DEFINING ENVIRONMENTAL LITERACY:
PERSPECTIVES ON ENVIRONMENTAL EDUCATION IN THE GALÁPAGOS
ISLANDS SCHOOL SYSTEM

A THESIS
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Abstract

The Galápagos Islands are a UNESCO World Heritage Site and a popular destination for international travelers and researchers. However, the islands have often been overlooked as a center of local education in the large school system on the islands for young residents of Galápagos. This study investigates educators’ perceptions of environmental literacy as an outcome in both schools and organizations, spanning informal and formal environmental education programs. Using an ethnographic research approach, I carried out participant observation and semi-structured interviews with administrators and leaders in schools and organizations. The research included on-site observation of environmental education programs in both informal and formal settings. Through these interviews, I investigate the complications of providing environmental education for students on the islands. I also review the current state of student environmental literacy and explore how it can be supported with collaboration between schools and organizations for more frequent, comprehensive environmental education programs. The implications for adult residents living alongside a National Park and World Heritage Site are explored as well, with emphasis on the importance of environmental literacy for continued conservation and protection of the islands.
Acknowledgements

This research and ensuing analysis and continued study is due to the incredible generosity of time, wisdom, support, and editing of both Professor Nicole Ardoin and Professor William Durham. I am immensely grateful for the guidance from start to finish of this research endeavor by both professors, who have been invaluable mentors to me for the past three years. I am forever indebted to Professor Durham, who encouraged me to go beyond what I thought I knew of anthropology and human-environment interactions on my very first voyage to the Galápagos on his Sophomore College course to the islands in 2012. It was on that first trip that my fascination with the islands and love for the communities and organizations on them first began, and since then I have been able to follow that passion with encouragement and push for excellence from Professor Durham. Professor Ardoin has been a mentor on whom I base my success and goals for future education and research. She is an incredible inspiration for sincere connection to communities through environmental education and learning, and instills fathomless curiosity and joy in research and collaborative projects. Also, a heartfelt thank you to my peers in the Goldman Honors program, for their support, ideas, commiseration, and positivity throughout our year-long collaboration. To Professor Noah Diffenbaugh for his constant support and encouragement in the Goldman Honors program in weekly meetings, emails, and for his tireless interest in our research subjects and his expertise and advice. It has been a pleasure to be a part of a program that cultivates the curiosities and endeavors of students pursuing environmental
research. Thank you to the Stanford Woods Institute for the Environment, as well, for supporting the Goldman Honors Program!

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all.
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<thead>
<tr>
<th>Island</th>
<th>School Code</th>
<th>Number of Students</th>
<th>Grades taught</th>
<th>Type</th>
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<td>Island A</td>
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<td>177</td>
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<tr>
<td></td>
<td>SCA2</td>
<td>656</td>
<td>PreK-12</td>
<td>Public</td>
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<tr>
<td></td>
<td>SCA3</td>
<td>846</td>
<td>7-12</td>
<td>Public</td>
</tr>
<tr>
<td></td>
<td>SCA4</td>
<td>183</td>
<td>PreK-8</td>
<td>Public</td>
</tr>
<tr>
<td></td>
<td>SCA5</td>
<td>536</td>
<td>7-12</td>
<td>Public</td>
</tr>
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<td></td>
<td>SCA6</td>
<td>422</td>
<td>PreK-9</td>
<td>Public</td>
</tr>
<tr>
<td></td>
<td>SCA7</td>
<td>1113</td>
<td>PreK-12</td>
<td>Public-private</td>
</tr>
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<td></td>
<td>SCA8</td>
<td>177</td>
<td>PreK-12</td>
<td>Private</td>
</tr>
<tr>
<td>Island B</td>
<td>SCB1</td>
<td>89</td>
<td>PreK-12</td>
<td>Public</td>
</tr>
<tr>
<td></td>
<td>SCB2</td>
<td>??</td>
<td>PreK-9</td>
<td>Public</td>
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<td></td>
<td>SCB3</td>
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<td>SCB4</td>
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<td>SCB6</td>
<td>271</td>
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<td>Island C</td>
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<td>144</td>
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### Table I2. Participating Organizations

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<tr>
<th>Island</th>
<th>Organization</th>
<th>Level</th>
<th>Type</th>
<th>Mission</th>
<th>Student Programs</th>
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<tbody>
<tr>
<td>Island A</td>
<td>ORA1</td>
<td>Local</td>
<td>Gov.</td>
<td>National Park management, community involvement and awareness</td>
<td>Alternativa Estudiantil; club; funding ORA3 selective program; field trips</td>
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<tr>
<td></td>
<td>ORA2</td>
<td>Local</td>
<td>NGO</td>
<td>Provide opportunities for exemplary students to create social initiatives</td>
<td>Selective summer empowerment program</td>
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<td></td>
<td>ORA3</td>
<td>International</td>
<td>NGO</td>
<td>Place-based outdoor education to connect local experts and high school students (both international and local students)</td>
<td>Summer selective camp; club</td>
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<td></td>
<td>ORA4</td>
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<td>Waste management, community awareness</td>
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<td>Total</td>
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Table I4. Coding Themes

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<tr>
<td>Environmental Awareness</td>
<td>Conservation; Care for environment</td>
</tr>
<tr>
<td>Environmental Behavior</td>
<td>Recycling; Invasive species maintenance</td>
</tr>
<tr>
<td>Environmental Knowledge</td>
<td>Transversal in classes</td>
</tr>
<tr>
<td>Science Education</td>
<td>Single-class; Strict or limited curriculum</td>
</tr>
<tr>
<td>Environmental Values</td>
<td>Buen Vivir; Identity of Galápagos</td>
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Table F1. *Iterative terms used to describe environmental education*

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<tr>
<td>Behavior</td>
<td>3</td>
</tr>
<tr>
<td>Care</td>
<td>11</td>
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<tr>
<td>Knowledge</td>
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### Table F2. *Environmental behavior referenced by interviewees*

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<th>Collaboration</th>
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<th>School-Based</th>
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<td>2</td>
<td>7</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Clean up trash</td>
<td>3</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Compost</td>
<td>7</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Gardens</td>
<td>12</td>
<td>8</td>
<td>22</td>
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<tr>
<td>Invasive Species Maintenance</td>
<td>3</td>
<td>4</td>
<td>3</td>
</tr>
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### Table F3. *Reasons Environmental Education for Students has Decreased*

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<th>School-Based</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>8</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>La Reforma</td>
<td>16</td>
<td>6</td>
<td>20</td>
</tr>
<tr>
<td>Resources</td>
<td>7</td>
<td>3</td>
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</tr>
<tr>
<td>Administration</td>
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Chapter 1  Introduction

Research Overview

This thesis explores perceptions of environmental literacy in public and private schools, as well as among government agencies and nongovernmental organizations (NGOs), on the Galápagos Islands, Ecuador. The purpose of the study was to investigate how environmental education efforts combine formal and informal resources—in particular, those of schools and community-based organizations—to enhance environmental literacy for young people in Galápagos. This study stemmed originally from conversations with local naturalist guides on a first trip to Galápagos in 2012, when I first heard that students on the islands did not receive nearly as much environmental education as tourists visiting the islands.

Using a qualitative approach, I researched this topic on three of the four inhabited Galápagos Islands, visiting primary and secondary schools on each of those islands and conducting interviews with the director of each school. Additionally, to develop a broader understanding of the range of resources and supports available for building environmental literacy across the community, I explored environmental education programs offered by organizations, such as governmental agencies or NGOs on the islands. In this study, and in the words of study respondents, the term “environmental education” was often used a proxy for “environmental literacy” because the latter is difficult to express in Spanish.
Research Context

Internationally, the Galápagos Islands are widely recognized for many reasons: They are deemed a UNESCO World Heritage site for their globally unique biodiversity and their key historical significance in Charles Darwin’s discoveries. Their network of complex natural ecosystems provide an important location for biological and ecological research, often conducted by conservation organizations, many of which are internationally based.

The social ecosystem in Galapagos is also quite complex, becoming increasingly so over the past 50 years, with rising numbers of people moving to the islands from the mainland of Ecuador and from other countries as well. With the influx of a human population, the governmental sector on the archipelago has had to establish systems and regulations for living on the islands that protects the National Park. As 95% of the archipelago is protected national park land, only 5% is dedicated to human establishments. As of 2008, there were an estimated 30,000 inhabitants on the four populated islands in the archipelago, up from 2,300 residents in 1962, only three years after the National Park was established (Gardener, 2011). The ecotourism industry is also thriving and this industry brings with it the potential to have major impacts on the ecosystem. Because communities live in such close contact to these protected spaces, and because the ecotourism industry can also have such a big footprint, practices related to sustainability and conservation behavior are important.

To date, however, researchers have paid much less attention to the social sphere than to the ecological or biological sphere in the islands. There is little understanding, for example, of the baseline of environmental literacy among the
population or of the environmental education opportunities that exist in the islands. Yet, because of the importance of human knowledge, awareness, and environmentally related behaviors in Galápagos, it is critical to know how people living there—and young people, in particular—learn about the environment, including how they might develop skills to become involved in making decisions about environmentally related issues.

**Formal and Informal Education in Galápagos**

Formal education in Galápagos (that is, education that takes place primarily within a classroom setting) is surely constrained in terms of the resources, including time and funding, available for environmental education (SCA6, personal communication, 2014). Examples of this include such things as poor internet and electricity capabilities in school facilities, or books and curriculum guides not being successfully delivered to Galápagos schools from the Ministry of Education. By contrast, informal education, or education that takes place outside of school settings (Eshach, 2006)—and thus often presented by environmentally based governmental agencies and non-governmental organizations (NGOs)—has resources to support schools to produce collaborative environmental education programs. Because informal environmental education (hereafter EE) offers activities like visiting nature sites, fieldtrips, and science projects, it would fill a void in formal EE in schools.

Currently, students in Galápagos have little access to environmental education through either the formal school system or through informal programs offered by conservation organizations. Science curriculum in schools on the islands does not

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1 This is a reference to one of the interviews conducted in this study. All interviewee identities have been removed and replaced with number and letter codes to preserve confidentiality.
emphasize conservation awareness or the relationships between humans and flora and fauna. Yet, connecting the scientific knowledge produced by the many nonprofit organizations and government agencies that work in Galápagos to the students who live there seems like a fitting opportunity for increasing conservation awareness and engagement. There is an apparent disconnect between the education of local students in the islands and larger academic research on the islands. Investigating this lack of connection between research and opportunities available to students, as well as the level of environmental education and awareness of students, might help produce more streamlined approaches to environmental education and conservation.

