any remaining hatchlings.

(Informed by: Ballantyne et al., 2009; Choi & Eckert, 2009; Clovis, 2005; Schroeder, 2001)

5. **It should be ensured that the development of tourism infrastructure more effectively addresses sea turtle impacts, and that their educational efforts support sea turtle conservation.** Hotel, lighting, and road design, among other aspects, should be adapted to promote sea turtle conservation goals (e.g. reducing obstacles for nesting turtles, or improving hatchling access to the sea). Hotels should be encouraged to change their practices to minimize threats to sea turtles. Some examples of best practices that should be encouraged include:
  - a. Removing umbrellas, chairs, or other obstacles from the beach during nesting season.
  - b. Closing curtains on beachfront windows, and incorporating this practice into the housekeepers' nightly routine.
  - c. Regularly collecting litter from the beaches on hotel property, and furnishing beach trashcans with lids to prevent spillage and to reduce the presence of predators.
  - d. Prohibiting the sale of sea turtle products such as tortoiseshell trinkets, jewelry, and turtle leather, in hotel gift shops.
  - e. Discouraging beach driving on hotel property, as it can compact the sand, crush incubating eggs, and trap hatchlings en route to the ocean.
  - f. Incorporating tinted windows into beachfront rooms, providing thicker window treatments, and replacing high-intensity light bulbs with LED lights where possible.
  - g. For beach cleaning, using only hand tools that penetrate less than two inches into the sand, as opposed to mechanized beach cleaning methods which could disturb nests.

Hotels can also employ several tactics to encourage their guests to respect the local environment and minimize disturbances to sea turtles. Strategically placed signs around hotel property can enlighten visitors about sea turtle conservation, and their potential contributions to it—both positive and negative. Information should be simple, concise, and clear when emphasizing appropriate behaviors and alerting guests and staff to the seasonal presence of sea turtles. Staff members should also encourage guests to report evidence of nesting and hatching, so they can be shared with conservation groups. Visitors should know whom to contact in the event that a turtle is wounded or stranded. Tourists should also be encouraged to turn off unnecessary lights, close their drapes, and make minimal use of flashlights. Visitors should also be

encouraged to build their sand castles below the high-water mark to avoid destroying nests. Hotels can provide educational materials in welcome packages and host informative events for guests to be aware of measures they can take to conserve turtles. (Informed by: Bräutigam & Eckert, 2006; Choi & Eckert, 2009; Clovis, 2005; Eckert, 2007)

- 6. Sea turtle tours should contain an interpretive component, to impart information to tourists about sea turtles and appropriate turtle watching behavior.** It is recommended that sea turtle tourism management recruits tourists as conservation partners, by communicating the reasons behind any enforced policies, and present a consistent message regarding wildlife interactions. If tourists understand *why* certain behaviors are inappropriate, they are more likely to: (1) better realize how their actions impact sea turtles, their habitats, and their conservation; and (2) appreciate the need for such restrictions, so that they are not seen as barriers or constraints. Tourists should be exposed to complementary signage, presentations, and interactive discussions with trained tour guides *before* participating in a turtle tour. This information should convey that turtle sightings are not guaranteed, and explain desirable and undesirable behaviors for sea turtle conservation, both during and beyond turtle encounters. (Informed by: Ballantyne et al., 2009; Meletis & Harrison, 2010)
- 7. Regular monitoring of sea turtle populations should be established to improve understanding of local sea turtle presence, and to assess and mitigate negative impacts associated with tourism.** Managers should collaborate with key stakeholders and researchers—drawing on a combination of local, regional, and international expertise—to implement consistent, unified, and long-term monitoring and evaluation programs that assess the social, environmental, and economic impacts of sea turtle tourism. Such information can allow planners to determine sea turtle densities needed for ecotourism and the carrying capacity of tourism-related activities (e.g. What turtle population size will continue to support sustainable tourism use? What is the maximum tour group size that produces minimal disturbance to a nesting turtle?). If STT evolves to include sea turtle monitoring, data should be shared at various scales—local, regional, and international, contributing to the efforts of the international conservation and scientific community. Data sharing should also be extended to tourists and locals, given their contributions to the enterprise and their potential interests. Economic and social factors should also be monitored to assess the costs, benefits, dynamics, and existing conflicts of STT. Gathering economic evidence of the revenues associated with STT could help actors understand the economic role of STT, as well as incentives, barriers, and costs affecting local participation in conservation. (Informed by: Chaverri, 2001; Clovis, 2005; Finkbeiner, 2009; Frazer, 2001; Hayes et al., 2016; Nahill, 2012; Sammy et al., 2008; Waayers, 2006)
- 8. Regulations of in-water sea turtle tours should be informed by studies that identify spatial and temporal patterns of habitat use exhibited by turtles, particularly those relevant to the island and region.** It is recommended that tours should avoid critical small-scale habitat and instead focus on less-critical habitat, on a randomized rotational basis. Core habitat areas occupied by turtles should be closed to tourists either permanently or for extended periods, to reduce disturbances by tourism activities. Studies should also be used to establish properly marked nautical zoning that designates where swimming, boating, and other turtle observation activities should or should not take place. Schedules, speed limits, and strict navigational rules should be established in critical habitat areas—if they do not already exist, and provisions for enforcement must be made in order to encourage compliance. (Informed by: Landry & Taggart, 2009; Penié et al., 2015)

- 9. Formalized sea turtle tourism offerings should be developed in close partnership with NGOs or other sea turtle conservation groups.** Partnerships with NGOs can strengthen community ties, inform local employment in STT, and contribute to sea turtle protection. NGOs and conservation groups could potentially contribute strong influence and local involvement, making them more equipped to accomplish positive tasks such as workshops, education campaigns, and monitoring. They also can play an important role in leveraging additional support from government or extra-local agencies. (Informed by: Choi & Eckert, 2009; Finkbeiner, 2009)
- 10. Strategic, widespread educational campaigns for diverse audiences should be initiated in conjunction with development and promotion of sea turtle tourism.** Informed audiences can contribute to more effective STT management; thus it is paramount that messages about sea turtle conservation, and potential tourism contributions and challenges, are broadly communicated. Targeted audiences should include local people, members of the diaspora, and general tourists, even those unaffiliated with sea turtle tourism. Regularly distributed newsletters and/or travel guides should include tips on how both residents and visitors can contribute to local sea turtle conservation efforts. These could include small everyday actions such as closing curtains at night during the nesting season to mitigate beachfront lighting, what to do if a sea turtle is encountered, and options for greater involvement in sea turtle conservation. Such campaigns should be conducted in linguistically and culturally appropriate ways, and provide additional sources of information for those interested in learning more. (Informed by: Choi & Eckert, 2009; Eagle et al., 2016)
- 11. A marketing strategy should be prepared and implemented, that promotes sea turtle tourism as a conservation tool and a source of conservation revenues, if applicable.** It is suggested that sea turtles should only be mentioned in travel brochures if people will be able and allowed to observe the species as a part of their holiday destination, so visitors do not develop false expectations. When using threatened species as a marketing tool, messages should include: (1) details on seasonality and species availability for wildlife viewing, (2) biology and ecology of the species, (3) the possible effects of tourism—both positive and negative—on the species, and (4) applicable codes of conduct for interacting with the species. Using low-cost marketing tools, such as social media and conservation websites, is also recommended. Transparency about how tourism does or does not fund sea turtle conservation efforts in the area would also be an ideal inclusion in such efforts. (Informed by: Cosijn, 1995; Nahill, 2012; Waayers, 2006)
- 12. Strategic partnerships should be formed and local involvement with interested companies in the community should be fostered when developing sea turtle tourism.** The development of sea turtle tourism should further build on existing relationships between companies with conservation-driven interests. Working with local businesses and services with conservation values can bolster support for related initiatives, and could also facilitate the distribution of STT benefits. For effective implementation of STT and related management strategies, a well-connected network, with linkages between tour operators, hotels, transportation companies, tourism offices, and small businesses, must be further developed and nurtured. (Informed by: Nahill, 2012; Sammy et al., 2008)

## PART VII: ANNOTATED BIBLIOGRAPHY WITH KEY REFERENCES

The purpose of this section is to provide the clients and other stakeholders in Martinique with a list of important references to which to refer back if more information about any of the topics discussed in this report is needed. The sources that follow include those that were relied upon most heavily to inform this report, as well as others that may be of particular interest to those using this document.

**REFERENCE: Ballantyne, R., Packer, J., & Hughes, K. (2009). Tourists' support for conservation messages and sustainable management practices in wildlife tourism experiences. *Tourism Management*, 30(2009), 658-664.**

**ABSTRACT:** A common justification for developing wildlife tourism attractions is that they help to secure long-term conservation of wildlife and wildlife habitats. Managers and guides often highlight their role in protecting wildlife and its habitat, yet little is known about the interests, needs and preferences of the tourists who participate in such activities – how aware are they of conservation issues; how concerned are they about the environmental impacts their visit may cause; do they expect and accept the conservation messages they receive? This research explores the perceptions, preferences and conservation awareness of tourists visiting the Mon Repos Conservation Park in Queensland, Australia. Comparison data from four other sites are also presented in order to provide a wider context for interpreting the data. The findings suggest that wildlife tourism management practices that enlist tourists as conservation partners, communicate the reasons behind any constraints imposed, and present a consistent message regarding interactions with wildlife, are likely to be most successful in meeting the needs of both tourists and wildlife.

**REFERENCE: Bell, C. D., Blumenthal, J. M., Austin, T. J., Ebanks-Petrie, G., Broderick, A. C., & Godley, B. J. (2009). Harnessing Recreational Divers for the Collection of Sea Turtle Data Around the Cayman Islands. *Tourism in Marine Environments*, 5(4), 245-257.**

**ABSTRACT:** Here we present data from a 26-month program “Caribbean Turtle Watch,” initiated as part of the “Turtles in the Caribbean Overseas Territories” (TCOT) program and designed to harness recreational divers to assess in-water populations of marine turtles in the Cayman Islands. We recorded 521 dives in Grand Cayman and Little Cayman between September 1, 2002 and November 29, 2003. Data, presented as the mean number of turtles sighted per dive, provide insight into spatio-temporal patterns of sightings as a proxy of abundance. Widespread sightings were recorded of two marine turtle species, green turtles *Chelonia mydas* and hawksbill turtles *Eretmochelys imbricata*, around both islands. There was no obvious relationship between the existence of Marine Protected Areas (MPAs) and the abundance of turtle sightings. Diving is allowed in Marine Park Zones and dive pressure may impact overall habitat quality in these areas. While turtle sighting potential was not a major influence on dive site choice, actual turtle sighting greatly enhanced dive enjoyment. Spatiotemporal and morphological analyses of data collected by volunteers compared favorably with those based on data collected by scientists. This technique is transferable to other countries and may hold particular value in areas where resources assigned to marine turtle research are low.



**REFERENCE: Bräutigam, A., & Eckert, K. L. (2006). *Turning the Tide: Exploitation, Trade and Management of Marine Turtles in the Lesser Antilles, Central America, Colombia and Venezuela*. Cambridge, UK: TRAFFIC International.**

**ABSTRACT:** (abridged) This comprehensive review of exploitation, trade and management of marine turtles in the Wider Caribbean Region (WCR) highlights findings related to the legal framework for marine turtle management, patterns of domestic exploitation and use and international trade, and a variety of core management issues, including population monitoring, fishery controls and law enforcement. While there have been many advancements over the past half-century in our understanding of marine turtle biology and of the management needs of these species, the review concludes that actual management of marine turtles, and of marine turtle exploitation in particular, has in many ways not kept pace with this understanding nor with the contemporary scope of threats to their survival. The report documents the implications of management shortcomings in one country for the management and conservation efforts being made in others and, finally, calls attention to a range of activities that are being undertaken at the national level to address these problems and which could be expanded or adapted across the region.

