SCIENCE FOR GALÁPAGOS?: SCIENCE AND ITS PUBLICS IN THE GALÁPAGOS ARCHIPELAGO

Haruna Suzuki

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Approved by:
Scott Kirsch
Banu Gokariksel
Gabriela Valdivia
ABSTRACT

Haruna Suzuki: Science for Galápagos?: Science and its Publics in the Galápagos Archipelago
(Under the direction of Scott Kirsch)

In May 2011, UNC-CH and the Universidad San Francisco de Quito in Ecuador inaugurated the Galápagos Science Center in San Cristóbal, Galápagos. The GSC signifies a new site for science in the archipelago, where the science-society relationship has been historically complex. Through examination of the GSC’s outreach initiatives I ask, “What is a science for Galápagos?” “Science for Galápagos,” is a phrase from Santander et al. (2009) who argue that a science for the islands signifies a model of science in which research priorities are established by “competent authorities” according to “real knowledge needs.” I revisit this definition, arguing that a science for Galápagos should incorporate Doreen Massey’s (2005) idea of place as process. Science for Galápagos, then, is not a science that is tied to any singular understanding of—or vision for—the Galápagos but rather one that is open to engaging with the inherent multiplicity of place.
ACKNOWLEDGEMENTS

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<td>CAC</td>
<td>Community Advisory Committee</td>
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<tr>
<td>CDF</td>
<td>Charles Darwin Foundation</td>
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<td>CDRS</td>
<td>Charles Darwin Research Station</td>
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<td>GMR</td>
<td>Galápagos Marine Reserve</td>
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<td>GNP</td>
<td>Galápagos National Park</td>
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<td>GSC</td>
<td>Galápagos Science Center</td>
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<td>USFQ</td>
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CHAPTER 1: INTRODUCTION

1.1 “We have a building—so what?”

On May 16, 2011 UNC Chapel Hill and the Universidad San Francisco de Quito (USFQ)\(^1\) in Ecuador inaugurated the Galápagos Science Center (GSC) on San Cristóbal Island, Galápagos. A state-of-the-art research station with four laboratories, office and meeting space for resident and visiting scientists and students, and a classroom for community programs and events, the GSC signifies a new site for science in the archipelago, where the science-society relationship has been historically complex and at times, contentious. As is common in many protected areas, tensions initially resulted from competing visions over ‘proper’ human-environment interactions (Peluso 1993, Agrawal & Ostrom 2001, Robbins 1998, 2004), and by extension over opposing conceptualizations of place. Conflicts became particularly heightened in the 1990s, when fishers protested violently against Park officials and scientists\(^2\) over stricter regulation of fisheries in the

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\(^1\) USFQ, a top-rated private university founded in 1988, was the first liberal arts institution in the Andean region of Ecuador. There are approximately 5,500 students enrolled at USFQ, 4,500 of which are undergraduates. USFQ offers semester and summer programs for Ecuadorian and foreign students. Since 2011, USFQ has been accepting UNC Chapel Hill students into their semester programs in Quito as well as into summer programs with UNC and USFQ faculty at the USFQ Galápagos campus. The UNC-USFQ relationship was established primarily by the GSC’s co-directors; Co-director 2 completed his doctoral degree under the supervision of Co-director 1 at UNC and the two have continued their relationship as research collaborators.

\(^2\) In this case, scientists refer to scientists from the Charles Darwin Research Station (CDRS), founded by the Charles Darwin Foundation in 1964 on Santa Cruz Island. In the earlier years of the National Park, the CDRS was closely aligned with the Park as their scientific and technical adviser. Over time, this relationship has changed such that the distinction of the Park as a management body and the Station as a science research institution has been blurred. The National Park now has its own science research projects and some officials believe that coordination between the Park and the CDRS has become increasingly tenuous. It should also be stated from the outset that the categories, conservationist and scientist, are not mutually exclusive. Many conservationists are scientists. As one senior scientist at the CDRS stated, “I’m both scientist and conservationist. I base my conservation recommendations on science. It’s not that in some cases, I’m a
Galápagos Marine Reserve (GMR). As noted in Quiroga and Ospina’s (2009) survey of 558 residents on San Cristóbal, Santa Cruz, and Isabela islands, individuals 45 years of age and older—the demographic that lived through these socio-environmental disputes—tended to be highly critical of science, often essentializing scientists as an elitist group having little regard for the economic and social welfare of local populations. Survey respondents below the age of 45, conversely, demonstrated greater support for science and scientists. Even so, there is general consensus that Galápagos science, with its historical emphasis on conservation and environmental management, has largely failed to address the additional needs and concerns of a growing human population.

In a September 22, 2011 meeting at the Center for Galápagos Studies at UNC, a GSC co-director (Co-director 1 hereafter) asked a group of UNC-based Galápagos researchers, “We have a building—so what?” The building of that building, a multi-million dollar research facility, I argue, constitutes a paradoxical moment and process, at once enabling and complicating science. On one hand, it signifies the installation of the GSC as an official scientific and institutional presence at a multitude of scales, allowing for the accumulation and consolidation of advanced human, technical, and technological resources and expertise. As Co-director 1 explained, “We’re already fielding requests from other universities from around the world about getting involved. And they want to get involved in a variety of ways. We’ve also been approached by NGOs so as our name and as our presence in the Galápagos...”

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3 Throughout this thesis, I use the category, residents, to refer to non-scientists living in the Galápagos. Many scientists themselves are residents—either permanent or temporary—but for purposes of ease, I refer to them simply as scientists.
becomes more advertised, more well-known, there will be people that want to do a variety of things.” At the same time, it is precisely this institutional visibility and capacity—combined with historical science-society tensions and the widespread perception of Galápagos science as being detached from community concerns—that generates particular expectations from residents and institutions. As Co-director 1 noted, “We have a structure…we have a location in space…so in that way, we become part of the community infrastructure in a more obvious way, interacting with organizations on different islands as well as the mainland as well as international organizations…”

In the summer of 2011, the Governor of Galápagos Province, Jorge Torres stated, “If it [the GSC] is anything like the Darwin Station⁴, I want nothing to do with it.” (personal communication, June 30, 2011) Torres expressed discontent with the ways in which local scientific activity has historically worked, in his opinion, to alienate and marginalize island residents. In interviews, GSC representatives expressed their awareness of critiques of this nature and consequently, their desire to develop novel and mutually productive science-society interactions. The opening of the Center, then, in addition to initiating a new phase of leading-edge science research and education in the islands, highlights a kind of crisis of the identity of GSC and Galápagos science, particularly with respect to their relationships with Galapagueñan society.

1.2 Science for Galápagos?

In the second chapter of the 2009 co-authored book, Science for the Sustainability of the Galápagos, Santander et al. offer a critique of Galápagos science and research. The authors point to the disproportionate amount of Galápagos research devoted to the biological

⁴ The Darwin Station refers to the Charles Darwin Research Station in Puerto Ayora, Santa Cruz Island.
and biophysical sciences as evidence of an ill-defined and poorly coordinated research
agenda that has mostly accommodated the “academic interests of researchers or of funding
institutions” (Santander et al. 2009, 105), or what they refer to as a science in the Galápagos.
Ultimately, the authors call for a shift from a science in to a science for the Galápagos. A
science for the islands, as defined by them, signifies a new model of sustainability science—
social and ecological—in which research priorities are established by “competent Ecuadorian
authorities” such as the National Park, and according to “objective criteria” and “real
knowledge needs.” (Santander et al. 2009, 105)

In this thesis, I revisit and complicate Santander et al.’s discussion, arguing that while
their intervention remains invaluable in its critique of overinvestment in the biological and
biophysical sciences—especially considering the significant growth of the human population
over the past several decades—what they propose in its place also proves to be problematic
for a number of reasons. First, it is taken for granted that “objective criteria” and “real
knowledge needs” are self-evident. What local authorities deem as most critical may not
address some of the issues that other social groups might find highly imperative at this
moment in the Galápagos. What is more, by dismissing “academic needs” the authors not
only imply that science can be neatly categorized as either applied or basic, but also that the
former is what matters for the current situation in the Galápagos. Should the Galápagos have
a research agenda that dismisses particular types of research as superfluous? Additional
questions that remain critical are: Who ultimately determines what constitutes real
knowledge needs? What will that process entail? Santander et al. (2009) make a passing
reference to participatory processes for defining knowledge priorities, but the dominant
message is that it is the decision of “competent Ecuadorian authorities” from the Park and
local government. (105) In this research I explore the question, “What is a science for the Galápagos?” through the case study of the GSC and its emerging relationships with its publics. I contend that in addition to the recent opening of the Center and its efforts to develop a community-friendly reputation, the historical struggles over place between conservation science and certain sectors of civil society as well as the widespread resident perception that Galápagos science continues to prioritize charismatic species over human inhabitants necessitate critical engagement with this question.

1.3 Theoretical engagement

This thesis is a contribution to the wide body of scholarship in two principal areas: Geographies of Science and Critical Public Understanding of Science (cPUS), a subset of Science and Technology Studies (STS).

Broadly speaking, Geographies of Science work considers both how science has its own geographies and how particular geographies (places, contexts, regions, etc) shape scientific knowledge and practice. In this research, I explore the co-constitutive nature of science and place, arguing that while science has been one of the most influential agents in shaping understandings of place—and nature—both within and without the archipelago, place has also come to shape science in important ways. Specifically, the historical science-society context in the Galápagos as well as ongoing resident critiques about the lack of socially relevant science in the archipelago has brought to bear on the availability, modes and terms of outreach initiatives between the recently established GSC and San Cristóbal publics; various geographies of GSC science are currently emerging via Center outreach and engagement initiatives.
To critically assess the potentialities and limitations of these geographies of science, I put my research in conversation with Critical Public Understanding of Science (cPUS). In general, cPUS scholarship seeks to problematize both science and publics in addressing the public understanding of science, engaging with issues around the dichotimization of expert and lay knowledge; power and agency in public engagement with science initiatives; scientists’ conceptualizations of publics; new modes of scientific governance, among other areas. In this research, I draw attention to the ways in which GSC representatives and residents understand Galápagos science and explore their objectives and aspirations for public engagement with science as well as their perspectives on local knowledge needs and capacities (See Appendices A and B for interview guide questions). I turn to these perspectives as well as on my preliminary assessments of GSC outreach activities and initiatives as a means through which to re-conceptualize a science for the Galápagos.

Doreen Massey’s critical theory of place provides an overarching spatial context for this thesis. According to Massey (1994, 2005) place, rather than a fixed point in time-space, is a process, the consistently changing product of multiple entities and identities. In the subsequent chapter, I give a brief overview of place-identity in the Galápagos, highlighting twentieth century western science’s role in shaping one of the most powerful spatial imaginaries of the Galápagos—as natural laboratory. Drawing on Massey, I demonstrate that while place-identities are powerful, they are also temporary. Thus I emphasize how the Galápagos as a site for science and conservation remains but one of many interpretations of place in the archipelago’s history. Also, in Chapter two, I refer to Massey’s assertion that the process of place not only involves relations within a particular locale, but also those that extend far beyond that setting to highlight the fact that the GSC’s concern with connecting
with San Cristóbal communities is reflective of a global trend in promoting greater communication and interaction between science and society.

In Chapters Four and Five, both of which are empirical in nature, I highlight interview comments that invoked a Masseyan sense of place (or not) and the implications of these perspectives. For example, various residents acknowledged an appreciation for the heterogeneity of place in expressing that they found no issue with scientists seeing and using the Galápagos strictly as a natural laboratory, even though Galápagos was something distinct for them.

I return to Massey in the conclusion to address the central question of a science for Galápagos. I argue that in order to cultivate a science for the islands that is both flexible and inclusive, we would benefit from incorporating Massey’s ideas of place. Specifically, I contend that an ideal science for the Galápagos would be a place-based science that takes place as process. In other words, it is not a kind of science that is tied to any singular understanding of, or vision for, the Galápagos (which, as will be demonstrated in the subsequent chapter, is neither ideal nor tenable), but rather one that is open to engaging and negotiating with the “throwntogetherness” (Massey 2005, 140) of people, ideas, discourses and experiences in the archipelago. Implementing such a philosophy allows us to avoid imposing rigid boundaries around the production and application of scientific knowledge.

I share my interviews with San Cristóbal residents and GSC scientists as an initial contribution to the ongoing process of building a critical place-based science.
1.4 The GSC

The 11,000 square foot GSC (Figure 1), situated in front of San Cristóbal’s most popular recreational beach, Playa Mann, and adjacent to the USFQ Galápagos campus\(^5\), houses four laboratories—terrestrial ecology; marine ecology and oceanography; geospatial technologies [remote sensing & geographic information systems]; and microbiology; See Figure 2—each with three offices. In addition, the Center houses a community classroom and terrace for public outreach and engagement activities; two administrative offices, one for directors and one for the outreach coordinator/facilities manager; and six offices for senior visiting researchers from UNC and USFQ.

Figure 1. Galápagos Science Center. The peach building in the foreground is USFQ Galápagos. (Source:GSC)

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\(^5\) USFQ Galápagos was founded in 2002 and until 2013, was named the Galápagos Academic Institute for the Arts and Sciences (GAIAS). USFQ Galápagos grants university credits to both national and international students via semester and summer programs and also offers English language classes taught by volunteer teachers. This campus is housed in one building, with six classrooms; a computer lab with wireless internet; two administrative offices as well as one office for English language teachers; a small library; and a kitchen and communal dining area. Because the GSC is attached to the USFQ Galápagos building, in interviews various residents referred to the Center as “la universidad,” explaining that they thought the GSC was an expansion of classroom space for USFQ Galápagos.
The GSC, jointly funded and managed by UNC and USFQ, has five full-time, on-site staff (one facilities manager and outreach coordinator; one field and lab technician; one IT manager and database coordinator; one maintenance and operations technician; one security manager; one cleaning staff) as well as two directors and two deputy directors who work on site several times a year, but are otherwise based in UNC Chapel Hill and USFQ. In addition there is one administrative assistant based at USFQ; one program manager at UNC and one assistant from the Galápagos National Park (GNP) all of whom, in conjunction with the facilities manager, are responsible for logistical issues; reviewing research, internship, and research assistantship proposals; and the acquisition and submission of research permits to the GNP.

The GSC executive board, which oversees the overall policies and procedures that guide the use and operation of the Center, is comprised of six members (three USFQ, three UNC), with one chair and one vice-chair position that will rotate every two years. More than 30 academic researchers (representing a wide range of disciplines including geography;
anthropology; public health; medicine; biology [marine, terrestrial, conservation, evolutionary]; ecology; and sociology, among others) from UNC and USFQ are GSC fellows. Though the GSC is a new institution, many of the fellows from USFQ have more than ten years of research and teaching experience in the archipelago. As such, the GSC cannot be dissociated from the broader science-society debates and conflicts mentioned earlier.

1.5 Methodology

1.5.1 Research development

The idea to develop the present thesis emerged as a result of several years of personal, professional, and academic experience in the Galápagos Islands. I first visited San Cristóbal and Santa Cruz Islands in the summer of 2007 as a study abroad program coordinator for USFQ. Over the course of the two years in this position as well as one year as a research assistant for Galápagos-related projects at USFQ from 2009 to 2010, I not only became well acquainted with the archipelago and its most pressing issues but also with many members of Galapagueñan society, including tour operators; hotel and restaurant owners and employees; business owners; government officials; National Park officials; university students; scientists; NGOs; and USFQ Galápagos staff and faculty. Six years of informal and formal conversations in the islands have given me a rich understanding of the complexity—social, political, economic, and environmental—of this famous archipelago.

When I discovered that UNC and USFQ were planning to build a science center in the Galápagos, I immediately became interested in learning about the visions and the goals of

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Before the opening of the GSC in 2011, USFQ and UNC professors, and faculty and student researchers, principally utilized the facilities at USFQ Galápagos. There were, however, neither formal office spaces for them nor conference rooms nor specialized laboratory spaces in this building.
directors and managers from both institutions. One aspect that had always resonated with me about the archipelago was the complicated relationship between science and society; a whole range of questions came to mind, particularly about the GSC’s thoughts on this social dynamic and history; residents’ perspectives on—and expectations of—Galápagos science; and the GSC’s stance on working with local communities. I also saw the opening of the Center as a critical opportunity to consider the role that a science center could play in a context where science education—and the education system as a whole—remain largely inadequate and where few Ecuadorians occupy positions as scientists and researchers. Thus, in addition to working through the question of a science for the Galápagos, this case study is intended to stand alone as an initial assessment of the new Center and its outreach and engagement efforts, as well as a means of documenting a particular chapter of the GSC’s development. As such, it is hoped that study findings will be useful for Center directors, staff and scientists.

1.5.2 Primary data collection and sampling

The following thesis is a qualitative, interview-based study. Data for this research was collected on San Cristóbal Island, Galápagos from July 10-31, 2012. A total of 105 individuals were interviewed, including 82 residents from the 15 neighborhoods in Puerto Baquerizo Moreno, the port town comprising the urban core of the island; nine residents from two towns in the highlands of San Cristóbal Island (El Progreso and Cerro Verde); five GSC staff; and nine GSC scientists/researchers (four of the GSC staff members also comprise this group; see Appendix C for general information about GSC respondents).

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7 Two resident participants do not reside in official neighborhoods—one lives at the San Cristobal Naval Base and the other lives in El Manantial, a private property on the way to the highlands. Nonetheless, both of these sites appear in the graph, “Neighborhoods represented” in Appendix B.
I identified the 91 resident participants (50 females and 41 males) via a process of randomly selecting and approaching households in each neighborhood. This process of selection was employed in an effort to gather in-depth, island-wide perspectives and to enable the inclusion of voices that are underrepresented in public spaces (e.g. homemakers, domestic workers). Residents’ ages ranged from 12 to 80 years old (For further information about resident participants, see Appendix D). In most cases, the person who answered the door was the individual that completed the interview.

All interviewees were presented with an IRB consent form in Spanish and explained the details of the present research, including the main conversation topics, the total number of study participants, and the intended use of interview responses. Respondents were also informed that participation in the study was entirely voluntary and that there would be no penalty for refusing interviews; no individuals refused an interview.8

Each conversation was conducted in Spanish; lasted between 25 minutes and 1.5 hours; followed a short, semi-structured interview guide and was audio recorded whenever permission was granted. Many interviews ultimately took on the form of surveys rather than

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8 Two interviews began with some difficulty; a fisher expressed anger over what he perceived to be researchers’ “obsession with fishers” in the islands. The initial 30 minutes of conversation with him and five other fishers addressed their frustration over regularly having to disclose personal information to researchers about their lives, life histories and livelihoods, only to see little or no change or improvements in their social or economic status in the islands. Various fishers expressed anger over the unethical practices of Galápagos researchers. They explained that researchers have gotten them in trouble in the past by reporting information collected in interviews or surveys to the National Park. They also stated that the majority of them had just been interviewed over the past week or month by another researcher and felt that there was nothing more to add. I retracted my request for an interview but the fishers asked for a description of the present research and agreed to talk upon learning that this study was not centered on fishing practices or fisheries. Permission was then granted to conduct a recorded interview. I ultimately elected not to record the two fishers that were interviewed. General frustrations about Galápagos research and scientists surfaced several more times throughout the conversation. One other interview request—with a construction worker—was initially met with frustration. However, this respondent expressed anger about what he described as widespread corruption in the islands and like the fishers, unchanging conditions for certain island residents. This respondent immediately associated science and scientists with the power elite in the islands and therefore, “part of the problem.”
interviews due to some respondents’ limited time. In cases where I sought to get a direct quotation from the participant, I asked them to write their response on the interview guide.

Nearly all of the full-time GSC staff members were interviewed, including the two co-directors; the outreach coordinator; the program manager and one member of the executive board. This member of the board was chosen for his longstanding experience with Galápagos as an educator, educational administrator, and researcher. As interviews were meant to explore the science outreach and education objectives and plans of the Center, maintenance and IT staff were not interviewed.

In addition to GSC staff, nine scientists affiliated with the institution (four of whom are also full-time staff members: two co-directors; program manager; and executive board member), and having more than five years of professional experience in the Galápagos, were interviewed.

Only half of the scientists were interviewed in person, each conversation lasting between one and three hours. The remaining scientists were not in the archipelago at the time of data collection and were thus contacted by email to arrange Skype interviews. Due to scheduling difficulties and limited access to internet in their field sites, the remaining five scientists were sent an interview guide via email. Each scientist provided written responses to the interview guide; any follow-up questions or clarifications were requested and gathered via email.

I also draw on exploratory interviews conducted from June 30 through July 20, 2011 with eight scientists on Santa Cruz Island, and on San Cristóbal Island, with the Governor, a senior official in the municipality and two National Park employees in the Environmental
Education Department. I focused on scientists in Santa Cruz, as that is where scientific activity is predominantly based in the archipelago. As for local authorities, I chose to speak with people from San Cristóbal as this island is the seat of the provincial government. While this project is centered on the GSC, I feel that it is critical to include these voices, as they also comprise a principal part of the scientific community in the islands. Several of these scientists have been and/or will be partners on research projects with GSC scientists and it was these scientists’ responses that inspired further development of research questions. What is more, interviews from 2011 revealed that various scientists based in Santa Cruz are also concerned with improving their reputation amongst, and relationships with, local communities.

1.5.3 Data analysis

To analyze the data, I employed qualitative content analysis, a dynamic form of analysis in which codes are generated from the data themselves and then systematically applied (Altheide 1987; Morgan, 1993; Sandelowski 2000). As Sandelowski (2000) notes, “Qualitative content analysis is…reflexive and interactive as researchers continuously modify their treatment of data to accommodate new data and new insights about those data.” Like quantitative content analysis, the qualitative version involves identifying response categories and the number of study participants in each category. In the case of qualitative content analysis, however, the researcher does not aim to establish a statistical interpretation of the data but rather to identify the complete range of perspectives around a particular phenomenon, a range that would likely appear in a representative sample. Thus, even those responses that are given only by one person or a few people constitute results.
All interviews were first translated from Spanish to English and then coded by hand.\footnote{9 I initially coded resident interviews in the Qualitative software, Atlas Ti.6. However, upon finding no significant results of co-occurrence—where two or more themes emerge together amongst various interviewees—or of correlations between respondent positionality (sex, occupation, years in Galápagos, etc.) and their perspectives, I found it more helpful to code by hand.}

To begin, I read through each interview as a narrative multiple times, each time making note of overarching themes that emerged across interviews; these themes became my initial codes. For example, upon reading the resident interviews, it became clear that access to scientific information was a common concern for residents. Whenever possible I consolidated these codes into one larger code such as ‘information,’ in which I categorized the various other ways that people talked about information. For instance, I looked at the specific scientific topics about which residents wanted to learn more. As another example, I explored the particular ways in which residents placed value on scientific information (e.g. as a vehicle for enculturation and enlightenment; as a way to enhance critical thinking, etc.). As mentioned above, I also included themes that were less prevalent in an effort to represent the range of views that arose in interviews. Whenever relevant I also looked for the different conceptualizations of place that were communicated by interview responses. In addition to reading the interviews as narratives, I went question by question in the interview guides, tallying responses and identifying representative quotations.

1.5.4 Secondary data

To trace the various interpretations of place in the archipelago over the centuries as well as the history of conservation science in the archipelago, I reviewed several key articles (Ospina 2006; Quiroga 2009; Hennessy and McCleary 2011); book chapters (Tapia et al. 2009; Quiroga 2011); books (Weiner 1995; Larson 2004; Grenier 2007; Bassett 2009); and theses/dissertations (Hennessy 2009; Cairns 2011). I also consulted Santander et al. 2007.
and Gonzalez et al. 2008 to explore how scientists talked about Galápagos and “science for the Galápagos.” In addition, I referred to Quiroga and Ospina’s (2009) survey of 558 residents on San Cristóbal, Santa Cruz and Isabela Islands to look at existing work about archipelago-wide perceptions of/attitudes toward scientists and scientific work in the Galápagos. Lastly, I reviewed official GSC documents and memos generously provided by Center directors, including a general Outreach document stating their purpose and goals; an application form to use the Center’s facilities, which outlined Center regulations and their mission; a document listing outreach initiatives and their objectives and timelines; and a memo about the formation of a Community Advisory Committee at the Center.

1.5.5. Methodological concerns

While qualitative content analysis is useful in that the analysis remains as close to the data and the informants’ perspectives as possible, it is often important to include a group of researchers in the analytic process. I was the sole researcher on this project, which posed some challenges. To address this issue, I often consulted colleagues and professors about my analyses of interview responses.

In addition, there are many scientists who are not represented in interviews. However, for the purposes of this research, I felt it was important to begin with those scientists that have at least a decade of research and professional experience in the Galápagos; these individuals are not only aware of the various science-society dynamics and conflicts that have taken place in the archipelago over the last several decades, but also have personal experience working with science engagement initiatives of various kinds. In addition, various scientists that appear in this thesis also occupy different management roles, including deputy director, laboratory supervisor, and executive board member.
Thirdly, I have known the GSC members represented in this study for several years now and continue to have personal and professional relationships with many of them. I have also been affiliated with the two institutions—UNC and USFQ—that are responsible for founding the GSC. As such, I am at once an outside observer and deeply embedded in this research. When I initially began this project, I was concerned about assessing and/or critiquing the ideas and statements of people I knew so intimately and for which I had great admiration and respect. At the same time, I recognized that it was necessary to set aside these apprehensions if I were to accomplish what I set out to do with this project: advance and encourage constructive and empowering discussions about and between science and society. Ultimately, I feel that throughout this research I have remained committed to presenting analyses that are at once critical and fair.

I am also aware that it would be helpful to collect data from all of the populated islands in the archipelago to facilitate a more comprehensive discussion concerning science for Galápagos. I merely put forward the case study of the GSC and San Cristóbal as a starting point. What is more, I believe that my ultimate argument that building a science for Galápagos should involve constantly engaging with multiple perspectives in place implies that I do not see San Cristóbal as the model for establishing a rigid definition of a science for the archipelago; instead, I leave the discussion open for incorporating perspectives and debates from the other inhabited islands. It is worth noting here that the particularities of each island are likely to lead to some differences in resident and scientist responses. For example, because Santa Cruz is home to the highest population of scientists and the CDRS (the principal scientific research station in the islands since the 1960s) as well as residents, science-society tensions have been most visible there. Based on informal conversations I
have held with residents throughout the years, when they express their grievances about science, they are often referring to the CDRS and its scientists. In Quiroga and Ospina’s (2009) survey, amongst Santa Cruz, San Cristóbal and Isabela residents, Santa Cruz residents agreed the least with the statement, “If institutions listened to scientists, they would make better decisions.” Santa Cruz is also where the largest percentage of survey respondents stated that scientists do not appreciate popular knowledge. In San Cristóbal and Isabela, science has had less of a visible role—as will be seen in Chapter Four, for example, various San Cristóbaleños were unaware that scientific research was conducted on their island, instead referring to Santa Cruz as “where science is.” At the same time, there are notable similarities in opinion across islands. According to Quiroga and Ospina (2009), the percentages of residents that agreed that the current amount of financial investment in science research is appropriate and that scientists should continue conducting research were comparable. And as mentioned previously, on all three islands, respondents below the age of 45 tended to have a more positive view of science than older generations of residents. It is important to note here that neither Quiroga and Ospina nor I have addressed science-society issues in Floreana in our analyses.

A final challenge regarded the timing of this research. As the GSC is a new initiative, data collection was conducted in real-time. Various outreach plans are still in the planning stages and changes are both frequent and ongoing. Between the time of initial data collection to the time of writing, a new outreach coordinator was hired; new outreach ideas were developed; and some outreach programs were put on hold or cancelled altogether. Thus, it is important to take the information in this thesis not as a final description of the Center’s relationships with its publics, but as initial views on the aims of outreach and public
engagement with science. It will be important to do a follow-up study in several years to enable comprehensive evaluation of the results of GSC outreach.

1.6 Study Site

1.6.1 The Galápagos archipelago

The Galápagos Islands, situated 600 miles (1000km) off the western coast of Ecuador and covering an area of 5,000 square miles, consist of 13 islands—four of which are populated—and 100 islets (Figure 3). Located at the confluence of four major warm and cold oceanic currents, the archipelago has a moderate and dry climate in spite of its equatorial latitude as well as highly variable water temperatures from month to month.

Figure 3. Map of Galápagos Islands. The inset indicates the location of the archipelago in relation to the Ecuadorian mainland. (source: Galápagos National Park 2005)
The Galápagos were first discovered by the Bishop of Panama, Tomas de Berlanga, in 1535 when his ship was blown off course en route to Peru. Over the next several centuries, English and Spanish whalers, buccaneers, pirates and explorers would use the Galápagos as a temporary base of operations, exploiting local fauna for food, oil and fur. In 1832, the newly independent Ecuador annexed the archipelago. Three years later, the islands’ most celebrated visitor, Charles Darwin, arrived in the islands aboard the HMS Beagle. Darwin’s observations of the local flora and fauna would eventually play an integral role in the development of his theory of evolution by natural selection.

By 1936, under pressure from international scientists and UNESCO, the government established a wildlife sanctuary, banning the hunting of some species (Zapata 2005). In 1959, through a process largely driven by an international group of scientists, UNESCO and a nascent national forestry service, the Galápagos National Park (GNP) was founded, designating 97% of the terrestrial area of the archipelago as protected area. That same year, the Charles Darwin Foundation was established. In 1998, the Galápagos Marine Reserve (GMR) was established, covering an area of 40 nautical miles from the outermost points of the islands. Spanning approximately 133,000 sq. kms of marine area, the GMR is the largest marine reserve in the Global South and the second largest marine reserve in the world.