**Research Purpose**

Ultimately, this study uses “environmental literacy” as an outcome related to the process of “environmental education”—a relationship and definition that is used by NAAEE (the North American Association for Environmental Education). This research aims to highlight barriers to and opportunities for environmental education in schools; the research findings might also suggest a more comprehensive picture of how environmental literacy is being accomplished on the islands. With acknowledgement to the importance all school subjects play, and to the needs of school leaders and organizational directors on the islands, this thesis will provide insight into the current state of formal and informal environmental education for students and will note the ideas and ideals of both school directors and NGOs for enhancing opportunities for environmental literacy.
Chapter 2  Literature Review

DEFINING ENVIRONMENTAL LITERACY AND ITS IMPORTANCE

Environmental literacy (EL) is a concept and term that has gained traction in the academic literature and the field of environmental conservation, particularly over the past few decades (Roth, 1992; Hollweg et al. 2011). Various researchers and studies have worked to operationalize environmental literacy (e.g., Roth, 1992; McBeth & Volk, 2010; Goldman et al. 2013; Stables and Bishop, 2001; Wood, 2013), although debate continues in the literature as to a clear definition. Environmental literacy—differentiated from the core concept of “literacy,” which is primarily associated with reading and writing ability—uses a broader conceptualization than simply knowledge gained from reading and writing. In the wake of increased publications, differing definitions and uses of the term have surfaced. In my research, I opted for using the definition agreed upon by the North American Association for Environmental Education (NAAEE), which worked with academics and practitioners to create a coherent consensus definition of the term (Hollweg et al., 2011). NAAEE, and partners, describe environmental literacy as comprised of various components, including competencies, knowledge, dispositions, skills, and environmentally responsible behavior (2011). Competencies include the ability to analyze environmental issues, ask questions about such issues, and participate in environmental discourse and debate to form and evaluate plans to solve environmental issues. In this case, knowledge is defined broadly to include an understanding of the context of environmental systems and human-environment interactions and issues. Dispositions for environmental literacy include having or
understanding of environmental values, motivation to act on such values, a pro-environmental attitude, and components of self-efficacy, or feeling that one’s actions make a difference (Hollweg et al., 2011).

One of the core elements of environmental literacy relates to environmentally responsible behavior, or pro-environmental behavior, because it actively produces positive change for the environment. Such behaviors can manifest on different scales and in different manners: some culminate in social or political action, others in personal actions such as recycling or reducing electricity and water use, while still others relate to participating in environmental management (e.g., planting trees, removing invasive species) or persuading others to take action (Ardoin et al. 2014; Ardoin et al., 2013).

The terms used in this study are based on this encompassing definition of EL by the NAAEE, and, thus, terms we use when analyzing qualitative data include: Environmental Values, Environmental Behavior, Environmental Awareness, and Environmental Knowledge.

Stables and Bishop (2001) examined the context of the term environmental literacy in a larger academic discussion of what literacy entails. While this exceeds the boundaries of the present study, it provides insights into the components of environmental literacy and usefulness in encouraging environmental literacy among students (Stables and Bishop, 2001). Stables and Bishop acknowledge that EL has been written about extensively in the United States and some other countries, such as Scotland, but argue that it is not well- or consistently defined and is not situated in a "broader philosophical or theoretical framework" (2001). Stables and Bishop contend that there are "many 'correct' ways of understanding the environment" and that "different
cultural and social groups almost inevitably have different views of the environment and of environmental issues” (2001). This culturally relevant and wider conceptualization is clearly critical for my Galápagos study.

These various definitions, as well as the historical context, not only provide a background for this study, but also help when considering how to operationalize environmental literacy or transform the concept into an instrument—a survey or an interview protocol—that might actually get at the underlying components of the idea. A number of prior studies have attempted to do so, but only a few have developed instruments that have clearly defined elements of the environmental literacy concept and that align with the NAAEEE definition. McBeth and Volk (2010), for example, describe the efforts of a group of U.S. researchers to understand environmental literacy at the middle school levels. They created a survey instrument that is used to measure knowledge, dispositions, and potential behaviors; they discuss how this kind of survey could be useful, both from a basic conceptual perspective as well as in advance of beginning an environmental education program. In this way, the describe the importance of using this kind of survey—which has been implemented in the United States, as well as in several other countries—to understand baseline levels of environmental literacy as well as to better understand the effects of a program on a range of outcome variables. This kind of an instrument can help to better understand where students currently stand on relevant skills, attitudes/values, and knowledge (Stables and Bishop, 2001).
DEFINING ENVIRONMENTAL EDUCATION AND ITS CONTEXT IN ENVIRONMENTAL LITERACY

Although the relationship between environmental education and environmental literacy may be seen as murky, at its most basic, one might imagine that environmental education is the process and environmental literacy is the outcome. EE is recognized as a process that is about lifelong learning; one that “remains with the learner beyond the classroom years; it is part of a lifelong process rather than one restricted to the few years of formal education” (Haigh, 2006). Similarly, the field of education for sustainability (EfS)—a related field—also works to build knowledge, attitudes, skills, and encourage participation. In both EE and EfS, the ultimately desired outcome is that people become engaged in making the world sustainable and in undertaking some kind of conservation action or behavior. In this way, environmental literacy reflects some action component. Environmental education is the term most commonly used in programs teaching about the environment, either formally (in school settings or informally (in non-school or out-of-school settings). This conceptualization of settings is important to this study as one aspect of my work was to examine, and develop an understanding of, the relationship between formal and informal settings for and providers of environmental education in Galápagos.

Formal education most often takes place in a classroom or other formal space (Schugurensky, 2000). Most formal education is compulsory (up until university level) and is highly institutionalized or regulated by a governing body, either state or federal. Additionally, formal education is often dictated by a mandated curriculum with education standards per grade or level (Schugurensky, 2000). Schugurensky specifies informal
learning as any learning that occurs outside of that curricula, and often has purposes outside of stated curricular goals, which is why there may be conflict between informal and formal education institutions (i.e., field trips administered by informal institutions like a National Park, for students in a formal classroom setting). Schugurensky states that "historically, the learning acquired through informal means has not been recognized by formal educational institutions," which makes collaboration between the two difficult, but there are merits to successful collaboration between both institutions.

As Bell et al. (2009) note, one distinction of formal environmental education from informal is that "many academic achievement outcomes (1) do not encompass the range of capabilities that informal settings can promote; (2) violate critical assumptions about these settings, such as their focus on leisure-based or voluntary experiences and nonstandardized curriculum." The Bell et al. report, by the National Research Council, describes informal education as including “community-based organizations, libraries, schools, think tanks” etc. and “informal environments include a broad array of settings, such as family discussions at home, visits to museums, nature centers, or other designed settings” (2009, 3). Informal settings offer a complementary range of venues for education and distinct abilities in achievement in those venues. Bell et al. state that “informal education as one of three integral pieces of the U.S. education system” because “while often complementary and sometimes overlapping with the goals of schools, the goals of informal environments are not identical to them” (2009, 3). Additionally, “informal science learning experiences are believed to lead to further inquiry, enjoyment, and a sense that science learning can be personally relevant” (Bell
et al., 2009) which can apply to environmental education that includes science education.

Many different groups undertake efforts aimed at environmental literacy—from schools to nongovernmental organizations (NGOs). Schools undertake environmental education, with the aim of an environmental literacy outcome, in formal settings, some in science classes and others in through using the “environment as an integrating context” (Lieberman & Hoody 1998) or an “environment-based education” model (Ernst & Monroe, 2004). NGOs—including zoos, aquariums, museums, parks, and conservation organizations—thus, described as an "enormous disparate group of organizations" (Haigh, 2006)—are also often providers of opportunities for environmental literacy. On a broad scale, many NGOs are committed to "a universal process of educational transformation" and EE specifically was deemed "a continuous learning process based on respect for all life" (Haigh, 2006). NGOs are composed of volunteers, directors, and staff who are united based on common values and the mission of the organization, and thus education can take a concentrated form in focused projects and funding areas more so than formal education institutions, such as schools. Here, NGO work is described as more focused or "direct action" in the field of the organization's mission. In environmental NGOs, informal environmental learning is imparted on participants and target audiences, as opposed to formal education found in schools (Haigh, 2006).

NGOs are often a more effective site for providing opportunities for experiential learning, which is particularly key in environmental education, because they are not bound by the same structures as formal school settings. They also are often guided by
conservation missions and have staff members and volunteers specifically trained in, and dedicated to, environmental education and literacy work. Thus, one of the areas of focus for this Galápagos study is on the potential nexus of environmental NGOs and other community-based organizations and how they may work with formal, school-based EE programs in creating more effective outcomes related to environmental literacy.

**CONTEXT OF ENVIRONMENTAL EDUCATION OPPORTUNITIES IN GALÁPAGOS**

The human population in Galápagos did not begin to thrive until the last century. Consequently, in comparison with many other place, the societies in Galápagos have not been given much attention from the international research community. Recently, however, because of the increase in human population in Galápagos over the past half-century, due to economic opportunities in harvesting marine resources and growth in tourism, more attention is being paid to people on the islands. This has led to interest in social institutions in Galápagos, even though the education has not yet received much attention. Education of students on the islands is mentioned in many recent publications about Galápagos, but judgments made by outside voices about the school systems may be detrimental to progress in schools (Bassett, 2009; De Roy, 2009).

While it is pertinent to recognize the dire situation of conservation in Galápagos, it is often presented in a way that downplays voices of the locals and demands unwanted and unwarranted change of residents. Many international authors, researchers, and contributors to the Galápagos have written about the local reality as an after-thought, stating ultimatums that the communities “must do” to save the Enchanted Isles. These presumptions from outside sources have often slowed, or
halted, progress in conservation within residential communities in Galápagos, as they create resentment between both parties rather than creating constructive and respectful dialogue (White\textsuperscript{2}, personal communication, 2014). The Galápagos National Park Service (GNPS) is keenly aware of these conflicts, and their programs attempt to promote dialogue between those groups (ORA1, personal communication, 2014). Therefore, international involvement in discourse about actions related to conservation, including environmental education, must be sensitive and cognizant that residents are active participants in ongoing discussions; residents are often initiating grassroots efforts and trying to engage on larger scales (White, Personal communication, 2014).

