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Waking the Giant: community engagement and local environmental attitudes on Andros Island, Bahamas

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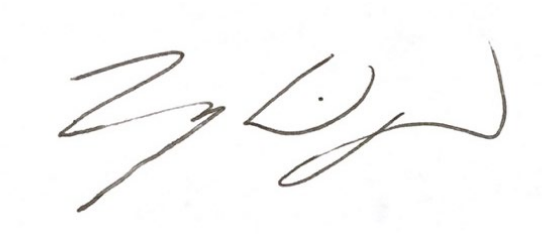

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ABSTRACT OF THESIS submitted by:
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Waking the Giant: community engagement and local environmental attitudes on Andros Island, Bahamas.

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In order to achieve long-term success, conservation projects must have the support of the local communities that are affected by them. Andros Island (Bahamas) bases 67% of its economy on ocean resources, making the successfully-managed ocean conservation a critical part of its development. Without public awareness and support, clashes over access to resources and a loss of trust in conservation may place the natural resources of Andros at risk. This study aims to assess the environmental attitudes of residents of Andros Island towards ocean conservation and their relationships with selected conservation projects on the island. A face-to-face questionnaire was conducted among residents of two voting districts of Andros – North and South Andros – and a combination of quantitative and qualitative analysis was conducted to assess and compare attitudes. Semi-structured interviews and archival research was conducted of conservation groups in the area to gain a more dynamic snapshot of the situation on Andros. Attitudes were neutral-positive in both North and South Andros and were not significantly different. Older residents and men were found to have more positive attitudes towards the ocean. Those with ocean-related occupations were found to be more aware of local ocean health and more frequently reference their own personal historical baselines for fisheries. Residents of both districts expressed high interest in taking a more active role in conservation on the island.

Keywords: environmental attitudes, Andros Island, ocean conservation, Bahamas, NGO-local community relationships

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Table of Contents

List of Tables

List of Figures

List of Abbreviations

ANCAT – Andros Nature Conservancy and Trust
AUTEC – Atlantic Undersea Test and Evaluation Center
BAMSI – Bahamas Agriculture & Marine Science Institute
BCSA – Bahamas Commercial Sponge Association
BNT – Bahamas National Trust
Forfar – Forfar Field Station
IDB – Inter-American Development Bank
masl – metres above sea level
MPA – marine protected area

1. INTRODUCTION

1.1 Conservation and community engagement

The presence and management of conservation efforts can have immense impacts on local communities. Ideally, entities involved in conservation become integrated in the fabric of the community as a meaningful and beneficial presence.

Recent trends in such entities indicate that community engagement is an increased focus in many regions, with the hope of developing communities that are enfranchised in the management of their own resources. At the same time, it is critical that communities value their environment and these efforts for them to be effective.

1.2 The Andros context

Andros is largely dependent on ocean-derived resources for its economy and culture. As such, its conservation for future use is critical for the island. However, this requires support and willingness to act on the part of local communities, who are key in maintaining conservation projects. Without public awareness and support, clashes over access to resources, and a loss of trust in conservation may place the natural resources of Andros at risk.

Lack of community investment is a major limiting factor to successfully managed conservation efforts. Therefore, exploring the social context of Andros will aid in unveiling some of the local needs and challenges for ocean conservation. This study aims to understand the attitudes of residents of Andros towards ocean conservation and their relationships with conservation projects on the island.

1.3 Research aims

This study aims to assess the environmental attitudes of residents of Andros towards ocean conservation and its relationship with their awareness of and engagement with conservation efforts on the island. Reviewing selected conservation groups will aid in contextualising results.

The major aims of this study are: to determine the directions and strength of attitudes of local residents, and their relation to conservation engagement, as well as sociodemographic variables such as sex, age, and level of education.

1.4 Thesis structure

A literature review will be presented regarding the background and key concepts of the study. A general overview of conservation and local interactions, including regional-specific aspects, the connections between attitudes and behaviour, the climate and socioeconomic context of Andros, and the details of conservation efforts the island are discussed. Then, the research methodology, study site, and sampling details are outlined.

Next, the results of the study are presented using descriptive statistical analysis. Qualitative findings are also detailed in this section. Then, the results of the study are discussed, and their potential causes considered. Lastly, a summary of the results is offered, and some recommendations outlined based on these results.

2. LITERATURE REVIEW

2.1 Conservation and local interactions

2.1.1 Challenges

Conservation projects face the dual challenge of protecting natural resources and retaining value to local communities. If society values that which is trying to be conserved, the efforts are more likely to succeed (Salafsky 2011). Therefore, the choice of boundaries for conservation projects are often not purely scientific, but rather dependent on practical, legal, and ethical concerns (Salafsky 2011). These concerns are intrinsically tied with the values that local communities assign both to the environment itself and to the work being done (Borrini-Feyerabend 1997). This is particularly true in cases where the area being conserved serves a common pool and necessary resource, such as the ocean (Borrini-Feyerabend 1997).

Education and engagement efforts on the part of conservation groups, such as Non-Government Organizations (NGOs), can be effective in developing a more comprehensive understanding of relationships between human resource use and natural environments (Blum 2009). When local communities are actively engaged in the management of their resources through participation or education, opportunities for successful conservation increase (Borrini-Feyerabend 1997). However, opportunities like these are most effective and likely to be retained when they cater to local demand, including embracing local learning styles and culture (Blum 2009). A clarity in goals and relevance to local communities is key to the success of conservation (Salafsky 2011).

2.1.2 The coastal context

Coastal communities face a number of additional challenges within the conservation field. Aid is often received from numerous international, national, and local fronts, but these typically come in the form of disconnected, short-term (3-5 year) projects that fail to become self-sustaining once external financing runs out (Sale *et al*. 2008). The long-term success of these programmes relies strongly on local perceptions of their necessity and effectiveness, making the creation of positive community opinion almost as if not more critical than the formation of the programme itself (Bennett & Dearden 2014). Coastal communities can manage localized conservation efforts independently or in conjunction with intermediaries to great success, particularly when transparency is given regarding the long-term economic value of the work being done (Agardy 1997). High community involvement in decisionmaking regarding conservation issues can increase the success of a project (Pollnac *et al.* 2001). By failing to include or adapt to local values, voices, and concerns into the conservation dialogue, these projects are ineffective at best and exacerbating at worst, creating mistrust in intermediary institutions and the effectiveness of conservation as a whole (Hayley & Clayton 2003; Bennett & Drearden 2014).

Improved management of conservation projects requires committed backing for environmental protection from the communities that it will affect (Sale *et al.* 2008). Since the ocean serves as both a common-pool (aesthetic, recreation, sport) and necessary (essential protein, livelihood source) resource for many coastal communities, the consultation of local knowledge and attitudes and subsequent

reflection of this in resource management is critical in building this support (Borrini-Feyerabend 1997).

Ocean conservation presents a challenge of shifting baselines, as very little data exists to describe the conditions of marine ecosystems before major human impact (Knowlton & Jackson 2008). As a result, those who manage ocean resources tend to compare the health of stock based on their own personal recollections of past conditions (Pauly 1995). Where baselines can be extrapolated, it is often from historical data regarding individual economically important species such as cod, making the creation of a description of the whole ecosystem difficult (Campbell *et al.* 2009). This can be facilitated by conducting gradient studies on marine ecosystems that are heavily impacted by human presence as opposed to those that are near-pristine due to their remote location or low economic value (Knowlton & Jackson 2008). However, this sort of approach can only assess a general baseline for a given ecosystem and cannot account for unique geographic or climatic factors, localized species, or other aspects that contribute to human population distribution (Knowlton & Jackson 2008).

Local communities that derive all or part of their livelihoods from the ocean can prove to be an important source of information in establishing historical baselines for species and ecosystem health in a particular area (Bender *et al.* 2013). However, this is dependent on generational transfer of information and may lose its value amongst younger members of the community even if all members still recognize a general degradation of ecosystem quality (Bender *et al.* 2013; Turvey *et al.* 2010). Conservation institutions interested in gaining a clearer perspective of marine

ecosystem health may find that community elders, formal or informal, provide the best resources for this type of information (Bender *et al*. 2013).

2.2 Attitudes towards conservation efforts

2.2.1 What are attitudes?

The way that people perceive the world around them is filtered through a socially-shaped worldview. This worldview is composed of ideologies, moral systems, social positions, values, and attitudes, which can vary in the level of specificity to which they mould an individual's perceptions (Hitlin & Pinkston 2013). Attitudes are understood as reflecting positively or negatively on some subject and can be either explicit or implicit. Explicit attitudes are deliberately formed and conscious. They are able to be measured by self-reporting assessments, which rely on the individual's honesty and ability to recall and report them accurately. Implicit attitudes are unconscious biases formulated from an individual's experiences and must be evaluated indirectly. These influence an individual's actions towards and judgement of the subject of the attitude.

Attitudes can be modified by the relevant beliefs a person may hold, including the circumstances surrounding the subject and its relation to the individual's social circle (Hitlin & Pinkston 2013). As they are formed through socialization and experience, attitudes are subject to critique, discussion, and revision as an individual encounters new dialogues (Hitlin & Pinkston 2013). Attitudes with links to a small number of beliefs are relatively easy to change, whereas those with more connections are more immutable and may take decades of continued experiences to change (Heberlein

2012). Those attitudes considered more critical to an individual's sense of identity are most stable over the course of time (Hitlin & Pinkston 2013).

Attitudes imply correspondingly positive or negative behaviour towards the subject. This can be modified by an individual's subjective evaluation of the subject within their social circle and their beliefs connected to the attitude (Hitlin & Pinkston 2013). Explicit attitudes are stronger predictors of behaviour, but their correlation weakens for socially sensitive topics (Hitlin & Pinkston 2013). Implicit attitudes serve as strong predictors when social norms affect these more explicit measures, as they are more isolated from societal pressure. An attitude is better at predicting a behaviour when it is more specific to that behaviour (Heberlein 2012). However, an individual may exhibit behaviours in conflict with their attitudes when outside factors exert enough pressure on them to act contrarily (Heberlein 2012). And, while greater education is associated with more positive environmental attitudes, this does not always translate into behaviour (Moorman 2006).

2.2.2 Attitudes and conservation

There are a number of factors which contribute to forming environmental attitudes. Specific knowledge about environmental issues has a consistent, positive correlation with environmental attitudes (Arcury 1990). Higher levels of ocean literacy are also correlated with more positive attitudes towards environmental conservation (Mogias *et al.* 2015; Greely 2008). In younger populations, women score higher on environmental attitude evaluations that rely on morality and empathy as a primary indicator (Greer 2008), whereas men tend to perform better on knowledge-based

evaluations (Arcucry 1990). However, men are more likely to act on their environmental attitudes via activism or other behaviours (Mohai 1991).

Alienation from the conservation process and concerns about access limitation can produce strong negative attitudes (Suman *et al.* 1999). Perceived unnecessary restrictiveness on the part of MPAs can create negative attitudes amongst populations who fish for sport (Salz & Loomis 2011). Amongst those that fish for their livelihood, however, restrictions on resource access may be accepted if there is a communal memory of fishery decline, or if the benefits of the project are observable (Hamilton 2012). However, active participation in conservation, whether through the policy development process or arranged environmental groups, is correlated with more positive attitudes (Suman *et al.* 1999). There is also a correlation between children being exposed to environmental education and their parents exhibiting more environmental behaviours (Evans *et al.* 2010). However, short-term education may not always be enough to produce measurable effects, as attitudes can take time to shift and reflect in behaviour (Ramsey & Rickson 2010).

2.2.3 Trends in the Bahamas

Conservation efforts in the Bahamas commonly concern the dual elements of fishery overexploitation and tourism (Hayes *et al.* 2015). Amongst Family Islanders (Bahamians that do not live on New Providence or Grand Bahama), a belief that local oceanic conditions were degraded typically corresponded with positive attitudes towards conservation institutions (Broad & Sanchirico 2008). Those that perceived tourism as having a serious negative impact on economically important species such as Queen conch (*Lobatus gigas*) were twice as likely to support additional

conservation efforts as those that did not (Hayes *et al.* 2015). However, where perceived or actual loss of access to natural resources takes place due to conservation efforts, Bahamians expressed resistance and a willingness to violate no-take policies in order to maintain traditional fishing habits (Stoffle & Minnis 2007). It is more likely that ecosystem degradation is credited to pollution or natural events as opposed to local overexploitation of resources (Broad & Sanchirico 2008).

Communities that rely more heavily on tourism for their livelihoods are more likely to support conservation efforts, while those dependent on natural resources are less likely to support them (Broad & Sanchirico 2008). Individuals that derive all or part of their livelihoods from selling natural products are less likely to support conservation efforts (Hayes *et al.* 2015). Public support does not always lead to the implementation of a successful marine protected area (MPA) or conservation policy (Wise 2014). This “paper park” phenomenon, where conservation policies or reserves exist but are ignored or not enforced, can lead to frustration and disillusionment amongst local communities (Hayes *et al.* 2015).

2.2.4 Attitudes summary

There are a number of factors which can influence an individual’s attitudes towards ocean conservation. For a summary of these attributes, see Table 1. Overall trends indicate that increased support for ocean conservation is connected with knowledge and opportunities for increased participation either directly or indirectly through their children/grandchildren. In general, younger people or those who are exposed at a younger age to conservation concepts are more likely to hold positive attitudes towards ocean conservation. Empowerment is also an important factor, particularly

when resources upon which an individual's livelihood depends are in question (Borrini-Feyerabend 1997).