**REFERENCE: Campbell, L. M. (1999). Ecotourism in Rural Developing Communities. *Annals of Tourism Research*, 26(3), 534-553.**

**ABSTRACT:** This paper considers the ad hoc development of ecotourism at Ostional, Costa Rica, and the potential benefits for the local community in the absence of government planning or intervention. In 1995, only four percent of Ostional households identified tourism as a source of income; however, this was substantial in comparison to that derived from other economic activities. While most Ostional residents had positive attitudes toward tourism, they had limited awareness of employment or investment opportunities. Lack of awareness, along with increased activity by outside investors, suggests that, in the absence of formalized planning or intervention, the possibilities for the community at Ostional to further benefit from tourism development will be limited.

**REFERENCE: Campbell, L. M., & Smith, C. (2006). What makes them pay? Values of volunteer tourists working for sea turtle conservation. *Environmental Management*, 38(1), 84-98.**

**ABSTRACT:** As charismatic mega-fauna, sea turtles attract many volunteers to conservation programs. This article examines the ways in which volunteers value sea turtles, in the specific context of volunteers working with the Caribbean Conservation Corporation, at Tortuguero, Costa Rica. The complexity of volunteer values is explored using a qualitative approach. In-depth interviews with 31 volunteers were conducted in July of 1999 and 2000. Interviews probed, among other things, interest in sea turtles and their conservation, motives for participating, and the most gratifying parts of their volunteer experience. Results show that volunteers hold multiple and complex values for sea turtles, but particular values dominate. Results have implications for understanding human–environment relations and the emerging study of volunteer tourism. There are also management implications for volunteer programs hoping to attract participants.

**REFERENCE: Choi, G. Y., & Eckert, K. L. (2009). Manual of Best Practices for Safeguarding Sea Turtle Nesting Beaches. Wider Caribbean Sea Turtle Conservation Network (WIDECAST) Technical Report No. 9. Ballwin, MO.**

**ABSTRACT:** (abridged) Sea turtles are ancient creatures, living mostly unseen in the world's oceans. At certain times of the year, egg-bearing females must come ashore to lay eggs deep in the warm sand of tropical beaches. The nesting process can be threatened by beachfront development. This Manual emphasizes the positive role that the hospitality and tourism sector can play in biodiversity conservation by demonstrating ways in which the industry can help protect endangered sea turtles and their nesting habitats. Following a brief overview, recommendations associated with each of these activities are explained in greater detail. Our hope is that the Manual will inspire you to adopt and implement a Sea Turtle Policy Statement, collaborate with local experts, communicate relevant information to guests, staff and contractors, and start taking steps, however small, to promote the survival of Caribbean sea turtles.

**REFERENCE: Clovis, T. (2005). Sea Turtle Manual for Nesting Beach Hotels, Staff, Security and Tour Guides. Scarborough, Tobago: The Travel Foundation.**

**ABSTRACT:** (abridged) SOS Tobago is a registered community based organization (CBO), and as a small group we derive great strength from our partnerships with agencies like Environment TOBAGO, the Travel Foundation, the Tobago House of Assembly (THA) and the Tour Guide Association, with regional expertise such as is available through WIDECAST, and through the commitment of individuals like yourself who take the time to get involved. This manual is designed to develop your skills in handling the sea turtles that nest on your beach. Your help and understanding are essential to ensuring that these sensitive and critically endangered creatures nest successfully—every successful nesting event increases the chances that they will survive well into the next generation.

**REFERENCE: Eagle, L., Hamann, M., & Low, D. R. (2016). The role of social marketing, marine turtles and sustainable tourism in reducing plastic pollution. Marine Pollution Bulletin, 107(2016), 324-332.**

**ABSTRACT:** Environmental plastic pollution constitutes a significant hazard to marine turtles, human health and well-being. We describe a transdisciplinary approach to draw together findings from diverse disciplines in order to highlight key environmental pollution problems and their consequences, together with social marketing-based strategies to address the problems. The example of plastic pollution and impacts to marine turtles illustrates the severity of the problem. Wildlife tourism and sustainable tourism activity have not focussed on specific behaviours to change and have had minimal impact on subsequent human behaviour regarding environmental issues, indicating the need for new strategies. Social marketing principles offer promise, but there is a need to investigate the utility of various theoretical foundations to aid the design and implementation of interventions. We offer insight towards using sophisticated multi-method research to develop insights into behaviours and segmentation-based strategies, that can aid the identification of barriers to, and enablers of, sustained behaviour change.

**REFERENCE: Eckert, K. (2007). How Tourism, Tourists, and Coastal Residents Can Be Stewards of Sea Turtles. *SWOT: The State of the World's Sea Turtles*, 2, 36.**

**ABSTRACT:** Many of the quiet, sandy beaches at which turtles have nested for millennia are some of today's most popular vacation destinations around the globe. Coastal development near sea turtle habitats can be a detriment to the turtles' ancient nesting grounds and the waters in which they live. Improperly managed, tourism destinations can degrade beaches and alter the natural environment on which turtles and other wildlife depend for survival. Thoughtful tourism development and management practices, however, can benefit marine life and bring a whole new level of enrichment to guests.

**REFERENCE: Eckert, K. L., & Grobois, F. A. A. (2001). Proceedings from the Regional Meeting: "Marine Turtle Conservation in the Wider Caribbean Region: A Dialogue for Effective Regional Management", Santo Domingo, Dominican Republic.**

**ABSTRACT:** (abridged) Forty-eight resource managers and scientists from 29 states and territories in the Wider Caribbean Region (WCR) discussed a variety of topics relevant to the management of marine turtles and their habitats. These participants of this meeting have produced this declaration to provide recommendations on the conservation of marine turtles and their habitats in the WCR for consideration by governments, international organizations, non-governmental organizations, academic institutions, and other sectors of society.

**REFERENCE: Finkbeiner, E. M. (2009). *Establishing a Socio-economic Baseline of Sea Turtle Ecotourism in Baja California Sur, Mexico*. (Unpublished master's project). Duke University's Nicholas School of the Environment, Durham, NC.**

**ABSTRACT:** Baja California Sur provides vitally important habitat to five of seven species of sea turtles. All five species have long been subject to direct and indirect exploitation in the region, and federal intervention has largely failed to address conservation goals. A powerful opportunity exists to incentivize sea turtle conservation by means of ecotourism, as locals can use turtles non-consumptively to their socio-economic benefit. However, ecotourism is a complex multi-faceted endeavor built upon a mix of social, economic, and environmental factors. Community participation, a central component of ecotourism, depends on local perceptions and realities, but is often overlooked in ecotourism implementation. The purpose of my research is to describe and contextualize community perception and involvement in sea turtle ecotourism, with existing infrastructure and resources in the region. To achieve this goal, oral surveys, semi-structured interviews, and participant observation techniques were administered in communities throughout Baja California Sur during the summer of 2008. My findings suggest that local perceptions of ecotourism are highly optimistic but vary significantly between communities, as do existing tourism infrastructure and resources. Current local participation is low, but desire to participate is high among communities. Drivers to participate are based on a variety of economic, social and conservation factors. These findings will advise on proper implementation of sea turtle ecotourism in the region in order to maximize community involvement, and will provide a baseline from which to measure future successes and failures of sea turtle ecotourism.

**REFERENCE: Godfrey, M. H., & Drif, O. (2001). Developing Sea Turtle Ecotourism in French Guiana: Perils and Practicalities. *Marine Turtle Newsletter*, 91, 1-4.**

**ABSTRACT:** (abridged) Sea turtle conservation programmes traditionally sought to limit human access and presence on nesting beaches, for example by creating exclusionary parks or by limiting development. However, in the last decade there has been a change in the thinking of many, with increasing interest in augmenting human visitation to nesting beaches in the form of ecotourism. For sea turtles, the relatively easy access to nesting beaches gives an unparalleled opportunity for a close and safe look at a large wild animal which inspires much of the public, and thus can be the focus for the activities that are part of the ecotourism model. Yet when ecotourism is recommended as a proper course of action for sea turtle nesting beaches, there are rarely any guidelines or goals presented by which the success (or failure) of ecotourism ventures can be evaluated. Tourism itself is a dynamic and complex process, which must answer to the vagaries of supply and demand. Encouraging an increase in the number of people in a natural area embodies a number of potentially negative impacts, from environmental degradation to the social disruption of small local communities, that must be taken into consideration, no matter how well-intentioned the initial objectives are for ecotourism. It is within this context that we discuss the potential impact of ecotourism in French Guiana.

**REFERENCE: Harold, S., & Eckert, K. (2005). Endangered Caribbean Sea Turtles: An Educator's Handbook. *Wider Caribbean Sea Turtle Conservation Network (WIDECAST) Technical Report No. 3*. Beaufort, NC.**

**ABSTRACT:** This Handbook is intended to provide a science-based outreach tool that is both Caribbean-focused and aimed at a broad public audience. The Handbook features cross-cutting conservation issues associated with six species of endangered sea turtles, emphasises classroom activities and curriculum units, and provides a unique education tool for conservation and youth groups, park and protected area officers, dive and tour operators, museums and cultural societies, and public awareness programs associated with Fisheries and Forestry departments throughout the region. The Handbook is designed to assist educators by using standard layouts developed for classroom use, including lesson plans, analytical exercises, fact sheets and work sheets, contests and team-building assignments, field and conservation exercises, and suggestions for “enrichment” activities that encourage students to think more deeply about the issues. We hope that through direct participation, students will become familiar with sea turtle biology, including ecological roles, patterns of behavior, and survival needs (food, shelter, nesting beaches); management tools and conservation strategies, including laws and treaties, best practices and policy options (e.g. protected areas, time and area closures, alternative fishing gear technologies); and how to become involved in local management issues, including beachfront lighting, beach clean-ups, coastal care (e.g. bonfires, beach-driving), reporting violations, and basic ‘etiquette’ (e.g. what to do when you encounter a sea turtle).

**REFERENCE: Lake, K. N., & Eckert, K. L. (2008). Reducing Light Pollution in a Tourism-Based Economy, with Recommendations for a National Lighting Ordinance. *Wider Caribbean Sea Turtle Conservation Network (WIDECAST) Technical Report No. 3. Ballwin, MO.***

**ABSTRACT:** Anguilla is a small island in the Caribbean with recovering nesting populations of hawksbill (*Eretmochelys imbricata*), leatherback (*Dermochelys coriacea*) and green (*Chelonia mydas*) turtles. While there is currently a moratorium on sea turtle harvesting until 2020, the Department of Fisheries and Marine Resources is concerned about anthropogenic impacts on nesting habitat. These impacts relate to tourism pressures and include artificial beachfront lighting, largely unconstrained coastal development, and illegal sand mining for construction aggregate. Artificial lighting on beaches can deter gravid females from approaching nesting sites, disrupt and shorten nesting efforts, and inhibit sea-finding mechanisms in both turtles and hatchlings. The majority of light pollution in Anguilla emanates from beachfront tourism-related properties, the most rapidly expanding economic sector on the island. In addition to stakeholder interviews, field work included formal lighting assessments on three hotel properties located on nesting beaches and informal assessments of lighting and other anthropogenic effects on other potential nesting habitat on the island. The project provides recommendations for elements of a Lighting Ordinance, as well as tourism-oriented materials designed to help reduce the impact of the tourism industry on sea turtle nesting habitat in Anguilla.

