Chapter 3
Contextualizing the Ecuadorian National Science Curriculum: Perspectives of Science Teachers in the Galapagos Islands

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1 Introduction

The Galapagos Islands, a province of Ecuador, is a volcanic archipelago of 13 main islands located almost 1000 kilometers off the west coast of South America. In 1978, the Galapagos were declared UNESCO's first World Heritage Site, and in 1985, UNESCO also named the archipelago one of its biosphere reserves due to its endemic wildlife (Oxford et al. 2009). The unique flora and fauna of the Galapagos archipelago and its influence on Charles Darwin's theory of evolution have, over the years, attracted the interest of international and national tourists, scientists, and various private and public environmental conservation agencies (Durham 2008).

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Although the narratives around the Galapagos continue to emphasize its pristine nature and unique flora and fauna, the conservation of the archipelago has been the source of concern to the international community in the past few years (Cairns et al. 2014). In 2007, UNESCO put the Galapagos Islands on the list of World Heritage Sites in Danger mostly due to the negative impacts of the human population growth on the islands' ecosystems (Durham 2008). While the UNESCO removed Galapagos from the list of threatened sites in 2010 as a result of conservation actions taken by the Ecuadorian government (UNESCO 2010), UNESCO emphasized that the long-term sustainability and conservation of the Galapagos requires an education system "that incorporates elements of environmental management and heritage preservation, as well as natural resources conservation development" (UNESCO 2007, p. 10).

Prior literature, however, has not addressed how the education system and how local *Galapagueño* teachers, in particular, have contextualized the education provided in schools to address the unique socio-ecosystem of the Galapagos Islands, especially when in the past decade Ecuador has standardized the science curriculum taught in schools across the country. To shed light onto this topic, in this chapter, we use contextualization of instruction (Rodriguez 2005) to present a study that analyzed the voices of 17 K-12 teachers who taught science in Galapagos at the time of this study. Drawing on qualitative data collected through video/audio recording of focus groups with the teachers, this chapter discusses our participant teachers' perceptions of the challenges and opportunities they faced in contextualizing the Ecuadorian national science curriculum to address issues relevant to their unique context.

We start this chapter by providing an overview of the principles of contextualization in science that guided our theoretical perspectives. Then, we present a brief overview of the Ecuadorian education system and the Galapagos Islands as a socio-ecosystem. Afterward, we describe the methods we used to collect and analyze our data and follow with the discussion of the tension perceived by teachers in their attempts to contextualize the national curricula.

In our final section, we connect these topics with our theoretical approaches of contextualization to recommend ways in which the Ecuadorian education system can support teachers in contextualizing the national curriculum in a way that addresses the particular environmental conservation and social aspects unique to Galapagos. Specifically, in this chapter, we posit that addressing the long-term conservation of Galapagos requires the Ecuadorian education system to empower teachers via processes that provide them with training and resources for teachers to create productive ways to contextualize the national science curriculum to address science concepts in the unique context in which they work and live.

2 Conceptual Framework

In this chapter, we discuss the perceptions of 17 K-12 science teachers in the Galapagos Islands about the tension they perceived in contextualizing the national science curriculum to address issues relevant to the Galapagos. To address this topic, we use a contextualization theoretical lens, in which science instruction must connect the knowledge that is valued in schools to the one valued by the local communities served by those schools (Banks 1993, 2005; Gay 2010).

Contextualized instruction is an instructional approach that offers learning experiences that are relevant to students' contexts (Finkelstein 2005; Giamellaro 2014; Gordon 2014). In practice, contextualized instruction can happen in the classroom, through problem-based learning, or outside the classroom, through field experiences (Ballantyne and Packer 2010; Giamellaro 2014; Nashon and Anderson 2013). Contextualized instruction promotes students' positive attitudes toward science and increases their level of engagement (King and Ritchie 2012).

Because science curricula tend to be content heavy, contextualization offers teachers opportunities to make curricula and challenging science concepts accessible and relevant to students (Gough 2015; Rivet and Krajcik 2008; Rosebery et al. 1992; Warren and Rosebery 1995, 1996). Contextualizing science curricula can include making the curriculum meaningful to students' lives (Giamellaro 2014; Orpwood et al. 2010; Rivet and Krajcik 2008; Schwartz and Lederman 2008), promoting the skills necessary to apply the knowledge gained in science to real-life situations (Pearson et al. 2010; Gordon 2014), or establishing learning routines that foster equitable student participation (Johnson 2006; Paquette and Kaufman 2008). Furthermore, contextualizing the science curriculum could involve embedding real-life examples in science lessons that are meaningful to students' daily lives (Orpwood et al. 2010), real-world questions that connect the content with the doing of science (Krajcik 2015), and integrating knowledge of different disciplines to enrich the discussion of issues related to their students' contexts (Gordon 2014).