Table 1. Summary of attributes linked to attitudes towards ocean conservation (Ramsey & Rickson 2010; Evans *et al.* 2010; Greely 2008; Suman *et al*. 1999; Salz & Loomis 2011; Mogias *et al.* 2015; Heberlein 2012; Hayes *et al.* 2015; Broad & Sanchirico 2008; Stoffle & Minnis 2007; Hamilton 2012)

More Positive Attitudes	More Negative Attitudes
Male	Female
Younger	Older
Can Swim	Cannot Swim
Higher formal education	Lower formal education
Greater ocean literacy	Lesser ocean literacy
Greater knowledge of environmental issues	Lesser knowledge of environmental issues
Children/grandchildren in environmental education programmes (transferred knowledge)	No children/grandchildren in environmental education programmes
Sense of control/power over the situation	Sense of helplessness or exclusion from the situation
High participation	Sense of frustration or mistrust toward authority
Access to educational resources	Belief in a lack of management
Divers	Low participation
Affiliation with conservation groups	Fishermen
Awareness of a decline in fishery or ocean health	Perceived or actual loss of access to natural resources
Perceived or actual positive impacts of policy on local culture and environment	Concerns that livelihood will be placed at risk
	Concerns that sportfishing will be placed at risk

2.3 Andros

Andros, known colloquially as ‘the Sleeping Giant’ or ‘the Big Yard,’ is an archipelago in the Bahamas that is politically treated as a single island. Covering 5957 km^2, Andros is 167 km long and 64 km wide at its widest point (Figure 1). It is composed of a number of inlets connected by mangrove estuaries and tidal swamps and is divided into three major islands: North Andros, Mangrove Cay, and South Andros. These are separated by wide but shallow saltwater bights that connect Andros’ eastern and western shores.

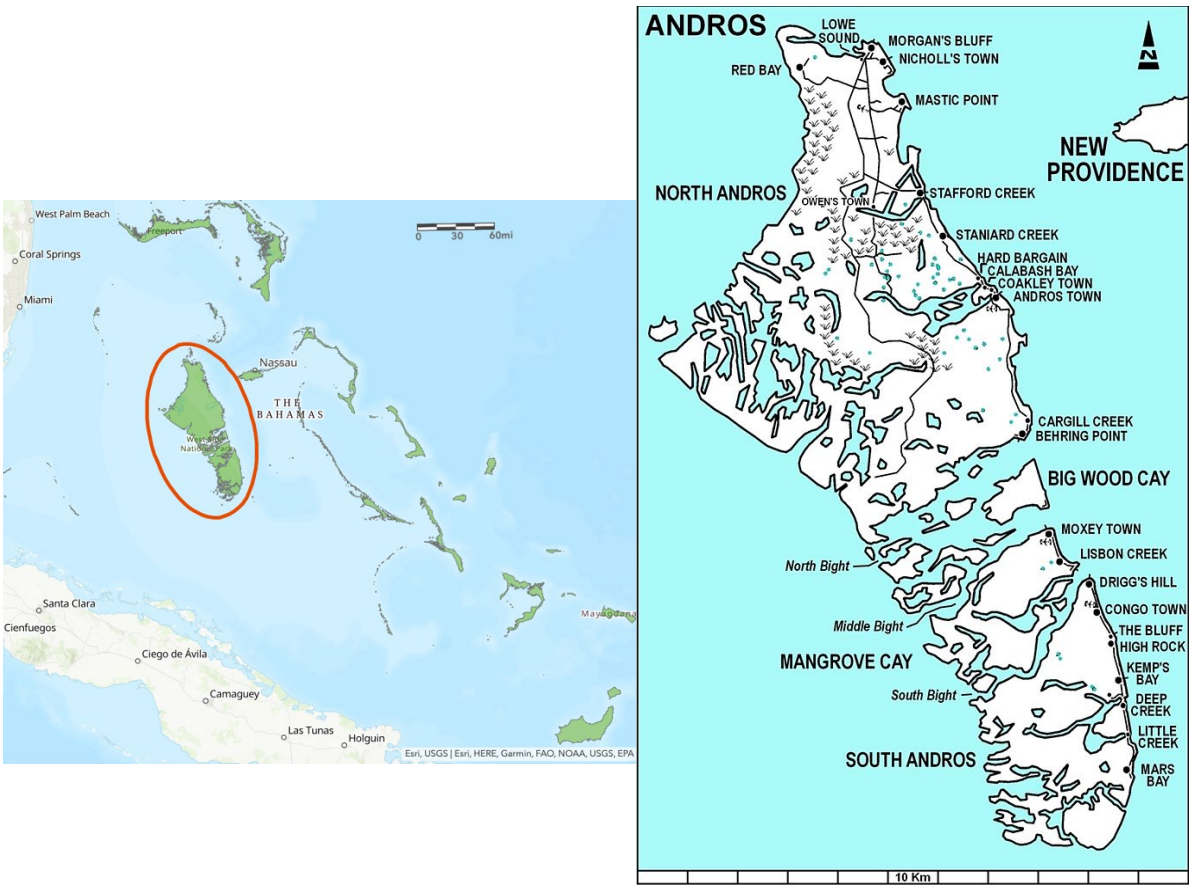

Figure 1. Left: Map of the Bahamas, Andros circled in red (Esri 2018). Right: Map of Andros Island with major settlements highlighted (Geiner 2012).

2.3.1 Geography & climate

The largest of the 700 Bahamian islands, Andros is a sprawling limestone archipelago composed of hundreds of inlets. Most of the island is less than 1 m above sea level (masl), with a strip along the eastern shore that can reach up to 18 masl.

North Andros is home to the largest strand of Bahamian Pineyards, a dense tropical coniferous forest composed primarily of young strands of tall Caribbean pine (*Pinus caribaea* var. *bahamensis*) (Myers *et al*. 2004). In elevated regions and near the shore the Pineyards subside into Bahamian dry forest (coppice), which is tolerant to periodic or regular saltwater flooding (Smith & Vankat 1992). A number of brackish creeks cut deeply inland, the largest of which are at Fresh Creek and Blanket Sound. South Andros is dominantly covered in Bahamian dry forest, which locals refer to as “the bush,” and virgin pine forest. The island is trifurcated by two large creeks, at Little Creek and Deep Creek. The west side of the entire archipelago is virtually untouched by development. Covered in thick bush and mangrove flats, it is protected by the expansive West Side National Park.

To the west and south lies the Great Bahama Bank, a vast, shallow expanse locally referred to as “The Mud.” To the east sprawls the Andros Barrier Reef, the third largest fringing barrier reef on Earth, and the Tongue of the Ocean, a trench that drops to a depth of about 2000m (Bahamas 2017). Although it faces relatively low disturbance, the Andros Barrier Reef has been ranked as impaired for overall reef health (Dahlgren *et al.* 2016). Its fish stocks have also been evaluated as being at high risk of overexploitation should fishing pressures increase (Kramer *et al.* 2003).

The island, as well as the sea surrounding it, is home to the world's densest collection of blue holes, an assortment of caves that cut deep into the limestone of the Great Bahamas Bank (Schwabe & Carew 2006).

Andros has a tropical climate with a hot, wet summer and a mild, dry winter. Mean temperatures remain approximately equal year-round, peaking in the summer at a daily average of 28ºC and reaching lows of 20ºC during the winter months.

2.3.2 Socioeconomic information

Andros is sparsely populated for its size, with a population of 7490 (Bahamas Department of Statistics 2010a). This population is mostly concentrated in settlements along Queen's Highway or in small clusters of households just off of the main road. The majority (79%) of residents have at least a secondary education (Bahamas Department of Statistics 2010a).

As much as 85% of residents derive their primary or secondary incomes from natural resources, of which 67% is directly related to the ocean (Hargreaves-Allen 2010). Many residents of Andros depend on seasonal fisheries such as the Caribbean spiny lobster (*Panulirus argus*), black grouper (*Mycteroperca bonaci*), and blue land crab (*Cardisoma guanhumi*) for both food and economic stability. Year-round fisheries such as the endangered Queen conch (*L. gigas*) and sponging provide a consistent source of income, and much of the catch is sold to export companies or markets in Nassau (Bethell 2017). About $70 million is generated by commercial fishing alone, but the high number of participants in this sector of the economy make individual incomes quite low, especially in sponging (Hargreaves-Allen 2010). Concerns over

the high rates of poverty amongst spongers have led to efforts from the Inter-American Development Bank (IDB) and the Bahamas Commercial Sponge Association (BCSA) to revitalize the industry and enfranchise members of sponging communities through education and the installation of processing equipment (Moreno 2016; Bethell 2017).

Andros' emerging tourism industry has become increasingly important to the island, with about 9000 tourists visiting each year to engage in bonefishing, SCUBA, and other nature-based activities (Delancey 2011). The nature-based tourism industry generates approximately $43.6 million in revenue for the island each year (Hargreaves-Allen 2010). Andros is promoted by the Bahamian national government as the leading site in the Bahamas for ecotourism, with plans to expand the industry further in coming years (Macleod 2010; Commonwealth of the Bahamas 2017; Broad & Sanchirico 2010). As it is a key part of the culture and economy, conservation of Andros' natural resources remains foremost in both the national government and local communities' minds when development is considered (Hayes *et al.* 2014; GEO Bahamas 2005).

2.3.3 Conservation & outreach activity

Conservation activity on Andros is varied and rich. Government presences, including the Local Government of North Andros and South Andros, the Ministry of Tourism, and the Ministry of Agriculture and Marine Resources, and the educational presence of the recently-opened Bahamas Agriculture and Marine Science Institute (BAMSI) are also present on the island and may initiate or partner in outreach efforts. There are also a number of foreign and local non-governmental organizations (NGOs)

currently or historically active on the island. For the purpose of this study, four NGOs have been selected to represent the national, local, and international presences on the island.

The Bahamas National Trust (BNT) is a national NGO established under the 1959 BNT Act that manages the national park system of the Bahamas (BNT 2019a). On Andros, BNT manages five parks, all of which were established in 2002 as part of a widespread initiative to conserve more of the natural resources of the Bahamas (BNT 2019a; BNT 2019b). The largest of these, the West Side National Park, encompasses the entire western half of the island from north to south (6070km^2), and protects a flock of West Indian Flamingo (*Phoenicopterus ruber*), and critical nursery habitat for the bonefish (*Albula vulpes*) and a number of culturally, ecologically, and economically important species. After the establishment and development of the West Side park, extensive surveys of both the land and communities of Andros were conducted to determine more expansive boundaries for the park and a better local understanding of its purpose (International Union for Conservation of Nature 2014). The expansion was completed in 2012.

BNT also provides after-school educational opportunities for elementary and high school students in the public education system on Andros through the Discovery Club programme. Young children engage in outdoor learning and exposure to the parks system, while high schoolers can obtain diving certifications and partake in research (BNT 2019c). During the summer, residents of Andros ages 6-12 can partake in a Safari Summer camp, and any Bahamian youth age 14-16 can partake

in Eco Camp, a joint effort with Forfar Field Station (Forfar) (BNT 2019d; Main, personal communication).

Forfar, active in the area since 1971, is a research and education site in Blanket Sound owned by International Field Studies, a US-based science and education non-profit. Forfar hosts private groups of mostly American students from middle school to university for weeklong cultural and environmental education programmes. Recently they have begun offering scholarship spaces for local children if groups agree (Main, personal communication). They also offer facilitation to permitted researchers who come to the island, including beds and vehicle rentals.

Within the last year, Forfar has greatly expanded their outreach efforts to the residents of Andros. They recently began conducting low-cost swimming lessons for residents ages 13-18 and have paired with the Ministry of Tourism to launch a curriculum on littering in local primary schools, including clean ups on campus (Main, personal communication). Free educational overnight camps for 12th grade students have also recently begun, with the aim of every high school student on Andros eventually having spent at least one night at Forfar. Outreach efforts like these are at times cyclical, dependent on the staff available on site and how events are received by the local community (Main, personal communication).

The Andros Nature Conservancy and Trust (ANCAT) is a grassroots NGO based in Andros Town composed entirely of residents of Andros. They strive to protect and preserve the natural resources of the island by providing a voice for local citizens (ANCAT 2010). ANCAT arranges events for communities, including opportunities to

participate in beach and creek clean ups, mangrove restoration, and environmental education summer camps (ANCAT 2015). School visits have occurred previously, with both in-class and hands-on programmes focused on mangroves and their importance to Andros (ANCAT 2016). ANCAT also caters to visitors to Andros via nature tours and boating excursions (ANCAT 2010). Their work has led to successes like the establishment of the Central Andros National Park, but historically they have been limited by funding (Hargreaves-Allen 2010).

Starting in 2001 and concluding in 2019, Greenforce, a United Kingdom-based NGO, was present on the island at Staniard Creek. Founded as a response to the Rio Summit's call for countries to take stock of their natural resources, Greenforce worked on Andros to survey the reef and create baseline datasets for future conservation action (White & Smith 2010). This was conducted in close consultation with BNT with the purpose of establishing MPAs over critical parts of the Andros Barrier Reef (White & Smith 2010) Volunteers, typically students on a gap year, from any country could apply to become dive certified and trained to conduct surveys on corals, fish, or benthic organisms according to the Atlantic-Gulf Rapid Reef Assessment (AGRRA) protocol (personal observation, Lidyard).

