

GEOCONSERVATION AND ENVIRONMENTAL EDUCATION AT GEOPARK ARARIPE (CEARÁ) THROUGH DIDACTIC WORKSHOPS AND FIELD CLASSES

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ABSTRACT

Environmental Education can be developed from the perspective of the diversity of experiences, and commitments, which have in common the transformation of society through education. In this process of environmental awareness, it is developed in the school space, or outside it, which is contemplated as determined entities, as in geoparks, it proves to be decisive for the understanding of the individuals or environments that surround them. Thus, the objective of this study is to analyze and work on non-school environmental education as a strategy in the process of geoconservation of geosites in the Araripe Geopark. Among the results, we can see that the geopark, mainly through the interpretation and environmental education centers, develop activities such as workshops for replicas of fossils, bio-jewels, puppet theater and cloth book, in addition to ecological trail and holiday camp. Many are extraordinarily important actions for regional geoconservation, as they are not public actions in important actions still carried out for the geopark conservation area

Keywords: Geodiversity. Geoconservation. Environmental Education.

GEOCONSERVAÇÃO E EDUCAÇÃO AMBIENTAL NO *GEOPARK* ARARIPE (CEARÁ) POR MEIO DE OFICINAS DIDÁTICAS E AULAS EM CAMPO

RESUMO

A Educação Ambiental pode ser desenvolvida na perspectiva da diversidade de experiências, reflexões e compromissos, que têm em comum a transformação a sensibilização da sociedade através da educação. Neste processo de conscientização ambiental, seja ela desenvolvida no espaço escolar, ou fora dele, contemplados nos currículos ou em ações promovidas por determinadas entidades, como nos geoparques, revela-se determinante para a compreensão de como os indivíduos percebem o meio que os cercam. Desse modo, o objetivo deste estudo é analisar e trabalhar a educação ambiental não-escolar como uma estratégia no processo de geoconservação dos geossítios do geopark Araripe. Entre os resultados podemos constatar que o geoparque, principalmente, por meio dos centros de interpretação e educação ambiental desenvolvem atividades como oficinas de réplicas de fósseis, biojóias, teatro de bonecos e livro de pano, além de trilha ecológica e colônia de férias. Muito embora, as ações sejam extramente importantes para a geoconservação da geodiversidade regional, o público alcançado pelas ações realizadas ainda não é relevante em relação à área de abrangência do geopark Araripe.

Palavras-Chave: Geodiversidade. Geoconservação. Educação Ambiental.

ENVIRONMENTAL EDUCATION AND GEOCONSERVATION: A BRIEF INTRODUCTION

Environmental education involves educational actions and practices aimed at raising awareness of environmental issues and their organization and participation in the defense of the quality of the environment (KLEIN et al., 2011). According to federal law No.

9,795/1999 (BRASIL, 1999) it is the duty of the public authorities: "to promote environmental education at all levels of education and public awareness for the preservation of the environment".

From this perspective, the law recognizes environmental education as an essential and permanent component in the entire educational, formal and/or non-formal process, as guided by Articles 205 and 225 of the Federal Constitution of 1988 (SILVA, 2003). One of the objectives of environmental education is to encourage individual and collective, permanent and responsible participation in preserving the balance of the environment, understanding the defense of environmental quality as an inseparable value of the exercise of citizenship (BRASIL, 1999).

Among the areas in need of environmental protection are the geosites of geoparks and sites of geological and geomorphological interest, which require constant actions of environmental education for the geoconservation of geoheritage.

In this context is the Geopark Araripe, in the southern region of the state of Ceará, surrounding the territory of the municipalities of Crato, Juazeiro do Norte, Barbalha, Nova Olinda, Missão Velha and Santa do Cariri (figure 1). The first geopark in the Americas (GOVERNMENT OF THE STATE OF CEARÁ, 2012), created in 2006, is part of the Global Geoparks Network (GGN) and has 9 (nine) geosites. The geopark is a territory with defined limits, composed of geosites with great scientific, historical, cultural and environmental value that present rarity, geological and paleontological richness, allowing broad understanding about history and evolution of the earth.