Presently, the Galápagos is home to 25,124 human inhabitants (Galápagos Census 2010) as well as 2,000 endemic species of flora and fauna (Ospina 2004), including the famed Galápagos giant tortoises (*GeOutreach Coordinatorhelone elephantopus*), marine iguanas (*Amblyrhynchus cristatus*), sea lions, and penguins (*Spheniscus mendiculus*).
1.6.2 San Cristóbal Island

Qualitative data for this research was collected from 105 participants on San Cristóbal Island, the easternmost and oldest island in the archipelago. The island’s capital, Puerto Baquerizo Moreno, is home to the seat of the provincial government. The current population of San Cristóbal has more than doubled since 1990, from 3,603 (1595 female; 2008 male) to 7,475 (3,488 female; 2,987 male) at present (Galápagos Census 2010). The majority of residents over the age of 12 self-identify as Mestizo, 9% as Indigenous, 6% of European descent, and 4% as Afro-Ecuadorian (Living Conditions Survey, INEC, 2009). Of the total number of people currently employed in San Cristóbal, 23% work in public administration, 12% in commerce, 11% in transportation services, 9% in hotels and restaurants, and 9% in farming and livestock (Living Conditions Survey, INEC, 2009).

The 91 residents in this study represent the fifteen neighborhoods that make up the urban core of Puerto Baquerizo Moreno. (See Figure 4) Though no specific socioeconomic data on neighborhoods exists, it can generally be said that Divino Niño, Estación Terrena, La Fragata, Las Palmeras, and El Manzanillo are lower-income neighborhoods; many domestic workers as well as construction workers live in these sectors. Residents from El Progreso and Cerro Verde, two towns in the humid highlands of San Cristóbal, were also interviewed. El Progreso, established in 1869, is a small farming community with approximately 500 residents. Cerro Verde is a tiny hamlet in the highlands—no specific population data for this town exists—where agricultural production also takes place. Both El Progreso and Cerro Verde can be characterized as low-income compared to many areas of Puerto Baquerizo Moreno.
1.7 Thesis outline

Chapter Two provides a historical overview of the various ways in which place has been imagined and lived in the Galápagos since its human discovery in the sixteenth century. I highlight the process through which twentieth century science came to shape one of the most powerful spatial imaginaries of the Galápagos—as natural laboratory—simultaneously establishing a particular definition of a science for Galápagos. I then discuss how different ideas about nature, place and science led to conflicts between the science and conservation sectors and different social actors in the 1990s and early 2000s. Next, I turn to how these earlier tensions, as well as ongoing critiques about Galápagos science lacking social relevance, have created certain pressures for the recently opened GSC to demonstrate both an...
interest in, and a commitment to, community relations, ultimately emphasizing the co-
constitutive nature of science and place.

In **Chapter Three**, I provide an overview of the relevant literatures in the
Geographies of Science and a Science and Technology Studies (STS): Critical Public
Understanding of Science (cPUS). I also explain how my engagement with geographies of
science and cPUS is grounded in Massey’s idea of place.

**Chapter Four** forefronts residents’ perspectives on science and research. I share their
definitions and perceptions of science, highlighting the various understandings of science that
exist in local communities.

**Chapter Five** covers the GSC’s emerging relationships with its publics, describing
the GSC’s objectives with respect to science outreach and engagement and the spaces and
modes of interaction that are being carved out for science-public interactions; resident’s
perspectives on the ideal relationship between the GSC and local communities; the kind of
information residents wish to access via GSC outreach; the GSC’s perspectives on local
knowledge needs and whether or not residents are knowledge producers or consumers,
followed by residents’ perspectives on the same subject; scientists’ opinions about involving
publics in scientific research; and finally residents’ and scientists’ definitions of a science for
the Galápagos.

In the **Conclusion**, I give an overview of thesis findings and arguments and argue for
a science for Galápagos that is predicated on Massey’s idea of place.
1.8 Thesis contributions

This research is put forth as a contribution to the broad range of scholarship in the interdisciplinary areas of geographies of science and cPUS. First, while geographers’ work in the geographies of science often looks at the situated and embodied nature of scientific rationality and theories, or at the science-public dynamic in the context of policymaking processes, this thesis examines how places and contexts—including social histories—also impact the importance granted to, and the formation of, particular public engagement initiatives and activities. Secondly, this thesis offers an empirical study of a developing country context; geographies of science scholarship predominantly focuses on the United States or Western Europe. Including case studies from developing areas can offer different dimensions to relevant science and technology study debates, as the disparity between the educational and professional opportunities of scientists and publics can be significantly greater in these contexts. In these places, furthermore, failure to meet basic social needs often exists alongside a robust science sector supported by generous internal and external funding. Developing country case studies also provide a meaningful lens through which to consider the different factors at stake in public outreach and engagement activities in diverse areas of the globe, and also shed light on the additional challenges—particularly in the form of language and cultural gaps—facing outreach and engagement in these places. Thirdly, while work about outreach within geographies of science (Shapin 1988; Naylor 2002; Finnegan 2004) has mainly emphasized the influence of particular spaces on the reception of scientific information provided for different publics, or about sites of experimentation that simultaneously became sites of outreach, this thesis focuses on the social and epistemic implications and possibilities of outreach activities and objectives. Fourth, this study brings
together geographies of science, critical public understanding of science, and Massey’s
theory of place to explore the implications of particular geographies of science, and to
emphasize that while science shapes place, place itself constantly remains in flux, in turn
reflecting back on the manner in which science is practiced. Lastly, in addition to its
theoretical contributions, this research has practical value, as the empirical sections offer
important insights for advancing the GSC’s goal of developing constructive relationships
with its publics.
CHAPTER 2: SCIENCE AND THE GALÁPAGOS

Throughout its social history, the Galápagos has been interpreted and used in myriad ways. What is taken as self-evident today—the Galápagos as a site of world-class science and international conservation—was not always the case. I begin this chapter by providing a brief history of place-identity in the Galápagos. I then trace the relationship between twentieth century science and the founding of the National Park, emphasizing this event as a pivotal moment in the trajectory of science and understandings of place in the archipelago. To conclude, I describe the science-society conflicts that arose in the 1990s and 2000s as a response to heightened environmental regulations in the Park and how the legacy of these conflicts as well as ongoing critiques about Galápagos science’s lack of social relevance have come to impact how the GSC views science outreach and community relations. Through this narrative, I seek to highlight: 1.) the co-constitutive nature of science and place in the Galápagos; and 2.) the different views of science for Galápagos that have existed over the past several decades.

2.1 Shifting ideas of place in the Galápagos Archipelago

The identities of place are always unfixed, contested and multiple. (Massey 1994, p.5)

When Bishop Berlanga, en route to Peru, stumbled upon the Galápagos Islands in 1535, he remained unimpressed with the jagged and arid landscape, seeing little purpose in claiming or naming the islands for the Spanish empire. From the seventeenth through the nineteenth centuries, buccaneers looting Spanish ships and British and North American
whalers used the Galápagos as a stopover point for collecting tortoises and other animals as food sources.

The earliest known settler in the islands was the Irishman, Patrick Watkins. “Irish Pat” lived on Floreana Island, where he bartered vegetables with whalers. In 1809, Watkins left the islands for the coastal city of Guayaquil. The first to propose colonization in the archipelago was General José María de Villamil Joly. In 1831, Villamil commissioned a survey of the economic possibilities in the islands. The study revealed that the common lichen, or Dyers Moss, which produces a mauve dye, had commercial potential. Villamil thus established the Sociedad Colonizadora del Archipiélago de Galápagos and urged the nascent Ecuadorian government to annex the islands. General Juan José Flores, Ecuador’s first president, supported Villamil’s requests and, on February 12, 1832, Colonel Ignacio Hernandez formally appropriated the Galápagos as a territory of Ecuador. Both prior to and following annexation, the U.S. and the U.K. expressed interest in the islands, either for the extraction of resources (tortoises, whales, sea lions, guano, orchilla, fish) or as a strategic geopolitical base (Quiroga 2012).

In 1832 Hernandez established penal colonies on Floreana and San Cristóbal islands. The initial colonists on Floreana were soldiers who had participated in a futile coup attempt on mainland Ecuador. Eighty others arrived subsequently, including General Villamil. The new settlers brought with them donkeys, goats, pigs, and cattle, introducing these animals in the islands for the first time. They also felled forests in the highlands of Floreana in order to create pasture land, and planted crops. The settlers lived by selling Orchil, live tortoises, and tortoise oil to visiting whalers and also by exporting these commodities to the mainland. Villamil left Floreana in 1837, and in the same year the remaining colonists revolted against
the governor, Colonel Jose Williams; by 1852, the settlement had collapsed. The most recent penal colony was established on Isabela in 1944; 94 prisoners arrived in 1946. A 1958 rebellion, however, led to the closure of the prison.

Another major colonization attempt took place in 1858 when Manuel J. Cobos, José Monroy, and José Valdizán formed the Orchillera Company. Though this joint venture failed, in 1860, Valdizán began extracting orchil in Floreana and nine years later, secured a 12-year contract with the government of Ecuador to extract the plant from the island. Meanwhile, Cobos, a wealthy Ecuadorian businessman from Quito founded the El Progreso plantation on San Cristóbal Island for the large-scale production of sugar cane, coffee and tortoise oil. (Figure 5). From 1879 onwards, Cobos brought in prisoners from mainland Ecuador as laborers. Faced with brutal working and living conditions, Cobos’s workers eventually revolted, murdering him in 1904.

In 1893, Antonio Gil made another attempt to colonize Floreana, but eventually moved to Isabela Island, where he founded the settlements of Puerto Villamil and Santo Tomás. By 1905, 200 people were residing in Isabela, exporting sulfur and lime and

Figure 5. El Progreso plantation. (Source: Watkins and Oxford 2009)
harvesting tortoises for meat and oil. Colonists also mined salt from James Bay on Santiago Island in 1886, from 1924 to 1930, and again in the 1960s.

Other early colonization attempts were made by Europeans, mostly from Norway and Germany, who upon the publication of William Beebe’s, Galápagos: World’s End, became increasingly fascinated with the remote islands described so captivatingly by Beebe (Figure 6). In 1925, Norwegians colonized Floreana and San Cristóbal. Those in Floreana initially planned to set up a whaling station, but the venture ultimately failed and they migrated to Santa Cruz Island. Other Norwegians arrived on Santa Cruz and San Cristóbal in 1926. On Santa Cruz they mostly fished and canned turtles, lobster, and grouper, an industry that came to a halt after the cannery boiler exploded in 1927. Norwegians living on San Cristóbal also moved to Santa Cruz in 1928. One year later, German colonists arrived in Floreana, of which the most famous were Dr. Friedrich Ritter and his patient and lover, Dore Strauch, and the Baroness Eloise Wagner de Bosquet. The unusual incidents that involved these individuals and their eventual deaths have come to be known as the Galápagos affair and many questions still remain regarding the events leading to their deaths. (Basett 2009) These individuals, along with the Witttmer family, settled in the islands, establishing homesteads where they raised vegetables and animals. Over the course of the 1930s, other Germans arrived in Santa Cruz to work with the Norwegian colony and lived predominantly by farming and fishing. Still, San Cristóbal remained the most appealing to colonists for its relatively easy access to water.
2.2 Science in(venting) the Galápagos: the institutionalization of a natural laboratory

Thus far, I have described the different ways in which place was understood and used in the Galápagos since their discovery in the sixteenth century. Though its discoverer, Bishop Berlanga, saw nothing particularly valuable about the islands, many subsequent attempts were made to extract resources for personal use and economic gain. What we know as the Galápagos today—as the “cradle of evolution” and an internationally renowned symbol of environmental conservation—is a relatively new and meticulously constructed conceptualization of place.

In this section, I highlight the process through which a group of conservation-minded scientists, with support from the United Nations Education, Scientific and Cultural Organization (UNESCO) and the International Union for Conservation of Nature (IUCN), succeeded in solidifying the archipelago as a so-called natural laboratory and an internationally recognized site of conservation in the latter half of the twentieth century. By framing the Galápagos as a living laboratory and as a space ‘urgently’ in need of protection from local human impact, western scientists and conservationists were eventually able to
establish the Galápagos National Park and its scientific arm, the Charles Darwin Foundation. It is important to note here that until the inception of the protected area, the Galápagos were largely overlooked by the majority of the world.

The idea of the Galápagos as a natural laboratory can be traced back to its most celebrated visitor, Charles Darwin, who upon arriving in the 1830s recognized the scientific significance of the archipelago for the naturalist. After the publication of Darwin’s On the Origin of Species in 1859, scientists from all over the globe increasingly ventured to the archipelago with the explicit aim of gathering evidence that would (ideally) enable them to either confirm or refute Darwin’s theories. A general increased interest in fieldwork as well as the rise of ecology as a discipline at this time also contributed to the framing of the archipelago as a natural laboratory—the islands were seen as an ideal location for studying entire ecosystems and measuring human impact on ecological processes (Larson 2001).

In 1907, a California Academy of Sciences expedition led by Rollo Beck arrived in the islands, collecting 75,000 biological specimens to be brought back to San Francisco and put on display in its natural history museum. (James 2010) According to Quiroga (2013), “These efforts to collect reflect the idea, common at the time, that collecting was the only way of safely preserving and studying the specimens.” (28)

By the 1930s, however, conservation had come to be interpreted differently. The Austrian ethologist, Irenaus Eibl-Eibesfeldt, began to promote in situ conservation, in order to “conserve the animals living on the islands for future generations.” (Quiroga 2013, 28) German naturalist Victor Von Hagen supported Eibl-Eibesfeldt’s proposal, simultaneously endorsing the creation of a scientific station in the archipelago.
In 1936, under pressure from international scientists and UNESCO, the Ecuadorian government established a wildlife sanctuary, banning the hunting of some species (Zapata 2005); however no formal institution existed at the time to enforce these regulations, making them virtually irrelevant.

In 1954, Eibel-Eibesfeldt traveled to the Galápagos aboard the oceanographic survey ship Xarifa. On Baltra Island, the former site of a WWII American airbase, he was troubled by the ecological impact of humans and introduced species, especially on land iguana populations. Reporting back to the International Union for the Conservation of Nature (IUCN), he wrote, “Nothing could be more melancholy.” (Eibl-Eibesfeldt in Larson, 177) Affected by what he saw, Eibl-Eibesfeldt urged the IUCN to promote the preservation of the Galápagos on an international scale, noting that “only the establishment of a biological station with a permanent warden could, in the long run, provide effective protection” (Eibl-Eibesfeldt in Larson, 178, emphasis my own). Learning of Eibl-Eibesfeldt’s pleas to the IUCN, Julian Huxley (Figure 7 and Figure 8) evolutionary biologist, the first Director-General of UNESCO and the then president of the Royal Society, also began vigorously promoting the preservation of the Galápagos. Unlike Eibl-Eibesfeldt, who was mainly invested in protecting the archipelago for the contributions it could make to the discipline of ecology, Huxley, a staunch supporter of the eugenicist movement, was most attracted by the potential the islands offered for the study of evolution. According to Larson, Huxley “turned his science into a nontheistic ‘religion without revelation’ that worshipped natural selection as the guiding process.” (179). For Huxley, scientific research in the Galápagos could reveal “the way to universal evolutionary progress” (179), what he referred to as a kind of
evolutionary humanism. Thus, for Huxley, the preservation of the Galápagos was crucial not
only for science and conservation, but for the course of humanity as a whole.

![Figure 7. (Left) Irenaus Eibl-Eibesfeldt. (source: http://www.Galápagos.org/about_Galápagos/the-conservationists/).](image)

![Figure 8. (Right) Julian Huxley (source: http://www.huxley.net/transhumanism/)](image)

In addition to Huxley, Eibl-Eibesfeldt and other Europeans, various Americans,
including Harold Coolidge, Harvard University conservationists and the then head of the
Pacific Science Board, and the zoologist Robert I. Bowman at San Francisco State College
also championed the establishment of a science research station in the archipelago (Figure 9).
In 1957, the UNESCO sent Eibl-Eibesfeldt and Bowman to the archipelago to conduct a five-
month survey of the Galápagos. In their formal survey report, the two outlined five principal
recommendations: 1.) the establishment of a biological research institute; 2.) setting aside
more than a dozen islands as wildlife sanctuaries; 3.) stringent enforcement of environmental
regulations protecting unique native species; 4.) the development of a breeding colony for
tortoises; and 5.) education of the human inhabitants of the islands about the importance of
the native species. (Barnett 1958, 76)

On September 8, 1958, *Life* magazine ran a cover story about the Galápagos,
highlighting its unique flora and fauna and Darwin’s experience in this “living laboratory of
evolution,” counting species of plants, studying animal habits and habitats, and variations
within species from island to island (Barnett 1958, 57). Replete with photographs and
illustrations of plants, animals and landscapes, the article emphasizes the “primeval aspect of
Galápagos life” and its “…look of eternity, as though the river of time had frozen in some
peaceful epoch of the prehistoric past” (Barnett 1958, 66), at the same time alluding to the
human despoiling of island nature. The article closes with the message that the above
recommendations provided by Eibl-Eibesfeldt and Bowman give “hope that Darwin’s living
laboratory of evolution may not perish.” (Barnett 1958, 76) *Life’s* 20-page coverage of the
Galápagos thus helped to cement the construct of the Galápagos as an invaluable site for
science and conservation.
Various science organizations, including the international congress of zoology, backed the UNESCO and IUCN’s proposals for island preservation and in 1959 on the centennial of the publication of Darwin’s *On the Origin of Species*, western scientists, the UNESCO, and a nascent Ecuadorian forestry service helped to produce the most influential social technology in the archipelago’s post WWII-history: the Galápagos National Park; the Charles Darwin Foundation was founded the same year.

By the late 1950s, then, conservation science had solidified itself as a necessary and central actor in the Galápagos. As Grenier (2007) importantly argues, the inception of the Park is when the Galápagos became a space imagined exclusively for science. It is also, I contend, when a particular kind of science for Galápagos was born—the islands, as argued by the Park’s founders, needed robust and ongoing scientific research, monitoring and advising for conservation purposes. In 1964, the government of Ecuador officially named the CDF the technical/scientific advisor of the GNP.

One year later, a group of British planners visited the archipelago and recommended tourism as the best option for securing the economic and environmental sustainability of the Galápagos. (Larson 2001) Indeed one of the principal arguments that had been presented to the Ecuadorian government to found a research station and national park was that they would help to promote economic development through tourism. Huxley and his contemporaries thus advocated the islands as a primary destination for nature tourism. At this time, nobody imagined that Galápagos tourism would eventually transform into a booming industry that would have detrimental effects on the environment that they so fervently set out to protect.
By 1970, the Ecuadorian government had designated 97% of the Galápagos as protected area. Park rangers now monitored the nearly 5,000 square-mile area of the Park and management remained centralized in Quito, highly influenced by foreign scientists and conservationists (Quiroga 2009). And as Cairns argues, this move, ‘while framed as being of universal value and in the common interest, actually justified a territorial organization that was restrictive and exclusive.” (Cairns 2011, 80) The Ecuadorian government, under pressure from conservationists, began banning activities that had formerly been integral to the daily lives of island residents: logging of some endemic and native trees normally used for construction purposes; the consumption of tortoise meat; the fishing of sharks and marine turtles, and the use of long lines (for fishing) and pesticides (Quiroga 2009). The early colonists, who “did not see animals according to a Darwinian classification of endemic, native or introduced, but rather as useful, useless or pests” (Quiroga 2012, 31), viewed these new regulations as antithetical to their understanding of place and nature.

In 1978, the Galápagos was declared a UNESCO World Heritage Site, garnering greater international attention for these remote islands. The rapid growth of tourism over the next few decades as well as lucrative opportunities in the sea cucumber fishery from 1993-2000, created incentives for Ecuadorians struggling to secure employment on the mainland to migrate to the Galápagos.10 The majority of people who currently reside in the Galápagos arrived in the 1980s and 1990s. According to the Galápagos Conservancy, over these two decades, the population increased at more than 6% per year, compared to about 2% on the

10 The Ecuadorian economy faltered in the early 1980s as the international price of petroleum declined gradually and the country lost some foreign markets for its principal agricultural products. Furthermore, the El Niño of 1982-83 led to severe coastal floods as well as drought, which damaged crops as well as transportation and marketing infrastructures. The Ecuadorian economy also faced a rapidly growing external debt. Between 1987 and 1997, the average unemployment rate was 7.7%, with 1992 and 1996 reaching rates of 8.9% and 10.4% respectively. (http://www.theglobaleconomy.com/Ecuador/Unemployment_rate/)
Ecuadorian mainland. ([http://www.Galápagos.org/about_Galápagos/people-today/](http://www.Galápagos.org/about_Galápagos/people-today/)) In 1975, there were approximately 3,500 residents in the islands. By 1990, this number had reached nearly 6,000 and by 2000, there were approximately 10,000 people living in the archipelago. ([http://www.Galápagos.org/about_Galápagos/people-today/](http://www.Galápagos.org/about_Galápagos/people-today/)) Migrants arrived from all over mainland Ecuador, particularly the Andean regions. Interestingly, as Larson notes, well into the twentieth century, many mainland Ecuadorians still saw the archipelago as a forbidding and depraved place—associating the islands with Cobos’s plantation and penal colonies—an image that stood in stark contrast to its burgeoning international reputation as a natural laboratory and exotic, ecotourism destination.

2.3 Science, space and society

Geographer Doreen Massey argues that the ways in which we imagine space and nature have important material effects (Massey 2005). In the Galápagos, managing the islands as a natural laboratory and site of strict environmental protection initially led to policies that limited activities that had formerly been considered part of daily life in the islands. Over the past decade, it has resulted in intense social conflicts, and as I will subsequently explain, a strained relationship between some members of the Galapagueñan society on the one hand and scientists and scientific and conservation institutions on the other.

As described above, by the mid-twentieth century, scientists and conservationists had effectively designed a particular kind of Galápagos in which their intervention could be justified as a necessity; the science being practiced was mainly for conservation purposes and advancing ecological knowledge. At the same time, with the idea of nature as a usable good and place as frontier (Quiroga 2013) dominating the cosmology of the earliest colonists as
well as of migrants that arrived in the 1980s and 1990s, it became progressively difficult for the GNP and the CDF not only to defend their environmental regulations but their scientific agenda; the concept of a science for the Galápagos was rapidly changing, with many residents increasingly wanting to see science that considered their needs in addition to those of environmental protection.

Conflicts, at times violent, between the GNP and the CDF on the one hand and fishers on the other, were common in the mid- to late 1990s and early 2000s. As a long-time resident of San Cristóbal recalled, “In 1998, I remember, the GNP was the number one enemy of the town because of restrictions they placed on fishing.” (50M, construction and beach concession stand) These clashes were not only over defining ‘proper’ uses of space and nature but over what many fishers perceived as an imposition of oversimplified (environmental) subjectivities—conservationists as nature’s guardians and all others as its destroyers.11 As Quiroga (2012) notes, “as experts and professionals entered the scene, conservation was problematized, and a discourse was produced about the need to protect the Galápagos, in particular from the local population, for the rest of humanity.” (37) Thus, for example, many older fishers argue that though they were instrumental in the founding of the Galápagos Marine Reserve (GMR) and the formulation of its regulations, they have never reaped the benefits of their labor and instead have been seen as barriers to the proper management of marine resources. (Quiroga 2009) Historically, many residents have felt alienated from decision making as well as a lack of respect for their own knowledge of the environment. As Quiroga and Ospina (2009) argue, many older residents’ perceptions of science derive from this contentious history; at that time, the CDF and the GNP had a more

intimate relationship\textsuperscript{12} and thus for many older residents, science came to be equated principally with restrictive, top-down environmental policies. The link between science and conservation policy is, of course, not quite so linear—in fact, in my interviews with scientists from Santa Cruz and San Cristóbal Islands in 2011 and 2012, various interviewees expressed their concern for what they saw as a gap in communication and coordination between the information that they collect and the policies that are implemented (or not) on the ground. Furthermore, Galápagos science is a complex and multi-faceted entity that comprises diverse types of research, only some of which are explicitly linked to conservation and environmental management.

While many residents have felt alienated from decision making in the national park, some—albeit few—attempts have been made to incorporate local perspectives. In the late 1990s, for instance, the CDF began to promote more local participation in the planning and execution of conservation activities. In recent years, the CDF has had some level of success in co-managing fisheries in the marine reserve with local fishers. According to a senior scientist at the CDRS:

“When we started the fisheries monitoring program in 1997, when we went out with fishermen, we would go down to collect in the monitoring sites and everyone came out of the water. They would all sign off on what they actually collected on data sheets themselves, and all of that data would be worked out between the fishermen and scientists and people would make decisions based on information collected…but that didn’t work either…there were accusations about how the numbers were fixed even though they had signed off on this….that’s common in a lot of other areas as well, in the Great Barrier Reef they changed the quotas; there was an outcry from across all of the sectors and a hugely powerful commercial sector working in fisheries in those regions and so here, it was kind of interesting. The fisheries sector lost a lot of momentum after the fisheries crashed…everyone started talking about

\textsuperscript{12} According to my interview with the GSC PM, various Park officials have expressed discontent with the CDRS for alienating the Park. As Cairns (2011) notes, where science was once primarily carried out by the CDF and management by the GNP, the Park presently has 45 scientific investigation projects and collaborates with a wide range of national and international institutions.
sustainability, and the government was under a lot of pressure to provide for the
Ecuadorian community as a whole…there’s an island effect as well, of lots of familial
relations and different interests here…So what we did is we started working with the
fishermen to develop a fisheries management plan where we set a series of clear
guidelines; this is what will happen if the abundance goes below this, etc. We
redesigned everything with the fishermen. For the first time in 2009 fishermen
recognized that the stocks were below abundance; they accepted the process. They
again kind of protested and we recognized that the resource was lower than the limit
that they actually should be. Some still said they wanted to open the fishery…for the
socioeconomic crunch, some of which was caused by themselves, for lack of strategy
and cooperation…” (personal communication, July 11, 2011)

As this scientist explains, the process of implementing sustainable livelihood practices is
highly complex, especially—and obviously—during times of economic hardship. Another
senior scientist at the CDRS who has worked closely with fishermen explained:

“…the fishermen feel very threatened by every new regulation and new science
project…fishermen generally don’t understand sustainability…they’re hunters,
they’re thinking from today to tomorrow…there’s no sense of the future…it takes a
long time to educate them, to make them understand that it makes sense to
regulate…there are fishermen that go out with us to tag groupers…they’re open-
minded…their sons are going to university and so their mindset changes…but the
majority does not think like that…the majority think, ‘If I don’t take this fish out
today, somebody else is going to take it…only a tiny percentage are on board with the
Park’s goals…maybe 5%…the people I’m working with are the people who are more
interested in conservation…” (personal communication, July 13, 2011)

As this scientist notes, some older residents are beginning to see conservation science as a
tool that will help them gain economic security in the future, signaling not only a shift in
their conceptualization of place—Galápagos as simultaneously a site of
exploitation/economic development and conservation—but also of science for Galápagos;
whereas before, science for conservation purposes may not have been seen as a science for
the Galápagos, an increasing number of residents are making a connection between
conservation science and their own sustainable economic development. Local scientific and
conservation discourses have also been emphasizing the dual goals of ecological and social
sustainability over the last 10 to 15 years.

For the majority of those who were born in, or arrived to, the archipelago after conflicts between fishers and the Park and CDF, science and conservation are indisputable goods. But for some, the science-society relationship remains complex and contentious. Jorge Torres, the governor of the Galápagos Province, for example, objected to what he saw as scientists’ framing of local people as “predators of nature” and “in need of education.” (personal communication, June 30, 2011) Another resident stated, “The scientists come here and they think we have nothing in our heads.” (50M, construction and beach concession stand) While this is certainly not true of all scientists—according to interviews from 2012 as well as informal conversations carried throughout the years with Galápagos scientists, many respect local knowledge and see it as a potentially important resource for their work—such discourses have indeed existed and continue to exist in different ways. A prime example is the 2002 Biodiversity Vision. This document, a 142-page report that outlines a vision for “Going back to Eden—one last chance,” is the result of an international workshop of conservation biologists convened in May 1999. The authors note that:

“The Government is also preparing a strategy for the sustainability of human presence in Galápagos, as well as a binding regional plan built on that strategy. It is essential that the strategy and the plan address the threats to biodiversity and guide Galápagos towards a sustainable future, in which a small, well educated, healthy human population co-exists with nature, uses resources sparingly and works constantly to control alien species. The people would have their own, distinctive way of life, appropriate to oceanic islands that evolved in isolation from man and are consequently so vulnerable to human presence. They would accept restrictions and responsibilities and enjoy to the full the privilege of living in one of the most special natural environments on Earth.” (CDF and WWF 2002, emphasis my own)

The above message is unmistakable: an ‘original’ Galápagos nature is under threat by residents that urgently need to modify their cultural habits. As it stands now, they are poorly educated and have not yet learned to embody what it means to live in an island setting. The
discourse reflects a kind of technocratic utopianism reminiscent of Huxley, in which science is what will ultimately guide the Galápagos towards an ideal future. At a two-day symposium on the Galápagos held in January of 1964 at the University of California, Berkeley, Huxley stated to an audience of 600 people:

…the overriding aim must be concerned with the general idea of conservation and special conservation areas, to make people understand that the conservation of wild life [sic] and natural beauty is of great value and importance to the human species, and outstandingly so on the Galápagos. In the few thousand years since he has become biologically dominant, man has radically changed the ecology of the world, mostly for the worse. To prevent further deterioration and to plan for possible improvement we need to extend traditional ecology to include human and psycho-social ecology. Conservation is one obvious aspect of this extension… (Huxley 1967, 9)

In 1978, GNP director Miguel Cifuentes declared that “humans can live in the Galápagos, but they must do it in a boldly different way—without pollution, without despoliation, without any kind of the dreadful mistakes of the past.” (Cifuentes in Larson 2001, 233) Thus it is evident that the same message of negative resident impact has been replicated over decades.