Yet, in order to contextualize curriculum, teachers need professional freedom and knowledge on how to adapt the content of their instruction to create meaningful lessons (Giamellaro 2014). Teachers, for instance, must know how to design lessons that ask students to apply scientific knowledge to everyday life situations (Upadhyay 2006) and consider the similarities, differences, and connections between everyday and science practices (Aikenhead 1997, 2001). In addition, contextualizing the curriculum entails that teachers are able to design activities in which students use science to address struggles in their lives or problems in the context in which they live to promote change (Sconiers and Rosiek 2000; Gallard and Antrop-González 2013). In this study, we built on the existing literature around contextualization of science education to explore whether our science teacher participants adopted the national science curriculum as given or have adapted it to the socio-natural conditions of the Galapagos.

To situate our discussion, and before we present the voices of both primary and secondary Galapagos teachers, in the next sections, we present a short overview of the Ecuadorian education context and a brief history of the Galapagos and the current state of its education system.

3 A Brief History of the Ecuadorian Educational Context

The common historical background of Latin America's education characterizes Ecuador's public education system. In particular, during the 1990s and the following decade, the global discourse led by the United Nations agencies (i.e., the *Education for All* program of 1990), accompanied by funding from the World Bank, impacted educational policies in Ecuador and the entire continent. This funding implied a liberal framework that assigned to education the goal of preparing students for a changing workplace by encouraging entrepreneurship and the use of technology (Torres 2002). Although using students' scores in large-scale standardized tests is a controversial measure of educational quality, Ecuador performed poorly in the areas of reading and mathematics in 2006 in UNESCO's *Segundo Estudio Regional Comparativo y Explicativo de la Calidad de la Educación* [Second Comparative and Explanatory Regional Study of Education Quality] (SERCE)—the first international test in which the country participated. In that test, Ecuador ranked at least one standard deviation below the mean in both reading and mathematics (Estarellas and Bramwell 2015).

The poor results on UNESCO's SERCE of 2006 and the emerging discourse around education quality were a wake-up call for the Ecuadorian government and prompted the administration to direct financial resources toward the decentralization of education management. Thus, starting in 2007, the current Ecuadorian government implemented a new series of normative changes to the education system prevalent during the 1990s. In addition, investment in the education sector grew from $1094.6 million dollars in the year 2000 to $2908.4 million dollars in the year 2014 (Estarellas and Bramwell 2015). According to the Ecuadorian think tanks Grupo Faro and Contrato Social por la Educación, the reforms implemented by recent governments have produced improvements in the educational quality of the Ecuadorian education system (Bellettini et al. 2015; Estarellas and Bramwell 2015). For instance, in 2013, the results of Ecuador in UNESCO's *Tercer Estudio Regional Comparativo y Explicativo de la Calidad de la Educación* [Third Comparative and Explanatory Regional Study of Education Quality] (TERCE) showed that Ecuador was one of the countries whose results have improved the most (UNESCO 2014). Even though Ecuador improved in TERCE, the results ranked the country only above the mean in both content areas (Estarellas and Bramwell 2015).

Yet, the standardization of the science curriculum also had another consequence. As the Ecuadorian public education system enforced that all Ecuadorian educators adhered to the national science education curriculum (Bellettini et al. 2015), educators lost some of the freedom they had traditionally and had to modify their lessons

to meet the needs of their communities. Therefore, while innovation has been touted in reform documents and educational results seem to have improved, at least according to international standardized tests, little is known in regard to if and how science teachers in Ecuador have contextualized the national curriculum based on their students' needs and local realities (Román et al. 2015).

4 The Galapagos Social and Educational Context

After this short overview of the Ecuadorian education system, it is important to situate our discussion in the history and the condition of education in the Galapagos archipelago to understand its unique natural and social context.

