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ENVIRONMENTAL EDUCATION: MITIGATION ASPECTS IN TREE FALL IN THE AMAZON

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Abstract: Natural disasters are part of all world societies today. Each region has its particularities in relation to them, being visibly observed that the Amazon region, especially the State of Pará, is constantly impacted by disasters classified as Hydroclimatic. Its highest incidence is directly linked to heavy rains, storms and floods, with the fall of trees being a consequence that is repeated annually. The disorders resulting from these effects are numerous, from material losses to human lives. Within this context, the main objective of the study was to address the importance of Environmental Education (EE) related as a dimension of knowledge in the perception of risks in falling trees that, historically, affect our region. This is a study of literature review, whose collected data belonged to the following bases: VHL – Virtual Health Library; and Scielo – Scientific Electronic Library. The sample consisted of 13 articles and the inclusion criteria were: works published between 2007 and 2014, in Portuguese; and adequacy to the subject of study. The results showed the low level of knowledge of the Amazonian population regarding the consequences of falling trees. Therefore, it is concluded that it is necessary to provide environmental education actions for the community; in order to bring them closer to the government, and investigate the best ways to mitigate possible risks.
Keywords: Tree falls. Environmental education. risk perception.

INTRODUCTION

Knowing the afforestation process in the Amazon region is of paramount importance to society, since it is responsible for numerous environmental and social benefits capable of helping the quality of life of the population of a given location. The trees act in the characterization of the spaces of the city, responsible for their shapes, colors and way of grouping. In addition, they contribute to the organization, definition and delimitation of the same (MASCARÓ, 2005, p.13 apud CABRAL, 2013, p.3). However, due to the growing and rapid urbanization, significant changes in the natural system are being perceived, such as the waterproofing of the soil by paving and constructions, the massive use of materials such as concrete, asphalt and ceramics, the remarkable reduction of vegetation cover and the increase of atmospheric, water, visual and noise pollution. However, efficient and quality afforestation is an important factor in making the urban environment pleasant and compatible with the natural environment, providing a better quality of life for citizens (RGE, 2000).

Furthermore, another extremely relevant issue related to afforestation is the hydroclimatic changes that directly impact the Amazon region, impacts arising from the so-called hydrometeorological risks, which include intense rains, strong winds, flooding, floods and flash floods. All these frequent climate changes in our region automatically cause great inconvenience to the population of Pará as a whole, when combined with the lack of planning by public agencies. Through this combination, they create opportunities for high risks of falling trees both in rural and urban areas, especially in more vulnerable communities. This risk represents the possibility of people being negatively affected when this event is not avoided, either through material or human damages.

In some situations, the local population itself does not have the slightest knowledge of the consequences of these risks, especially when they have never been affected. However, there are those people who are aware of what can happen, but due to social and financial vulnerability, they do not have relocation options, dangerously establishing themselves in the area without even trying to alleviate the

situation. For Faginnato (2007), it is necessary to discuss environmental perception in order to build a critical awareness of the environment around them and what can interfere positively or negatively.

Thus, it is necessary to portray the contribution that environmental education can develop in families in areas of great vulnerability. Because, related to the perception of risk, its main function is the formation of conscientious citizens, prepared for decision-making and active in the socio-environmental reality, with a commitment to life and society. As it is a totally interdisciplinary subject, it provides the active participation of the community,valuing the pedagogical aspects, activities related to creativity, instigating the construction of a more conscious vision of society in relation to the environment, helping it in the formation of its citizenship.

The perception of populations around the dynamics of the sociocultural landscape in the face of extreme hydroclimatological events brings to light other elements to be addressed and discussed, which risk and adaptation are addressed in this work. The perception of risk illustrates the need to adapt to changes, following the following chronology (CURI et al., 2016):

1. Perception of extreme hydrological events;
2. Perception of the dynamics of the cultural landscape;
3. Risk perception and identification;
4. Adaptation measures.

Environmental perception studies in communities that face sociocultural landscape dynamics as a result of extreme hydroclimatic events, work to improve the quality of life of these communities, using the identification of impacts caused by the events and the search for adaptations, adapting to new realities. One of the techniques used in the study of collective environmental perception is social cartography (BARROS, 2016).

Social mapping or cartography is understood as a participatory and collaborative research technique that invites reflection, organization and action around a specific physical and social space (VELEZ TORRE et al., 2012).

According to the work of Tuan (1980), there are several ways to reflect on landscapes, building reality through unique experiences. When coming into contact with the environment, people make use of the five senses in a process associated with cognitive mechanisms, that is, each individual perceives, reacts and responds differently to actions on the environment. The responses or manifestations are, therefore, the result of the perceptions, cognitive processes, judgments and expectations of each individual.

Based on this, the study of environmental perception becomes fundamental for what is proposed through EE, for a better understanding of the relationship between man and the local environment, as well as values, satisfactions and dissatisfactions, behaviors and reactions of each individual facing the actions of the environment. The study must also seek not only to understand the perception, but also to raise awareness and awareness of society and the environment around it, creating educational measures and practices to guide communities.