Greenforce's work on Andros also included opportunities for community engagement. This involved both volunteers partaking in education and community events such as beach clean ups and school programmes and training local community members the necessary skills to eventually take over the project (White & Smith 2010).

While conservation efforts have been present on Andros for many years, community engagement is a relatively new development that is still expanding. In addition, much of these efforts are focused on North Andros, where the aforementioned NGOs are based. No research has as of yet been conducted in the area addressing the effects of community engagement on local attitudes. This study aims to contribute to this gap.

3. METHODOLOGY

This study is aimed at assessing attitudes and behaviours towards ocean conservation and their correlation with exposure to conservation activities and sociodemographic factors. It is assumed in this study that the ocean and conservation activities are not socially sensitive topics.

This study uses three techniques to collect data:

1. Face-to-face questionnaires with closed and open questions, on a random sample of adult individuals.
2. Semi-structured interviews with conservation organizations currently or formerly active on Andros.
3. Analysis of available publications from conservation organisations currently or formerly active on Andros.

3.1 Questionnaire

The questionnaire was formally planned and structured by consulting de Vaus (2014). It has a total of 36 items organized into four sections: I. sociodemographic information, II. ocean-related beliefs and attitudes, III. ocean-related activities, and IV. awareness and engagement with conservation groups (Appendix I). These questions were designed to address the relevant factors influencing attitudes towards the ocean, such as frequency of interaction with the ocean, sex, age, level of formal education, and occupation. Personal communication with conservation organizations and research into their work also influenced the final set of items.

The first section has closed questions on general sociodemographic data (sex, age, occupation, level of education), and open questions regarding place of residence and occupation. The second section has open and closed question pertaining to participant's ocean-related beliefs and attitudes, including ocean health, important species, and feelings. The third section contains closed questions regarding the different activities and frequency participants may engage with the ocean. Some open questions in the third section may be prompted depending on a participant's answers to filter questions. For instance, if a participant answers 'yes' to being able to swim, it is then asked how they learned. The final section contains open and closed questions about their knowledge and participation in conservation activities. As in section three, open-ended questions can be prompted depending on their answers to filter questions. For instance, if a participant answers 'yes' to if they have participated in an education programme, they are asked where and for approximately how long.

3.2 Study Area

Andros was selected amongst the Bahamian islands as an ideal place of study as its bights naturally divide the island into isolated subcommunities.

For the purpose of this study, two of the four voting districts of Andros were selected: North Andros and South Andros (Figure 2). These were chosen due to their accessibility and location in relation to active conservation groups on the island, which are mostly present in North Andros. Andros is heavily fragmented and though regarded by the national government as a single island is actually an archipelago. Travel between the various islands can be expensive, irregular, and indirect, limiting the exchange of information and lessening the likelihood of exposure to or

awareness of the activities of conservation groups on parts of the island where they are not active.

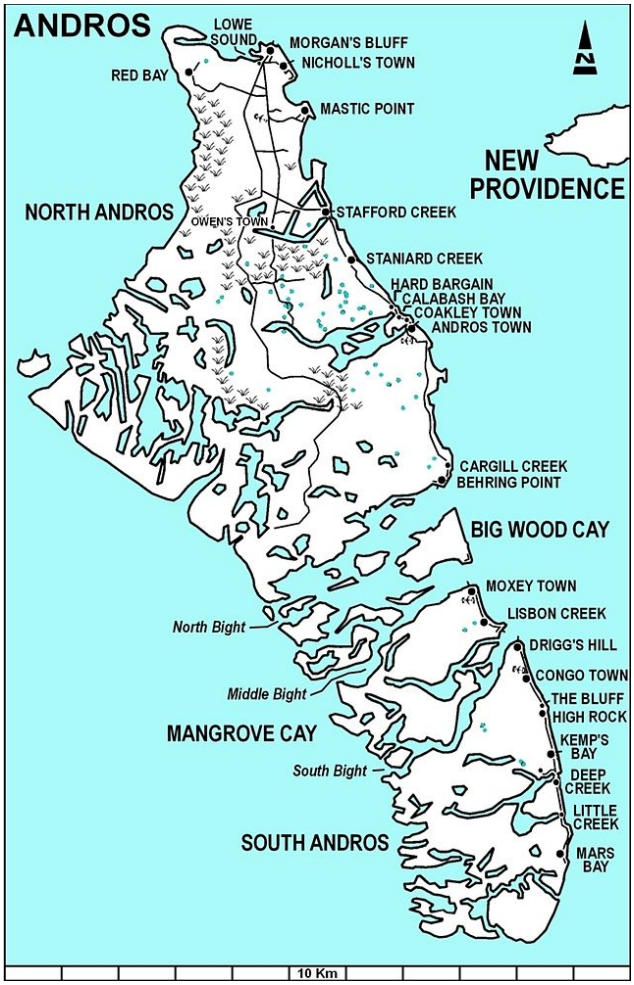

Figure 2. Map of Andros Island, showing major settlements (Greiner 2012)

North Andros is where the field stations and main offices of several conservation groups are located. International Field Station (IFS) has operated Forfar Field Station in Blanket Sound since 1977, and Greenforce operated a research and eco-volunteering base in Staniard Creek for twelve years, closing in early 2019. The main offices of BNT and ANCAT are also located in North Andros. All settlements in this district are accessible by the main road, Queen's Highway, and only one – Red Bays – is located on the western side of the island. North Andros is the most populated of the four districts, with a population of 3898 that is spread out in a number of small,

tight-knit settlements (Bahamas Department of Statistics 2010b). Home to several luxury resorts and smaller hotels popular among snorkelers and divers, North Andros has a budding ecotourism industry, though small in scale compared to other Bahamian islands. It is historically known for its fishing and sponging industry.

South Andros is the southernmost main island of Andros. As the landmass is fragmented, South Andros is only accessible from the other districts by boat or airplane, and there is no regular, public route by which it can be directly accessed from North Andros. It is the second most populated of the four districts, with a population of 1651 that is, like North Andros, primarily clustered in settlements along Queen's Highway on the eastern shore of the island (Bahamas Department of Statistics 2010c). South Andros is home to a number of bonefishing lodges and is famous for its rich bonefish (*A. vulpes*) flats, which bring in a modest but profitable number of tourists. It is primarily known for and supported by its seasonal fisheries of traditional Bahamian delicacies such as the blue land crab (*C. gunahumi*) and Queen conch (*L. gigas*).

3.3 Population Sampling

The questionnaire was administered to a total of 111 households, 62 on North Andros and 49 on South Andros. Of the surveys collected, 4 from North Andros were incomplete, and 3 too incomplete to be used. The 108 viable surveys yield a confidence level of 95% and a confidence interval of 9.13. For details regarding the population and sampling, see Table 2.

Table 2. District populations and sample (Bahamas Department of Statistics 2010a; 2010b; 2010c)

District	*Population*	*Occupied Households*	*Surveyed Households*
North Andros	3898	1189	59
South Andros	1651	506	49
Total	7490	1695	108

Households were randomly selected using available satellite imagery to identify residential areas and individual houses were randomly tagged. An adult from the selected household was invited to voluntarily participate in the survey. Participants were informed of their rights according to CEU ethics protocol, and of the nature of research and affiliations of the researcher. Research permits granted by the Bahamas Environment, Science and Technology (BEST) Commission were made available upon request. When no one was present at the selected home, or when a residence was inaccessible, the residence two over from it on the left was selected. If this house did not respond, it was marked as a non-response.

3.4 Semi-structured interviews

In order to better understand the history of conservation activity on Andros, conservation groups were interviewed as available. These groups were both national and international NGOs that were currently or recently active on Andros. Interview questions centred around activities conducted by the organisations, whether any community engagement activities are/were conducted by the organisation, whether any educational programmes were put on by the organization (independently or in conjunction with a school), how long these programmes have been running, and whether they have been changed based on local needs/requests/responses.

Where interviews were not possible, publications, archives, and public access documents were examined for information of this nature.

3.5 Data collection

3.5.1 Questionnaires

Individuals who agreed to take the survey were asked the questions orally in interview style unless the individual specifically asked to fill out the survey themselves. Responses to closed questions were codified and consolidated into an Excel sheet. Responses to open questions were transcribed into Microsoft Word. Any additional relevant comments made by the interviewee during the survey were noted on the associated questionnaire and transcribed into a Microsoft Word document.

3.5.2 Interviews

Interviews were conducted in person and noted on paper with the interviewee's permission. The notes were later transcribed into a Microsoft Word document for reference.

3.5.3 Publication review

When it was not possible to interview a conservation group, available publications, including websites and social media, of the groups were reviewed for information on their mission, activities, and outreach efforts. Relevant information was compiled for citation in a Word document, accompanied by relevant citation information.

3.6 Data Analysis

3.6.1 Interviews

Both qualitative and quantitative analysis were applied in this study. Respondents' answers to open-ended questions were coded based on observed themes related to the individual questions (Appendix II).

The content of the semi-structured interviews and archived information was reviewed to clarify the relationship between conservation institutions and local residents. By seeking information about what work conservation groups have done and are doing, information on the organisations' perceptions of their effectiveness was gained. This was compared with data from the surveys to ascertain the difference between perceived effectiveness as reported by the organisations and as reported by community members.

3.6.2 Questionnaires

Excel was used to conduct basic univariate analysis (central tendency, dispersion) to determine general trends in section II of the questionnaire and some portions of section III.

Except question 14, closed-ended questions in section II were tallied into an "attitude score" calculated based on an individual's responses (1, 2, 3). Questions are written such that agreement correlates with positive attitudes (ie "the ocean is in generally good condition"), so the value assigned to 'agree' is positive (3). Other questions were coded in reverse, such that agreement correlated with negative attitudes (ie "enough is being done to protect important marine species"), so the value assigned to 'agree' is negative (1). In doing so, the questions were tallied for a total score

between 8 and 24, and divided by 8 so that all aspects of the attitude scoring could be measured against the same scale. The total scores were then averaged and compared between the two study groups. Responses to question 14 were compared with question 25 in section IV to see if there was a correlation between perception of a lack of resources and lack of knowledge of resources.

Within R correlation matrices were created to identify strong relationships (R Core Team 2019). This analysis involved responses to questions in section II (e.g. “there are enough educational resources”) and IV (e.g. “knows of environmental education programme”).

Bivariate analysis between responses to questions in part I to part IV was undertaken to see if there is a correlation between certain sociodemographic factors (sex, age, etc.) and their participation or willingness to participate in engagement events. These helped to establish if there is any particular social group that is underserved within the structures currently in place based on their desire to participate or learn about conservation efforts taking place on Andros.

3.7 Limitations

3.7.1 Sample Size

The obtained sample size was less than half of the planned 249 (133 on North Andros, 116 on South Andros). This was the result of several complications that limited the number of houses that could be approached. First, there was not an available copy of the voter’s registrar for the surveyed districts, so the selection of households was conducted in a more time-consuming manner where it was not possible to eliminate non-resident or abandoned houses before arrival. During the

summer months, especially once the schoolyear has ended, many residents of Andros travel to other islands, leaving their properties unoccupied. In addition, there are a number of generational properties on the island that are not occupied by full-time residents of Andros or that have been abandoned. In order to mitigate time spent replacing non-response households, the home two to the left of the initial residence was selected as an alternate.

Furthermore, the research was conducted during hurricane season, and heavy rains forced the suspension of research when the weather made already poor roads too dangerous to navigate. On South Andros, available time to conduct surveys was also restricted by the availability of a car, and surveys had to be suspended by supper, as families would leave their residences to go crabbing. The additional time pressure was mitigated by beginning surveys on this part of the island earlier in the afternoon.

3.7.2 Questionnaire Limitations

The survey is limited by its self-reporting method, as there is no way to check if participants' responses accurately reflect their actual thoughts and behaviours. For instance, the amount of times a participant goes fishing in one week may be reported differently whether a respondent chose to answer the question based on their average activities during their main fishing season or off-season fishing. In order to reduce potential variation in response, questions were clarified upon request.

The perceived audience may also bias how a participant answered questions. The presence of the researcher and being made aware of the nature of the study as one involving environmental attitudes may influence participants to respond in a certain

way. No attempt was made to obscure the intent of the survey, but respondents were assured their responses and commentary were anonymous.

4. RESULTS

The fieldwork of this study was conducted from 3-27 June 2019. A total of 108 (107 complete, 1 incomplete) viable questionnaires were gathered (Table 3).

Table 3. Summary of data collection

	North Andros	*South Andros*	*Total*
Households approached	87	107	194
Non-response	38	48	86
Incomplete questionnaires	4	0	4
Complete questionnaires	58	49	107
Viable questionnaires	59	49	108
Reviewed conservation groups	-	-	4

4.1 Sociodemographic profile

In this section the sociodemographic profile of the sample is presented, including sex, highest level of formal education, and occupation status and type. As only basic census data (total population, population by sex, and total occupied households) is available for individual districts, other socioeconomic variables are references from the whole island census.

4.1.1 Sex

The sex distribution of the sample is displayed in Table 4. The overall sample is representative of the population.

Table 4. Sample population sex and district distribution (n, %). Percentages in parenthesis based on 2010 census data (Bahamas Department of Statistics 2010a).