The Galapagos archipelago amounts to a total land area of about 8000 sq. km. Although the Galapagos Islands were (re)discovered by Fray Tomás de Berlanga in 1535, they owe their worldwide reputation as a laboratory of evolution to an event that occurred 300 years later: Charles Darwin's visit of scientific exploration on board the HMS *Beagle*. Darwin's visit to Galapagos has had a powerful scientific and social impact that has even been described as "instrumental in forever changing the world view of life on earth, while making the small islands of Galapagos famous" (Darwin 2009, p. 16).

The history of the Galapagos as part of Ecuador starts in 1832 when the Ecuadorian state felt the need to officially integrate the archipelago into its national territory for ideological and political reasons (Grenier 2007). At the time of annexation, however, the Galapagos Islands were far from being considered important. In fact, the Ecuadorian government and society perceived the islands as worthless, cursed, and not suitable for farming due to their lack of fertile soil and fresh water (Tapia et al. 2009). Today, the islands constitute their own province subdivided into three cantons that correspond to the three most populated islands: Santa Cruz, San Cristobal, and Isabela.

The Galapagos province is governed by the Special Law for Galapagos (*Ley Orgánica para el Régimen Especial de Galápagos* [LOREG]) that has been part of the Ecuadorian Constitution since 1998. The Special Law regulates a variety of aspects related to urban planning, tourism, agriculture, quarantine policies, and waste management. One of the most important and controversial aspects regulated by the LOREG is human migration to Galapagos. Although the population of the islands grew slowly until the 1980s, the rate of population growth has increased significantly in the last three decades (Ramos 2015). According to the last official census, between 25,000 and 27,000 people currently inhabit four of the islands: 7500 in San Cristobal (30%), 15,250 (61%) in Santa Cruz, 2250 (9%) in Isabela, and 100 in Floreana (*Instituto Nacional de Estadísticas y Censos* [INEC], 2010). The areas designated for human settlement and agriculture comprise 3% of the total land area of the archipelago—the remaining 97% is a protected area—after the Ecuadorian government established the Galapagos National Park in 1959.

Given its worldwide reputation as a natural destination, tourism is the biggest employment sector in Galapagos and has contributed to the islands economic growth (Cairns et al. 2014). Epler (2007) estimates that 78% of employment in Galapagos is directly or indirectly connected to tourism, and Taylor et al. (2009) point out that between 65% and 71% of the total income in Galapagos is related to this industry. Although the rapid growth in the number of tourists has been contained to specific sites monitored successfully by the Galapagos National Park (Durham 2008; Martin et al. 2015), the increasing number of tourists and the economic growth in the islands has augmented the number of immigrants to the archipelago to provide services for tourists.

It is worth mentioning that in 2014 the Ministry of the Environment approved a new *Plan de Manejo de las Areas Protegidas de Galápagos para el Buen Vivir* [Management Plan of the Protected Areas of Galapagos for Good Living]. This new plan recognizes that Galapagos is a socio-ecosystem that requires for its conservation the integrated management of its protected as well as its urban areas (Calvopiña et al. 2015). In addition, this plan incorporates the concept of *Sumak Kawsay* (*buen vivir* or living in balance with nature in the Quechua language), which constitutes a fundamental component of the agenda of the political party currently in power in Ecuador. The incorporation of the human element in the management plan of Galapagos recognizes that the archipelago has been continuously inhabited since the mid-nineteenth century (Tapia et al. 2009) and identifies education as one of the mechanisms that need to be addressed for the conservation of the islands (Calvopiña et al. 2015).

The Ecuadorian Ministry of Education based in Quito, the capital of the country, regulates education programs in the Galapagos. The Special Law of Galapagos of 1998, however, gave the schools in the province greater local control than the ones in the mainland. The Special Law, for instance, allowed schools to use curriculum that addresses the needs of Galapagos and incorporated elements of environmental protection. The creation of the Special Law of Galapagos is a clear example of the tension that exists between Ecuadorian educational policies that seek to standardize curriculum and procedures, while creating a "special law" for the Galapagos province—the Special Law, for instance, provided teachers with higher salaries than their peers on the continent, given the higher cost of living in the Galapagos than in the Ecuadorian mainland.

