CAATINGA BIODIVERSITY AND ECOSYSTEM SERVICES: A CASE STUDY WITH STUDENTS FROM A MUNICIPAL SCHOOL

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Abstract

Environmental education with a focus on biodiversity values can be an instrument for sensitization, reflection, construction of a critical vision and behavior change. The knowledge of local Caatinga biodiversity is fundamental for the valorization and conservation of its the native elements. This work aimed to present a diagnosis about the the knowledge of school students on the topics environment, Caatinga biodiversity and ecosystem services in Juazeiro, Bahia, Brazil. We used qualitative and quantitative methods, through bibliographic research, in which the conceptual and normative aspects were addressed through books, articles, journals and others, as well as through questionnaires for students. Was verified that students recognize Caatinga biodiversity especially by plants as cactus species. They presented some knowledge about the research topics, but many of the concepts were confuse. This confusion in concepts may be due to the scarcity of information related to Caatinga biodiversity in the school context, and highlight the importance of present the studied topics as a way of encouraging conservationist actions and behavioral changes.

Keywords: Ecosystem; Biodiversity; Environmental education.

1. INTRODUCTION

The Caatinga is a natural region that occurs only at Brazilian boundaries, and its rich biodiversity has suffered from devaluation and constant deforestation (Tabarelli et al. 2018). Both flora and fauna are completely adapted to the dry climate, recent studies showed that it posses a great biodiversity and endemism for being a very heterogeneous region (MMA, 2016). To promote appreciation of Caatinga is essential that topics such as Caatinga biodiversity and the environment are addressed in the classroom to raise awareness among students through environmental education, bringing elements about biodiversity conservation and how ecosystem services are important for the conservation and human well being.

The relevance of Environmental Education - EA is legally established through several Brazilian educational laws and guidelines, such as LDB (1996), National Environmental Education Policy (PNEA) (1999), National Education Plan - PNE (2001) and Curriculum Guidelines for Basic and Higher Education. Within this scenario, Carvalho (2008), commented on the legality of the National Policy for Environmental Education - PNEA, when ratified and regulated, makes environmental education as compulsory at all levels of education and considers urgent and essential component of elementary education.

Nevertheless, EA application in schools is still superficial and punctual, usually restricted to the disciplines as Science, Biology and Geography, or to commemorative events such as "environmental day".The educational proposal of EA is constituted as an identity and structuring element able to developing a critical, participatory, transformative and emancipatory education, allowing the subject involved to be responsible and capable of promoting ethics and environmental citizenship (BRASIL, 1998).

The objective of this article is to present a diagnosis of the knowledge of the topics environment, Caatinga biodiversity and ecosystem services, with students from the Antônio Francisco de Oliveira Municipal School (EMAFO) of Juazeiro, Bahia, Brazil. Moreover, we aim to recognize the relationship between biodiversity and human well being, reflecting on how biodiversity is exemplified in everyday life, making students aware about the environment of their own community.

To achieve our aim, a qualitative and quantitative research was used, through bibliographic research, in which the conceptual and normative aspects were approached through books, articles, magazines and others, as well as through questionnaires for the students. Thus, the research aimed to arouse students' interest about the environmental conservation and make them realize that the conservation initiative can start with small attitudes and that the knowledge acquired in the classroom can be used at home.

2. METHODOLOGICAL PROCEDURES

The quali-quantitative research, which fits as a case study, because it is related as a data collection instrument that according to Gil (2007, p.168):

> The objective of the analysis is to organize and summarize the data in such a way as to provide answers to the proposed problem for investigation. Interpretation, on the other hand, aims to find the broadest meaning of the answers, which is done by linking them to other previously obtained knowledge.

2.1. Research location and subjects searched

The research was developed at the Antonio Francisco de Oliveira Municipal School - EMAFO, located in the Goiabeira II community, Salitre Valley, 52 km from the city of Juazeiro Bahia, Brazil, which serves about 240 students, distributed in elementary classes I and II , High School and Youth and Adult Education, working in the three shifts and 15 teachers all with postgraduate course.