	North Andros	*South Andros*	*Total*
Male	32, 54% (50%)	22, 45% (45%)	54 (50%)
Female	27, 46% (50%)	27, 55% (55%)	54 (50%)
Total	59	49	108

4.1.2 Age

The median age range of the enitre sample is 31-40. The sample at North Andros had a median range of 31-40, while the sample at South Andros had a median range of 41-50. Overall, nearly half (45%) of the respondents were 51 or older (Figure 3). Compared to census data (Bahamas Department of Statistics 2010a), the population over 41 years of age is significantly overrepresented. This is likely due to the time of year the survey was conducted, when many younger residents have left for the summer, and the wider time window of availability for older, often semi-retired residents to answer surveys.

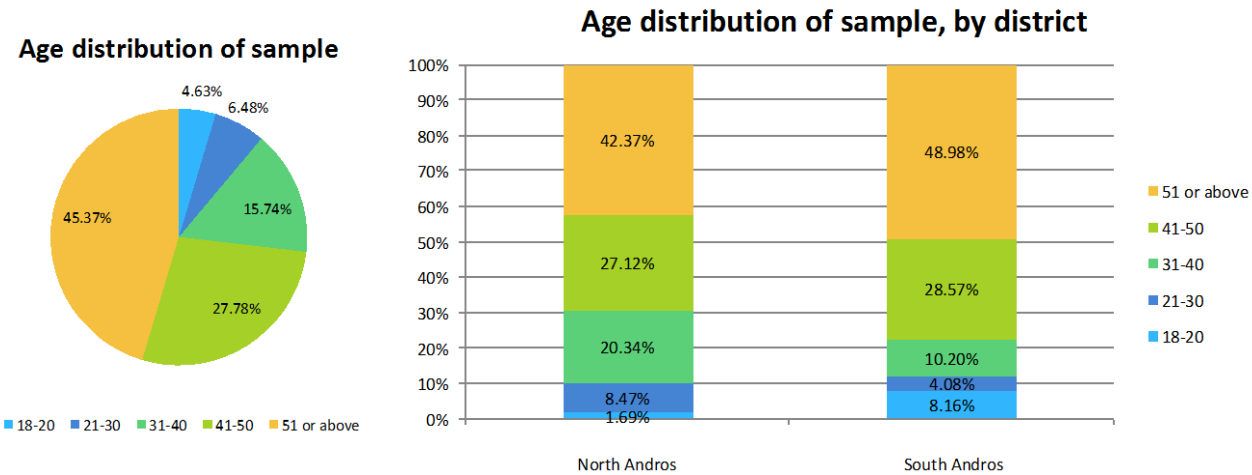

Figure 3. The age distribution of the sample (left) sorted by district (right), displayed as percentages.

4.1.3 Level of education

About half (47.22%) of all respondents' highest level of formal education was stated as secondary or "all ages" school (Figure 4). This is approximately in agreement with census data (Bahamas Department of Statistics 2010a), where 44% of the population reported having a secondary education. Those reporting at least some college education, including an Associate's degree or higher, were overrepresented in the sample, as only 7% reported having any tertiary education in the census (Bahamas Department of Statistics 2010a). North Andros had the highest percentage of respondents with a Bachelor's or higher level of education (23.73%). Both sites had representative samples of people with a primary school education (12%) or no formal education (2%) (Bahamas Department of Statistics 2010a).

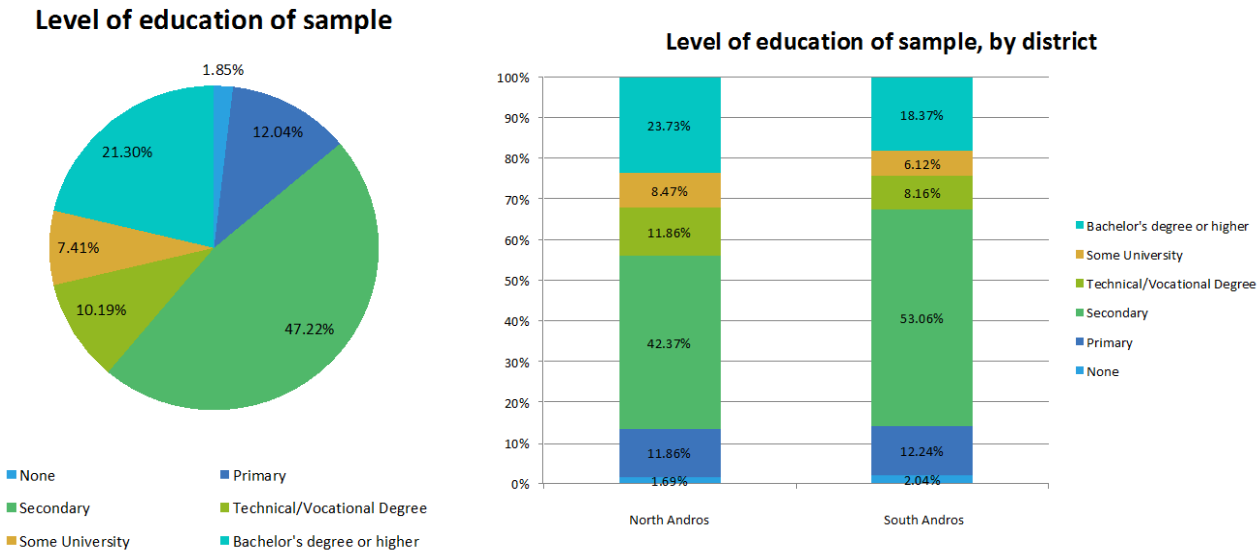

Figure 4. The education distribution of the sample (left) sorted by district (right), displayed as percentages. "Other" (n=1) includes: unknown certifications.

4.1.4 Occupation

Students were underrepresented in the sample (Figure 5), but this can be explained in that the institute of higher learning on North Andros (BAMSI) had already

completed its academic year by the time of the survey and students either graduated or left the island for the summer. Unemployed respondents (12.96%) were overrepresented in the sample, particularly on South Andros, where 22.45% of respondents fell into this category. This is more than double the national average of 10.7% (Bahamas Department of Statistics 2018).

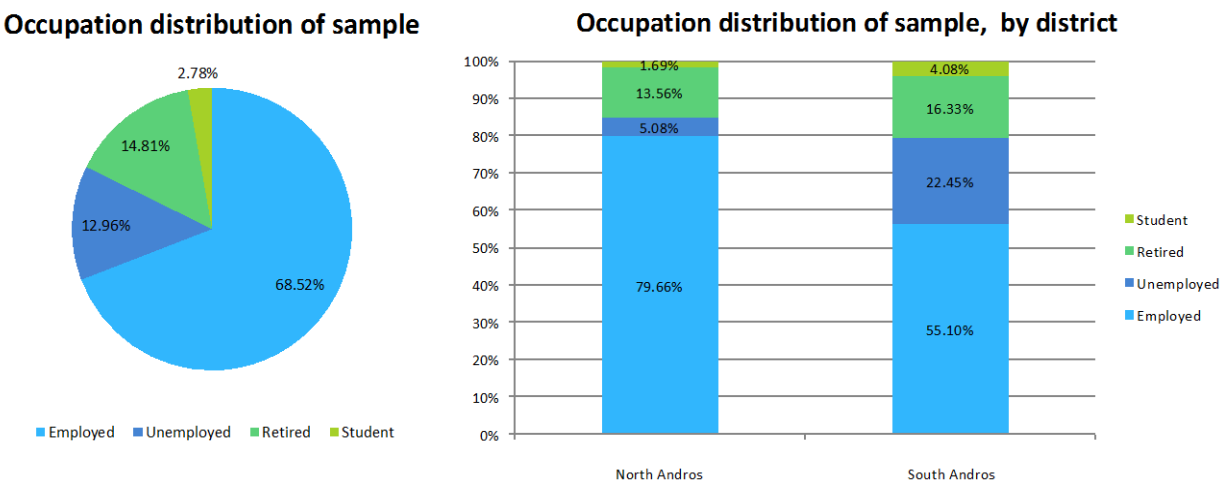

Figure 5. The occupation distribution of the sample (left) sorted by district (right), displayed as percentages.

More than half (68.52%) of the respondents reported being in some form of employment (Figure 5). Of those employed, 28.38% (n=21) were employed in an industry directly involved with the ocean (sponging, bonefish guide, government or diving), or pursuing seasonal employment (fishing) (Table 5). Some respondents mentioned having previously been involved in ocean-oriented employment. Just 14.81% of respondents marked themselves as retired, with 56.25% (n=9) of this group specifying that they had retired from an industry directly related to the ocean (fishing, sponging, sailing, sportfishing guides).

Table 5. Sample respondents currently holding or having retired from occupations relating to the ocean.

	Employed	*Retired*	*Total*
North Andros	10	5	15
South Andros	11	4	15
Total	21, 19.44%	9, 8.33%	30, 27.78%

4.2 Engagement with the ocean

The vast majority of respondents (84.26%) had lived on Andros for more than 10 years (Table 6), with many making the additional comment that they had lived on the island for all of their lives. Only 7.4% of respondents had moved to the island within the last 5 years.

Table 6. Number of years the respondent has lived on Andros.

	North Andros	*South Andros*	*Total*
Non-resident	0	1, 2.04%	1, 0.92%
< one year	0	1, 2.04%	1, 0.92%
1-5 years	2, 3.39%	5, 10.2%	7, 6.48%
6-10 years	5, 8.47%	3, 6.12%	8, 7.41%
> 10 years	52, 88.14%	39, 79.59%	91, 84.26%
Total	59	49	108

When asked how often they enter the ocean, 35.19% of respondents answered that they never visited, some citing fear of the sea or an inability to swim preventing them (Table 7). Only 14.81% of respondents claimed to enter the water once a day or

more (7-9, 10+), many of whom cited work or exercise as their motivation. A number of respondents on both North and South Andros commented that they wished they could go more often, but that they were unable to get a ride to a ‘safe’ beach, citing concerns over sharks coming near to shore in their area.

Table 7. Average number of times respondents enter the water in one week. Presented in percentages.

	North Andros	*South Andros*	*Total*
Never	38.98%	30.61%	35.19%
1-3 times	37.29%	53.06%	44.44%
4-6 times	3.39%	8.16%	5.56%
7-9 times	11.86%	4.08%	8.33%
10+ times	8.47%	4.08%	6.48%

Table 8 outlines the types of ocean-related activities that respondents reported as participating in at least once per week. “Other” includes activities done in or near the ocean as reported by the respondents in item 22 of the questionnaire: walking to/along the shore (n=28), water sports (n= 17), relaxing on the beach (n=14), watching the water (n=9), community or family gatherings (n=8), conching (n=7), crabbing (n=6), bringing (grand)children to the shore (n=5), watching sky/storms (n=3), collecting molluscs (n=3) beachcombing (n=2), sponging (n=2), and building sandcastles (n=1). Participants could have answered positively to multiple prompts.

Table 8. Types of activities respondents reported engaging in at least once a week (n=108). Diving includes freediving, SCUBA, and SNUBA. Respondents could respond positively to several prompts.

	North Andros	*South Andros*	*Total*
Swimming	30	23	53
Fishing	34	29	63
Snorkelling	16	5	21
Diving	17	8	25
Other	42	58	100

More than half (58.33%) of the respondents reported going fishing at least once a week (Table 8). Of the respondents that reported going fishing, a significant amount (79.36%, n=50) stated they went fishing to supplement their diet, while 25.4% (n=16) reported selling their catch for supplementary income (Table 9). This pattern was also true to a lesser extent with snorkelling (food, n=5), and (free)diving (food, n=9; extra money, n=1), which most respondents noted were used for practical purposes such as spearfishing rather than leisure. When considered with those that reported the ocean as an active source of primary income (n=21), 35.19% of the sample reported deriving primary or secondary income from ocean resources. While lower than the 67% reported in the literature (Hargreaves-Allen 2010), this study did not directly ask for secondary sources of income and individuals could elect not to report it.

This pattern of high participation in fishing for a source of food or secondary income was especially true for South Andros. There, 86.21% of respondents reported food as a reason for fishing and 41.4% reported that they used fishing as a source of

supplementary income (Table 10). On North Andros, 73.53% reported fishing to supplement their diet, while just 11.76% said they went fishing to supplement their income. Very few (n=6) respondents reported that they went fishing for sport.

Table 9. Reasons for fishing reported by respondents. 'Other' includes meditation and social opportunities. Presented as percent of total fishers (n=63).

	# of respondents	*% of respondents*
Leisure	31	49.21%
Work	18	28.57%
Sport	6	9.52%
Supplement Diet	50	79.36%
Extra Income	16	25.4%
Other	3	4.76%

Table 10. Reasons for fishing reported by respondents, by district. 'Other' includes meditation and social opportunities. Presented as percent of total fishers in each district.

	North Andros	*South Andros*
Leisure	19, 55.88%	12, 41.37%
Work	9, 26.47%	9, 31.03%
Sport	6, 17.65%	0
Food	25, 73.53%	25, 86.21%
Extra Income	4, 11.76%	12, 41.4%
Other	1, 2.94%	2, 6.9%

A number of respondents (n=17), mostly women, mentioned having a fear of the ocean or of entering it. Most explained that they feared the water because they could not swim, while others cited hurricanes or sharks as their reason for being afraid of the ocean.