**REFERENCE: Landry, M. S., & Taggart, C. T. (2009). “Turtle watching” conservation guidelines: green turtle (*Chelonia mydas*) tourism in nearshore coastal environments. *Biodiversity and Conservation, 19*(2010), 305-312.**

**ABSTRACT:** We propose a conservational opportunity for humans to ‘use’ the green turtle (*Chelonia mydas*) in a non-consumptive manner. Although the concept of a social safe-minimum standard analysis, as applied to the sustainability of tourism-dependent turtle watching, has focused on beach-nesting habitats, other tourist activities like diving and snorkelling also occur in shallow coastal habitats frequented by juvenile and adult turtles. When integrated over time, at a specific location, such tourism activities may compromise turtle physiology in a manner that limits conservation goals for the species and hence the tourism. We identify research insights that can be used to achieve a creatively managed tourism—one that allows tourists to observe turtles in their natural coastal habitat in a manner that is commensurate with functional turtle conservation. We propose management options loosely based on whale-watching: i.e. voluntary and/or mandatory regulations based on home-range studies that identify localized temporal and spatial patterns of habitat use exhibited by turtles. We recommend temporally- and spatially-dynamic stratified-random-design tours that exclude critical local (small-scale) habitat and include less-critical habitat on a randomized rotational basis. Practical guidelines for tour operators that are founded on turtle habitat-occupancy patterns may ensure expanded life-history conservation measures and sustainable turtle-watching tourism.

**REFERENCE: Matarasso, M. (2009). *Targeting Behavior: Working with People to Design Conservation Communications Strategies*. Arlington, VA: Conservation International (CI).**

**ABSTRACT:** (abridged) This manual is designed to help conservation practitioners use *Targeting Behavior* to plan and carry out successful communication and education programs that lead to behavior change and conservation results. The manual is divided into three sections. The first section is an overview of the *Targeting Behavior* methodology. The second section describes a case study of a marine program in Raja Ampat, Indonesia, where the methodology was used to develop an education and communication strategy. Examples from this case study are used throughout the manual to show the methodology in practice. Raja Ampat is a rural fishing community, but the methodology is equally applicable to other sectors of society, including corporations, urban groups, and policymakers. The third section of the manual walks you through the steps and tools you will use to identify (1) conservation problems and behaviors, (2) alternatives to those behaviors, (3) ways to overcome barriers, (4) target groups, (5) learning needs, and (6) program activities. This manual will help you develop targeted and effective strategies that affect behavior at its roots and lead to conservation outcomes. For best results, read the entire guide before you start to design your strategy. Remember, the biggest investment you will make to ensure that your program is successful is not financial; it is your investment in understanding why people do what they do. Only then can you help find solutions to environmental problems.

**REFERENCE: Meletis, Z. A., & Harrison, E. C. (2010). *Tourists and Turtles: Searching for a Balance in Tortuguero, Costa Rica*. *Conservation and Society*, 8(1), 26-43.**

**ABSTRACT:** Tourism is seen as an important part of the turtle conservation 'toolbox' that can be used to (1) raise awareness about sea turtles, (2) provide funding for conservation and management, and (3) create 'alternative livelihoods' and revenues for communities who engage(d) in direct consumption or sale of sea turtle products. With some exceptions, however, few studies of sea turtle tourism dedicate adequate attention to the wants, needs, and perceptions of tourists (exceptions include Wilson & Tisdell 2001; Smith 2002; Gray 2003; Meletis 2007; Ballantyne *et al.* 2009). In this paper, we focus on tourist perceptions of turtle tours in Tortuguero, Costa Rica, home to Tortuguero National Park (TNP; est. 1975) and among the oldest turtle tour systems in the world. In 2004, the tour system was changed to mitigate potential negative impacts of tourist activity on nesting turtles. Whereas tourists and their guides once walked the beach 'looking' for nesting turtles, they now wait behind the beach and are radioed by TNP-affiliated 'turtle spotters' when turtles are 'ready' to be viewed. Impact mitigation was the primary motivation for this alteration to the tour system; resulting changes in the nature of the tour were not central considerations. Are the tourists enjoying the new tour format? Do they like/dislike the more passive waiting? Do the tourists know about, and understand the new tour system? In this paper, we address questions such as these, using a sample of 147 tourist surveys collected in 2008. We designed our survey to (1) add to the existing data on tourism in Tortuguero, (2) collect data on tourist perceptions of the (new) tour system, and (3) gauge tourist awareness of the Turtle Spotter Program (TSP) and the reasons for the new turtle tour system. The main purpose of this study was to collect data requested by interested stakeholders, and to consider the results with respect to implications for the future of turtle tour management in the area.

**REFERENCE: Montoya, F., & Drews, C. (2006). *Livelihoods, Community Well-Being, and Species Conservation. A Guide for Understanding, Evaluating and Improving the Links in the Context of Marine Turtle Programs*. San Jose, Costa Rica: World Wildlife Fund (WWF) Central America.**

**ABSTRACT:** (abridged) There is a growing recognition that community livelihoods and well-being are intimately linked to the state of the natural environment, and that each impacts the other. This manual presents a conceptual framework for making the link between marine turtle conservation, community livelihoods, and community well-being. It establishes a methodology for identifying and monitoring the components of, and relationships between, community livelihoods and well-being, and marine turtle conservation. Finally, the manual provides a road map for improving the integration of conservation efforts with progress in community well-being. Environmental conservation and community development practitioners, in particular, may find this document helpful. Marine turtles are chosen throughout the document as a 'golden thread' to illustrate the concept and methodologies, but we believe that this approach is equally valid for community-based projects related to other natural resources.

**REFERENCE: Nahill, B. (2012). *Best Practices for Sea Turtle Conservation Tourism. SWOT: The State of the World's Sea Turtles*, 7, 18-19.**

**ABSTRACT:** (abridged) Conservation tourism has benefited sea turtle programs and local communities in a few places, yet it remains relatively underused as a sea turtle conservation methodology. Tourism can offer people firsthand experiences with nature and with the people and organizations working to protect it. Turtle-based tourism can also have negative impacts if not properly controlled. Best practices for ensuring success in developing or growing a conservation tourism program are discussed.

**REFERENCE: Pegas, F. d. V., Coghlan, A., & Rocha, V. (2012). *An exploration of a mini-guide program: training local children in sea turtle conservation and ecotourism in Brazil. Journal of Ecotourism*, 11(2011), 48-55.**

**ABSTRACT:** This study explores the mini-guide program delivered by the Brazilian Sea Turtle Conservation Program (TAMAR) in the fishing community of Praia do Forte, Bahia, Brazil. Established in 1995, the program lasts one year, training local children, aged 10 to 14 years old, in guiding skills, learn about sea turtles and marine ecosystems. The children also receive a monthly stipend. In-depth semi-structured interviews with 77 local community members were conducted during nine months of ethnographic research to assess perceptions about the program. The interviews also included seven former students who provide an evaluation of the program from their perspective. The results indicate community-wide support for the program, with locals focusing not only greater environmental awareness of the children (or Tamarzinhos, as they are called), but on the personal development as result of participation. Former Tamarzinhos themselves agree with this assessment, and demonstrate knowledge gain and positive behaviour about conservation of marine species, new aspirations towards higher education, greater training and skills acquisition. As such, long-term environmental programs such as the mini-guide program at TAMAR can promote socioeconomic and environmental changes that last throughout their youth and adult lives.

**REFERENCE: Penié, I., Lozano, M., & Slater, K. (2015). Ancient Mayan “Place of the Turtles” Copes with Modern-Day Tourism. *SWOT: The State of the World’s Sea Turtles*, 10, 28-29.**

**ABSTRACT:** Akumal is a small town on the eastern coast of Mexico’s Yucatan Peninsula in the state of Quintana Roo, about 100 kilometers (62 miles) south of the well-known tourism mecca of Cancún. It was the first tourist destination in Quintana Roo, and the name Akumal means “place of the turtles” in the Mayan language. Akumal lives up to its name, not only as a nesting site for four species of turtles, but also as a foraging ground for a sizable population of juvenile green and loggerhead sea turtles. Akumal has gained fame as one of the few places in Quintana Roo, if not in all of Mexico, where observing sea turtles in their natural habitat is guaranteed. Tourists flock to Akumal by the tens of thousands annually. As a result, local sea turtle populations and marine ecosystems are now threatened by the impacts of too much visitation.

**REFERENCE: Sammy, D., Eckert, K., & Harris, E. (2008). *Action Plan for a Sea Turtle Conservation and Tourism Initiative in the Commonwealth of Dominica – A Community Based Approach*. Roseau, Dominica: United States Agency for International Development.**

**ABSTRACT:** (abridged) This Action Plan lays the foundation for a national dialogue that will propel Dominica in a natural evolution from a single sea turtle research and conservation project (the Rosalie Sea Turtle Initiative, or RoSTI) to a coordinated national programme of sea turtle research, conservation, management, and livelihood development. In order to achieve a national Sea Turtle Conservation and Tourism Initiative designed to “enhance the standard of living for persons living in communities near major sea turtle nesting beaches, while at the same time offering greater protection to nesting turtles and their young”, the Action Plan’s recommendations are discussed in this report.

**REFERENCE: Stapleton, S. P., & Eckert, K. L. (2008). *Community-Based Sea Turtle Research and Conservation in Dominica: A Manual of Recommended Practices. Wider Caribbean Sea Turtle Conservation Network (WIDECAST) Technical Report No. 8*. Beaufort, NC.**

**ABSTRACT:** (abridged) This Manual of Recommended Practices is designed to offer guidance to community based organizations involved in sea turtle population monitoring (on nesting beaches), tagging and measuring of sea turtles, characterizing habitat and nest site selection, documenting hatch success, keeping standardized records, and engaging in public education and outreach. The recommendations are based on the experience and success of Dominica’s Rosalie Sea Turtle Initiative (RoSTI), and they follow internationally recognized best practices.



**REFERENCE:** Stewart, K., Norton, T., Mohammed, H., Browne, D., Clements, K., Thomas, K., ... & Horrocks, J. (2016). Effects of "Swim with the Turtles" Tourist Attractions on Green Sea Turtle (*Chelonia mydas*) Health in Barbados, West Indies. *Journal of Wildlife Diseases*, 52(2), S104-S117

**ABSTRACT:** Along the West Coast of Barbados a unique relationship has developed between endangered green sea turtles (*Chelonia mydas*) and humans. Fishermen began inadvertently provisioning these foraging turtles with fish offal discarded from their boats. Although initially an indirect supplementation, this activity became a popular attraction for visitors. Subsequently, demand for this activity increased, and direct supplementation or provisioning with food began. Food items offered included raw whole fish (typically a mixture of false herring [*Harengula clupeiola*] and pilchard [*Harengula humeralis*]), filleted fish, and lesser amounts of processed food such as hot dogs, chicken, bread, or various other leftovers. Alterations in behavior and growth rates as a result of the provisioning have been documented in this population. The purpose of this study was to determine how tourism-based human interactions are affecting the overall health of this foraging population and to determine what potential health risks these interactions may create for sea turtles. Juvenile green sea turtles (n=29) were captured from four sites off the coast of Barbados, West Indies, and categorized into a group that received supplemental feeding as part of a tour (n=11) or an unsupplemented group (n=18) that consisted of individuals that were captured at sites that did not provide supplemental feeding. Following capture, a general health assessment of each animal was conducted. This included weight and morphometric measurements, a systematic physical examination, determination of body condition score and body condition index, epibiota assessment and quantification, and clinical pathology including hematologic and biochemical testing and nutritional assessments. The supplemented group was found to have changes to body condition, vitamin, mineral, hematologic, and biochemical values. Based on these results, recommendations were made to decrease negative behaviors and health impacts for turtles as a result of this provisioning.