The survey was conducted with 35 students from the 8th grade of elementary school, in the age group of respondents is between 13 to 17 years old, 10 male and 25 female students. Before data collecting with students, the project proposal was submitted for approval by the Research Ethics Committee of the University of Pernambuco, being approved by the license CAAE (96543918.5.0000.5207).

2.2. Data collection

First, students were asked to do a work class about the Caatinga and to search which species they had most contact with where they live and then they should draw on the proposed subject. After that, the students answered a semi-structured questionnaire, based on daily questions, relating the proposed topics (environment, Caatinga biodiversity and ecosystem services) and the level of understanding of the class, containing a total of 11 questions (objective and subjective), to obtain their knowledge about to these research topics.

3. RESULTS AND DISCUSSION

From the observation of the drawings, it was exposed by students the existence of cactaceae such as *Cereus jamacaru* DC. (mandacaru) (Figure 1), species that are very recurrent in the environment and of great importance for the Caatinga. This species present morphological characteristics of adaptation to dry climate with water storage capacity, thus synonymous with drought resistance. The drawings showed each student's knowledge of local biodiversity, even if indirectly, it was expressed through images as an important means of displaying perception. For Goldberg (2005), from drawing the individuals organizes information, processes lived and thought experiences, reveals his learning and can develop a unique style of representation of the world.

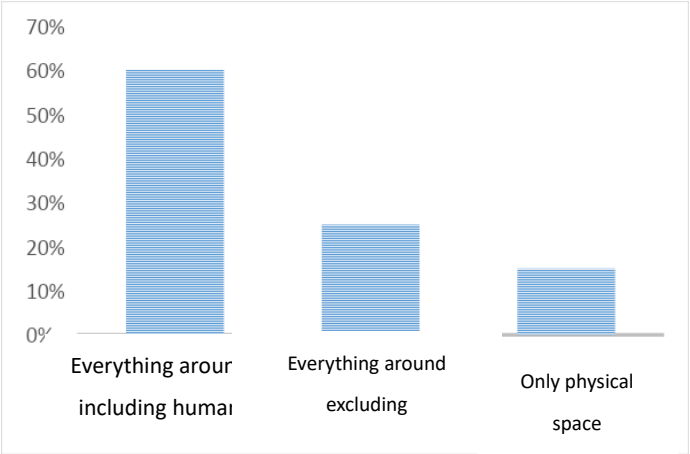
Figure 1. Draw of an 8th grade student representing the Caatinga with a greater diversity of species.

In addition, some of these cacti are frequently used to feed the herds, being offered in natura and in preserved form to the animals, such as xique-xique (*Pilosocereus gounellei* (F.A.C.Weber) Byles & Rowley)

and mandacaru (*Cereus jamacaru* DC.) (ARAÚJO, 2010). In this sense, it is important that aspects related to biodiversity, conservation and current social and environmental problems are equally remembered by them.

When asked about the concept of the environment, 60% of students answered that they understand everything around them, including men, while 25% marked the alternative that excludes men and homes and 15% considered it to be just a physical space (Figure 2). It is noted that students know well the meaning of the environment and everything around it.

Figure 2. When asked about the concept of environment.



According to Sauvé (2005), when the environment is perceived by students as nature that we must respect and appreciate, the author proposes as interpretative paths the teaching strategies. When asked if they are part of the environment, everyone was unanimous in saying yes, and that they have a duty to care for and protect the environment (Figure 3). The environment is not simply an object of study or a subject to be addressed among so many others, nor is it something that obliges us for a development we want to be sustainable. It is the crucible in which our identity is forged, our relationships with others, our "being in the world" (SAUVÉ, 2005, p. 317).