CURRENT STATE OF FORMAL AND INFORMAL ENVIRONMENTAL EDUCATION IN GALÁPAGOS

Formal Environmental Education

Currently, environmental education in Galápagos is not taught as a stand-alone EE course; rather, it is taught as an element of science courses. Based on interviews with school directors on three islands, EE curriculum and experiential EE through field trips are either non-existent or, where they do exist, are minimal (and the teachers and students desire to have more of them). One naturalist guide in Bassett’s book describes EE as, “a few drops on a hot rock; they just evaporate. It helps to plant a certain consciousness in people’s minds, to give them reasons to be proud to live here,” but then laments that “education is so basic that it’s hard to open people to the

\textsuperscript{2} Pseudonyms are used for interviewees who were not leaders of institutions.
environment,” (Bassett, 2009). Points such as these are critical as they suggest that an opportunity exists to create curriculum that supports collaboration with schools.

Currently, the formal curriculum in Ecuador is nationally-based, thus every school in the country receives the same materials (Ministerio de Educación, 2011). The current Ecuadorian presidential administration supports the inclusion of federal core educational standards that include environmental education for all grades. But recently the Ministry of Education designed a curriculum specifically for Galápagos with units in the natural sciences dedicated to teaching Galápagos ecosystems (Ministerio de Educación, 2011).

This curriculum included lesson plans with objectives such as “explain the relationship that exists between the volcanic origin of the Galápagos Islands, their topography, and the adaptations developed by the endemic flora and fauna” and “explain the relevance of the conservation of the particular biota of the Galápagos” (Ministerio de Educación, 2011).

Although the addition of environmental education to the national education system of has not appeared in the classroom in Galápagos as of this writing (May 2015)—nor has the Galapagos-specific curriculum—the promise is seen as exciting. The curriculum’s call for adding environmental education and literacy in formal and informal settings provides opportunities for collaboration between informal and formal EE organizations and schools in Galapagos. Once implemented, this new curriculum would provide clearer opportunities for many environmental education-related topics to be incorporated into the curriculum and also might offer guidance—and linkages—to out-of-school learning.
Galápagos schools, in particular, have the opportunity to see unique and highly specialized examples of flora and fauna that present easy tools for teaching biodiversity, environmental conservation, evolution, climate, and other aspects of environmental education. Simply learning about “ecological hierarchy: the components of nature are grouped together in sets of nested and interacting levels of organization, ranging from very small (genes) to very large (ecosystems and landscapes)” (Trombulak, 2004) can provide contextual knowledge for students about their environment, especially one as tangible and accessible as an island in the Galápagos. Scientifically, in classes of natural sciences, showing that “all organisms are related to one another” (Trombulak, 2004) creates an impactful lesson for students and provides a personal connection to the flora and fauna they see every day.

As an authority on EE, Brewer describes the importance of “overcome[ing] the institutional barriers that limit our participation in promoting ecological literacy” (Brewer, 2002). These barriers appear to exist in the formal/informal structure in Galápagos as well. Unfortunately, these administrative issues cannot be quickly fixed based on requests from school directors or NGO employees due to the hierarchical structure of the local education system. Many layers of discussion need to occur and permission needs to be granted in order to alleviate the tension that might, at times, create difficulties between district or federal level education administrations, and local schools.

According to the Galápagos Conservancy, the Galápagos school system has faced, and still faces, many internal issues (Conservancy, 2014). The Conservancy describes one issue as a “weak teacher base” in which many teachers have been “trained in pedagogy that stresses memorization and repetition” which leads to “little
emphasis on independent thought” (2014). This can directly hinder any attempts to expand or reform environmental education. The Conservancy also observes that “environmental themes have not been integrated into the curriculum” and that schools are not participating in experiential education. From this report, it is apparent that schools are not taking advantage of, or do not have the resources to take advantage of, the natural surroundings in the Galápagos. The Conservancy also references environmental literacy as a remaining need of the islands, by explaining that: “there are few formative extracurricular activities in Galápagos to complement and reinforce what is learned in the classroom and to expand environmental literacy.” It should be noted that the Galápagos Conservancy is a United States-based organization, and has more exposure to the term environmental literacy.

The Conservancy also notes that with recent education reform in Ecuador, many of the issues stated above have been addressed; for example, by introducing environmental themes in curriculum. The success of this introduction in actual school settings will be explored in the Findings section below. Ultimately, under President Rafael Correa, the Ministry of Education in Ecuador has made important progress in designing new curriculum and outlining values and goals of the national education system. It remains to be seen if these goals have been implemented or are successful, especially in Ecuador’s most isolated region: Galápagos.

Other authors in the literature on education in the Galápagos state similar findings. Gardener and Grenier (2011) find that “education is of very low quality in the Galápagos; school programs tend to be mediocre and ill-adapted to the particularities of the archipelago.” Gardener and Grenier also reference the Special Law of Galápagos,
a federal legislation passed in 1998 that is now included in Ecuador’s national
collection, to explain the context of education in the archipelago. The Special Law
(officially, the “Organic Law for the Special Regimen for the Conservation and
Sustainable Development of Galápagos”), includes regulations for island management
including quarantine to protect against invasive species, correct practices for fisheries,
rights for residents versus non-residents, and restrictions on imports and living spaces
(i.e., where structures can be built) in an attempt to protect the national treasure that is
Galápagos (Conservancy, 2014). The Special Law, under revision since Ecuador
adopted a new constitution in 2008, also includes an education reform specifically for
Galápagos that includes re-imagining the current education system, creating a
Galápagos-specific curriculum with examples in text and activities directly pulled from
the Galápagos environment, a “focus on human and environmental relations”
(Gardener, 2011) among other conservation-oriented materials. However, this reform
has yet to be implemented in the islands, due to administrative hold-ups and lack of
resources. The needs of teachers on the islands, expressed in the interviews I
conducted for this study, highlight the missing pieces of this reform.

Similarly, a report by a former volunteer in one high school on Santa Cruz island
stated the need for increased environmental learning and education in formal systems
to “promote more conservation based lifestyles” of residents and “conservation
understanding, participation, and collaboration to strengthen social organizations and
encourage integration and participation in regional conservation programs” (Stepath,
2009, 1). Stepath recognizes that school systems, and thus students in them, lack
effective environmental education, and that working with the younger generation is of
the utmost importance to produce future Galápagos leaders who will make political and social decisions that will encourage conservation and sustainability. He also references the proximity concept (Stepath and Whitehouse, 2006) that explores how proximity to natural environments, often obtained through experiential learning, increase environmental awareness, knowledge, and can affect pro-environmental behavior (Stepath, 2009).

**Informal Environmental Education**

In terms of informal environmental education, the Galápagos Islands host a large number of organizations across the four inhabited islands: Floreana, Isabela, San Cristóbal, and Santa Cruz (in order from smallest to largest population). According to Watkins and Martínez (2007) there are an “estimated 160 groups across the islands, 75% of them built around specific interests, such as fishing, tourism, labor, and conservation.” Overall, the vast majority of these organizations are internationally-based, with offices on the islands, but in recent years, local NGOs have gained more presence in community building and conservation (Conservancy, 2014).

Many of the organizations with an environmental or conservation focus produce internationally-based information and have campaigns focused on tourist attraction and philanthropy in the international sphere. However, as will be explored in the methods and findings, many of these organizations also have internal programs produced for local Galápagos residents. Local organizations also provide programs for residents.

The Charles Darwin Foundation, and the adjoining Charles Darwin Research Station, a local organization on Santa Cruz Island, was one of the largest proponents for
environmental education in the islands, though has had funding cuts that resulted in near closure and an inability to continue their production of environmental education materials (Stepath, 2007). The CDRS (Charles Darwin Research Station) did sign a contract with a local high school on Santa Cruz island in 1999, which created a partnership in which the CDRS provided full didactic materials for an integrated environmental education curriculum, along with teacher training (Stepath, 2007). That program no longer exists, though the station still has shelves of those didactic materials, books, and guides that could be used by schools. This is an example of informal environmental education in collaboration with formal institutions to increase or reform environmental education.

Another local organization, FUNDAR-Galápagos (Foundation for Alternative Responsible Development in Galápagos) offers programs for locals and international visitors both in town and in the highland region of Santa Cruz. The organization focuses on youth, and offers programs for the federally-mandated school volunteer program, Alternativa Estudiantil (new with the latest education reform), which requires high schoolers to complete 200 hours of community service, working every Saturday with an enlisted organization (Barriga, personal communication, 2014; Bassett, 2009). In addition to these weekly outings, FUNDAR brings students in groups up to its highland farm, Pajaro Brujo. Here students can work in scalesia (an endemic tree-daisy) reforestation, and harvest produce from the farm. FUNDAR offers an impressive range of classes and opportunities for civil engagement to students, though is also limited by staff, time, and resources (Barriga, personal communication, 2014).
These are a few examples of the programs of local organizations based on what little literature exists. The literature stands in stark contrast to the plethora of organizations in Galápagos that specialize in conservation and environmental issues. This informal sphere is not lacking in resources overall, but individual organizations have limitations that determine the scope of their offerings for students.
Chapter 3  Methods

A key message from the literature, then, is that there is work to be done on environmental education in Galápagos. As a modest step in that direction, this study focuses on EE efforts for students in the Galápagos Islands, with particular attention to ways that collaboration between environmental and other organizations and schools can produce more comprehensive or frequent environmental education offerings for students on the islands. I look closely at informal and formal environmental education platforms within a framework of components that support enhancing environmental literacy among students.

I conducted this study using a mixed-methods approach. This thesis reports on the qualitative data I collected to gain a deeper and more comprehensive understanding of the research topic. The qualitative research is comprised of interview transcriptions and field notes, which, when analyzed, serve as resources for policy makers, leaders of organizations, and international interest groups focused on education in a protected area. The qualitative methods for the study reflect the ethnographic approach of the research, based on anthropological forms of data collection and researcher-awareness of their surroundings.