**REFERENCE:** Troëng, S., & Drews, C. (2004). *Money Talks: Economic aspects of marine turtle use and conservation*. Gland, Switzerland: World Wildlife Fund (WWF) International.

**ABSTRACT:** (abridged) For thousands of years, marine turtles have provided sustenance to coastal communities around the world. Unfortunately, their populations have declined drastically due to human overexploitation, fisheries by-catch and habitat destruction. Six of seven species are classified by the World Conservation Union (IUCN) as endangered or critically endangered. Marine turtles occur predominantly in developing countries. These countries stand to lose most from continued decline and have most to gain from reversing negative population trends. Economic factors are often behind marine turtle declines. Therefore, we set out to analyze economic aspects of marine turtle use and conservation. Decision-makers defining policies for sustainable economic development and poverty alleviation may incorporate the results of this study as additional criteria to reconcile their agendas with marine turtle conservation goals.

**REFERENCE:** Troëng, S., & Rankin, E. (2005). Long-term conservation efforts contribute to positive green turtle *Chelonia mydas* nesting trend at Tortuguero, Costa Rica. *Biological Conservation*, 121(2005), 111-116.

**ABSTRACT:** Worldwide, green turtle *Chelonia mydas* populations have declined and the species is classified as globally endangered. Tortuguero, Costa Rica, hosts the largest remaining green turtle rookery in the Atlantic basin. Tortuguero green turtles have been hunted since pre-Columbian times. Monitoring and conservation of the green turtle population began in 1955. The long-term efforts provide an excellent opportunity to evaluate the success of sea turtle conservation action and policies. Nest counts conducted 1971–2003 were analyzed to: (1) determine the nesting trend, (2) estimate rookery size and (3) identify events and policy decisions influencing the trend. A nonparametric regression model indicates a 417% increase in nesting over the study period. Rookery size was defined as the mean number of nests 1999–2003 and estimated at 104,411 nests year<sup>-1</sup>, corresponding to 17,402–37,290 nesting females year<sup>-1</sup>. A comparison with 34 index populations verifies Tortuguero as one of the two largest green turtle rookeries worldwide. Events and policy decisions in Costa Rica, Nicaragua, and Panama that comprise the main nesting, feeding and mating grounds for the Tortuguero population are likely to have had the greatest influence on green turtle survivorship. Conservation efforts and policies catalyzing increased hatchling production and decreased adult and juvenile mortality since 1963 have contributed to the positive nesting trend. The trend demonstrates that long-term conservation efforts can reverse nesting declines and offers hope that adequate management can result in recuperation of endangered sea turtle species.

**PART VIII: REFERENCES**

- Abas, N., How, N. C., Chai, Y. S., Jia, K. Y., Marzuki, N. M., Suhaimi, N. A. S. M., ... & Karim, S. A. (2016). *Tourism Policy and Organization: Case Study of Penang National Park*. Paper presented at the 12<sup>th</sup> Biennial Conference of Hospitality and Tourism Industry in Asia, Bandung, Indonesia.
- Agrawal, A., & Gibson, C. C. (1999). Enchantment and Disenchantment: The Role of Community in Natural Resource Conservation. *World Development*, 27(4), 629-649.
- Airaud, B. F., Regalla, A., Barbosa, C., & Betunde, D. (2016). Conservation Progress in the Bijagós Archipelago, Guinea-Bissau. *SWOT: The State of the World's Sea Turtles*, 11, 40-41.
- Álvarez-Varas, R., Petitpas, R., Stowhas, P., & Fuentes-Hurtado, M. (2015). Conservation Research Needs of Easter Island (*Rapa Nui*) Marine Turtles. *Chelonian Conservation and Biology*, 14(2), 184-192.
- Amarasooriya, K. (2001). *The role of sea turtle hatcheries in the conservation of sea turtle fauna of Sri Lanka*. Paper presented at the 21<sup>st</sup> Annual Symposium on Sea Turtle Biology and Conservation, Philadelphia, USA.
- Arraiza, M. P., Cordon, C., Gimenez, M. C., Lopez, J. V., & Garcia, J. L. (2015). *Practical Applications of Ecotourism in Latin America: Kowabunga Ecoproject Association*. Paper presented at the 7<sup>th</sup> International Conference on Education and New Learning Technologies, Barcelona, Spain.
- Bachan, A. (2009). *Position Paper on Sea Turtle Conservation in Trinidad and Tobago*. Paper presented at the International Conference on: "Turtle Conservation, ecotourism and sustainable community development", St. Augustine, Trinidad and Tobago.
- Ballantyne, R., Packer, J., & Hughes, K. (2009). Tourists' support for conservation messages and sustainable management practices in wildlife tourism experiences. *Tourism Management*, 30(2009), 658-664.
- Ballantyne, R., Packer, J., & Sutherland, L. (2011). Visitors' memories of wildlife tourism: Implications for the design of powerful interpretive experiences. *Tourism Management*, 32(2011), 770-779.
- Baver, S. L., & Lynch, B. D. (2006). *Beyond sun and sand: Caribbean environmentalisms*. New Brunswick, NJ: Rutgers University Press.
- Bell, C. D., Blumenthal, J. M., Austin, T. J., Ebanks-Petrie, G., Broderick, A. C., & Godley, B. J. (2009). Harnessing Recreational Divers for the Collection of Sea Turtle Data Around the Cayman Islands. *Tourism in Marine Environments*, 5(4), 245-257.
- Benson, A. (2007). Research Tourism. In M. Novelli (Ed.), *Niche Tourism: Contemporary issues, trends and cases* (pp. 133-142). Abingdon, UK: Routledge.
- Berkes, F. (2004). Rethinking Community-Based Conservation. *Conservation Biology*, 18(3), 621-630.
- Boura, L., Grimanis, K., & Sfyroeras, E. (2014). Economic Recovery Takes its Toll on Mediterranean Loggerheads. *SWOT: The State of the World's Sea Turtles*, 9, 36-37.
- Bräutigam, A., & Eckert, K. L. (2006). *Turning the Tide: Exploitation, Trade and Management of Marine Turtles in the Lesser Antilles, Central America, Colombia and Venezuela*. Cambridge, UK: TRAFFIC International.
- Campbell, L. M. (1999). Ecotourism in Rural Developing Communities. *Annals of Tourism Research*, 26(3), 534-553.
- Campbell, L. M., & Smith, C. (2006). What makes them pay? Values of volunteer tourists working for sea turtle conservation. *Environmental Management*, 38(1), 84-98.

- Campbell, L. M., Gray, N. J., & Meletis, Z. A. (2008). Political ecology perspectives on ecotourism to parks and protected areas. In K. S. Hanna, D. A. Clark, & D. S. Slocombe (Eds.), *Transforming parks and protected areas: Policy and governance in a changing world* (pp. 200-221). New York, NY: Routledge.
- Caric, H., & Mackelworth, P. (2014). Cruise tourism environmental impacts - The perspective from the Adriatic Sea. *Ocean & Coastal Management*, 102(2014), 350-363.
- Carrier, J. G., & Macleod, D. V. L. (2005). Bursting the Bubble: The Socio-Cultural Context of Ecotourism. *Journal of the Royal Anthropological Institute*, 11(2), 315-334.
- Cazabon-Mannette, M., Schuhmann, P. W., Hailey, A., & Horrocks, J. (2017). Estimates of the non-market value of sea turtles in Tobago using stated preference techniques. *Journal of Environmental Management*, 192(2017), 281-291.
- Ceballos-Lascuráin, H. (1996). *Tourism, Ecotourism, and Protected Areas: The State of Nature-Based Tourism Around the World and Guidelines for its Development*. Cambridge, UK: International Union for Conservation of Nature (IUCN).
- Chaverri, D. C. (2001). *Cultural and Economic Roles of Marine Turtles*. Paper presented at the Regional Meeting: "Marine Turtle Conservation in the Wider Caribbean Region: A Dialogue for Effective Regional Management", Santo Domingo, Dominican Republic.
- Choi, G. Y., & Eckert, K. L. (2009). Manual of Best Practices for Safeguarding Sea Turtle Nesting Beaches. *Wider Caribbean Sea Turtle Conservation Network (WIDECAST) Technical Report No. 9*. Ballwin, MO.
- Clovis, T. (2005). *Sea Turtle Manual for Nesting Beach Hotels, Staff, Security and Tour Guides*. Scarborough, Tobago: The Travel Foundation.
- Coghlan, A. (2006). Volunteer tourism as an emerging trend or an expansion of ecotourism? A look at potential clients' perceptions of volunteer tourism organisations. *International Journal of Nonprofit and Voluntary Sector Marketing*, 11(2006), 225-237.
- Colmenares, N. A. (2001). *Open Forum: Strengthening International Cooperation*. Discussion held at the Regional Meeting: "Marine Turtle Conservation in the Wider Caribbean Region: A Dialogue for Effective Regional Management", Santo Domingo, Dominican Republic.
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). (N.d.-a) *How CITES Works*. Retrieved from <https://cites.org/eng/disc/how.php>.
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). (N.d.-b) *Member countries*. Retrieved from <https://cites.org/eng/disc/parties/index.php>.
- Cosijn, R. (1995). Using Sea Turtles for Tourism Marketing. *Marine Turtle Newsletter*, 71, 12-14.
- Cozens, J. (2014). Can Turtle Conservation and Tourism Development Coexist in Cabo Verde? *SWOT: The State of the World's Sea Turtles*, 9, 40-41.
- Davenport, J., & Davenport, J. L. (2006). The impact of tourism and personal leisure transport on coastal environments: A review. *Estuarine, Coastal and Shelf Science*, 67(2006), 280-292.
- Dehoorne, O., & Augier, D. (2011). Toward a New Tourism Policy in the French West Indies: The End of Mass Tourism Resorts and a New Policy for Sustainable Tourism and Ecotourism. *Études caribéennes*, 19. Retrieved from <http://etudescaribeennes.revues.org/5262>.
- Denkinger, J., Parra, M., Muñoz, J. P., Carrasco, C., Murillo, J. C., Espinosa, E., . . . Koch, V. (2013). Are boat strikes a threat to sea turtles in the Galapagos Marine Reserve? *Ocean & Coastal Management*, 80(2013), 29-35.
- Dias, R. B., Bondioli, A. C. V., & Schlindwein, M. N. (2014). Tourists and Sea Turtles: A First Evaluation of Tourism Potential and Risks in Cananéia, Brazil. *Marine Turtle Newsletter*, 142, 14-17.

