SOCIO-ENVIRONMENTAL PERCEPTIONS OF SCIENCE TEACHERS IN THE AMBIENCE OF THE PIABAS STREAM/PB

PERCEPÇÕES SOCIOAMBIENTAIS DE PROFESSORES DE CIÊNCIAS NA AMBIÊNCIA DO RIACHO DAS PIABAS/PB

PERCEPCIONES SOCIOAMBIENTALES DE LOS DOCENTES DE CIENCIAS EN EL ENTORNO DEL ARROYO PIABAS/PB

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ABSTRACT

This article analyzes the socio-environmental perception of Science teachers working in public middle schools (final years of Elementary Education) located in the surroundings of the middle stretch of the Riacho das Piabas, in the city of Campina Grande, Paraíba, Brazil. The research represents a partial outcome of an ongoing master's dissertation and adopts a qualitative approach, of basic nature and exploratory character. Data were collected through semi-structured questionnaires, applied after approval by the Research Ethics Committee, and analyzed based on emergent categories. The results indicate that, although teachers present different levels of knowledge about the Riacho das Piabas, all recognize its environmental, historical, and social relevance. The teachers associate the stream with elements such as preservation, biodiversity, water resources, and historical aspects, in addition to identifying its potential as a contextualization object in Science teaching. Furthermore, the understanding of environmental education as an instrument capable of promoting the transformation of the local socio-environmental reality is evident. Furthermore, interconnections between non-formal environmental education processes, driven by communities and local NGOs, are evident, consolidating an understanding of inequalities in the territory and social engagement.

Keywords: Society. Natural Resources. Micro-Watershed. Civic Education.

RESUMO

Este artigo pesquisa a percepção socioambiental de professores de Ciências do Ensino Fundamental (Anos Finais), atuantes em escolas públicas localizadas no entorno do trecho médio do Riacho das Piabas, na Cidade de Campina Grande (PB). O estudo constitui um recorte de resultados de uma dissertação em andamento e adota abordagem qualitativa, de natureza básica e caráter exploratório. Os dados foram obtidos por meio de questionários semiestruturados, aplicados após aprovação pelo Comitê de Ética em Pesquisa, e

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analisados a partir de categorias emergentes. Os resultados indicam que, embora os docentes apresentem diferentes níveis de conhecimento sobre o Riacho das Piabas, todos reconhecem sua relevância ambiental, histórica e social. Os professores associam o riacho a elementos como preservação, biodiversidade, recursos hídricos e históricos, além de identificarem seu potencial como objeto de contextualização no ensino de Ciências. Evidencia-se, ainda, entrelaçamentos de processos de educação ambiental não formal, puxados por comunidades e ONG local, consolidando a compreensão das desigualdades no território e engajamentos social.

Palavras-chave: Sociedade. Recursos Naturais. Microbacia Hidrográfica. Educação Cidadã.

RESUMEN

Este artículo analiza la percepción socioambiental de profesores de Ciencias de la Educación Básica (últimos años de la Educación Primaria), que trabajan en escuelas públicas ubicadas en el entorno del tramo medio del Riacho das Piabas, en la ciudad de Campina Grande, Paraíba, Brasil. La investigación constituye un recorte de los resultados de una disertación de maestría en curso y adopta un enfoque cualitativo, de naturaleza básica y carácter exploratorio. Los datos fueron recolectados mediante cuestionarios semiestructurados, aplicados tras la aprobación del Comité de Ética en Investigación, y analizados a partir de categorías emergentes. Los resultados indican que, aunque los docentes presentan diferentes niveles de conocimiento sobre el Riacho das Piabas, todos reconocen su relevancia ambiental, histórica y social. Los profesores asocian el arroyo con elementos como la preservación, la biodiversidad, los recursos hídricos y los aspectos históricos, además de identificar su potencial como objeto de contextualización en la enseñanza de las Ciencias. Asimismo, se evidencia la comprensión de la educación ambiental como un instrumento capaz de promover la transformación de la realidad socioambiental local, impulsado por comunidades locales y ONGs, consolidando la comprensión de las desigualdades en el territorio y el compromiso social.

Palabras clave: Sociedad. Recursos Naturales. Microcuenca. Educación Ciudadana.

1 INTRODUCTION

The development of Campina Grande is closely linked to the Riacho das Piabas system/PB, initially used by the original peoples, the body of water sustained the growth of the original urban core with clear waters that served as a supply for the local inhabitants (Sousa Rêgo, 2014).

Originally characterized by dense vegetation and an abundance of reservoirs, the area of reduced dwellings, from the second half of the twentieth century, intensified its occupation through irregular allotments, triggering severe processes of environmental deterioration (Andrade; Son; Anjos, 2025).