Most respondents (72.22%) reported being able to swim, although many women remarked that they had either learned how only as adults or were very weak swimmers (Table 11). All but one of respondents who said they could not swim (n=32) were women (96.88%).

Table 11. Respondents' ability to swim, by sex.

	Female	*Male*	*Total*
Can swim	25	53	78
Cannot swim	29	1	30
Total	54	54	108

4.3 Attitudes

4.3.1 Attitude scoring

Cronbach's alpha was used to evaluate the internal consistency of the eight attitude score questions. A value of .77 was calculated, meaning that the reliability of the instrument is adequate, and all eight items were retained (Chronbach 1951).

In order to evaluate the responses in a numerical format and measure the strength of the attitudes, responses to Likert scale questions were coded according to a 1-3 attitude scale, 1 being the most negative and 3 being the most positive. Responses

to each question were tallied together to give each respondent a total attitude score, which was then averaged per district to produce a mean attitude score. South Andros has a slightly higher mean overall score (2.385) and North Andros (2.282), although both fall into the Neutral-Positive range. However, there is no significant difference between the overall attitude scores of North and South Andros (p=0.25). Further details regarding how the data was processed can be found in the Methodology chapter. Scores for individual questions, and totals for both groups, are summarized in Table 12.

There is a significant difference (p<0.05) between districts in their responses to identifying with the ocean. Respondents on South Andros on average answered more positively (2.837) than those on North Andros (2.576).

Table 12. Mean attitude scores by question, by district and overall (1.00-1.67 = negative, 1.68-2.33 = neutral, and 2.34-3 = positive).

Question	*North Andros*	*South Andros*	*Total Sample*
7a: local health	1.559	1.490	1.528
8a: global health	1.898	1.959	1.926
9a: local protection	2.186	2.388	2.278
10: global protection	2.254	2.306	2.278
11: identity	2.576	2.837*	2.694
12: thought	2.492	2.735	2.602
13: learning	2.678	2.837	2.750
15: emotions	2.610	2.531	2.574
Total	2.282	2.385	2.329

Note: * (p<0.05), ** (p<0.01), *** (p<0.001)

4.3.2 Attitudes and sex

In the sample, women had significantly ($t=2.01$, $p<0.05$) lower mean scores (2.236), and therefore more negative attitudes, than men (2.421). The mean attitude score of women was lower than that of men on both North and South Andros(Figure 6). The difference is significant ($p<0.05$) in both populations. In general, respondents on South Andros scored higher than those on North Andros.

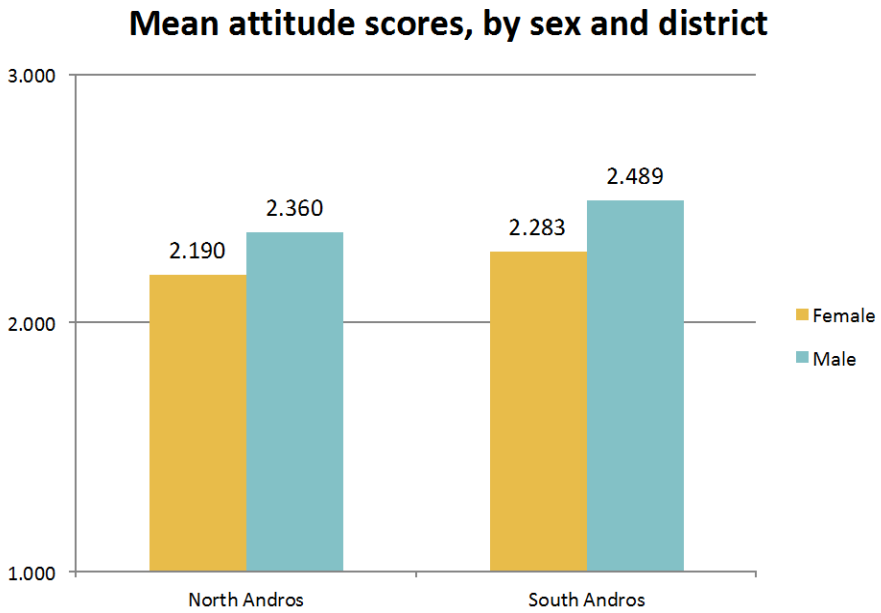

Figure 6. The mean attitude scores of the sample, sorted by sex and by district.

4.3.3 Attitudes and age

There is a weak but significant positive correlation between total attitude scores and age (Pearson's $\rho= 0.086$, $p<0.001$, $n=108$). The group with the lowest mean score were those ages 18-20 (2.175), and the group with the highest mean score were those ages 41-50 (2.396) (Figure 7).

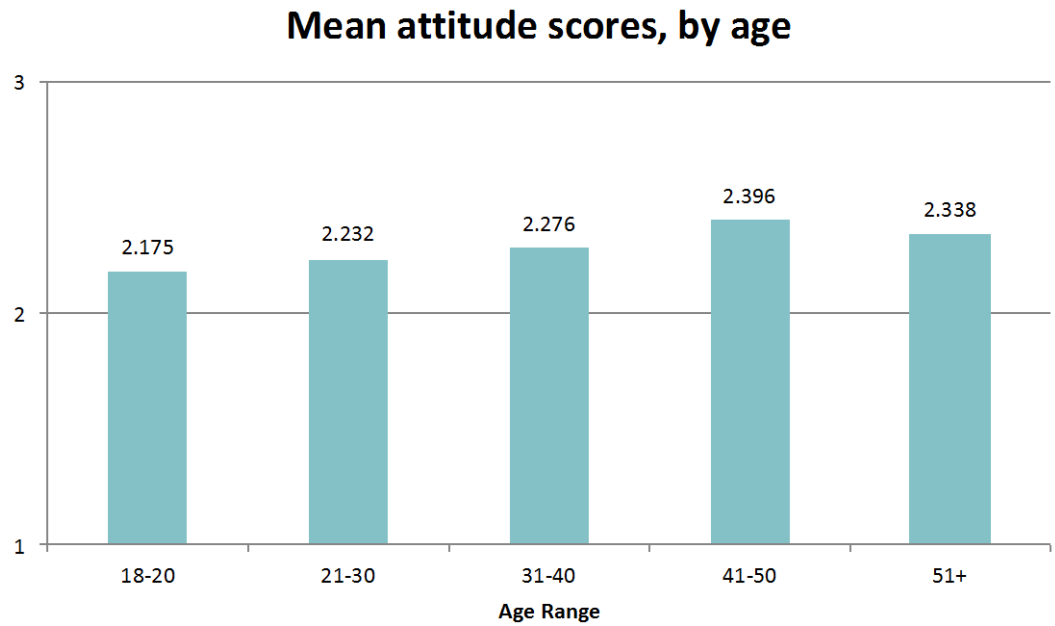

Figure 7. The mean attitude scores of the sample, sorted by age groups.

There is a very weak but significant negative correlation (Pearson's ρ= -0.051, p<0.001, n=108) between age and feelings towards the ocean. Thus, older people are not only more likely to have slightly more positive attitudes towards the ocean and the need for conservation but are also more likely to have negative emotions about the ocean itself.

When asked to describe their emotions towards the ocean in their own words, older respondents and especially women often cited fear and concerns regarding hurricanes. Several (n=6) directly mentioned concerns for ocean health based on their life experiences, summarised here.

Things are getting worse and worse. When I was a girl my daddy always pulled in a good catch, but now my husband sometimes comes back with barely anything. [female, North Andros, 41-50]

The sea is unpredictable, and the storms are getting worse. We get lots of big storms here – hurricanes – but they didn't used to be this bad. My granddaughter says it's because the water is warmer now. [female, South Andros, 51+]

There's less fish in the area now than there used to be, because the water's getting too warm for them. It makes me nervous. [female, South Andros, 51+]

Andros collects the Bahamas garbage. It gets on our beaches, on the reef, I think it gets into the fish. I worry one day I will cut into a catch and there will be plastic inside, like you see on TV. I never used to worry about that. [male, South Andros, 41-50]

When I was a boy you could catch big grouper right up near the shore. Now the fishermen have to go way out for a good catch. [male, North Andros, 41-50]

There ain't nothin left to catch. I'm glad my grandbabies live in Nassau because they won't have to know what it's like now. [female, South Andros, 51+]

4.3.4 Attitudes and level of education

There is a weak but significant positive correlation (Pearson's $\rho=0.183$, $p<0.001$, $n=108$) between education and total attitude score. Respondents with no significant formal education (n=2) had the lowest mean score (1.875), while the highest mean score was had by those that had attended some university (2.484, n=8).

There is a moderate positive correlation (Pearson's $\rho=0.42$, $p<0.001$, $n=108$) between level of education and having had experience with some form of environmental education. Individuals with a higher level of education are significantly more likely to have been exposed to some sort of environmental education programme, in many instances through their work.

4.3.5 Attitudes and occupation

Of those that had employment in or had retired from occupations directly involving the ocean, the highest-scoring group was retirees from North Andros (2.500) and the lowest employed persons from South Andros (2.341) (Table 13). Overall, people in

North Andros that did not have ocean-related occupations had the lowest mean score (2.233).

Table 13. Overall attitude scores of respondents working in or retired from occupations directly related to the ocean, compared with all other respondents.

	North Andros	*South Andros*	*All*
Employed	2.375	2.341	2.358
Retired	2.50	2.438	2.473
All	2.416	2.366	2.391
Non-ocean-related	2.233	2.394	2.303

The correlation between ocean-related employment and score is weak (Pearson's ρ=0.078, n=108) and not significant. Therefore, persons employed or retired from fields reliant on ocean resources are no more likely to oppose or support conservation than those not in these fields. However, they are significantly (Pearson's ρ=0.336, $p<0.001$, n=108) more likely to respond that the local ocean was not in good health and provide examples based on their own experiences. Older or retired respondents in particular were more likely to make negative commentary regarding local ocean health and the practices of current (especially younger) fishermen. These remarks are listed below:

The sea isn't like how it was when I was young. We used to pull up big fish regularly, but now when the boys bring in something big in at the docks it's a whole affair. [male, South Andros, 51+]

Fish here is plentiful, but it seems like they are getting smaller and smaller. [male, North Andros, 31-40]

The younger fishermen are eager for extra money and I suspect some of them are willing to poach for it. Things are hard, here, but it's not fair to the rest of us. [male, North Andros, 41-50]

The sea is busier than it used to be, and when the big [shipping] boats come out, or AUTEC [Atlantic Undersea Test and Evaluation Center; a US navy base] come out, we don't catch anything. The sounds of the boats scare all the fish away. [male, North Andros, 41-50]

I heard some boys use bleach to get the crawfish [Caribbean spiny lobster, P. argus] out of the coral. It's bad for the crawfish, bad for the coral – kills everything around. [female, North Andros, 51+]

When you go out fishing you learn the way the sea goes: like the tides, when things spawn, what sponges are ready. I don't think the younger men have learned this the same as [my generation]. The no-take seasons are important, but they see it as an inconvenience. [male, North Andros, 41-50]

Our water is beautiful and clear, but nowadays I just see trash all over, and no one picking it up except for homecoming. Even then, they never get the stuff in the water. [female, South Andros, 51+]

4.3.6 Attitudes and accessibility

While individuals who were not able to swim had lower total attitude scores on average (2.200) to those who were able to swim (2.378), the difference was not significant. There is, however, a significant positive correlation (Pearson's $\rho=0.281$, $p<0.05$, $n=108$) between increased entry into the water and more positive overall attitudes. Persons who reported entering into the water were also significantly more likely to view the ocean as an important part of their identity (0.173, $p<0.001$, $n=108$).

Individuals who did not fish scored slightly lower (2.304) than those who reported fishing (2.346), but the difference was not significant. However, there is a weak but significant (Pearson's $\rho=0.055$, $p<0.05$, $n=108$) correlation between increased fishing and positive emotions towards the ocean.

4.4 Problem identification

Respondents were asked to identify problems they believed the local and global ocean faced. Respondents were more likely to identify vague, general issues in both cases. However, poaching was considered a serious local problem.

4.4.1 Local problem identification

The most common problem listed for the local ocean was poaching (n=25). Respondents noted that the problem was both local and international – not only did community members poach in order to make extra money before the open season, but also foreign fishers might come into the area and fish out-of-season. Some respondents (n=6) also listed dangerous fishing methods such as the use of bleach or gasoline to catch crawfish as a concern and worries about not being able to tell when (shell)fish they purchased had been caught this way. Only 2 respondents listed overfishing by name, although a few others expressed it indirectly:

Younger fishermen have less respect for the sea, they take and take and it gets harder and harder to make a good catch. [female, North Andros, 51+]

There are too many fishing boats out there. We're taking too much. [female, South Andros, 18-21]

If we keep going [at this rate] I think my grandchildren will not know what conch tastes like. [male, North Andros, 41-50]

The second most common problem listed was garbage (n=23), with many (n=12) adding that they were concerned about cruise ships dumping trash and sewage too close to land. Respondents also listed plastics (n=3) and dirty beaches (n=3) as serious concerns.

Additional common themes were pollution (n=9), erosion (n=2), tourism related issues (n=4, not including cruise ships), and concerns regarding testing/noise from AUTEC (n=6). Coral health (n=3) and climate change (n=2) were not considered localised problems.

