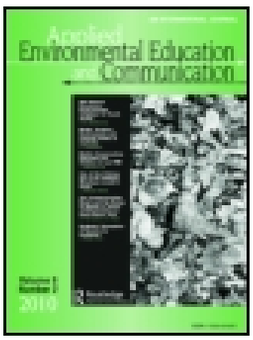

Applied Environmental Education & Communication

ISSN: 1533-015X (Print) 1533-0389 (Online) Journal homepage: http://www.tandfonline.com/loi/ueec20

Strengthening bonds between environmental education facilities and their surrounding communities: Best practices in Eixo Atlântico (North of Portugal and Galicia, Spain)

Sara Costa Carvalho, Pablo Ángel Meira Cartea, Araceli Serantes Pazos & Ulisses Miranda Azeiteiro

To cite this article: Sara Costa Carvalho, Pablo Ángel Meira Cartea, Araceli Serantes Pazos & Ulisses Miranda Azeiteiro (2018): Strengthening bonds between environmental education facilities and their surrounding communities: Best practices in Eixo Atlântico (North of Portugal and Galicia, Spain), Applied Environmental Education & Communication, DOI: 10.1080/1533015X.2018.1467290

To link to this article: https://doi.org/10.1080/1533015X.2018.1467290

Published online: 22 Jun 2018.

APPLIED ENVIRONMENTAL EDUCATION & COMMUNICATION
2018, VOL. 0, NO. 0, 1–19
https://doi.org/10.1080/1533015X.2018.1467290

Routledge
Taylor & Francis Group

Strengthening bonds between environmental education facilities and their surrounding communities: Best practices in Eixo Atlântico (North of Portugal and Galicia, Spain)

Sara Costa Carvalho [a], Pablo Ángel Meira Cartea [b], Araceli Serantes Pazos[c], and Ulisses Miranda Azeiteiro [a]

[a]Department of Biology & CESAM Centre for Environmental and Marine Studies, University of Aveiro, Campus de Santiago, Aveiro, Portugal; [b]Department of Theory of Education, History of Education and Social Pedagogy, Faculty of Education Sciencies, University of Santiago de Compostela, Campus Universitário Sur, Santiago de Compostela, Galicia, España; [c]Department of Pedagogy and Didactic, Faculty Education Sciencies, University of Coruña, Campus de Elviña, A Coruña, Galicia, España

ABSTRACT

Local institutions can be effective tools in engaging environmental education. Especially, Environmental Education Facilities/Centres (EFF) have a high degree of relevance in the Eixo Atlântico Region (Galicia, Spain and North of Portugal). This study investigates the EEF's capacity to improve social involvement and impact. A multiple case study strategy was employed in which in-depth interviews were conducted with directors from 29 facilities in Eixo Atlântico. The research reveals a high level of EEF social impact, which was optimized when employing strong partnerships, when clearly-defining the sociocultural objectives of the educational program, and when the local population was actively involved.

Introduction

The complexity of post-modern society calls for environmental education (EE) programs that challenge hegemonic culture and values. Local institutions such as environmental education facilities (EEF, also known as environmental education centers) are particularly useful tools since they are located close to local communities, which help educators in challenging the mentioned hegemonic and collective behavior by using a sociocritical approach. Generally, EEF are initiatives of nonformal education with many of them having been founded in order to receive and educate school groups in natural areas.

The geographic area under study is the Euroregion of Eixo Atlântico (an autonomous Region of Galicia, Spain, and the northernmost region of Portugal). The research in this geographic area is significant since Eixo Atlântico was the first

CONTACT Sara Costa Carvalho saradcarvalho@ua.pt Department of Biology and Centre for Environmental and Marine Studies (CESAM), University of Aveiro, Campus de Santiago, 3810-193 Aveiro, Portugal.
Color versions of one or more of the figures in the article can be found online at www.tandfonline.com/ueec.

cross-cooperation structure to be created in Europe and had celebrated 25 years, in 2017. However, this area still lacks a common EE strategy, thus motivating this study of the Eixo Atlântico region.

Portugal lacked an effective political instrument on EE strategies until 2017, when the National Strategy of Environmental Education was finally approved. However, Galicia has had an EE strategy in place since 1999 and has also established an EEF network. Meira and Pinto (2008) explain the causes of this situation and the asymmetries between both regions as being due to: i) the territorial context (in Galicia there is an autonomous decentralized community as opposed to the centralized state in Portugal); ii) the current context of EE crisis and the lack of investment; iii) the lack of systematized studies. Regarding the latter point, a lack of updated studies occurs across the scope of EE but is especially pronounced in EEF, where there are few studies apart from the work of Serantes and Barracosa (2008). Even in other euroregions, few studies exist. Lepik (2009) and Kovach (2015) have, respectively, studied EE in the Baltic Sea region and in the Carpathian Euroregion. Additionally, Dubeck and Schulz (2004) have studied within the educational scope and Kocur-Bera (2017) within the environmental area, but neither have been focused on the EE area specifically.

Our research has focused on the interconnections of the EEF with their immediate local surroundings (i.e., with their local community) and with their wider context (e.g., with other EEF). To study these interconnections, we analyzed "EEF social impact" (Serantes, 2011; Serantes & Barracosa, 2008), which encompasses: the level of visitors' participation (passive or active engagement/activities); the extent of their contact with the local community; and the average activities' duration. These social impact criteria are useful in assessing the success of EEF and to identify areas for improvement. Further, rather than solely seeking to educate individual visitors, we consider how EEF may achieve a broader and more efficient social change when working with the community at a deep level, contributing simultaneously to local community cohesion. It is also important to consider how empowering EEF to participate in regional strategic planning can benefit EE.

To examine the strategies used by the EEF to strengthen their bonds with the surrounding community, this study aims to:

- Identify factors that benefit or hinder the social involvement of EEF with their surroundings;
- Identify the elements of educational projects that promote interconnection with the local community;
- Analyze the types of community involvement in each EEF;
- Assess the level of "social impact" of the EEF studied, considering specifically the *criteria* of "the extent of their contact with the local community."