Regarding the risk of trees falling, facilitating their understanding through a contextualized dynamic. In addition, guidelines are provided, bringing the community closer to the government, investigating the best ways to mitigate this risk.

PURPOSE

This article aims to reflect on the contribution of Environmental Education and risk perception relating them to the dangers of falling trees, a frequent occurrence due to

heavy rains that constantly fall in our region, in addition to demonstrating the importance of the benefits provided by a harmonization between the man-nature relationship, a concern relevant to the socio-environmental representation of our modern society.

METHODOLOGY

The methodology applied in the present study was a literature review, with an exploratory and descriptive approach, whose objective is defined in a synthesized grouping of the discussion of results from Information Sources. The research was based on the survey of literature that addressed environmental education as a way of reducing the risk of falling trees in the Amazon region. The survey was carried out between September and October 2021, using an advanced form, typing, in the first line, "Tree falls" in the category of subject descriptors and, in the second line, "Environmental perception in the category of words ; 21 articles were found. After analysis, 13 publications were selected to compose the sample of this research, respecting the following inclusion criteria: complete and free documents such as articles, annals, monographs, dissertations in Portuguese published in the time frame of 2007 – 2014; and exclusion, such as: incomplete, repeated and paid documents such as articles, monographs, dissertations in a foreign language and with a time cut below the year 2007. The databases that provided the search for data based on the combination of descriptors: Falls of trees, Environmental Education, risk perception, were VHL – Virtual Health Library; and Scielo – Scientific Electronic Library.

RESULTS ANDDISCUSSION

According to COPEL (2009), urban trees offer several benefits to society, such as thermal comfort, pollution mitigation, rainwater absorption, shelter and food for animals, visual harmony and breaking the monotony of the urban landscape. This way, it improves the population's living conditions and also brings economic advantages, such as increasing the value of properties on well-treated streets and reducing energy consumption due to surface cooling.

Trees play a fundamental role in ecosystems and the environment, acting in several functions, in hydrological cycles and diversities, soil improvement, conserving biodiversity, capturing carbon, filtering pollution and contamination of the environment (BUCKERIDGE, 2015), improving conditions and facilitates the cooling of the air and the environment, reducing the production and release of heat (LOMBARDO, 2016), significantly contributing to human health and living conditions (BARROS; MOREIRA et.al, 2020).

Despite the significant contributions that trees provide to the environment, due to several intrinsic (structural) and extrinsic (environmental) factors, such as improper management, sanitary problems, varied climatic conditions, such as intense winds, water changes, lightning and storms, generate many factors. of physical and human risks, with emphasis on the intense falls of trees (OLIVEIRA; LOPES, 2007), observed in the rainy and winter periods, where their structures are more exposed, increasing instabilities and falls, both in urban areas and in environmental parks. (SAMPAIO et al.2010)

Even playing a very important role in the lives of people who live in the city, the study of afforestation is not a priority and, due to inefficient plans and the imminent existence of policies in the sector, pruning is carried out in an improvised way, generating several conflicts with the growing urbanization. Among these, we can cite damage to sidewalks, sewage or water networks, damage to buildings,

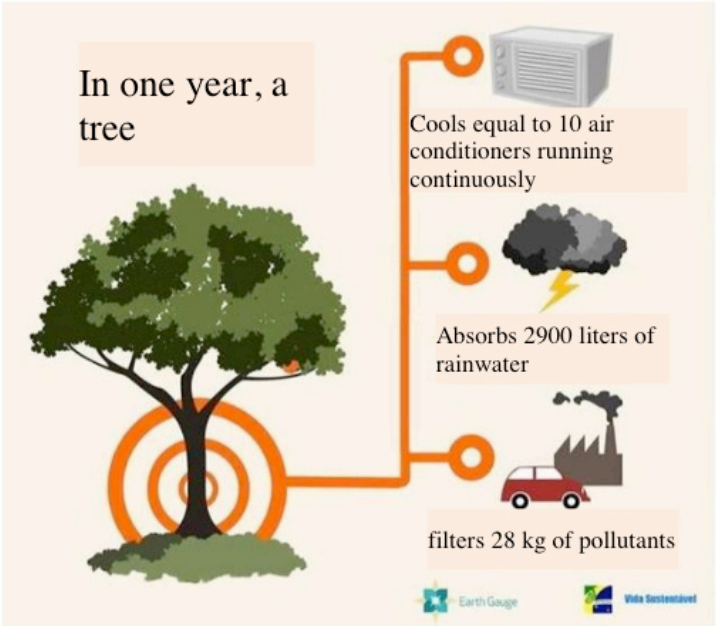

Figure1–Importance of trees

Figure2–Example of a distribution network where pruning is required.

Source:Velasco,2003.

interference in culverts, difficulty in viewing guidance signs, restriction of the passage of pedestrians or vehicles, among others. With regard to the electricity transmission network, a tree in uncontrolled growth is capable of interrupting the energy supply or making it inefficient (PIRES et al, 2007; SANTOS and TEIXEIRA, 2001), in addition to causing short circuits or short circuits. breakage of wires/cables as shown in Figure 2.