- do Sul, J. A. I., Santos, I. R., Friedrich, A. C., Matthiensen, A., & Fillmann, G. (2011). Plastic Pollution at a Sea Turtle Conservation Area in NE Brazil: Contrasting Developed and Undeveloped Beaches. *Estuaries and Coasts*, 34(4), 814-823.
- Dow, W., Eckert, K., Palmer, M., & Kramer, P. (2007). An Atlas of Sea Turtle Nesting Habitat for the Wider Caribbean Region. *Wider Caribbean Sea Turtle Conservation Network (WIDECAST) Technical Report No. 6*. Beaufort, NC.
- Draper, R. (2016, May 7). Watch Florida Sea Turtles Nest on the Beach. *Authentic Florida*. Retrieved from <http://www.authenticflorida.com/articles/where-to-go/watch-florida-sea-turtles-nest-on-the-beach/>.
- Eagle, L., Hamann, M., & Low, D. R. (2016). The role of social marketing, marine turtles and sustainable tourism in reducing plastic pollution. *Marine Pollution Bulletin*, 107(2016), 324-332.
- Eckert, K. L. (2007). How Tourism, Tourists, and Coastal Residents Can Be Stewards of Sea Turtles. *SWOT: The State of the World's Sea Turtles*, 2, 36.
- Eckert, K. L., & Grobois, F. A. A. (2001). Proceedings from the Regional Meeting: "Marine Turtle Conservation in the Wider Caribbean Region: A Dialogue for Effective Regional Management", Santo Domingo, Dominican Republic.
- Finkbeiner, E. M. (2009). *Establishing a Socio-economic Baseline of Sea Turtle Ecotourism in Baja California Sur, Mexico*. (Unpublished master's project). Duke University's Nicholas School of the Environment, Durham, NC.
- Foroughirad, V., & Mann, J. (2013). Long-term impacts of fish provisioning on the behavior and survival of wild bottlenose dolphins. *Biological Conservation*, 160(2013), 242-249.
- France.fr: Official website for tourism in France. (N.d.). *Martinique Fast Facts*. Retrieved from <http://us.france.fr/en/information/martinique-fast-facts>.
- Frazer, N. B. (1989). *Management options: a philosophical approach to population models*. Paper presented at the Second Western Atlantic Turtle Symposium, Mayaguez, Puerto Rico.
- Frazer, N. B. (2001). *Management and Conservation Goals for Marine Turtles*. Paper presented at the Regional Meeting: "Marine Turtle Conservation in the Wider Caribbean Region: A Dialogue for Effective Regional Management", Santo Domingo, Dominican Republic.
- Frazer, N. B., & Ladner, R. C. (1986). A Growth Curve for Green Sea Turtles, *Chelonia mydas*, in the US Virgin Islands, 1913-14. *Copeia*, 1986(3), 798-802.
- Frazier, J. G. (2001). *General Natural History of Marine Turtles*. Paper presented at the Regional Meeting: "Marine Turtle Conservation in the Wider Caribbean Region: A Dialogue for Effective Regional Management", Santo Domingo, Dominican Republic.
- Gerigny, O., Delaugerre, M., & Cesarini, C. (2016). Love is a Losing Game. Loggerhead Turtle in Corsica vs. Tourism = Nesting Failure. *Marine Turtle Newsletter*, 148, 12-14.
- Godfrey, M. H., & Drif, O. (2001). Developing Sea Turtle Ecotourism in French Guiana: Perils and Practicalities. *Marine Turtle Newsletter*, 91, 1-4.
- Godley, B., & Broderick, A. (1996). Turtles and Tourist Marketing: A British Perspective. *Marine Turtle Newsletter*, 74, 16-17.
- Gray, N. J., & Campbell, L. M. (2007). A Decommodified Experience? Exploring Aesthetic, Economic and Ethical Values for Volunteer Ecotourism in Costa Rica. *Journal of Sustainable Tourism*, 15(5), 463-482.
- Harold, S., & Eckert, K. (2005). Endangered Caribbean Sea Turtles: An Educator's Handbook. *Wider Caribbean Sea Turtle Conservation Network (WIDECAST) Technical Report No. 3*. Beaufort, NC.
- Hayes, C. T., Baumbach, D. S., Juma, D., & Dunbar, S. G. (2016). Impacts of recreational diving on hawksbill sea turtle (*Eretmochelys imbricata*) behaviour in a marine protected area. *Journal of Sustainable Tourism*, 25(2016), 79-95.

- Heppell, S. S., Snover, M. L., & Crowder, L. B. (2003). Sea Turtle Population Ecology. In P. L. Lutz, J. A. Musick, & J. Wyneken (Eds.), *The Biology of Sea Turtles (Vol. 2)* (pp. 275-306). Boca Raton, FL: CRC Press.
- Higgins, B. M. (2003). Sea Turtle Husbandry. In P. L. Lutz, J. A. Musick, & J. Wyneken (Eds.), *The Biology of Sea Turtles (Vol. 2)* (pp. 411-440). Boca Raton, FL: CRC Press.
- Horrocks, J. (2001). *Reducing Threats on Foraging Grounds*. Paper presented at the Regional Meeting: “Marine Turtle Conservation in the Wider Caribbean Region: A Dialogue for Effective Regional Management”, Santo Domingo, Dominican Republic.
- Hughes, K., Packer, J., & Ballantyne, R. (2011). Using post-visit action resources to support family conservation learning following a wildlife tourism experience. *Environmental Education Research, 17*(3), 307-328.
- Jacobson, S. K., & Robles, R. (1992). Ecotourism, Sustainable Development, and Conservation Education: Development of a Tour Guide Training Program in Tortuguero, Costa Rica. *Environmental Management, 16*(6), 701-713.
- James, R., & Melero, D. (2015). Nesting and conservation of the olive ridley sea turtle (*Lepidochelys olivacea*) in playa Drake, Osa Peninsula, Costa Rica (2006-2012). *International Journal of Tropical Biology and Conservation, 63*(2015), 117-129.
- Jorge, M. (2001). *Open Forum: Criteria and Benchmarks for Sustainable Management of Caribbean Marine Turtles*. Discussion held at the Regional Meeting: “Marine Turtle Conservation in the Wider Caribbean Region: A Dialogue for Effective Regional Management”, Santo Domingo, Dominican Republic.
- Kapurusinghe, T. (2012). Turtle night watch nature tourism: Sharing benefits to sustain local community and sea turtles in Rekawa Sanctuary, Sri Lanka. In W. Legrand, C. Simons-Kaufmann, & P. Sloan (Eds.), *Sustainable Hospitality and Tourism as Motors for Development: Case Studies from Developing Regions of the World* (pp. 377-389). Abingdon, UK: Routledge.
- Katselidis, K. A., Schofield, G., Stamou, G., Dimopoulos, P., & Pantis, J. D. (2013). Evidence-based management to regulate the impact of tourism at a key marine turtle rookery on Zakynthos Island, Greece. *Oryx, 47*(4), 584-594.
- Krumholtz, M. (2015, July 19). Playa Hermosa, the unknown turtle-watching haven. *The Tico Times*. Retrieved from <http://www.ticotimes.net/travel/2015/07/playa-hermosa-the-unknown-turtle-watching-haven/>.
- Kutty, R. (2000). Turtles and Tourists – A coastal village in Goa shows the way. *Kachhapa, 3*(2000), 5-7.
- Lake, K. N., & Eckert, K. L. (2008). Reducing Light Pollution in a Tourism-Based Economy, with Recommendations for a National Lighting Ordinance. *Wider Caribbean Sea Turtle Conservation Network (WIDECAST) Technical Report No. 3*. Ballwin, MO.
- Landry, M. S., & Taggart, C. T. (2009). “Turtle watching” conservation guidelines: green turtle (*Chelonia mydas*) tourism in nearshore coastal environments. *Biodiversity and Conservation, 19*(2010), 305-312.
- Lopez, G. G., Saliés, E. d. C., Lara, P. H., Tognin, F., Marcovaldi, M. A., & Serafini, T. Z. (2015). Coastal development at sea turtles nesting ground: Efforts to establish a tool for supporting conservation and coastal management in northeastern Brazil. *Ocean & Coastal Management, 116*(2015), 270-276.
- Luderer, C. (2008). *Developing a Framework to Assess SEE Turtles Ecotourism Ventures*. (Unpublished master’s project). Duke University’s Nicholas School of the Environment, Durham, NC.
- Lyons, K., Hanley, J., Wearing, S., & Neil, J. (2012). Gap Year Volunteer Tourism: Myths of Global Citizenship? *Annals of Tourism Research, 39*(1), 361-378.

- Marcovaldi, M. Â., & dei Marcovaldi, G. G. (1999). Marine turtles of Brazil: the history and structure of Projeto TAMAR-IBAMA. *Biological Conservation*, 91(1999), 35-41.
- Maréchal, L., Semple, S., Majolo, B., & MacLarnon, A. (2016). Assessing the Effects of Tourist Provisioning on the Health of Wild Barbary Macaques in Morocco. *PLoS One*, 11(5).
- Margaritoulis, D. (1990). Successes and Failures: Conservation and Tourism on the Nesting Beaches of Laganas Bay, Zakynthos, Greece, 1989. *Marine Turtle Newsletter*, 49, 13-14
- Marion, J. L., & Reid, S. E. (2007). Minimising Visitor Impacts to Protected Areas: The Efficacy of Low Impact Education Programmes. *Journal of Sustainable Tourism*, 15(1), 5-27.
- Matarasso, M. (2009). *Targeting Behavior: Working with People to Design Conservation Communications Strategies*. Arlington, VA: Conservation International (CI).
- Meadows, D. (2004). Behavior of Green Sea Turtles in the Presence and Absence of Recreational Snorkellers. *Marine Turtle Newsletter*, 103, 1-4.
- Meletis, Z. A. (2007). *Wasted Visits? Ecotourism in Theory vs. Practice at Tortuguero, Costa Rica*. (Unpublished doctoral dissertation). Duke University's Department of Environment, Durham, NC.
- Meletis, Z. A., & Campbell, L. M. (2007). Call It Consumption! Re-Conceptualizing Ecotourism as Consumption and Consumptive. *Geography Compass*, 1/4(2007), 850-870.
- Meletis, Z. A., & Campbell, L. M. (2009). Benevolent and Benign? Using Environmental Justice to Investigate Waste-related Impacts of Ecotourism in Destination Communities. *Antipode*, 41(4), 741-780.
- Meletis, Z. A., & Harrison, E. C. (2010). Tourists and Turtles: Searching for a Balance in Tortuguero, Costa Rica. *Conservation and Society*, 8(1), 26-43.
- Montero, C. G. (2010). *Turtle Islands: endangered species as tourism attractions in Latin America*. Paper presented at the 2<sup>nd</sup> International Conference on Heritage and Sustainable Development, Évora, Portugal.
- Montoya, F., & Drews, C. (2006). *Livelihoods, Community Well-Being, and Species Conservation. A Guide for Understanding, Evaluating and Improving the Links in the Context of Marine Turtle Programs*. San Jose, Costa Rica: World Wildlife Fund (WWF) Central America.
- Mycoo, M. (2006). Sustainable Tourism Using Regulations, Market Mechanisms and Green Certification: A Case Study of Barbados. *Journal of Sustainable Tourism*, 14(5), 489-511.
- Nahill, B. (2012). Best Practices for Sea Turtle Conservation Tourism. *SWOT: The State of the World's Sea Turtles*, 7, 18-19.
- Nichols, W. J., Nahill, B., & Gaskill, M. (2014). *A Worldwide Travel Guide to Sea Turtles*. College Station, TX: Texas A&M University Press.
- Papafitsoros, K. (2015). *In-Water Behaviour of the Loggerhead Sea Turtle (Caretta caretta) Under the Presence of Humans (Homo sapiens) in a Major Mediterranean Nesting Site*. Paper presented at the 35<sup>th</sup> Annual Symposium on Sea Turtle Biology and Conservation, Muğla, Turkey.
- Pegas, F. d. V. (2015). From Dinner Plate to T-shirt Logo: The Changing Role of a Flagship Turtle Species in One of Brazil's Most Popular Tourism Destinations. *Animals and Tourism: Understanding Diverse Relationships*, 67(2015), 240-255.
- Pegas, F. d. V., Coghlan, A., & Rocha, V. (2012). An exploration of a mini-guide program: training local children in sea turtle conservation and ecotourism in Brazil. *Journal of Ecotourism*, 11(2011), 48-55.
- Penić, I., Lozano, M., & Slater, K. (2015). Ancient Mayan "Place of the Turtles" Copes with Modern-Day Tourism. *SWOT: The State of the World's Sea Turtles*, 10, 28-29.
- Pesenti, C. (2014). New Model Melds Conservation, Community, and Business Gains in Mexico. *SWOT: The State of the World's Sea Turtles*, 9, 32-33.