The environmental education facilities

The high relevance of environmental education facilities today is illustrated by the diversity of initiatives that can be found (for example, interpretation centers in

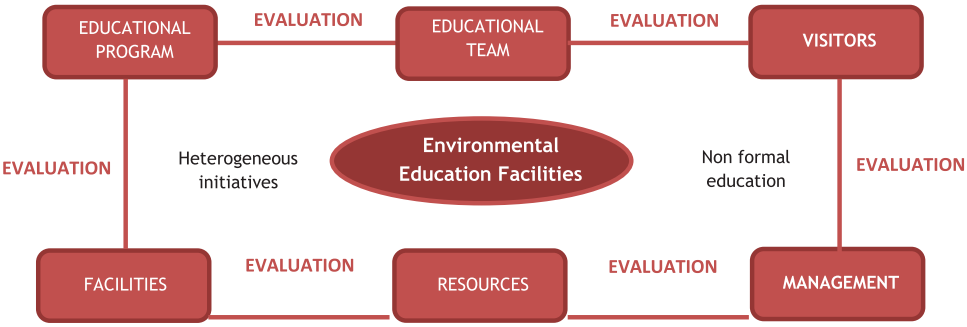

Figure 1. Definition of environmental education facilities (Serantes, 2011).

protected areas of nature conservation; centers of urban ecology, general museums and Ecomuseums, science centers, centers for rural development, etc.) (Fig. 1).

The main elements of an EEF are: 1) facilities for EE purposes; 2) an educational program; 3) a stable educational team; 4) material and methodological resources; 5) an environmental management model; 6) an evaluation system; and 7) programs for each type of visitor.

The diversity of EEF occurs in various aspects, such as, the main themes they approach (for example, marine aspects, rural and inner life regions, renewable energies, sustainable food chain, etc.); the educational strategies and approach (for example, if they are predominantly focused on biophysical aspects or if they also consider sociocultural aspects), the typology of management (public municipalities' management vs. private management); typologies of visitors (individual citizens, seniors, informal and professional groups, scholars, etc.); expected and actual number of visitors per year; size of the educational team; existence of outdoor areas; type of buildings (if they are environmentally sustainable or not, if they were pre-existing buildings adapted to the EE purposes or if they were brand new buildings constructed specifically for the EE, often with European funding (Carvalho, 2015)).

The visitors who attend EEF are also very diverse. In this study, we focus on the "local community," which we classify into the following types: 1) property owners/users (e.g., farmers); 2) private institutions; 3) nonlocal users (e.g., tourists); 4) decision-making agents; 5) NGOs; 6) teaching and research institutions.

EEF might be considered to be social facilitators (Serantes & Barracosa, 2008) especially if they integrate both biophysical and sociocultural aspects, which also helps to expand other potentialities (Fig. 2).

Figure 2 highlights four potentialities: pedagogical; local development; participation in educational and environmental policies; and also EE research.

Pedagogical potentiality of EEF might be promoted through practicing a "critical pedagogy of place" (Gruenewald, 2003; McKenzie, 2008), e.g., a bioregionalist EE (Sauvé, 2005). This pedagogy combines sociocritical education with localized ecological education (Orr, 2005). Gruenewald (2003) advocated a critical pedagogy of place that acknowledged our enmeshment in cultural and ecological systems, and the resulting need for this to figure in programs of both formal and informal education.

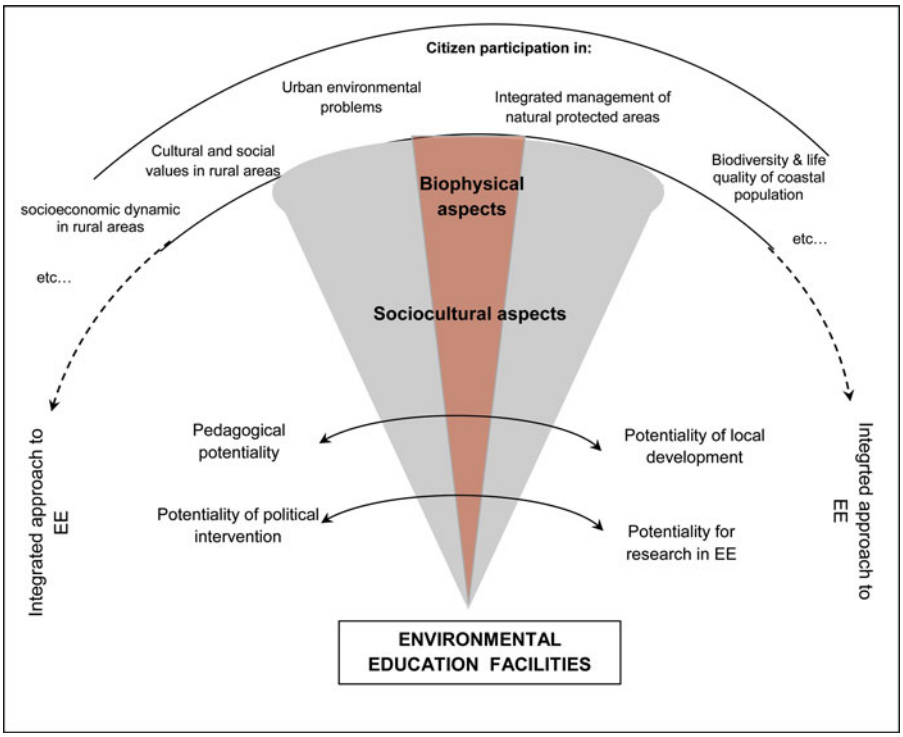

Figure 2. Potentialities of EEF considering the socio-cultural dimension in their activities.

EEF is an ideal context in which to apply a critical pedagogy of place because EEF are structures located close to local communities, thus enabling a long-term engagement with natural and social surroundings. Additionally, EEF enable a great variety of methodological approaches and themes, serve as training institutions that combine educational and leisure dimensions, and offer reference materials/resources to support research (Serantes, 2011). Thus, the pedagogical potentiality of EEF may also be optimized if they approach local "socioscientific themes" (the debate about socioenvironmental problems and solutions considering the diverse human interests and values) (Robottom, 2012). With this approach, socioecological knowledge is socially built rather than limited to the scientific sphere, so it is essential to take lay knowledge into consideration (Alves, Leal-Filho, Araújo, & Azeiteiro, 2013). The consideration of lay knowledge and local community cohesion by EEF is especially important as political entities, in contrast, mainly focus on rational arguments and do not generally give much consideration to local community cohesion (Moran & Rau, 2016).