In this way, geoparks foster the identity of territory, through the valorization of the image of the territory, and education for sustainable development, since natural resources can and should be used by its residents under the paradigm of sustainability and not until its exhaustion. The management strategy of a geopark focuses on promoting geoconservation, in addition to promoting tourist and educational activities that contribute to the economic development of the region (PEREIRA, 2010).

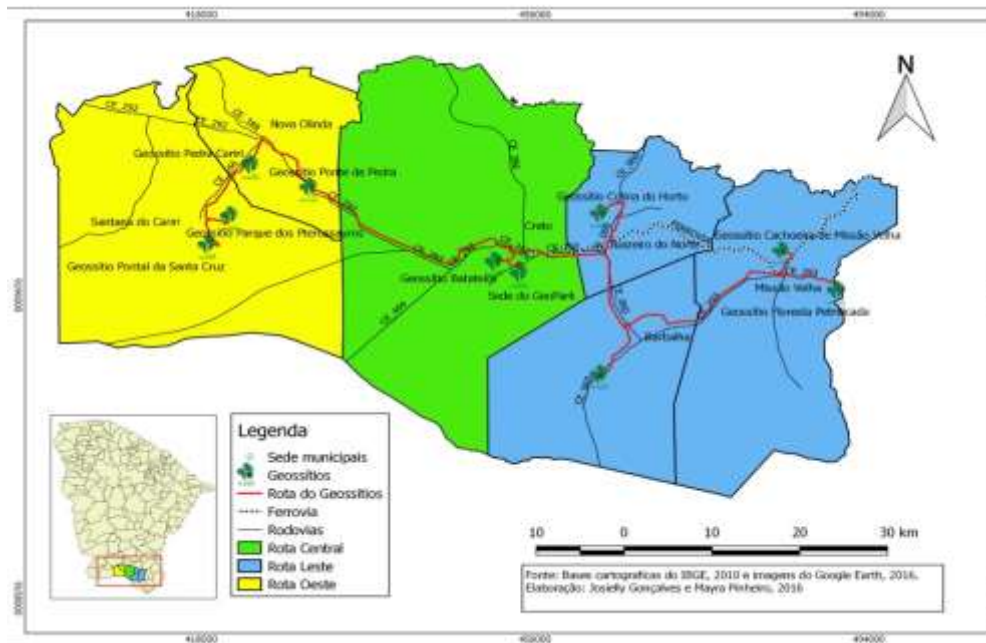


Figure1. Map of the territory of the Araripe geopark, southern region of Ceará, With indication of geosites distributed on 3 (three) routes.
Source: Josielly Gonçalves and Mayra Pinheiro, 2016.

The geoconservation of the geoh heritage of a geopark, in addition to ensuring the protection of geodiversity, also aims at the protection of sources of information about the geological history of the Earth, contained in geological structures that were formed by processes, whose time scale is millions or billions of years (RUCHKYS, 2007).

The Araripe geopark as an instrument of education, culture and socio-environmental development has assumed an effective character in the face of the dissemination of knowledge on the environmental theme, due to the need for conservation of environmental, paleontological, cultural and socioeconomic heritage existing in its area of coverage.

One of the main characteristics of natural resources belonging to the geopark is the aesthetic dimension of its geodiversity that is configured as an oasis in the Brazilian Semi arid, located in the southern region of Ceará in the Araripe sedimentary basin. This title is justified by the richness in freshwater sources, allowing the presence of plant and animal species, specific to the said environment.

Geodiversity is the result of the interaction of several factors, such as rocks, climate, living beings, among others, enabling the appearance of distinct landscapes around the world (SHINES, 2005), integrating geological diversity (rocks, minerals and fossils), geomorphological (relief forms) and pedological (soils), in addition to the processes that originated them (BÉTARD; PEULVAST; MAGELLAN,2011).