When asked about the main environmental problems identified where they live, they were: deforestation with 20%; 40% waste; air pollution and animal hunting appear in 20% of responses; soil contamination to 10%; and 10% selected social inequalities (Figure 4). After indicating the environmental problems, the students were asked if they have any responsibility for them and what the solution to these problems, all were unanimous to answer yes, but 50% answered the solution depends on individual and collective actions of society, as well as of government actions (Figure 5). Another 35% said that it depends only on the individual action of each citizen, and only 15% point out that it would only be by government action, control and supervision.

Figure 3. When asked if they have any responsibility for the environmental problems.

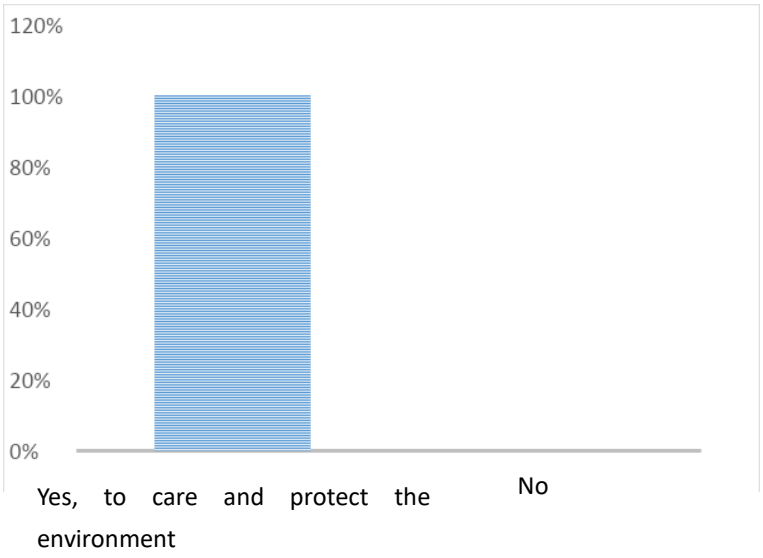
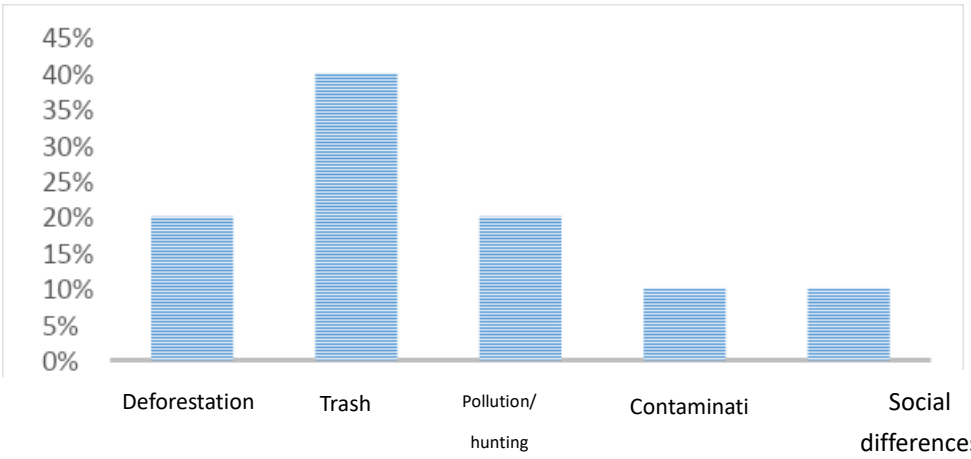


Figure 4. Students' answers about the main environmental problems.



When asked what the meaning of the word biodiversity means, 40% of the answers involved the terms care, protection and cleanliness of the environment, while another 40% cited a set of people, animals and plants, 20% was able to assimilate the word biodiversity to the various life forms (Figure 6).

Figure 5. Answers about the student's responsibilities for the environmental problems.