Combining their pedagogical potentiality with their potentiality of local development, the EEF can increase their importance and impact on society. These EE structures can be classified according to their level of "social impact" (Serantes & Barracosa, 2008):

- EEF of high social impact: strong participation in activities and contact with the local reality; activities that extend over long periods of time (one or more days);

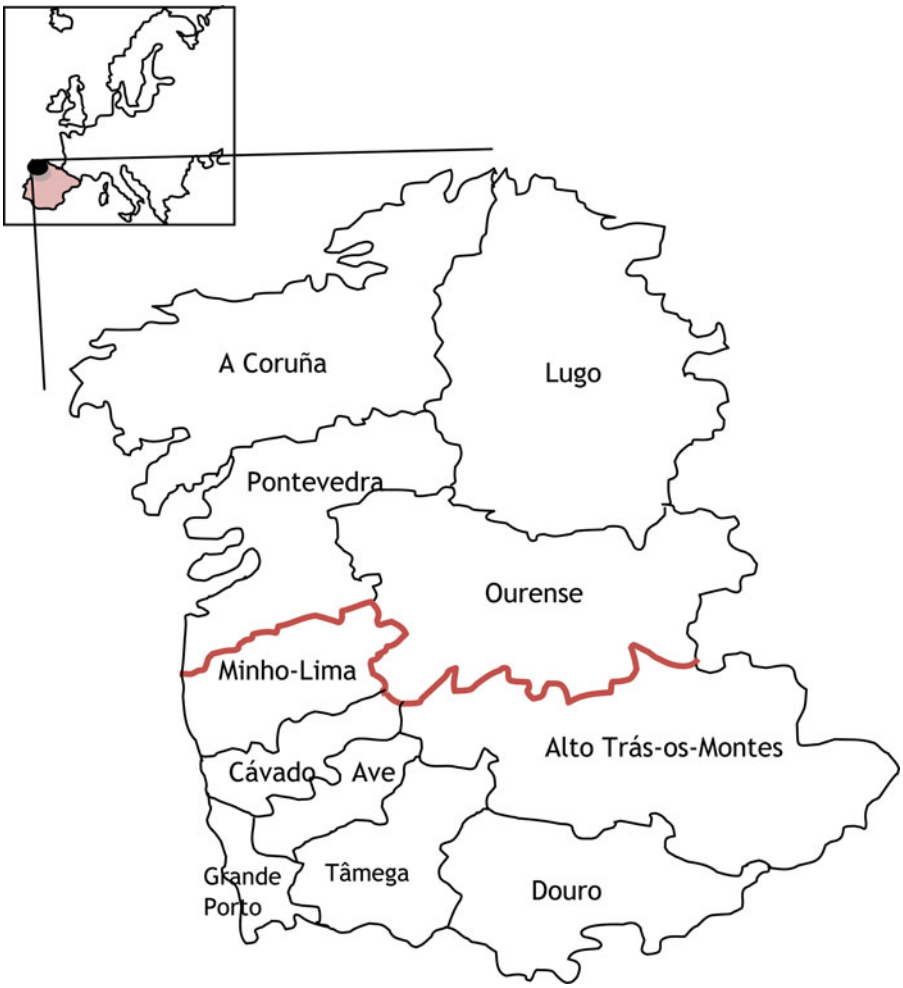

Figure 3. Geographical framework of Eixo Atlântico in Europe.

- EEF of low/medium impact: focused more on activities of unidirectional communication (e.g., exhibitions); shorter activities (less than a day in duration).

The Euroregion of Eixo Atlântico

In ancient times, the people from the northwest of the Iberian Peninsula shared common ways of living. After a long period of separation in recent centuries, the entry of Spain and Portugal into the European Union (EU), in 1986, resulted in an increase in cooperation. With the creation of the *Eixo Atlântico of the* Peninsular Northwest (a private association) it became possible to support the sociocultural, economic, technological, and educational development of the cities and regions within that geographic area (Sampedro, 2012). Currently, 38 cities belong to the Eixo Atlântico Association, whose territory has a total area of 50.700 km^2 (Fig. 3):

On the northern side of this territory live 2.7 million Spanish Galician inhabitants, while on the southern side live 3 million Portuguese inhabitants, giving a

Table 1. *Criteria* battery for case selection.

Criteria for sample selection of EEF		Value
A. Characteristics of the educational project	A.1.1 Existence of sociocultural objectives	1
	A.1.2 Diversity of visitors' typology	
	A.1.3 Medium/long term activities	
	A.2.1 Existence of sociocultural themes	1
	A.2.2 Participatory methodologies	
	A.2.3 Systemized and consistent evaluation	
B. Connection with the EEF surrounding community	B.1.1 Local people as frequent users	1
	B.1.2 Local people as part of the facility's staff	
	B.2.1 Partnerships	1
	B.2.2 Participation in strategic plans at local level	
	B.2.3 Use of the facilities by other entities	
C. Facilities of the EEF	C.1 Accommodation	0,5
	C.2 Environmental sustainable buildings	
	C.3 Pedagogical use of outdoor areas	
D. Educational team	Multidisciplinary team (more than one area and preferably including Educational Sciences)	0,5

total density of 125 inhabitants per km^2 (Carvalho, 2015). Although there is a natural and cultural *continuum* among these border regions, within the inner areas of Eixo Atlântico there is an aging population with a traditional rural way of living, as opposed to the coastal areas where a younger urban population is guided by global patterns in society (Marques, 1999).

The Eixo Atlântico's Project created the "Strategic Agenda for Eixo Atlântico" and the "Agency of Urban Ecology" with the aim to promote a sustainable territory and urban system. This association also supports projects and networks such as ENVIRONMENT 21 and CLIMANTIC, the latter being focused on Climate Change (Sorrosal, 2010).

Since the 1990s there have been a growing number of EEF initiatives across the geographic territory of Eixo Atlântico, especially along the coastline (Carvalho, 2015; Serantes, 2011). However, the geographic distribution of EEF does not always suitably reflect local EE needs due to a lack of an overarching plan for the region (Serantes, 2011). In 2008, at the time of an important study regarding EEF in the Eixo Atlântico (Serantes & Barracosa, 2008), the total number of existing EEF was 84. Additionally, Galiza had a further 81 initiatives for interpretation/dissemination centers, but these were not considered to be EEF.

Methodology

By means of a qualitative research design and following an interpretive paradigm, multiple case studies were conducted within EE facilities of Galicia and North of Portugal. The selection of the intentional sample considered a set of *criteria* with four main aspects (Table 1).