- Peskin, J. D. (2002). *Attitudes of Local Guides Toward Ecotourism, Sea Turtle Conservation, and Guiding in Tortuguero, Costa Rica*. (Unpublished master's thesis). University of Florida's Graduate School, Gainesville, FL.
- Petro, G., & Fletcher, M. (2007). One Small Bag for Tourists Brings Big Benefit. *SWOT: The State of the World's Sea Turtles*, 2, 38.
- Powell, R. B., & Ham, S. H. (2008). Can Ecotourism Interpretation Really Lead to Pro-Conservation Knowledge, Attitudes and Behaviour? Evidence from the Galapagos Islands. *Journal of Sustainable Tourism*, 16(4), 467-489.
- Rathnayake, R. M. W. (2016). 'Turtle watching': A strategy for endangered marine turtle conservation through community participation in Sri Lanka. *Ocean & Coastal Management*, 119(2016), 199-207.
- RED Travel Mexico. (N.d.) *About*. Retrieved from <http://redtravelmexico.com/about/>.
- Reix, M., & Mahir, M. (2016, August 23). Hilton Seychelles Labriz Resort & Spa Recognized for Outstanding Conservation Work by the Seychelles Sea Turtle Committee. *Hilton Hotels and Resorts*. Retrieved from <http://news.hilton.com/index.cfm/news/-hilton-seychelles-labriz-resort-spa-recognized-for-outstanding-conservation-work-by-the-seychelles-sea-turtle-committee?tl=fr>.
- Reynolds, P. C., & Braithwaite, D. (2001). Towards a conceptual framework for wildlife tourism. *Tourism Management*, 22(2001), 31-42.
- Robertson, K., Booth, D. T., & Limpus, C. J. (2016). An assessment of 'turtle-friendly' lights on the sea-finding behaviour of loggerhead turtle hatchlings (*Caretta caretta*). *Wildlife Research*, 43(2016), 27-37.
- Roe, D., Leader-Williams, N., & Dalal-Clayton, B. (1997). *Take Only Photographs, Leave Only Footprints: The Environmental Impacts of Wildlife Tourism*. London, UK: International Institute for Environment and Development (IIED).
- Sammy, D., Eckert, K., & Harris, E. (2008). *Action Plan for a Sea Turtle Conservation and Tourism Initiative in the Commonwealth of Dominica – A Community Based Approach*. Roseau, Dominica: United States Agency for International Development.
- Sanchez, A., Ortiz-Hernández, M. C., Talavera-Sáenz, A., & Aguiñiga-García, S. (2013). Stable nitrogen isotopes in the turtle grass *Thalassia testudinum* from the Mexican Caribbean: Implications of anthropogenic development. *Estuarine Coastal and Shelf Science*, 135(2013), 86-93.
- Scheyvens, R. (2000). Promoting Women's Empowerment Through Involvement in Ecotourism: Experiences from the Third World. *Journal of Sustainable Tourism*, 8(3), 232-249.
- Scheyvens, R. (2002). Backpacker Tourism and Third World Development. *Annals of Tourism Research*, 29(1), 144-164.
- Schofield, G., Scott, R., Katselidis, K. A., Mazaris, A. D., & Hays, G. C. (2015). Quantifying wildlife-watching ecotourism intensity on an endangered marine vertebrate. *Animal Conservation*, 18(6), 517-528.
- Schroeder, B. A. (2001). *Reducing Threats at Nesting Beaches*. Paper presented at the Regional Meeting: "Marine Turtle Conservation in the Wider Caribbean Region: A Dialogue for Effective Regional Management", Santo Domingo, Dominican Republic.
- Senko, J., Schneller, A. J., Solis, J., Ollervides, F., & Nichols, W. J. (2011). People helping turtles, turtles helping people: Understanding resident attitudes towards sea turtle conservation and opportunities for enhanced community participation in Bahia Magdalena, Mexico. *Ocean & Coastal Management*, 54(2011), 148-157.
- Shanker, K., & Pilcher, N. J. (2003). Marine Turtle Conservation in South and Southeast Asia: Hopeless Cause or Cause for Hope? *Marine Turtle Newsletter*, 100, 43-51.

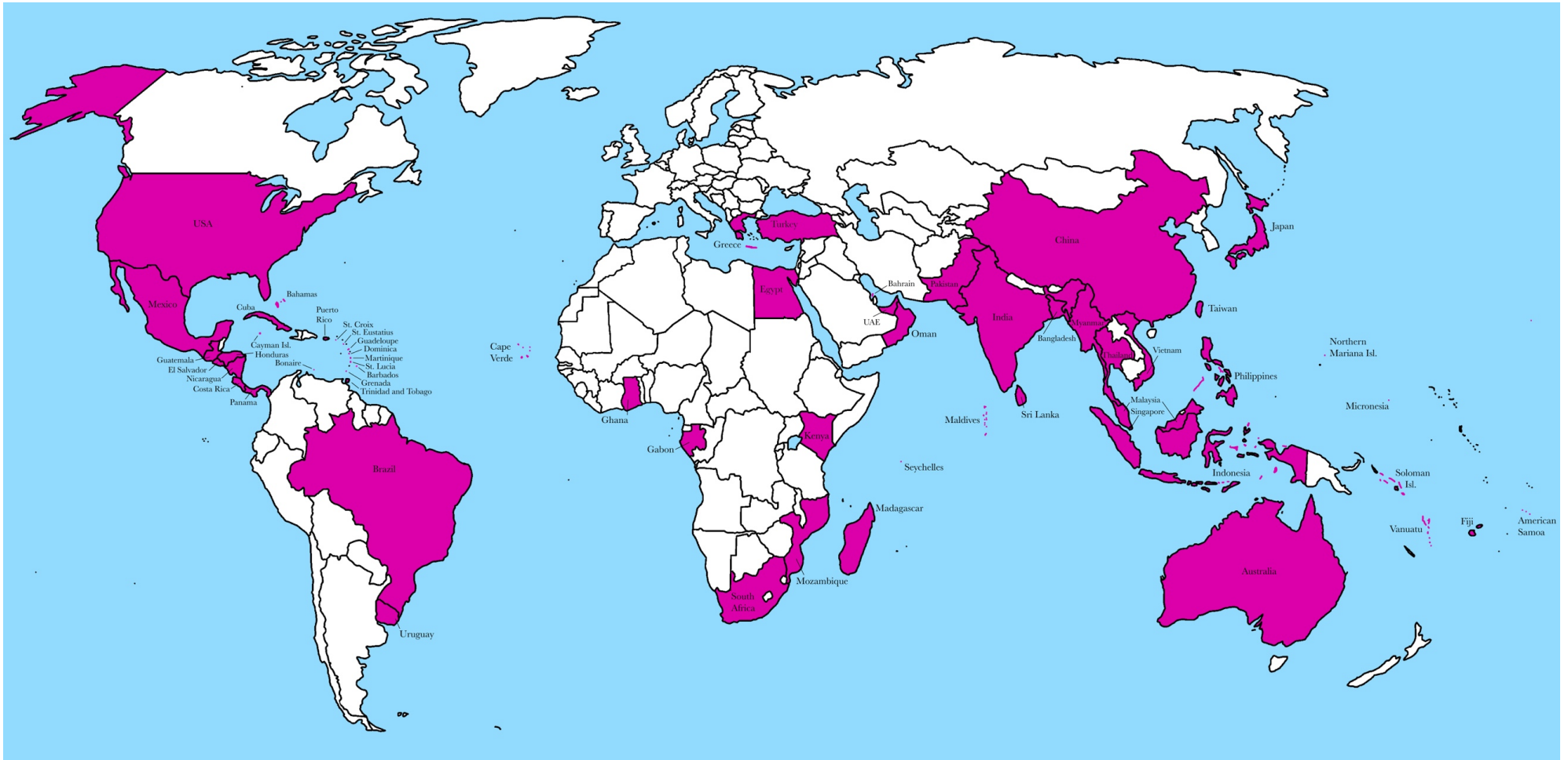


- Slater, K. (2014). Immature Green Sea Turtle Monitoring Report. *Operation Wallacea*. Retrieved from <https://opwall.com/wp-content/uploads/2014-Turtle-Monitoring-Report.pdf>.
- Sorice, M. G., Shafer, C. S., & Ditton, R. B. (2006). Managing Endangered Species Within the Use-Preservation Paradox: The Florida Manatee (*Trichechus manatus latirostris*) as a Tourism Attraction. *Environmental Management*, 37(1), 69-83.
- Stapleton, S. P., & Eckert, K. L. (2008). Community-Based Sea Turtle Research and Conservation in Dominica: A Manual of Recommended Practices. *Wider Caribbean Sea Turtle Conservation Network (WIDECAST) Technical Report No. 8*. Beaufort, NC.
- Stewart, K., Norton, T., Mohammed, H., Browne, D., Clements, K., Thomas, K., ... & Horrocks, J. (2016). Effects of "Swim with the Turtles" Tourist Attractions on Green Sea Turtle (*Chelonia mydas*) Health in Barbados, West Indies. *Journal of Wildlife Diseases*, 52(2), S104-S117.
- Theng, S., Qiong, X., & Tatar, C. (2015). Mass Tourism vs Alternative Tourism? Challenges and New Positionings. *Études caribéennes*, 31-32. Retrieved from <http://etudescaribeennes.revues.org/7708>.
- Tisdell, C., & Wilson, C. (2001a). Ecotourism for the survival of sea turtles and other wildlife. *Biodiversity and Conservation*, 11(2002), 1521-1538.
- Tisdell, C., & Wilson, C. (2001b). Wildlife-based tourism and increased support for nature conservation financially and otherwise: evidence from sea turtle ecotourism at Mon Repos. *Tourism Economics*, 7(3), 233-249.
- Tisdell, C., & Wilson, C. (2003). *Does Ecotourism Contribute to Sea Turtle Conservation? Is the Flagship Status of Turtles Advantageous?* (Working paper). University of Queensland's School of Economics, Brisbane, Australia.
- Tisdell, C., & Wilson, C. (2005). Do Open-Cycle Hatcheries Relying on Tourism Conserve Sea Turtles? Sri Lankan Developments and Economic-Ecological Considerations. *Environmental Management*, 35(4), 441-452.
- Tisdell, C., & Wilson, C. (2012). *Nature-based Tourism and Conservation: New Economic Insights and Case Studies*. Cheltenham, UK: Edward Elgar Publishing.
- Troëng, S., & Drews, C. (2004). *Money Talks: Economic aspects of marine turtle use and conservation*. Gland, Switzerland: World Wildlife Fund (WWF) International.
- Troëng, S., & Rankin, E. (2005). Long-term conservation efforts contribute to positive green turtle *Chelonia mydas* nesting trend at Tortuguero, Costa Rica. *Biological Conservation*, 121(2005), 111-116.
- United Nations World Tourism Organization (UNWTO). (2003). *Sustainable Development of Ecotourism. A Compilation of Good Practices in SMEs*. Madrid, Spain: UNWTO.
- United Nations World Tourism Organization (UNWTO). (2014, February). *Glossary of tourism terms*. Retrieved from: <http://cf.cdn.unwto.org/sites/all/files/Glossary+of+terms.pdf>.
- Vieitas, C. F., & Marcovaldi, M. Â. (1997). An Ecotourism Initiative to Increase Awareness and Protection of Marine Turtles in Brazil: the Turtle by Night Program. *Chelonian Conservation and Biology*, 2(4), 607-610.
- Waayers, D. (2006). Potential for developing marine turtle tourism as an alternative to hunting in Bali, Indonesia. *Indian Ocean Turtle Newsletter*, 4, 12-14.
- Waayers, D., Newsome, D., & Lee, D. (2006). Observations of Non-Compliance Behaviour by Tourists to a Voluntary Code of Conduct: A Pilot Study of Turtle Tourism in the Exmouth Region, Western Australia. *Journal of Ecotourism*, 5(3), 211-222.
- Wallace, B. P., Lewison, R. L., McDonald, S. L., McDonald, R. K., Kot, C. Y., Kelez, S., ... & Crowder, L. B. (2010). Global patterns of marine turtle bycatch. *Conservation Letters*, 3(2010), 131-142.