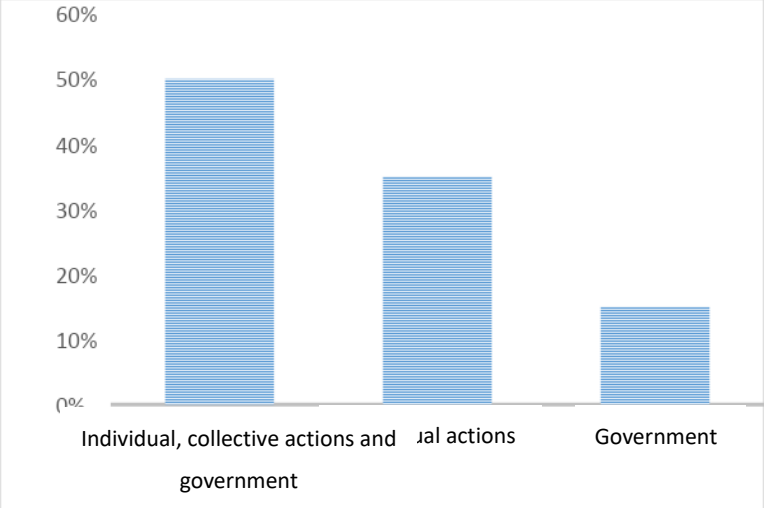
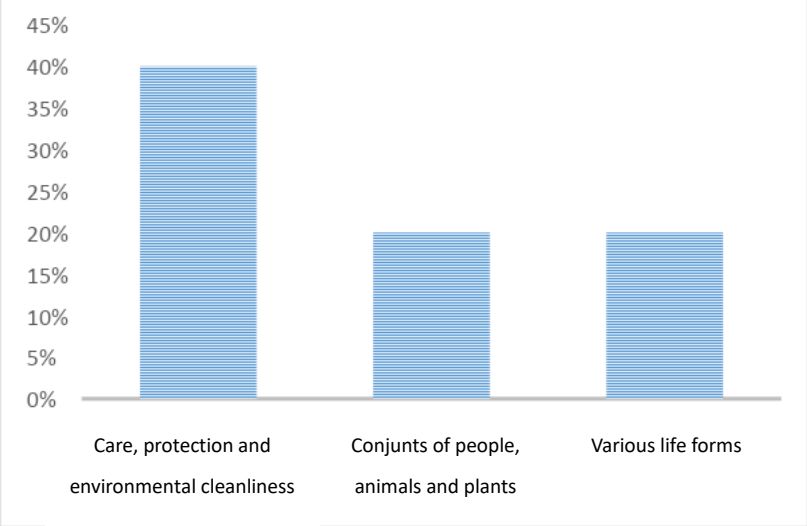


Figure 6. When asked about the meaning of the word biodiversity.



They were asked if they value the biodiversity present in the community in which they live, and 90% said yes (Figure 7). Therefore, it is observed before that they related the term biodiversity with the environment and not with the various life forms. Students living in the Brazilian Northeast region, where there is a predominance of the Caatinga ecosystem, are harmed by the little information addressed about local biodiversity. Stimulate the observation of their surroundings, are essential strategies in educational practices (DO AMARANTE MATOS; LANDIN, 2014).

When asked about the words that best represent Caatinga, one of the most recurring terms was drought, with a percentage of 70%, followed by deforestation with 20% of responses, and 10% for burnings (Figure 8). They also mentioned the suffering and death of animals caused by the lack of water.

Figure 7. When questioned if they value biodiversity.