As shown in Table 1, the set of criteria is comprised of the general characteristics of an EEF, the characteristics of an EEF with a high social impact (e.g., medium/long

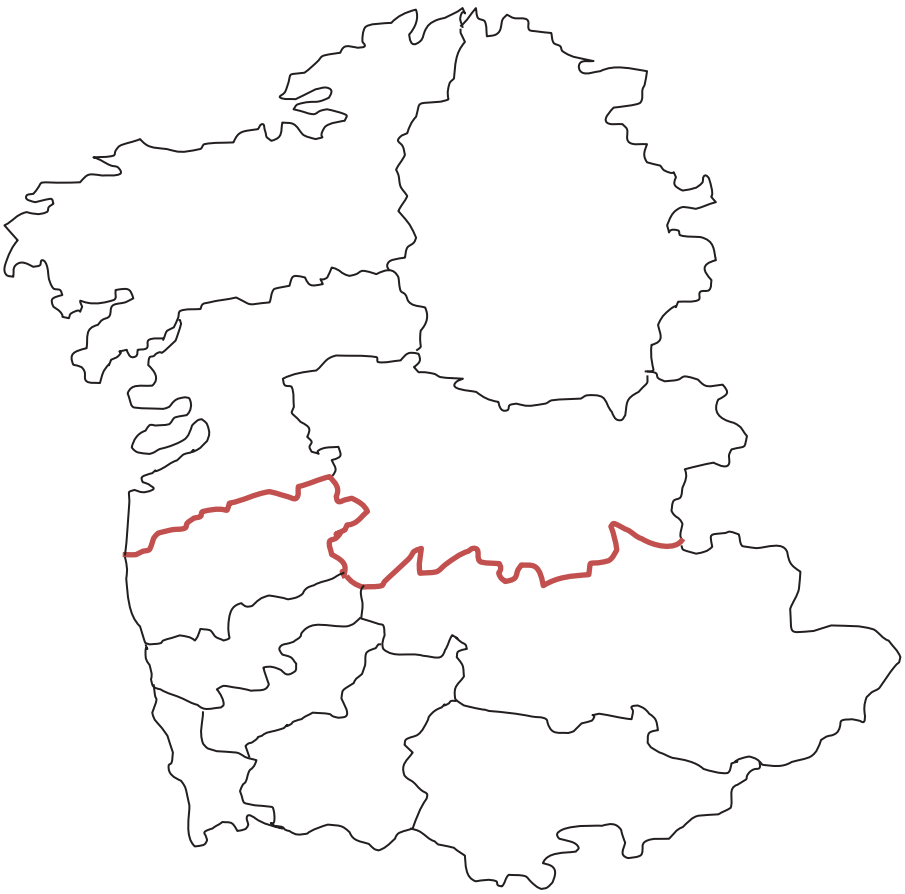

Figure 4. Identification of the EEF selected and the sub-criteria fulfilled.

term activities; local people as part of the facility's staff) and the EEF characteristics concerning a critical pedagogy of place (e.g., existence of sociocultural objectives and themes; participatory methodologies; and systemized and consistent evaluation). To be included in the study each case required a minimum of three points in this table of characteristics (Table 1). Characteristics were broken down into subcharacteristics, and provided the particular case matched at least one of those subcharacteristics then it was awarded a point for that characteristic group (e.g., if an EEF satisfied the A.2.1 characteristics then it would get 1 point for the A.2 group). In the selection, it was crucial to consult existing documentation (e.g., a database from the Portuguese Environment Agency and the publications of Serantes (2010) and Serantes & Barracosa (2008)). The selection was limited to a total 29 EEF (17 in Galicia and 12 in the North of Portugal, both in coastal and inland areas of Eixo Atlântico) (Fig. 4).

As shown in Fig. 4, the sample of EEF includes both initiatives on the coast (in mostly urban or semiurban areas) and also inland areas (mostly rural) of the Eixo Atlântico.

Table 2. Summary of interview script scheme/topics.

General parts	Structure of the questions
Part A General characteristics	i) Biographical data of the interviewed person; ii) Quantitative data of the EEF (creation date; team elements; number of visitors) …
Part B EEF evolution and connection with the surroundings	i) Motivations for the EEF creation; ii) Educational project (main activities, themes including of sociocultural aspects; typology of visitors); iii) economic situation of the EEF and of the surroundings; iv) socio-environmental problems of the surroundings; v) relation with the surroundings (connection with the local community; partnerships); vi) main success and difficulties of the EEF; vii) educational team (areas of initial training and needs of continuous training; changes with the experience at the EEF).

Information was collected through semistructured interviews (Kvale, 2011) with the directors and educators of each EEF. The interview structure included quantitative data about the EEF as well as qualitative topics connected to the selection *criteria* (Table 2).

A different approach to the initial contact with the EEF was used in each region of Eixo Atlântico. In the Portuguese side, contact was initiated in a more formal way (via email contact to the directors), while in Galicia a more informal approach was taken (via telephone) since the EEF are smaller and more informal. The timing of the interviews took into consideration the seasonality of some EEF (some close during winter time). Where local accommodation was offered by the EEF, it provided an additional opportunity to more deeply understand the dynamic of the center and to observe some activities. In two cases, in which the director wasn't available, an educator was interviewed instead. In another two EEFs, the director's role was shared, so a group interview was conducted. In total, 31 people were interviewed.

The confidentiality and privacy of the interview was guaranteed, allowing the interviewees to more freely express their opinions. Permission was sought to make an audio recording of each interview, with each one taking approximately 60 minutes. There was also a brief tour around the EEF before the interview commenced. Although the main researcher is Portuguese, the language wasn't an issue in Galicia as the similarity of both languages and cultures allowed for an easy bilingual conversation, with the interviewer speaking Portuguese and the interviewee speaking Galician. However, in two EEFs, the interview was conducted in Spanish since the directors/persons responsible were more familiar with this language.

A general reading of the transcribed interviews (Yin, 2001) was carried out and then used as the basis for the categorical analysis in the computer program *NVivo*. The main categories include elements such as educational programs and characterizations of educational teams. Through an analysis matrix, these characterizations in different categories were compared and correlated with each other and with additional "attributes" (quantitative data) and variables (e.g., rural/ urban areas).

Results

The results focus on the various interconnection strategies that the EEF establish with their surroundings and the factors that influence those connections.

Table 3. Categorization of the objectives of the activities and the visitors' typologies.