In view of the current growing socio-environmental problem, the need to rethink the relations established between society and nature has been evidenced, which requires mitigation and adaptation of urban spaces (middle and downstream stretch) and the preservation of natural remnants (rural upstream stretch).

In the educational field, environmental education contributes to sustainable development by fostering social engagement and understanding of inequalities, this process is essential to awaken active citizenship, allowing the population to intervene directly in the management of their territory (Antunes; Lehner; Ribeiro, 2025). In this sense, the teaching of Science has significant potential to articulate curricular content to environmental issues, favoring the process of contextualization and critical development of students.

Socio-environmental perception, which is the way communities and individuals understand and interpret the relationship between the social environment and the environment (Carvalho; Peçanha; Carvalho, 2025) is a fundamental element in the educational process, especially the perception of teachers, since it directly influences the way content is approached and how territories are recognized.

Understanding how teachers perceive the environments in which they are inserted, their meanings, values and problems, allows us to identify possibilities and limits for the development of educational practices aimed at sustainability.

The Riacho das Piabas, especially because it crosses urban areas and is close to school institutions, has socio-environmental relevance and educational potential, which makes it pertinent to investigate how this space is perceived by science teachers who work in schools located in its surroundings.

At the same time, there are popular initiatives in the field of non-formal education, led by communities and local NGOs, for the revitalization of the Riacho das Piabas system and the quality of life of the communities.

From this, we propose the following research question: what socio-environmental

perceptions are expressed by Elementary School Science teachers (Final Years), working in schools located around the Piabas Stream, in the reading of the territory and the role of environmental education in the construction of full citizenship?

It is based on the logical-conditional hypothesis: Science teachers from schools located around Riacho das Piabas build environmentally relevant and socially representative knowledge about the territory to the extent that Environmental Education (EE) is legitimized as an important factor in the search for perception and socio-environmental transformation.

Thus, the objective of this study is to research the socio-environmental perceptions of Elementary School Science teachers (Final Years), working in public schools located in the surroundings of Riacho das Piabas, considering the level of familiarity with the territory, the meanings attributed to it and the understandings about the role of environmental education to know, care and transform.

2 THEORETICAL FRAMEWORK

2.1 SOCIO-ENVIRONMENTAL PERCEPTION: CONCEPTS AND RELATIONSHIPS

One of the main terms to understand the complexity of socio-environmental perception is topophilia, which is characterized as the "affective link between the person and the place or physical environment. Diffuse as a concept, vivid and concrete as a personal experience" Tuan (2012, p. 4). From the conception of this term to the present day, there have been intense changes between human relations and the environment, mainly as a result of globalization mediated by technologies (Duarte et al., 2021).

Perception consists of the process of organizing and interpreting sensory stimuli to attribute meaning to the external environment. This phenomenon comprises the stages of capturing, selecting and processing information captured by the five senses: sight, hearing, touch, smell and taste (Carvalho; Peçanha; Carvalho, 2025). It depends on experience, but does not necessarily follow from it, it is possible to clarify this concept through questions that start from practical elements towards deeper ideas (Tuan, 1983).

Socio-environmental perception refers to the way individuals and groups interpret the interdependence between society and the environment, in a systemic view. More than recognizing problems, this concept involves raising awareness about how human activities impact nature, encompassing the ability to evaluate and act responsibly in favor of quality of life and environmental preservation (Carvalho; Peçanha; Carvalho, 2025).

2.2 THE PIABAS STREAM: ANTHROPIC ACTIONS AND BIODIVERSITY

Riacho das Piabas exemplifies how accelerated urbanization and deficiencies in basic sanitation affect water resources. Belonging to the basin of the middle course of the Paraíba River, the stream is mostly channeled in the urban perimeter of the City of Campina Grande/PB. Research indicates that the area faces severe anthropogenic impacts, which directly compromise its original biodiversity (Santos et al., 2024). Sousa Rêgo (2014) describes the complexity of the territorial changes that have occurred over the decades:

> Under the ecological irrationality and passivity of the population, the flat part (middle portions and downstream to the south) of the microbasin was urbanized. In this way, in contrast to the assets of urbanization, edaphic resources were turned over, water resources were filled, biological resources exterminated. The Riacho das Piabas gave its banks to the avenues and began to be channeled, drain sewage, carry solid waste, exhale bad smells. Its lentic portion, the Açude Velho (postcard), became a stabilization lagoon. In peri-urban areas, socioeconomic discomfort exposed housing in permanent protection areas (PPAs), decreases in substantive freedom, reduction of productive jobs, hopelessness, social cohesion, increased poverty, drug addiction and violence, worsening scenarios during rainy and flood seasons (Sousa Rêgo, 2014, p. 16).