- Waylen, K. A., McGowan, P. J. K., Pawi Study Group, & Milner-Gulland, E. J. (2009). Ecotourism positively affects awareness and attitudes but not conservation behaviours: a case study at Grande Riviere, Trinidad. *Oryx*, 43(3), 343-351.
- Weiler, B., & Richins, H. (1995). Extreme, extravagant and elite: a profile of ecotourists on Earthwatch expeditions. *Tourism Recreation Research*, 20(1995), 29-36.
- Williams, S. L. (1988). *Thalassia testudinum* productivity and grazing by green turtles in a highly disturbed seagrass bed. *Marine Biology*, 98(1988), 447-455.
- Wilson, C., & Tisdell, C. (1999). Sea turtles as a non-consumptive tourism resource especially in Australia. *Tourism Management*, 22(2001), 279-288.
- Wilson, C., & Tisdell, C. (2003). Conservation and Economic Benefits of Wildlife-based Marine Tourism: Sea Turtles and Whales as Case Studies. *Human Dimensions of Wildlife*, 8(1), 49-58.
- Zeppel, H., & Muloin, S. (2009). Conservation and Education Benefits of Interpretation on Marine Wildlife Tours. *Tourism in Marine Environments*, 5(2-3), 215-227.
- Zug, G. R., Kalb, H. J., & Luzar, S. J. (1996). Age and Growth in Wild Kemp's Ridley Seaturtles *Lepidochelys kempi* from Skeletochronological Data. *Biological Conservation*, 80(1997), 261-268.

**APPENDIX**

**Figure A-1. Map of countries and territories (n=59) where sea turtle tourism (STT) has been documented in the literature. Further details are provided in Table A-1.**



**Table A-1. Locations and types of sea turtle tourism (STT) occurring globally, as documented in the literature.**

← Region	Country	Location/ Province	Program/Park/ Village Name	STT (nesting)	STT (in water)	STT (hatcheries)	Ecotourism	Voluntourism	Add-On Tourism	NGOs/Departments Involved	Source	
Africa	Cape Verde	Boa Vista Isl.	Sal Rei	X			X	X		Turtle Foundation	Nichols et al., 2014	
		Sal Isl.	Santa Maria	X		X	X	X		SOS Tartarugas	Nichols et al., 2014	
	Gabon	Estuaire	Pongara Nat'l Park	X			X			Gabon Sea Turtle Partnership	Nichols et al., 2014	
		Nyanga	Gamba Protected Areas	X			X			Gabon Sea Turtle Partnership	Nichols et al., 2014	
	Ghana	Central	Winneba	X			X			Ghana Wildlife Division	Nichols et al., 2014	
	Kenya	Coastal	Malindi Marine Nat'l Park; Kisite-Mpunguti Marine Nat'l Park; Watamu Turtle Watch; Lamu; Takaungu; Ungwana Bay	X		X	X	X		Kenya Wildlife Service; Local Ocean Trust; Lamu Marine Conservation Trust	Nichols et al., 2014; Tisdell & Wilson, 2012	
	Madagascar	Atsimo- Andrefana	Morombe			X					Tisdell & Wilson, 2012	
	Mozambique	Vamizi Island	Malaune Project	X			X			WWF Mozambique	Nichols et al., 2014	
	Seychelles	Various							X		Troëng & Drews, 2004	
South Africa	KwaZulu- Natal	iSimangaliso Wetland Park	X			X		X	Ezemvelo KZN Wildlife	Nichols et al., 2014; Tisdell & Wilson, 2012; Troëng & Drews, 2004		
Asia	Bahrain	Hawar Isl.	Hawar Isl. Protected Area	X						National Commission for Wildlife Protection (NCWP)	Tisdell & Wilson, 2012	
	Bangladesh	St. Martin's Isl.	Cox Bazar Sea Turtle Hatchery			X				Marinelife Alliance	Tisdell & Wilson, 2012	
	China	S. China Sea	Spratly Isl.; Pratas Isl.			X					Tisdell & Wilson, 2012	
	India	Andaman & Nicobar Isl.		X		X						Tisdell & Wilson, 2012
		Gujarat	Madhavpur Beach			X						Tisdell & Wilson, 2012
		Karnataka	Apsarkonda; Kumta; Kundapur			X	X	X			Field Services; Intercultural Learning of India	Tisdell & Wilson, 2012
		Odisha	Rushikulya River	X			X				Rushikulya Sea Turtle Protection Committee	Nichols et al., 2014; Tisdell & Wilson, 2012
Tamil Nadu	Chennai				X					Tisdell & Wilson, 2012		

← Region	Country	Location/ Province	Program/Park/ Village Name	STT (nesting)	STT (in water)	STT (hatcheries)	Ecotourism	Voluntourism	Add-On Tourism	NGOs/Departments Involved	Source	
Asia	Japan	E. China Sea	Ishigaki Isl.; Yakushima Isl.	X		X					Tisdell & Wilson, 2012	
	Malaysia	Melacca	Padang Kemunting Sea Turtle Sanctuary	X		X					Padang Kemunting Turtle Management Centre	Tisdell & Wilson, 2012
		Penang	Penang Turtle Sanctuary	X		X	X				Dept. of Wildlife & Nat'l Parks	Abas et al., 2016
		Sabah	Turtle Isl. Borneo Park; Layang Isl. Resort, Sipadan Isl. Turtle Hatchery, Lankayan Isl.	X	X	X					Board of Trustees of the Sabah Parks (Sipaden)	Tisdell & Wilson, 2012; Troëng & Drews, 2004
		Terengganu	Rantau Abang; Ma'Daerah Turtle Sanctuary; Redang Isl. Turtle Sanctuary	X		X	X				Turtle & Marine Ecosystem Center; Ma'Daerah Working Committee; Turtle Conservation Society of Malaysia	Tisdell & Wilson, 2012; Troëng & Drews, 2004
	Maldives	Ari Atoll; Malé Atoll	Maldivian Sea Turtle Conservation Program		X	X					Marine Savers	Tisdell & Wilson, 2012
	Oman	Ras al Hadd	Ras Al Jinz Turtle Reserve	X		X	X				Oman Tourism Development Co.	Nichols et al., 2014; Tisdell & Wilson, 2012; Troëng & Drews, 2004
	Pakistan	Karachi	Sandspit, Hawkesbay Beach	X							Sindh Wildlife Dept.; WWF	Tisdell & Wilson, 2012
	Sri Lanka	Hambantota District	Sea Turtle Hatcheries (Rekawa, Wellodaya, Kahandamodara, Kaluwamodara, Yala)	X			X				Turtle Watch Rekawa	Kapurusinghe, 2012; Rathnayake, 2016; Tisdell & Wilson, 2012; Troëng & Drews, 2004
	Taiwan	PengHu Isl.	Wan-An Isl.				X				National Taiwan Ocean Univ.	Tisdell & Wilson, 2012
		Taipei	Wenshan District				X				Taipei Zoo	Tisdell & Wilson, 2012
		Taitung	Lanyu Isl.				X				National Taiwan Ocean Univ.	Tisdell & Wilson, 2012
	Thailand	Andaman Sea	Koh Khao Isl.; Koh Phra Thong Isl.; Phi Isl.; Similan Isl. Nat'l Park; Mu Ko Surin Nat'l Park	X	X	X					Dept. of Nat'l Parks, Wildlife and Plant Conservation	Tisdell & Wilson, 2012
	UAE	Abu Dhabi	Saadiyat Isl.			X						Tisdell & Wilson, 2012
	Vietnam	Binh Thuan	Hon Cau Isl.			X						Tisdell & Wilson, 2012
Con Dao Isl.		Bay Canh Isl.	X							Con Dao Nat'l Park Office	Tisdell & Wilson, 2012	

← Region	Country	Location/ Province	Program/Park/ Village Name	STT (nesting)	STT (in water)	STT (hatcheries)	Ecotourism	Voluntourism	Add-On Tourism	NGOs/Departments Involved	Source	
Caribbean	Barbados	Cave Hill	Barbados Sea Turtle Project	X	X		X	X		Univ. of West Indies	Colmenares, 2001; Stewart et al., 2016; Troëng & Drews, 2004	
	Bahamas	Various							X		Jorge, 2001	
	Bonaire	Various			X				X		Bräutigam & Eckert, 2006	
	Cayman Isl.	Grand, Little Cayman	Caribbean Turtle Watch		X		X	X			Turtles in the Caribbean Overseas Territories (TCOT)	Bell et al., 2009
		West Bay	Cayman Isl. Turtle Farm				X				Cayman Turtle Centre	Tisdell & Wilson, 2005
	Cuba	Cayo Largo	Cayo Largo Hatchery	X		X	X		X			Nichols et al., 2014
		Guanahacabibes	Guanahacabibes Sea Turtle Project	X	X					X	Ocean Foundation	Nichols et al., 2014
	Dominica	Londonderry Beach	Sea Turtle Conservation and Tourism Initiative	X		X	X				Dominica Sea Turtle Conservation Organisation (DomSeTCO); Rosalie Sea Turtle Initiative (RoSTI)	Bräutigam & Eckert, 2006; Nichols et al., 2014; Sammy et al., 2008
	Grenada	Levera Beach	Working Abroad	X			X	X			Ocean Spirits	Nichols et al., 2014
	Guadeloupe	Various		X	X				X	Marine Turtle Network of Guadeloupe	Z.A. Meletis, pers. comm., 4 Mar. 2016	
	Martinique	Various		X	X				X	Marine Turtle Network of Martinique	Z.A. Meletis, pers. comm., 4 Mar. 2016	
	Puerto Rico	Luquillo	NE Ecological Corridor Nature Reserve	X			X				Sierra Club; Luquillo Sunrise Beach Inn	Nichols et al., 2014
		Maunabo	Playa Maunabo	X			X				Amigos de las Tortugas Marinas (ATMAR); Mauna Caribe Hotel	Nichols et al., 2014
	St. Croix	East End	Jack & Isaac's Bay Presv.	X			X	X			The Nature Conservancy	Nichols et al., 2014
		West End	Sandy Point Nat'l Wildlife Refuge	X			X	X			Sandy Point Leatherback Sea Turtle Project	K. Stewart, pers. comm., 27 Mar. 2017
St. Eustatius	Various	St. Eustatius Nat'l Marine Park; Quill Nat'l Park	X	X		X	X			St. Eustatius Nat'l Parks (STENAPA)	Nichols et al., 2014	
St. Lucia	Dauphin Quarter	Grand Anse	X			X				Desbarras Sea Turtle Watch Group (DSTWG)	Bräutigam & Eckert, 2006	