Elements of the educational program (descending frequency importance)	
Objectives of the activities	Typologies of EEF visitants
Sociocultural objectives	Primary and middle school' students
Valuing the local culture	Families
Local development	Senior Groups
Social inclusion	Groups of professionals from different sectors
Social and political press	Secondary school students
Educational and research objectives	Diverse types of non-governmental organizations
Scientific research	People with special educational needs
Civic and health awareness	University students
Creativity and critical analysis	Parents and schools' staff
Objectives of resources management and conservation	Institutionalized youngers

Strategies for EEF interconnection with their surroundings

What are the most frequent objectives of EEF activities and the most frequent type of visitors to the EEFs?

First, EEFs were asked about their educational programs (specifically, the objectives of their activities and the types of visitors) (Table 3).

According to the directors, sociocultural objectives of the educational programs (valuing the local culture and local development) are the most common type of objectives in the EEF studied (Table 3). Concerning the users/visitors of those EEF programs, young students are the main type of visitors (Table 3), although other sectors of the local community (e.g., professionals such as fisherman) also attended several EEF activities.

What are the most frequent types of EEF interaction with the local community?

Different types of interaction of the EEF with the local community were investigated (Table 4).

The directors and educators stated that the EEF conducted more collaborative (as opposed to less collaborative) forms of interaction with the local population (Table 4). The category "local people as activities' guides" includes, for example, demonstrations of traditional rural crafts and work practices.

Another strategy of involvement with the local surroundings is the development of projects for local improvement. These projects were directly aimed at improving environmental, socioeconomic, and/or cultural aspects, as shown in the extract from participant NP3 in a natural area:

Table 4. Categorization of the interaction of the local population with the EEF.

Most collaborative ways of interaction	Less collaborative ways of interaction
Local people as activities' guides	Local passive participants in EEF activities
The EEF lends facilities and objects to the population	Initial or current resistance to EEF actions
The population lends objects and information for EEF' exhibitions	—
Public participation in strategic plans of the territory	—
Elements from the EEF team are originally from the surroundings	—
Protection of the EEF area	—

Table 5. Categorization of the interconnection among EEF and types of continuous training.

Connection among the EEF cases	Continuous training models used by educators
Mention to another EEF during interviews	Congresses, courses
Team training in other EEF	Communities of practices and team meetings
Visiting another EEF	Visiting another EFF
Some EEF participate in the same project (national, international level)	—
Informal contacts (phone) for experiences sharing	—
Educators of one EEF lead activities in other EEF	—

> (…) we help farmers to rethink their practices. Since some people are very old (…) we compensate them and commit to ecomanage their properties to conserve the natural area. NP3

An additional important interconnection strategy consists of creating partnerships of diverse types: i) "Internal" partnerships (between the EEF and departments/facilities of the entity who manage the EEF); ii) "external" partnerships (with other EEF and various other entities such as local authorities, universities and private companies). Many of the external partnerships are related to youth volunteering initiatives, professional traineeships, and scientific support for environmental educators.

What are the most frequent types of interconnection among the EEFs and types of continuous training?

Interconnection between EEF was analyzed along with models of shared staff training that the study participants have attended (Table 5).

Directors and educators highlighted the category "team training in other EEF" and "visiting another EFF" as the most commonly used informal strategies for EE training (Table 5).

What types of network and interconnections exist among EEF in the North of Portugal and Galicia?

Cooperative networking is another form of interface among the EEF and other entities (Fig. 5).

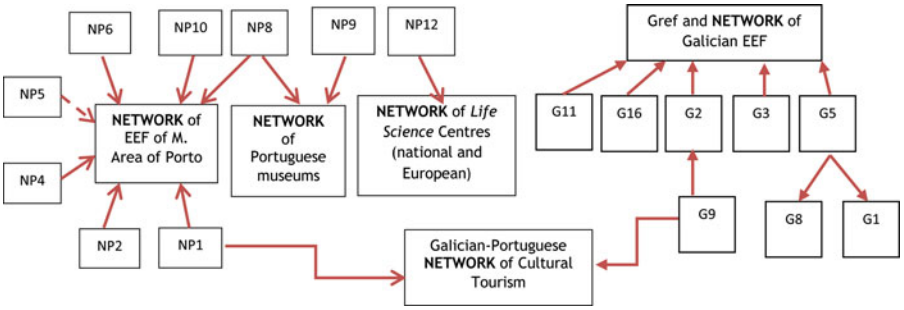

Figure 5. Networks and Interconnections among EEF in the North of Portugal and Galicia.

Table 6. Categorization of the areas of initial training, experience/knowledge and the ideal profile to be an educator.

Areas of initial training	Experience knowledge of educators	Ideal profile of an educator
Biology, Chemistry, Geology, Biotechnology, Sea Sciences	Consistency between professional and private life	Curiosity for different areas of knowledge
Education, Pedagogy, Environmental education	Knowledge increasing	Sociability and the capacity of valuing other people
Leisure time entertainment, Tourism, Sports	Enjoyment and Knowledge acquisition from visitors contact	Communication competence of scientific information
Engineering and technical courses	Contacting with several institutions	The will to increase environmental behaviors
Environmental Sciences, Env. Management, Env. Engineering	—	Enjoy guiding activities
History, Cultural Heritage	—	Creativity and flexibility in activities
Communication, Journalism, Languages	—	—
Economy, Management, Administration	—	—
Arts, Architecture	—	—

In the study both educational and noneducational networks were observed in equal amounts (Fig. 5). Regarding educational networks, one initiative was found on each side of the Eixo Atlântico region. A few Galician participants mentioned the Network of EEF in Galicia, which provides training courses that take place at the University Extension Centre of Environmental Education of Galicia (CEIDA- referred to in this study as Gref). Some of the Portuguese participants mentioned the Network of the Metropolitan region of Porto. The exchange of information between Galicia and North of Portugal was also mentioned by a minority of educators (who referred to eight interconnections for exchanging educational information and four interconnections for exchanging noneducational information).

Correlating factors that improve the interconnection of the EEF with its surroundings

What are the most frequent areas of initial training, types of experience/knowledge, and ideal profiles of an educator?

How educators are trained, their experience and their opinion on an ideal profile for their role, are factors that influence the interconnection of an EEF with its surroundings (Table 6).

The participating professionals largely came from the area of Natural Sciences and have mainly acquired educational skills through their work experience (Table 6). This self-motivated learning is well-suited to the profile of an ideal educator— especially their curiosity for different areas of knowledge. Compared to other fields, the areas of Educational and Social Sciences (e.g., Environmental Education) were found to have only a medium level of representation in Eixo Atlântico.