In addition to the vulnerability to floods and landslides, the irregular occupations around the Riacho das Piabas compromise physical and visual accessibility, this barrier prevents the community from establishing a deeper connection with the body of water, hindering urban and environmental integration (Andrade; Son; Anjos, 2025). Regarding the problems mentioned, the area preserves an expressive biological wealth, pointed out by Sousa Rêgo (2014):

> The upstream and rural domain of the micro-basin with about 500 hectares still retains an expressive natural remnant in vital processes and a mixture of species surrounding the Brazilian megabiodiversity. The area is framed as an ecotonal region enclosing biocenoses of the Atlantic Forest and the Caatinga. Expressive ecosystem services stand out, such as the production of excellent fresh water, constituting a unique endogenous possibility of water security for the urban center (Campina Grande) downstream (Sousa Rêgo, 2014, p. 02).

2.3 FUNDAMENTALS OF ENVIRONMENTAL EDUCATION

Environmental education is derived from the environmentalist area, as it inherited from the environmentalist area the most important representative and institutional pillars that define its identity and formation, but it is also characterized as a field, in a certain way, independent (Layrargues; Lima, 2014). In the National Policy for Environmental Education (PNEA), the EE in the 1st article is defined as follows:

> The processes through which the individual and the community build social values, knowledge, skills, attitudes and competencies aimed at the conservation of the environment, a good for the common use of the people, essential to a healthy quality of life and its sustainability (Brasil, 1999 [sp]).

EE reveals the integration between human identity and nature, it makes us realize that, by preserving the environment, we are preserving our own identity and recognizing our place as living beings among other living beings (Sauvé, 2005). In Brazil, it also has a plurality bias:

> Environmental education (EE) in Brazil was constituted as a field of knowledge and pedagogical and political activity from the 70s and, above all, from the 80s of the next century to the last century. It was born as a plural and differentiated field that brought together contributions from various scientific disciplines, philosophical matrices, political-pedagogical positions, actors and social movements (Lima, 2009, p. 147).

In the scenario of basic education, the National Common Curriculum Base (BNCC) establishes that Environmental Education must be integrated into the curricula and pedagogical projects of educational institutions (Brasil, 2017). In addition, Layrargues and Lima (2014) theorize the political-pedagogical macro-tendencies of Brazilian environmental education: the conservationist and the pragmatic, focused on individual actions, and the critical, focused on the exercise of citizenship and transformative education.

Critical environmental education drives the demand for effective public policies and sustainable practices in the field of basic education, prepares citizens to defend their rights and question exclusionary development models, by aligning itself with environmental justice, this pedagogical practice protects vulnerable communities and minorities, promoting awareness of socio-environmental disparities and encouraging active participation in the management of natural resources (Antunes; Lehner; Ribeiro, 2025).

It grounds and enables the construction of new models of relationship between the individual and the environment. This process helps to attribute meanings to these interactions, respecting and integrating the sociocultural and geographical particularities of each intervention context (Sauvé, 2005).

3 METHODOLOGY

3.1 CHARACTERIZATION OF THE RESEARCH

The research is characterized, from the point of view of the way of approaching the problem, as qualitative, a choice that is justified by the complex nature of the proposed problem and by the need for an interpretative immersion in the field of socio-environmental perception of teachers by the researchers.

> In the qualitative approach, the research has the environment as a direct source of data. The researcher maintains direct contact with the environment and the object of study in question, requiring more intensive fieldwork. In this case, the questions are studied in the environment in which they are presented without any intentional manipulation by the researcher (Prodanov & Freitas, 2013, p. 69).

As for its nature, it is classified as basic, because "it aims to generate new knowledge useful for the advancement of science without foreseen practical application" (Prodanov & Freitas, 2013, p. 51), we seek to expand knowledge about the socio-environmental perception of science teachers in a specific context.

Regarding the objectives, also according to Prodanov & Freitas (2014) it is an exploratory study, which aims to deepen more information on the subject of investigation.

3.2 AREA OF RESEARCH

Located in the state of Paraíba, the City of Campina Grande has an estimated population of 443,911 inhabitants (IBGE, 2025). According to data from the 2022 census, the city exhibits high levels of urban infrastructure, with about 97% of residents living in the urban area, while the coverage of basic services reaches 98% for water supply, 87.5% for sanitary sewage and 97% for solid waste collection.

The research area comprises the middle stretch of the Riacho das Piabas, located in the municipality of Campina Grande, Paraíba. The area stands out for its proximity to schools. In the surroundings there is an Early Childhood Education school, two Elementary Schools (Early Years). however, in this study, the focus was exclusively on Elementary School (Final Years).