The main regional office of the Ministry of Education is located in the capital of the province, Puerto Baquerizo Moreno, in San Cristobal. Yet, professional development for teachers in Galapagos is planned at the Ministry's central offices in Quito, the capital of Ecuador, and is delivered by Ministry's personnel from the mainland. Schools in the Galapagos follow the calendar of the coastal communities in Ecuador, in which classes go from May to February to respond to regional weather factors (e.g., amount of precipitation). The presence of local education offices to oversee Galapagos schools and the availability of a school calendar that responds to the climatic conditions of the area are another examples of the forces that, on the one

Table 3.1 Number of schools and approximate number of students and teachers in PK-12 schools in Galapagos

Location (island)	Number of schools	Number of students	Number of teachers
Santa Cruz	11	4585	184
San Cristobal	7	2186	86
Isabela	4	715	31
Floreana	1	28	3
Total	23	7486	304

Source: Ecuadorian Ministry of Education, 2014

hand, want to centralize educational initiatives (e.g., planning of professional development) and, on the other, contextualize some of its policies to the needs of the region.

The number of PK-12 schools, students, and teachers in Galapagos is small (Table 3.1). Schools are distributed in the four inhabited islands of Santa Cruz, San Cristobal, Isabela, and Floreana. In terms of higher education, only extension programs of four Ecuadorian universities serve Galapagos, and 10% of Galapagos youth attends distance (i.e., online) courses for their postsecondary education despite the unreliable Internet connection (Villacis and Carrillo 2013).

Of the approximately 304 teachers in Galapagos, almost 40% (i.e., 120 teachers) teach elementary school and the remaining 60% (184 teachers) teach secondary school. Yet, teachers' teaching assignments are in constant flux, and teachers could work in an elementary school and also teach at the secondary level. Secondary school in Ecuador is subdivided into *básica* (equivalent to middle school) and *bachillerato* (equivalent to high school in the United States). According to Ecuadorian education law, elementary teachers received their teacher certifications by majoring in education in college while secondary teachers need to have a degree in their field of expertise (e.g., science teachers could have a degree in biology, physics, or chemistry), but not necessarily a degree in education (Knab 2016). In terms of results in national standardized tests, *Galapagueño* students have historically had poor results in the national evaluations of academic achievement (Knab 2016).

The brief overview of the Galapagos history, its education system, and the Ecuadorian education context in which it is embedded reflect the complex characteristics of the Galapagos Islands not only as a natural environment but also as a unique social environment. In this socio-ecosystem, there is a constant tension between policy national-level initiatives mandated from the mainland and the perceptions of *Galapagueños* as to whether those policies respond to the needs of the archipelago (Cairns et al. 2014). It is in this unique natural and social setting in which science teachers must use the national curriculum in their practices. In the next sections, we present a study that investigated whether science teachers have contextualized the national science curriculum to address the complex social issues in the Galapagos.

5 Methods

As we have discussed thus far, our study explored whether our participant teachers have contextualized the national science curriculum to address the reality of the Galapagos Islands. In this section, we describe the study participants, our data sources, and the type of analysis we conducted to explore this topic.

5.1 Focus Group Participants

To gather the voices of the local teachers, this study included a group of 17 science teachers who participated in two focus group sessions. At the time of the study, participant teachers taught science-related courses in different grade levels including natural sciences (i.e., *ciencias naturales*) in elementary schools and biology, physics, or chemistry courses in middle school and high school classrooms. Seven teachers taught secondary school science and ten taught science in elementary schools. Teacher participants were recruited with the support of the local school principals. After receiving authorization from the Ecuadorian Ministry of Education, two of the authors of this chapter met with principals of schools of the two most populated islands in the Galapagos (i.e., Santa Cruz and San Cristobal) and asked them to refer teachers who were leaders in their schools to participate in the focus groups. In the end, there were 7 teachers in one focus group and 10 in the other. Both focus groups consisted of a mix of elementary and secondary teachers to capture their opinions and promote discussion.

Due to logistic limitations, only teachers from schools located in the two most populated islands (i.e., Santa Cruz and San Cristobal) were able to attend the focus group sessions. In total, these teachers represented 14 of the 23 schools in the Galapagos. All the conversations and focus groups were conducted in Spanish and were video and audio recorded to link quotes with speakers. Table 3.2 describes our participant teachers' pseudonyms, genders, the grade levels they taught, and their years of teaching experience at the time of the study.