Table 7. Categorization of the motivations and successes of the EEF studied.

Motivations for the EEF creation	Perceptions of EEF success	
Support study visits to natural areas	Concerning the surrounding area of EEF	Strong connection to local community
Foster bonds with the EEF surrounding		Greening municipal and intermunicipal politics
Promote an integrated debate by connecting the environmental area and arts	Concerning the visitors	Visitors satisfied in respect to knowledge
Joining EE with hotel and cultural dimensions		The same groups or schools repeating the visit
Have a repaired or new building for EE	Concerning the educational team	Stability of the educational team

What are the most frequent initial motivations for creating the EEF and the most frequent types of success mentioned?

The motivations for creating an EEF were compared and correlated with the perceptions of EEF successes (Table 7).

The main categories for the reasons to start an EEF and the factors of its success, are related to sociocultural aspects (e.g., to foster bonds with their surroundings) (Table 7).

Is there any correlation between the existence of local projects and the vision of the EEF as a social facilitator?

Responses related to local improvement projects were compared and correlated with responses related to envisioning the EEF as a social facilitator (Table 8).

The EEF which have projects for local improvement view the EEF as a place for community bonding as well as a place of training (Table 8).

Are there differences in the educational objectives and forms of community engagement between rural and urban EEFs?

A final factor conditioning the bonds between EEF and local people is related to the population density and demographics, essentially considering if the EEF is located in a rural or urban area. This aspect is evident from examining the objectives of the educational program and the forms of interaction with the community in both contexts (Table 9).

Table 8. Categorization that compares and correlates the vision of EEF as social facilitators with the view of EEF as promoters of improvements to their surroundings.

Visions of social facilitators in EEF that run projects for local improvement	Subcategories of vision types
EEF as a connection point with the local community	Intergenerational factor and integration of excluded groups
	Exchange of knowledge and of community values
	Socioeconomic benefits for local people and a touristic point
	Connection Environment-Culture
EEF as training center, accessible to all	Centre for professional training

Table 9. Comparing the frequency of educational objectives and forms of community engagement in both rural and urban areas.

Objectives of the Educational program	Rural area	Urban area	Interaction with the community	Rural area	Urban area
Local development	8	3	Local people as activities' guides	8	4
Valuing the local culture	7	5	The EEF lends facilities and objects to the population	5	7
Social inclusion	6	6	The population lends objects and information for EEF' exhibitions	4	6
Social and political press	1	0	Public participation in strategic plans of the territory	1	4
Resources management and conservation	3	2	Elements from the EEF team are originally from the surroundings	4	2
Scientific research	3	4	Protection of the EEF area	0	2
Civic and health awareness	2	5	Local passive participants in EEF activities	5	7
Creativity and critical analysis	2	1	Initial or current resistance to EEF actions	6	3

In rural areas, there are stronger bonds to the local population than in the cities (Table 9). In most rural contexts, there are also more active forms of interaction that in the cities. Some EEF exist in semiurban coastal areas that don't neatly fit into the rural or city categories (e.g., fishing communities) but that have the strong local bonds and interaction exhibited by rural areas.

The importance interviewees placed on EEF having goals to enhance the local culture, especially in rural areas, is exemplified by G3:

> Our main goal is not to separate the rural from the urban world, it's to create partnerships (…). (…) It's to live from the land, to eat healthy, and people from here did it. (The EEF) is a proud achievement for the community because rural knowledge was never found in books and so was typically given little value [until it was promoted by the EEF]. G3

Discussion of results

The results highlight the diversity of connections that the studied set of EEF established with their surroundings.

How have the educational programs contributed to a high social impact?

First, the educators and directors emphasized that visitors of the EFF value the sociocultural objectives of their educational programs, such as the way the local culture is valued in these centers. By exploring this traditional ecological knowledge, it is possible to gain a deeper understanding of the local ecosystems and to develop values consistent with sustainable socioecological systems (Reid, Teamey, & Dillon, 2004). Also, the reality observed shows that directors follow a practice of place-based education as part of a critical pedagogy of place (Orr, 2005).

EEF visitors include a variety of local community sectors, with primary school groups being the most common type of visitors. These young visitors can become environmental change agents in their families and in their larger community

by pressuring adults (as in the IVAC (investigation-vision-action-change) Project (Uzzell et al., 1998)). However, they have a lesser direct decision-making power regarding environmental issues compared to those adults.

The dominance of the school education sector and the importance placed on acquisition of knowledge (rather than practical skills and problem solving) extend to all the regions of the Iberian Peninsula. In South America, by contrast, in countries such as Brazil, there is a tradition of an integrated and community EE (Deboni-Silva & Sorrentino, 2003), resulting in EEF having more contact with other groups, such as families, farmers, other professionals, tourists, etc. Post-adolescents and pre-adult students have a small presence in the studied EEF, as similarly reported in a survey by Schmidt, Gil-Nave, O'Riordan, and Guerra (2011) about the participation of Portuguese citizens in environmental actions. This finding may be explained by "unattractive" approaches of EE, which do not engage or connect with the interests and identity of these groups. Entrepreneurs, local decision-makers, and adults in general, barely visit EEF. As suggested by Serantes (2011), it seems necessary that the EEF reorient their programs to target social groups with more decision-making power.

How have EEF connections contributed to a high social impact?

The directors value two main ways in which the EEF create strong connections with their surroundings: 1) active methods of interaction with the local community; 2) projects for local improvement. Additionally, directors consider that the diverse interaction with the local community is one of the central motivations for having created those EEF. In this way, visitors have much "contact with the local reality", so contributing to a set of EEF with a high social impact.

The research of Serantes and Barracosa (2008) found that many EEF in Galicia, and even more in the North of Portugal, still have much room for improvement in terms of delivering a high level of social impact. However, most of the case studies investigated in this research already show a high level of social impact.

Indeed, the committed action of EEF in the surrounding community (e.g., EEF activities conducted by elderly neighbors) reveals a strong sense of place attachment, similar to that described in the work on critical pedagogy of place by Orr (2005) and McKenzie (2008). Additionally, some directors proudly shared episodes of direct protection of the EEF by neighbors.