The opening abstract of the Biodiversity Vision ends with:

“…We hope that the scientific analysis and projections presented here will persuade the Government of Ecuador to take well-reasoned, responsible decisions that steer Galápagos away from irreversible loss of biodiversity and ecological degradation and towards sustainability and restoration.” (CDF and WWF 2002)

These statements demonstrate a desire on the part of the science and conservation sectors to shape place via the homogenization of what is a highly heterogeneous resident population (as mentioned earlier, the majority of current Galápagos residents migrated from diverse regions of mainland Ecuador); the ideal state is for residents to have a unique (and arbitrarily

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13 This symposium was part of a larger program entitled the Galápagos International Scientific Project, an 11-week interdisciplinary science initiative that predominantly took place in the Galápagos. The participants included 66 biological and physical scientists of different disciplines, nationalities, and ages. The purpose of the trip was to expose scientists to the Galápagos and to outline research priorities “in an area that is rapidly undergoing destruction through colonization.” (Cohen and Bowman 1967, 4)
defined) island identity and environmental ethic. In a 2008 article in Ecology and Society, Gonzalez et al. outline a sustainable development plan for the Galápagos that involves “adopting a more comprehensive approach to territorial planning, strengthening participative approaches and institutional networks, and promoting transdisciplinary research.” (31) Nonetheless, the article concludes:

However, regardless of the approaches proposed here or the policies and management practices that are actually adopted, we think that it is the idiosyncrasy and way of life selected by the Galápagos residents that will determine the future of the archipelago. The adoption of exogenous mainland-influenced lifestyles will certainly continue to erode the system’s resilience and hinder future sustainability. In contrast, more endogenous development models based on a particular lifestyle that assumes that living in Galápagos is fundamentally different and accepts the limitations associated with the archipelago’s fragile natural system are the best and only way to facilitate the transition toward a more sustainable future. (Gonzalez 2008, 31-32)

Again, ensuring a sustainable future means enlightening the public and more specifically, about thwarting the threat they pose to the ‘real’ Galápagos. The authors make no reference to the infrastructural deficiencies (e.g. lack of adequate waste and waste water treatment facilities, potable water, etc.) that also make life less sustainable in the islands or to the ecological imprint of scientists and conservationists themselves. As one scientist based in Santa Cruz explained, “The Park has separated people from nature, people from conservation. They’ve always communicated this idea that local people are bad and scientists are good because they conserve. This idea has always existed.” (personal communication, July 18, 2011). In thinking through what a science for Galápagos might look like, then, I maintain that we must move away from narratives that seek to essentialize residents, scientists, or the place-identity of the Galápagos; decades after the creation of the GNP, it is clear that the Galápagos is not merely a natural laboratory, but also a site of social experimentation where people are made to grapple with complex questions about nature, conservation, science and place.
As I will discuss in more detail in Chapter 4, some of the discourses that frame residents as the principal barrier to effective environmental management have been internalized and/or promoted by the residents themselves, thereby blurring the boundaries between science and society. Furthermore, while Governor Torres’s perspective highlighted earlier demonstrates that some Galapagueños take issue with scientists’ negative portrayal of local people, according to my interviews, criticisms about scientists were more commonly about alienating residents from their activities and conducting research that, in their opinion, lacks social relevance.

2.4 The Galápagos Science Center: why place matters

As a new science institution, the GSC is inheriting some lasting community tensions around science. In some ways, they are also implicated in these dynamics as some Center scientists have been conducting research in the islands for several decades, and to varying degrees, advocate some of the discourses that have generated opposition from residents.

Even though the GSC is a science research and education institution as opposed to a conservation and environmental management body, because science symbolizes certain things for certain people, in the end, the nature of the organization becomes less relevant.

GSC managers and staff are acutely aware of the need to create positive relationships with its publics. In interviews, they all emphasized the importance of incorporating community feedback into their operations, with respect to outreach programming; Center policies; and research. By community, the interviewees included everyone from farmers and fishers to municipal workers and Park authorities. CD1 noted: “What I’ve been told is that they [Charles Darwin Research Station] often times did not listen to the community; the community was not part of decision-making—it was thrust upon them. Whether that’s true or
not, that’s the impression that I’ve been told.” Later, he explains that: “I think for so long, the community has not had a voice, or at least that’s what they felt, with other NGOs and institutions, and I think they feel upset and we don’t want to repeat these issues. We want to get them involved.” At the same time, he openly acknowledged that “Right now there’s too much top-down because the initiative is new.”

The Program Manager also discussed the specificities of the historical science-society dynamic in the Galápagos that have made—and continue to make—building community ties a complex endeavor:

I think people in the community, they’re living in a place that has been nominally partially managed for quite a while now based upon science with a capital ‘S’ and that’s much more explicit in the Galápagos than it is in many other places, and so, therein lies the tension in ways that, say, rice farmers or cassava famers in northeast Thailand, they don’t see it quite in their face in quite the same way that people in the Galápagos do.

He adds:

“We’ve been both aware of, and you know, concerned about what we early on saw with the Station [CDRS] that people in the towns, the communities in the Galápagos, saw themselves as being pretty much separated entirely from the Station. We’re also aware that even the people in the Park who nominally were partners with the Station didn’t feel that they were very well integrated or necessarily being serviced as well as could be done by the Station...so we from the get-go have tried to be explicit about the fact that, you know, where possible we’re going to try to be integrated with the community in various ways.”

The Program Manager interestingly notes that the National Park has also felt isolated from the CDRS in recent years, a circumstance that most non-scientist, non-manager residents would likely be surprised to learn; according to interviews, residents perceive a strong relationship between the Park and the CDRS, and see a disconnect between themselves and this allegedly sound partnership.

The Program Manager continues, “I’ve also talked to people who are skeptical, you know, the drop-in scientist, people come in, collect some data, publish articles, they’re never
heard from again, you know, I’ve repeatedly heard about that from people and I don’t want that.” Both GSC managers importantly note that some of these perspectives may be perceptions rather than true reflections of the science-society relationship; nonetheless they take seriously what they have heard.

Keeping these GSC perspectives in mind, we can read the Center’s emphasis on public engagement with science and conducting socially relevant science research as a response, at least in part, to the historical science-society context in the Galápagos, underscoring historical geographer of science, David Livingstone’s, point that science bears the mark of its locality (Livingstone 2003). As will be elaborated upon in the following chapter, to support his argument Livingstone (2003) refers to everything from the influence of specific sites like public houses, cathedrals, and museums, to aspects of material culture such as regional identity, the religious beliefs of a particular place, educational customs, and forms of communication, among other factors. Naylor (2005) similarly argues for paying “attention to the biographies of place as we research the practices of science.’ (11) As part of a biography of place, Livingstone (2003) also suggests that we pay greater attention to the “spaces of a life.” (183) For example, he argues that one could draw upon “different Darwins”—Darwin the experimenter, the explorer, the invalid, the family man, and the ‘dupe of quack medicine’”—to understand the “mutual making of science and scientist.” (183)

We must also understand the Center’s efforts with its publics as a response not only to local dynamics but to various processes at a multitude of scales. As Massey (1993, 1994) notes, places are constituted by relations that extend far beyond their immediate contexts. The GSC’s concern with connecting with community reflects a wider global trend in promoting greater communication and interaction between science and society. Speaking of
the British context, for example, Irwin (2006) notes that “from the late 1990s there has been a partial, but nevertheless significant, rhetorical shift towards a style of scientific governance based on public dialogue, transparency and democratic engagement.” (304)  

Phillips (2011) adds that “Dialogue has become a buzzword in the production and communication of research, and researchers are being called upon to produce socially relevant knowledge and further social innovation in dialogue with different social actors and their perspectives.” (80, emphasis in original)

The example of the Galápagos highlights the reciprocal relationship between science and place. Also as Naylor (2005) stresses and as can be observed in this case study, places not only influence particular types of science, but also particular types of scientists. In talking about his other field sites, the Program Manager explained that:

“…I’ve participated in some of the Thailand research, also some of the Ecuadorian Amazon research and in both places, you have local populations who are interested in what science can do for them and you know, don’t always see immediate results, which is frustrating for them. So you have some of these same science awareness issues and connection between science and eventual good for the community that you have in the Galápagos. I think the Galápagos is a bit special. I’m not going to say it’s unique in the world because I’m sure it’s not, but it’s a place where focus and attention to this tension is a little more heightened than even in many other developing areas, the tension between science and society.”

Co-Director 1 explained that much of this had to do with the lack of a permanent physical presence in these other field sites. As mentioned previously, however, in the Galápagos a physical structure and institution like the GSC creates greater visibility and thus more pressure for directors and scientists to reflect on their positionalities as well as their

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14 At the same time, Irwin contends that it would be erroneous to take these shifts, whether rhetorical or practical, as something novel. He explains, for example, that countries like Denmark and the Netherlands have emphasized public participation and engagement for some time now and furthermore, that Denmark may be moving away from this model, growing more skeptical of the efficacy of mechanisms like consensus conferences (Irwin 2006).
relationships with local communities. These reflections, in turn, provide fruitful grounds from which to begin thinking about a science for the islands.
CHAPTER 3: GEOGRAPHY, SCIENCE AND SOCIETY: EXPLORING THE RELEVANT LITERATURE

...if we can have a history of science, a philosophy of science and a sociology of science, why not a geography... (Withers, 2002, 9)

“...geography must necessarily lie at the heart of my concerns.” (Foucault, 1980, 77)

3.1 Geographies of science

This research falls under the larger umbrella of geographies of science, which encompasses a wide range of scholarship both within and beyond geography, including history, anthropology, sociology, and science studies. In fact, it is precisely a “geographical turn” in these latter disciplines that ultimately laid the foundations for geographies of science (Livingstone, 1995, 6); several theorists have been instrumental in developing this interdisciplinary area.

In the words of Livingstone (1995), “The writing of the French poststructuralist, Michel Foucault, is perhaps a natural place to begin.” (6) Foucault’s historical engagement with space, knowledge and power, have profoundly shaped the work of geographers of science. In particular, Foucault’s theorizations helped to undermine normative notions of rationality, highlighting not only the historically and geographically contingent nature of truth-making processes, but also the ways in which power is inscribed in, and circulated through, these processes. As he wrote, “Once knowledge can be analysed in terms of region, domain, implantation, displacement, transposition, one is able to capture the processes by which knowledge functions as a form of power and disseminates the effects of power.”
According to Thrift et al. (1995), various scholars studying science as a social construction have drawn on Foucault’s theories of power to “account for the construction of power without refiguring it as an inhuman force leading to foregone conclusions.” (1) In Archaeology of Knowledge (1989), Foucault destabilized the boundaries between truth and falsity by showing that both are “embedded discourses in particular time-space arenas—arenas which actually constitute the ‘facts’ to which interlocutors appeal.” (Livingstone 1995, 6)

Various other theorists have also sought to unpack the complex politics and transactions of truth-making. Bruno Latour (1986, 1987), Karin Knorr-Cetina (1983,1995) and Sharon Traweek (1988, 1992)—along with several other scholars (Collins, 1992; Law, 1994; Franklin, 1995; Gusterson, 1996; Nader, 1996; Nothnagel, 1996; Mol, 2002; Doing, 2004)—for example, advanced an important area of geographies of science: laboratory ethnographies. Laboratory ethnographies theorize laboratories as cultural and anthropological spaces, emphasizing science as an entity constituted through practices. Latour and Woolgar’s 1979 book, Laboratory life: the construction of scientific facts, still remains a seminal work in this area. Latour’s Science in Action: How to Follow Scientists and Engineers Through Society (1987) famously introduced the concepts of “immutable mobiles” and “centers of calculation,” referring to the manner in which knowledge travels, consolidates in specific places, and is again reassembled; in this way Latour crucially distorted the boundaries of knowledge production and consumption. A related approach to laboratory ethnographies, ethnomethodology—largely initiated by Michael Lynch (1993, 2001)—investigates the manner in which individuals bring order to social settings through shared methods and practices of sense making.
Laboratory ethnographies and ethnomethodology inspired various strands of posthumanist geographies of science, Actor Network Theory (ANT) being the most well-known of these. In developing ANT, scholars (Latour 1987, 1999, 2005; Callon 1986, 1987, 1991; Law 1994, 1999) extended ideas understood to be profoundly human such as agency and intention to material objects and organisms, ultimately conceptualizing science as a building up of networks comprised of human and non-human actors.

The Strong Programme of the Sociology of Scientific Knowledge (SSK), or the Edinburgh School—principally associated with the work of David Bloor, Barry Barnes, and Steven Shapin—has also played a prominent role in the development of geographies of science. SSK proposed that facts could best be understood as ideas that have been agreed upon within particular social and epistemic communities. As Bloor (1991) engagingly put it, knowledge is “whatever people take to be knowledge.” (5) Ophir and Shapin (1991) also asked how some knowledges are able to travel from one context to another, a question that remains central to the geographies of science (Secord 2004, Powell 2007). Simon Shaffer (1991) made a similar intervention, interrogating the ways in which local techniques mobilized in one laboratory environment become spatialized beyond that laboratory. Shapin (1984), in what has come to be known as the socio-spatial school—which, as its name implies, argues for the mutual constitution of the spatial and the social—further focused on the act of witnessing as a form of knowledge authentication. Robert Boyle and other experimental philosophers, he argued, strove to establish “matters of fact” (Powell 2007) through performing experiments before live publics.

The majority of the scholarship that geographers have produced in the geographies of science has been relatively recent and historical in nature. Much of this work maintains that
although science—and rationality more broadly—is often conceptualized as being detached from local specificities, they are ultimately embedded firmly in culture and place at different scales of analysis. One of the most comprehensive works in this area is David Livingstone’s (2003) Putting Science in its Place: Geographies of Scientific Knowledge, which explores the spatiality of science in terms of sites, regional identity and circulation. Like Shapin (1988) Livingstone reveals the ways in which different settings allow for highly variable types of inquiry and knowledge claims. Various aspects such as the availability and positioning of equipment or the ways in which entry to sites of science are restricted in particular ways, shape human behavior, reflecting back on the production of scientific knowledge. Different sites produce distinctive forms of inquiry and explanation, modes of practice, and methods of justification. Livingstone—building on Thomas Glick’s work (1974,1987)—also demonstrates that different theories such as Darwin’s theory of evolution or Einstein’s theory of relativity were not only understood and received very differently in distinct places, but were also mobilized for varied cultural and scientific purposes. Thus—as Naylor (2010) and MacDonald (2011) similarly illustrated—Livingstone argued that scientific knowledge and regional identity were often times co-produced. Finally, Livingstone destabilized the notion that procedures of replication and standardization move seamlessly from one context to another, instead emphasizing how local procedures are often adapted in other places depending on the degree to which scientists are able to reproduce equipment, technology and expertise.

Other works in the historical geographies of science include Withers’s (1999) investigation of a range of geographical practices that were instrumental in understanding the geography of late seventeenth century Scotland; Naylor’s (2002) analysis of nineteenth-
century natural history and, specifically, of the provincial natural history society, in which he contends that a series of particular spaces—the Society’s museum; field sites; and lecture hall—were essential to the functioning and outputs of such societies; Finnegan’s (2004) examination of the evaluation, dissemination and reception of glacial theory in the scientific culture of Victorian Edinburgh; and Lorimer and Spedding’s (2005) exploration of a scientific history of Glen Roy Scotland via an unpublished document—the Murray family’s holiday expedition logbook—emphasizing how the presence of these individuals in the field changed the ways in which the field site was experienced and understood.

Fewer geographers have explored contemporary geographies of science, although there have been a few important contributions. Kirsch (2007) examined the ways in which ecologists and environmental scientists transformed the buffer zone surrounding the U.S Department of Energy’s Savannah River Site into an experimental landscape. Kirsch’s investigation of both historical and contemporary science at this particular site deals with the exclusionary and territorial practices employed by scientists in their daily work, themes that are particularly relevant to the (recent) historical geography of science outlined in the previous chapter. Eden (2006) explores science and its publics, with a particular emphasis on how environmental NGOs complicate the dichotomy of experts and the public by increasingly recruiting researchers with postgraduate degrees as well as scientists who support their agendas. In the present research I show how the expert-public distinction is challenged by residents’ knowledge acquired outside of formal educational settings.

Holifield (2006) similarly looks at the science-public dynamic; however, he focuses on the
participation of tribal publics in Indian Country in the practice of regulatory science. He draws parallels between tribal worldviews and Latour’s concept of collectives of humans and nonhumans (2004), and how they are at odds with the EPA’s standard risk assessment procedures that cater to typical suburban populations. Holifield argues that regulatory science must thus engage with multiple publics as well as posthuman actors; the importance and challenge of collaborating with heterogeneous publics is also a central theme in this thesis.

My research is intended to be a contribution to the wide body of scholarship in the geographies of science. It is distinct from other geographers’ work in this area, however, in that rather than exploring the situated nature of scientific theories, this thesis examines how places, including their social histories, can also influence the attention given to, and the development of, particular science outreach and engagement initiatives and activities. I look particularly at the GSC’s emerging community initiatives, taking each as its own geography of science as they entail the carving out of certain participatory, intellectual and physical spaces. Since the Center is still mostly in the planning stages of outreach and public engagement, I turn my attention in large part to GSC representatives’ logics and discourses about knowledge, expertise, collaboration, social responsibility of science, and power—discourses that I take not as autonomous statements but as the products and producers of various discourses on science, nature, conservation and knowledge—that emerge from preliminary reflections about building relationships with San Cristóbal’s publics. As Shapin argues, “Demonstrating that science can be understood geographically should… not be viewed as an end in itself, but as the basis upon which rich empirical stories can be built.”

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15 Regulatory science refers to scientific and technical knowledge upon which regulations are devised in various industries, particularly those related to health or safety.
(Shapin in Naylor 2005, 2) Thus, to consider the implications of these diverse geographies of science and the perspectives of both science and publics on science; outreach/engagement; and local knowledge needs and capacities, I draw on Science and Technology Studies (STS) literature in Critical Public Understanding of Science (cPUS).

3.2 Critical Public Understanding of Science (cPUS)

Critical Public Understanding of Science (cPUS) first emerged as a response to public understanding of science (PUS). PUS scholars (The Royal Society 1985; Bodmer and Wilkins 1992) uncritically conceptualized the growing public wariness of science as a product of the public’s ignorance of the content and objectives of scientific work. If the public were to understand science, it was believed, they would accept and support it. Drawing on Sociology of Scientific Knowledge (SSK), various cPUS theorists challenged this deficit model—a term coined by Brian Wynne in 1987—calling for the need to problematize both publics and science (Gilbert and Mulkay 1984; Wynne 1991, 1993; Fayard 1992; Irwin 1995; Turney 1996; Locke 1999). Several cPUS scholars (Fayard 1992; Michael 1996; Dickson 2000; Michael and Brown 2000; Burchell 2007; Lezaun and Soneryd 2007; Davies 2008; Barnett et al. 2012) have approached questions around the science-society relationship with a particular focus on constructions of the public in diverse contexts. As Davies (2008) notes, much of this literature on imagined publics focuses on scientists’ conceptualizations of the public in times of controversy, conflict, or debate with respect to science and/or technology. As such, she (2008) points to the need for the comprehensive examination of scientists’ perceptions and opinions of the public in everyday contexts. The present thesis is an attempt to respond to this call. San Cristóbal, I argue provides the fitting
setting for the exploration of these questions, as it is a small island in which scientists observe and/or interact with non-scientists frequently in a variety of contexts and capacities.

Other researchers have problematized the science popularization methods that are often used to promote greater public understanding of science. Miller (2009) argued that science popularization is predominantly seen to be external to the knowledge production and authentication process. Scientists’ dissemination of scientific knowledge to non-scientist audiences is viewed as a subsidiary activity that may even damage the researchers’ reputation (Whitley, 1985: 3), as many traditional scientists still hold an idealized notion of pure genuine scientific knowledge that can clearly be distinguished from popularized knowledge. As Hilgartner notes, any discrepancies between the former and the latter are attributed to “distortion or degradation by journalists and the lay public.” (Hilgartner, 1990: 519)

Miller (2009) described a new model of science popularization, which challenges the various assumptions cited above. First, this model recognizes diversity within the public and its attitudes towards science. Following this logic, throughout this thesis, I refer to science’s publics rather than a singular public. Secondly, according to the new model, popularization plays an integral role in the process of producing and generating knowledge. For example, in order to garner support from the general society and lay decision makers, scientists must necessarily translate scientific knowledge, decision makers or the general public may influence scientific controversies within a scientific community. Thus, the new model discards any notion that scientific knowledge exists independently of social context, a fundamental argument of geographers of science as previously noted.
Various people (Beck, 1992, 1995; Funtowicz & Ravetz, 1993; Gibbons et al., 1994; Irwin, 1995; Irwin & Wynne, 1996; Nowotny, Scott, & Gibbons, 2001; Jasanoff, 2003), have examined varied approaches to scientific knowledge production that explicitly claim to be non-science-centered, their work comprising an influential body of scholarship on the democratization of science or the new governance of science. Sclove (1995) and Leydesdorff and Ward (2005) studied the development of Community-Based Research Centers and Science as a means of linking the aims of science with those of community and civil society groups and activists. Irwin (1995) assessed mechanisms known as Science Shops, which “involve the transfer of ‘ownership’ of research at least partly in the direction of non-scientific groups.” Such initiatives—in addition to the democratization of science and new governance of science—fall under the broader category of citizen science, a concept and model that has been widely investigated (Irwin 1995; Kruger and Shannon 2000; Schneider 2000). Collins and Evans (2002) highlighted the importance of valuing experience-based experts, while also inquiring how far public participation in science should extend.

Interestingly, Irwin (2006) critiques some of his earlier work about citizen science, arguing that those models that identify themselves as “new governance paradigms,” could more accurately be described as a “blend of old and new assumptions.” Similarly, other theorists have discussed the shortcomings of these new paradigms, often known as public engagement with science (PES) activities. PES is framed as being distinct from PUS in that it promotes—at least in theory—dialogue between scientists and their publics.

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16 While all of these areas are related to cPUS, I also explicitly name them in an effort to acknowledge the different ways in which STS scholars classify their work. What is more, various scholars mentioned here may not expressly identify themselves as cPUS scholars; some may call themselves scholars of public engagement with science and/or technology; of science communication; of science governance, among others.
Various people (Michael 1996; Jasanoff 2003; Irwin 2006; and Davies 2008) have critiqued the one-way communication from scientist to the public commonly seen in PES activities, arguing that scientists and scientific institutions often neglect the public’s agency and voice. As Michael (1996) notes, “Traditionally, science is the active disseminator and the fountain of meaning and agency, the public are merely the passive receivers and repositories.” (109)

In this research, I apply a cPUS lens to the examination of GSC outreach and public engagement as well as publics’ and the GSC’s opinions about public understanding with and engagement of science in an effort to highlight the strengths and the shortcomings of particular initiatives and/or attitudes. In doing so, I advance discussions regarding the various cPUS issues outlined above, and furthermore, explore an valuable avenue through which to inform and build on existing conceptions of science for the Galápagos.

3.3 Massey and Place

My engagement with geographies of science and cPUS scholarship is predicated on Doreen Massey’s idea of place. As Low and Barnett (2000) argue, many concepts of place rely on a “notion of uniform time” such that places are conceived of “as sites where a host of different social processes are gathered up into an intelligible whole.” (58) According to Massey (2005), however, place—rather than a fixed and coherent point in time-space—is something that is constructed and reconstructed by the bodies, identities and relations that occupy, interact in, change and are changed by it. Place, in other words, is a process, a spatio-temporal event. (Massey 2005) What is more, it is an arena in which new political interventions become possible. As Massey (2005) states, “Reconceptualising place in this way puts on the agenda a different set of political questions (the politics of the negotiations of relations). There can be no assumption of pre-given coherence, or of community or
collective identity…they ask how we shall respond to our temporary meeting-up…They require that, in one way or another, we confront the challenge of the negotiation of multiplicity.” (140)

Massey’s critical theory of place remains central to the present thesis in multiple ways. First, it intersects with geographies of science concepts in Chapter 2, which highlights that while science can shape place in powerful ways, places are never fixed; what was created as a natural laboratory by scientists and conservationists in the mid-twentieth century is quickly challenged by the arrival of an increasing number of economically precarious migrants from the Ecuadorian mainland only two to three decades later. And as the example of fishers in the 1990s and early 2000s demonstrates, places “fight back” and in doing so, can generate new critiques of knowledge production and push certain aspects of science in novel directions— I illustrate this phenomenon through the case study of the GSC and its attempts to create meaningful relationships with its publics as a partial response to these local critiques by different sectors of the society.

What is more, Massey (1991), in arguing that understanding the character of place requires “linking that place to places beyond,” reminds us that GSC scientists and the institution as a whole are part of a much larger network of science and conservation institutions and discourses that also influence their perspectives about science and society in the Galápagos. As such, Massey’s theorizations of place also help to contest the common association of islands with isolation.

Most importantly, Massey’s conceptualization of place brings to bear on my engagement with cPUS literature as well as the primary argument of this research in proposing that GSC scientists engage with the inherent multiplicity of place—the “temporary
meeting-up” (Massey, 2005, 140) of entities, identities and ideas in a single location—in continuously evaluating the epistemic and social goals and assumptions of the GSC and of Galápagos science more broadly. If, as Massey argues, place is a process, an ideal science for a place should also be a process—constantly evolving in relation to the changing dynamics of place.

Massey’s conception of place is also reflected in my research methodology. As described in the Introduction, I approached households from each neighborhood of San Cristóbal in an effort to gather a multiplicity of perspectives about science and the GSC. Had I limited my scope to the center of town I would not have collected the voices of many people who make up San Cristóbal.

In addition to engaging with Masseyan ideas of place, the present thesis is intended as a contribution to these conceptualizations as it offers a lens through which to consider the material implications—and potential benefits of—understanding place as processual.
CHAPTER 4: PUBLIC UNDERSTANDING OF SCIENCE ON SAN CRISTÓBAL ISLAND, GALÁPAGOS

As outlined in Chapter 2, a historically complex relationship between science and society in the Galápagos Islands has made relevant a conversation about building and enhancing relationships with communities at the newly established GSC. Furthermore, outreach, though by no means the central objective of this Center, has become an important component of its broader vision. Before describing GSC outreach initiatives as well as residents’ perspectives on the ideal Center-public relationship—social and epistemic—in the following chapter, however, I first explore the public understanding of science in San Cristóbal. In his interview, Co-director 2 explained that one of the GSC’s priorities over the next several years entailed getting acquainted with its publics and their views on science and science research. Thus in sharing the publics’ opinions about Galápagos science here, I seek not only to describe San Cristóbal publics’ understanding of science but also to enhance science’s understanding of the public.

I begin this chapter by sharing the various definitions of science put forth by residents. I then include additional understandings of science that emerged in conversations with them. Next, I outline residents’ opinions about the impact of scientific research on San Cristóbal and continue by sharing their views on science and social responsibility. In order to build a science for the Galápagos, it is important to first ask who the Galápagos is; the following sections provide some initial insights.
4.1 Defining science

“‘Science’ means different things to different people in different situations.” (Wynne 1991,112)

With the exception of Quiroga and Ospina (2009), no other study has collected residents’ perspectives on science and scientists. Building on their work, I start at the beginning, outlining the different ways in which residents define science.

The majority of residents (n=75) gave a general definition of science as research; learning; and discovery. Most of these respondents discussed science as a way of learning for the sake of learning; however, some individuals highlighted the pragmatic aspects of science, as knowledge that could be used to address problems or make decisions. Also, though very few residents explicitly named different branches of science (social, natural, etc.), many of their responses referred to the diverse nature of scientific investigation:

“Science is investigating all that has life and is material.” (16F, student)

“Science helps us to learn about things that at first glance we don’t understand.” (23M, GNP guard)

“There are sciences that study rural areas, vegetables, science studies everything.” (30F, bank teller)

“Science is some kind of study about, for example, the oceans, the island, how people live here. Science comprises a lot of things.” (80M, clothing store owner and clerk)

“Science is a subject that studies new phenomena, new things. It’s discovery to address needs.” (19F, hotel receptionist)

“For me, science is a tool that gives you the opportunity to learn about things in your environment and based on that knowledge, we can make decisions.” (24F university student and administrator)

“It’s a way of investigating the causes of certain phenomena. It’s something that tries to find solutions to specific problems.” (29M, police officer)
Five people associated science more or entirely with the study of ecological systems and processes; biodiversity; and nature, revealing a place-based understanding of science. That is, science was equated with Galápagos science, which has historically focused its investigative attention on the natural and biological realm of the islands. Residents explained that:

“Science is an area of study that allows us to learn about nature and the things that can affect the planet.” (19F, hotel receptionist)

“Science is what studies life and others things, specifically the natural environment and ecology.” (36F, owner and clerk of convenience store)

“Science is the study of animals.” (46F, artisan and souvenir shop owner and clerk)

“Science is counting animals on the beach.” (49M, construction worker)

In contrast, one individual linked science specifically with the study of human issues:

“Science is… how people investigate, look at things…” (25F, convenience store clerk)

HS\(^{17}\): What do scientists study?