Scientific witness of the events that marked the evolutionary history of the Earth, geodiversity should be preserved as a fundamental part of natural heritage and used for scientific, didactic, cultural, educational and geotourism purposes (GODOY et al.,2013), in the form of natural sites, geosites, considering their 7 (seven) fundamental values:

intrinsic, cultural, aesthetic, economic, functional, scientific and didactic (MOCHIUTTTI et al., 2012).

Considering this geoh heritage, it is essential to take educational actions aimed at collective awareness and participation in the defense of the environment, in which different social and political actors can act, such as the public authorities in the promotion and dissemination of educational campaigns related to geodiversity, the participation of public and private companies, media, non-governmental organizations (NGOs), schools and society, in the formulation, execution and development of programs and activities linked to environmental education (BRASIL, 1999), associated with the introduction of the discussion on geodiversity among the physical-natural themes of School Geography (ALBUQUERQUE, 2019) thus allowing the articulation between the object to be conserved/disseminated to the educational tool.

Considering these aspects, Article 13 of Law No. 9,795/99 treats the non-formal scope defining it as "educational actions and practices aimed at raising the awareness of the collective on environmental issues and its organization and participation in the defense of environmental quality" (BRASIL, 1999). The sole paragraph of this article states that the government will encourage, among others, the broad participation of the school, the university and non-governmental organizations in the formulation and implementation of programs and activities related to non-formal environmental education; and the participation of public and private companies in the development of environmental education programs in partnership with the school, university and non-governmental organizations.

Within this context are the environmental education centers (CEA) which were officially created in Brazil by the Ministry of Education and Culture in 1993, from the realization of the 1st National Meeting of Environmental Education Centers, held in 1992, in Foz do Iguaçu, Paraná. With the realization of RIO-92, there was an influence on the environmental issue in Brazil providing the formalization of CEAs as complementary resources and change in the integral formation of the citizen (SILVA; SORRENTINO, 2012).

The Araripe geopark has two (2) environmental education centers located in the cities of Crato and Missão Velha, both in Ceará. In these centers are developed activities focused on the playful always focusing on the environmental issue and inclusion. From this study, it is verified that an AEC contributes significantly to the educational process, and that the work developed in this space has been increasingly accepted and sought by the community of geosites and society as a whole (MACEDO, 2015).

In view of the above, this study aimed to analyze and work environmental education in non-school space as a strategy in the geoconservation process of geosites and promotion of geodiversity of the Araripe geopark.

METHODOLOGY

From the methodological point of view, the research consisted of the collection of data on institutionally documented educational activities, the performance of practical activities and the application of questionnaires, thus structuring itself in 3 (three) stages carried out in 2019.

The first stage consisted of the analysis of reports of the actions developed in communities and schools located in the territory of the Geopark Araripe, in particular, the activities developed in the centers of interpretation and environmental education (CIEAs) of the cities of Crato and Missão Velha involving environmental education in schools and communities, that is, in school and non-school spaces.

Based on the analysis of the institutional reports, in the first phase, 2 (two) actions of the EA were chosen to be carried out and monitored personally. Among the actions developed at CIEAs were chosen, the classroom class and workshop of fossil replicas for the realization of the second phase, aiming to better know the relationship of the public with environmental education associating the physical-natural themes of school geography.

In the second phase of the research, activities were carried out with 94 students between the 4th and 6th years of elementary school in the age group from 7 to 14 years of 2 (two) private schools in the municipalities of the east script (figure 2) of the geopark Araripe, Crato, Juazeiro of Norte, Barbalha and Missão Velha.

