

## **Practices of Education/Environmental and Cultural Awareness in Rural Communities of the Municipality of Pilões, Paraíba, Brazil**

**Luciene Vieira de Arruda**

Postdoctoral Student  
Geography Post-graduation Program,  
Federal University of Paraíba/UFPB;  
&

Associate Professor of the Geography Degree  
State University of Paraíba/UEPB/Humanities Center  
Guarabira/Paraíba/Brazil.

**Carlos Antônio Belarmino Alves, Ph.D.**

Professor of the Geography Degree  
State University of Paraíba/UEPB/Humanities Center  
Guarabira/Paraíba/Brazil.

**Marcelo Luiz de França**

Master's student of the Software Engineering Post-Graduate Program  
Federal University of Rio Grande do Norte/UFRN;

**Jailson da Silva Cardoso**

Teacher with a degree in Geography,  
State University of Paraíba/UEPB/Humanities Center  
Guarabira/Paraíba/Brazil.

**Maria Dannielly Viana Pessoa**

Teacher with a degree in Geography  
State University of Paraíba/UEPB/Humanities Center  
Guarabira/Paraíba/Brazil.

**Eduardo Rodrigues Viana de Lima**

Full Professor of the Postgraduate Program in Geography/PPGG  
Department of Geosciences/DGEOC,  
Federal University of Paraíba in João Pessoa/Brazil

### **Abstract**

*This research shared environmental, cultural and education awareness practices in rural communities in the municipality of Pilões, state of Paraíba, northeastern Brazil, to promote environmental preservation and human valorization. The research staff working group was formed by professors and students of the Geography course of the State University of Paraíba/Humanities Center and a group of technicians of this institution, who made alternate visits to educational practices in the communities. Activities were developed to understand the natural and cultural potential of the area, with expeditions to remove garbage along the tracks, technical guidance on planting and care with local biodiversity. In addition, spaces for dialogue and informal conversations were held involving residents and visitors, who began to develop a sense of greater responsibility and belonging to the place, providing the creation of associations and environmental protection groups and valuing their own activities.*

**Keywords:** Environmental preservation; rural communities; environment.

## **Introduction**

Over time, the way we see nature is becoming different as long as we begin to distance ourselves from it, as if we could be able to live without the use of natural resources. Nowadays, it is confirmed that all environments are being modified drastically, whether in urban or rural areas. All natural resources have been under pressure from society with the pursuit of economic growth that does not take into account the capacity of support of the environments. In this way, problems related to deforestation, extinction of animals, pollution of water resources, soils and the atmosphere are multiplying.

According to the United Nations World Report (2017), pollution levels on water resources and climate change are intensifying, promoting changes in the water cycle, represented by the incompatibility of water supply and demand. The report also states that approximately 500 million people live in areas where water consumption exceeds twice the renewable water resources.

Northeastern Brazil is an example where water resources, plants and soils represent the greatest wealth, due to the climate regime in that region. However, there are still places characterized by periods of abundant precipitation, such as the Brejo Paraibano Microregion, formed by eight municipalities located in the Borborema Plateau, among them, the municipality of Pilões with several rural communities and settlement projects that have several natural and cultural attractions, but are little preserved or valued.

The interest in performing activities of environmental, cultural and education awareness in rural communities of Pilões/Paraíba/Brazil, brought together Geography professors and students of the State University of Paraíba (UEPB/Campus III) in partnership with a group of technicians from the same institution, with the objective of identifying the natural and cultural potential of the study area and sharing this knowledge through participatory activities in order to promote environmental preservation and human valorization.

## **2 Theoretical Foundation**

In mid-1960, the model of capitalist development began to be criticized in world-wide dimensions as its consequences were shown, symptoms of a serious crisis that would spread throughout the globe in the following decades (Silva et al, 2012). With these discussions, the initial foundations of political ecology were consolidated and the environmental and education awareness were promoted. In this regard, the ecological movements that emerged, opened the door to a new conception of environment, based on the concept of sustainable development.

Sustainable development is considered a condition capable of meeting the needs of the current generation without affecting the capacity of future generations to meet their own needs (World Wide Fund for Nature, 2010). It is a development that can meet the needs of today's generations without compromising the needs of future generations, seeking to preserve natural assets and human dignity. Thus, it is understood that we must reconcile economic growth and environmental preservation, seeking to produce and develop in balance with nature (Bicalho, 2003).

The studies involving the term "sustainability" started in the environmental sphere and expanded to the social, economic and political fields, proving the diversity and complexity involved in the most diverse areas of activity and, thus implying in the difficulty of exact definition for the term (Ferreira and Amado, 2009). It is based on the environmental and cultural dimensions that sustainability presents itself as a new scientific reference for thinking about the relationship between human populations and the environment.

The genesis of Environmental Education (EA) in the Brazilian scenario was based on the results and the internal developments of the major international environmental conferences promoted by the United Nations (UN), which occurred with the dispute of the hegemonic interests of capitalism and their relations of appropriation and exploration of nature (Tamaio, 2008). The EA arises to develop the awareness of the subjects in relation to the environmental field they are inserted. Carvalho (2008 p.13) points out that EA, "as an educational practice, is seen as part of a set of social relations that is built around the concern for the environment and what we could call environmental field."