5.2 Focus Group Purpose/Content

The focus groups described in this study are part of a larger research project that encompassed topics related to all the content areas (i.e., mathematics, social studies, English as a foreign language) and include classroom observations and parent interviews. The main purpose of the focus groups was to understand the context in which Galapagos teachers worked, their perceptions about their context and practice, and whether they adapted their curriculum to this context. To this end, the focus groups asked teachers a set of open-ended questions that addressed the following topics:

Table 3.2 Grade level/subject area taught and years of experience of participating teachers

Teacher	Gender	Grade level/subject area	Years of experience
Fatima	Female	Fourth	10
Ricardo	Male	Third	2
Juan	Male	Second	1
Concepcion	Female	Fifth	1
Cristina	Female	First	4
Esmeralda	Female	Fourth	2
Liliana	Female	Third	1
Nohemi	Female	First	12
Omar	Male	Fifth	9
Erica	Female	Second	2
Pablo	Male	Secondary biology	3
Alejandra	Female	Secondary biology/chemistry	2
Pedro	Male	Secondary chemistry	5
Arturo	Male	Secondary physics	8
Patricio	Male	Secondary physics	3
Luisa	Female	Secondary biology	9
Betty	Female	Secondary biology/chemistry	3

teaching as a profession; teaching in the Galapagos Islands; teachers' preparation; teachers' classroom resources; the science curriculum; and teachers' relationships with education authorities, other teachers, and parents (Appendix A). All participant teachers were informed of the study and signed consent forms.

5.3 Analysis

The focus group sessions were audio and video recorded, transcribed, translated, and coded using NVivo®. Videos were mostly used to identify the teacher who initiated the discussion of a topic and connect specific quotes with particular teachers. All the transcriptions were read and reread several times between two coders (who are two of the authors of this chapter) arriving to an 80% interrater coder agreement. We used constant comparative analysis and an inductive approach to coding. First, we created a set of open codes (Glaser and Strauss 1967) to capture the main trends mentioned by teachers during the focus groups. Next, we generated conceptual categories aligned with the open codes, in keeping with the literature regarding teaching science and contextualization. As can be seen in Table 3.3, the conceptual categories in which we focused for this study were Galapagos uniqueness and the ways in which this uniqueness is addressed in education and the environmental conservation of Galapagos and education. Table 3.3 also includes the codes that were identified in these categories.

Table 3.3 Categories and codes for teaching science in the Galapagos

Conceptual categories	Codes	Description	Examples of quotes
Galapagos uniqueness and education	Galapagos-based curriculum	Instances in which participants talked about education in Galapagos, the availability of educational resources and training, the reality of their communities (Cairns et al. 2014; Taylor et al. 2009), and the national curriculum (Calvopiña et al. 2015)	"The textbooks come from the continent … We should have local materials, too" (Betty, high school biology teacher)
	National curriculum		
	Educational resources (lab materials, textbooks)		
	Teacher preparation and professional development opportunities		"Students sooner or later have to go to the outside world and have to know general stuff …prepare students for what is global" (Pablo, high school biology teacher)
Environmental conservation of Galapagos and education	School discussions/ lessons around the Galapagos as a protected area	Instances in which teachers expressed ideas about conservation (Ardoin and Ryan 2011; Busch and Osborne 2013), tourism (Ardoin 2014), the environmental uniqueness of the islands (Oxford et al. 2009), and its affordances for science instruction	"The fact that we live in a place with special characteristics puts teachers as protagonists in the conservation effort" (Luisa, high school biology teacher)
	Language of conservation in schools		
	Living laboratory for students		"Here, we speak 'the conservation language' because we live in the Galapagos" (Nohemi, first grade teacher)

5.4 Galapagos' Uniqueness and Education

Out of the 10 elementary teachers and 7 high school science teachers who participated in the focus groups, 12 of them (six elementary and six secondary teachers) discussed issues related to the science curriculum and how it could be contextualized to address the characteristics of the Galapagos. Their comments reflected the feeling that for them the Galapagos is a unique place and that this natural environment should shape the science curriculum. Specifically, all of the 12 teachers who mentioned curriculum expressed that the topics taught in science classes should reflect Galapagos' natural uniqueness in relation to its flora and fauna. Fatima, a fourth grade elementary teacher, indicated that she viewed her role as: "Helping students understand what we have here, our unique animals and also plants."

Furthermore, those 12 science teachers pointed out that the Galapagos' unique natural surroundings and specific conservation issues warrant the inclusion of a strong regional focus into the national science curriculum. Yet, six of the secondary teachers and three elementary teachers reported a tension with this regional focus because they believed that one of the main purposes of education is to prepare students for university-level education. Because postsecondary education is not available in Galapagos, students need to migrate to continental Ecuador to further their education once they obtain a high school diploma. For this reason, these nine teachers thought that a regional science curriculum would hinder their students' possibilities for success. As Pablo, a secondary biology teacher, mentioned:

> Students sooner or later have to go to the outside world and have to know general stuff. Even though we know that in Galapagos everything has to do with conservation. But Galapagos has to prepare students for what is global.