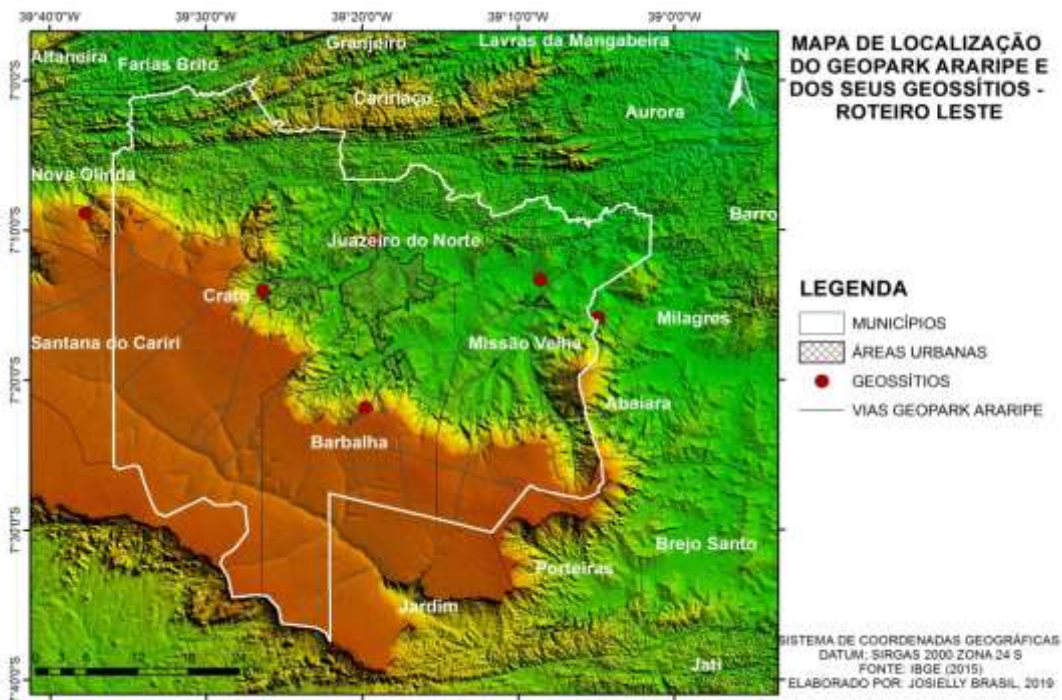


Figure 2. Map of the territory of Geopark Araripe, southern region of Ceará, With indication of the geosites of the East script. Source: Josielly Gonçalves, 2019.

At Ângelo Gabriel College, in the city of Juazeiro do Norte, workshops were held for fossil replicas and poster making with the classes of 5th grade (20 students) and 6th year (16 students). At the Pica Pau College, in the city of Crato, in turn, workshops were held for fossil replicas and field classes in the Site Fundação State Park, Geosites Batateiras Crato with the 4th grade classes (30 students) and 5th year (28 students).

Finally, in the third stage, questionnaires were applied (chart 1) with the students after the 2 (two) practices in order to verify the students' level of learning.

Table1.Pre-elaborated questionnaire applied to students of the schools Ângelo Gabriel (Juazeiro of Norte) and Pica Pau (Crato) after the workshops.

<p>1° Part: Characterization of the interviewee</p> <p>2)Age: _____</p> <p>3) Gender: male () female ()</p> <p>4) Series/Year: _____</p>
<p>1) Educational institution: _____</p> <p>2)Age: _____</p> <p>3)Gender: male () female ()</p> <p>4) Series/Year: _____</p>
<p>2° Part :Information on EA and geodiversity</p>
<p>Where was your first contact with environmental education?</p> <p>() At home()At school() On social networks()Never hear of</p> <p>Do you consider the workshops developed by the Araripe geopark a tool in the dissemination of environmental education? ()Yes()No</p> <p>What do you know about Araripe geopark and geosites?</p> <p>Do you think the workshop has added something more about your knowledge about environmental education? ()Yes() No</p> <p>How can environmental education contribute to your life? What teachings will you use in your daily life?</p>

Source: Authors (2019).

ENVIRONMENTAL EDUCATION AS GEOCONSERVATION STRATEGY OF GEOPARK ARARIPE

The Araripe geopark has 9 (nine) geosites, Batateiras, Horto Hill, Middle Creek, Stone Bridge, Cariri Stone, Petrified Forest, Old Mission Waterfall, Pterosaur park and Pontal da Santa Cruz. The geosites are distributed in 6 (six) municipalities, Juazeiro do Norte, Barbalha, Nova Olinda, Santana do Cariri, Missão Velha and Crato and, in the last two, are located the centers of interpretation and environmental education (CIEA).