Population Sample and Selection

My sample consists of principals of public, private, and public-private schools in Galápagos (the latter characterized by mixed funding from private and federal sources). The sample also includes leaders from nongovernmental organizations and
Defining Environmental Literacy | Farber

governmental organizations on the same three islands. The schools and organizations
chosen depended on time constraints, relevance to the environmental focus of the study
and availability of principals and directors to participate. I included as many schools as
possible in the study; I did have to exclude a few because of time limitations or
availability of school directors. All schools are listed by island below in Table 1 with
number of students, grades taught, and the type of school, to give a context for the
formal education environment. All organizations interviewed in this study are listed in
Table 2 with a description of the organization’s mission or focus, and programs they
offer for students. All names of schools and organizations have been removed to
preserve confidentiality. All interviews focused on environmental education for
students; thus the numbers of students in schools on the islands is pertinent.

Table 1. Participating Schools

<table>
<thead>
<tr>
<th>Island</th>
<th>School Code</th>
<th>Number of Students</th>
<th>Grades taught</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Island A</td>
<td>SCA1</td>
<td>177</td>
<td>PreK-6</td>
<td>Public</td>
</tr>
<tr>
<td></td>
<td>SCA2</td>
<td>656</td>
<td>PreK-12</td>
<td>Public</td>
</tr>
<tr>
<td></td>
<td>SCA3</td>
<td>846</td>
<td>7-12</td>
<td>Public</td>
</tr>
<tr>
<td></td>
<td>SCA4</td>
<td>183</td>
<td>PreK-8</td>
<td>Public</td>
</tr>
<tr>
<td></td>
<td>SCA5</td>
<td>536</td>
<td>7-12</td>
<td>Public</td>
</tr>
<tr>
<td></td>
<td>SCA6</td>
<td>422</td>
<td>PreK-9</td>
<td>Public</td>
</tr>
<tr>
<td></td>
<td>SCA7</td>
<td>1113</td>
<td>PreK-12</td>
<td>Public-private</td>
</tr>
<tr>
<td></td>
<td>SCA8</td>
<td>177</td>
<td>PreK-12</td>
<td>Private</td>
</tr>
<tr>
<td>Island B</td>
<td>SCB1</td>
<td>89</td>
<td>PreK-12</td>
<td>Public</td>
</tr>
<tr>
<td></td>
<td>SCB2</td>
<td>??</td>
<td>PreK-9</td>
<td>Public</td>
</tr>
<tr>
<td></td>
<td>SCB3</td>
<td>277</td>
<td>7-12</td>
<td>Public</td>
</tr>
<tr>
<td></td>
<td>SCB4</td>
<td>421</td>
<td>7-12</td>
<td>Public-private</td>
</tr>
<tr>
<td></td>
<td>SCB5</td>
<td>609</td>
<td>PreK-9</td>
<td>Public-private</td>
</tr>
<tr>
<td></td>
<td>SCB6</td>
<td>271</td>
<td>PreK-12</td>
<td>Private-Military</td>
</tr>
<tr>
<td>Island C</td>
<td>SCC1</td>
<td>334</td>
<td>PreK-9</td>
<td>Public-private</td>
</tr>
<tr>
<td></td>
<td>SCC2</td>
<td>230</td>
<td>7-12</td>
<td>Public-private</td>
</tr>
</tbody>
</table>
Table I2. Participating Organizations

<table>
<thead>
<tr>
<th>Island</th>
<th>Organization</th>
<th>Level</th>
<th>Type</th>
<th>Mission</th>
<th>Student Programs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Island A</td>
<td>ORA1</td>
<td>Local</td>
<td>Gov.</td>
<td>National Park management, community involvement and awareness</td>
<td>Alternativa Estudiantil(^3); club; funding ORA3 selective program; field trips</td>
</tr>
<tr>
<td></td>
<td>ORA2</td>
<td>Local</td>
<td>NGO</td>
<td>Provide opportunities for exemplary students to create social initiatives</td>
<td>Selective summer empowerment program</td>
</tr>
<tr>
<td></td>
<td>ORA3</td>
<td>International</td>
<td>NGO</td>
<td>Place-based outdoor education to connect local experts and high school students (both international and local students)</td>
<td>Summer selective camp; club</td>
</tr>
<tr>
<td></td>
<td>ORA4</td>
<td>Local</td>
<td>Gov.</td>
<td>Waste management, community awareness</td>
<td>Informational field trips with schools, Alternativa Estudiantil</td>
</tr>
<tr>
<td></td>
<td>ORA5</td>
<td>Local</td>
<td>NGO</td>
<td>Sustainability and education-focused, created a private, bilingual school on Island A</td>
<td>Support and foundation of SCA8</td>
</tr>
<tr>
<td></td>
<td>ORA6</td>
<td>International</td>
<td>NGO</td>
<td>Global and local conservation, recycling, compost, beach cleans, and awareness</td>
<td>Club, pamphlets/cartoon</td>
</tr>
<tr>
<td>Island B</td>
<td>ORB1</td>
<td>Local</td>
<td>Gov.</td>
<td>Park management, community involvement and awareness</td>
<td>Field trips, talks</td>
</tr>
<tr>
<td></td>
<td>ORB2</td>
<td>Local</td>
<td>Gov.</td>
<td>University education, community education</td>
<td>Talks</td>
</tr>
<tr>
<td></td>
<td>ORB3</td>
<td>Local</td>
<td>NGO</td>
<td>Experiential learning, computer skills, library services, agriculture, rehabilitation</td>
<td>Extracurricular, camp, club</td>
</tr>
<tr>
<td>Island C</td>
<td>ORC1</td>
<td>Local</td>
<td>Gov.</td>
<td>Park management, community involvement and awareness</td>
<td>Summer camp, Alternativa Estudiantil, club, talks</td>
</tr>
</tbody>
</table>

I recruited school principals for the study based on knowledge of school availability and accessibility from a local NGO, and from recommendations of the school district office on each island. Additionally, any recommendation or advice from an

\(^3\) Alternativa Estudiantil is a program recently mandated by the Ministry of Education that requires high school students to complete 200 hours of service conducted in partnership with approved organizations, such as the National Park.
organization leader or community member was taken into account for which schools would be willing to participate and where they were located on the respective island. Similarly, I recruited organization leaders for interviews based on communication with the primary contact on each island (an individual or organization leader) and from school principal suggestions. In this way, organization participants were recruited by snowball sampling within the requirement that the organization has some environmental or education focus. Interviews were arranged a few days in advance by going to each school or organization and planning the date and time to conduct the interview and so interview participants had that time to prepare for the interview, but were not given interview questions in advance.

Following an approved protocol of the Stanford University Institutional Review Board (IRB) all participants were given consent forms in their native language. The forms were signed voluntarily, indicating the willingness of respondents to participate in the study, for their data to be included in analyses and future publications and presentations, and for interviews to be recorded. Additional approval was obtained from the central school district on Isla San Cristóbal. This permission was obtained by submitting a request for entrance into Galápagos schools for conducting interviews with school principals. Organizational leaders gave direct approval for participation by signing the consent form.

**Data Collection**

Data were collected between July 7, 2014 to September 6, 2014 through participant observation and semi-structured interviews. Participants were interviewed in Spanish or, in two cases, English. Interviews lasted between 10 and 90 minutes; interviews of
the principals lasted between 10 and 40 minutes and of organizational leaders between 20 and 90 minutes. All interviews were conducted individually, with one participant (principal or leader) as the interviewee and the primary author as the interviewer. (See Table 3 for information on interviewees.)

The interview questions were designed to gather information on broad as well as more specific scales. The questions for both principals and leaders included the following subjects: what environmental education programs exist at the institution; how environmental education is perceived in the institution; difficulties in administering environmental education; and if the institution is aware of or uses the term environmental literacy.  

Interviews for school principals started with these questions:

How do you teach or present environmental education in your school? Is it transversal or focused in one or two classes or programs? Do you have any programs in your school in collaboration with outside organizations?  

Slightly adjusted, interviews for organization leaders began with these two questions:

Do you have programs for local students; and, if so, are they all extracurricular or are some in the classroom? Would your organization be interested in initiating more collaborative programs within schools?

---

4 See Appendix A for the complete interview questions
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Overall, 30 interviews were conducted across the three islands (see Table 3). For this study, however, three organization interviews were not used in analysis because of irrelevance or misalignment with the focus of the study. Two of the three dropped interviews were not with the proper leaders of the organization, and subsequent interviews with more appropriate leaders were used instead. The third interview was not used because the individual did not directly represent an organization, and thus did not fit the framework of the study.

Data Organization and Analysis
This research used iterative and interpretive methods to analyze the qualitative data collected, allowing me to identify themes and draw conclusions from the rich format of interview transcriptions and field notes.

All data, in form of audio recordings for interviews, were transcribed in the original language. This means that all but one interview (one of the interviews in English) were transcribed in original Spanish, and I conducted qualitative coding of the Spanish transcripts in NVivo with codes logged in English. These codes were English translations of terms and themes that were repeatedly stated in Spanish in the interviews. Transcriptions were not translated into English, to avoid key words or phrases that could be translated a number of ways and thus would result in different code matches. Interviews were transcribed verbatim, which includes pauses and repetition of words.

Initially, three main coding sections were developed based on the literature and on field notes from the research: Components of Environmental Education; Delivery of Environmental Education; and Issues Associated with Environmental Education.
Environmental Literacy components were linked, more interpretively, with Components of Environmental Education. Following this first stage, I listened to all interview transcripts, took notes, and wrote brief summaries of points interview participants made. From the summaries of each interview, I noted prominent themes; I then transformed those into initial codes. Interviews were then transcribed, and I worked through transcriptions iteratively creating a set of more specific internal codes within the three broad categories above. Additionally, codes were added from outside literature, and all codes were grouped as either descriptive or interpretive. Descriptive codes include those that describe environmental education programs, collaboration, and difficulties with implementing such education. Interpretive codes include those that describe on-paper plans for environmental education, how schools value environmental education, and how federal education reform affects informal and formal environmental education on the islands. These codes were then used to create a coding node structure in NVivo, a program for coding qualitative data.

Through the coding process, I took chronological notes to determine where and when salient themes were developing across transcriptions, and across transcription type (school versus organization). Following initial and second-round coding of all interview transcriptions, I ran queries to clarify connections between coded nodes and find patterns and findings in the coded data. I coded matrix and coding queries in NVivo, checking each node to be sure coded material aligned with the purpose of the query. In third-round coding and second-round queries, I re-coded for the iterative versions of key interpretive codes like environmental awareness, environmental
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behavior, and environmental values, to produce clear results for what interviewees explicitly stated versus what I interpreted in each transcript.