“Medicine, technology, society in general.”

Eight people responded, “I don’t know.” A 47M, DVD store owner with a university degree in political science and economics stated:

“Here…science, this word…many people know about it through the subjects they studied in school…there’s always going to be social sciences, natural sciences in the curriculum…so these are things that they have learned about through their education…So if a person, for whatever circumstances in their life, hasn’t been able to study to an advanced level, that word [science] is new, you know? That word is strong; it sounds strong that word, it scares them.”

According to this respondent science has a certain cache that is intimidating for some residents. He also draws a direct correlation between the level of one’s formal education and level of understanding of science that is not quite satisfactory for describing the Galápagos

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\(^{17}\) HS = Haruna Suzuki
context. In a place like Galápagos, science is often a highly visible activity: scientists monitor species on public beaches; scientific conferences of various types are held on the islands throughout the year; and some scientists give public talks, among others things. Thus, many Galapagueños—in spite of completing only the most basic levels of education—have a sense of what science is; that “that word [science] is new” to them does not account for everybody that has not completed an advanced level of study.

To further illustrate this point, though one of the eight respondents in this category had studied environmental biology as an undergraduate student and currently works as a consultant on the environmental impacts of road construction in San Cristóbal, when asked to define science in her own words, she was unable to do so. What is more, according to my interviews, most residents—many of whom have had very few years of formal education—had diverse ways of describing science that were not unlike the descriptions given by those who had completed university-level studies or beyond. It is important to keep in mind, then, that science can be difficult to define whether or not one has had extensive personal experiences with it, and furthermore that various factors make the assessment of public understanding of science a complex process.

Two interviewees indicated that they could not define science because they did not believe in it. One resident identified himself as a Seventh-Day Adventist and the other as a Jehova’s Witness; both explained that God and Creationism provided the primary explanations for everything in the world:

“Science is evolution. All the things that we have here have evolved but there has to be a Creator. I don’t believe in evolution. I don’t believe in science.” (48M souvenir shop owner and clerk)
HS: So then what do you mean by science is evolution?

“I mean here, that’s what science is: the study of evolution. But I don’t believe in either. God is how one understands how the world really is.”

A 48F homemaker stated, “I don’t believe in science. I don’t believe anything scientists say. Nothing that people do can help us.”

HS: What do you mean?

“Scientists try to understand the world and what will happen, but it’s impossible to discover this. Only God knows what will happen. And it doesn’t make sense to study what will happen with the weather or with the animals here because those things are out of our control. God has a plan for Galápagos.”

Interestingly, various people talked about science as a vehicle through which to map out the future. A 29F university administrator explained science as “…a way of keeping a record of things, studying something in order to make a note of it in time and making projections for the future.” (emphasis my own). A 34F gift and stationary shop clerk stated that science helps us to learn “where we’re from, where we’re going…” A 34M, carpenter noted, “…if science didn’t exist, we wouldn’t find out what’s going to happen or what’s happening now.” And a 40M public sector employee explained that through science, “one can know what can happen to the animals; long-term monitoring is important.” These statements are fitting in the context of the Galápagos, where much of the science research—especially in response to recent declarations of a Galápagos in crisis—has attempted to outline potential scenarios around tourism and population growth and its economic and social implications; spread of invasive species; land use and development trajectories; marine resource stocks and the long-term viability of fishing activities; among other things.

Also noteworthy is one resident who, rather than rejecting science in the name of his religious beliefs, described science as something that helps him to be a better Christian. When asked how this was so, he replied, “Because the more we know, the more we can share
information and take care of each other. For example, if we know how to plant trees and its importance for the atmosphere, we can avoid the risk of UV rays.” (54M hostel owner and operator in the highlands)

Six individuals remain unaccounted for in this section because rather than providing definitions of science, they shared general impressions of it. I turn to these impressions in the following section.

4.2 Conceptualizing science

Resident interviews revealed several conceptions of science:

4.2.1 Science as social good

The majority of respondents (N=93) described science in positive terms. When asked about the potential risks associated with it, respondents reiterated their belief that science mostly reaped advantages for people and therefore could be trusted as a social good:

“Science is something that is beneficial for human beings.” (23M, GNP security guard)

“Science is discovering something good that we haven’t yet discovered.” (26M, hotel security guard and administrator)

“If you think about it, everything good has come from science.” (46M, teacher)

“Without science, there wouldn’t be development of any kind. Science is an ambition, not greed for wealth or material things. Without science, we wouldn’t have developed countries. It’s something that tries to achieve greater things, improvements for humanity.” (57M, hotel administrator and owner of construction company)

“I don’t know what it [science] is, but I have a good impression of it.” (61F, street food vendor)

The residents that did not concur with these evaluations were those that did not see the relevance of science in their lives due to their religious beliefs as well as a few other individuals who critiqued science’s shortcomings throughout their interviews. This is not to say that they do not see science as a social good, but that notion was not made explicit.
4.2.2 *Science as enlightenment, progress, and culture*

Several people (N=15) discussed science as a way towards general enlightenment and advancement:

“Science is what awakens a person because one doesn’t know about things. When one listens to talks, etc. one begins to understand.” (58F, municipal gardener and street food vendor)

“There are many…things that people don’t know because they’re here, isolated; they don’t know. They don’t have perspective like people from outside.” (27F university student)

“Science is a kind of help…It’s progress…It’s a window for us all.” (32F, homemaker)

“Science is something that through time, with studies and discoveries, people keep advancing.” (39F, restaurant owner and cook)

“For me, science is…investigation about new ways of living and being that can help us live better as human beings.” (45F, university administrator)

Others explained that science helped to educate residents, particularly with respect to being better stewards of the environment:

“They [scientists] study the marine and the terrestrial. Before, people didn’t know anything. They hunted the animals, but this is an internationally protected place. Scientists have shown us the proper way to treat the natural environment.” (16F, high school student)

According to this youth, science brought people out of a state of ignorance with respect to the environment. As is true for many people of her generation (born three to four decades after the founding of the national park) the idea of protecting, as opposed to using, nature has been normalized; it is taken for granted that the founding of the national park radically transformed what constituted ‘proper’ human-environment interactions in the Galápagos.

Several others discussed the role of science in fortifying the environmental consciousness of residents:
“Science can educate local people. Not long ago, I saw people hitting the sea lions. They have to learn to live in harmony with nature.” (20F, university student)

“Science is important to teach my kids not to destroy nature. It teaches us to take care of animals here, which are special.” (27F, university student)

“People here throw trash everywhere, they mistreat animals, they pollute the air. They forget that they live in a natural paradise. We need science and scientists to educate us about living in harmony with the environment. You don’t see scientists behaving in the same way as the people here. They know better; that has to do with culture and education.” (56F, homemaker)

These statements importantly demonstrate that it is not only scientists—as Governor Torres implied—that perceive of local residents as people in need of instruction. Some residents have also adopted and perpetuated this notion, granting scientists the status of guardians of nature as well as of arbiters of culture. Thus it can also be said that the lines that separate science and society remain blurred; there is much variation within each group.

These views—both of science as social good and science as enlightenment—reflect what various STS scholars (Yearley 1994; Jasanoff 1996; Dickson 2000; Davies 2008; Sarewitz 2011) have described as the dominant ideology of science wherein more science necessarily signifies greater well-being and social progress, and what feminist philosopher of science, Sandra Harding (2011) terms the “triumphalist assumptions of the conventional Western views of science and technology in history…Triumphalism assumes that the history of Western scientific and technological work consists only of a parade of admirable discoveries and inventions.” (6)

Only one resident expressed some skepticism about the virtues of science:

“…science is so important in the Galápagos. They’re always doing research here. But is science always good? Is it harmful sometimes? Wasteful? Why do we research X and not Y? Are scientists influencing policy? As Galápagueños we should know about these things. We should want to know about these things.” (47F, shop clerk)
HS: “Do you think other people feel the same?”

“Some, I don’t know about many. Here people just concern themselves with what they’re doing. For this reason, we have a lot of the problems that we do.”

4.2.3 Science as abstract and omnipresent.

Various people spoke of science in nonconcrete terms:

“Science is something big, it’s in everything.” (38M day tour operator and inter-island speedboat operator)

“Science is everywhere, in everything we do. I couldn’t explain to you how, but it’s everywhere.” (46F, homemaker)

4.2.4 Science as technology

A few residents described science as a kind of panacea for local problems, failing to distinguish between municipal and governmental responsibilities on the one hand and scientific work on the other. Their comments also implied that the science sector has sufficient funds to address all of residents’ concerns:

“We need better roads to the highlands. And improved sewage systems. Scientists should work on this.” (58F, municipal gardener and food vendor)

“Galápagos science should produce real improvements—roads, less trash…” (49M, construction worker)

Three residents asserted that the science sector should assist with the economic well-being of the islands, though nobody could explain how this should take place:

“They [scientists] should research locally-based tourism and how to develop it.” (36F, convenience store owner and clerk)

“Galápagos science should support economic development, support those who don’t have money or work.” (42F, convenience store owner)

A 45M dive shop owner and operator added:

“Science should help to develop and increase tourism on this island.”
HS: How would the science sector do that?

“It already is in the sense that science is what has given this place fame—all those videos about Galápagos, books, etc; they attract people here.

HS: So how else do you propose that science help with this?

“I’m not sure, good question.”

4.2.5 Science as critical thinking

According to one resident science, among other things, helps him to put his own beliefs—specifically religious—into perspective. He notes:

“…that’s science: educating, creating other worldviews. We have to educate generation after generation.” (45M, souvenir shop and hostel owner)

HS: Creating other worldviews?

“Helping us to understand our world better. Galápagos is the birthplace of evolution. I’m a very religious person. These things don’t coincide. But I have to understand how I understand the world in relation to other things, other visions like that of science.”

4.3 Importance of science in residents’ lives

“Any serious discussion of science and its relationship to everyday life must…take full account of the, often contradictory, meanings that science has assumed within our society (Irwin 2006, 108).”

Residents were asked to comment on whether or not they saw a connection between science and their daily lives. There was some overlap with responses from section 4.2; for example, eight individuals discussed the role of science in helping them conserve the environment; seven individuals talked about science in their daily lives in terms of enlightenment and progress. However, various other ideas emerged:

4.3.1 Fundamental knowledge

The most common response (N=51) was that science helped people to understand life and the world:
“Yes, to understand what life is.” (13F, student)

“Without science, how are we going to know about anything?” (15F, student)

“Science is fundamental in everyone’s life; it’s in everything: drinking a glass of purified water, eating a tomato, putting on sunblock.” (24F, university administrator)

“Yes, it’s how we find out how things are” (25F, convenience store clerk)

“Yes, I see science in every aspect of my life. Science helps you simply things in life. And you can always build on the knowledge developed by others.” (45M, souvenir shop owner)

“One learns so many things from science.” (56F, homemaker)

Interestingly numerous scientists had the perception that residents saw the connection between science and their daily lives mainly through negative impacts on their livelihoods.

The Program Manager stated:

“Science is frequently a long-term endeavor that if any of us are kind of in our normal Joe daily routine, we only indirectly see the connection between our lives and science with a capital S. And that’s 100% true in the Galápagos, just like anywhere. But you know, in addition to that sort of little bit of disconnect, it seems to be that people are well aware of science doing things like affecting fish catch policy, you know, lobster policy, what can and can’t be done on agricultural land, you know, and the fact that the Park manages most of the land in the archipelago and so on and so on.”

A senior scientist at the CDRS noted, “People don’t see how science plays a role in their lives unless it’s about enforcing regulations that say, keep them from fishing less or consuming tortoises, which people still do” (personal communication, July 13, 2011).

Another CDRS scientist added, “I think science is a distant thing for people. It only registers with them when they’re being told that they have to be more conservation-minded or that they can’t overfish.” (personal communication, July 16, 2011).

4.3.2 Health

Thirteen people identified health-related issues as the way science played an important role in their daily lives:
“Of course because without science, we wouldn’t have had so many advancements in medicine, cures.” (19F, hotel receptionist)

“Of course because it helps us to improve the lifestyles of human beings, through medical discoveries, technology.” (29M, police officer)

“Of course…For example, being a mom, one has to know about food and eating well, health. Now we have things that are supposedly natural, but later they become more and more scientific, more food engineering and chemicals...so we have to know about these things.” (43F, secretary for fire station)

“Maybe a connection is medicinal plants. So yes there's a relationship…” (50M, construction worker and beach concession stand)

4.3.3 Technology

Six individuals felt that science was most visible in their lives through technology:

“Thanks to science, we have things that help us to live, for example, soap, cell phones, many things.” (23M, GNP security guard)

“Science is definitely important in my life. My work, for example, is in communications. All of that is based in science, our cell phones, our ability to use email, everything.” (32F, telecommunications company worker)

4.3.4 Not important

Seven residents saw no link between science and their daily lives (including the two that stated that they did not believe in science):

“As far as how much of the science happening here affects me, it’s hard to say. The science that happens here…unfortunately it’s geared towards plants and animals which is less directly related to human populations in daily life.” (29F, university administrator)

“I don’t think it affects me.” (44M, municipal worker in distribution of water)

“I don't see a direct relation.” (49M, construction)

4.3.5 Knowledge for livelihoods

Four people talked about the way in which science helped them in their occupations:

“It's important for my job…I always have to be informed about the latest information about the islands. And I also think science allows me to participate in different kinds
of conversations with different people. Without knowledge of science here, you can't converse with a lot of people.” (30M, naturalist guide)

“It helps me to understand where I live and explain it to my tourists. People are interested in all sorts of things when they come here and a lot of it is based in science, whether it’s about the formation of the islands or the flora and fauna.” (62F, hostel owner and administrator)

4.3.6 Conservation for livelihoods

One person directly linked science to conservation efforts in the islands and thus its importance for sustaining livelihoods that depend on tourism revenues, stating “Of course, yes, because if there were no conservation in Galápagos, people like me who depend on tourism for a living couldn’t survive.” (46F, artisan and souvenir shop owner and clerk) With the majority of the population depending on tourism—directly or indirectly—as their primary source of income, it was expected that more residents would discuss this factor.

4.4 Impact of Science Research on San Cristóbal Island

When asked about their perceptions of the impact of science research on their island, residents’ responses were split relatively evenly among positive impact (N=26), no impact (N=22) and unaware about science research in San Cristóbal (N=24). Twelve people answered, “I don’t know.” Two people felt that science research had had mixed results. In this section I outline the reasons respondents gave for these answers.

4.4.1 Positive impact

The majority of those that stated that science research had had a positive impact (21/26) cited the conservation of the archipelago as their reason:

“It’s because of science that we can even live here. Science has helped us to conserve this place and we can live, study and work here.” (12M, student)
“The last study they did was about how fishermen should fish... They researched catches, population sizes. This kind of research is important because they [fishers] still catch undersized individuals, which is not sustainable. They only think about selling fish.” (21M, municipal street cleaner)

“I don’t know of any specific research here, but I think the Park does a good job of taking care of the natural environment here and I imagine that that has to be based at least somewhat in science.” (36F, food stand cook and vendor)

“It has awakened the Park. The Park now knows how to do research. Everyone there has a specialization, in marine, in terrestrial, and now they’ve really been protecting this place in the last couple of years.” (58F, municipal gardener and street food vendor)

Another individual disagreed, stating that fishers—due to the influence of science research—had come to have a more conservationist outlook:

“The impact has been positive. For example, when they began to regulate the sea cucumber fishery, they didn’t let the fishermen touch them. That raised awareness and now the fishermen know that that’s important. They know they have to conserve the resource for the future.” (57F, gift and stationary store owner)

These statements about the effectiveness of conservation activity in the archipelago reveal that many people believe that science on the one hand, and environmental management and policy on the other, are well coordinated. Cairns’s (2012) statistical analysis of the discourses about the role of science in conservation efforts in the Galápagos revealed four main perspectives, one of which demonstrated cynicism about the translation of scientific knowledge into conservation policy. As Cairns notes, “According to this view, it is not science that is lacking, but the political will to make the necessary changes, thus more science on Galápagos is not really considered necessary.” (222)

S1, revealed similar sentiments about lack of communication and coordination between scientists and policymakers, also adding that policymakers lack knowledge and

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18 Scientists will be identified as S and a number
appreciation of science: “Most management decisions obey politicians’ interest and conveniences rather than science. Decision makers do not understand science, do not value science and still do not understand that conserving the Galápagos is the best way to ensure their future in the Galápagos.” In a 2011 interview, a senior scientist at the Charles Darwin Research Station emphasized that “It’s not necessarily that science leads to conservation or sustainability by any stretch of the imagination.” Furthermore, the GNP (2006) identified the lack of planning and coordination between scientists and decision makers as one of the major weaknesses in the model of science that has been developed in the archipelago over the last few years. Santander et al. (2007) largely attribute this gap to the lack of accessibility to scientific information and results, an issue that will be addressed in further detail in Section 4.4.3.

At the same time, there have been some successful science-policy collaborations recently. In the 2011-2012 Galápagos Report, Luna et al. (2012) reported that “studies of marine communities at specific sites have increased understanding of the dynamics of seasonal and annual ecological processes and have resulted in an adjustment of management methodologies.” (132) And “In the GMR, both the creation of the baseline and the subsequent monitoring have helped in the establishment of management measures to ensure that resources are maintained and that we can continue to enjoy their benefits.” (132) Still, the authors also call for improving the links between scientists and the large network of decision-makers in the islands, and describe effective communication between the two as a “major challenge” in the marine reserve.

19 The Galápagos Report is a publication of social, economic, political, and biological analyses of the Galápagos Islands, developed by the Charles Darwin Foundation; the Galápagos National Park Service; and the National Galápagos Institute, with funding and editorial support provided by Galápagos Conservancy. Typically, a new Report is published every other year.
A small group of people (5/26) indicated that research provided positive impacts through the **dissemination of scientific information**:

“All types of studies improve life, so definitely positive. So in terms of education and information, research has had a positive impact.” (23M, GNP security guard)

We’ve learned about things like sea level rise and they’ve taken into account things like tsunamis. And they’ve done studies about El Niño. We have more information on the ocean currents. Through scientific research, we get more informed, we learn a little more.” (32F, homemaker)

“People have learned more about this island.” (61F, street food vendor )

One person noted that research helped to shape worldviews in positive ways:

“With all of the research people are doing here, it has to reach even the remotest person…Through research, you educate the local people to have a different worldview. For example, with the sea cucumber, there used to be a lot of them but people were still poor. Nobody taught them how to live sustainably.” (45M, souvenir shop owner on boardwalk)

Another individual stated that there was only a short-lived positive impact:

“There’s an impact, but it only lasts about 15 days. We find out about something and then we forget. We live in the present and nothing more.” (52F, hostel owner)

4.4.2 Unaware about San Cristóbal research

Twenty four people stated that they could not answer this question because they had never heard about any research being conducted in San Cristóbal. Many stated that they associated science research with Santa Cruz where the Charles Darwin Research Station is based or with another island.

“I haven’t heard of any research they’ve done here. But Galápagos should be a laboratory.” (42F,hostel and hardware store owner)

“I didn’t know they did any research here. But…let’s see…a few months ago, I did hear that they found a pink iguana in Isabela. A while ago, when I was a little girl, I remember they repatriated iguanas.” (46F, artisan and souvenir shop owner and clerk)
While some respondents felt that research results were well disseminated on the island, the majority of interviewees that stated that scientific research had had no impact in San Cristóbal cited the lack of access to scientific findings as the principal reason:

“Look, here, a lot of people have come to do surveys, interviews, all these things. But what happens when they take the studies and don’t share them with the town? Only they benefit, only they study, right? We’re left not knowing what’s going on with our environment in the Galápagos—we don’t know if it’s good, if it’s bad, they don’t let the people know; they simply study and take the information with them... If you study a plant, you know what that plant is going to produce. So you have to give that information to the farmer. Then the farmer knows what to plant...Local authorities have to ask researchers to leave that information behind.” (60M, ex-fisher and water tubing installer)

“I know they’ve studied a lot of things here, but when I need to work, and I’m talking as a student, I can’t even find books. There aren’t a lot of materials about Galápagos and what does exist is in English and my level of English isn’t so good. So scientific research here is a good thing, but when you need results, you can’t find them. I’ve asked the Park for information and it’s a whole complicated process to get it.” (24F, university student and administrator)

“They [scientists] don’t disseminate the information and the research doesn’t remain in the country. The various foundations here, for example, conduct research but they don’t give back locally.” (30M, naturalist guide)

“I’ve never heard about what people research. They don’t share the information. There’s no science in the Galápagos. It can’t be seen. I know there’s science here, but it’s as if there wasn’t.” (50M, construction and beach concession stand; emphasis my own)

“We’re here to learn, not just to live without thinking. So we should be informed about what scientists are doing, discovering.” (60F, convenience store owner and clerk)

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20 The Galápagos National Park requires all researchers to obtain a research permit and to leave a physical copy of their results with the Park. However, those results are filed in the GNP database, which is not publicly accessible. Thus, access to, rather than availability of, information is the main issue.
One person went as far as calling the dissemination of research results a scientist’s “moral
duty.” (54M, hardware store clerk) The information deficit and its consequences were the
greatest concerns expressed by the majority of respondents throughout various points in the
interviews. For example, many people qualified their statement about valuing all types of
research by saying that scientists should be allowed to study the subject of their choosing so
long as they shared the findings with the public.

The Outreach Coordinator agreed, stating that “I think the thing we need to focus on
is how to get the information that we have here out—that should be our responsibility.”

As a 19M naval officer explained, “We know that the education here isn’t very good
so it seems to me that having more information is good for students, for everyone.”

“They [scientists] have to teach, share …if we know more, we don’t have to be stuck
in the same place, with the same information.” (42F, hostel and hardware store co-
owner)

Here it may also be useful to consider additional factors that might make residents
feel alienated from scientific information. First—as one interviewee pointed out—there may
be a language barrier that prevents people from accessing information; many of the reports
that are made public are in English. According to a visiting scientist conducting research on
marine birds in Santa Cruz, “The person in charge of petrels in the National Park doesn’t
speak English so he can’t read the reports on decades of monitoring data.” Secondly, it may
be an issue of short-term memories around information that is, in fact, disseminated. To re-
quoting one resident, “There’s an impact [of science research] but it only lasts about 15 days.
We find out about something and then we forget. We live in the present and nothing more.”
(52F, hotel owner) S2 confirmed that this was the case in his experience—that people
appreciate hearing about scientific projects and their results but are also quick to claim soon
after that they never get any information. It is perhaps also the case that many of the people who have participated in outreach efforts have addressed topics that are only interesting or accessible to a handful of people, thereby making it seem that few efforts exist to engage the public with science.

Various people talked about what could be described as problematic geographies of Galápagos science; science, according to them, does not circulate locally, but rather travels to distant places. As a result of this, they explained, scientists not only knew how to take better care of Galápagos but also knew Galápagos better as a place. The same goes, they argued, for people living outside of the Galápagos since scientists export information rather than sharing it internally:

“The knowledge that they obtain through science should be available here for the citizens of Galápagos and for the tourists. Because what good is it if we [Galapagueños] don’t know anything and people outside do?” (39F, restaurant owner and clerk)

“…that’s what science has been so far--information that helps other places or information about Galápagos but for people from other places, for those conferences in London or wherever. That's why people from outside know more about the Galápagos than the very people from here. So that's why I say it has to be science that benefits Galápagos. We share information that is generated here, here. We need to direct the science towards local problems and solutions.” (30M, naturalist guide)

“Here, it’s all about, be proud of this place, be proud of your heritage, but it’s like first of all, we’re all from different places, and then I want to ask, what is that heritage? You can tell me that Galápagos is a natural wonder, that is has great importance for humanity, but I know nothing about this place compared to a scientist. At least scientists have been to different parts of the islands. Only a small percentage of the local people have been to other parts of the islands. Do you know how expensive it is to go to some of these places? People die here without ever knowing what’s out there. Children have no idea what kind of a place they live in.” (39M, car mechanic).
“They [scientists] need to fortify the local knowledge base. It shouldn’t be that people from outside teach the locals, but vice versa. The university needs to help local people develop a global outlook…but the university is not interested in waking the people up.” (50M, construction and beach concession stand)

One resident, a 29F university administrator, lamented the lack of place-based education in the islands. Before becoming university personnel, this individual was an English teacher in San Cristóbal. She stated that whenever she asked her students to explain why Galápagos is important, they would answer, “the world tells us it’s important because of tourism, endemic species, etc.” Thus this resident stated that the science sector could help teachers to develop place-based education. Again, science is seen as knowing place and passing that information on to others.

Though this is an important critique, we must also acknowledge the valuable types of knowledge that residents have. While many scientists and their international interlocutors and audiences may know more about the natural and ecological components and processes of the archipelago, local people have a wealth of knowledge about social dynamics and local economic issues. If we consider that the popular imagination of the Galápagos mostly includes Darwin and endemic species, it is clear that local people have a lot to teach scientists and popular audiences.

As one resident stated, “There’s a lot of things to study about people, including illnesses, mental health, women’s health, etc. What kind of place is Galápagos? Who lives here? What problems do they face? What can we do?” (32F, homemaker)

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21 The university refers to the Universidad San Francisco de Quito (USFQ), co-funder and founder of the GSC. USFQ’s Galápagos campus is adjacent to the GSC. Some people think of the GSC and the university as the same entity.
Although many residents feel that they are alienated from important scientific information, closer investigation shows that there exists a general information deficit, for scientists, policymakers, and residents alike. As the Galápagos Conservancy notes:

“Although Galápagos is one of the most studied places in the world, access to basic scientific information is surprisingly difficult. Information is held in disperse archives and databases in Galápagos and around the world. There are no shared data collection and archiving protocols. Potential users of data often do not know what exists and as a result often duplicate research and data collection or make decisions based on incomplete and sometimes outdated information. In Galápagos there is a very real need for improved development of, access to, and use of knowledge about the Galápagos Islands to ensure effective natural resource management, decision-making, and policy development in support of biodiversity conservation and a sustainable society. (http://www.Galápagos.org/conservation/knowledge-management/)

As such, the Conservancy, in partnership with The Government Council of Galápagos, the GNP, the Charles Darwin Foundation, local municipalities, ministries of the Ecuadorian government, and national and international universities, has developed a project, the Knowledge Management Initiative, devoted to improving this situation. The two key objectives include implementing “a multi-year, multi-institutional work plan to build the institutional capacity, relationships, infrastructure and protocols needed for improved knowledge management in Galápagos” and to “develop infrastructure needed to engage and benefit from the observations of Citizen Scientists (both tourists and local residents)” (http://www.Galápagos.org/conservation/knowledge-management/). However, according to CD1, this project has seen no progress. The President of Ecuador, Rafael Correa as well as Arturo Izurieta, the National Park Director, issued a mandate requiring that all key institutions in the Galápagos share their data with the GSC for a large-scale project solicited by the President (the project and the GSC’s involvement will be described in further detail in Chapter Five). CD1 explained that in addition to using the data for the project, their idea was
to build a data network in collaboration with various other institutions. When he approached the Conservancy, they were initially enthusiastic, but there was never any kind of follow-up. What is more, the GNP was one of the only institutions that shared their data. CD1 noted, “Information is power, especially in the Galápagos, and people don’t want to give that up.” He also noted that with or without the cooperation of other institutions, the GSC would begin to build a database, using GNP data and data collected by GSC researchers. CD1 stated, “We told institutions that we didn’t necessarily have to be in charge of creating this database. We have some money that we would be willing to contribute and so we wanted to collaborate and make it happen. We understand that data is sensitive. However, we could create a system where scientists are required to share their data within three to five years of publishing their work. We have to create a culture where data is available and shared. This is a mandate from the President and the Park Director, so there will be repercussions for those who do not cooperate.” He stated that the Center would first make their database available to GSC researchers since “We don’t want our own people to have to jump through hoops to get information,” then to local organizations and finally to residents in the form of a digital library.

Co-director 1’s description emphasizes the difficulty of sharing and consolidating information in the archipelago. In order for individuals and institutions to build on existing information and collaborate on projects, it is critical that this situation change. What’s more, it would make a profound difference for the state of knowledge and education in the islands. With so many residents calling for the need for better access to information, creating a central database would be a valuable step towards enhancing the social reach of science.
While most residents attributed the lack of impact of science research on San Cristóbal to the insufficient dissemination of information, two people placed fault with the public for this situation:

“Here the people can listen to talks but there are never any changes. They don’t put into practice what they’ve learned and there’s no development. A sociological study would be important because that’s what studies society, people’s habits, behavior. Many people here don’t care about this place, they don’t care about anything and I’d like to know why that is.” (39F, restaurant owner and cook)

“The people here don’t pay attention to what we’ve learned via science.” (60F convenience store owner)

A few people cited the exportation and exchange of knowledge generated in and about Galápagos as a positive characteristic of Galápagos science:

“A science that investigates and can apply itself here and in other places is good.” (43F, secretary of fire station)

“It would be important to make Galápagos science relevant to Ecuador and the world, no?”(46M, teacher)

One person gave a more specific response, citing climate change as an area that should be explored with respect to Galápagos, but also in terms of global environmental change:

“Well, there are a lot of important and new things not only for the Galápagos but for the world because the world is changing, in temperature. Look, we’re losing the seasons that we used to have…so we need new research to know why we’re seeing these climate changes.” (47M, DVD store owner)

Various people expressed their perception that research **never translates into concrete results**, thereby barring any possibility of seeing the local impact of scientific research:

“I know we’ve had people come multiple times in the past to study water, but years later we’re still without clean water.” (39F, homemaker)

“They do studies but they don’t finish anything. Scientific studies should concretize something.” (43M, taxi driver)
“Where are the results? Where are the changes? A better quality of life is not just having more information. It’s about being able to use information to improve things, like the roads, healthcare, education. (49M, construction)

“We don’t have things that we should have, for example in terms of health.” (56F, homemaker)

A few respondents stated that rather than more research, what was necessary was the implementation and application of existing knowledge:

“My gut reaction is to say that we don’t need more research. There are a lot of reports, with private and public funding, but the actual application and implementation of that knowledge is the challenge. What are the attitudes that keep us from putting things into practice? Is it rumors? False information? … the key is that if we look at information on its own, it doesn’t do anything. We have to find how to communicate that information, ask what we can do with it, apply it in some way. I take a very pragmatic approach to research and information. We should try to apply what we learn.” (30F, high school English teacher)

“We don’t need more research, more people asking us about our life stories. We need some concrete changes. I’ll give you an example: I would like to get a compression chamber here. I’d like people to address the problem of diabetes, all sorts of things.” (40M, ex-fisher and dive boat captain)

While the more common response was that science helps to better manage the Galápagos, one person felt that this was only recently beginning to happen. This echoes what was addressed earlier about some scientists’ belief that policymakers often dismiss key scientific information:

“Only recently are they starting to take into account the importance of scientific research.” (71M, snack stand vendor)

HS: How so?