When asked if it is possible to do both, that is, cover the topics in the national curriculum and address the characteristics of the Galapagos region, only four elementary teachers mentioned that the national curriculum is flexible enough to some forms of local adjustment. Yet, the 12 teachers agreed that the breadth of content in the national curriculum is too wide to cover within each school year, and therefore, they do not attempt to make many adaptations. Although 10 of the 12 teachers indicated that textbooks used as part of the national science curriculum do discuss some Galapagos-related issues, they indicated that these textbooks are designed to support a national-centered approach and local materials could be used to discuss local issues. Yet, their biggest concern was that they did not have enough time in their lessons to cover local issues when there were so many topics they were required to cover as part of the national curriculum. In the words of Betty, a high school teacher who teaches biology and chemistry:

> The textbooks come from the continent. We should have local materials, too. We have some resources produced by local organizations, but it is already hard to cover all the topics in the textbooks that I rarely used other materials in my classroom.

In addition, 8 teachers (2 elementary and 6 high school teachers) of the 12 teachers who discussed curriculum expressed that the difficulty of reconciling local and contextualized knowledge is limited by the restricted number of out-of-school visits due to schools' accountability measures (e.g., number of hours of instruction that need to be met). Alejandra, a high school biology and chemistry teacher, summarized this point in this way:

> The science period is so short! How can I take students out for a field trip and be back on time for the next period? Also, I would need to ask for permission to the principal and she may ask me when I am going to cover all the science concepts I need to cover according to the curriculum.

Although all of the 17 teachers pointed out the importance of practical activities inside and outside the classroom for students to really learn science utilizing their natural surroundings, they immediately mentioned several limitations that prevent them for including these types of activities in their lessons. Among the limitations

they all reported were the lack of lab equipment and school supplies needed to conduct in-depth scientific explorations. As Pedro, a high school chemistry teacher, indicated:

> We do have a science lab, but we don't have enough working microscopes, test tubes, and other supplies and equipment. I guess I could take the kids outside to experience nature more often, but I would also love for them to continue doing investigations in the laboratory.

All 17 teachers mentioned that the geographical isolation of the Galapagos from the continent has always been an issue for not only in receiving the educational materials (e.g., textbooks, notebooks, workbooks, lab materials) but also in terms of receiving adequate training on how to implement the mandates from the central government. In relation to curriculum, the 12 teachers who mentioned this topic indicated that, given the costs for the Ministry of Education to send trainers and coaches to the Galapagos from the continent, the training they received about how to implement the new curriculum was very limited. According Liliana, a third grade teacher:

> I have colleagues who teach in the continent and they get much more training than we do here. Sometimes we don't get any training at all because it is very expensive to send coaches and trainers from the cities in the continent. When we were asked to implement the new curriculum, the trainers from the Ministry came only for a couple of days, but then they left and we don't have local coaches that can help us when we have questions.

As regards to the topics that should be covered in a Galapagos-based curriculum, the 12 teachers mentioned the need for students to understand that by living in the islands, they are, in their words, in "direct contact with nature" (Luisa, high school biology teacher), "here we all live in paradise" (Juan, second grade teacher), and it is "a special place" (Liliana, third grade teacher). Although 12 teachers acknowledged that the national science curriculum has topics (e.g., soil, biodiversity, landforms, climate, maritime ecosystems, forests) which are easily illustrated by visits to different parts of the Galapagos Islands, these teachers lamented that, as discussed earlier, they do not feel they had enough time and resources to take advantage of such opportunities as much as they would like.

All the 17 teachers who participated in the focus groups recognized the importance of protecting the Galapagos so future generations could also enjoy this unique natural environment. Among the 12 teachers who mentioned curriculum as an important aspect of teaching in the Galapagos, they reported that the curriculum should address ways to develop their students' conservation consciousness and to safeguard their students' general well-being. As Omar, a fifth grade teacher, puts it, "Teaching in Galapagos provides the opportunity to teach our youth the importance of our environment … and guide them to care for it, protect and conserve it." In this sense, teachers view themselves as "protagonists" of conservation efforts for future generations. According to Luisa, a high school biology teacher:

> The fact that we live in a place with special characteristics as the Galapagos put teachers as protagonists in the conservation effort. We can teach children to value the importance of our environment, of our ecosystem. Therefore, we have to use materials that guide them on how to do this, so they are able to look after it, how to protect it, and in this way to be able to

> keep the conservation efforts. Doing this is a reward in itself [for teachers] because we are the protagonists in protecting this paradise.