The environmental conception consists of the interrelationships and interdependencies between the living and non-living environment, being these the determinants of all manifestation of life on earth. In this way, a balance between them is fundamental.

The purpose of EA is to enable a change in the behavior and acquisition of new values and concepts by society which converge with the current world needs and its relations with socioeconomic, cultural and environmental issues (Quadros, 2007).

The National Environmental Education Policy, in its Regulatory Decree (Law 4,281/02) (BRAZIL, 2008), affirms that EA aims to provide the conditions for the development of the necessary capacities; so that societies, in different socio-environmental contexts can act in a qualified way, both in the management of environmental resources and in the planning and implementation of decisions that affect the quality of the environment and, consequently, in human well-being.

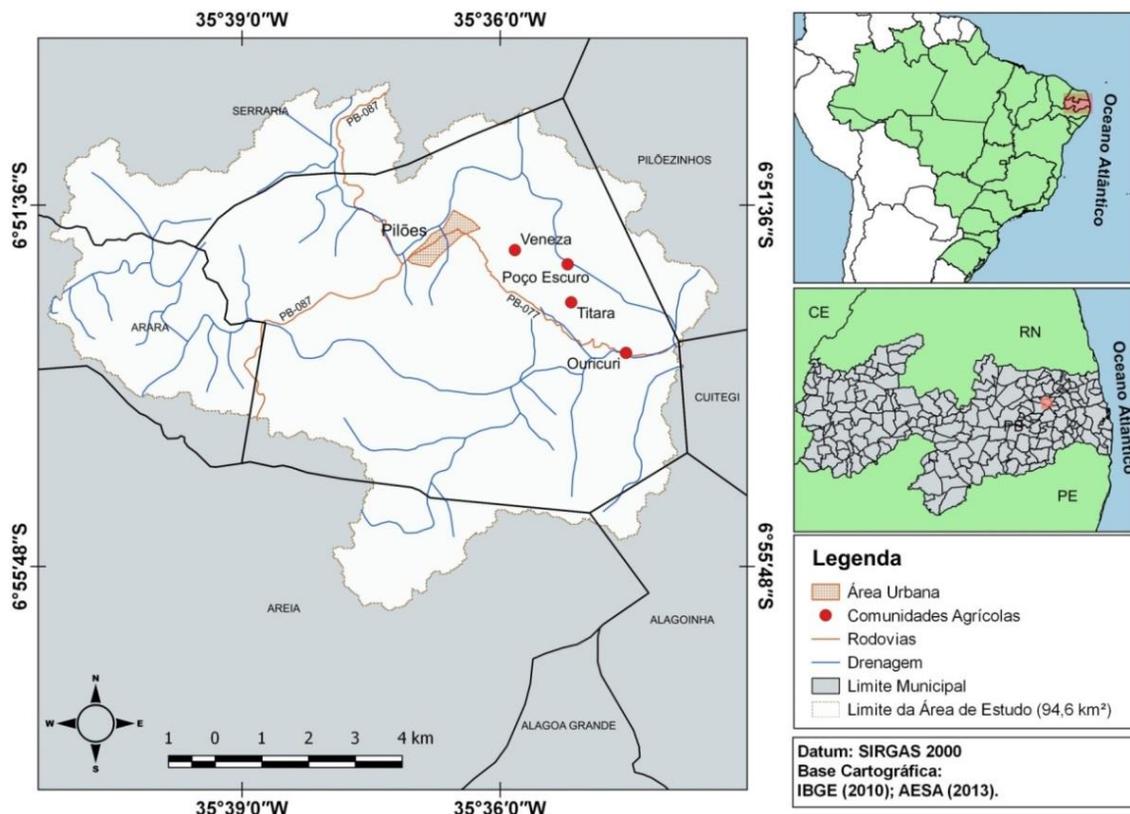
Thus, the more the world population grows and occupies new spaces, the greater the environmental problems, both in urban and rural areas. That is why it is fundamental that EA be part of their lives, to promote a change in the behavior of individuals and their awareness. Only with such knowledge will it be possible to trigger effective behavioral changes in relation to natural and inhabited spaces.

### 3 Methodology

The EA practices promoted in this research took place in rural communities and settlement projects in the municipality of Pilões, between 2014 and 2017, with the participation of teachers and students of the Geography course of the State University of Paraíba (UEPB/Campus III ) and its research groups: IN THE TRAILS OF SERRA DO ESPINHO, PILÕES/PB; TERRA - Urban, Rural and Environmental Research Group (UEPB/CH/CNPq); A GEOGRAPHICAL LOOK - Research Group on Cultural Geography and Perception (UEPB/CH/CNPq); CEAT - Center for Agrarian and Labor Studies (UEPB/CH/CNPq); and the TEJU-AÇÚ team (technicians/UEPB/CH group), totaling 50 participants.