4.4.2 Global problem identification

The most common problem listed for the global ocean was garbage (n=33), with many (n=9) adding that they were concerned about oceanic dumping. Several (n=9) people also mentioned plastics as a concern for ocean health. Only 2 respondents mentioned dirty beaches being a global issue.

The second most common problem listed for the global ocean was pollution (n=20), with most going on to explain they meant illegal chemicals getting into the water. A few (n=3) remarked that oil drilling and oil spills are a concern.

Overfishing was also mentioned more frequently by name as a global problem (n=17). One respondent mentioned being concerned that global fisheries were under threat. Some respondents (n=4) believed that overfishing was the result of too many boats being in the sea, while others (n=3) thought it came about because of dangerous fishing practices.

Climate change was mentioned several times (n=7), while other issues like noise causing harm to sea life (n=3), sea level rise (n=3), coral bleaching (n=1), ocean acidification (n=1), and sea temperature rise (n=1) were mentioned more sparsely.

4.5 Knowledge & feelings towards conservation

4.5.1 Awareness of conservation groups

About half (50.93%) of respondents were aware of some sort of conservation group on Andros, with no significant difference between North and South Andros (Table 14). Respondents on South Andros also tended to list informal groups or names of individuals, while respondents on North Andros listed the names of NGOs or education institutions. Respondents on South Andros that were able to name a specific group (i.e. BNT) often mentioned that the group was active on North Andros but not in the South.

Table 14. Awareness of some form of conservation group on Andros, sorted by district.

	North Andros	*South Andros*
Aware	32	23
Unaware	27	26
Total	59	49

On North Andros, of those that were aware of conservation institutions (n=32), most (70%) believed that they or their settlements had benefitted from the work that these groups did (Table 15). The majority of these (90.48%) also held positive or neutral feelings towards the groups. Those that stated they held a negative opinion cited Greenforce's sudden closure in early 2019.

Table 15. North Andros. Whether respondent believes they have benefitted from conservation groups, and their general opinions of these groups.

	Positive	*Neutral*	*Negative*
Has Benefitted	12	7	2
Not Sure	2	6	0
Has Not Benefitted	3	0	0

On South Andros, of those that were aware of conservation institutions (n=23), most (56.21%) believed that they or their settlements had neither directly nor indirectly benefitted from the work that these groups did (Table 16). The majority of these (84.62%) held neutral or negative feelings towards conservation groups. Many respondents cited a lack of formal action in their area as creating negative feelings

Table 16. South Andros. Whether respondent believes they have benefitted from conservation groups, and their general opinions of these groups.

	Positive	*Neutral*	*Negative*
Has Benefitted	3	3	0
Not Sure	2	1	1
Has Not Benefitted	2	4	7

A significant number (n=72) of respondents expressed interest in both more opportunities to learn about and to participate in the work conservation groups do on Andros. An additional 11 respondents expressed interest in learning about the work being done but were neutral or uninterested in participating in it. The few respondents that expressed interest in neither (n=5) cited age or work making it difficult to do so.

4.5.2 Engagement and outreach

A little more than half (n=34) of respondents on North Andros were aware of some sort of environmental education programme taking part on the island (Table 17). Most listed BAMSI (n=14) or at least one of BNT's school clubs or seminars (n=13) as being a source.

Most respondents (n=37) on South Andros were not aware of any sort of environmental education programme on the island. Of those that were aware of some sort of programme, BAMSI (n=3), tourist attractions (n=4), and "school programmes" (n=4) were mentioned, with one respondent adding that BNT puts up informational flyers and advertises events at the airport (Congo Town).

Table 17. Awareness of some form of environmental education programme on the island, sorted by district.

	North Andros	*South Andros*
Aware	34	12
Unaware	25	37
Total	59	49

Very few (n=17) respondents on North Andros had ever attended any form of environmental education programme (Table18). A significant amount (n=7) of people that had participated in such programmes on North Andros were currently or previously active in the educational field. Few (n=5) respondents on South Andros had ever participated in any sort of environmental education.

The lack of participation in education outreach seen in the data may be explained by the age of the respondents. Most respondents (n=93) were willing to participate in an environmental education programme if available on their part of the island. There is no correlation between perception of resources for learning as reported in question 12 and knowledge of learning opportunities as reported in question 25.

Table 18. Participation in some sort of environmental education programme, sorted by district.

	North Andros	*South Andros*
Participated	17	5
No Participation	42	44
Total	59	49

Most respondents (n=92) were willing to attend an environmental education event if it were available to them (Table 20). In both districts, residents preferred such events be offered in or near to their settlement.

Table 19. Willingness to travel for an environmental education event, sorted by district.

	North Andros	*South Andros*	*Total*
Only near residence	30	26	56
Anywhere	18	19	36
Not willing to attend	11	4	15
Total	59	49	108

Most respondents (n=68) were aware of some sort of beach clean-up event that took place on the island (Table 20). Schools, the Ministry of Tourism, and local government were the most frequently listed initiators, although some individuals and tourist groups were also listed.

Table 20. Awareness of some sort of beach clean-up programme, sorted by district.

	North Andros	*South Andros*	*Total*
Aware	39	29	68
Not Aware	20	20	40
Total	59	49	108

Most respondents (n=66) in both districts had also participated in some sort of beach clean-up programme (Table 21). Hurricane clean-ups, school-organised events, and local community-organised clean-ups were most often mentioned. Although some lasted longer than others, most of the reported clean-ups were one-time events.

Table 21. Participation of some sort of beach clean-up programme, sorted by district.

	North Andros	*South Andros*	*Total*
Participated	37	29	66
No Participation	22	20	40
Total	59	49	108

In total, just 10 respondents said they would not be willing to participate in a beach clean-up, most citing old age (Table 22). On North Andros, about half of the willing respondents (n=28) noted they would be willing to travel to other parts of their district

for a clean-up. On South Andros, most (n=27) noted they would prefer to clean up near their own settlement. Overall, respondents were split fairly evenly in their willingness to travel for such an event.

Table 22. Willingness to travel for beach clean-up, sorted by district.

	North Andros	*South Andros*	*Total*
Only near residence	24	27	51
Anywhere	28	19	47
Not willing to attend	7	3	10
Total	59	49	108

4.6 Additional commentary

A number of respondents (n=19) from both North and South Andros directly voiced concerns regarding the ocean and its conservation. A sense of frustration or mistrust towards authority was a common theme amongst many comments, many carrying the opinion that not enough is being done to protect their natural resources, and others expressing concern that things had become too restrictive. The words of the respondents are summarized here.

Restricted resource access:

Those conservation groups in Nassau don't know anything about here, they just pass laws without thinking. What am I supposed to do if all I catch is a bonefish? I can't have my grandchildren go hungry, but I can't afford the fines. [female, South Andros, 51+]

I moved back here for my retirement so that I could enjoy the sea I grew up on. Now I hear that BNT and the environmentalists are going to come in and make this all protected area. My father fished here and I have a right to fish here too. [male, North Andros, 51+]

I worry that maybe the closed seasons are too much. I think it encourages the young people to poach so that they can make extra money before everyone is allowed to fish. [male, North Andros, 41-50]

I read in the paper that they're going to make a closed season for conch. They say we're taking too many of them. But I need the conch to feed my family and to make a little extra money. What will I do without that? [male, North Andros, 41-50]

The government makes laws that keep me from catching fish. We've been fishing here for long enough to know when it is good and when it is bad to go out, but it feels like what we are not important, only that there are enough fish for tourists. [male, North Andros, 41-50]

Environmentalists need to be more open about their information. Down here [on South Andros] we don't hear much about what they are doing or why, just that we can't catch things. I think it's so there's more big fish for the tourists. [male, South Andros, 51+]

Maybe there are problems on other Family Islands, but not here. Our reef is virgin, and fish, crawfish [Caribbean spiny lobster, P. argus], and conch is always plentiful, so why all these laws? Why should I follow them? [male, North Andros, 31-40]

Frustration with conservation practices and disillusionment with authority:

There is not enough manpower to protect what [BNT] says they are protecting. They've come in here and put up signs, but no one is making sure that our reserves are actually respected. [male, North Andros, 41-50]

I would like to see scientists or other professionals come and tell us what parks and laws and all these things do. The posters are too vague, we need someone to come to the community. [female, South Andros, 51+]

The researchers and conservationists come to our island and conduct studies and we never hear what happens to them. I want to have more access to the science that goes on here. [female, North Andros, 31-40]

The protected areas of Andros are much too large and not well managed. Politics has played too much into their location, so that the best places are not protected. I wish that they had asked us [locals]. [male, North Andros, 31-40]

Conservation groups come in here from time to time and they always tell us things are going to change, build up our hopes. But then things don't change, and they still don't change, and now some of us don't go out to their meetings any more. Why bother? [female, North Andros, 51+]

There aren't enough eyes on Andros to keep the poachers from doing whatever they want. We need more rangers. We need more action. [male, North Andros, 31-40]

Sometimes there are meetings about 'community this' and 'conservation that,' and it's usually just that: talk. All talk, sometimes we get laws, but there is never enough funding or manpower to actually keep our stocks safe. [female, South Andros, 51+]

Can you imagine the Bahamas without conch? I don't want to think about it and I don't want my grandchildren to have to live it. But the government does nothing about it, and Nassau keeps buying up conch from Andros like nothing's wrong. [male, North Andros, 21-30]

There used to be more local efforts to keep our beaches clean, but since Matthew it seems like everyone's just given up. All my life, I've never seen the beaches so bad, but Bahamas don't care about Andros. [female, North Andros, 31-40]

Greenforce packed up here without much warning, we don't know why and we don't know where they went. Who is looking at our reef? They've left but nothing is better. [female, North Andros, 31-40]

BNT came and set aside this [West Side Park] but there's no one making sure it's obeyed. We need more rangers to help stop poaching in our community. [female, North Andros, 51+]

Our mangroves are dying and our fish are getting eaten up by lionfish before they can grow. If the environmentalists really want to protect our sea, why do they not help us manage or kill all of them? [male, South Andros, 41-50]

It doesn't matter what [the Bahamas] does, even if we all follow the laws, no one stops the foreign fishers who come into our waters and poach our fish. [female, South Andros, 51+]

A few respondents (n=8) also commented on there being inequality in opportunities

to access conservation resources:

There are nature walks and learning tours for people who come here to go bonefishing, but I don't think we [residents] have the same right to them. [male, South Andros, 51+]

There are [environmental education] things going on up in North Andros, because they have the reserves. But even though there's a big park down here, too, they don't have anyone here to teach about it. I wish they would come down and talk to my children. [female, South Andros, 31-40]

The road here is bad and that makes it hard to access the rest of the island. People rarely come here to talk to us about things, but I think we all want to learn. [male, North Andros, 18-20]

Now that my grandson is in school he can read the guides BNT left me, but I wish that they would send someone again to talk about what is being done here. I would

like to know what has been going on in the [West Side] park for the last few years. [female, North Andros, 50+]

I try to go to as many meetings and classes as I can, and sometimes bring other people too, because talking and learning is important. But they're usually way over in Fresh Creek, or Nicholls Town, and driving there takes time and money that we don't always have. [male, North Andros, 41-50]

Why is there nothing for us? I want to see chances for my children to learn, like summer camps or maybe jobs picking up the beach, but there's nothing on Andros. [female, South Andros, 41-50]

I want summer camps for my children like I hear of on other Family Islands. They got swimming and teaching – stuff to show them to respect nature. I think that would do some good here. [female, South Andros, 41-50]

I don't think we get enough. The conservation activities that do happen here on South Andros are not well publicised and are seldom productive. The bonefish lodges do things, but they don't benefit the community, just their own areas. [female, South Andros, 51+]

4.7 NGO interviews/text analysis

Interviews and text analysis from the conservation groups present on Andros provided additional insight to the dynamic relationship between local communities and the NGOs. Through these efforts the aims and future goals of each NGO was brought into clearer view.

Information gathered on the NGOs and their conservation/outreach projects helped to contextualise some comments made by respondents to the survey, as well as providing some potential pathways for data analysis. Basic summaries of their mission, work, outreach, and future goals for Andros are outlined in table 23. It is notable that contrary to remarks on the part of survey respondents, Forfar does not offer dive certifications, although they do provide diving opportunities for visiting groups if they are certified (Main, personal communication).

Table 23. Participation in some sort of environmental education programme, sorted by district.
(BNT 2019; BNT 2018; Main, personal communication; ANCAT 2018; ANCAT 2016; ANCAT 2015; ANCAT 2010; White & Smith 2010; anonymous interviewee 2019)

	Mission	**Work**	**Outreach**	**Future Goals**
BNT	"To protect and conserve the natural resources of the Bahamas"	Park management; education; biodiversity conservation	Summer camps, including joint EcoCamp effort with Forfar;	Further development for the West Side National Park,
Forfar	Providing environmental and cultural education through hands-on learning experiences	Educational camps for student groups; housing and resources for researchers; coral nursery	Swimming lessons (children); scholarship opportunities; EcoCamp (BNT)	Continue offering current services and expand outreach based on demand and capability
ANCAT	"To protect, conserve, and restore the natural resources of Andros"	Ecosystem restoration; education; local representation; tourist engagement	Beach and creek clean up events; summer camps; guided tours	Preservation of natural resources for future generations; continued education of residents and tourists
Greenforce (Bahamas)	To survey the barrier reef, with the intent of establishing a baseline reference for ecosystem health	scientific surveys; education; dive certifications;	Volunteering in schools; swimming lessons (children); beach clean ups	n/a; closed 2019

4.8 Summary

A significant number (27.78%) of all respondents reported being employed in or having retired from an ocean-related industry, and their attitudes were not significantly different than those in other fields. Fishing was the most highly reported ocean activity in both districts, with a significant amount (79.36%) stating that they went fishing to supplement their diet. Very few (9.52%) reported fishing for sport. On South Andros, a significant amount (41.4%) of respondents stated they went fishing to supplement their income.