In addition, the 12 teachers, who discussed curriculum, indicated that, due to living in a national park and a protected area, the science curriculum that should be taught in the Galapagos has to use the "conservation language." As Nohemi, a first grade teacher, puts it, "Here we speak 'the conservation language' because we live in the Galapagos."

Finally, only Luisa, a high school biology teacher, mentioned a tension she perceived not about contextualizing the national curriculum necessarily, but about the lack of discussion of the social aspects that also influence living in the Galapagos. When asked to elaborate, she indicated that:

> We need to protect Galapagos because it is our home. People think that the Galapagos Islands are worth protecting because they are a paradise, but for us more than anything, they are our home. We need to protect the Galapagos because we live here and we need to protect them for our children.

6 Discussion and Recommendations

In this chapter, we discussed the challenges and opportunities that Galapagos teachers perceived in contextualizing the Ecuadorian national science curriculum to address the unique characteristics of the region in which they live and work. First of all, it is important to highlight that all 17 science teachers who participated in the focus groups mentioned that environmental conservation was central to teaching and living in the Galapagos and that science education in schools there should address the environmental conservation of the archipelago in depth. Second, although the topic of curriculum was not the only one mentioned during the focus group sessions, 12 of the 17 participant teachers indicated that the curriculum used in schools should address the unique characteristics of the Galapagos—making the topic of curriculum the most frequently mentioned among all the topics. The way in which curriculum was discussed by these 12 teachers, however, reflected some tension teachers perceived between using and adapting the Ecuadorian national science curriculum to reflect issues important to the Galapagos archipelago.

As we described in the first section, during the last decade, Ecuadorian teachers have dealt with a number of important normative modifications (e.g., school and teacher evaluation measures, longer teaching days) intended to improve the quality of education in the country (Bellettini et al. 2015). One of those modifications was a reform to the national science curriculum as well as producing new textbooks to accompany it (Estarellas and Bramwell 2015). Yet, given the Galapagos isolation from the continent and the unique natural characteristics of this region, 12 participant teachers reported challenges in contextualizing the national curriculum. The challenges these teachers reported were related to training, availability of educational resources, national-level textbooks that do not address the particular issues

affecting the region, time to cover regional topics and the science topics covered in the national curriculum, and ways to integrate their natural surroundings into their teaching of science.

When referring to the curriculum, our participant teachers did mention that the national science curriculum discusses topics related to the Galapagos as well as concepts that could be addressed using the natural context of the islands (e.g., soil, biomes). However, educators expressed a tension around the time needed to cover in their lessons the breath of topics included in the national science curriculum *and* discuss topics relevant to the Galapagos. Teachers also reported this tension as, on the one hand, needing to prepare students for postsecondary education outside the archipelago where students will have to go if they want to attend college and, on the other hand, spending instructional time in addressing science issues relevant to the local region.

However, addressing fundamental science concepts and regional issues does not have to be an either-or situation. In fact, science instruction should include a broad range of tasks designed to meet the students' learning needs and their future science learning. According to Sánchez-Tapia and colleagues (2018), students have the right to an education aligned with their local culture, the context beyond their own realities, and diverse opportunities for science learning. By making connections of the science lessons with other realities, teachers can focus on the opportunities provided by a contextualized curriculum to pursue questions and seek answers at the local level while addressing key scientific ideas in this process.

Because science curricula and standardized testing can limit opportunities to offer lessons that value local knowledge and diverse ways of knowing science communities (Rosebery et al. 1992; Warren and Rosebery 1995, 1996), the particular natural and social realities of the Galapagos due to their isolation make contextualizing the national science curriculum a necessity. Yet, there is much work to be done in Ecuador at the teacher training, research, policy, and practice level in identifying the essential scientific knowledge and skills students need to construct and at the same time give teachers the freedom they need to adjust them to their distinct instructional contexts.