The participants of this study worked together in four communities on the eastern slope of the Borborema Plateau, locally known as “Serra do Espinho”, belonging to the city of Pilões (Ouricuri, Titara, Poço Escuro and Veneza) (Figure 1). Subgroups with differentiated functions were organized, which concurrently involved studies on the natural, historical and cultural potential of the communities, based on four aspects:

**Figure 1. Geographic location of Serra do Espinho, Pilões/Paraíba/Brazil**



Source: Field activities (2017).

- 1 - History of community formation, survey and analysis of its natural, social and cultural potential; visit to the residents residences, presentation of the team and work objectives; informal conversations about the main difficulties faced by the residents in their agricultural and livestock activities, and the consultation on the frequent presence of visitors in the communities;
- 2 - Evaluation of the environmental conditions, safety and level of difficulty in the route of the main tracks; group activities to clean the tracks (trash removal and branches);
- 3 - Follow-up of visitors to the waterfalls, “bicas”, overlooks and “lajedos”, with dialogues about the natural potential (rocks, soils, fauna, flora and water resources) of the area and the importance of their conservation; distribution of educational pamphlets;
- 4 - Use of new technologies to disseminate the study groups’ activities and the diverse environments and attractions of the Serra do Espinho.

The initial activity of the study was the characterization of the geological framework (CPRM, 2002; 2005), of the relief units, water resources (Cardoso et al. 2015), plant cover (Silva et al, 2016), the main soils and their agricultural aptitude (Reinaldo et al, 2013, Silva et al, 2015). Then, a qualitative and participatory research was carried out among the residents and their families, who shared information to elaborate a formation history of these communities and their economic, social and cultural situation (Almeida et al, 2015). On the occasion, we present the study proposals and invite them to participate in the EA activities, planned for the following months (Pessoa et al, 2016).

The visits to the communities occurred monthly, mainly on weekends, due to the greater probability of finding residents at home and also the greater frequency of residents and visitors in leisure areas (waterfalls, spouts, streams, overlooks, lajedos, natural pools, flour houses, headquarters of residents' associations, handicraft center, among others).

Due to the need to identify the researchers for the local communities during the field work, we created a logo and printed on shirts, with the title IN THE TRAILS OF SERRA DO ESPINHO, PILÕES/PB. In addition to this identification, the name of our educational institution (UEPB), the financial support (CNPq/PIBIC) and the research groups involved were also presented.

## **4 Results and Discussion**

### **4.1 Geoambiental characterization, historical formation and conflicts of use**

The landscape of Serra do Espinho is developed in crystalline rocks, with spots of sedimentary rocks of the Serra dos Martins Formation, in diverse slopes, covered by high-altitude vegetation (CPRM, 2005). The relief is arranged in rounded hills and in valleys where water courses pass that transform this environment into a vector of attraction for many visitors, which has awakened its use for rural, ecological or cultural tourism practices (Cardoso et al, 2015).

The communities of Ouricuri, Titara, PoçoEscuro and the Settlement Project (PA) Veneza are made up of more than 100 families. Its formation dates back to the beginning of the 20th century, associated with former land owners and sugar mill owners, but with the obligation to cultivate sugarcane to supply the region (Moreira and Targino, 1997). However, with the bankruptcy of the mills in the 1990s, farmers were abandoned and some communities came together to claim their rights in order to transform land into agrarian reform settlements (Ponte, 2011).

In the municipality of Pilões, only six communities have been transformed into rural settlements, under the responsibility of the National Institute for Colonization and Agrarian Reform (INCRA), while the great majority survives on lands that do not belong to them. For example, the residents of the communities of Ouricuri, PoçoEscuro and Titara, who, together with those of the Venice Settlement Project (AP), live from agriculture, fruit growing and livestock, as a way of ensuring food and place. However, there is no concern with crop planning or with the preservation of water resources, plants, animals and the nutritional quality of soils.

Farmers exploit lands with traditional crops, planting downhill, practicing burning, deforesting hillsides, slopes and riverine areas, using pesticides, practicing the hunting of wild animals and throwing solid and liquid waste in waters and soils. All these acts are justified by farmers because of the lack of municipal public assistance in the collection of these wastes (Almeida et al, 2015, Cavalcante et al, 2015, Cardoso et al, 2015).

Thus, they appropriate the relief in a way that provokes the slopes destabilization when the vegetation cover is removed, triggering erosive processes and silting the watercourses, causing soil losses (Silva et al, 2015, 2016). Environmental and social problems intensify when hundreds of people, especially on weekends, use these spaces for leisure and to refresh themselves in streams, waterfalls and spouts, and begin to interfere in the quiet of the place making noise, scaring away, killing or chasing the animals, consuming drugs, causing damage on roads and trails, accumulating trash along trails, woods and streams, making fires that can cause forest fires, knocking down fences, invading crops, stealing agricultural products and animal, consequently creating a sense of vulnerability in local communities and in natural spaces.