Most respondents (72.22%) reported being able to swim, with about half (49.07%) swimming at least once a week. A significant number of women (53.7%) reported being unable to swim, most also mentioning a fear of the water. There is a positive relationship between swimming and attitudes in women.

The mean attitude on both North Andros is neutral, while on South Andros it is weakly positive. There is no significant difference in general attitude scores between the two districts. On average, respondents on South Andros scored slightly higher than those on North Andros. Attitudes were strongly positive on questions regarding identity and emotions towards the ocean, but more negative towards ocean health. Respondents on South Andros had a significantly more positive response on questions involving identity with the ocean.

Women had lower mean scores than men in both districts, however both sexes scored better on South Andros. Respondents in the 41-50 and 51+ age brackets had the highest mean attitude scores, while those in the 18-20 range the lowest. Older

people are more likely to have slightly more positive attitudes, but also have more negative emotions, towards the ocean. Older respondents were more likely to mention personal experiences of worsening ocean health as reasons for their concern. People with a higher level of education are more likely to have more positive attitudes.

Increased entry into the water was found to correlate with more positive attitudes towards conservation, as well as have a significant impact on an individual's identification with the ocean. Individuals who fished more frequently were found to have significantly more positive emotions towards the ocean.

Poaching and garbage were the most frequently mentioned problems that respondents believed the local ocean was facing. Garbage, (chemical) pollution, and overfishing were the most commonly-mentioned problems that respondents believed the global ocean faced. Very few respondents mentioned concepts like climate change, sea level rise, or coral bleaching.

About half (50.93%) of respondents were aware of some kind of conservation group being active on Andros. There was no significant difference between North and South Andros, although respondents on South Andros were more likely to name informal gatherings or individuals as opposed to groups. When a formal conservation group was mentioned, it was prefaced with the comment that the group was not active in the area. Most (70%) on North Andros believed they had benefitted from the presence of conservation groups and of these 90.48% held positive or neutral feelings towards them. On South Andros, over half (56.21%) that were aware of

conservation institutions believed they had not benefitted, with 84.62% having neutral or negative feelings. Most respondents in both districts were interested in learning more about and participating in conservation work on Andros given the opportunity.

Although more than half of North Andros' respondents were aware of some sort of environmental education programme, very few had actually participated in one. Most respondents on South Andros were not aware of any sort of environmental education programme. Participants in both districts were willing to participate in environmental education programmes if available but preferred them to be near their settlement.

Most respondents in both districts were aware of and had participated in some sort of beach clean-up event that took place on the island, although no regular programme was known in either case. Participants in both districts were willing to participate in a beach clean-up if it were available, but residents of South Andros preferred to have such events near their settlement, while residents of North Andros were willing to travel anywhere in their district.

Common concerns mentioned while conducting the surveys were the limiting of resource access, disillusionment with authority due to inaction or insufficient action, and frustration with unequal services to different social groups and locations. Comments from North Andros were more likely to be aimed at resource access and insufficient action, while comments from South Andros more likely to highlight inaction and unequal services.

5. DISCUSSION

5.1 Expectations & results

The main results of this study are not in line with the findings of other studies involving attitudes towards conservation and relationships with conservation institutions. The residents of North Andros, who have had more diverse and lengthened contact with varying conservation efforts, have similar scores to those in the South, who have had little contact with conservation groups. While support for known conservation groups was shown to be lower on South Andros, possibly as a result of feeling alienated from the process of conservation projects (Suman *et al.* 1999), overall attitudes towards conservation remained in the neutral-positive range. However, the non-response rate to the survey on South Andros was much higher than on North Andros, suggesting that conservation may be a less prominent issue locally.

The previous observation that individuals on Andros that derive their livelihoods from natural resources are less likely to support conservation (Hayes *et al.* 2015) was not detected amongst those with jobs dependent on ocean resources. It was found that those in ocean-dependent fields do not hold significantly different opinions to those in other occupations. However, those in ocean-related careers were significantly more likely to be aware of problems in the ocean around Andros, which has previously been shown to correlate with more positive attitudes towards conservation (Broad & Sanchirico 2008). The increased awareness of local habitat degredation may be explained by the remembered historical baselines of fisheries many respondents referenced during the survey.

Individuals who went fishing, regardless of whether it was career-related, were also found to have more positive emotions towards the ocean. Very little resistance to no-take policies was directly observed, although a number of respondents expressed concerns over poaching within their own communities or on the part of international entities.

5.2 Values and emotions

Overall, residents of Andros are less likely to believe that the ocean around their home is degraded or at risk of degradation, creating more negative opinions towards conservation efforts seen as potentially limiting to their own access of fisheries (Broad & Sanchirico 2008). However, their views towards the protection of marine species are neutral to positive and appears to be considered separate from general ocean health. Many expressed concerns about poaching, mostly on the part of foreign entities, particularly expressing frustration when no-take seasons and other legal protections were violated.

Many respondents, regardless of their overall attitudes, made commentary regarding the insufficiency of the current infrastructure in place to protect marine species, particularly economically important ones, in the Bahamas. Their value of the ocean as a resource is high, with most remarks in this light involving concerns about depleted or poorly-protected economically important fisheries. In part, this may be because the Bahamian identity with the sea, and the creatures they derive from it, is a foundational part of everyday life. In part, it may also be because many residents of Andros reply on the ocean as a source of food and income. Regardless, the

backing for more effective resource protections is strong in the community, suggesting that future expansion of projects involving fisheries protection will not face great opposition if transparency and communication is upheld (Sale *et al*. 2008; Agardy 1997).

For most residents of Andros, then, their concerns for the ocean are primarily utilitarian: conservation for continued resource extraction. Projects and parks in the North have worked on making this a reality through recharge zones for important species like the blue land crab (*C. guanhumi*), but there is currently very little work in the South in the same line, despite more respondents on South Andros reporting relying on marine resources as for a food source and secondary source of income.

5.3 Socioeconomic variables

As expected from the results of previous studies, men had slightly higher attitude scores than women (Arcucry 1990), with more women mentioning negative emotions such as fear or anxiety towards the ocean. For many, this was linked to swimming ability, and they were less likely to identify strongly with the ocean. It was also found that those that entered the ocean water regularly for any reason had more positive attitudes than those that did not and create a stronger sense of identity with the ocean. Being unable to interact with the ocean in the same way that people who are able to on an at least weekly basis may produce an emotional disconnect, creating weaker positive emotional and associative ties to the ocean and therefore ascribing less value to its conservation.

Older people and people with a higher level of formal education were more likely to have slightly more positive attitudes. However, older people are also more likely to have more negative emotions about the ocean in general. Older respondents often mentioned traumatic events such as worsening natural disasters or concerns for the future of their grandchildren as the root of their fear, suggesting that elders are more concerned with maintaining environmental stability for the future of their community. Elders mentioned that younger fishers did not share the same caution and respect for the environment that they did, suggesting that generational transfer of environmental information is weak in some areas. However, the correlation between more positive attitudes and higher education suggests that the loss of historical environmental conditions can be amended or at least compensated through consistent, long-term education efforts (Borrini-Feyerabend 1997; Ramsey & Rickson 2010; Ramsey & Rickson 2010).

The positive relationship between knowledge of environmental issues and attitudes (Arcury 1990) indicates that, if formal education and knowledge of basic environmental topics are related, then so are formal education and attitudes. The after-school programs, summer camps, and overnight stays available to students through BNT and Forfar on North Andros may help to shift the attitudes of younger generations directly, and to a lesser extent the attitudes of their caretakers (Evans *et al.* 2010; Ramsey & Rickson 2010). Extending similar programmes to South Andros could prove effective to building a positive presence in the area and strengthening support for future conservation projects, as well as satiate the requests from residents of this region of the island for some sort of engagement activity for their children.

Working directly with the ocean in any capacity produced a stronger identity with the ocean and greater awareness of local ocean health. However, people who had retired from an ocean-related industry generally scored higher than those still working. Like older respondents in general, they were more likely to relate declining fisheries as a local environmental concern and were also more likely to mention local fishermen as being a potential part of the problem through poaching or unsafe fishing methods. This may be because their removal from active employment in the field means their livelihoods are no longer perceived as being placed at risk by conservation, allowing retirees to provide a different perspective. Their knowledge of historical baselines, intimate familiarity with local conditions, and continued participation within their communities make retirees from ocean-related occupations a valuable resource for future conservation efforts, as noted in previous studies (Bender *et al.* 2013).

5.4 Conservation & community

Respondents from both districts offered commentary on the benefits and shortfalls of conservation activities on the island. People on North Andros were more likely to express frustration with the insufficiency of existing structures, while those in South Andros were unsatisfied with the lack of activity and perceived imbalance of services for tourists as opposed to locals.

Respondents from both North and South Andros offered a number of frustrations regarding the current state of Andros' environmental protections. In North Andros, residents were critical of the parks system, commenting that it was understaffed

(there is one active ranger, stationed on North Andros, for all five parks on the island) and unable to carry out its goals. Concerns of poaching, harmful fishing practices, and violating species recharge areas were commonly mentioned. Overall, residents in the North wished for a strengthening of current conservation infrastructure more than expansion. As previously observed (Hayes *et al.* 2015), the phenomenon of underenforced conservation policies or effectively unprotected conservation zones has led to general frustration amongst many residents of Andros.

On North Andros it was commented that residents of South Andros hold a certain degree of animosity towards the concept of conservation (anonymous personal communication). However, it was observed that residents of South Andros are merely frustrated with the lack of effective activity in their area and failure on the part of conservation groups to provide services to their communities. When asked to name conservation groups in their area, many residents described activities and learning opportunities geared towards tourists or available “up North,” but did not know of any such programmes for themselves. In particular, a desire for some sort of summer camp or activity for children was mentioned, as well as increased efforts to keep the beaches of Andros clean. Public support alone does not lead to fruitful conservation implementation and is merely a facet of successful management (Wise 2014). Although the residents of South Andros view conservation efforts in a neutral-positive light, conservation institutions must prove their value to this segment of the population in order to secure the long-term success of any large-scale project (Bennett & Drearden 2014).

In both surveyed districts of Andros, these frustrations with conservation did not necessarily correlate with more negative attitudes towards conservation. Rather, concerned comments of this nature came without prompting in an effort to expand upon the simple binary options offered by the questionnaire. For most residents of this Family Island, the ocean is a central facet of both identity and economy, making most amenable to cooperating with conservation efforts if they are conducted in a manner that: 1) functions and communicates transparently, 2) educates the younger generations, and 3) does not place too great of a burden on commercial and subsistence fishing.

Most residents on both North and South Andros were open to attending environmental education programmes or partaking in beach cleanups if they took place near to their settlement. Many were also receptive to learning about and potentially participate in conservation work on the island if they had the time and opportunity to do so. This openness to active participation in conservation projects on Andros bodes well for the success of such projects in the area so long as transparency is retained (Borrini-Feyerabend 1997; Salafsky 2011).

Assuring that children have access to environmental education has been shown to cause their guardians to display more positive environmental behaviours (Evans *et al.* 2010) and more consistent exposure to is more likely to produce results that change attitudes (Ramsey & Rickson 2010). Establishing opportunities for children is not only strong step for the future of conservation on Andros, but also requested by the communities themselves. Respondents often had their children or grandchildren in mind when answering questions about resources available on the island,

remarking the particular importance of consistent environmental education programming being available to younger community members as early as possible.

5.5 Future research

Based on the outcomes of this study, there are a number of potential research topics that may be conducted in order to build a clearer picture of the relationships between the residents of Andros, the ocean, and the conservation efforts taking place:

1) A quantitative research study on local environmental attitudes which considers all parts of Andros, including Central Andros and Mangrove Cay.

2) A comparative study of the environmental attitudes of those who make their livelihoods from the sea versus those that have retired from these fields.

3) Exploring and establishing the historical baselines of Andros. What are the perceived historical fisheries populations from living memory? Do they match with available records? How do fishermen's current perceptions of fishery robustness align with their actual health?

4) What is the actual economic impact of the national parks on Andros? How many residents are impacted, and are there any negative economic impacts?

5) What is the current baseline knowledge of common environmental issues and ocean literacy amongst adults on this area? Does this change when they have a child in the household participating in Discovery Club or another environmental education programme?

6. CONCLUSIONS

In summary, there is no significant difference in ocean conservation attitudes between North Andros and South Andros, with both districts holding neutral positive views. However, residents of South Andros carry more negative views of conservation groups themselves, believing their communities are not benefitted by their presence. The residents of Andros are concerned about poaching in their local waters and overfishing abroad. They worry about garbage in the ocean and chemicals being dumped into the water, tainting the fish they eat. Many discussed being frustrated with the lack of action and manpower on the part of managing bodies to control these harmful practices. This attitude pattern has been previously observed in other studies and suggests a more active management role may need to be taken on Andros in order to improve large scale conservation outcomes. In general, a greater need for the consideration of the human dimension within conservation needs to take place.