**Thematic Codes for Analysis**

Before beginning analysis, I reviewed the literature on environmental literacy, environmental education, and collaboration in the environmental education sector (e.g., Ardoin et al., 2014; Borchers et al., 2013; Farmer et al., 2007; Goldman et al., 2013; and Wood, 2013) to lay a foundation for better understanding these data. These themes that arose from this initial review included: environmental awareness, environmental behavior, environmental knowledge, environmental education, science education, and environmental values. Upon analysis of the transcribed interviews in Spanish, it became clear that more specific themes and themes involving institutional administration and federal support were required to understand how environmental literacy and education and collaboration function in Galápagos. In Table I4 are the most prominently discussed themes from the interview transcriptions of principals and organization leaders, along with those from the literature:

<table>
<thead>
<tr>
<th>Initial Themes</th>
<th>Applied Themes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Awareness</td>
<td>Conservation; Care for environment</td>
</tr>
<tr>
<td>Environmental Behavior</td>
<td>Recycling; Invasive species maintenance</td>
</tr>
<tr>
<td>Environmental Knowledge</td>
<td>Transversal in classes</td>
</tr>
<tr>
<td>Science Education</td>
<td>Single-class; Strict or limited curriculum</td>
</tr>
<tr>
<td>Environmental Values</td>
<td>Buen Vivir; Identity of Galápagos</td>
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</tbody>
</table>
FINDINGS

THEMES CONSISTENT IN SCHOOLS AND ORGANIZATIONS

One of my goals was to understand how various groups define environmental literacy or environmental education, as translated into Spanish. Here I present key findings by theme, supported and illustrated using direct quotations from interviews with school administrators/directors as well as NGO leaders. Several themes were evident across all of the interviews, both those in schools as well as those in the NGO community. Themes that were common across both types of interviewees included: the use of different terminology for environmental literacy; lack of environmental behavior as well as lack of variety of such behavior as a focus for students; and infrequent or inconsistent provision of environmental education.

Use of the Term “Environmental Literacy” and Understanding the Components

The first theme that bridged both communities is that environmental literacy is not a term commonly used in Spanish. In fact, most leaders as well as school administrators and classroom educators and had not heard the term before. Environmental education, the process by which one arrives at environmental literacy (the outcome), is often used as a proxy for environmental literacy; that indeed occurred in this study as it was a term more widely used and understood in Galápagos (“educación ambiental” in Spanish). For example, one school administrator said, “The truth is that I’ve never heard [the term environmental literacy]. I have understood it in a different manner but not with this term.
But it’s great to use this term.” (SCC3, personal communication, 2014). A nonprofit leader noted that the term is somewhat confusing, saying, “So this environmental literacy, people are going to say, ‘we aren’t illiterate; we know about the environment,’ so that [environmental literacy] then is more, for me, an insult [...] I don’t know, . . . they talk more about ecological awareness, that could be it, for example, the people are going to tell you ‘we need more awareness, we need to be more aware.’” (ORA6, personal communication, 2014). Rather, interviewees were more likely to use the term “environmental education.”

In terms of defining environmental education, both groups understood environmental education—and literacy—primarily as focusing on knowledge. The schools emphasized science content knowledge (natural science), with some conservation themes (e.g., recycling). By contrast, the NGOs were heavier on aspects of conservation knowledge and lighter on science knowledge. Overall, the interviewees indicated that providing science education is important because such knowledge of Galápagos ecosystems has not, to date, been equally emphasized with other school subject knowledge for students. For example, school administrators and NGO leaders suggested that student knowledge of island geography—including their knowledge of, for example, flora, fauna, and human-environment interactions—and awareness is low. Many school directors described students’ environmental knowledge as general or superficial. One educator noted, “the fact is that we see nature, we know all these things, but it is all superficial. We don’t have a real knowledge, and we have not been well-informed about that; it would be good to know more” (SCA8, personal communication, 2014).
Although the definition of environmental education—again, with this emphasis on “knowledge”—was shared between the groups (schools and NGOs), the implementation was quite different. While similar components existed in each institution’s definition of environmental education, the implementation that occurred was markedly different. One aspect that was particularly evident in schools related to the overall lack of environmental education in school settings. Interviewees discussed the resulting lack of knowledge and limited environmental values, resulting in conflicting environmental behaviors. A school administrator critiqued, “If we talk about values and we don’t live them, we have … people who also talk about environmental education but don’t live it. So you can talk about a ton of things but, in your house, you have a car that uses a lot of gas, you leave your lights on, you don’t reduce water use, but nonetheless you can work in the environment, so it’s a theme of consistency that we’re looking for” (ORA5, personal communication, 2014).

**Provision of Environmental Education across Formal and Informal Settings:**

**Infused Across Subjects and Included in Science Education**

Some environmental education themes are presented in clubs administered by schools (which are newly mandated in schools by the new education reform) but are infrequent and insufficient sources of environmental education. As one school director noted, “in the clubs there are field trips, there are views [of the island]. There, they can understand the reality about which they’re studying. So, they’re involved with their hands, building with their hands, so it is 100% practice and they start to change in their hearts and later change their awareness to care for the environment” (SCA7, personal communication, 2014). This venue for environmental education is very promising if it provides students
with field trips and experiential education outdoors, but the reality is that clubs only have resources for a few field trips, and some schools’ clubs lack resources altogether (facilitation, funding for transportation) for field trips.

The belief that school-based environmental education is somewhat superficial was consistent in the interviews of principals. They also viewed organization-based environmental education as being infrequent. Referring to the work of a local NGO, for example, a school educator observed that:

“environmental education sometimes seems like a fad, like, sometimes it’s fashionable to reuse plastic things, a fad for a month, which is like when a famous artist appears with a famous song and the entire world sings the song to ourselves, the same thing happens with EE. Seems like ReciclaMan [a fictional character created by the NGO to encourage recycling] is talking about classification of trash and then ReciclaMan disappears and so does the concept taught to the students” (SCA6, personal communication, 2014).

Because of the infrequency and inconsistency of environmental education, there is little development of environmental values or of more sustainable environmental behavior in students’ everyday lives. Organizations often have summer camps for students, but these are selective, short-term programs that attract and ultimately affect a low number of students. The infrequency of these programs and their small-scale carrying capacity mean that the environmental education administered is limited and ineffective for all students.

A related finding was that school administrators and NGOs indicated that, while students may be surrounded by encouraging messages about becoming engaged in
their communities, rarely are they provided with the skills, social supports, and actionable environmental knowledge to be able to implement what they have learned in a sustainable way. Without comprehensive environmental education, which helps young people develop more in-depth knowledge about locally relevant environmental issues, why and how human actions can impact the environment, and what they can do to address these issues, it is difficult for students to take effective action on conservation issues. One NGO leader explained that families within the Galápagos communities may not support the conservation ethics that some organizations are espousing; thus, the environmental education that students do engage in may not be effective:

“I think that it [EE] is inconsistent, or that the students are great at identifying the inconsistencies. So if you teach them EE and they leave the class and go into a society that doesn’t understand or practice those values and concepts, the students raise the question of inconsistency and they don’t put those values into practice; they see them as invalid, so it is the inconsistency of the system I think that is the biggest challenge” (ORA5, personal communication, 2014).

The leader of the organization went on to describe how teaching about environmental knowledge, without discussing the underlying values, is challenging: “a theme of values like we had talked about earlier is important, because it is a theme that requires an agreement on values and it is the values that generate a change in behavior and when that [change in behavior] isn’t there and there isn’t responsibility and the students don’t learn those concepts in their home, it’s much more difficult” (ORA5, personal communication, 2014).

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5 It should be noted that this issue is not unique to the Galápagos and may be common for students and other residents in many international locales.
communication, 2014).

By contrast, one educator thought that it might be less important for environmental education to be part of the school curriculum and more important for it to be part of the daily life of Galapagueños. This educator said, “we live day to day, we don’t need to have an assigned curriculum or materials; we only need to practice and live it daily” (SCA4, personal communication, 2014). On the other hand, it is problematic to assume that young people- and their families- inherently know the environment of Galapagos and what actions might be most appropriate and effective in terms of conservation, especially as these issues are shifting. Countering this statement, another school director affirmed that, although students may be surrounded by environmental themes in their daily lives schools needed a specific curriculum because of that to increase student understanding of how humans are a part of and also impact their environment:

“we basically live in a national park, so we have those themes not only as a school subject but also as part of daily life, so we are immersed in that situation and we can’t get out of all of those themes. … For Galápagos, they want a distinct curriculum and they want a reform. … Here, in addition to presenting [environmental themes] generally, [we also need to] have them specific to Galápagos” (SCA8, personal communication, 2014).

Another finding in both NGO and school-based environmental education, though more heavily weighted toward the latter is that the interviewees perceive environmental education to be a topic that is most appropriately infused throughout all subjects rather than being pulled out as its own individual topic. School administrators describe how
every class includes themes related to the environment; NGO programs also take
similar approaches.

Yet, while this infused approach can be effective, suggesting that environment is
part of all subjects, and not just relegated to, for example, science, there is also the view
that transversal learning provides only a superficial treatment of the topic. A number of
the interviewees expressed this concern. The indicated that, because classes only
discuss environment in a piecemeal fashion, they never have the opportunity for
substantial depth on any particular topic. During the interviews, school leaders,
especially, often conflated environmental education with themes that were topically
based that but that lacked any attention to other elements of environmental literacy,
such as dispositions, skills, and practices.

As an example of the lack of breadth and depth to these themes in both schools
and organizations, the most common terms used to describe environmental education
were ‘care’ and ‘knowledge’—as in, wanting students to “care” and “know” about the
environment and their place. These two terms exemplify that there is very little
emphasis on actually developing skills to engage in issues and then, ultimately, take
action, when and in ways that are appropriate. One educator, for example, discusses
care for the environment: “in each class, for example, they talk about […] things you can
do, [and] how I can take care of the environment. Now we have, in the [national]
constitution, a very important amendment that is the care for the environment” (SCC2,
personal communication, 2014).