In this context, both local residents and visitors contribute to the current degradation process. We decided to develop several activities of education and environmental awareness in order to promote the natural and cultural beauties appreciation and maintenance of this place, which is considered an exception in the middle of the Brazilian Northeast region semi-aridity.

It is necessary that local population and visitors know and value the natural and cultural potential of these environments, trying to organize and adapt to the requirements of streams preservation, natural vegetation, rock formations, and knowledge of environmental legislation. We believe that environmental preservation and the sustainable use of local natural resources can contribute to these communities economic growth and the residents' self-esteem increase.

#### 4.2 The trails that lead to the natural spaces of Serra do Espinho

In order to know better the natural spaces still existing in Serra do Espinho and to sensitize the subjects involved in their preservation, a trail sketch that give access to the local communities (Cardoso et al., 2015) (Figure 2) was elaborated, identifying the main attractions along the trails, which usually lead to residences, woods, slabs, waterfalls, spouts and planting areas.

Figure 2. Mapofecologicaltrails in Serra do Espinho, Pilões/Paraíba/Brazil.



Source: CARDOSO (2015).

On the roads and trails that connect the communities of Venice, PoçoEscuro and Pedra do Espinho, it is possible to appreciate nature through rock formations (lajedos, marmitas, pylons), relief forms (river valleys, slopes, hills, rounded top hills), covered by common Atlantic Forest arboreal species that occur between one and another area of cultivation and animal husbandry.

When arriving at the overlook of Pedra do Espinho, at 442m altitude, the rural communities are visualized. Data collected from the representative of the Residents of the PA Venice Association assert that older residents found a drawing on this rock, which resembles a human foot, associating it with the "foot of Christ." This fact strengthened the belief in Jesus Christ and motivated the construction of a chapel and a cross at its highest point. This place receives hundreds of people in pilgrimage.

The walk along Casa de Farinha Memorial, from Venice to Pedra do Espinho, totals 6,06 km and an estimated 3 hours walking time due to natural obstacles and strong declivity. The walk starts from within the forest reserve of the community, which has large plant species such as angico (*Anadenantheramacrocarpa* (Benth.) Brenan), juá (*Ziziphusjoazeiro* Mart.), Mutamba (*Guazumaulmifolia*Lam.), o ingá (*Inga vera* subsp.*Affinis* (DC.)T.D. Penn and other species that can measure up to 20m in height (Silva et al, 2016).

The existence of the Veneza forest reserve is a requirement imposed on the settlement project, for the vegetation maintenance (previously removed for the use of the sugarcane crop) seeking to avoid erosive processes, to promote shading, maintain the microclimate, protect the soils and water, and provide food to animals. The results are already being noticed, since the community already perceives the greater presence of birds, insects, mammals and reptiles, proving that the forest vegetation has been recovering.

There are also several trails in the area of study that can be transformed into space for recognition and appreciation of natural elements, in a sustainable use perspective. Geological, geomorphological and biodiversity richness suffer from the lack of adequate conservation strategies to local conditions and the lack of incentives to the natural heritage conservation. The importance goes beyond the educational and scientific relevance because it involves the local identity, the relation of the resident with the environment and its valorization. The point is that this heritage is subject to several forms of degradation, such as the deposition of garbage in the outcrops and the riparian forest felling, intensifying the erosive processes in the rivers (lateral erosion) and their silting.

The absence of environmental awareness causes the loss of natural resources in the medium and long term, in addition to what may compromise the landscape aesthetics and the residents life quality. Accumulated solid waste attracts many animals that carry diseases such as rats, cockroaches, scorpions, spiders, mosquitoes, flies, among others (Ramos and Fuckner, 2004).

In this context, it is necessary for the communities to know and value their natural and human resources in order to organize and adapt to the preservation of streams, natural vegetation, rock formations requirements, have knowledge of environmental licensing and safety in tourist activities. Thus, development based on rural tourism, if well planned, will be able to promote endogenous and exogenous economic growth with its local social agents.

The community of Titara is in one of the highest points of the Serra do Espinho (330m) which allows the full visualization of the course of the Poço Escuro stream, towards the Araçagi River. The paths or trails that can be ranged are narrow, tortuous, and filled with obstacles like rocks, trees and twisted trunks. The strong declivity hinders traffic on the only two roads in the community, being more suitable for motorcycles, bicycles and carts. Farmers have great difficulties in planting, due to the few spaces indicated for this activity.

In the Ouricuri Community the main attraction is to walk along the 1200m trail following the Ouricuri river, always listening to the noise of the water pouring down the hill, until crossing the lajedo to reach Ouricuri Waterfall (Figure 3), which forms a beautiful lake of calm and clear waters in the middle of the forest. During the rainy season, Ouricuri River reach most of the slabs and the trail attracts mainly the most courageous visitors to rappel and zipline at the crossing from the left bank to the right bank of the river while the waters sparkling run between the rocks.