The CIEA of the Araripe geopark was created in Crato (figure 3) in June 2010, with the historical, environmental and cultural identity of the Cariri's people as a base. It is located in the Pedro Felício Cavalcante Exhibition Park, at the city's headquarters. In December 2013, an extension of CIEA was inaugurated in Missão Velha, located in road support (MACEDO, 2015).

Figure 3. Center for interpretation and environmental education (CIEA) of the Araripe geopark, in the city of Crato, Ceará.



Source: <http://www.badalo.com.br/featured/centro-de-interpretacao-do-geopark-e-inaugurado-em-novo-espaco/>

At CIEA is made the reception of visitors, tourists, students of schools of children's, elementary, middle and higher, in addition to conducting courses, projects, workshops and lectures, with the objective of disseminating the knowledge about the Geopark Araripe and the geoconservation of geosites through educational actions of preservation and conservation as well as preparation of multiplier agents of EA.

The environmental education activities developed by the Araripe geopark team in the area of coverage and at the time of the research were: workshops of replica fossils, biojewelry, Puppet Theater and cloth book, as well as ecological trail and holiday colony, as detailed below:

- Fossil replica workshop: from the replicas is made an explanation about environmental education in the context of the Araripe geopark that aims to contribute to the preservation of the paleontological heritage of Araripe;
- Workshop of biojewelry: making necklaces, bracelets among other artifacts having as raw material seeds found in the territory of the Geopark Araripe, thus characterizing itself as a "geoproduct" which can be commercialized generating income for local communities;

- Puppet theater workshop: making dolls with recyclable materials such as pet bottle and cardboard, to deal with environmental themes focused on the geopark Araripe in a ludic form;
- Cloth book workshop: approaches environmental education in a playful way, with the use of recyclable materials. The book can also be marketed generating income for the community;
- Ecological trail :held in the geosites of the Araripe geopark, aims at environmental education, going far beyond the practice of geotourism and ecotourism, has educational purpose with a view to sensitizing the visitor;
- Holiday colony: has as target audience crianças.Com duration of one week in the holiday period, when activities focused on the environmental theme are carried out.

During the research period, 55 activities focused on environmental education were carried out in the area covered by the Araripe geopark reaching an audience of 3,424 participants (chart 2). Among the actions developed, the Geopark in the Schools and Mother-Land GEA, which involved the participation of 176 schools and the participation of 1,750 people, deserves to be highlighted. The cooperation project "GEA - TERRA MÃE", competition and school show, seeks to promote, encourage and stimulate a recent action created by UNESCO through the Global Geoparks Network (GGN).

Table2.Activities, strategies and public assisted by the actions developed by the Geopark Araripe team focused on environmental education in 2019.

Activity	Strategy	Schools/communities
Geopark in Schools and Mother-Land Gea	Lectures and workshops in schools.	176 schools visited/1,750 people attended
Geopark in the Community	Preparation of geoproduct in order to awaken the environmental awareness of residents of local communities	1held/61participants
Holiday Colony	Playful activities with replica workshops, production of toys with reusable materials, storytelling and the end ecological trail.	2 held/53 participants
Lectures and Short Courses	Approach and distribution of material on Environmental Education and Geopark Araripe.	4realized/160people served
Replica Workshop of	It seeks to draw the public's	36/1.260 people

Fossils	attention to the Araripe geopark and preservation.	attended
Puppet Theatre	Making dolls using Recyclable material.	6 held/60 people attended
Fabric Book	Making a thematic cloth book using recyclable material.	1 held/20people
Biojewelry	Use of seeds from plants in the region	4 held/60people

Source: Geopark Araripe (2019).

Undoubtedly the Araripe geopark team through its CIEA has over the years developed an important environmental education work which implies numerous benefits for the geoconservation of the region. Since its implementation in 2010, this center has received approximately 30,000 visitors, with an average of 497 workshops, serving an estimated audience of 15,910 participants and seventeen holiday colonies in the six municipalities that comprise the territory of Geopark Araripe (MACEDO, 2015). But taking into account the entire area of the territory of the geopark, the actions are still very centralized, especially where the CIEAs work, while the communities surrounding the geosites are still little in the process of being in the case of environmental education actions.