The term ‘themes’ for environmental education was used by most educators and
many NGO leaders, including one who discussed the transversal implementation of
environmental education: “we also find themes in the contents of each one of the curriculums though also they are not that in-depth” (SCB4, personal communication, 2014). Many school leaders were aware that these themes did present superficial-level environmental education, while others described them as positive aspects of their schools. They can be both, providing at least surface-level reminders of the importance of environmental awareness in all subjects. One educator elaborated: “in high school, the … ‘environment’ is dealt with in different subjects, for example, they discuss it with recyclable material, with recycled paper, so they work on that in the social sciences. The students in language arts work sometimes on theatrical skits with recycled materials, so it’s not all in natural sciences.” (SCC2, personal communication, 2014). Another educator highlighted how these themes played a role in their school and others: “I believe that some schools do only teach environmental education in the sciences, but there are others that can put it to use in math, like exercises or reasoning problems in which is immersed this theme of… of the environment--and [also] with literature, to make poems, or write environmental messages” (SCA4, personal communication, 2014).

Aside from cross-cutting themes, the most prominent source for environmental education, perhaps not surprisingly, was science education. Science education was important to both schools and organizations and was described by leaders of both institutions, especially in natural science classes and in using the scientific method in conducting small research projects on animals or plants with NGO collaborators. However, science education programs and classes present only a small amount of time for environmental education and rarely focus on active engagement in the community or
issues. One educator stated that they “use EE in natural sciences obviously for the relation between natural sciences and nature” (SCA6, personal communication, 2014) but do not have a curriculum outlining environmental education outside of basic science concepts.

To most educators, science education and environmental education were interchangeable terms, although science education did not include or implement environmental behavior or values, both key concepts of environmental literacy. Only one educator made a distinction between science and environmental education, even though this distinction was more clearly made in official curriculum and NGO programs: “the two things are very important: EE and also natural sciences so that the students take care of the planet, because if we don’t take care of it there is no life, so it is so important to teach students to care for the planet, [care] for what they know/understand and why they should care for it. Because of that, it is very important for the students to learn about the environment and natural sciences” (SCA1, personal communication, 2014).

Terms Used to Describe Environmental Education and Experiential Learning

Following the finding that environmental education was presented mostly in an infused way and rarely with a great deal of depth, a related finding was that environmental awareness, care, and knowledge were referenced more than engagement skills or environmental behavior, for both schools and organizations (see Table F1). Moreover, when schools or organizations did reference participation skills or environmental behavior, the activity mentioned was most frequently recycling (see Table F2). Because of specificity, environmental behavior is viewed as limited to just a few activities, of
Defining Environmental Literacy | Farber

which the majority of instances are recycling. As one of the key components of environmental literacy, environmental behavior is lacking in the discourse and actual practice of environmental education in both schools and NGOs on the whole.

Table F1. *Iterative terms used to describe environmental education*

<table>
<thead>
<tr>
<th></th>
<th>Organization-Based</th>
<th>School-Based</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>Behavior</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Care</td>
<td>11</td>
<td>21</td>
</tr>
<tr>
<td>Knowledge</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Values</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

In terms of pedagogical practice and teaching-and-learning strategies, organizations did present more opportunities for experiential, hands-on learning, particularly linked with environmental behavior. But these rarely were talked about in terms of more sustainable, longer-term behavior that would reach beyond the short time frame of that specific project or program. One organization did discuss more sustainable behavior that might affect the community or lives of the students: “I saw in my students some changes through the work we did with [another organization] and through the work they did with Alternativa Estudiantil [school-required student participation]. And so there I can see a bit of those changes in the students. I think that those types of projects have real applications for a change not only in the way they think, but also maybe in the way they act, which is the most important” (ORA1, personal communication, 2014). See Table F2 for a description of each NGO, school, and collaborative effort; they are cross-referenced with the types of environmental behaviors
described in the interviews. These were all the behaviors mentioned by interviewees; note that the vast majority of references were to recycling.

Table F2. Environmental behavior referenced by interviewees

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Collaboration</th>
<th>Organization-Based</th>
<th>School-Based</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean up trash</td>
<td>7</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Compost</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Gardens</td>
<td>3</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Invasive Species Maintenance</td>
<td>7</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Recycling</td>
<td>12</td>
<td>8</td>
<td>22</td>
</tr>
<tr>
<td>Reforestation</td>
<td>3</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

**Leader Acknowledgement and Collaboration between Institutions**

Here is another important finding: while many leaders acknowledged that environmental education is important for conservation, they do not have sufficient curriculum, class time, or programs to present it thoroughly and effectively. Some school administrators described feeling constrained by the prescribed curriculum. One administrator stated that “the most important thing is the learned ability we have to care for the environment, that is one of the necessities of Galápagos” (SCA2, personal communication, 2014).

Many school administrators tied this finding in with the potential gain for environmental education from more collaboration with NGOs, which have the opportunity to provide informal learning experiences. One educator said:

“I would be in agreement with help from the NGOs to better EE, so that everyone participates for the Buen Vivir [good life], for the planet, we will take care of it, because it is the responsibility of human beings to care for the planet, because the animals take care of it, but the human beings, we don’t take care of it, so we,
as people responsible for the planet, should take care of it, so everyone should participate: the NGOs, the schools, the families, so that we will have a planet with life for the long term” (SCA1, personal communication, 2014).

Similar to this educator’s thinking, a key finding was that both school administrators and NGO managers felt that improved collaboration would provide more in-depth and effective environmental education opportunities. This finding relates to the distinct benefits of each of these sectors related to environmental education. With unique offerings and resources, both organizations and schools provide pieces of an environmental education puzzle that, when blended through collaboration, becomes a more comprehensive and complete environmental education landscape that would incorporate all the core concepts of environmental literacy. For example, one NGO affirmed that it can provide supplemental environmental education and professional development for school educators, providing a richer experience: “if the teacher comes to us with a theme related to vegetation zones, what do we do? We reinforce the knowledge and understanding of the students with a field trip” (ORB1, personal communication, 2014). Many times, schools do not have the monetary resources to pay for the transportation and materials required for field trips, and teachers may not have the knowledge of a field trip destination that an organization specializing in that environmental space would. A school educator also confirmed that organizations give valuable support to classes: “the ORB1 or other foundations or institutions help and work with our students. So with those institutions we work a little more with those themes” (SCB4, personal communication, 2014).
Unfortunately, a parallel finding was that, in the past, before the most recent education reform, there used to be more collaboration between schools and organizations. Now schools and NGOs perceive that they have limited access to each other for resources, time, and so on. This finding means that schools that do not have the monetary or training resources to take students on educational field trips outdoors can no longer rely on organizations for that support and facilitation. With the new reform, organizations must submit a year-long plan for when and where they want to interact with schools. Subsequently, organizations cannot enter classrooms or schools without pre-approval from the local school district, which must be given at the start of each academic year. This overrules previous systems in which schools had more autonomy in asking organizations for support and field trip facilitation during the school year or as class subjects became apparent.

Below, Table F3 illustrates reasons that environmental education has decreased in organizations, schools, and collaboration between the two institutions this academic year, based on statements in all interviews:

<table>
<thead>
<tr>
<th></th>
<th>Collaboration</th>
<th>Organization-Based</th>
<th>School-Based</th>
</tr>
</thead>
<tbody>
<tr>
<td>La Reforma</td>
<td>8</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Resources</td>
<td>2</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Administration</td>
<td>16</td>
<td>6</td>
<td>20</td>
</tr>
<tr>
<td>Curriculum</td>
<td>7</td>
<td>3</td>
<td>13</td>
</tr>
</tbody>
</table>

This table suggests that one of the reasons why environmental education, and collaboration between schools and organizations, are low is that recent administrative changes, including the most recent education reform (“La Reforma”) has made these
opportunities more difficult. This means that activities such as field trips, talks from organization leaders who have environmental knowledge that teachers do not, and additional programs facilitated by organizations for schools, are not offered to students. Additionally, the newest reform made changes in class hours for specific subjects, notably, a decrease in hours dedicated to the sciences, where most schools have a clear opportunity to include environmental education. Hopefully, with the addition of the focus on the ‘Buen Vivir,’ which is very much aligned with environmental education, new possibilities may open up to environmental themes.

THEMES THAT DIFFERED BETWEEN SCHOOLS AND ORGANIZATIONS

Schools: Undefined environmental education and limited experiential learning

An important finding in the schools alone is that environmental education remains undefined in the curriculum. This is a common problem with formal environmental education, as it requires the nationally mandated curriculum to agree upon a cohesive definition of environmental education and the core concepts and standards, similar to any other core subject such as mathematics or social studies. But because environmental education is not a required subject by national standards, concepts of environmental education are included only as themes (discussed above) no comprehensive definition of or standards related to it exist. Some schools explained that they have these environmental education ‘themes’ without having any teacher training, curriculum, or teaching points, which means ‘anything goes’ in terms of environmental education in schools. One educator observed that “many school directors try to make [EE] transversal by adding environmental ‘themes’ to each class,” as discussed above. The educator went on to explain that “for [EE] to be transversal, that
requires that the teacher is trained for that; meanwhile, currently the only teacher who teaches environmental education is the natural sciences teacher because it is within that program [...] so we’re missing professional training for the other teachers so we can make the curriculum transversal” (SCA3, personal communication, 2014). This points out what other directors have failed to note: that teaching EE has to be part of teacher training, so simply saying that it is infused, without professional development and training for how to teach EE, the themes can only be superficial. While commitment and transition to the a new Galapagos-focused curriculum suggests an exciting next step in terms of focusing environmental and science education on the Galápagos with a Galápagos-specific curriculum, directors of primary and secondary schools included in this study indicated that they have yet to receive these materials (SCA3, personal communication, 2014). Ultimately, schools do not have a curriculum for EE so it is infrequent and inconsistent. For example, one director said:

“we as an institution try to implement environmental education as a core concept that is infused. There isn’t one subject or a class for it in the overall curriculum at the national level, so in our school there also isn’t a subject or class that is called environmental education. But it is within the transversal concept that we have EE, but it’s very basic themes. The problem of EE in practice, or in each core concept, is that we have not defined the terms together. To me it seems, for example, that in this respect Galápagos is behind [the times]. Galápagos should have defined basic themes to teach EE a while ago but we haven’t done that.” (SCA6, personal communication, 2014)
This finding suggests that the lack of EE guidelines or teaching standards results in the topic being taught intuitively, focused on subjects such as conservation, care, and recycling, without any defined goals or points to accomplish effective, specific outcomes, such as environmental literacy.