Concerning the strategy of local improvement projects, the directors and educators shared two types of local initiatives: biophysical and socioeconomic projects. Such projects resulted in a high social impact of the EEF since the EE initiative is focused on enhancing the skills of citizens to improve their surroundings. Despite this involvement, it is uncommon for citizens to report environmental infractions to EEF, as Medir, Heras, and Geli (2013) and Serantes (2011) find, respectively, in Galicia and in Spain. Equally, public participation is still rare in Portugal, despite occasions showing that the popular mobilization of people is possible (for example, during the revolution in the 1970s) (Sousa-Santos & Nunes, 2004).

We found four main interdependent factors that contribute to EEF interconnection within the regional and transnational contexts: i) the strong incidence of partnerships and a wide range of partner organization types; ii) interaction between different EEF; iii) the existence of cooperation networks of EEF; iv) exchanges between EEF from Galicia and the North of Portugal.

Can an economic crisis motivate stronger EEF partnerships?

In this study we have found that, in the Portuguese reality, the economic crisis has motivated stronger EEF partnerships in two main areas: the strengthening of human resources (for example, utilizing researchers from universities to develop activities within the EEF) and the training and improvement of their environmental educators. Meira, Barba, and Lorenzo (2015) argue that the social and economic crisis is being exploited to justify the elimination of an inconvenient sector for the hegemonic system. To improve this situation and to meet the local environmental needs, Cid (2013) recommends the streamlining of professionalization processes, including the promotion of training courses. We also agree with Meira and Pardellas-Santiago (2010) who suggest strengthening connections between institutions within this sector to improve the professional conditions of EE organizations.

Are there relevant connections between the Galician and Portuguese EEF?

Although there are formal cooperation networks of EEF, these platforms currently do not have a strong presence nor do they exist at a trans-regional level. Furthermore, the directors admitted that the exchange among these networks and among EEF across the Galicia/North of Portugal border is minimal. As Meira and Pinto (2008) consider, there is still a high potential for knowledge exchange among the EEF within this Euroregion. Particular topics that could be beneficial for EEF to exchange information on include:

1) Aspects in which the EEF in Galicia and North of Portugal differ. For example, in Spain, the educators' career path is more commonly linked to the Education Sciences (Meira et al., 2015) whereas in Portugal the educator's career path it is more commonly linked to the Natural Sciences. In Galicia, the focus on the initial and continued training in Education/Social Sciences, may explain the differences with Portugal in terms of the high level of EEF bonds with their surroundings and the greater integration of sociocultural aspects in EE practice. Another important difference to share between Galicia and Portugal is how Portugal EEF utilise university partnerships to reinforce human resources (as previously discussed).
2) Common phenomenon across the Eixo Atlântico Euregion. In particular, the differences exhibited between geodemographic contexts of the EEF (i.e. between the rural and urban settings of the EEF). In rural and remote settings the objective of local development is emphasised more than in urban settings. Additionally, within the territory of Eixo Atlântico, many of the EEF with

high social impact are in rural areas. This result concurs with the research of Pitoska and Lazarides (2013) who show the positive impact of EEF on the local community (including schools), especially in disadvantaged regions. Another difference between rural and urban settings was that in Galicia, some rural EEF were created as self-employment solutions for local inhabitants (Serantes & Barracosa, 2008). Finally, compared to urban EEF, rural EEF typically have the opportunity to offer more enjoyable local educational activities due to their pleasant natural surroundings (Serantes, 2011).

Final considerations

This study revealed a great variety of strategies that EEFs establish to connect with their local and wider surroundings.

The sociocultural objectives of educational programs, as well as the initial social motivations and the involvement of some local community sectors, all enhance the high connection of the EEF with its local surroundings. These factors demonstrate a place-based approach to EE and result in this set of EEF being classified as "high social impact". This is illustrated, for example, by the existence of projects for local improvement.

Regarding the involvement of EEF with their wider surroundings, partnerships proved to be a crucial element. In particular, helping to address the human resource constraints in this European trans-region. This study also shows the importance of the sociocultural context of where the EEF is located, as well as the type of educational team, in strengthening the bonds with the surrounding community.

The exchange between EEF across border regions was found to be under developed, as were EEF networks. The demographic factor of land use (urban versus rural/natural) is one of the main reasons for the disparities between EEF in Eixo Atlântico.

Considering the role of the EEF in promoting social contact and the contact of citizens with nature, our study agrees with Serantes (2011) who states that local people may be effective actors in education and action to support environmental goals.

Furthermore, the fostering of the following processes is recommended:

(1) Increasing educators' training on educational strategies to better address issues such as critical pedagogy of place, urban problems and evaluation systems of EEF;
(2) Creating a cooperation network of EEF in the scope of the Eixo Atlântico which might address: i) the coordination between the EEF and local/regional sectoral strategies; ii) the coordination between EEF and significant institutions of Eixo Atlântico.

Acknowledgments

The authors express their thanks to all the EEF that participated in this study, as well as to the reviewers of the English version of the manuscript (Pedro Flores and Jason Pascoe).

Funding

This work was supported by the Foundation for Science and Technology (FCT), Portugal (Grant numbers: SFRH/BD/69059/2010 and SFRH/BPD/116379/2016).

ORCID

Sara Costa Carvalho http://orcid.org/0000-0002-0954-8449
Pablo Ángel Meira Cartea http://orcid.org/0000-0003-0194-7477
Ulisses Miranda Azeiteiro http://orcid.org/0000-0002-5252-1700

References

Alves, F., Leal-Filho, W., Araújo, M. J., & Azeiteiro, U. M. (2013). Crossing borders and linking plural knowledge: Biodiversity conservation, ecosystem services and human well-being. *International Journal of Innovation and Sustainable Development*, *7*(2), 111–125. doi:10.1504/IJISD.2013.053323

Carvalho, S. C. (2015). Potencialidades e práticas de integração das dimensões sociocultural e biofísica em equipamentos para a educação ambiental: Estudos de caso do Eixo Atlântico (Norte de Portugal e Galiza). Doctoral dissertation, Universidade de Santiago de Compostela, 2015.

Cid, O. (2013). A vueltas con los equipamentos de educación ambiental. In C. Escudero, M. Oliver, & A. Serantes (orgs.), *Los equipamientos de educación ambiental en España: Estudio desde el Seminario de Equipamientos de Educación Ambiental del CENEAM* (pp. 7–14). Madrid: Organismo Autónomo Parques Nacionales. Ministerio de Agricultura, Alimentación y Medio Ambiente.