Identifying where, when, and how teachers can contextualize the national curriculum would, first of all, require professional development that targets the specific needs of the educators in the islands. Our participant teachers, however, reported not having enough training due to the isolation of the Galapagos and the costs of sending teacher educators there from the mainland. Nevertheless, if *Galapagueño* teachers are to create lessons that address local issues *and* apply scientific concepts and practices (Upadhyay 2006), the Ecuadorian government would need to invest more resources in targeted teacher training (Aikenhead 1997, 2001). Focusing on the contextualization of the national curriculum, the type of training needed would guide teachers on how to create lessons that a) cover science concepts, b) ask students to apply scientific knowledge to everyday life situations, and c) respond to their local reality (Giamellaro 2014; Upadhyay 2006).

Providing teachers with training will not be enough, however. Training must be connected to providing *Galapagueño* teachers with adequate educational resources

(e.g., lab materials, workbooks, textbooks) that teachers can receive on time—lack of resources and long delays in receiving them was an issue our participant teachers reported as a challenging aspect of teaching in the Galapagos due to the distance of the islands to the mainland. Furthermore, the central government must develop educational guidelines that allow the freedom to teachers to contextualize the science curriculum according to the issues that are relevant to the Galapagos. Those guidelines must allow teachers to identify areas in the existing national curriculum that not only could be modified, expanded, or adapted but that can also be challenged based on their own knowledge and experiences (Rodriguez 2015) of living and teaching in the Galapagos. Because it has been noted that conservation strategies often "ignore the needs and the perceptions of the local inhabitants" (Celata and Sanna 2012, p. 979), an effective contextualized approach to teaching and modifying the science curriculum in the Galapagos must involve local science teachers in the contextualization process. As mentioned earlier, the creation of policy that has a local focus has a precedent in the Galapagos as reflected in the Special Law developed by the central government to address the particular needs of the region.

Lessons that use a contextualized approach to the national curriculum to the Galapagos, for example, could discuss the natural and social aspects associated with the tourism industry in the Galapagos Islands from scientific, economic, and cultural perspectives relevant to particular realities of its inhabitants. Teachers can ask their students, for instance, to conduct observation on various touristic sites and collect data that analyzes the impact that people have on the environment. Then, teachers can facilitate classroom discussions to identify problems, opportunities, and potential solutions that are appropriate to the Galapagos as a social and environmental setting. By addressing topics such as the impact of tourism, the contextualized Galapagos curriculum could break the cycle of colonial histories that have traditionally shaped approaches to teaching and learning, bring the local culture into the science classroom, and honor the many ways of scientific reasoning (Bangs 2016).

In addition, using a contextualization of the science curriculum lens, science teachers can present science to their students as a problem-solving tool and a powerful resource to promote local change (Sconiers and Rosiek 2000; Gallard and Antrop-González 2013). In discussing the impact of tourism from scientific and social perspectives, for example, science teachers could embed participation practices that promote not only students' academic performance but also identity development (Brown 2004, 2006; Furman and Calabrese Barton 2006). Furthermore, as posited by Delen et al. in one of the chapters of this book, when teachers make science lessons culturally relevant to the students, teachers increase students' motivation and empower them as active learners.

Finally, it is important to indicate that all our participant teachers agreed that the Galapagos must be protected for future generations, and they as educators have a responsibility in addressing conservation topics in their lessons. Yet, when science teachers were asked about the types of environmental conservation topics that should be addressed, they mentioned environmental threats and conservation strategies only in general terms within a discourse of shared responsibility for the future of the islands and the planet. The lack of specific mention of conservation strategies

that could be embedded in science teaching reflects the results found in other studies (Ardoin and Ryan 2011; Busch and Osborne 2013) that have found that conservation, when mentioned, is presented in abstract terms rather than in concrete actionable items. Much more work, however, needs to be done in the area of working with science teachers around the best ways to develop their own knowledge about effective conservation strategies and ways to include the discussion of conservation issues in the teaching of science.

As part of our larger project, we are integrating elements of teachers and students' interests, needs, and dreams to study ways to learn from and work with science teachers in the Galapagos. Our greater project seeks to tap into the identity of teachers and students in the unique Galapagos setting while developing with them critical conservationist discourses that connect their science learning within their environment and their communities. Finally, we advocate for more science and interdisciplinary educational research to be done in the Galapagos to enlighten how the discussions around science education, conservation, and social issues are instantiated in schools in the archipelago. Echoing the UNESCO's (2015) recommendation, we are convinced that only when issues around education become central, meaningful and sustainable conservation efforts will take place in the Galapagos Islands.

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