Figure 3. Ouricuri Waterfall, Pilões, Paraíba/Brazil



Figure 4. EA Activities in the tracks of Serra do Espinho, Pilões, Paraíba/Brazil



Figure 5. Environmental awareness with residents and sharing of research results.



Source:Field activities (2014 - 2017).

On the other hand, landscape loses some of its beauty in the paths and trails due to the rock block falls, solid waste deposition, soil and water contamination, abandoned domestic animal, killed wild animals (snakes, lizards, foxes and birds), signs of fires and invasion of crop areas. There are also changes in the local population values and customs, changes in lifestyle, local rites commercialization, violation of traditions, alcohol and drug abuse, violence and prostitution.

The environmental awareness process initiated by the working groups seeks to develop a vision of sustainable socioeconomic growth in the local population and visitors of the communities mentioned above making them capable of meeting the needs of the current generation, without affecting the capacity of the future generations meeting their needs (*World Wide Fund for Nature*, 2010), considering that the communities receive people from all over the region to appreciate its beauties.

However, it is an environment that needs an environmental planning so that these spaces do not lose the natural wealth, besides the involvement in environmental awareness activities and the importance of its conservation. The idea is to arouse people's interest in preserving natural environments and to show how important it is to maintain the natural beauty of these places, free of any polluting materials.

### 4.3 EA practices in rural communities of Pilões

EA practices in the rural trails and communities of Pilões were only made possible after a presentation to the local residents and the associations, in the form of meetings and discussions. The associates' participation allowed the collection of the main complaints and community's needs. Local residents feel abandoned by municipal governments and environmental protection agencies; they complain about the lack of employment, security, support and orientation to agricultural production and feel invaded and vulnerable in their spaces.

Aware of the local population needs, the first AE activities were directed to the visitors, in the form of expeditions, always accompanied by young people from the communities (Figure 4). Participants and volunteers carried plastic bags and gloves to collect garbage along the trails. Naturally, participants and volunteers approached small groups that traveled the tracks and invited them to participate in the activity, giving them the material for the collection. Then began the dialogues and questions on why so many people were there doing this collection.

After the presentations people were invited to discuss the importance of the place natural potential (rocks, soils, fauna, flora and water) and its conservation. At the same time, they were questioned about their own behavior in these places, discussing the amount of garbage scattered along the trails and the awareness that much of that garbage was left by its own visitors. Then, pamphlets were distributed with information on the time of decomposition of some industrialized products, such as plastics, glass, cans, cigarette ends and fabrics.

Other information given to the visitors referred to the importance of animals and vegetables in the food chain; warning of abuses, violence and animals death; to the noise they make in the middle of the forest, which chases away the animals; the fires used to prepare food which often cause forest fires; violence against local residents and their domestic animals; invasion of areas with plantations; the various forms of pollution on water resources, rocks, vegetation and animals.

During the years 2015 and 2017 working groups dedicated themselves to the EA activities in the trails; to the analysis of the soils to know the agricultural potential of the plantation areas (Silva et al, 2015); to the analysis of the agrochemicals use in some crops (Silva et al, 2016); to the survey of public policies for local development (Guilherme et al, 2017); the valorization of cultural practices as a rescue of social identity (Taveroset al, 2016); participation in the residents meetings to share the survey results and create bonds of responsibility about natural environments.

The community meetings were held twice a month, one for visitors and another for the presentation of results to communities, in associations or homes (Figure 5). The objective was to share the activities carried out, to invite them to be part of the teams and to know how such actions were being seen by them.

The researchers evaluated the above-mentioned studies as very important, however, difficult to put into practice because of the families financial difficulties, conflicts between members and distancing of the younger people, who seek work outside the communities and therefore distance from the internal issues of associations.

The EA practices in the trails were also considered valid, but not very impressive, because on the weekends (when there is no activities), the same problems would happen again. This only confirms what the literature says, that EA must be an ongoing process so that such activities can sensitize people to the point of making them change paradigms and conceptions; that people can feel part of that environment and have the awareness that it is not nature that needs us, but we ourselves.

The dissemination of research and EA activities in rural communities of Pilões also took place on social networks and through Google Earth, Street View, via internet. In 2014 a page was created on facebook: (<http://www.facebook.com/nastrilhasdaserradoespinho/>) to share photographs, papers published in scientific events, journals, book chapters, graduation and postgraduate courses, as well as the dissemination of expeditions to the field, as a way to get volunteers to work on the environmental awareness process.

The UEPB technical team, titled Teju-Açú, through a partnership with Google, obtained a device called Google Street View, a feature of Google Maps and Google Earth that, a system of cameras coupled to a car or any other means of locomotion that provides 360° panoramic views horizontally and 290° vertically and allows users to view online the distance to be covered (Figure 6).

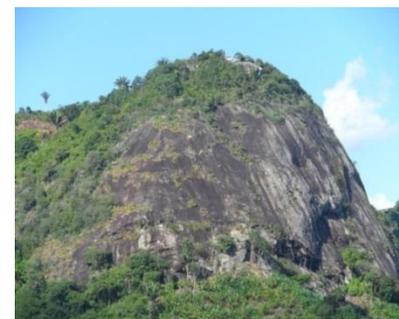
Figure 6. Google Street View device backpack-shaped.