In addition to having undefined environmental education, schools offer limited experiential learning for EE. This finding is important to note, as much environmental education is more effective when conducted in the actual environment, for example, through experiential learning strategies, such as field trips. When experiential learning is offered through schools, it is done so for small groups of students on single field trips or summer programs (which require selective applications), so they do not reach all students. This is the fault of lack of monetary, temporal, and knowledge-based resources for schools.

The majority of school directors interviewed on three Galápagos Islands stated that connection with the natural world—as it might occur through field trips and experiential learning—was important for developing environmental literacy among young people (SCA6, personal communication, 2014; SCA7, personal communication, 2014). However, school directors explained that resources and time restrictions, as well as administrative blocks on outside organizations, resulted in few opportunities for this kind of experiential learning (including field trips) to occur as part of the formal education experience, as currently designed. One director stated that the formal education sector simply does not have the resources to provide the transportation, research supplies, or supplemental materials needed to support field trips and out-of-school efforts (SCA3, personal communication, 2014).
As one educator laments: “[classes] are not sufficient because [...] they’re 40 minutes, and to do environmental education that requires much more time, it requires much more. [...] it should not be as much in the classroom, but more outside, because the classrooms are clean and the destruction is in the forest, in the animals, in the countryside, so the students have to work there, not in the classrooms” (SCA7, personal communication, 2014). The educator goes on to explain that for students, too, experiential education is more attractive than formal classroom education:

“the students don’t want that much theory/textbook work, they want more practice [...] so sometimes teaching environmental education classes with theory isn’t practical or satisfactory. Practice that builds the theory is more important. So in that context I think that environmental education in classrooms has been made theoretically, but in practice we need to strengthen it more with processes and projects specifically with the entities/organizations that have their own resources. In contrast we don’t have that ability, we are below the Ministry, we have a general outline, a curricular outline that we have to complete, but that outline/guideline is in a book so we continue with it word for word” (SCA7, personal communication, 2014).

This statement not only describes an ideal situation for environmental education in a school setting, but also notes that school directors must follow standardized curricula from the central Ministry of Education.

In parallel, some organizations also recognize the lack of experiential learning to which students have access. One organizational leader stated that:
“it’s a shame because you’re in Galápagos, the whole idea of experiential education is that you’re able to learn through experience and here in the islands especially for environmental studies, it’s the perfect area to learn through experience. But it’s really difficult for high schools to go out and do field trips and take them out and, for example, teach them about food chains or food webs. It would be something really easy for them to actually learn here just by going out” (ORA2, personal communication, 2014).

This argument highlights the awareness that both schools and organizations have about the lack of experiential education offered to students, and recognizes the opportunities that students might have because of their location in the Galápagos Islands.

**Organizations: Experiential learning offerings**

Contrastingly, organizations have the potential to offer more opportunities for experiential learning in informal settings, but these opportunities remain infrequent and unreliable. The same organizational leader described their organization’s concept of the importance of experiential education for students, saying:

“you are not able to practice conservation or really realize all the wonderful things that we have here in Galápagos until you’ve actually experienced the nature of Galápagos. [...] So in terms of conservation one of the things that we’ve realized is that the vast majority of participants have never been able to go out to other islands and to experience, for themselves, their body, their emotions, their psychological status, in nature in this context. So, if students here aren’t aware of their bodies, aren’t aware of being out of their comfort zone, and they haven’t had the experience of being able to go out into nature, [and see the] processes of
conservation, they will never be able to process” (ORA2, personal communication, 2014).

Another organizational leader observed that it is important to have an “understanding in the actual site of how these things are, how they work, and you come into a mentality of responsibility that we should all take care of the environment. EE in classes is fine, knowledge is fine, but reinforce it through time outdoors” (ORB1, personal communication, 2014). This leader, and other interviewees, recognize that experiential learning is critical to making connections between the core concepts of environmental literacy.

Within these informal EE organizations, my findings suggest that programs and community outreach are plentiful, offering many positive opportunities, yet current work with students in schools is limited to infrequent visits by only a few select organizations. The GNPS (national park), for example, has year-round programs that reach out to students during breaks or after school to teach about reducing plastic use and reforestation programs; they also invite classes to visit their interpretive center near Tortuga Bay in Santa Cruz (ORA1, personal communication, 2014). The park representatives noted that workshops, classes, and fieldtrips have more spaces available than are used because of stringent requirements of the school curriculum, which often prevent school children from participating in off-site informal educational opportunities (personal communication, 2014).

Ecology Project International, housed on Santa Cruz Island, focuses on providing camps during school vacations to select local students. These camps offer students the opportunity to conduct scientific projects and be in direct contact with nature (ORA3,
personal communication, 2014). Hacienda Tranquila, an NGO on San Cristóbal Island, produces programs for international students, as well as some local students, to work on their land in the highlands in an effort to promote learning outside of the classroom (ORB3, personal communication, 2014). These, and many more organizations, have resources for student-focused programs; the challenge is to find an intersection between what these programs have to offer and what classroom educators need in terms of content, support, and linkage to the existing (or aspirational) curricula (ORA1, personal communication, 2014).
Discussion

The findings of this research suggest that environmental education in the Galápagos is challenged (1) by the current structure of the educational system; (2) by the lack of links between environmental education and the local environment (which abounds in opportunities for enhancing environmental literacy); and also (3) by missed opportunities for deeper and more meaningful connections between the formal and informal sectors.

Structure of the Education System

The first issue relates to the structure of the educational system: Many of the school leaders interviewed explained that their schools teach environmental education using an “infusion” approach, weaving the concepts through themes in all classes. However, when they elaborated on those themes, the specific teaching points were unclear and the themes were redundant or did not appear to cover a comprehensive range of environmental knowledge, skills, or behaviors. Reasons for this shortcoming primarily include a lack of time allotted to environmental sciences or outdoor experiences, which is not the fault of the individual teachers or schools but, rather, an unfortunate side effect of a strict, nationally mandated curriculum. The school structure and standards result in that the knowledge students obtain through science, or other, classes being relatively superficial.

The majority of school directors interviewed on three Galápagos Islands stated that connection with the natural world through field trips and experiential learning was
important; however, directors explained that resources and time restrictions, as well as administrative blocks that prevented them from working with outside organizations, prevented their pursuing field trips and other kinds of experiential education currently. This relates to the situation that Brewer describes, saying that we need to “overcome the institutional barriers that limit our participation in promoting ecological literacy” (Brewer, 2002). Unfortunately, these challenges relate to larger hierarchical structures within the educational system and, thus, may take time to change.

Another structural issue is that Galápagos schools must apply a nationally designed curriculum, which at times creates barriers to environmental education. In the archipelago, environmental education themes may be more relevant than elsewhere as ecological and biological themes may be more pertinent to the islands with opportunities to take field trips into the National Park, undertake recycling initiatives, and pursue more in-depth knowledge of Galápagos ecosystems, flora, and fauna. With the most recent educational reform, however, more opportunities may be available as environmental themes, as well as the notion of education for “buen vivir” are included as strands in the national curriculum. These offer entry points for environmental education in the national curriculum, and Galápagos may be particularly well-positioned to implement these themes.

**Connection to Local Environment to Build Environmental Literacy**

A second finding is that of missed opportunities to capitalize on the immediate environment – in particular, the Galápagos National Park— to build local environmental literacy. School administrators and NGO staff suggested that current environmental education programs lack meaningful connection to the local environment and issues.
Without this core component of environmental literacy, students are left without a full grasp of environmental issues, human-environment interactions, and how they directly affect their own, local environment. The educators expressed concern that this means that environmental ethics and behavior are low.

Many of the interviewed administrators expressed interest in building environmental literacy among their students, although they had not heard that specific term before and it did not translate effectively into Spanish. This suggests potential for honing environmental education in the Galápagos and providing more concrete goals for environmental education in schools, even if the national curriculum cannot be changed to include a separate course for environmental education. With a goal-oriented [or standards-driven] term like environmental literacy, school and organizational leaders could have a more comprehensive awareness of what to teach and what outcomes are expected, in terms of environmental knowledge, dispositions, skills, and participation—core elements of the environmental literacy definition. From the literature, we know that focusing on knowledge alone does not produce a more favorable environmental attitude, nor does it lead to more productive engagement in environmental issues; therefore, it is important to think about how to thoughtfully design environmental education with appropriate outcomes in mind (Heimlich & Ardoin, 2009).

The school and NGO interviews indicated that recycling is currently the main environmental behavior of emphasis in Galápagos, and there was little understanding of the other components that comprise a foundation of environmental literacy. This situation is perhaps similar to elsewhere in the world, where the primary emphasis is on often on knowledge of environmental principles, but less on application of that
knowledge to real-world issues and problem-solving. Yet, as seems to be occurring in Galápagos as in other regions, effective environmental education with an outcome of environmental literacy is integral to affecting actual conservation of the environment (Blum, 2008). Therefore, an opportunity seems to exist to better connect environmental education to the local environment and, in this way, build environmental literacy that is relevant and meaningful for students.

**Connection between Formal and Informal Sectors**

Interviews with school and organization leaders indicated that both institutions can provide distinct avenues for environmental education, although neither can do so comprehensively. Schools can provide structured learning environments, school gardens, recycling, and science education, but they do not have defined environmental education tenants or components such as those of the environmental literacy definition. NGOs can provide experiential learning outings; field trips; direct contact with scientists; afterschool, weekend, and family programs; and immersive summer programs; but these are infrequent and intermittent and do not provide daily access to environmental education. From that perspective, it seems that collaboration is the center of a Venn diagram of EE activities and resources that provides the most in-depth and effective production and administration of environmental education, and thus the highest outcome in environmental literacy. In other words, collaboration between the informal and formal education sectors would covers all components of environmental literacy most completely and comprehensively. As Farmer, an education researcher, describes, "the definitive aim of environmental educators is to change individual behavior toward the environment by producing environmentally literate and responsible citizens"
(Farmer, 2010). By working to bolster both school and organization production of environmental education, I think that Farmer’s descriptive goal can be obtained for Galápagos students.