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Caribbean	Trinidad and Tobago	Tobago	Black Rock	X			X	X		SOS Tobago	Bachan, 2009; Clovis, 2005; Nichols et al., 2014; Troëng & Drews, 2004; Waylen et al., 2009
		Trinidad	Grande Riviere; Matura	X			X	X		Grande Riviere Nature Tour Guide Association; Nature Seekers; Earthwatch	Nichols et al., 2014; Troëng & Drews, 2004
Central America	Costa Rica	Guanacaste	Guanacaste Nat'l Park; Playa Grande; Playa Ventanas; Playa Langosta; Ostional Wildlife Refuge; Tamarindo; Las Baulas Nat'l Marine Park; Playa Corozalito; Punta Islita; Junquillal	X	X	X	X	X	X	Leatherback Trust; Working Abroad; Programa Restauración de Tortugas Marinas (PRETOMA)	Campbell, 1999; Montoya & Drews, 2006; Nichols et al., 2014; Tisdell & Wilson, 2012; Troëng & Drews, 2004
		Limón	Tortuguero Nat'l Park (Turtles of Tortuguero Research Participant Program); Parismina; Gandoca (Sea Turtle Conservation Project Volunteer Programme); Cahuita Nat'l Park; Las Tortugas Research Station; Pacuare Beach	X		X	X	X		Asociación ANAI; SEEtheWILD; EcoTech; Caribbean Conservation Corporation (CCC)	Campbell & Smith, 2006; Gray & Campbell, 2007; Meletis, 2007; Montoya & Drews, 2006; Nichols et al., 2014; Peskin, 2002; Troëng & Drews, 2004
		Puntarenas	Quepos; Punta Banco; Golfito; San Lucas Isl.; Matapalo; Corcovado National Park; Osa In-Water Project; Drake Bay	X	X	X	X	X		Osa Conservation; ACOTPRO (Asociación Conservacionista para la Protección de la Tortuga Marina del Progreso)	James & Melero, 2015; Nichols et al., 2014; Tisdell & Wilson, 2012; Troëng & Drews, 2004

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Central America	El Salvador	Usulután	Bahia Jiquilisco Biosphere Presv., Eastern Pacific Hawksbill Initiative (ICAPO)	X		X	X	X		SEetheWILD; EcoViva	Nichols et al., 2014
	Guatemala	Jutiapa	La Barrona Hatchery	X		X	X	X		Project Parlama	Nichols et al., 2014; Tisdell & Wilson, 2012
		Santa Rosa	Monterrico; Las Lisas; El Rosario Hatchery; Hawaii Park	X		X	X	X		ARCAS	Tisdell & Wilson, 2012
	Honduras	Roatán	Sandy Bay-West End Marine Reserve (SBWEMR)		X				X	Roatán Marine Park (RMP)	Hayes et al., 2016
	Nicaragua	Chinandega	Estero Padre Ramos Nature Reserve	X		X	X	X		Flora & Fauna International (FFI)	Nichols et al., 2014
		Rivas	La Flor Wildlife Refuge, Morgan's Rock Ecolodge	X			X		X	Paso Pacifico; SEetheWILD	Nichols et al., 2014
		S. Caribbean Coast	Pearl Cays Hawksbill Project	X	X		X			Wildlife Conservation Society (WCS)	Nichols et al., 2014
	Panama	Bocas del Toro	Bluff Beach	X			X	X		Smithsonian Tropical Research Institute	Montero, 2010
		Guna Yala	Conservación de las Tortugas Marinas	X	X		X		X		Nichols et al., 2014
	Mediterranean	Egypt	Mediterranean Sea	Alexandria; Zaranik Protected Area			X				Egyptian Environmental Affairs Agency; Alexandria Turtles Rescue Team
Greece		Zakynthos	Nat'l Marine Park of Zakynthos (NMPZ)	X	X				X	WWF Greece	Cosijn, 1995; Nichols et al., 2014; Papafitsoros, 2016; Schofield et al., 2015; Tisdell & Wilson, 2012
		Various	Zakynthos; Peloponnesus; Crete	X	X	X	X	X		Sea Turtle Protection Society of Greece (ARCHELON)	Nichols et al., 2014; Tisdell & Wilson, 2012



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Mediterranean	Turkey	Cirali Beach		X							Tisdell & Wilson, 2012	
		Various	Sea Turtle Hatcheries (Dalyan, Kumluca, Anamur, Kazanlı, Akyatan, Köyceğiz, Fethiye, Gazipaşa, Yumurtalık)			X						Tisdell & Wilson, 2012
North America	Mexico	Quintana Roo	Bahia Tortuga; Cozumel; Ecological Center of Akumal; Cancún Hotel Project; Isla Holbox; Riviera Maya and Tulum Sea Turtle Conservation Program	X	X	X	X	X	X	ProNatura; Flora, Fauna y Cultura	Nichols et al., 2014; Penié et al., 2015; Slater, 2014; Tisdell & Wilson, 2012	
		Jalisco	Puerta Vallarta; Playa Cuixmala	X		X						Tisdell & Wilson, 2012
		Oaxaca	Kowabunga Ecoproject; Mexican Turtle Center	X			X	X				Arraiza et al., 2015; Nichols et al., 2014
		Baja California	Bahia Magdalena (Grupo Tortuguero); Laguna San Ignacio; Rancho Punta San Cristobal; Todos Santos	X	X		X	X			SEE Turtles; RED Sustainable Tourism; Earthwatch; Southern Baja California Association for the Protection of the Environment and the Marine Turtle (ASUPMATOMA); Tortugueros Las Playitas	Nichols et al., 2014; Senko et al., 2011
		Colima	Campamento Tecoman	X			X	X			Projects Abroad	Nichols et al., 2014
		Guerrero	La Tortuga Viva	X			X	X				Nichols et al., 2014
	USA	California	Sea Turtle Restoration Project; Leatherback Watch Program		X		X	X			Turtle Island Restoration Network	Nichols et al., 2014

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North America	USA (cont.)	Florida	Canaveral Nat'l Seashore; Archie Carr Nat'l Wildlife Refuge; Sebastian Inlet State Park; John D. MacArthur Beach State Park; John U. Lloyd Beach State Park; Loggerhead Marinelife Center; Hobe Sound Nature Center; Gumbo Limbo Nature Center; Florida Keys; Dry Tortugas Nat'l Park; St. George Isl.	X	X		X		X	National Park Service (NPS); Florida State Parks	Nichols et al., 2014; Tisdell & Wilson, 2012
	Georgia	Georgia Sea Turtle Center	X			X	X		Georgia State Parks	Nichols et al., 2014	
	Hawaii	Hawaii Volcanoes Nat'l Park; Oahu	X	X		X	X	X	National Park Service (NPS)	Landry & Taggart, 2009; Meadows, 2004; Nichols et al., 2014	
	North Carolina	Bald Head Isl.; Sunset Beach; Ocean Isle Beach; Holden Beach; Pleasure Island; Wrightsville Beach; Cape Hatteras Nat'l Seashore; Pea Isl. Nat'l Wildlife Refuge; Fort Macon State Park; Hammocks Beach State Park	X			X	X	X	Bald Head Isl. Conservancy; Sunset Beach Turtle Watch Program (SSBTWP); Ocean Isle Beach Sea Turtle Protection Organization (OIBSTPO); Holden Beach Turtle Watch; Pleasure Isl. Sea Turtle Project; Wrightsville Beach Sea Turtle Project; National Park Service (NPS), North Carolina State Parks	Nichols et al., 2014; Tisdell & Wilson, 2012	
	South Carolina	Edisto Beach State Park				X		X	South Carolina State Parks	Nichols et al., 2014	
	Texas	Padre Island Nat'l Seashore	X		X	X	X		Kemps Ridley Restoration Project; National Park Service (NPS)	Nichols et al., 2014	

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South America	Brazil	Bahia	Praia do Forte	X		X	X			Projeto TAMAR	Pegas, 2015; Tisdell & Wilson, 2012; Vieitas & Marcovaldi, 1997
		Fernando de Noronha		X			X	X		Projeto TAMAR	Nichols et al., 2014; Troëng & Drews, 2004
		Various		X			X			Projeto TAMAR	Godfrey & Drif, 2001; Marcovaldi & dei Marcovaldi, 1999; Vieitas & Marcovaldi, 1997
	Uruguay	Cerro Verde	Bañados del Este Reserve; Coastal Fringe Biosphere Reserve		X		X	X		Karumbé	Nichols et al., 2014
South Pacific	American Samoa	Various	Nat'l Park of American Samoa; Nat'l Marine Sanctuary of American Samoa		X				X		Nichols et al., 2014
	Australia	Queensland	Mon Repos Conservation Park; Green Island National Park; Other Great Barrier Isl.	X	X		X		X	The Sea Turtle Foundation; Queensland Dept. of Parks & Wildlife	Nichols et al., 2014; Tisdell & Wilson, 2001, 2003, 2012
		Western Australia	Ningaloo Turtle Program	X			X	X		Cape Conservation Group Inc.; WWF Australia; Exmouth Dept. of Parks & Wildlife	Nichols et al., 2014; Waayers et al., 2006
	Fiji	Kadavu Isl.			X				X		Tisdell & Wilson, 2012
		Koro Isl.			X				X		Tisdell & Wilson, 2012
		Various		X							Tisdell & Wilson, 2012
	Indonesia	Aceh	Pulau Banyak; Pulau Bangkaru	X		X	X	X		Yayasan Pulau Banyak	Nichols et al., 2014, Tisdell & Wilson, 2012
		Bali	Turtle Hatchery Pemuteran; Bali Sea Turtle Society Hatchery; Turtle Conservation & Education Center (TCEC)			X				Reef Seen Divers' Resort, Nature Resource Conservation Agency, WWF Indonesia, Bali Sea Turtle Society (BSTS)	Tisdell & Wilson, 2012

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South Pacific	Indonesia (cont.)	East Java	Meru Betiri Nat'l Park	X	X					Ministry of Environment & Forestry	Tisdell & Wilson, 2012	
		Kalimantan	Derawan Isl.			X				Turtle Foundation: Project Indonesia	Tisdell & Wilson, 2012	
		Lesser Sunda Isl.	Komodo Nat'l Park	X	X					Ministry of Environment & Forestry	Tisdell & Wilson, 2012	
		Sulawesi Isl.	Bunaken Marine Park	X	X					Ministry of Environment & Forestry	Tisdell & Wilson, 2012	
		West Papua	Bird's Head Peninsula; Banda Isl.; Kai Kecil	X	X	X	X		X	Bird's Head Leatherback Conservation and Research Program; WWF Indonesia	Tisdell & Wilson, 2012	
	Micronesia	Ulithi Atoll	Ulithi Sea Turtle Conservation Project	X	X		X	X	X	Oceanic Society	Nichols et al., 2014	
	N. Mariana Isl.	LaoLao Bay			X				X		Nichols et al., 2014	
	Philippines	Vigan City	Vigan City Marine Turtle Hatchery			X				Community Environment & Natural Resources Office	Tisdell & Wilson, 2012	
	Singapore	Hantu Isl.	Sea Turtle Conservation Gallery		X						Nanyang Technological Univ.; Underwater World Singapore (UWS)	Tisdell & Wilson, 2012
		Semakau Isl.		X								Tisdell & Wilson, 2012
	Soloman Islands	Arnavon Isl.	Arnavons Community Marine Conservation Area (ACMCA)	X	X		X		X	The Nature Conservancy	Nichols et al., 2014	
Vanuatu	Tanoliu	I'm a Turtle				X		X		Petro & Fletcher, 2007		