Figure 7. Google Street View device capturing images in Serra do Espinho, Pilões/Paraíba/Brazil



Figure 8. Pedra do Espinho, Pilões/Paraíba/Brazil



Source:Field activities (2017).

In this way, the study area main paths were traversed on foot with the Google Street View device stuck in the one of the technician's back, who monitored the camera and captured images of the entire route, and then recorded on hard drive (HD). The mode of image captured on foot is called Google Trekker (Figure 7). The backpack is connected to a globe with 15 lenses that allow taking pictures. Altogether, backpack weighs about 20 pounds and works connected to an Android smart phone.

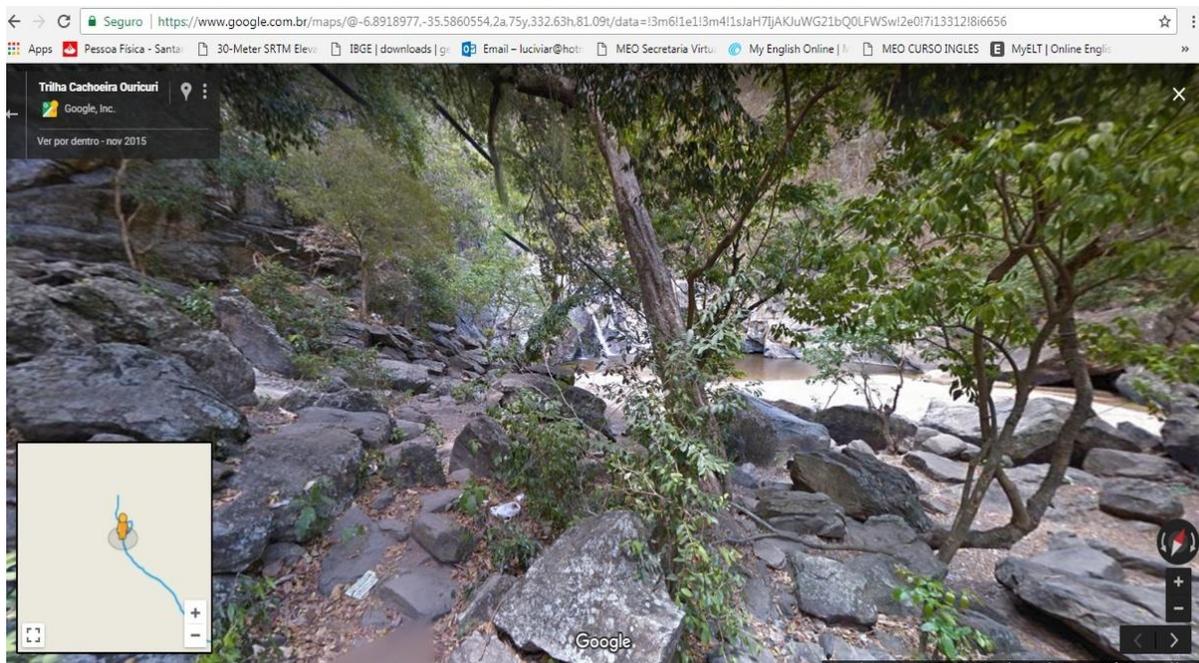
The paths traveled are automatically configured by the global positioning system (GPS) and the place images are recorded. Then, the images recorded in the HD are sent to Google, so that they can be accessed worldwide by any user interested in knowing these paths, giving them the sensation of walking on the trails. The capture of images was followed by young people from the local communities, UEPB technicians and members of the research groups involved, and a trail was made each day (Figure 8).

During the course, technicians explained that virtual images (arranged in Google) would allow the knowledge of the place characteristics and its natural resources in the whole world; would allow various educational activities in the classroom, in laboratories, at home, by cell phone or computer using the big screen or other resources without the need to go through such places. The images have several options to observe the different components of nature, safely and effectively.

Thus, the use of Google Street View equipment constitutes a technological tool of great importance for use in education, in general, and especially in EA activities, because it allows the teacher in classroom to take the student to the most diverse places in the world, as in a virtual game, transforming him into the subject of the process and not just a mere spectator. Added to this modern process of knowledge is the use of 3D glasses, which gives the impression of really walking the tracks.

Using Google Street View was possible to record and traverse the main tracks that provide access to local communities. Tracks are currently available worldwide via Google Maps site: (<https://www.google.com/intl/pt/streetview/>) (Figure 9). Access to the data is done by the terms: Ouricuri waterfall or PoçoEscuro trail.

**Figure 9. Ouricuri Waterfall Trail, Pilões/Paraíba/Brazil**



Source: Field activities (2017).