In the fossil replica workshop (figure 4) it was found that for most students it was the first opportunity of knowledge about the Araripe geopark and its importance for the good practices of environmental education and consequent conservation of the environment. According to Reis et al. (2012), too effectively implement programs related to non-formal environmental education is essential for the opportunity of participation that must be given to all involved, allowing questions and solutions to the objectives outlined.

The workshops held ensured the participants first contact with the real definition of geopark and the importance of environmental education for geoconservation of the same, considering that before the workshops these students did not know the geopark, believing that it was restricted to the physical structure of the headquarters located in the municipality of Crato.

All participants stated that the workshops brought knowledge about environmental education with the majority using the word "valorization" to answer how environmental education would influence their daily lives, for many it was the first contact with the concept of geodiversity.

Figure 4. Fossil replica workshop held with elementary school students from Pica Pau College, Crato, and CE.



Source: Bruna Almeida (2019).

From the theoretical-methodological point of view, the workshop functions as a strategy facilitating dialogic exchange and the construction of meanings, whose methodological procedures, at first sight, seem to articulate focus groups (RESSEL et al., 2008). According to Catalão (2011, p.74), when developing research in the area of environmental education "all learning of the living being results in an individual transformation, a co-evolution and an environmental change". Leaving the school environment alone has a positive effect on students' interest in content (FARINA; GUADAGNIN,2007).

The field class held in the Site Fundão State Park (figure 5), where the Batateiras geosites is also located, led students to direct contact with nature, opportunistic to them to experience knowledge in a contextualized way, intensifying the sensitization process, since they had the opportunity to make use of all senses, especially the vision in the assimilation of knowledge. Field classes also allow the construction of a critical vision, because it is a practice that involves seeing, feeling, participating and being present.

Knowledge of the dynamics of relief, waters and occupation of the area in the field provides knowledge of the importance of geodiversity of the Brazilian semiarid, ratifying the importance of the approach of natural processes and features in school disciplines, such as Geography (ALBUQUERQUE; SOBRINHO FALCON, 2006).

Figure 5. Field class with 5th grade class in the State Park Site Fundão and geosites Batateiras, Crato (CE).



Source: Julia Sullen (2019).

In fact, the local reality should be taken into account for the practice of environmental education, as it says a lot about the cultural and social aspects of the target audience. In this perspective, environmental education applied at the non-school level can be understood as that which occurs through programs aimed at the dissemination and promotion of geoconservation of geodiversity, to be applied outside the formal school environment, outside the pedagogical context, but without losing the educational character.

Environmental education, in addition to the interdisciplinary and transversal character, should also be used as a social inclusion strategy for the critical education of the subject, in order to lead him to understand his relationship as an environment that surrounds him. Actions aimed at environmental education should aim to lead the individual to rethink the forms of human intervention in the environment and ultimately rethink the pattern of relationship between society and nature, and thus take knowledge of the plurality of thinking, feeling and acting, in relation to the environment in which they live. In this perspective, environmental education can enhance an education focused on the construction of transdisciplinary knowledge, and be a great ally in geoconservation, where the subject begins to live on a path of individual construction and, at the same time, collective.

CONCLUSION

It was evident the lack of information about the real territorial and environmental significance of a geopark and the importance of good environmental education practices for the conservation of the environment and all ecological, paleontological, cultural, floristic, faunistic and geoenvironmental practices contained in this territory. Although the actions are extremely important for the geoconservation of regional geodiversity, the public achieved by the actions carried out is not yet relevant in relation to the area of coverage of the Geopark Araripe.

The team responsible for the geopark could work environmental education more intensified with teachers, school managers and community leaders, so that such actions

were not only as an activity carried out on commemorative dates related to environmental issues, thus expanding the link between schools, communities and the Araripe geopark, through the development of broader actions that would reach a greater number of participants who would become disseminators of the importance of environmental education for the development and conservation of the territory.

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