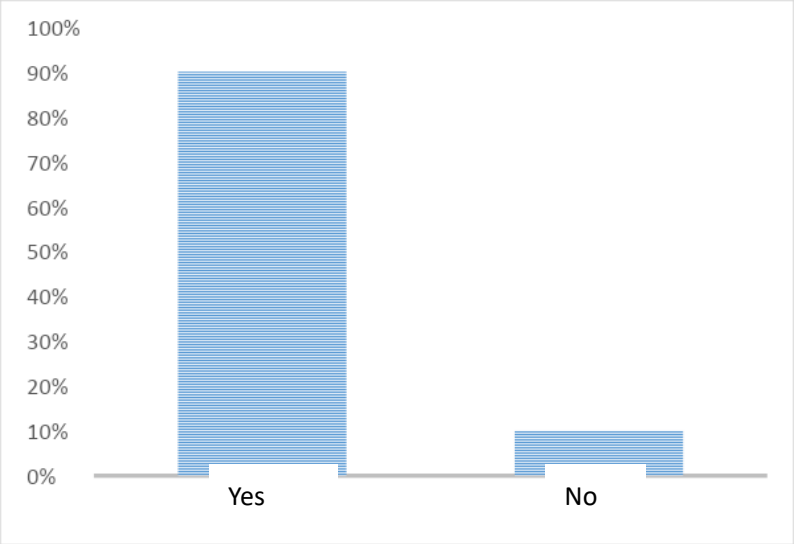
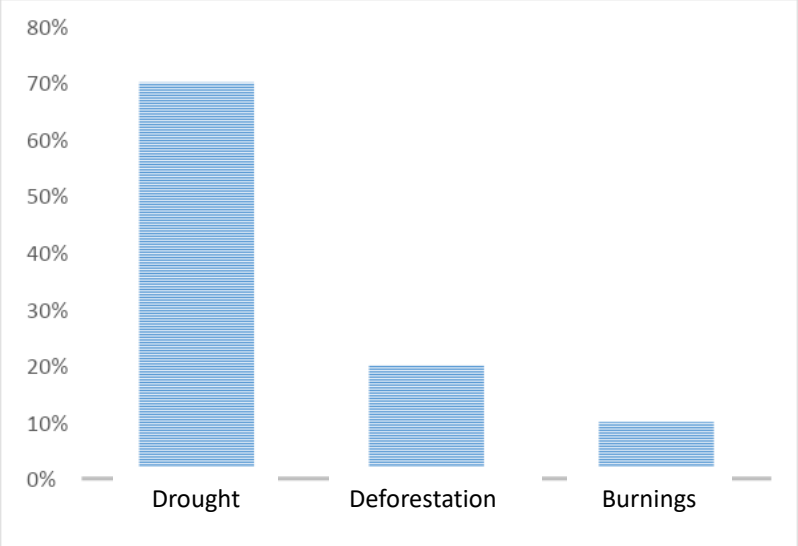


Figure 8. When asked word is best represent the Caatinga.



It is then noticed a limitation of information in the students' repertoire to characterize the Caatinga, which seems to be related to the way this contents are approached in the classroom through books, which is the most used research tool in school. Santos et al (2015), reaffirmed the deficiency of textbooks, when in the study it was perceived a less broad approach to Caatinga compared to other ecosystems that are better known, assigning concepts to it in a simplistic way, citing only basic characteristics and relating them. o with drought and scarcity of natural resources.

When asked about the elements that represent the Caatinga, humans, plants and animals as a whole, reached more than 60% of the answers, another 20% cited some native species such as mandacaru (*Cereus jamacaru*), caatingueira [*Cenostigma pyramidalis* (Tul.) E. Gagnon & G.P. Lewis] and umbuzeiro (*Spondias tuberosa* Arruda) and 20% of the terms were related to deforestation, drought and pollution (Figura 9). Regarding to the importance of Caatinga biodiversity, 80% agreed that it is important, and cited some examples as of its value: for subsistence; value of life; and value of nature itself. The others did not consider that Caatinga has values due to drought (Figura 10). These results show how students are aware

of the benefits that nature provides, and an interpretation of reality. Bizzo (2001) states that students understand issues that are related to daily life, since this information obtained comes from experiences, popular knowledge, cultures and myths.

Figure 9. When asked which elements represent the caatinga.