## 5 Conclusion

- The residents of Serra do Espinho have shown an interest in discussing environmental issues, mainly about the increasing deposition of solid waste around the communities. They dispose solid waste knowing it is harmful, but they do not collect the waste they produce and only complain about the lack of systematic municipal collection;
- The recommendation is that the waste be placed in plastic bags or containers and left at the edge of the highway PB 077 to be collected by the municipal waste collection system. However, the most important thing is that communities claim the collection of these solid wastes, which is a right of every citizen, provided for in Law 11455/07 of the Brazilian Federal Constitution
- The residents showed a sense of devaluation of the place in which they live and of their own activities. They state they are forgotten by local political representatives, who do not contribute to rural development, but spread the local attractions without providing infrastructure. They feel invaded by visitors in their spaces and want to find solutions to better manage access to leisure areas;
- Some residents and visitors recognize the natural, social and cultural potential of Serra do Espinho communities and already encourage the development of sustainable rural tourism;

- The residents said that after the EA activities in the communities trails were cleaner, but it only takes a few weeks and everything goes back the same, requiring uninterrupted awareness and supervision work by municipal public agencies;
- The practices performed contributed not only to rethink human actions about nature, but also to create a critical and conscious view on the subjects involved, encouraging a greater participation in the discussions aimed at solving environmental problems, motivating them to take better care of their spaces, as well as to demand from the public power their responsibilities;
- The relationship between scientific and local knowledge was very relevant because it established links with communities and created a sense of importance and elevation of self-esteem, knowing that its natural and cultural potential has been disseminated worldwide;
- EA practices are very important for the continuity and preservation of natural resources, since it is from a critical and interdisciplinary EA that the construction of environmental awareness is given, which provides the understanding that the human being depends on the environment. Therefore, it will be possible to perceive positive changes in the area preservation and in the emergence of activities focused on sustainability;
- Residents of Veneza and Titara were very receptive to our visits and orientations and began to accompany visitors in their trails looking for to interact with them in the Memorial House of Flour and in the Women's Artisans Association;
- In 2018, a group of young residents of Ouricuri, encouraged by EA activities, contacted the City Hall of Pilões, received the support of the Environment Department and created the Association of Friends of Ouricuri Waterfall (AACO). The young people were instructed to improve access to the trails and to do systematic cleaning. They also built an entrance gate to control the number of people and started charging an access fee. They stated the guidance received during EA activities provided the confidence and courage to open the AACO;
- Recognizing that EA should be a continuous process, in 2018 we approved another research project with the Foundation for Research Support of the State of Paraíba (FAPESQ) (EDITAL 005/2018 - SEIRHMACT/FAPES/PB - INFRASTRUCTURE/UEPB), which involves the entire Micro-region of BrejoParaibano. In this way, we are sure of the continuity of these activities until 2021 with the elaboration of an environmental guidebook for farmers and visitors.

## References

- Almeida, E.B.; Silva, A.B.; Cardos, J.S.; Arruda, L.V. Uso e ocupação do solo na Serra do Espinho, Pilões/PB In: Terra - Saúde ambiental e soberania alimentar. 1ª ed. Ituiutaba/MG : Barlavento, 2015, v.III, p. 317-327.
- Bicalho, A.M.S.; Hoefle, S.W. A dimensão Regional e o desafio à Sustentabilidade Rural. Rio de Janeiro. UFRJ. Laboratório de Gestão do Território – LAGET, 2003
- BRASIL. Ministério do Meio Ambiente. Secretaria de Articulação Institucional e Cidadania Ambiental. Departamento de Educação Ambiental. Os diferentes matizes da educação ambiental no Brasil: 1997-2007. Brasília, DF: MMA, 2008, (Série Desafios da Educação Ambiental) 290p.
- Cardoso, J.S.; Souza, M.C.; Santos, F.F. Arruda, L.V. Espinho, Pilões/PB - turismo rural a partir do potencial natural In: Terra - Saúde ambiental e soberania alimentar. 1 ed. Ituiutaba/MG : Barlavento, 2015, v.II, p. 685-697.
- Carvalho, C.M. A Educação Ambiental no Brasil. p. 13-20. In:BRASIL. Ministério da Educação. Educação Ambiental no Brasil, ano XVIII, boletim 01 – p. 2-54, Rio de Janeiro, março de 2008.
- Cavalcante, T.M.S.; Arruda, L.V.; Mariano Neto, B.; Silva, A.B. Políticas públicas para a promoção da sustentabilidade ambiental no Assentamento Veneza, Pilões/PB In: Geografia e Território: planejamento urbano, rural e ambiental. 1 ed. João Pessoa/PB : Ideia, 2015, v.III, p. 359-372.
- CPRM. Serviço Geológico do Brasil. Geologia e Recursos Minerais do Estado da Paraíba. Santos, EJ; Ferreira, CA; Silva, JMF Jr. (Org.). Geologia e recursos minerais do estado da Paraíba. Recife, 2002. 142p
- CPRM. Serviço Geológico do Brasil. Projeto cadastro de fontes de abastecimento por água subterrânea. *Diagnóstico do município de Pilões, estado da Paraíba*. Organizado [por] João de Castro, Breno Augusto Beltrão, Luiz Carlos de Souza Junior, Franklin de Moraes, Vanildo Almeida Mendes, Jorge Luiz Fortunato de Miranda. Recife: CPRM/PRODEEM. 2005. 11p. + anexos.
- Ferreira, L.M.; Amado, R.F. Levantamento e análise de indicadores de sustentabilidade ecológica para propostas urbanísticas. São Carlos: Universidade Federal de São Carlos, 2009.