“There has always been a lot of research here, lots of studies, thousands or more. But that information was kept between scientists, used for people’s careers, published in books written in English. And now, the authorities are learning that they could be using that information to better manage this place. This place has changed a lot; it’s worse than it used to be. We didn’t used to have so much contamination, so many...
cars, so many buildings. We used to take better care of the animals and the wildlife. And now look at this place. It’s still beautiful, but it has changed a lot. I think the authorities are learning that they need to connect more with scientific knowledge, to implement the recommendations that scientists make to better manage Galápagos, to take better care of it. And we’re also learning that we need more types of research. We have a lot of health issues here that need attention. We also need to improve the water, we need to improve a lot of things.”

4.4.4 Mixed impact

One individual stated that while research had had a positive impact in that it helped to conserve the island, it had also had a negative one “because they only study the ecological part and sometimes scientists have been extreme. They’ve enforced extreme restrictions. Some people here live off the natural resources.” (33F, Government Council member)

Another respondent explained that while research may have helped to control the number of people entering the islands, it was negative for the same reason: “People who are coming to find work can’t enter.” (47F, gift shop clerk)

4.5 Science and social responsibility

4.5.1. What kind of research?

Residents were asked whether or not the GNP should grant more research permits to scientists whose work addresses specific local issues. Most interviewees indicated that while an ideal scientific research agenda would prioritize particular concerns such as the lack of potable water, weak education system, inadequate healthcare, and the lack of waste and wastewater treatment systems (or a combination of these items) in the Galápagos, they nonetheless concurred that the National Park should allow and encourage scientists to investigate the topics of their choosing:
“It would be nice if they [scientists] could research about things like medical care, how to improve the hospital, the water, but that has nothing to do with the Center [GSC]. That’s a governmental and municipal responsibility. You pay taxes to the government, not the Center. So obligating people to do certain types of research or only valuing certain types of studies is not fair.” (24F, university student and administrator)

“Whatever type of investigation is good. Everything is open because researchers want to know more and more and more and they have the right to do so. Only God has the final say. The curiosity for investigating is good. Through them, we also learn things. Who stopped Charles Darwin? Nobody. Through him, we know all sorts of things about birds, about everything.” (25F, convenience store clerk)

“If you like science, you should be able to research something whether or not it will improve quality of life or well-being.” (34F, homemaker)

“If someone wants to study something just because, they should be able to. It’s not their job to investigate something that is important to us; it has to be what’s important to them.” (40M, construction worker)

“Researchers who come here do not have the responsibility to solve our problems, although there are many.” (46F, homemaker)

“From what I understand, scientists want to study different things, know about them deeply…nobody said they had to help the local people.” (61F, street food vendor)

Two residents further complicated this issue by discussing the varying roles that different types of science play in society as well as scientists’ professional responsibilities and obligations:

“Scientists sometimes do research that can improve society in direct ways, but they also have other interests and obligations. First, there are different types of scientists, so from the beginning some people’s work is not that directly related to social issues. Then, they work for different kinds of places. If you work for a university, I imagine you have to teach and you have to publish your work. That’s the way it is on the mainland, so why should it be any different here? And there are parts of their job that we don’t even know about, so to say that they can only do certain kinds of research seems ridiculous.” (45M, souvenir shop owner)

“Scientists also have to finish their theses; they have certain requirements.” (57F, municipal gardener and street food vendor)
These statements have important implications not only for scientific research, but for place. First, we learn from the majority opinion that many residents—like scientists—can appreciate the Galápagos as a natural laboratory where different types of scientific research can be developed. In addition, the residents cited above are reflexive about the “multiplicity of place” (Massey 2005); they make an effort to understand scientists’ circumstances, namely their desire to pursue knowledge of diverse types and the pressure they experience to fulfill professional responsibilities. Comments from two senior scientists at the Charles Darwin Research Station become interesting in light of these resident statements:

“People don’t know what we do…therefore they can’t appreciate what we do.” (CDRS scientist, personal communication, July 15, 2011)

“Most people have no idea what goes into our work. They think we have to solve all of their problems. They don’t know what our job entails.’ (CDRS scientist, personal communication, July 11, 2011)

4.5.2 Defining social benefit and well-being.

The majority of residents cited the opportunity to learn and to advance knowledge in general as noteworthy benefits of Galápagos science (though as mentioned previously, they simultaneously feel that the dissemination of information is lacking):

“Science has helped me a lot, in terms of knowing about flora and fauna and conservation.’ (19F, hotel receptionist)

“Learning simply to learn is important.” (38M, p/t construction, p/t convenience store clerk)

“What ever the type of study, it will reap benefits. A study about plants, for example, may not be a priority but it will be beneficial because it will inform people about some aspect of our environment.” (45M, dive shop owner and operator)

“Research pursues benefits, of which the advancement of knowledge is one.” (54M, municipal worker)

Two people were in strong disagreement with the above view:
“Scientists usually give talks. Scientists cannot just give talks and be satisfied. They may talk about something we don’t even care about. And there are more urgent things to do than to give talks and presentations!” (49M, construction)

“The community is going to learn a lot from the Center scientists, but that’s as far as it goes. And more often than not, the knowledge that they generate in the university stays in the university.” (50M construction worker and beach concession stand)

Various people saw aiding the Galápagos as a separate benefit from advancing knowledge, though they felt both were meaningful endeavors:

“To each their own. Helping Galápagos and advancing knowledge are equally important.” (19F, hotel receptionist)

Two residents indicated that what is defined as socially beneficial research remains—and should remain--open to interpretation:

“We don’t all have the same way of thinking. I might think something is beneficial while you don’t. I think there’s room for everything. They say that it’s a natural laboratory here. It isn’t that way for me, but it is for someone else, you know what I mean?” (25F, convenience store clerk)

“Improving well-being and quality of life can be thought of in different ways. If for you, that only means reducing pollution or installing potable water, then you deny other important opportunities that we could have to learn.” (19M, naval officer)

These respondents importantly acknowledge the diversity of place, and demonstrate a relational view not only about science but about well-being. The critical factor, as the naval officer describes, is to not speak for other people when determining knowledge needs and standards of well-being.

Many residents maintained that the social reach of scientific research was not something that could be identified easily, either in time or in space:

“Scientists are trained and know a lot. It would be good that they do research and then share that information with us. If someone wants to study a plant, for example, it will inform us and later it could perhaps produce benefits, for medicine or to know more about ecosystems, for example.” (16F, student)
“All kinds of research should be developed. And, you know, who knows what will be important in the future?” (24F, university student and administrator)

“For example, they [scientists] find out about an insect that causes a certain illness. So then we know more about that sickness and we can benefit, though indirectly. So we might say at first that a study about insect X is not useful, that it won’t improve our quality of life, but maybe it will, no?” (57F, gift and stationery store owner)

“We have to think about application more broadly. The work that people do here may be useful somewhere else.” (33F, Government Council 22 member)

The Executive Board Member shared a similar view:

I have a bit of a problem thinking of applied vs. not applied science. I think it’s a bit naïve when people think of that as a clear divide…I think many of the things that apparently are not applied, you know, they might be studying the origin of the universe and then they develop a cell phone…So Einstein and Newton were probably not thinking about applied. Darwin was not, but they have had a lot of applications and I don’t think there’s good or bad science…”

The above views pose a challenge for Santander et al’s (2007) argument in favor of science research that responds to urgent management needs over that which caters to academic and funding interests. The residents critically blur the lines that have been drawn between basic and applied research—a distinction that dates back to the late nineteenth century (Daniels 1967; Hounshell 1980; Pielke 2007)—and in doing so, open up a space for scientific inquiry that some scientists and Park officials are attempting to restrict.

4.5.3 A different kind of research?

Though in the minority, some respondents felt that the National Park should be more selective about granting research permits, taking into account the most urgent needs of the human population in the protected area:

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22 The Governing Council of Galápagos (consejo de gobierno in Spanish) is the body responsible for the administration of the inhabited areas of the Galápagos Province as related to planning and zoning, resource management, and the organization of economic activities.
“We have too many problems here not to be addressing them. If they’re [scientists] are allowed to come here to advance their careers, we should be allowed to ask for something in return.” (39M, car mechanic)

“They’re getting paid, so yes it’s [work that reaps social benefits] is an obligation. They get paid well, so we should demand more from them in terms of what their work can do in a place, how it can be put to use. They’ve had all of the opportunities in the world and they should feel a responsibility to give back.” (34F, store clerk in stationary and gift shop)

Some residents, as revealed in these views, are highly resentful about the Galápagos being used as a natural laboratory. Critical of this stance, one respondent stated, “This is a very complicated society. People here think that everyone here has to ask them for permission to do what they want, but it isn’t like that.” (45M, souvenir shop owner) These perspectives reflect the attempts made by Ecuadorian-born Galapagueños to lay claims to the islands, much like foreign scientists and conservationists at the time of the GNP’s founding. Because scientists often times are not Ecuadorian nationals, some Galapagueños categorize them as outsiders. Ecuadorian-born Galapagueños, they argue, are the real locals and are therefore owed something from the foreigners who come to use ‘their’ space for professional advancement. As one resident put it, “…they should try to support the place where they’re doing their research, in appreciation.” (43F, administrative assistant of fire station). Yet many Ecuadorian-born Galapagueños have not been in the islands any longer than scientists, and some, for less time. Thus, rather than invoking an “imagination from the inside in,” (Massey 2005) many Galápagos residents are in fact appealing to one from the outside in. And ultimately, these population dynamics mean that the question of who gets to speak for the Galápagos becomes a particularly contested one.
4.5.4 Lack of science research on human issues

Several people expressed frustration about Galápagos science’s tendency to prioritize animals over people. Other studies (Quiroga and Ospina 2009; Hennessy and McCleary 2011) have highlighted this frustration throughout the islands:

“Advancing science for science’s sake does not make sense here. We need to improve a lot of things. We have spent more money and time on preserving marine turtles than the local population.” (41F, stationary store clerk)

“Enough with animals, plants, insects!! What about the people of Galápagos? If you’re not going to care about people, don’t let them live here in the first place!!” (49M, construction)

“Globally, Galápagos is known for the animals, but the human beings count too.” (42F, hostel owner and hardware store co-owner)

“There’s nothing for me, but for a sea lion, there’s lots of money.” (40M, ex-fisher and dive boat captain)

“George23 died and it’s all a big drama. But there’s no clean water here. I know that that’s not an issue of scientists but people feel resentment. They feel resentment towards scientists and managers. It’s that feeling that human life is not valued, or at least undervalued. This is something a lot of people feel and something scientists and managers should think about.” (45F, university administrator)

One resident challenged altogether the notion that Galápagos was in great need and that scientists had a responsibility to help:

“In Galápagos, you don’t see poverty like you see in other places. Galápagos can’t even compare to the conditions in other places and yet there’s no research center there. Here it’s pretty Westernized. You have WIFI, you can get a decent pizza. If science is about meeting needs, this is not it, Galápagos is not it.” On the question of scientists’ responsibility to Galápagos, this person stated, ‘Good question. If this

23 Lonesome George was a male Pinta Island tortoise (Chelonoidis nigra abingdonii) and the last known individual of this subspecies. Over the decades, various efforts were made to mate George with females of a similar subspecies, but none were successful. Though he died in June of 2012, George continues to be a powerful symbol of conservation efforts in the Galápagos Islands. Residents often refer to George when speaking about the disproportionate amount of resources expended on preserving animal populations in the archipelago.
weren’t a developing country, would it then be ok to study turtles and things? Research is research and should be open to everything.” (29F, university administrator)

On one hand, this statement offers a critical macro-perspective. But as another resident compellingly put it, “Galápagos is better off than a lot of other places, but we also lack a lot of things here that would be considered basic in other places. Those that say that we’re doing ok probably have the things we lack or they have a way of leaving the islands.” (33F, domestic worker)

There is little indication in this sample that people with similar educational backgrounds or socioeconomic status are more aligned in their perspectives regarding science and social responsibility. Overall, residents were in favor of protecting scientific freedom. That is, most people did not feel that scientists were obligated to conduct research that would address urgent, social issues. Interviews also showed that people on the whole appreciate the opportunity to learn for the sake of learning, giving importance to the educational value of science research. As one resident stated, “Many people from my generation weren’t able to finish even the most basic levels of education. So whatever kind of talk that a scientist gives is an opportunity. For me, this is a beautiful and unique thing; it’s like free education.” (61F, street food vendor) Taking these perspectives into account, Santander et al’s dismissal of Galápagos research that pursues “academic interests” remains unsatisfactory, as it discounts a broader audience that sees value in generating and circulating knowledge that is not solely about addressing urgent management needs in the archipelago.
CHAPTER 5: THE GSC AND ITS PUBLICS

In the previous chapter, I explored the public understanding of science in San Cristóbal. Residents’ voices illustrated the different ways in which they perceived of and experienced science in their time in the islands.

In this section, I turn to the GSC-public dynamic. I first explore the kind of science-public relationship to which GSC directors and managers aspire. I then briefly outline the different outreach initiatives that are emerging at the GSC, discussing in more detail the formation of a Community Advisory Committee, as it constitutes both an innovative and challenging proposal for the Center. Subsequently, I turn to residents’ views on the kind of connection they would like to have with the Center to preliminarily assess how well their desires match up with the Center’s outreach offerings. Next, I further explore the question of knowledge needs in the islands by sharing what San Cristóbal residents stated that they wanted to learn via Center outreach. Subsequently, I turn to the GSC’s imaginations of the public, focusing particularly on how Center representatives talked about residents’ knowledge base. I conclude by sharing the GSC’s perspectives on public participation in science research. This chapter provides some insight into the kinds of debates that might materialize between and among GSC scientists and residents about Galápagos science and establishing mutually beneficial science-society relationships. As maintained throughout, these debates allow us to begin mapping out a science for Galápagos that is not limited to the visions of “competent authorities.”
5.1 GSC-publics relationship

Two of the GSC’s main principles as stated by the Center in their institutional guidelines include:

- Promoting “a culture of respect, sensitivity, and cooperation between USFQ & UNC, government and non-government organizations, and the people of Ecuador and the Galápagos Islands, and encourage ethical behavior that is sensitive to the interests and rights of others.”

- Fostering “projects and activities that enhance the well-being of the inhabitants of the Galápagos Islands and inform research, education, and community outreach and engagement throughout the archipelago and on our respective campuses.”

In the following subsections, I summarize GSC perspectives on two main areas that emerged in interviews and are related to the above objectives—inclusivity and collaboration and human well-being—in addition to a third factor that was emphasized by GSC co-directors: neutrality.

5.1.1 Inclusivity and collaboration

One of the main concerns expressed by GSC representatives was the historical alienation of local populations from Galápagos science and its activities. According to Co-director 1, “We are often compared to the Charles Darwin Station. We are like them in some ways, but we’re also very different. The Mayor once pulled me aside and said that if we become like the Station, we would not have his support. So I asked him what that meant, what is being like the Station? And he said, not having a spirit of collaboration with the rest of the town, doing what they want without considering feedback…both about their internal operations and their research.” Co-director 1 therefore discussed the need to develop a politics and practice of community inclusion at the Center. He acknowledged that building new relationships with residents and authorities and distinguishing themselves from the
Station will be a slow and difficult process, as “They’ve sort of clumped us [scientists] all together.”

The Outreach Coordinator maintained: “The whole point of the Center is to be inclusive…but we have to be really careful with the building about who’s allowed in where because we have expensive materials here. And also we have a lot of projects. You don’t want someone to unknowingly go like this [swings her arm] and all of a sudden a project is done because it’s messed up.”

With respect to collaboration, Co-director 1 talked about establishing community partnerships that would allow the Center and residents to find overlapping areas of interest: “We want them [community members] to be partners with us. We want to be part of the community. We want to engage them in a way that we can come to some areas of cooperation that we’re both interested in…” (emphasis my own). He maintained that while the GSC intended to work with communities whenever possible, it was also critical that the Center prioritize its own science and research goals: “We cannot just do whatever the community asks of us—that’s not how this works. We are not a foundation that brings grants to the community. We don’t have unlimited funds. That said, any opportunity we have to partner up with community members, I’m open to it and think it’s important that we do so…but again, not at the cost of what we’ve determined internally as the way forward with our work.”

5.1.2 Human well-being

Human well-being was a factor that surfaced multiple times when talking about the overall aims of the GSC. It was evident that Center representatives felt a certain level of
responsibility to give back to place. Co-director 1 stated, “Improving well-being whenever possible, that’s how I think about what we’re trying to do…We’re…interested in knowing more about the taxi driver and the school teacher and the fisherman, and the tour guide leader and where, if at all, we can play a role in helping the environmental well-being but also the social well-being.” He added:

“Case in point might be our interest in water quality. The communities have long complained about the poor water distribution system, water and sanitation and health. We have scientists in environmental sciences and engineering and other domains, both here at Carolina and at USFQ, who are keenly interested in the science in the movement of pathogens and how that is affecting human health.”

The Program Manager affirmed:

“I would like them [residents] to be able to see a connection between the scientists being there and doing their thing and maybe even if it’s only indirectly related to the science itself, there being some positive outcomes in their community as well. And, you know… this could be things like better science education in the schools, maybe better education in general; could be, you know, an outcome of some of the water work that we’re starting, actually improving the water conditions in the islands. So I’d like to see, them to see, both those things: great science that they can be proud of, that isn’t necessarily directly related to them, but indirectly related to that great science, improvements happening in their community.”

He additionally stated that:

“…we hope that having this infrastructure in these islands, the GSC facility, and the outreach coordinator and other people in the future who are explicitly involved in the outreach side of things, that linkages between our science and community well-being get made. We hope the scientists, who are busy people, can participate in this sometimes, maybe they do some of the teaching in the workshops or interventions directly with families or whatever, but that can’t be their primary job…” (emphasis my own)

Much like Co-Director 1, one of the concerns that arose for the Program Manager was that the science research aims of the GSC remain intact no matter how much community collaboration or assistance takes place.
The Executive Board Member explained:

“I think it’s a mistake to think that science has to be the ‘good science,’ which I think is what some people are thinking, that it has to be science that benefits the local people; I don’t think that. On the other hand, I do think that in a place like this, we do have a responsibility with the local community and I think that can be materialized in different ways. One is that we do have a responsibility and I think we want to understand better some of the issues that affect people, that we have that responsibility. I think we cannot come here to do pure evolutionary work. I’m not saying that we don’t, that some of that is not needed…” (emphasis my own)

The Outreach Coordinator maintained that:

“People have daily concerns, and if we can help relieve that stress, great. No one here knows how to clean the water. And I think having scientists being able to come and do things that are important for daily stresses and challenges in terms of health and environment for people here and giving them good answers or advice that they understand is important.”

Other GSC representatives weighed in on the issue of human well-being:

“Science with intended benefits or applicability for the country and the local community is obviously necessary.” (S2)

“Yes, but not everybody [has a responsibility to do research that reaps broader social benefits]. You have to have the will to expand your field of research to other areas…link social sciences with your field…That should be a priority.” (S3)

At the same time, one concern that Co-director 1 repeatedly addressed was the need to reconcile community expectations with the Center’s primary objectives. As he later explained, “We can’t do everything. We can’t be the solution to all of the local problems and needs. People often think of international scientific institutions as being money pots.” The Outreach Coordinator validated Co-director 1’s apprehension with an example:

“There’s this one woman who has a farm up in the highlands. She has lived in the states. She’s married to, I think her husband might be United Statesian [laughs]…but she’s got a farm here and she came in to my office and she was like, ‘Can you
connect me with some students because… I need to cut back the mora\(^{24}\)… And I was like, well, I don’t know if there are students, they have a lot of classes. And she says, ‘yeah, but all of these gringos like to do that sort of stuff.’ And I said, maybe they’d be interested if it was for a foundation or whatever. And she was like, ‘no, it’s my land’ and I told her, well, I can ask them, maybe they will have fun helping someone and hacking mora with a machete, maybe it is their bag, I don’t know. And…she’s like, ‘well, you know, they’re volunteers.’ And I was like, ‘We don’t have volunteers, we have students.’ And then she was like, ‘Well you don’t do anything for agriculture’ and then she didn’t even want to provide transportation or food or water for these kids. And she says, “You don’t do enough for this, or for this!” and she just…started screaming about what we didn’t do. I have no problem with community members reaching out to us and proposing some kind of collaboration. But there has to be some kind of well thought-out proposal; it doesn’t need to be formal, just formulated in a way that we understand what the needs are and whether or not we can help in any way.”

5.1.3 Neutrality

GSC Co-directors emphasized neutrality as a key component of their overall vision for the Center. For Co-director 1, this largely meant that the Center would not get involved with policymaking. He described their role as “clarifying some issues. Part of it might be an objective eye, an objective voice, not making a political decision. We’re not elected, we’re not there to make policy, we’re there to define how processes operate, how they touch across the domains, meaning, social, natural sciences, marine sciences, etc., and how that all plays out. That’s our niche, that’s our job, that’s what we do best.” (emphasis in original) The Program Manager echoed Co-director 1 stating, “We can’t get around the fact that if you’re doing science right, it doesn’t start out with an agenda; it’s trying to answer questions.”

Co-director 2 spoke more at length about questions of neutrality. Like Co-director 1, he emphasized that the Center would not participate in policymaking processes. Both

\(^{24}\) The five species of mora, or blackberry, are aggressive, invasive species that have had a negative ecological impact on several islands in the Galápagos. Mora compete with native and endemic species for light, water, and nutrients, and affect agriculture in the highlands.
directors also expressed that the Center should prioritize dialoguing with different sectors of society, be it fishers or conservation NGOs, in an effort to understand their social and economic circumstances and their perspectives on a variety of issues; both stated that they were wary about imposing ideologies or decisions on residents. Co-Director 2 specifically explained that the GSC must respect the right of communities to develop as they choose while respecting the right of institutions and the local and national government to protect the environment in the islands. Thus, Co-director 2 argued, the Center should not be promoting more conservation, or less fishing or anything of that nature because “conservation is relative.” Yet the GSC facility application form explicitly states that the Center “has been created through the joint partnership between the Universidad San Francisco de Quito, (USFQ), Ecuador and the University of North Carolina at Chapel Hill (UNC), USA to promote conservation and sustainability in the Galápagos Islands and to advance science and education to benefit society.” (unpublished document, GSC facilities application form, p.1) Thus, Co-director 2’s comments seem to reflect his individual vision rather than that of the GSC as a whole; Center representatives, then, would benefit from initiating a critical conversation about the kind of position they would like to uphold and communicate.

Co-director 1 continues by stating that the Center “should never lose that neutrality because that is what will allow us to work on equal terms with the fishers, or whomever else.” (emphasis my own). At the same time, he acknowledged that the GSC, as is true of any institution, is constituted by myriad people with a multitude of perspectives and experiences:

“Within our institution, we have scientists and researchers with a diversity of opinions. We have extremist professors that say that there shouldn’t be any people in the Galápagos, that we should get rid of all of the people here, that Galápagos should
be for scientists, and we have other professors that say that the local people have every right to be here, to live their lives and that Galápagos should be for Ecuadorians and that all Ecuadorians have to be able to live here. You have all of these extremes. But as an institution, we have to try to remain neutral and objective.” 25

While both directors highlighted neutrality, upon closer examination, some interesting contradictions also emerged. Co-Director 1, for example, framed GSC outreach and education programming, in part, as vehicles through which to shape residents’ outlooks:

“We believe science and education are fundamental. It’s not just learning in the classroom, it’s altering the perspectives, shaping the kinds of questions and the kind of vision they [residents] might have and so what we want to get to, of course, is that the local citizens understand the contribution that we’re trying to make, not just in educating children in the school, but educating the community about values, about the rigors of debate, testing through experimentation, the uncertainties associated with science as well and some of the limitations of knowledge at this point and those are all part of what we rigorously try to understand.” (emphasis my own)

HS: What do you mean by educating the community about values? What kinds of values?

“Teaching residents about environmental ethics and the overexploitation of resources.”

This perspective was simultaneously complicated by Co-director 1’s view that communities should not be told how to live their lives or manage their livelihoods. Thus he attempts to at once take a position on particular issues and remain politically impartial. He repeatedly emphasizes that the GSC will not participate in making policy, which seems to be where he temporarily resolves his own contradictions—so long as the GSC does not sign policies into effect, they can claim political neutrality. Co-director 2, however, feels that choosing a

25 This statement has significant implications when one considers the management structure of the GSC. One Center scientist that has “extremist” views about human presence and impact in the islands also currently holds a position of power within the institution. Thus it is worth interrogating how viable it is to have an institutional policy of neutrality.
standpoint on particular issues or promoting certain “values” already necessarily diminishes their institutional neutrality.

It is evident that Center directors believe that staying out of policy and/or remaining unbiased about local debates will enhance their relations with the public. Still, the directors’ views regarding neutrality—no matter how well-intentioned—are not only inconsistent, but also convey a problematic, technocratic vision of science. As Cairns (2012) notes, it takes “the idea of scientific knowledge as an unproblematic source of objectivity and political neutrality.” For decades, STS scholars (Rose and Rose 1971; Bloor 1976; Latour 1987; Haraway 1991; Jasanoff 1995) have critiqued this notion. And regarding science research, Rose and Rose (1971) “even pure research can never be neutral since its nature and its directions are always framed by the social and scientific context of its time.” (137) Also, though Center directors state that their role is not to make policy, one official GSC document highlights that one of the Center’s goals is “inform policy and management through investigative and integrative science.” (unpublished document, “Galápagos Science Center,” p.4) It is questionable to what extent one can separate informing policy from making policy. Sociologist Thomas Gieryn’s (1993) influential theorization of “boundary work,” the discourses and practices that seek to demarcate science from non-science, is critical here as GSC directors attempt to delineate where science ends and politics start.

What is absent in these conceptualizations of neutrality is a broader analysis of power. If, as Martin and Richards (1995) note, “Nature is assumed to hold a unique truth and the current state of scientific knowledge is assumed to be the best available approximation to that truth,” then the GSC is easily able to embody the role of local knowledge authority. (510) Thus, that local authorities, institutions, and residents will more than likely take the
Center’s observations as “how things are” not only points to the influence granted to scientific knowledge, but also to the reality that there is little neutral about their position. It therefore follows that it is highly optimistic to think that the GSC will be able to work with different communities “on equal terms.” Perhaps, then, it is not as crucial to establish an institutional policy of neutrality, so much as one of reflexivity about science and place; interactions with communities can be seen as an opportunity to engage with the intricate power dynamics inherent in the production of scientific knowledge as well as with different “social processes, experiences and understandings, in a situation of co-presence” (Massey 1993, 66).

5.2 Reaching out to science’s publics

The majority of outreach activities at the GSC remains in the planning stages or have only recently begun. Over the next several years, programming is likely to change often, as the Center becomes more familiar with different communities’ needs. As is true for many other scientific, educational and/or conservation institutions, one of the greatest challenges to providing effective outreach at the GSC is finding sources of long-term funding. Nonetheless, GSC directors described various outreach objectives and publics, highlighting the different geographies of science emerging at and from the GSC:

**Foment community education**

The Center created a “community classroom” on the first floor, which provides a new meeting space for different community members (Figure 10).
As Co-director 1 described:

“We loan that out to the community free of charge for various programs. Among those might be seminars, science contests; they might be workshops, might be a place where fishermen gather or tourist leaders gather to talk things through and we’ve now used it in a variety of forms for the community that have come to our facility and asked for participation.”

The classroom has been used to conduct lectures on evolutionary biology; the geography of the islands; and conservation for the Park’s naturalist guides. According to the OC, the lectures received positive response from the guides, many of whom asked for the continuation of the lecture series. She stated, “The guides—or at least the good ones—always want to have the most updated information. They want to learn the information both for themselves and for their clients.”

Co-director 1 stated that in the future they would ideally like to create a more comprehensive program of classes that will certify guides with the GNP in various areas like sustainability.
Provide institutional support/create new partnerships

The GSC envisions working with local institutions in varying capacities. For example, Co-director 2 spoke about supporting the Park and municipalities on different planning projects by offering the use of the Center’s Geographic Information Systems (GIS) lab and training technical experts on the uses of ArcGIS, the principal GIS software program. Co-director 2 noted:

“The idea is that they can use our space, infrastructure, and human capital to advance their projects. It’s not that we’re going to try to influence these processes in any way; it’s more that we’d like to provide support via training. This is just one example…I’ve seen a lot of examples where an outside consultant was hired for a particular project; the consultant does what they want, are paid and leave. By taking advantage of our infrastructure and knowledge, local institutions can do more of that work themselves; it’ll be more of an organic process and at the same time they can strengthen their own capacities. I think that’s the correct way to go about this.”