In line with previous studies, women and people with a lower level of formal education had significantly more negative attitudes. For women, fear of the water and an inability to swim appeared to limit their ability to engage and identify with their environment. Those that were able to enter the ocean on an at least weekly basis were shown to have more positive attitudes and stronger identification with the sea, suggesting that increased exposure to an environment is likely to increase the value people ascribe to preserving it. People with lower levels of formal education are more likely to base their attitudes on their identity, experiences, and emotions.

Contrary to previous studies, older people were shown to have more positive attitudes, despite having stronger negative emotions towards the ocean. Those with occupations related to the ocean, especially those that were retired, were found to have a higher awareness of the degradation of the local ocean. Many based their perceptions on their own historical baselines of fisheries, expressing concern for the future. Those who fished on a weekly basis were found to have stronger positive emotions to the ocean.

The NGOs on North Andros have begun to offer a promising number of opportunities for children to learn about their environment through summer camps, after school programmes, overnight camps, and formal swimming lessons. They have an established presence and a generally positive reputation amongst residents of this district. Unfortunately, many of these programmes have no active analogue on South Andros, and there are very few programmes for young adults unless they attend BAMSI. Residents of South Andros feel they derive no benefit from the current presence of conservation institutions, which may make the establishment of long-term conservation efforts difficult without clearly establishing their benefit to the local community in order to gain committed support.

Residents of both districts expressed interest in taking a more active role in the conservation efforts taking place on Andros, whether it be through learning, cleaning up their beaches, or other outlets. While many hoped to see programmes in their home settlement, many others were open to travelling around their section of the island to both learn and actively participate.

The following recommendations are made based on the results of this study:

Increased transparency on the part of conservation groups. Many on Andros expressed frustration with the perceived inactivity of conservation institutions in the area. Offering active, factual communication about conservation and future projects in plain terms, with particular focus on prominent issues like timeline, poaching prevention, and fisheries access, provides an opportunity to address community concerns and improve local attitudes. The resumption of ANCAT's online newsletter system, halted in 2015, or some similar programme, would be useful.

Establishing a more prominent presence on South Andros. Residents of South Andros believe they do not benefit from the activities of conservation groups and many have neutral or negative opinions of them. By establishing more regular, announced visits to the sub-island and providing more regional-specific communications regarding the benefits of projects like the West Side National Park, conservation groups can open a stronger line of communication in the area that allows residents to be more active participants. Ideally, this would eventually include the extension of summer camps and other programmes currently available on North Andros to South Andros.

Increased trash management. The establishment of more regular beach clean-ups on the island would address the concerns many residents voiced about dirty beaches and garbage in the area. It would also provide an opportunity for conservation groups or local government to collaborate with communities in a mutually beneficial task.

Swimming classes for adults, particularly women. When Forfar opened up swimming classes for children in 2018, they received numerous inquiries from adults wanting to learn to swim (Main, personal communication). Many adult women expressed feelings of fear and powerlessness against the sea as a result of being unable to swim, creating more negative attitudes. Offering courses would not only empower a sector of the community that was previously unable to engage with the ocean, but also improve attitudes and strengthen relationships between conservation groups and local communities.

Establishing a baseline for fisheries and making it available. Older residents and those that had retired from ocean-related fields were more likely to have more positive attitudes, largely because they could refer to their remembered historical baselines of fish populations. Synthesising a “set” historical baseline from available surveys, historical documents, and trade records for economically important species and communicating it with the residents of Andros may dissuade potential poachers and increase awareness of fishery degradation.

Increased manpower for conservation management. Respondents expressed concerns about poaching and frustrations that there was no effective way to report or check this occurring. BNT plans to expand its presence in the West Side National Park, information which should be disseminated to the public (BNT 2018).

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APPENDIX I – Questionnaire

Ocean Perceptions Survey

Hello! My name is Zowey Lidyard and I am a student currently studying the effect community engagement has on people's perceptions of and interaction with the ocean. The results of this study and any future publications will be shared with the Government of the Bahamas for your future access. You have been randomly selected as a participant. This interview will take at most 30 minutes of your time. Participation is entirely voluntary - you have the right to decline partaking now and may choose to stop at any point during the survey. Your responses will be kept anonymous and confidential following the ethics policy of Central European University and can be held from the study at your request. If you have any questions or concerns, please feel free to contact me at [number] or [email].

Questionnaire:
I. This questionnaire is composed of several parts. The first part will ask some basic information. Please answer them as best suits your circumstances:

1. What is your sex?
   - ☐ Female
   - ☐ Male

2. How old are you?
   - ☐ 18-20
   - ☐ 21-30
   - ☐ 31-40
   - ☐ 41-50
   - ☐ 51 or above

3. How long have you lived on Andros?
   - ☐ I do not live on Andros
   - ☐ less than a year
   - ☐ 1-5 years
   - ☐ 6-10 years
   - ☐ More than 10 years

4. What is your highest level of formal education?
   - ☐ None
   - ☐ Primary (1-6 years)
   - ☐ Secondary (7-13 years)
   - ☐ Technical/Vocational Degree
   - ☐ Some University
   - ☐ Bachelor's degree or higher
   - ☐ Other: _____

5. What settlement do you live in/nearest?

_____

6. What is your occupation?

_____

II. This second part asks questions about ocean-related beliefs. Please answer them as best suits your circumstances:

7a. Around Andros the ocean is in generally good condition.

- ☐ Agree
- ☐ Neutral
- ☐ Disagree

7b. Are there any problems you believe the ocean around Andros faces?

_____
_____
_____

8a. Globally, the ocean is in generally good condition.

- ☐ Agree
- ☐ Neutral
- ☐ Disagree

8b. Are there any problems you believe the global ocean faces?

_____
_____
_____

9a. On Andros enough is being done to protect important marine species.

- ☐ Agree
- ☐ Neutral
- ☐ Disagree

9b. What marine species would you consider to be important to Andros?

_____
_____
_____

10. Globally, enough is being done to protect important marine species.

- ☐ Agree
- ☐ Neutral
- ☐ Disagree

11. The ocean is an important part of who I am.

- ☐ Agree
- ☐ Neutral
- ☐ Disagree

12. I often think about the ocean.
    - ☐ Agree
    - ☐ Neutral
    - ☐ Disagree

13. Learning more about the ocean is important to me.
    - ☐ Agree
    - ☐ Neutral
    - ☐ Disagree

14. There are enough resources for me to learn what I want to know about the ocean.
    - ☐ Agree
    - ☐ Neutral
    - ☐ Disagree

15. How would you describe your overall feelings about the ocean?
    - ☐ Generally Positive
    - ☐ Neutral
    - ☐ Generally Negative

16. What words would you use to describe your feelings towards the ocean?

_____
_____
_____

III. This section asks questions about how you interact with the ocean. Please answer them as best suits your circumstances:

17a. On average, how often do you enter the water each week?
- ☐ Never
- ☐ 1-3 times
- ☐ 4-6 times
- ☐ 7-9 times
- ☐ 10+ times

If never, please move on to question 18.

17b. What activities do you do in the water? (Check all that apply)
- ☐ Swim
- ☐ Walk
- ☐ Stand
- ☐ Other: _____

17c. Why do you enter the water? (Check all that apply)
- ☐ Leisure
- ☐ Work
- ☐ Sport
- ☐ Other: _____

18a. Can you swim?

- ☐ Yes
- ☐ No

If no, please move on to question 19.

18b. How did you learn to swim? _____

18c. On average, how often do you swim each week?

- ☐ Never
- ☐ 1-3 times
- ☐ 4-6 times
- ☐ 7-9 times
- ☐ 10+ times

18d. Why do you swim? (Check all that apply)

- ☐ Leisure
- ☐ Work
- ☐ Sport
- ☐ Other: _____

19a. On average, how often do you fish each week?

- ☐ Never
- ☐ 1-3 times
- ☐ 4-6 times
- ☐ 7-9 times
- ☐ 10+ times

If never, please move on to question 20.

19b. Why do you fish? (Check all that apply)

- ☐ Leisure
- ☐ Work
- ☐ Sport
- ☐ Other: _____

20a. On average, how often do you snorkel each week?

- ☐ Never
- ☐ 1-3 times
- ☐ 4-6 times
- ☐ 7-9 times
- ☐ 10+ times

If never, please move on to question 21.

20b. Why do you snorkel? (Check all that apply)

- ☐ Leisure
- ☐ Work
- ☐ Sport
- ☐ Other: _____

21a. Can you dive? (Check all that apply)

- ☐ Yes, SCUBA
- ☐ Yes, SNUBA/surface-supplied
- ☐ Yes, free dive
- ☐ No

If no, please move on to question 22.

21b. How did you learn to dive?

_____

21c. On average, how often do you dive each week?

- ☐ Never
- ☐ 1-3 times
- ☐ 4-6 times
- ☐ 7-9 times
- ☐ 10+ times

21d. Why do you dive? (Check all that apply)

- ☐ Leisure
- ☐ Work
- ☐ Sport
- ☐ Other: _____

22. Are there any other activities you do in or near the water that may not have been covered here?

_____

_____

IV. This section asks questions about conservation efforts on Andros. Please answer them as best suits your circumstances:

23. Do you know of any ocean conservation group(s) on Andros?

- ☐ Yes
- ☐ No

If no, please move on to question 25.

24a. What is/are the name(s) of these group(s)?

_____

_____

24b. What do the group(s) do?

_____

_____

24c. Have you or your settlement benefitted from their presence/activities?

- ☐ Yes
- ☐ No
- ☐ Uncertain

24d. How would you describe your overall feelings about these groups?

- ☐ Generally Positive
- ☐ Neutral
- ☐ Generally Negative

25. Do you know of any environmental education programs currently active on Andros?

- ☐ Yes
- ☐ No

If no, please move on to question 27.

26. What kind(s)?

_____
_____

27. Have you ever participated in any environmental education programs on Andros?

- ☐ Yes
- ☐ No

If no, please move on to question 29.

28a. What kind(s) of program(s) have you participated in?

_____
_____
_____

28b. How long did you participate in the program(s)?

_____
_____

28c. Did any of these programs take place within your settlement?

- ☐ Yes
- ☐ No

29. Would you be willing to participate in an environmental education program if it were available?

- ☐ Yes, anywhere on Andros.
- ☐ Yes, but only if it were in/near my settlement.
- ☐ No

30. Do you know of any beach clean-up events on Andros?

- ☐ Yes
- ☐ No

If no, please move on to question 32.

31. What kind(s)?

_____

32. Have you ever participated in a beach or ocean clean-up event on the island?
    - ☐ Yes
    - ☐ No

    If no, please move on to question 34.

33a. What kind(s) of program(s) have you participated in?

_____
_____

33b. How long did you participate in the program(s)?

_____
_____

33c. Were these programs taking place within your settlement?
    - ☐ Yes
    - ☐ No

34. Would you be willing to participate in such an event if it were available?
    - ☐ Yes, anywhere on Andros.
    - ☐ Yes, but only if it were in/near my settlement.
    - ☐ No

35. Would you be interested in more opportunities to learn about the work that conservation groups do on Andros?
    - ☐ Yes
    - ☐ No
    - ☐ Neutral

36. Would you be interested in more opportunities to participate in the work that conservation groups do on Andros?
    - ☐ Yes
    - ☐ No
    - ☐ Neutral

Thank you for your time!
If you have any further questions, please feel free to contact me at [number] or [email].

APPENDIX II – Coding for open-ended questions

Question	Coded categories
6. Occupation	Employed, Employed: Ocean-related carer, Retired, Retired: Ocean-related career, Unemployed, Student
7b. Local problem identification	Poaching, Garbage, Plastics, Cruise ship dumping, Dirty beaches, Dangerous fishing methods, Erosion, Overfishing, Pollution, Tourism-related issues, AUTEC testing/noise, Coral Health, Climate Change
8b. Global problems identification	Garbage, Oceanic dumping, Plastics, Dirty beaches, Dangerous fishing methods, Overfishing, Pollution, Climate change, Too many boats, Noise causing harm to sea life, Sea level rise, Coral bleaching, Ocean acidification, Sea temperature rise
9b. Locally important marine species	Economic species, Ecosystem species, Mixed, All Species
16. Self-described emotions to ocean	Negative, Neutral, Positive
18b. Learning to swim	Family, Self-taught, Formal lessons
21b. Learning to dive	Family, Self-taught, Formal certifications
22. Other ocean activities	Walking to/along the shore, Water sports, Relaxing on the beach, Watching the water, Community of family gatherings, Conching, Crabbing, Bringing (grand)children to the shore, Watching sky/storms, Collecting Mollusks, Beachcombing, Sponging, Building sandcastles
24a. Names of conservation groups	Formal groups, Informal group or individual, Government institution
24b. Activities of conservation groups	Services to community, Services to ecosystem, Services to tourists
26. Types of environmental education on andros	School-related, Occupation-related, NGO-related
28a. Types of environmental education respondent had participated in	School-related, Occupation-related, NGO-related
28b. Length of time participated	One-time event, Recurring event(s)
31. Types of beach clean-ups on andros	School-related, Occupation-related, NGO-related, Local Government, Community-led
33a. Types of beach clean-ups respondent had participated in	School-related, Occupation-related, NGO-related, Local Government, Community-led
33b. Length of time participated	One-time event, Recurring event(s)