- Guilherme, D.F.; Silva, A.B.; Silva, J.C.; Arruda, L.V.; Alves, C.A.B. Políticas Públicas para a sustentabilidade ambiental na Serra do Espinho/PB In: Educação ambiental em unidades de conservação e políticas públicas. 1 ed. Natal/RN : EDUERN, 2017, v. 2, p. 82-92.
- INCRA. Superintendência Regional do INCRA na Paraíba. <http://www.incra.gov.br/pb>. Acessado em dezembro/2016.
- Moreira, E.;Targino, I. Capítulos de Geografia Agrária da Paraíba. João Pessoa: Editora Universitária, UFPB, 1997. 332p.
- Pessoa, M.D.V.; Silva, M.L.G.; Santos, C.M.; Mariano Neto, B.; Arruda, L.V.Ações socioeducativas do grupo “NAS TRILHAS DA SERRA DO ESPINHO – PILÕES/PB.. Revista Brasileira de Educação Ambiental (Online). , v.11, , 2016. p.142 – 152.
- Ponte, G.D. De assalariados a assentados [dissertação] : as trajetórias dos agricultores familiares do Assentamento São Francisco no município de Pilões- PB / Graciete Dias Ponte ; orientadora, Maria SoledadEtcheverryOrchard. - Florianópolis, SC, 2011. 165 p.: il.
- Quadros, A. Curso de educação ambiental: iniciativas populares e cidadania. Universidade Federal de Santa Maria. Especialização em Educação Ambiental (CPGEA). Monografia de Especialização, março, 2007. p. 8-44.
- RELATÓRIO MUNDIAL DAS NAÇÕES UNIDAS SOBRE O DESENVOLVIMENTO DOS RECURSOS HÍDRICOS. Programa Mundial das Nações Unidas para avaliação dos recursos hídricos. Gabinete do Programa de Avaliação Global da Água Divisão de Ciências Hídricas, UNESCO, 06134 Colombella, Perúgia, Itália, 2017, 12p.
- Ramos, V.S.E.; Fuckner, M. Superagui, sítio do patrimônio natural da humanidade e o resíduos sólidos. In: IV Congresso Internacional sobre turismo rural e desenvolvimento sustentável, 2004, Joinville. Anais do IV Congresso Internacional sobre turismo rural e desenvolvimento sustentável CITURDES. Joinville: Instituto Superior e Centro Educacional Luterano Bom Jesus IELUSC, 2004. v. 1. p. 1-335.
- Reinaldo, L.R.L.R.; Lopes, L.R.; Silva Filho, A.M.; Xavier, R.A.; Arruda, L.V.Qualidade do solo em sistemas de cultivos no Brejo Paraibano. Qualit@s (UEPB). , v.14, p.1 - 7, 2013.
- Silva, L.O.; Costa, A.P.L.; Almeida, E.A. Educação Ambiental: o despertar de uma proposta crítica para a formação do sujeito ecológico. HOLOS, vol 1, 2012.
- Silva, A.B.; Almeida, E.B.; Felix, J.M.S.; Arruda, L.V.Análise da cobertura vegetal e de solos da comunidade Veneza - Serra do Espinho, Pilões/PB In: Terra - Saúde ambiental e e soberania alimentar.1 ed. Ituiutaba/MG : Barlavento, 2015, v.II, p. 275-287.
- Silva, A.B.; Guilherme, D.F.; Silva, M.L.G.; Arruda, L.V.; Alves, C.A.B.Processo de regeneração da cobertura vegetal da Serra do Espinho, Pilões/PB: Um estudo de caso. Revista Brasileira de Educação Ambiental (Online). , v.11, p.215 - 227, 2016.
- Tamaio, I.A. política pública de Educação Ambiental. p. 21-29. In:BRASIL. Ministério da Educação. Educação Ambiental no Brasil, ano XVIII, boletim 01 – p. 2-54, Rio de Janeiro, março de 2008.
- Taveros, T.S.; Nascimento, P.R.S.; Belizário, M.A.S. Práticas culturais como resgate da identidade social no projeto de assentamento (PA) Veneza, Pilões/PB. Anais do XVIII Encontro Nacional de Geógrafos. Julho de 2016, São Luis/Maranhão.
- World Wide Fund For Nature Brasil. O que é desenvolvimento sustentável? [2010]. Disponível: <[http://www.wwf.org.br/informacoes/questoes\\_ambientais/desenvolvimento\\_sustentavel/](http://www.wwf.org.br/informacoes/questoes_ambientais/desenvolvimento_sustentavel/)>. (10 de fevereiro de 2015).