A substantial project in which the GSC is already involved is one which the Ecuadorian President, Rafael Correa, personally petitioned. Concerned about the rapid growth of tourism and the human population in the archipelago, the national government called upon a group of GSC scientists, the GNP and the World Wildlife Fund to explore the question, “What is the carrying capacity of the Galápagos Islands?” Since October 2013, the research team has been developing an Agent-Based Model for each of the populated islands to investigate scenarios of change as a planning, management, conservation, and science tool for the Galápagos Islands.

Population projections will be developed from Park entrance surveys completed by all visitors. According to the GSC, “The project will link tourists and residents and create alternative futures of the Galápagos through population projections and scenarios of change.

26 An agent-based model is a type of computational model for simulating the actions and interactions of autonomous agents (both individual or collective entities such as organizations or groups) with the aim of evaluating their effect on a particular system.
that represent, for instance, mass tourism vs. nature-based tourism. Secondary data will also be identified to conduct preliminary assessments of environmental quality of the Galápagos and the consumptive demands of a burgeoning population, with severe implications for people and the environment.”

For the time-being, the project team will consider model designs for prototype development and generate preliminary population projections. According to Co-director 1, “The President and the government wanted a number…like the Galápagos could handle another 100,000 or 150,000 people. We said we couldn’t and wouldn’t do that. I don’t think we should be telling the government how many more people should be allowed in or whether or not people should be kicked off the islands. So that’s how we came up with this idea of creating scenarios and projections and trying to get an idea of what the social and environmental implications might be.”

**Revive past initiatives**

The GSC is recuperating past science and education initiatives in the islands. On November 8, 2013 the Center, along with UNC Chapel Hill and the municipality of San Cristóbal sponsored an all-day science and conservation fair, in which approximately 500 students from various schools on the island and of all grade levels (through high school) presented original science and/or conservation-related projects. (Figure 11) Students were given the option of using the format of their choice for their projects, including everything from a traditional science paper to photography or dance, among other things, and competed for various prizes, including scholarships to study at USFQ Galápagos.
The last large-scale science fairs took place in 2007 and 2008 and were developed in collaboration with the Charles Darwin Research Station. These types of education initiatives are especially valuable in the Galápagos where local schools often emphasize rote learning, giving students little opportunity to engage their creative and critical thinking skills.

**Recruit USFQ (Galápagos and mainland Ecuador campuses) and UNC students as research assistants/interns**

For the first years of operation, the Center plans to give priority to undergraduate and graduate students from USFQ and UNC to become involved with Center research projects or to develop their own projects, using GSC facilities. The feasibility of mentoring opportunities will be contingent on the availability and interest of GSC scientists. According to Co-Director 1, “…we want to do more community engagement. We want to do education, not only in the classroom, but in the field involving Carolina students as well as Ecuadorian students as well as Galpagueños.”

S5, a native of San Cristóbal Island, added, “We want students to integrate into the university and to our projects and then they can work on theses and later they’ll be our
colleagues. The idea is not that they just get a bachelor’s and then they finish but to show that they can go way beyond that, get a doctorate, and show them that we have the capacity to help them work in these types of things.”

The Program Manager spoke about getting students into the labs not only as a training opportunity, but as a way to enhance the local public understanding of science:

“You know, one of the things we talked about in terms of outreach is also getting some of the kids that are a little older into the labs and helping out on some of the projects so they can kind of see at least a piece of how science works. And talking with scientists so they understand what made it possible for the scientists to be there, doing that work, writing the proposals, getting the money and seeing this kind of bigger picture of what gets scientists there and doing work.”

**Develop citizen science**

As discussed in Chapter 3, various scholars (Irwin 1995; Kruger and Shannon 2000; Schneider 2000) have examined different models of citizen science. According to Irwin (1995) citizen science usually takes one of two forms: science research that is designed to address particular societal issues or research that is carried out by citizens. The latter is also often referred to as public participation in scientific research. Bonney et al. (2009) distinguished between contributory and co-created engagement, in which the former refers to participation in data collection while the latter entails collaboration between citizens and scientists and managers to develop research projects of mutual interest. In the case of the GSC, they would most like to develop the contributory mode of citizen science. Regarding naturalist guides, the Executive Board Member stated, “I think there are ways in which local guides can be involved, collecting data, analyzing data; they’re always traveling [around the islands]. For example, doing censuses. How many sea lions are there in Genovesa? We

27 Genovesa is a small island located in the northeastern region of the Galápagos Archipelago.
don’t go to Genovesa; it’s very expensive to go. But they go to Genovesa so they can do that, they can be very good field assistants and tell us what’s going on.” Co-director 1 added, “A number of people at USFQ are engaging the community for observational data. And that may be as simple as having local communities…students generally, count sea lions on the beach and do it every day for 30 days or every week for a whole year, and I then know something about the numbers and the census of sea lions, at multiple beaches, at the same time of day, across the seasons of the year.” Other institutions in the Galápagos are also in the process of developing citizen science initiatives. From June 25-29, the GNP conducted a citizen science workshop, in which attendees discussed how public participation in environmental monitoring could potentially enhance local conservation efforts. Participants included international specialists in citizen science, Park managers, scientists, naturalist guides, fundraisers, local community members, and other stakeholders

Community Advisory Committee

One of the principal spaces that the GSC has been carving out for science-society interactions is the Community Advisory Committee (CAC hereafter). The CAC—a non-voting committee whose members will be chosen or reviewed by GSC directors every two years, and will convene three to four times a year—will be a potentially valuable space where community representatives can provide feedback to Center directors and deputy directors on the education, research and outreach programs and policies of the GSC. Community members will also be able to converse with the GSC about local education, health, tourism, fisheries, agriculture, and island sustainability as well as on additional topics specified by GSC directors and/or CAC members. The CAC will also act as a primary information source, keeping residents of San Cristóbal, and of the archipelago in general, apprised of the
Center’s activities and goals. In addition, it will be a key public relations mechanism. As Co-director 1 explained, “We’re trying to let the community know who we are and what we do… That’s another reason why the CAC is important: so that we get members of the community who know who we are and can represent us to the rest of the community.”

Since the beginning of data collection for this thesis to the present, the makeup of the CAC has changed greatly. In June of 2012, Co-director 1 explained, “We don’t want just the power elite of the community. We want people that are more embedded in the fabric of the community so we can hear those issues as well.”

When we last conversed in November 2013, he explained that other Center managers “started saying that in order to understand what goes on at the GSC, is some degree of education and training necessary? So then it evolved away from strictly a citizen’s group. I’m fine with having reps from organizations as long as they represent a diverse range of perspectives. We don’t want it to be a Good ’ol Buddies Club, just people who agree with us, but people who are in a position to know about the issues. My strategy is to go to the individual and then to the organization.”

The proposed CAC will now be made up of people like the Mayor; the President of the local fishing cooperative; the Director of the hospital, among other local “experts” as well as two or three “regular” citizens.

When asked about the CAC, the Executive Board Member stated:

“I don’t know what the best mechanism is, but I think it’s important to have some guidance from the community and participation from the community and I don’t know, that might be one way, we’ll see what happens with that. I think that could be one way but I don’t know how they’ll perceive that… but I think it’ll be interesting to have some kind of feedback from the community at some point. I think that will avoid
being isolated from the community. So I think whatever we can do to integrate the community would be good.”

The Program Manager described the CAC as an opportunity for GSC directors and researchers to get together with the local community to talk:

“about what they see as important. We know that there are a number of, a host of natural science topics that we think are important. We think we have some idea about some of the social science topics that we think are important. Now obviously the local folks are going to have thoughts about all of these things too. But that’s not necessarily an easy conversation to have. It’s also not something that’s easy to figure out how to sustain while maintaining realistic expectations. One of the challenges that we’re already facing is that we come at this from a science system approach…we identify these important scientific questions, try to hone them to where they’re really carefully put together and then to start looking for money to support work on them, that’s a long process. You start talking to people in the community who have a host of things that they’re concerned about and we think would like some help dealing with and they may not be aware of that long process. And that’s a really hard gap to bridge.”

That the GSC is making the CAC one of its priorities in its initial years of operation is noteworthy. However, it is also critical to explore what exactly such a mechanism would accomplish; the implications of the terms of engagement; and the shortcomings of the structure of membership.

First, although the majority of CAC members will be people in positions of power, there will likely be an internal power hierarchy that largely dictates the interactions that take place within that space. For example, as mentioned previously, the Mayor of San Cristóbal is one of the potential council members. As Davies (2011) notes, “While power is often hinted at in assessments of public engagement, it is rarely addressed directly.” (68) She examines power as expressed in the control of certain members of a group by other members and “how this control enables dominance.” (68) Davies asserts that we can conceptualize public engagement activities as spaces of conflict “but that this conflict tends not to be overt but is
expressed through participants’ continual struggle to take the floor.” (69) Such a framing is helpful to avoid the temptation of thinking of public councils merely as spaces of open and transparent dialogue. It will remain to be seen how internal power hierarchies materialize; that is, how frequently will certain people “take the floor?” This may be an especially important issue for the two or three citizens in the CAC that are not local leaders. Kerr et al (2007) and Davies (2009) have shown that laypeople are often complicit in maintaining expert-lay hierarchies in public engagement events, thereby conveniently normalizing certain power relations. GSC directors will have to critically assess whether or not everyone’s voice is given legitimacy or if the power relations that one sees outside of the CAC are merely being reproduced inside. Thus, it will be crucial to be transparent about the rules of engagement (Davies 2011) from the outset. At the same time, it can be said that because the majority of CAC members will be people in positions of power—albeit to varying degrees—there may be less likelihood for the Council to become a space in which the GSC simply communicates and promotes its own agendas. As Co-director 1 stated, “We have to be prepared to absorb criticism and reflect. And it has to be a way for the community to have a voice, raise questions from the community… If I lived in that community, and Gringos came in, I’d have a problem with that.”

Another issue with the council is that because most people in leadership positions in the Galápagos, including the GSC, are men, the CAC is likely to become a male-dominated space and process. Additionally, it is the case that the GSC wields much control in the CAC in that it is a non-voting committee and the Center chooses its members and reviews membership every two years. In short, the potential for the CAC to be a bottom-up mechanism is largely eclipsed by the implementation of multiple top-down approaches.
Three residents expressed skepticism about the GSC’s commitment to acknowledging local perspectives:

“No matter what they [the GSC] say about getting local feedback, it doesn’t matter what someone like me has to say. Nobody is going to give me an opportunity to speak, or listen if I make recommendations. I’ve worked in youth environmental education for decades now, but my opinion doesn’t count because I’m nothing, a nobody here. I have no real power.” (50M, construction and beach concession stand; emphasis my own)

I don’t know if they’ve convinced me that scientists see Galápagos differently than they used to. Do they really think that local people’s opinions matter or have they simply learned that it’s not ok to say otherwise? Scientists are smart, you know [laughs].” (41F, stationery store clerk)

The first resident’s comments speak to the critical question of whose voices count in the governance of science, not only in the Galápagos but everywhere. The second individual questions whether or not Galápagos scientists’ support for local participation is merely reflects their political savvy.

The third resident added:

“Most scientists probably think of us as uneducated, unable to understand even the most basic things. Without doubt, there’s a big knowledge gap between scientists and the rest of the population, especially here in the Galápagos….opening dialogue between scientists and residents seems like a real challenge. When I hear about the fishermen working with the Darwin Station, I wonder what those conversations are like. Who’s really in charge? Do those scientists really listen?” (40M, ex-fisher, dive boat captain)

I do not mean for these critiques to imply that spaces like the CAC should not be created, after all as Irwin (2006) notes, ‘…initiatives towards public engagement are usually minor and restricted by comparison with the bulk of scientific committees and institutional processes that remain largely insulated from shifts in governance philosophy.” (302); nor do I want to suggest that developing a mechanism like the CAC is an easy task. I have merely
tried to point out some of the issues that GSC directors could consider with respect to this Committee.

The CAC has the potential to offset or reduce the common mode of one-way communication from scientists to publics that numerous STS scholars (Jasanoff 1995; Wynne 2006; Davies 2008; Phillips 2011) have critiqued. It is also possible that with the Committee’s feedback, the Center will be better equipped to conduct research and develop educational programs that are relevant to local communities. In order for the CAC to be a successful initiative, it will also be necessary for council members from the community to be reflexive about their own limitations with respect to advancing dialogue.

5.3 What publics want

With regard to GSC outreach, residents mainly indicated that they would like to see the development of educational programming for adults and children; internship or research assistantship opportunities for local students; and a mechanism through which publics can obtain information about the Center’s education and research initiatives. A few adults also expressed their interest in contributing to GSC research.

5.3.1 Access

*The community is going to be satisfied with the building so long as they have access to it.* (personal communication, GNP official in Department of Environmental Education, San Cristóbal, July 6, 2011)

The theme that consistently emerged in talking about the ideal relationship between the Center and the town was access. As one interviewee explained, it is important for the Center not to “close themselves off from the town. The community should feel that they can enter, ask questions, get involved. And they shouldn’t impose anything on us.” (36F,
A few residents described the Center as having an image of inaccessibility, as a privileged site reserved for particular individuals. These perceptions were largely related to the physical appearance of the building:

“It’s easily the nicest building, and the most expensive, here. People see that and they think it looks professional, it looks formal. It doesn’t seem like they would allow normal people to enter.” (34M, carpenter)

“I worked on the construction crew for that building. I haven’t been in there since. I don’t think they’d invite someone like me in [laughs].” (23M, GNP security guard)

The Outreach Coordinator regularly emphasized the importance of making publics feel welcome at the Center, noting, “Even with the taxi drivers, I’m like, ‘do you want to come see it? Some time when you’re not working, these are my office hours, come. And it’s…really cool…I can show you around, if you want to bring your kids, perfect. Come see it.”

The Executive Board Member sympathized with community members’ historical feelings of exclusion from science, but also candidly noted that:

“Science is exclusive. I’m sorry but that’s the nature of it. Not everybody is a lawyer, not everybody is a physician… same as how you put a hospital here and you wouldn’t like to have everybody be a physician; that’s why you have experts. So some of that is inevitable. And scientists are going to publish in scientific journals, they are…Now we have to make an effort to try to communicate what we’re doing and having ways of translating, not only in the language sense, but in the sense of bringing science to the local people, but some of that exclusion will be inevitable…What I think is we can minimize that gap or try to close that gap by having newsletters or whatever where we tell the local people what we’re doing and all that. We can do some of that. Giving talks and all that…is welcome. But we cannot have local people walk into the labs at any time and see what’s going on.”

Echoing this sentiment, one resident stated: “They should make it [GSC] a space that we can use, even if we can’t use all of it. We wouldn’t expect the mayor’s office to let us go
into whatever office, so it’s the same, but since they’re trying to promote education and community, they should try to open their doors whenever possible.” (32F, telecommunications company)

In order to reduce the sense of distance between the town and the Center, many residents suggested that the GSC give regular tours:

“I think people often feel excluded or intimidated by those types of places, so it would be good to…invite people, explain what they do, let high school students get involved, etc.” (36F, BBQ stand)

“They should do more open houses and tours…For example, every 15 days, they invite students. And do open houses per sector: guides, fishers, artisans, and plan activities catered to these groups” (45F, university administrator)

The Outreach Coordinator explained that while it was necessary for the Center to enforce particular regulations around the use of space, they simultaneously wanted to cultivate relationships with communities that were neither overly rigid nor bureaucratic. She stated, “I mean, this community room [community classroom] here, the sport fishermen needed a place for a meeting one time and they had nowhere to go and they called me. I said I need the paperwork but otherwise it’s fine, throw it under my door. You know, we want people here.”

Two residents stressed the need to build trust:

“There needs to be trust between scientists at the Center and the rest of the town, especially with those who are going to work on the health system. But really, trust is key. I don’t want the Center to act as though they are trying to help the community if they are only interested in their own agenda. I think people here should feel that they can share information and that that information will be used to improve things, instead of against them.” (39F, restaurant owner and cook)

“The problem is that people here don’t believe in change anymore. NGOs and prior governments have promised a lot of things to fishermen and the artisans that never
came through. So the Center has to open dialogue and create trust. But they *really* have to talk and listen; otherwise it's better not to reach out at all.” (57F, gift and stationery store owner; emphasis my own)

5.3.2 Information

The majority of residents stated that an outreach priority was to keep communities informed about the GSC’s mission and vision:

“Many people don’t even know that the GSC exists. I know it’s new, but it would be good for the community to get to know the Center so that people recognize what they have on the island. If people don’t know about it, they have no way of evaluating its importance.” (39F, restaurant owner and cook)

“They need better communication to explain *why* they created the Center.” (48M, souvenir shop owner and clerk; emphasis my own)

Most residents also indicated that they would like to know what research projects were being developed at the Center. One individual explained that it was important to understand both the nature and purpose of particular research projects: “It would be good to know what kind of work scientists are doing and why. Who do they work with? What is their connection to local policy? Those things are very unclear.” (52F, hotel owner)

Several respondents identified the radio as the best way to keep the public informed:

“I think the key is to publicize and inform via radio. Not everybody has TV or internet, but almost everyone has radio or access to radio.” (39F, homemaker)

“I never walk there [the GSC], but I would be interested in hearing reports on the radio about what’s happening there.” (80M, clothing store owner and clerk)

5.3.3 Incorporating students

Various people recommended that they reach out to students who might be interested in getting involved with research projects:

“I heard that it was for scientists and students. I think it would be good to develop a strong relationship with local students, in high school and university. They don’t have
a lot of opportunities. It could be interesting for them to work with scientists, enter the labs, use the equipment, do projects. I think if the Center tries to connect with students, they will have good relations with the town in general because the students are our kids and grandkids. You know what I mean?” (37F, Government Council administrative assistant)

“I’ve talked to some people about the Center. People have asked me, ‘why is there a research center when the people from here can’t use the lab?’…My friends that study environmental management have never been in the labs…The Center needs to provide the community with more information about how to access the Center, what the requirements are. And the university [USfq] should create programs that are related to the labs, so that local students can use them, for example a marine biology program. We have a marine biology lab, but no marine biology program.” (24F, university student and administrator)

“They should train students in everything from biology to medicine to education. We automatically think about teaching people about conservation here because we’re a national park. But Galápagos is unique and the same as any other place. We need people to get trained, educated, give back to Galápagos. Galápagos can be all sorts of things. We don’t have to just push people to work in tourism, in the service sector. If we think this way, we’ll never advance, we’ll never change. It seems ironic that we have so many professionals, trained, qualified people here, but almost nobody from here. So then who do the local youth look up to? The gringo scientist.” (40M, municipal worker)

Though many people expressed their desire to see more academic and training opportunities for local students at the Center, two people referred to science as a professional dead end. According to them, encouraging students to get involved with the GSC and cultivating their interest in science seems ideal in theory, but they may be better off using their time to develop skills that will ultimately provide them with job security:

“My daughter…studied environmental management and wants to work in the GNP, CDRS or GSC but so far there hasn’t been an opportunity to do so. So there are jobs, but not in what she studied…So if somebody studies something scientific, great, but will they be able to do something with that degree? Will there be jobs related to what they study? Who will help them? Who’s the competition?” (45F university, administrator)
“My son wants to study. I know he’s interested in marine science. I want to support
him but I also want to tell him it’s not worth it. He’s going to study and then what?
Nobody is going to help him here. And if he’s going to end up doing whatever job,
then why waste time and money studying? I know it’s important to study, but I don’t
always see the use.” (40M, ex-fisherman, captain of diving boat)

Though thus far professional opportunities in the sciences have been sparse for
Galapagueños, S5 explained that circumstances are slowly changing, including the way
people view science:

“I think little by little people are starting to see science as a potential career.
Presently there are three or four Galapagueñan PhDs; I’m the only one from San
Cristóbal. From Santa Cruz, there are two or three: Carlos Valle, Hernán Vargas, and
another guy whose first name I can’t remember but his last name is Carrión. I was
told that he recently finished his PhD in Spain. So we’re slowly starting to form a
new group. Before it was difficult for Galapagueños to even study at the university
level. Now it’s different; almost everybody goes to university and they have the
option of studying in the Galápagos. And with the creation of different sources of
work that are associated with science, that makes science become a part of the
community, here in San Cristóbal and in Santa Cruz also...With the election of
President Correa in Ecuador, there has been an academic revolution…They now have
a government program called the Prometheus program, which sends students to get
their PhDs in other countries; they pay you a monthly stipend, health insurance, your
return ticket and they guarantee employment in your field upon your return. Before
that would have been impossible.”

The Executive Board Member stated that the Center should play a central role in
promoting local youth to pursue science as a career; the hope is that they will become the
future researchers and decision makers of the Galápagos:

“I said in my speech when I was inaugurating the center… I told them that I think that
if in 10 years this place is full of gringos and Quiteños doing science for gringos, we
will have failed as a center. I think that’s one measure we should have: in 10 years,
there …should be locals at every level [of the Center], not just cleaning the building.
We have to have locals as scientists and assistants… that’s one of the ways I would
measure the success of this place, to measure how effective we are in helping the
community. I don’t think the whole community is going to be a scientist, but if three,
four, five people can get PhDs in the next 10 years, and we can get them doing science and taking leadership roles here, that means we’ve done something.”

S5 agreed that the Center should support students in science-related endeavors:

“… science is a new option for youth. We have to try to teach them what it means to be a researcher and show them that in the Galápagos, unlike many other places in the world, they have the opportunity to use science in service of the place, to conserve the place and to enhance the well-being of the community. We have to incentivize not only university students, but high school students. As long as we can fortify the quality of the university, of our research center, the youth are going to have more options; this place is going to become more attractive to them than it is now. There are youth that are interested in collaborating. If we speak in terms of percentages, about 40% of the youth are really interested.”

Still, economic factors incentivize many Galapagueñan youth to pursue work unrelated to the sciences. Many people see that it will be more lucrative to work in an industry like tourism, or at a company of some sort. The 45F university administrator that spoke about a lack of science opportunities for her daughter simultaneously explained that, “…there are incentives to do other jobs as well. My daughter works in CNT28. She doesn’t do as much as me, but she makes more money.”

Co-director 2 expressed a degree of skepticism about the local youth’s level of motivation to pursue opportunities in science. In his experience as a researcher in both the Amazon and the Galápagos, he has observed that youth in the former are significantly more invested in taking advantage of opportunities in the sciences or carving out professional opportunities in general:

“Here in Galápagos, it has been difficult to get local students as research assistants…the students are often interested in tourism and they start working early. In the summer, I needed three local students for a project. So I put out an announcement and after a month, nobody had responded. I had said I would pay $100 for one month of work. One person finally came to me and said they could do

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28 CNT is an acronym for the Corporación Nacional de Telecomunicaciones, a public telecommunications company in Ecuador.
it. But I needed three students, so I had to raise the pay to $300 for a month and only then was there a lot of interested students…Here, I think the youth have a lot of opportunities, not in science, but in life. Maybe they’ve never left Galápagos but they have opportunities to work, to interact with people from all over the world. In the Amazon, on the other hand, opportunities are limited for youth, so an opportunity like the one I just described, they have to take it. And they put more effort into it. I always think that we’re in a difficult culture for engaging the community with science. And I didn’t realize that until I tried to do it.”

5.3.4 Incorporating institutions

One resident recommended that the GSC “include the rest of the local institutions. By working with institutions, they work with the town. They might also want to link up with neighborhood committees. Each neighborhood has a directing body. But they only meet for holidays, to organize for the celebration for the reinas [laughs]. They hardly ever meet to talk about problems in the neighborhood.” (54M, municipal official in urban and rural estates and property)

It is evident from exploring the publics’ appeals that the Center is heading in the right direction with various outreach and engagement initiatives. Still, whether or not publics will be satisfied with the Center does not rely solely on how well the Center is able to match up its services with residents’ desires. The GSC could provide all of the programs and opportunities that communities request, but there will always be dissenting voices based on political differences, misinformation, and/or perceived economic competition. A primary example is Eduardo Veliz, a prominent Galapagueñan politician in the 1980s and 1990s under then President Abdala Bucaram’s administration, who was eventually deported from the

29 Female high school and university students compete for the much sought-after title of Reina, or the Queen, in beauty pageants throughout Ecuador. Winners become figureheads and spokespersons for their communities.
country on charges of corruption. Veliz, who is now back in San Cristóbal, went on the radio to accuse the Center of taking genetic material from local species in order to clone them outside of the Galápagos. He also spread rumors that the Center was simultaneously a four-star hotel. Hotel and hostel owners were concerned about the possible competition from the GSC, so much so that Center directors were forced to put up a large sign in front of the GSC that read “No hay habitaciones” or “We do not rent rooms” in the first few months of operation. As a resident stated, “Some people from the Government Council went to the Center’s inauguration. We were worried that it was going to be another hotel.” 36M, messenger for Government Council. A 52M hotel owner and former politician, who attended the inauguration of the Center, toured the facilities and heard the Directors speak about the GSC’s mission and vision still expressed skepticism in his interview that the Center would be renting out rooms to visiting scientists and students.

Another concern that residents raised was whether or not the Center would be providing free wireless to the community. A 27F internet shop clerk stated, “We weren’t sure if they were going to have a computer lab with free internet. Can you imagine that? The internet at the Center would probably be faster and we, along with all of the other internet businesses, would lose money.”

In addition, it may be the case that certain goals become difficult to fulfill because some community members are not willing to put in the effort required of them. For example, when the Outreach Coordinator visited various high schools in 2012 to propose a free weekend workshop at the GSC dealing with topics like teaching methods, cultivating dynamic classrooms, course planning, and proper use of lab equipment, she was disappointed
to find that multiple principals rejected the idea because they did not want to work on the weekend. According to the Outreach Coordinator:

“Some of them were like Saturday? That’s going to be really hard; I mean, the law changed, and now we have to work 40 hours a week…One principal asked me, ‘well would it be just a couple of hours?’ and I was like, ‘probably all day Saturday and all day Sunday.’ And he responded, ‘I really think that’s too much.’ I told him I could talk to the teachers about what types of workshops would be most helpful for them and he still wouldn’t get on board. He told me to just come back another time…And at Humboldt [high school], the principal just asked me for things like microscopes…At another school, they told me, ‘we need markers, notebooks, we need two laptops and a projector.’ They just wanted us to give them things. They didn’t want to do any work to try to enhance the education in the school.”

These cases are an important reminder of the different ways in which the GSC is made to engage and negotiate with place, as it attempts to build up its education and research profile.

The last anecdote also demonstrates that communities should not be romanticized as consistently having the island’s best interests in mind. Furthermore, in order for the GSC to be able to offer beneficial outreach and engagement programs, the residents must also dedicate the time and energy to make them viable.

5.4 What publics want to know

“The first thing that strikes me is, what do they want? What do they want to know?” Co-director 1

Residents were asked to list the topics that they would most like GSC outreach programming to address. While a wide range of subjects were identified, responses also clustered around a few key areas: natural environment/flora and fauna (N=29):

“I’d like to know about species that we know little about; marine life, especially fish species.” (23M, GNP security guard)
“Talks about the variety of Galápagos flora and fauna, especially the endemic ones. I think it’s important for students to hear this information, to know what exists here, what they need to take care of.” (46M, teacher)

“Anything about the ecology; I like turtles.” (56F, homemaker)

“Plant and animal biology. It’s what the tourists most ask me about…. ” (62F, hostel owner and administrator)

That many residents chose flora and fauna as an area of interest is interesting in light of the fact that one of the principal historical complaints from local populations has been that Galápagos science has placed too much emphasis on flora and fauna. Of these 29 people, however, only five mentioned that Galápagos science could afford to pay less attention to animals and more to humans.

Water quality (N=17):

“How to improve the water.” (28M, taxi driver)

“Water. My daughter used to get sick every month, from three to ten years of age. She’d have diarrhea and fevers. She would also vomit often. My baby has also gotten sick because of the water.” (A 34F, stationery store clerk)

Conservation and management of (N=14):

“More than anything the species like the sea lions. In the [naval] base, we have sea lions, but nobody takes care of them.” (19M, naval officer)

“The ecological reserve. I’d like to know about what is projected for the future of the reserve.” (19F, hotel receptionist)

“About marine resources—how much longer will fishermen be able to fish?” (46F, homemaker; fisher’s wife)

Health (N=13):

“Public health and the health system. We have to improve the health system and we have to develop trust for those professionals working in health fields.” (39F restaurant owner and cook)

“Health, for example, the types of diseases that are associated with sea lions, associated with the water and issues of sanitation.” (33F, government official)
“Health and infants—to know what illnesses there are and their consequences.” 43F, fire station secretary.

Nutrition (N=12):

“Nutrition is very important. We don’t know what we ourselves are consuming…” (25F, convenience store clerk)

“How to eat so that one doesn’t get sick. Fat, cholesterol.” (34M, carpenter)

“Nutrition would be interesting for my four daughters who all work with kids.” (58F, municipal gardener and street food vendor)

Waste and pollution (N=7):

“Treatment of water from homes and businesses.” (42F, convenience store owner)

“Pollution in the ocean, contamination from tour boats. They always accuse us here on land of polluting…but who’s really contaminating more?” (50M, construction and beach concession stand)

“Wastewater management, so they don’t pollute the bay. Before you could swim in the bay…not anymore.” (57F stationary store owner)

Tourism (N=6):

“I’d attend a talk about sustainable tourism.” (30M, naturalist guide)

“I’d like to know more about tourism flows.” (43M, DVD and variety store owner and clerk)

One resident had a different interest in learning about tourism:

“How to increase tourism on this island.” (45M, dive shop owner and operator)

Interestingly, this individual was also one of the people that stated that he wanted to know more about conservation and management.