Trees, especially those that are more isolated, are more prone to falling due to a series of factors that demonstrate their vulnerability, such as: greater exposure to winds, poor and compacted soils, which make rooting difficult, cutting of support roots for construction of urban structures and collisions by trucks, among others.

The lack of planning leads to an increase in management practices, such as pruning and removal of trees, carried out by city halls and electric energy concessionaires, mainly through the contact between the wiring and the outcrop of sidewalks (MEIRA, 2010).

However, in some cases, pruning is done incorrectly, for example, in a "U" shape, which can unbalance the tree and leave it at risk of falling (PIRES et al, 2007). According to Marek (2008) apud Velasco (2003), the correct way of pruning a tree to protect the electrical network generates less aggression to the trees due to the compression of the transmission and distribution network, through the insulating layer of protection of the conductors, the which allows greater approximation between them and between them and the branches of the trees, as illustrated in Figures 2 and 3.

Some points must be observed during the assessment and identification of risks of falls of large trees in urban areas, that is, intense flow of vehicles, especially large ones, pipes and complications generated by the basic sanitation and sewage networks, which often compromise sidewalks, gutters and consequently the roots of trees, especially those planted with shallow roots, weak resistance to pest attack, and more importantly, their vulnerability to intense winds (NETO, SOUZA, 2009).

Other factors that directly influence the possibility of tree falls are the cutting of roots and poorly executed pruning due to electrical and/or telephone wiring, which leave the structure of the plant highly destabilized, in addition to the inappropriate use of species (large and/or or susceptible to winds) and soil compaction (SAMPAIO, 2006; MOSER et al, 2010).

The risk of falling is closely linked to what will be hit, where very busy streets and exposed public and private monuments present a high risk potential, since the greatest risk is when there is the possibility of hitting someone. The fall can be caused by several factors, such as: heavy and long rains, irregular pruning, gusts of wind, unstable root (SAMPAIO et al, 2010).

FINAL CONSIDERATIONS

The perception on the theme presented in this article, which deals with environmental education and its relationship with the fall of trees, shows that such attitudes and knowledgeare passed on between generations within a society. Therefore, this perception of the impacts caused by hydroclimatic events reveals important challenges that environmental education seeks to develop, through its knowledge, better alternatives and more effective ways to mitigate these problems.

Strategies related to perception in the most vulnerable families are often conditioned by their environmental, social, cultural and economic limits, requiring the support of public policies that take responsibility for the inconvenience caused by falling trees, related to these hydroclimatic events in the Amazon region. More effective and mitigating

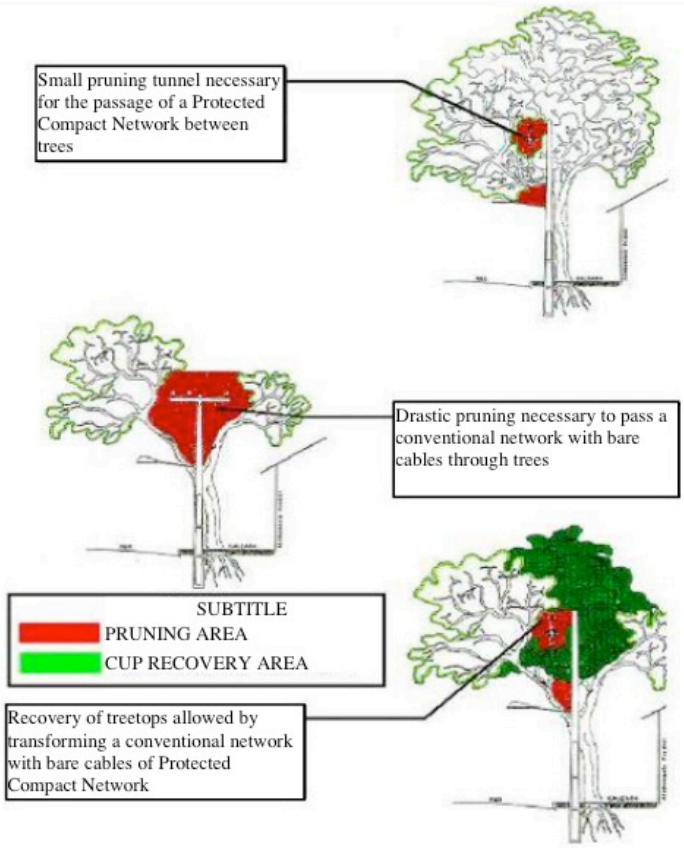

Figure3–Correct pruning in accordance with COPEL's technical standards.

Source:COPEL,2004.

Figure4–Personnel trained in the tree pruning procedure.

Source:Copel,2008.

alternatives influence the understanding of reality by the entire population. In this context, dialogue and awareness are crucial to address this particular problem that is so common in our region.

Finally, it is expected that the results are indicators for the scope of studies on the perceptions of the most vulnerable families about the effects of falling trees, as well as knowing how to avoid it. Thus, it is expected that this reflection will be able to encourage new research on this topic in the Amazon region, in addition to contributing to the formulation of public policies aimed at strategies to encourage environmental education.

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