Many organizations in Galápagos are also interested in and committed to educating about environment and conservation. These topics currently are not currently a focus in schools due to lack of curricular support as well as lack of teacher professional development in those fields. One interviewee astutely noted that teachers are not only lacking in professional development around infused environmental education, but also in natural sciences; bolstering these professional development opportunities will be important in order for environmental education to succeed in the formal sector (SCA3, personal communication, 2014).

Collaboration between informal and formal environmental education institutions can have positive outcomes in terms of student engagement, learning, and knowledge gain outcomes, which can positively affect environmental attitudes and pro-environmental behavior (Dori, 1998). By integrating learning activities from both informal and formal institutions, students gain a more comprehensive education that includes experiential or hands-on learning, community involvement, and a direct physical connection to the environment.

Specifically, experiential learning is a critical strategy for effective environmental education. It provides opportunities for hands-on learning and place-based environmental education, allowing students to connect with their local environment. Leaders of both formal and informal education programs in Galápagos agree that experiential education is needed, but is limited due to resources and access to
collaboration between institutions. As currently designed and mandated, the requirements and structure of daily school activities, governed by standards, restricts potential time for experiential, place-based education. However, through partnerships with NGOs and/or community-based educational collaborators, using the National Park, as outdoor classroom settings would provide an exciting opportunity.

**Limitations and Validity**

Like all research, limitations exist in this study. One limitation relates to potential perceived conflict of interest and influence on the part of the researcher in relation to the interviewees and their organizations. Specifically, some interviewees may have perceived a relationship between the researcher and their institution in terms of their organization’s ability to garner future support. Relatedly, the position I hold as a young, American, female researcher did affect my reception and acceptance in both formal and informal educational and community-based settings. Although I do not believe this position negatively affected this study’s results—in fact, I had positive and open receptions from almost all participants, with a willingness to help provide any information and views during the interviews—this reception may have been related to the desire for this research to reach higher levels of educational or federal administration in Ecuador. Because of this potential connection between the research and policy, the content of the responses may have been affected. I attempted to address these issues and potential concerns by emphasizing this study’s separation from concurrent research-and-funding projects being conducted in the Galápagos; I also
stressed the confidentiality of interviewees’ responses and the separation of this research in space and time from other related policy measures.

A second limitation stemmed from the relatively short amount of time that I was able to spend in the field conducting this study. With only eight weeks, split among the islands and with a number of different schools and organizations, I was unable to conduct interviews with all of the individuals—and, therefore, represent all of the institutions—that I desired. During the first 10 days in the islands, I established contacts and gained administrative approval to enter schools and conduct interviews with school leaders from the district office. While this relationship-building time was absolutely necessary, it did cut into time during which I could have conducted more interviews; thus I had to select a subset of school and organizational representatives to include among my interviewees. As such, this study cannot be viewed as a comprehensive overview of environmental education and environmental literacy perspectives in Galápagos; rather, it presents perspectives from study participants. Given the time constraints, it was also impossible for me to include students among the interviewees to learn their perspectives on environmental education; yet, perhaps needless to say, including students’ perspectives would add an important dimension to the research.

A third potential limitation is that this thesis is based solely on qualitative data. The methods used are appropriate for providing in-depth insight; however, they do limit the findings to a particular kind of analysis. Augmenting these qualitative data with quantitative data would help make the findings more robust. In particular, quantitative data from the youth in the islands, such as representing their level of environmental
literacy, would help support the data presented herein with regard to notions of environmental literacy in the archipelago.
Appendices

APPENDIX A:

Interview Questions

Note: This was the question guide used in each interview with school and organization leaders. However, these questions were not rigid, and new questions may have surfaced during the interview based on answers or comments made by the interviewee.

Interviews for School and Organization Directors:

Hello, thank you for meeting with me today. Again, this interview is for research that I am conducting as a student of Stanford University, and is to investigate how environmental education is taught in the Galápagos.

Firstly can you tell me a little about your school/organization?

- What importance does environmental education have in the values of your institution?
- How does your school/organization define environmental education, and how is environmental education presented?
  - what terms, frames of reference or study, or activities
- How do you teach environmental education?
  - For Schools: In which classes is environmental education taught?
- Has the education reform affected environmental education?
- Are there any ways you taught environmental education in the past that you no longer have in your school/organization?

A term I use in this study is Environmental Literacy.

- Have you heard of or do you use the term environmental literacy?
- Here is a definition of Environmental Literacy by the NAAEE (North American Association for Environmental Education) that I am using for my research; what are your thoughts on the components of environmental literacy?
  - “an environmentally literate person is someone who, both individually and together with others, makes informed decisions concerning the environment; is willing to act on these decisions to improve the wellbeing of other individuals, societies, and the global environment; and participates in civic life. Those who are environmentally literate possess, to varying degrees:
    - the knowledge and understanding of a wide range of environmental concepts, problems, and issues;
    - a set of cognitive and affective dispositions;
    - a set of cognitive skills and abilities;
    - and the appropriate behavioral strategies to apply such knowledge and understanding in order to make sound and effective decisions in a range of environmental contexts.
Defining Environmental Literacy | Farber

- And may include:
  - Ecological knowledge
  - Verbal commitment (to do environmentally responsible actions)
  - Actual commitment (completion or actually doing such actions)
  - General environmental feelings
  - Environmental issue and action skills

- Does your institution have a similar definition of values, even if they are not called environmental literacy?

Lastly, here are some principles/themes from a survey that is designed to determine student levels of environmental literacy. Do these principles align with what you or your institution perceives to be environmental literacy/education?

- What is pollination?
- What is a predator-prey relationship?
- Natural systems like the life cycle and food chains
- Sources of energy for living things
- Attitudes towards environmentally responsible behavior (recycling, saving energy, giving money to an organization that protects the environment)
- Listing actions students take to conserve and protect the environment (talk with parents about saving energy or water, writing a letter to the government, asking people to recycle, putting up a bird house)
- Environmental awareness (taking trips to natural places, participation in environmental clubs or outdoor activities, observing wildlife, hunting or fishing)
- Feelings about the environment (love or hate)
- Determining the responsible course of action in an environmental debate

Additional Organization Questions:

- Do you have programs for school students?
  - Are they outside the classroom or in the schools?
  - How many students participate per year?
  - Do the programs cost anything for local students?
  - Are these programs outside of schools or within schools?
- What student programs did you have in the past that you do not have anymore?
### APPENDIX B

Example of iterative codes:

<table>
<thead>
<tr>
<th>CODE</th>
<th>DEFINITION</th>
<th>EXAMPLE</th>
<th>TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clubs</td>
<td>Afterschool or before-school activities or semi-structured groups</td>
<td>“The school is working on a few clubs, like the science club” (SCC1)</td>
<td>Iterative – First pass</td>
</tr>
<tr>
<td>Recycling</td>
<td>Act of recycling, including sorting materials, or repurposing materials for crafts</td>
<td>“like, for example, we recycle” (SCC3)</td>
<td>Iterative – First pass</td>
</tr>
<tr>
<td>Alternativa Estudiantil</td>
<td>Ministry-required student service with approved organizations</td>
<td>“regulation of introduced plants, that, that we have every Saturday for Alternativa Estudiantil” (ORA1)</td>
<td>Iterative – First pass</td>
</tr>
<tr>
<td>Buen Vivir</td>
<td>Phrase used in Ecuador based on indigenous values that encompasses health, care for the environment, and active citizenship</td>
<td>“and human rights of Buen Vivir” (SCA5)</td>
<td>Iterative – Second pass</td>
</tr>
<tr>
<td>Care</td>
<td>Term used when referencing care for the environment like conservation</td>
<td>“you care for it, it is the same concept in Galápagos” (SCA6)</td>
<td>Iterative – First pass</td>
</tr>
</tbody>
</table>

Example of interpretive codes:

<table>
<thead>
<tr>
<th>CODE</th>
<th>DEFINITION</th>
<th>EXAMPLE</th>
<th>TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Behavior</td>
<td>Activities that are pro-environmental such as conservation or sustainability efforts</td>
<td>“like, for example, we recycle” (SCC3)</td>
<td>Interpretive – Third Pass</td>
</tr>
<tr>
<td>Environmental Awareness</td>
<td>Being aware of environmental issues and human-environment interactions</td>
<td>“everyone starts to learn that the environment is important” (SCA3)</td>
<td>Interpretive – Third Pass</td>
</tr>
<tr>
<td>Environmental Values</td>
<td>Personal values that include positive associations with environmental conservation</td>
<td>“we have all of these ethical perspectives of how they’re related to nature” (ORA2)</td>
<td>Interpretive – Third Pass</td>
</tr>
<tr>
<td>Environmental Knowledge</td>
<td>Knowledge about ecosystems and environmental processes, etc.</td>
<td>“they leave with better knowledge of the islands” (ORA3)</td>
<td>Interpretive – Third Pass</td>
</tr>
</tbody>
</table>
References

31. ORA2. Organization on Island A. In-person interview, July, 2014
33. ORA4. Organization on Island A. In-person interview, July, 2014
34. ORA5. Organization on Island A. In-person interview, July, 2014
36. ORB1. Organization on Island B. In-person interview, August 2014
37. ORB2. Organization on Island B. In-person interview, August 2014
38. ORB3. Organization on Island B. In-person interview, August 2014
39. ORC1. Organization on Island C. In-person interview, August 2014
40. SCA1. Director of a primary school on Island A. In-person interview, July, 2014.
42. SCA3. Director of two schools on Island A. In-person interview, July, 2014.
44. SCA5. Director of a primary and secondary school on Island A. In-person interview, July, 2014.
48. SCB1. Director of a primary and secondary school on Island B. In-person interview, August, 2014.
49. SCB2. Director of a Primary School on Island B. In-person interview, August, 2014.
50. SCB3. Director of a secondary school on Island B. In-person interview, August, 2014.
52. SCB5. Director of a primary and secondary school on Island B. In-person interview, August, 2014.
53. SCB6. Director of a primary and secondary school on Island B. In-person interview, August, 2014.
54. SCC1. Director of a primary and secondary school on Island C. In-person interview, August, 2014.
55. SCC2. Director of a secondary school on Island C. In-person interview, August, 2014.
56. SCC3. Director of a primary and secondary school on Island C. In-person interview, August, 2014.
57. Schugurensky, Daniel. The forms of informal learning: Towards a conceptualization of the field. Ontario Institute for Studies in Education of the University of Toronto. 2000

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6 Pseudonyms are used for interviewees who did not represent an institution.