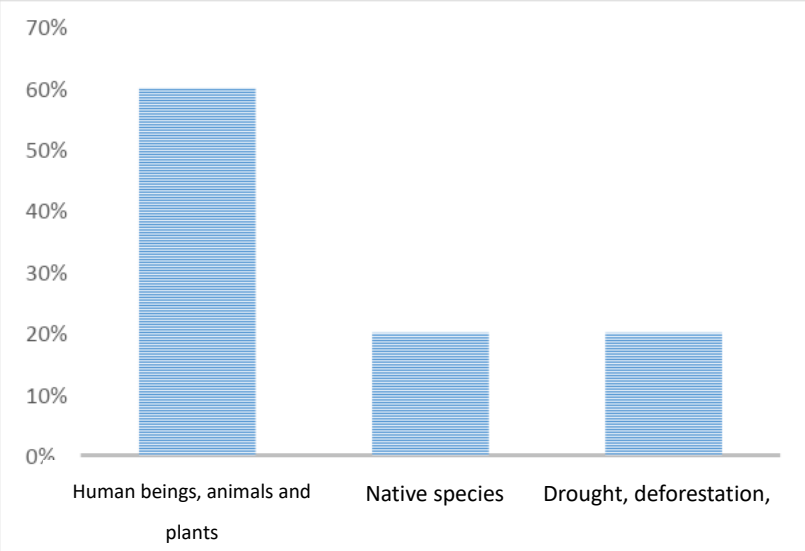
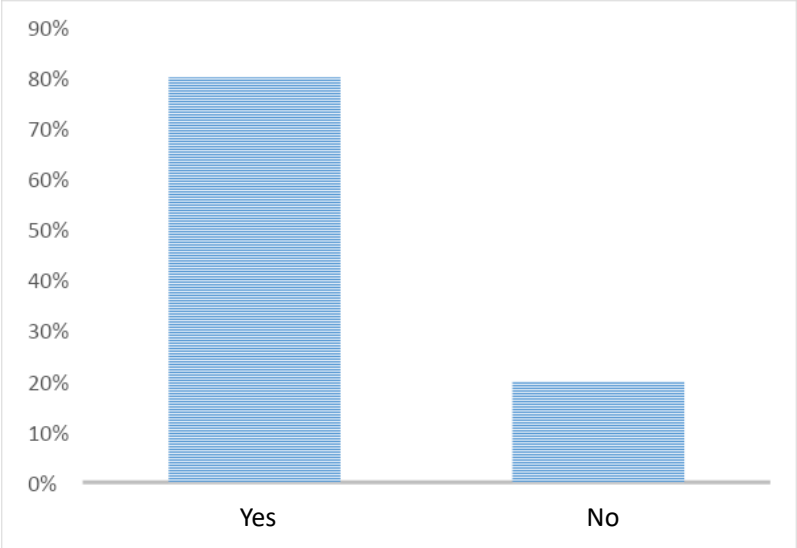


Figure 10. Regarding to the importance of biodiversity of the Caatinga.



The last question was about the terms “environmental services” and “ecosystem services” if they have ever heard, 50% say they never heard, while only 25% risked responding with terms related to destruction, care, protection or preservation of nature and also 25% related to services such as washing, cooking and drinking. which demonstrated a difficulty in recognizing the theme (Figure 11. It is noted that 50% students showed difficulty in recognizing the referred themes. According to Andrade and Romeiro (2009), although not yet fully understood, the relationships between welfare and ecosystem services are complex and nonlinear.

Figure 11. About the terms environmental services and services ecosystem

4. CONCLUSION

The results show that the biodiversity of the Caatinga, the flora, and especially the cactus species are the most frequent elements in the students' drawings. Although they show in their answers they are unaware of the richness of the Caatinga. What is most evident is their lack of knowledge about real diversity and how to conserve the Caatinga and make them understand that small habits such as the extraction of wood for the stove contribute to deforestation and endanger some species.

More than half of the students understand the environment broadly, including man, and can identify environmental problems where they live.It has been realized that the concept of biodiversity is often confused with environmental protection rather than its concept, although most claim that it has different values. The term ecosystem services or environmental services is still poorly understood by students.

Although there was some knowledge about the research topics, it was noted that many of the concepts are confused among students. These results may be due to the scarcity of information related to Caatinga biodiversity in the school context and highlight the need for further deepening in order to better highlight its values and the importance of its ecosystem services, as a way of encouraging conservationist actions and behavioral changes.

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