Other responses given by one or two people each included climate change; invasive species; population issues (migration; fertility; demography of the islands); sexually transmitted infections; youth issues (drugs, alcohol, teen pregnancy); the local economy;
development of local agriculture; formation of the islands; and disaster management and child psychology.

5.5 Why engage the public with science?

Center scientists shared their views about local knowledge needs, particularly with respect to why residents should be concerned with scientific information:

“In the case of the Galápagos people should understand that science is the most important tool that will help nature conservation... Local people must realize that nature conservation is the base of their local economy and wealth in the Galápagos.” (S1)

Despite S1’s confidence in science as “the most important tool” for Galapagueños, he also acknowledges that his statement is not self-evident. As he later explained, “If they understand it [science], it will be upon them to decide whether they want to learn more.”

Like S1, S3, and the Executive Board Member emphasized the need for residents to make a link between scientific research and their economic well-being:

“We have to be aware about how our environment responds to changes, particularly in places like Galápagos where people depend so closely on the status of the environment...on the health of the natural resources in Galápagos...” (S3)

“Science provides data to help to take the right decision and to maintain Galápagos as a unique place, where tourists come to see wilderness, wildlife and where people benefit from tourism without transforming Galápagos to Disneyworld.” (S4)

S2 focused more on the role that residents themselves could play in producing the scientific knowledge necessary to ensure effective environmental protection:

“People should engage with science in order to be able to contribute to successful environmental management...people must understand better the scientific importance of the islands in the international context, and must develop pride in their heritage. On the other hand, their contributions to science and increase of the knowledge base
would be greater if they understand how their own knowledge and experience contributes to science, management and sustainable living.”

The Executive Board Member cited the cultivation of critical thinking skills as the main reason to encourage people to engage with science:

“What I think they [residents] should be is critical and be engaged in kind of a critical way…I think people should be critical about what they’ve been told by the powerful. Kind of a Paolo Freire kind of an idea, where education should be to make people look at things in a critical way and not just buy things because somebody’s telling them about that. So I think in that sense, I believe in science for the people in this very specific sense of, not necessarily that they have to believe in evolution or whatever, but at least they have to be thinking about these things and engaging with them. They may not necessarily have to be doing experiments (laughs), you know?”

The Program Manager explained that a science-informed population was critical for building democratic societies. According to Irwin (1995), this rationale for the popularization of science has been one of the principal arguments for engaging public with science since the end of the Second World War. The Program Manager notes:

“I’d argue at length that just in general that it’s important to have a science-informed and science-educated populace to have a functioning society, or at least a well-functioning society. People are involved in places like the U.S. and Ecuador democratically in the governance of where they live and so a better informed populace, we think, we hope, is going to make better decisions, generally speaking. But then Galápagos is a special place, right? It’s uh, it’s ecologically unique and ecologically fragile and so having a better educated populace, specifically one that was strong with science education, we think, would allow them to better manage their place, their community where they live, we hope.”

Co-director 1 stated that Galápagos publics should engage with science in order to be able to understand the relationship between their actions and larger environmental changes:

“I think one of the things we need to have them understand is what people do in the Galápagos has environmental implications and the way that the environment is changing, whether it be through sea level rise or climate change or the changes in frequency or magnitude of El Niño events and La Niña events…create new
trajectories…They are not separate individual events and individual features; they are interwoven into a complex system where one element touches another in very interesting, complex ways and part of what we’re trying to indicate is that we’re living in an integrated, interdisciplinary world and the systems that are affecting their livelihoods as well as their ecological systems are all part of the same story…”

The Outreach Coordinator also talked about the need to communicate the interconnectedness of humans and the environment, but also cited personal security as a critical reason to provide scientific information to Galápagos publics:

“Here because of geographic circumstances, we need to be concerned about scientific information just in general, just for personal safety and well-being because you know, our world is much smaller and we’re much more detached…we have to be a little more technologically savvy, know about science because if something happens to all of the tour boats for example, we need to know a little bit about agriculture, a little bit about desalination, a little bit about this, a little bit about that…because anything could happen at any moment and we don’t have the services, you know, for a lot of stuff…”

Co-director 1 also discussed the necessity to clarify what science is for residents. Because of the historically intimate relationship between science and conservation, the two have been collapsed into one for many local people. Co-director 1 noted:

“Well I think sometimes in the local areas, science is viewed as an education, academic exercise. That’s where science is bound. It’s a laboratory, it’s a classroom and it doesn’t affect my life working in the highlands picking coffee or growing crops or bringing in travelers from United States or UK or Germany or whatever is part of international tourism arena. But of course, we believe it does.”

5.5 Imagined publics—scientists’ talk about publics

Several STS scholars (Irwin 2006; Davies et al. 2008; Barnes et al. 2012) have examined scientists’ imaginations of the public, in an effort to understand the principles and the assumptions underlying public engagement activities.
As GSC representatives talked about their outreach vision and programs, different conceptualizations of publics emerged with respect to the production and exchange of knowledge. As Irwin (2006) argues, “‘public talk’ (that is, talk both by and about the public) represents an important site for science and technology studies analysis.” (299)

5.5.1 Publics as recipients of knowledge.

“Traditionally, science is the active disseminator and the fountain of meaning and agency, the public are merely the passive receivers and repositories.” (Michael 1996, 109).

In this imagination, science is the bearer of knowledge, and an objective eye that is able to define the nature of things to publics. Co-director 1 notes:

“I think to many people science is something in the abstract. It’s not something that touches their lives. I think what we’re trying to do is show that science does touch their daily lives and that we can add through clarity of understanding and clarity of processes and clarity of patterns and clarity of how things integrate, uh, in very substantial ways, which would expand their idea about how the system in the Galápagos operates.”

Much of Co-director 1’s interview is science-centered, emphasizing it as the entity that provides a sense of clarity that is otherwise lacking. He also talks about educating communities in areas like conservation. S1 described science and society as “separated by a canyon deeper and wider than the canyon of the Colorado River.” S3 commented that they must “make people aware about the special place they live in and the kind of behavior they should have to live in harmony with the environment in Galápagos that is so fragile and so special.” S4 similarly asserted that “they [residents] should know what it means to live in a sensitive environment as Galápagos [sic] and take responsibility for their home and surroundings.” Residents are often framed as being the biggest threat to the environment. However, as Hennessy (2010) writes, scientists and international NGO employees “are
assumed to be appropriate environmental actors and their impact is rarely discussed, much less studied.” (37) Governor Torres’s distaste of the discourse of “educating residents” is a critical reminder that we must be cautious with regard to how we portray different people’s roles and impacts in the islands.

Co-director 1 also comments that the GSC wants “to find the areas where we have strong competency and they [residents] have high interest and see if we can find a way to collaborate together.” Scientists are thus described as having expertise while the community is framed as having curiosity. To be fair, this particular conversation was about addressing issues around water, sanitation and health, energy sources and associated pollution, which means that there is, in fact, a need and place for scientific expertise. At the same time, for some of these topics, the public is not merely a source of interest and curiosity but also of expertise as we will see in the next subsection. The following section will also illustrate that GSC representatives have multiple, simultaneous imaginations of the public.

5.5.2 Publics as bearers and producers of knowledge

Different epistemic communities may offer distinct yet equally valid forms of knowledge (Wynne 1996).

Interviews revealed that on the whole GSC respondents see San Cristóbal’s communities as more than passive recipients of scientific information. Most GSC representatives identified residents as important sources of knowledge in distinct ways. This view signals a different conceptualization of place wherein expertise is not merely situated in science.
Though the dominant paradigm in Co-director 1’s discussion emphasized the capacity of science to add clarity, explain, and enlighten, he also acknowledges local people’s knowledge:

“We care a lot about sustainability science questions and you will hear a lot of people in the Galápagos, whether they be taxi drivers, or anybody else, talking about, ‘this isn’t sustainable’ or ‘this is a vulnerable place’ or ‘fragile place.’ They might use very different words, but it evokes very intense conceptual understanding that is rooted in science and what we’re trying to do is provide the richer understanding of these important terms in the Galápagos because again, it’s not just for scientists talking about resiliency and sustainability, you hear that all of the time in the Galápagos.” (emphasis my own)

He continues:

“A number of people at USFQ are engaging the community for observational data. And that may be as simple as having local communities, people, students generally, count sea lions on the beach and do it every day for 30 days or every week for a whole year...And the community’s in a real position to do that. But I think communities can be used in other ways. There are oral testimonies...about historical life in the Galápagos and what that meant, and how it was changed as a consequence of either technology or accessibility and, or conservation programs and principles and so they have a wealth of stored knowledge of historical events...They also have observational data about animal populations or migrations, the nature of urban development...”

Co-director 1 concludes that the GSC can “use the community as part of the research or scientific set of assets that we can drive together.” (emphasis my own)

The Program Manager added:

“Who understands kind of the ground-level operations of the local economy better than the people who are doing it, right? And who understands kind of the day-to-day household challenges faced by families and their kids better than people who are living them. I think you could have a long list of areas where the people would be bringing so to speak, expert knowledge.”

Illustrating the Program Manager’s point, one resident stated:
“My daughter used to get sick every month, from three to ten years of age. She’d have diarrhea, vomit, fever. My baby has also gotten sick because of the water. Many of us know which water is ok and which water is bad. I know, for example, which neighborhoods have the worst water and which street vendors are selling juice that makes people sick. They’re obviously not using clean water.” (34F, stationery and gift shop clerk)

Several scientists credited publics with having valuable knowledge. S3 explained that “locals know a lot about their system, we should not patronize them, rather share with them experiences and points of view.”

The Executive Board Member added:

“I think the guides are very important…first of all…depending on the guide, they have some education of the Galápagos and they know about some of the scientific theories like evolution, they know about the animals, so I think we have to link more with the guides in different ways… I would like to see them more involved in the research actually, I think there are ways in which local guides can be involved: collecting data, analyzing data, they’re always traveling, we can give them GPSs, etc.”

The Outreach Coordinator identified various groups as local experts:

“… the fishermen, I mean, they really know the sea…The divers, the guides, I think they’re a reliable source of scientific information. I think there are plenty of people that in terms of the social aspect are the local experts. I mean, they remember when the boardwalk used to look like this. Or ‘oh, there were never sea lions in town, they were only in Loberia.’”

S5 similarly emphasized fishers’ knowledge, calling their livelihood a science:

“I think in the Galápagos, people do know about science, basic science. And then there are people, for example, the fishers that know a lot about their science…what they do is an art.” (emphasis my own)

S2 spoke about conductive collaborative research, citing fishers as a critical source of information:
“I must share scientific information and explain why I am doing what I’m doing, and will receive scientifically significant information in return. We have done this with fishery research, where much information comes from the fishermen themselves.”

S2 also notes that “Monitoring by guides is an important source of information.” In these scenarios, the scientist also becomes the public; non-scientist residents have information about various processes and phenomena that would be helpful for scientists.

S1, on the other hand, provided a bleak picture of residents’ knowledge base. He repeatedly emphasized how residents simply do not understand science and therefore “cannot appreciate it, cannot value it.” Furthermore, when talking about groups or individuals that could potentially contribute to scientific knowledge production, he explained: “Old colonos but by now almost everyone is dead! And the last few still alive are dying at a rate of three to five in the last ten years.” S1’s comments reflect the “deficit model” in traditional public understanding of science scholarship. It is implied that if residents could understand science and its “complicated messages”, they would necessarily appreciate it. Interviews with some CDRS scientists revealed similar perspectives; better communication of science is seen as the solution:

“The people don’t know about the good things that scientific knowledge has to offer. It’s our fault because we have been bad at communicating the information…” (personal communication, Santa Cruz, July 16, 2011).

“A big problem here is the level of education. The other issue is how effective you are in communicating complicated messages.” (personal communication, Santa Cruz, July 11, 2011)

Resident interviews importantly revealed that it is not always obvious who possesses specialized knowledge. A 34 year old homemaker explained:

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30 *Colonos* mainly refers to farming and fishing families who were in the islands before large-scale migration from the mainland occurred in the 1980s.
“Anybody who sees me would never imagine that I know something about science. I’m always in the doorway of my house, sweeping, selling vegetables and playing with my kids. I wear this thing [points to her house dress] all of the time. But I studied biochemistry in the university. I never finished my studies because I got married and had kids and we came here, but I know about labs, equipment, lab techniques. I’m really excited that there is a new science Center here because I love being in a lab. For me, it’s exciting and calming to be in a lab working on something.”

An 40M ex-fisher and current dive boat captain stated:

“I studied physics and math in Humboldt [high school]. I loved these subjects. I loved science. And I was good at it. But I couldn’t go on to study more for financial reasons. Back then, few people were able to continue on to university. But I know about science and I think I could have been a good scientist or maybe a science teacher. I’ll tell you one thing: nobody would think that I was good at science. They think all fishermen only know how to fish.”

5.6 Talk about publics by publics

5.6.1 Publics as partners

Approximately half of resident interviewees (N=52) saw potential for non-scientists to collaborate with scientists and contribute to the production and evaluation of scientific knowledge in the Galápagos—a simple diffusion of science, many argued, was not satisfactory. Various respondents talked about the importance of working with scientists in order to identify the most important issues in the islands:

“Often times, scientists are not from here, so they don’t know a lot about local problems. But they know about problems that are both local and globally important, for example, climate change or sustainable development…So I think we not only need to do a better job of sharing information about things like climate change, but also to ask people what other kinds of issues science can address. If you ask a homemaker what’s important, she will tell you something very different than what a foreign scientist or a guide like me would say.” (30M, naturalist guide)

One person identified homemakers as the people who:
“know best about what is needed here, what we need to know. They’re the ones that take care of the kids, that pay attention to education; they know how many times a month their kids have diarrhea because of the shitty water, literally, here [laughs].”
(40M, ex-fisher, dive boat captain)

Like the above resident, the majority of people in this camp underscored the significance of experiential knowledge:

“…my grandpa knows everything about fisheries and animals. Old people know a lot about this place.” (16F, high school student)

“We can talk about our concerns about medical attention, sicknesses that afflict us and our children.” (36F, owner and clerk of convenience store)

“The people here have life histories. Ask the fishermen what happened to certain marine species. Before they used to jump right off the pier here to catch them. Before there were so many sea cucumbers, not anymore.” (45M, souvenir shop owner on boardwalk)

Many of the interviewees in this group (N=23) named fishers as one of the most important sources of knowledge in the islands:

“If a scientist wants to know something about the ocean, a fisher can tell them. There are a lot of magnificent places underwater here and only the fishermen know about them.” (50M, construction and beach concession stand)

“The fishers. Maybe they’re not professionals, but they know about the sea.” (42F hostel and hardware store owner)

The above statement represents a view that emerged in various interviews—experiential knowledge as distinct from professional knowledge, which many residents described as information that is obtained through formal educational training.

One person, while acknowledging that fishers had valuable knowledge, also expressed distrust in the manner in which they applied it:

“They’re working and they don’t dedicate themselves to seeing if things are ok or not. They’re just making money.” 25F, convenience store clerk.
Various residents (N=18) named naturalist guides as a critical source of information for scientists, highlighting both their observational knowledge as well as their formal education:

“The guides are the ones that know the islands the best. They notice changes that nobody else would be able to notice.” (32F, telecommunications)

“The tour guides are a great source of information. A lot of them not only know about the place, but they have also studied biology.” (36M, messenger for Government Council)

Residents also acknowledged other sectors of Galápagos society as potential partners:

“Students. My friends that study environmental things, any of them would love to assist scientists. And then there are other students who are interested in marine biology or ecology. I think they would have enough knowledge to be field assistants.” (24F, university student and administrator)

“Normal people from here also know about agriculture, the plants. Local people know a lot. And obviously the GNP.” (27F, university student)

“It depends on what type of research is being done. If social science, everyone might be helpful. If marine bio, fishermen. You know, it can be a symbiotic relationship, giving and receiving information.” (29F, university administrator)

“Yes, the people that live here and work in institutions like the municipalities and the Government Council.” (43M, DVD and variety store owner and clerk)

“Farmers can be helpful. There’s space to grow things. We don’t have to import so many things, and wait years for things to arrive. Farmers and scientists can collaborate to work on this issue.” (60F, convenience store owner)

Two respondents located local knowledge specifically in older residents:

“I’ve been here for seven years but some have been here for 20 or more years and they’re the ones that really know what is needed locally.” (27F university student)

“I think the Galápagos resident lives in harmony with nature… I think we have a lot of people here that have had interesting experiences that could be of help to scientists. It’s always good to consult the people that have been here for a long time in order to enhance knowledge.” (52M, hotel owner and former politician)
HS: It’s interesting that you think the people here know how to take care of nature because the opposite view came up various times in other interviews.

“Listen, I’m going to differentiate; I don’t want to discriminate. The people who were born in Galápagos know how to live in harmony with nature but the resident that has come here for economic opportunities, he doesn’t have the same knowledge; he picks up the rock and throws it at the lizard, at the iguana. He hasn’t lived with nature since he was a child. We have conservation programs in the schools and they teach us that we have to take care of nature, so we were raised with that spirit, of taking care of nature. For this reason we’ll be the best guardians, the best park rangers in Galápagos.”

Both of these respondents believe that only long-time residents can speak for the Galápagos and are innately conservation-minded. Long-time residents, however, are often idealizing what is a relatively recent past rather than a longstanding tradition of preservation. As explained in Chapter 2, before the founding of the National Park, residents were permitted to hunt and consume species like the giant tortoise and sharks. Many long-time residents also fault newer residents for many of the problems that have emerged (Cairns 2011; Hennessy and McCleary 2011), thus calling into question what kinds of management or knowledge needs long-time residents would support. According to S5, it is the newer generations that are inherently conservationist:

“Galápagos is one of the few places in the world where the youth, since their adolescence, have an ecological sensibility; here the youth know a lot about ecological things, about conservation; they’re interested because they have that sensibility.”

5.6.2 Unsure about collaboration

A little less than one third of respondents (N=27) were uncertain about the potential for local contribution to science:
“Maybe. The population has to inform themselves about what we lack, what problems we have. But people are not very well educated so that’s tough. I don’t know if there are many groups here that could collaborate with scientists.” (30M naturalist guide)

“I don’t know. Maybe. But scientists’ knowledge is much more advanced than any local person’s.” (33F domestic worker)

“Maybe. It depends on the project. But I think the local capacity is still relatively low.” (40M, municipal worker)

5.6.3 Publics as scientific audience

About one tenth of respondents (N=11) indicated that local people did not have the capacity to contribute to scientific knowledge production. They often emphasized the lack of formal educational or technical preparation of non-scientist residents as a barrier to meaningful collaboration with scientists:

“There aren’t people here who have dedicated themselves to doing research.” (39M, car mechanic)

“I don’t think so. I think that’s why we need something like a research center. We need educated and prepared people to come and work on local issues.” (52M, convenience store owner)

“…there’s nobody in Ecuador that could help, there’s nothing. The gringuitos have to come; they have awakened us a bit.” (58F, municipal gardener, street food vendor) (emphasis my own).

Interestingly, at least half of the respondents expressed anxiety at some point about any kind of participatory science in the Galápagos, citing the overall divisiveness of the society as the primary obstacle:

“I don’t know. It might be less about knowledge and more about the difficulty of collaborating among people who think very differently about things. Everybody here thinks they know how things should be run. This is why we continue to have so many problems. It will require patience, modesty, trust, the capacity to listen…all of these
things are difficult, especially here…I don’t know why.” (25F, convenience store clerk)

“I don’t trust that people could work towards a common good. This society, and Ecuador in general, is really fragmented.” (28M, taxi driver)

“People here, we’re all from different places, we came at different times. I don’t think there’s a lot of unity with people here. We all do what we want and I think there would be a lot of conflict within the communities about research priorities.” (47F, shop clerk)

These comments show that it’s neither helpful nor realistic to think merely of a science-society divide, but also of schisms within groups. As Heylings and Bravo (2007) have highlighted, the human population in the islands is “recently arrived, fragmented and heterogeneous.” (206)

Taken as a whole, residents’ perspectives about the local knowledge base are revealing of the “boundary work” (Gieryn 1993) that they do. Some people believe that experience-based knowledge is a kind of expertise while others clearly indicated that expertise is something that can only be cultivated in formal educational settings. Collins and Evans (2002) have argued that the increasingly critical question regarding public expertise is that of extension. The scholars ask how far public participation in research and/or technical decision-making should extend, ultimately proposing that we create a normative theory of expertise, wherein different categories of expertise can be identified. Collins and Evans (2002) use Brian Wynne’s case study of Cumbrian sheep farmers after the radioactive fallout from the Chernobyl disaster to show that “the farmers have all the characteristics of core group experts in terms of experience in the ecology of hill sheep on (mildly radioactive) grassland, even though they had no formal qualifications.” (255)

5.7 Publics and scientific research
“I think it would be good for people to be able to come up with their own research questions, to say what they think would be useful knowledge. Then we can take a kind of vote based on people’s interest in particular topics. If everyone is saying we have to understand a particular kind of illness better, then I think it’s worth exploring that.” (62F hostel owner and administrator)

When asked about the possibility of giving publics a chance to weigh in on the direction of GSC and Galápagos research, Center scientists expressed varied points of view.

S1 and S4 vehemently opposed the idea:

“That is pure and stinky bull shit! Science is synonymous of freedom [sic]! Let scientists alone! Just let them to do what they love!..you would never know but sooner than later research that starts as pure/ basic science may have immense application and answer applied science. Support applied science but not at the cost of pure science.” (S1)

“No, science must be free from politics... People (including politicians and managers) are not educated and open enough to take the right decisions.” (S4) (emphasis in original)

Whereas S1 and S4 disagreed with allowing residents to provide input about research, for S2, public feedback was an “obvious” part of the research process:

“Obviously residents should be able to contribute with suggestions, which does not mean that they should have a right to prevent basic science or research which has the approval of the competent institutions and has adequately been scrutinized in terms of biosecurity and intellectual and biodiversity property rights.”

S3 echoed S2, stating, “In part yes… but that by no means should restrict the kind of science people could do in the islands.”

S5 expressed the most support for public participation in research:

“Unfortunately, before there weren’t many Galapagueños that had the academic training to develop research programs. But now, they’re getting training; now we have PhDs, people with Master’s degrees, and they’re students from here, so they should take advantage of local knowledge when thinking about research…”
A biologist based in a conservation NGO in Santa Cruz also supported the idea of a more inclusive, participatory approach to science and management. At the same time, he also expressed concern that the local population does not have the knowledge or the tools to participate in the first place:

“…applied research should begin with a process where not only scientists, but also the affected communities decide what kind of information and research is necessary. Now, this is a little complicated because the local population doesn’t necessarily know how to generate questions or articulate their needs. It’s complicated and requires some training.” (personal communication, Santa Cruz, July 16, 2011)

While opinions about the public evaluation of research were varied, three of the GSC scientists expressed concern about public opposition to “basic science.” However, as noted in the previous chapter, the majority of residents in this study supported all types of research and many specifically argued that the basic-applied distinction was not a reliable means of determining the significance of particular research projects.

5.8 Science for Galápagos?

“Well, I guess my question is, who is the Galápagos? Who is this Galápagos that they’re talking about when they say science for the Galápagos?” (Municipal official in Tourism Department, San Cristóbal Island, personal communication, July 6, 2011)

The various issues and benefits that both residents and scientists discussed in this chapter as well as in Chapter Four should be considered in developing a science for the Galápagos. Here, I share the specific definitions that interviewees provided. Residents identified ten principal themes regarding a science for the Galápagos. Science for the Galápagos (in order of importance, with the most important listed first):

- constantly produces new knowledge, especially with respect to the natural environment, emergency and risk; and knowledge integrating the social and natural aspects the Galápagos
• protects the island and improves pollution problems
• keeps publics informed about science research and provides publics with talks/new information
• improves local quality of life and gives priority to human beings or takes people into account more
• promotes conservation and development
• offers educational and professional training in the sciences and helps to inculcate new attitudes and habits by providing conservation education for community (an equal number of respondents gave each of these answers)
• improves science education in the islands
• incorporates local youth in science endeavors and provides role models for local youth
• promotes economic stability of local people

Again, it is clear through the various outreach and engagement activities that the GSC has done or is planning to do that they are fulfilling some of residents’ definitions of a science for the Galápagos.

Residents’ responses to this question also illustrated what they meant by Galápagos—that is, were they thinking about science for people, nature, or both? The greatest number of people talked about Galápagos as both people and nature:

“Science for both animals and humans because if you don’t take care of animals, it’s a chain. You keep destroying down the line. For example, if we consume, too much, too much, we’ll lose resources like lobsters and then what? We lose a source of food and work.” (16F, student)

“Everything is connected here, people and nature. So it doesn’t make sense to look at one or the other; it’s not possible to look at one or the other. Everything is integrated and we have to take care of each part and see how a change in one affects everything else. What value is there in having ecological health without human health?” (33F, Government Council member)

“A science that does an equal amount of natural and social research. Globally, Galápagos is known for its animals, but the human beings count too.” (42F hardware store and hostel co-owner)
A smaller number of people, though relatively comparable to the first category, were referring solely to people when they said Galápagos:

“Here they don’t really care about people, how we’re doing, our health. It’s true that it’s important to study animals and plants. But a science for the Galápagos should give priority to human beings.” (23F, administrative assistant for taxi cooperative) (emphasis my own)

“People talk about the presence of people here as a bad thing…But we’re here and we’re growing, so we have to take care of education and health.” (60F convenience store owner)

Those who said that science for Galápagos was for nature were in the minority by a large margin:

“I think it’s good to focus on the animals and plants, and more than anything the endemic ones. They [scientists] have to try to find solutions for the entrance of invasive species…These animals and plants were here long before we were, so we have a responsibility to protect them. Galápagos is a unique place in this world—it’s worth preserving that.” (23M, GNP security guard)

“It would reap benefits for the natural environment, but not something for social issues. We need to conserve the natural environment.” (29M, police officer)

HS: And why not for social issues?

“Because that’s not what this place is about…The government can take care of people; science should be focused on what Galápagos is about: nature, the flora and fauna.” (emphasis my own)

“A science that studies animals and habitats and the preservation of each one of them. We should protect animals because they are the real Galapagueños…Galápagos is Galápagos because of iguanas, sea lions, penguins. Otherwise what’s the difference from Quito?” (30F bank teller) (emphasis my own)

All of these respondents speak about a “real Galápagos” or the “real Galapaguenos,” lamenting the immense transformations that have occurred in the islands over the past several decades. A 24M taxi driver also prioritized nature, but not for nature’s sake:
“Science for Galápagos, hmm… hard question. Something that continues to preserve the flora and fauna for a long time to come. Tourists give me more work.” (24M, taxi driver)

GSC representatives had varied definitions of science for Galápagos. Co-director 1, the Program Manager, and S3 each talked about interdisciplinary and integrated science:

“I think now people are saying, the Galápagos is at risk, is in crisis… so it’s clear to anybody that’s wandering around there that there are some real challenges here and one can still go about the business of science and collecting data and writing journal articles and going through promotion and tenure and training of students… I think fundamental to our initiative has always been interdisciplinary science, around questions of community and social and ecological sustainability… and let’s not be too parochial here. It’s not only for the benefit of the Galápagos, it’s to benefit other environments around the world and other processes to which the Galápagos might be a perfect indicator of…” (Co-director 1)

“I would say that if we are doing science that either links or can be linked across the social, terrestrial, or marine environments as an integrated set, uh, then we are at least doing a much better job of doing science for the Galápagos because we’re kind of understanding the entirety of the systems there …” (Program Manager)

“I think priority should be given for research that could help preserve the Galápagos. But I think that freedom is also important when it comes to research. However, my best suggestion is to make it holistic, interdisciplinary so that all aspects are considered.” (S3)

The Outreach Coordinator touched upon many areas, principally science for personal well-being and for getting people to think more creatively and critically; the latter, she argues, will in turn contribute to one’s well-being:

“… there’s not one answer, but one part would be making your research accessible… doing permanent information for the people, what is important for health and well-being… I mean, I always go back to health because that’s my interest… But it would be everything… working with the guides… students shadowing scientists… And, I mean, why aren’t they having classes on the beach? The teachers take them there to play, but why aren’t they taking them out, getting them in a circle and doing cool beach stuff? And kids… why aren’t they the little experts?… So science for the Galápagos, I think it’s too big of a question, but it could mean all of those things… I think the important thing about research… is organizing information
and I feel like it’s a fundamental…it’s that sense of wonder, that’s really important that a lot of people don’t have because they haven’t been allowed and they haven’t been exposed to that. It’s starting to change in the education systems supposedly…to have more critical thinking. Because right now it’s a lot of, you’re wrong unless you just regurgitate what the teacher said…I think it’s a matter of organizing information and asking what is that, why does that happen and if you start to have that kind of mentality it’s going to help you in a lot of things, even in your personal life. So yeah, again, I think all of these things can be part of science for Galápagos.” (emphasis in original)

The Executive Board Member emphasized science for advancing knowledge and like the Outreach Coordinator, for improving human well-being:

“I think science has to have several roles in the Galápagos. I think it’s important to have science, and even for the people, it’s very important to have science for science sake in the Galápagos…I think nobody has done more for Galápagos than Charles Darwin. I don’t think that there’s anybody living in the islands today that hasn’t benefitted from Charles Darwin’s visit. So I think it’s naïve to say we don’t need certain types of science, we don’t need pure science…I think we also need, like everywhere else…we need science applied to the benefit of the people because we need microbiologists talking about water quality. We need people doing dengue studies. We need people doing AIDS studies…so I don’t think I have one answer for this question.”