Deboni-Silva, F., & Sorrentino, M. (2003). Los centros de educación ambiental (CEA) Brasileños y los equipamentos de educación ambiental (EEA) españoles: Aproximaciones e diferenciaciones. *Tópicos en Educación Ambiental*, *5*(13), 58–72.

Dubeck, K., & Schulz, D. (2004). German, Polish and Czech school cooperation in Neisse-Nisa-Nysa Euroregion. *European Education*, *36*(3), 70–76. doi:10.1080/10564934.2004.11042361

Gruenewald, D. A. (2003). The best of both worlds: A critical pedagogy of place. *Educational Researcher*, *32*(4), 3–12. doi:10.3102/0013189X032004003

Kocur-Bera, K. (2017). A safe space of rural areas in the context of the occurrence of extreme weather events – A case study covering a part of the Euroregion Baltic. *Land Use Policy*, *71*, 518–529. doi:10.1016/j.landusepol.2017.11.013

Kovach, V. I. (2015). Carpathian Euroregion as an example of euroregional cross-boundary cooperation. *Ekohomika AMK*, *11*, 96–101.

Kvale, S. (2011). *Las entrevistas en investigación cualitativa*. Madrid: Ediciones Morata.

Lepik, K. (2009). Euroregions as mechanisms for strengthening cross-border cooperation in the Baltic Sea Region. *Trames: A Journal of the Humanities & Social Sciences*, *13*(63/58), 3, 265–284. doi:10.3176/tr.2009.3.05

Marques, R. (1999). A vontade política de crear un espácio europeu. In X. M. Souto-González *A História no Eixo Atlântico (History of the Eixo Atlântico)* (pp. 10–71). Vigo: Eixo Atlántico do Noroeste Peninsular.

McKenzie, M. (2008). The places of pedagogy: Or, what we can do with culture through intersubjective experiences. *Environmental Education Research*, *14*(3), 361–373. doi:10.1080/13504620802194208

Medir, R. M., Heras, R., & Geli, A. M. (2013). Guiding documents for environmental education centres: An analysis in the Spanish context. *Environmental Education Research*, *20*(5), 680–694. doi:10.1080/13504622.2013.833590

Meira, P. A., & Pardellas-Santiago, M. (2010). Proxecto Fénix: Investigando y actuando en la Educación Ambiental Gallega. *Carpeta Informativa del CENEAM* (pp. 2–10). Febrero: National Centre of environmental education.

Meira, P. A., & Pinto, J. R. (2008). A educação ambiental em Galicia e Norte de Portugal: Uma valoração estratégica desde a perspectiva local no Eixo Atlântico. In L. Cunha & M. Santiago (orgs.), *Estratexias de Educación Ambiental: Modelos, experiencias e indicadores para a sostenibilidade local* (pp. 31–82). Vigo: Eixo Atlântico do Noroeste Peninsular.

Meira, P. A., Barba, M., & Lorenzo, J. J. (2015). O impacto da crise económica no campo da Educación Ambiental en Galicia: Análise comparada da situación profesional en 2007 e 2013. *Ambientalmente Sustentable*, *1*(17), 25–50.

Moran, L., & Rau, H. (2016). Mapping divergente concepts of sustainability: Lay knowledge, local practices and environmental governance. *Local Environment: The International Journal of Justice and Sustainability*, *21*(3), 1–17. doi:10.1080/13549839.2014.963838

Orr, D. (2005). Place and pedagogy. In M. Stone & Z. Barlow (Ed), *Ecological Literacy* (pp. 85–95). San Francisco: Sierra Club Books.

Pitoska, E., & Lazarides, T. (2013). Environmental education centres and local communities: A case study. *Procedia Technology*, *8*, 215–221. doi:10.1016/j.protcy.2013.11.030

Reid, A., Teamey, K., & Dillon, J. (2004). Valuing and utilizing traditional ecological knowledge: Tensions in the context of education and the environment. *Environmental Education Research*, *10*(2), 237–254. doi:10.1080/1350462042000198195

Robottom, I. (2012). Socio-scientific issues in education: Innovative practices and contending epistemologies. *Research in science education*, *42*(1), 95–107. doi:10.1007/s11165-011-9258-x

Sampedro, L. (2012). *Para compreender a Euroregião Galiza – Norte de Portugal* Master dissertation. Coimbra: Universidade de Coimbra.

Sauvé, L. (2005). Educação Ambiental: Possibilidades e limitações (Environmental Education: potential and limitations). *Educação e Pesquisa (Education and Research)*, *31*(2), 317–322. doi:10.1590/S1517-97022005000200012

Schmidt, L., Gil-Nave, J., O'Riordan, T., & Guerra, J. (2011). Trends and dilemmas facing environmental education in Portugal: From environmental problem assessment to citizenship involvement. *Journal of Environmental Policy and Planning*, *13*(2), 159–177. doi:10.1080/1523908X.2011.576167

Serantes, A. (2010). (Red.) *Equipamentos de Educación Ambiental en Galicia*. A Coruña: Xunta de Galicia.

Serantes, A. (2011). Os equipamentos para a educación ambiental en Galicia: Análise da realidade e propostas de mellora de calidade. Doctoral dissertation, Universidade da Coruña, 2011.

Serantes, A., & Barracosa, H. (2008). Contributos dos equipamentos de educação ambiental para as estratégias de acção local. Estudos de caso na Galiza e no Norte de Portugal. Case studies in Galicia and north of Portugal). In L. I. Cunha & M. P. Santiago *Estratexias de Educación Ambiental: Modelos, experiencias e indicadores para a sostenibilidade local* (pp. 179–200). Vigo: Eixo Atlântico do Noroeste Peninsular.

Sorrosal, A. (2010). Las redes de cooperación, seña de identidad del Eixo Atlántico. *Eixo Atlântico – Revista da Euroregião Galiza-Norte de Portugal (Eixo Atlântico – Journal of the Euroregion Galicia-North of Portugal)*, *17*, 113–120.

Sousa-Santos, B. S., & Nunes, J. A. (2004). Democracy, participation and grassroots movements in contemporary Portugal. *South European Society and Politics*, *9*(2), 1–15. doi:10.1080/1360874042000253465

Uzzell, D., Fontes, P. J., Jensen, B. B., Vognsen, C., Uhrenholdt, G., Gottesdiener, H., Davallon, J., & Kofoed, J. (1998). *As crianças como agentes de mudança ambiental*. Porto: Campo das Letras.

Yin, R. K. (2001). *Estudo de caso: Planejamento e métodos*. Porto Alegre: Bookman.