S4 focused mainly on the health of ecosystems and wildlife:

“Science for Galápagos should focus on the actual problems that come with the growing human population, increased risk of introduced species and pathogens, just as the human attitude towards ecosystems and wildlife. At the same time monitoring on wildlife population, health assessment and resource management for commercial species need to be improved and sustained by independent research.”

S5, a native of San Cristóbal echoed residents’ sentiments about the importance of circulating knowledge locally:

“They do science in Galápagos, but it doesn’t stay in Galápagos. Studies, theses, information, they don’t stay in Galápagos. I think people have to share their research; otherwise it goes somewhere like the library at UNC and nobody here is going to know what happened or what you said. So for me, that’s science in and for the Galápagos.” (emphasis my own)
S2 maintained that all the science that has taken place in the Galápagos has always been for the archipelago, for its wildlife, and in turn, for human populations:

“All of the research done by CDF over the years has been science for the Galápagos. Any type of research into biodiversity of taxonomic groups, which for some might seem to be science in the Galápagos, finally have led to better knowledge about conservation priorities, etc. Some of this research, for example, without wanting it, has shown that wildlife populations have been very resilient to visitor presence, which then permitted for tourism to grow into the basic support for the local economy, including for any additional migrants (another topic is whether this has been beneficial for the islands).”

GSC scientists gave varied responses for this question, illustrating the diversity of ideas within the Center.

The five CDRS scientists emphasized science for conservation and environmental management, which is unsurprising considering the research station’s role as the scientific and technical advisor for the GNP. A visiting scientist in Santa Cruz with many years of research experience in the Galápagos also stressed environmental protection, but also discussed the importance of addressing social and socio-environmental needs.

One of the CDRS scientists noted that, “Personally, I’m interested in conserving the islands for the species, not for tourism or for the people. I don’t agree with conserving for tourism, in other words for economic ends. I collect information that can inform management.” (personal communication, July 15, 2011). For this scientist, the purpose of scientific work in the Galápagos should strictly be to inform environmental management; science and conservation work that supports tourism is deemed less valid and even unacceptable. She maintains that people should not be benefiting economically from science and conservation work. Yet, her position fails to reflect on the fact that science and
conservation are themselves a multimillion dollar industry in the Galápagos as well as in many other parts of the world. As one of her colleagues stated, “Science is hugely important, but it’s also another business in Galápagos.” (personal communication, July 11, 2011)

In addition to framing a science for the Galápagos as science for management, four out of the five CDRS scientists also stated that a science for Galápagos was one that promoted science for science’s sake. One stated that “Science for the Galápagos means an applied knowledge but also knowledge for knowledge’s sake is hugely important…there’s a remarkable opportunity to understand, to investigate, to discover.” (personal communication, Santa Cruz, July 11, 2011) Another added, “Science is exciting, it’s fun. There’s no limit to what you can learn through scientific inquiry.” (personal communication, July 15, 2011) Thus not only is there a utility to science, but also a kind of wonder.

The visiting scientist cited above, however, disagreed completely, stating, “For me science for science’s sake is a waste of time, of funding, of opportunities… with the world being as it is…” (personal communication, July 18, 2011)

Not surprisingly, local authorities have a different perspective on the meaning of science for the Galápagos, one that focuses directly on the local population. One Park official from the Department of Environmental Education, noted, “Science for the Galápagos means collecting and verifying data that can be beneficial for local communities and that can also conserve the islands.” (personal communication, San Cristóbal, July 6, 2011) He described the Park’s “Social Component” project, which is principally targeted at adults. A past program under this project entailed working with transportation workers to increase
awareness around bird fatalities resulting from collisions with fast-moving vehicles. He noted:

For example, our campaign for the protection of birds…it’s social…I’m talking about the birds that you find along the road that connects Puerto Baquerizo Moreno and Puerto Chino. A lot of birds die because of taxi and bus drivers. Birds die because cars crash into them, they drive too fast. It's (the campaign) social because tourists come to see birds and if there aren't any birds, tourists aren't going to come. (personal communication, San Cristóbal, July 6, 2011)

Another GNP official from the Department of Environmental Education, similarly emphasized the importance of working with various sectors of the population. He described the main responsibilities of his department as “working with NGOs to reduce human impact in protected areas” (personal communication, San Cristóbal, July 6, 2011) and disseminating information collected from scientists with different local audiences. The official also explained that he would like to work closely with more scientists and educators to design more stimulating science and environmental education programming. Additionally, he discussed the importance of providing opportunities for local people to engage with science and conservation issues.

Governor Torres described science for the Galápagos as a science that “helps the local population to develop sustainably…that works with them, offers educational opportunities, offers technical support and education.” (personal communication, June 30, 2011). The governor is concerned with what science can offer the local population, and specifically in the form of education and technical training. He lamented the lack of interaction and exchange between scientists and the local population, explaining, “There's no justification for forgetting the community.” (personal communication, June 30, 2011)

Clearly there exists a gap between what the public sector and the science sector understand to
be a science for the Galápagos. It would be too simplistic and unfair to say that scientists do not care about people and that public officials do since the latter have been explicitly charged with serving the public. What is more, if public officials want scientists to work more closely with the local population and include them in more decision making processes, they, along with academic and funding institutions, must be willing to work with scientists to create the infrastructure, resources, and support needed to do so.
CHAPTER 6: CONCLUSION

6.1 Science, Place and Publics

In *Putting Science in its Place*, Livingstone asserts that “science is not above culture; it is part of culture. Science does not transcend our particularities; it discloses them. Science is not a disembodied entity; it is incarnated in human beings.” (180) Throughout this thesis, I attempted to illustrate how science, its histories, geographies and practices are necessarily embodied and embedded in culture. Drawing on the case study of the GSC and its emerging relationships with San Cristóbal publics, this research sought to: 1.) provide an initial assessment of GSC public outreach and engagement initiatives and offer suggestions based on this evaluation and 2.) utilize this preliminary assessment to explore the broader question, “What is a science for the Galápagos?”

In Chapter Two, I provided an overview of the various understandings and uses of place in the Galápagos since its discovery in the 16th century. I highlighted twentieth century science’s shaping of the Galápagos as a natural laboratory and a site in need of robust scientific monitoring for conservation purposes as a critical moment in the concretization of place-identity in the islands. I also addressed the science-society conflicts that eventually arose in the 1990s and 2000s around competing visions over place and how these conflicts as well as local critiques about the dearth of socially relevant science, eventually came to impact the importance given to public outreach and engagement activities at the GSC. In describing these discursive and material interactions, I highlighted both the co-constitutive
nature of science and place in the Galápagos and the different conceptions of science for Galápagos that have existed over time.

Chapter Three outlined the theoretical landscape of this research. I described the two key areas with which this thesis engages: Geographies of Science and Critical Public Understanding of Science. The former broadly examines the ways in which science has its own geographies and how particular geographies (places, contexts, regions) structure scientific knowledge and practice in specific ways. In addition to highlighting the co-constitution of science and place, this thesis conceptualized the GSC’s emerging outreach and public engagement initiatives each as their own geography of science as they imply the formation of particular epistemic and physical spaces. In Chapter Three I also introduced various issues raised in Critical Public Understanding of Science scholarship—imaginations of publics; critiques of science popularization and engagement methods; the democratization of science—to highlight the multiple lenses through which I evaluated the possibilities and limitations of GSC outreach. I argued that these issues should be considered in enhancing existing conceptions of science for Galápagos. Finally in Chapter Three, I underscored the centrality of Doreen Massey’s idea of place as process and spatio-temporal event to my engagement with Geographies of Science and cPUS scholarship. In short, throughout this thesis, I turn to Massey’s imaginations of place to promote an inclusionary geography and politics of science and knowledge production in the Galápagos.

In Chapter Four, I focused on residents’ understandings of science in order to contribute to the GSC’s understanding of the public. While various responses arose in residents interviews—all of which are valuable in their own right—for the purposes of remaining concise, here I summarize the viewpoints that the majority of residents expressed.
Most residents defined science as research; learning; or discovery. The bulk of these interviewees described science as a way of learning for the sake of learning while others discussed science in more pragmatic ways, as knowledge that could be used to address problems or make decisions. Overall, residents saw science as a social good. Many people discussed science as supporting a linear trajectory of social progress and advancement. The majority of residents also stated that science remained important in their daily lives because it served as fundamental knowledge; it helped them, they explained, to understand life and the world. Interestingly, conversations with various scientists revealed that they perceived residents as seeing a connection between science and their daily lives mainly through the enforcement of restrictions on their livelihoods. These scientists’ views are not entirely wrong, as one will often hear residents—and fishers in particular—talk about the constraints that science has put on them. As noted in an earlier section, one ex-fisher discussed how in the past scientists have collected information from them, which was eventually communicated back to the Park and resulted in sanctions and/or changes in regulations.

Most residents also stated that they supported science research of every kind in the Galápagos, though ideally, the local research agenda would address urgent human concerns like water quality, sanitation and health. This finding builds on the information collected by Quiroga and Ospina (2009) in their survey of residents in San Cristóbal, Santa Cruz and Isabela Islands. The authors similarly found that people felt that more science research should take place in the Galápagos. They also listed research priorities as outlined by residents, all of which—with the exception of one, island geology—were topics with a social focus; the top five included impact of migration; health and sanitation; impact of tourism; impact of human population; impact of climate change. In my interviews, however, I found
that people did not only want to see more research that would directly address local issues. Rather, they highlighted the importance of information of all types and the value of science for science’s sake; various people identified the provision of information itself as a social benefit of research. What’s more, they expressed that research could not be easily identified as either applied or basic, though they did not specifically employ those terms. Many people stated that information that seems to be irrelevant to the social realm could later become highly relevant. I do not necessarily see these viewpoints as contradictory. Residents want to see more socially relevant science, but for the most part, they do not view this as a responsibility of scientists. Furthermore, this finding had important implications for Santander et al.’s call to curtail science research that catered to academic needs. That is, residents expressed interest in learning for learning sake especially since many of them had missed opportunities to study in formal educational settings. To re-quote one resident, “Many people from my generation weren’t able to finish even the most basic levels of education. So whatever kind of talk that a scientist gives is an opportunity. For me, this is a beautiful and unique thing; it’s like free education.” (61F, street food vendor)

Chapter Five dealt specifically with GSC science and outreach and the San Cristóbal public. While many issues emerged in resident interviews, the most salient concern was access, both with respect to scientific information gathered in GSC projects as well as to the mission, goals, and operations of the Center. Students wanted access to more information for educational and research purposes; parents wanted access in order to enhance science education in the islands; and the population in general wished to have more information to be connected to the new Center. They also saw the dissemination of information as a particularly critical opportunity for everyone, especially to know more about the place where
they live; less than a third of residents have traveled to other parts of the archipelago. (Eliecer Cruz, Director of World Wildlife Fund Galápagos, Former Governor of Galápagos Province and National Park Director, Santa Cruz Island, personal communication, July 15, 2011). At the same time, I argued that residents have a wealth of knowledge about island history; livelihoods; health; and social dynamics, thereby making them important sources of information about the Galápagos.

GSC representatives consistently referenced their desire to improve human well-being through their science outreach, education and research efforts and to have a culture of inclusivity and collaboration with community residents at the Center. A subject that both directors emphasized was an institutional position of neutrality. I argued that with the authority granted to scientific knowledge in the Galápagos; Co-director 1’s comments about shaping residents’ outlooks; as well as the management structure of the Center—appointing scientists with extremist positions about science and conservation into positions of leadership—that neutrality was unlikely. I also highlighted the fact that director’s messages about neutrality revealed some important inconsistencies; individual perspectives about avoiding the promotion of particular attitudes about conservation, for example, did not coincide with what was being communicated on the institutional level. As the Center is new and still negotiating their identity and long-term visions, such inconsistencies are to be expected. Nonetheless, I contended that rather than one of neutrality, the Center may benefit from having a policy of reflexivity, in which issues such as expertise and power remain central to their continued process of self-evaluation. This is certainly easy in theory, but highly complex in practice. Still, it is worth challenging taken-for-granted assumptions
underlying the practices and philosophies of the Center. A critical examination of the goals and participatory methods of the CAC, for example, is an appropriate place to start.

I also described some of the outreach and engagement initiatives currently emerging from the GSC, each of which I conceptualized as its own geography of science, as they involved the carving out or renewal of different intellectual, collaborative and educational spaces. In general, the initiatives seemed to have great potential in training and collaborating with residents. In the Center’s “community classroom,” the GSC had held workshops for naturalist guides, providing them with the most up-to-date information about biology, evolution, geography, and other topics that would help them in their professional lives. The GSC also hopes to collaborate with local institutions, allowing them to use the Center facilities for their own projects and training them in different skills such as Geographic Information Systems Science. In addition, the Center is reviving old initiatives such as a science and conservation fair that involves students of all grade levels through high school from the island; students enter original projects regarding a science or conservation topic. I maintained that opportunities such as these are crucial, as local schools often emphasize rote learning over creative and critical thinking. The GSC is currently working with students from the mainland as well as from Galápagos to promote more collaboration between students and scientists; students are encouraged to be research assistants and interns whenever opportunities are available. With many youth turning to tourism or service sector jobs, these collaborative initiatives could change the way local youth look at science. Whereas science has predominantly been seen as an activity carried out by foreigners, it may increasingly come to be seen as an endeavor that is accessible to Galapagueñan youth. As the Executive Board Member stated at the GSC’s inaugural ceremony, ideally current Center
managers will see a growing number of local people take on positions of leadership within
the GSC, directing research and education programs. The Center would also like to develop
a Citizen Science program, which can be a mutually beneficial initiative, as people interested
in doing more fieldwork (e.g. naturalist guides) can gain more experience and the GSC can
gather data from places that are remote—and therefore expensive to access—in the
archipelago. I also described the Community Advisory Committee (CAC) that is currently
being formed at the GSC. The CAC will in large part be comprised of people in positions of
power. I argued that the challenge will be to negotiate the internal power hierarchies,
especially with respect to the “regular” citizen members who are not in positions of
leadership. I also expressed concern for the membership in terms of gender inequalities.
Because many people in leadership roles in the Galápagos are men, the membership is also
male-dominated. As such, I contended that the CAC faced the risk of replicating what exists
outside of the Committee rather than offering a novel participatory space. What is more, I
argued that the non-voting nature of the committee as well as the fact that its members are
chosen by the GSC posed natural limitations to the extent to which the GSC could be a
bottom-up process. Nevertheless, I maintained that these critiques should by no means be
taken as an argument against developing the CAC, but rather as a means through which to
facilitate critical discussions about its structure and governance.

In asking what types of information they wished to access via GSC outreach,
residents named five principal areas including information about flora and fauna; water
quality; conservation and management; health; and nutrition. GSC representatives identified
various areas about which they felt residents should know more, including the importance of
science and conservation as residents’ way of preserving their livelihoods; science as a way
to make more informed decisions and cultivate critical thinking; how their own knowledge
could contribute to environmental management; science for their own safety and well-being
in a remote setting; the impact of environmental change on the health of local resources; and
the environmental implications of human activities in the Galápagos.

In examining scientists’ imaginations of the public, I found that most GSC
representatives envisioned residents not only as recipients of knowledge, but as producers of
knowledge. One GSC scientist, however, had no confidence in local residents’ ability to
contribute to scientific knowledge production. A little over half of resident interviewees also
saw the resident population as a source of expert knowledge, particularly fishers and
naturalist guides.

In talking to GSC scientists about the potential for residents to help guide the
direction of Galápagos research, the majority of them said that residents should have some
kind of say; two scientists were adamantly opposed stating that science should be “free of
politics.” Various scientists expressed concern about residents curbing “basic science.”
However, as mentioned above, residents were in favor of all types of research, whether or not
a practical application could be immediately identified.

In discussing a science for the Galápagos, residents cited ten principal definitions:
regularly produces new knowledge, especially with respect to the natural environment, to
emergency and risk, and knowledge integrating the social and natural aspects the Galápagos;
protects the island and improves pollution problems; keeps publics informed about science
research and provides publics with talks/new information; improves local quality of life and
gives priority to human beings or takes people into account more; promotes conservation and
development; offers educational and professional training in the sciences; helps to inculcate new attitudes and habits by providing conservation education for community; improves science education in the islands; incorporates local youth in science endeavors and provides role models for local youth; promotes economic stability of local people. It should be noted that the GSC is already doing or planning to do a number of things that will address various items on this list. As such they are offering opportunities for meaningful engagement with science, an undertaking that should not be underestimated. Nonetheless, the long-term results of their outreach and engagement endeavors are yet to be seen and should be evaluated in several years.

Scientists talked about a few key areas with regard to a science for Galápagos. Co-director 1, the Program Manager and S3 called for an interdisciplinary science that integrates information across different systems (terrestrial, marine, human). The Outreach Coordinator discussed various factors. She identified the dissemination of information as a priority. She also spoke about working with different social groups and improving science education and opportunities for students. According to her, the local youth should be the experts of the islands. The Executive Board Member stressed the need for conducting all types of science research and avoiding what he sees as the artificial separation of pure and applied science. S4 emphasized human impact in the islands and also promote robust monitoring of commercial species (i.e. fisheries). Like residents, S5 called for a science for Galápagos that would ensure the local circulation of scientific knowledge. S2 argued that the CDF’s research about local species over the years has always been a science for the Galápagos in the sense that it helped to illustrate the resilience of Galápagos fauna, thereby allowing people to justify the growth of their economic base, tourism.
The five CDRS scientist respondents emphasized science for conservation and environmental management as a science for Galápagos. A visiting scientist with various years of research experience in the archipelago also emphasized the importance of managing social and socio-environmental issues in addition to environmental problems. Four out of the five CDRS scientists also stated that a science for the islands was one that promoted science for science’s sake. The visiting scientist cited here, however, disagreed completely, calling science for science’s sake a “waste of time, of funding, of opportunities…” (personal communication, July 18, 2011)

Not surprisingly, local authorities had a different perspective on the meaning of science for the Galápagos, one that focuses directly on the local population. An official in the GNP Department of Environmental Education described a conservation program, which targeted the killing of birds by taxis and other vehicles, stating that in addition to protecting the birds, the aim was to preserve people’s livelihoods—without birds, tourism would decrease, diminishing the client base for taxi drivers and for people in many different areas of tourism.

Another GNP official from the Department of Environmental Education emphasized the importance of working with various sectors of the population and circulating data collected from scientists with different local audiences.

Governor Torres described science for the Galápagos as a science that promotes the sustainable development of local populations; offers educational opportunities for local people and provides technical support for local issues. I argued that it would be unfair to say that public officials cared more about local residents than scientists since officials have been
explicitly charged with serving the public. Furthermore, I maintained that if public officials want scientists to work more closely with the local population and implement participatory decision-making mechanisms, they, along with academic and funding institutions, must be willing to support scientists with the necessary infrastructure and resources to do so.

6.2 Towards a science for Galápagos 2.0?

By now, it is evident that there is a diverse array of conceptualizations of a science for the Galápagos as well as numerous concerns that can be considered in developing it. On the whole, interviews revealed that GSC representatives are open to listening to residents’ views and recognize that the public is far from a homogeneous entity. Of all of the GSC respondents, however, Co-director 2 provided the most in depth discussion about the need to acknowledge and negotiate different viewpoints. He noted:

“We’re [the GSC] like a small Tower of Babel. There are so many different ideas, politics, visions, modes of seeing the world, modes of seeing the Galápagos in this space…We have to communicate this to residents and also ensure that they are involved in the process of negotiating this diversity; it’s something really basic.”

When asked about a science for Galápagos, he responded:

“It’s really about creating a model for how things should function, not just science. It’s about establishing new relations. This [GSC] is an experiment where science is perhaps merely the excuse for creating new relations between different cultures, different types of students, different types of researchers, different types of communities.” (emphasis my own)

Co-director 2 also talked about scientists’ own transformation in the process of forging new social and epistemic relationships:

“It’s not about supporting a single sector like conservation or tourism or some other part of the community…And we have to transform ourselves….we don’t want to be the typical scientist, which is difficult because we have those kinds of scientists working here, and there
are always going to be those kinds of scientists but our philosophy is that whatever comes from the Park, from communities, from ‘illegal’ fishers, that has to transform us.”

The “typical scientist,” according to Co-director 2, is a scientist that sees the public as mere recipients of knowledge rather than valuable partners in producing knowledge. When asked what he meant by transformation, he explained that it signified that scientists not only inform, but learn from the sectors with which they work, and that scientists learn to understand other people’s needs and concerns. Co-director 2 added, “We don’t have a specific vision or strategy outlined about what’s going to happen in the next five years; we don’t want to be a typical center in that way.”

Co-director 2’s discussions around science for Galápagos emphasize the importance of engaging with multiple perspectives in one place—“establishing new relations” as he put it—be it at the Center, San Cristóbal, or the Galápagos as a whole. His statements invoke Masseyan ideas of place that should remain, I argue, at the center of conceptualizations of a science for Galápagos.

A progressive science for the Galápagos, I maintain, would be a place-based science that takes place as process. It is not, in other words, a science that is tied to any singular or static understanding of—or vision for—the Galápagos, but instead is open to negotiating the “coming together of the previously unrelated.” (Massey 2005, 141) That there exist multiple ideas and concerns should thus be seen as an opportunity for open debate about the production of knowledge rather than for the premature suppression of diverse voices. As one resident stated, “The same people can’t decide what the priorities [for science for Galápagos] are. Simple people like me also have an opinion.” (58F municipal gardener and street food vendor) Because the point of departure denies any a priori notions of a coherent vision of—
or for—place, there can be novel political possibilities for constructing an inclusive and flexible science for the Galápagos. A science for Galápagos as proposed here allows us to incorporate what was learned from the case of the GSC and its publics without foregoing the possibility for continued input, debate and modification not only in San Cristóbal, but in the other inhabited islands in the archipelago. This implies, however, that scientists and residents must be willing to “confront the challenge of the negotiation of multiplicity,” between, among, and within groups. (Massey 2005, 141) To do so would be no small accomplishment. As Co-director 2 put it, “Writing papers, coming up with ideas, that’s the easy part of science. It’s all of the other things, like listening to, understanding and learning with communities, that’s difficult.”

6.3 Science for Galápagos: Lessons learned from the GSC

In the following, I list some suggestions for the GSC as well as other scientific institutions with respect to building a science for the archipelago:

- While ideas like inclusion, participation, engagement and collaboration can theoretically lead to fruitful interactions between science and society, in practice, they are often interpreted differently by different people and can potentially diminish the quality of interactions. Therefore, it is important to define and communicate what exactly is meant by these terms.

- As a few residents suggested, it would be valuable to promote place-based education in the Galápagos. However, so as not to prioritize a traditional scientific vision of the Galápagos, in addition to addressing the natural environment; ecological health and processes; and local flora and fauna, outreach efforts should encourage residents to articulate what kind of place Galápagos is for them.

- Community education efforts such as workshops for naturalist guides are an important outreach initiative. Currently, Galapágos tours offer little information about the social realm of the islands. Thus, in addition to providing guides with information about evolution, ecology, geography and geology, workshops should also
cover social issues. As such guides and tourists could be provided with a more well-rounded understanding of the Galápagos.

- Spaces like the Community Advisory Committee are potentially important for conversing with residents about science, research, education and outreach. However, as it stands now, the suggested members of the CAC are predominantly male. It is imperative to find ways to involve more females on the Committee. Furthermore, it will be important to create and communicate the particular terms of engagement for this space so as to allow different members to voice their opinions. Whether or not members respect these terms should be taken into consideration when renewing membership to these kinds of participatory committees.

- The majority of both residents and GSC representatives saw local knowledge capacity in both scientists and residents, highlighting the potential for productive collaborations between science and society in San Cristóbal. It should not, however, be taken as self-evident where knowledge is located as was demonstrated by the 34F homemaker who talked about her knowledge of chemistry and laboratory work and the 40M ex-fisher who discussed his aptitude in physics and math (see pp.132-133).

- Spaces that already exist—such as the neighborhood councils in each neighborhood— should be considered as venues to communicate the goals and objectives of institutions like the GSC and to receive feedback from residents.

- What residents most emphasized in their interviews was access, both to scientific information in the islands and the Center. The GSC eventually plans to create a digital library that is accessible to residents. However, in the meantime, it would be beneficial to either keep updated information about GSC research on the Center website or to circulate a GSC newsletter. Other institutions should do the same and also try to coordinate data management across institutions. Furthermore, as one resident suggested, regular open houses for different sectors of society would ensure that residents are given the opportunity to witness and learn about the operations and functions of scientific institutions.

- Neither scientists nor residents should undervalue science that does not appear to have an immediate human application, especially in a place like Galápagos where many people, especially of older generations, have had little opportunity to study beyond elementary or middle school. Availability of and access to all types of information is a privilege that should not be denied to people who have already been marginalized with respect to formal educational training. We must also consider the benefits of having diverse types of research for younger generations of Galápagueños.
Building a science for Galápagos requires a spirit of collaboration from everyone. Residents’ observations of the fragmented nature of Galapaguenan society cannot be taken lightly and will pose great challenges for collective action. Thus—as has been argued throughout—it would be ill-advised to impose a singular place-identity for the Galápagos and by extension a science that is tied to that narrow understanding of the archipelago.

Residents should not expect a one-way flow of benefits from science to society and scientists should—whenever possible—promote two-way communication in their interactions with publics. The latter could be facilitated through the physical arrangement of spaces (circular or semi-circular seating rather than traditional classroom setups; breaking up into small discussion groups); approaching public meetings with a general agenda while also allowing questions and concerns to arise organically; making informational talks interactive by leaving space for publics to contribute their own knowledge and experience; among other things.

6.4 Future plans

As this thesis deals with enhancing our conceptions of a science for Galápagos and discusses the importance of making information accessible to scientists and their publics, I have been concerned from the beginning with finding a way to share the information produced in this research with various audiences. Electronic copies of this thesis will be distributed to GSC respondents and a hard copy will be left in the library at USFQ Galápagos. As for sharing information with residents, Co-director 2 and I are discussing the possibility of mounting a public exhibition either at the GSC or on the boardwalk (one of the central social spaces in San Cristóbal) for which we would create large posters, graphs, and visuals of various kinds to display the community perspective—scientists included—gathered in this study. If such an exhibition becomes impossible to mount due to financial and/or time constraints, I plan to develop an informational pamphlet highlighting some of the key findings of this study for distribution at the GSC.
APPENDIX A: INTERVIEW GUIDE QUESTIONS FOR RESIDENTS

1. Define science in your own words

2. Is science important in your daily life? If so, how?

3. Do you believe that science has had a positive/negative/no impact in San Cristóbal and why?

4. Should Galápagos scientists be obligated to conduct research that addresses specific local issues?

5. Describe the ideal relationship between the Center and the town.

6. What kind of information would you like to access via GSC outreach?

7. Are there individuals or groups here that you think could contribute to science research? If so, whom and how?

8. What is your definition of a science for Galápagos?
APPENDIX B: INTERVIEW GUIDE QUESTIONS FOR GSC REPRESENTATIVES

1. Please describe the logics underlying GSC outreach.

2. Please describe current and planned outreach activities.

3. Are there particular things that you think that San Cristóbal residents ought to learn from science and research? If so, what are they?

4. Do you believe that local individuals or groups have the capacity to contribute to the production of scientific knowledge? If so, whom and how?

5. Should residents have a say in the direction of Galápagos research?

6. What is your definition of a science for Galápagos?
### APPENDIX C: GENERAL INFORMATION (GSC REPRESENTATIVES)

<table>
<thead>
<tr>
<th>GSC representative</th>
<th>Place of Origin</th>
<th>Area(s) of expertise</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>Galápagos</td>
<td>Ecology and evolutionary biology</td>
</tr>
<tr>
<td>S2</td>
<td>Europe (long-time resident of Ecuador and Galápagos)</td>
<td>Natural resource use and conservation biology</td>
</tr>
<tr>
<td>S3</td>
<td>Mainland Ecuador</td>
<td>Marine biology</td>
</tr>
<tr>
<td>S4</td>
<td>Europe (long-time resident of Ecuador and Galápagos)</td>
<td>Marine biology</td>
</tr>
<tr>
<td>S5</td>
<td>Galápagos</td>
<td>Marine biology</td>
</tr>
<tr>
<td>Co-director 1</td>
<td>United States</td>
<td>Geography</td>
</tr>
<tr>
<td>Co-director 2</td>
<td>Mainland Ecuador</td>
<td>Geography</td>
</tr>
<tr>
<td>Executive Board Member</td>
<td>Mainland Ecuador</td>
<td>Anthropology</td>
</tr>
<tr>
<td>Program Manager</td>
<td>United States</td>
<td>Geography</td>
</tr>
<tr>
<td>Outreach Coordinator</td>
<td>United States (long-time resident of Ecuador and Galápagos)</td>
<td>Higher education administration and community programming</td>
</tr>
</tbody>
</table>
APPENDIX D: GENERAL DEMOGRAPHICS (RESIDENTS)

Age (years)

Highest level of education completed

Neighborhoods represented

Galápagos residency time (years)
REFERENCES