Thus, two public schools located near the stream were selected: the Frei Dagoberto Stücker Municipal School of Elementary Education and the Professor Anésio Leão Technical Integral Citizen School, from the state network, which offers Elementary School. This scenario confers educational potential and diversity of socio-environmental scenarios. (Figure 1).

Figure 1

Excerpts from the middle course of Riacho das Piabas highlighting a) pollution; b) stretch of the Louzeiro Forest; c) image of the façade of the Anésio Leão Technical Citizen School; d) and the Frei Dagoberto Stucker Municipal School

Source: Applied research, 2026.

The area faces contrasts with the city's infrastructure indexes, as it faces socio-environmental weaknesses, such as the release of solid waste, the degradation of the riparian forest and the channeling of the watercourse, especially in the area popularly known as "Buraco da Gia". However, the coexistence of remnants of vegetation, the presence of biodiversity and the course of the stream are observed. This makes Riacho das Piabas a strategic territory for the development of contextualized pedagogical practices, especially in the field of Environmental Education and Science teaching.

3.3 RESEARCH PARTICIPANTS AND ETHICAL ASPECTS

The participants of the study were five teachers of Science of Elementary School – Final Years (6th to 9th grade), which corresponds to 100% of the sample of teachers who work in the schools around the middle stretch of the Riacho das Piabas. The participants voluntarily agreed to participate in the research, by signing the Informed Consent Form (ICF).

The project was previously submitted to and approved by the Human Research Ethics Committee (CEP) of the State University of Paraíba – Campina Grande Campus, through Plataforma Brasil.

3.4 DATA COLLECTION INSTRUMENT

Data collection was carried out through the application of semi-structured questionnaires. The instrument was developed based on the guiding question and the hypothesis, contemplating open and closed questions related to the socio-environmental perception of teachers about the Piabas Stream. It is noteworthy that this article is an excerpt from an ongoing master's research, from which only the data referring to the socio-environmental perception of the teachers, directly related to this thematic cut, were analyzed.

3.5 DATA ANALYSIS

The analytical strategy adopted is based on three phases defined by Gil (2008): (i) data reduction, understood as the process of selection, simplification, abstraction and transformation of the original data; (ii) categorization, through the construction of descriptive categories emerging from the reading and organization of the material obtained; and (iii) interpretation, carried out in the light of the theoretical framework adopted, enabling the understanding of the meanings and senses expressed by the participants. We built a word cloud based on the data from a questionnaire question using *Venngage*, an online graphic design platform.

To verify the existence and characteristics of the teachers' socio-environmental perception, it was based on central points of analysis: (a) the level of familiarity of the teachers with the Piabas Stream; (b) the socio-environmental meanings and values attributed to this territory; and (c) the understandings about the role of Environmental Education in its transformation.

4 RESULTS AND DISCUSSIONS

4.1 TEACHERS' FAMILIARITY WITH THE RIACHO DAS PIABAS

The analysis of the answers indicates that the participating teachers demonstrate different levels of familiarity with the Piabas Stream. Although all of them stated that they had some kind of previous knowledge about the stream, it was observed that only one of the participants stated that they knew it in a more in-depth way, while the others showed partial or superficial understandings about the territory.

These results indicate that the simple insertion of schools in the surroundings of Riacho das Piabas does not guarantee, by itself, an in-depth socio-environmental perception on the part of teachers and a high degree of familiarity with the territory. This reinforces the idea that knowledge about the territory is built from experiences and bonds (Tuan, 2012).

4.2 IMPORTANCE AND REPRESENTATIVENESS ATTRIBUTED TO THE RIACHO DAS PIABAS

The teachers' answers were varied, with the aim of synthesizing the meanings attributed by the teachers to the stream, based on the recurrence of central terms and ideas, a word cloud was elaborated that evidences the main semantic terms present in the teachers' discourses, Figure 2.

Figure 2

Word cloud elaborated from the answers of teachers about the importance and representativeness of Riacho das Piabas

Source: Applied research, 2026.

The word cloud highlights the centrality of terms related to the place, water, biodiversity and history, suggesting a perception that recognizes the Riacho das Piabas mainly as an environmental and sociocultural element.

The stream is also understood as a space that demands recognition and conservation, being associated with the idea of environmental preservation and the need to protect its natural resources. This perception points to an understanding of the stream as an environmental heritage, whose conservation is seen as a condition for the maintenance of life and ecological balance.

Other teachers highlight the social and educational relevance of Riacho das Piabas, recognizing it as an important resource for the local community and as a potential learning tool. From these perspectives, the stream is associated not only with ecological aspects, but also with possibilities of pedagogical use and social development, which evidences an integrated perception between environment and society.

The historical dimension is manifested in a recurrent way in the teachers' answers, especially through references to the role of the stream in the process of emergence and development of the city. As Tuan (2012, p. 144) points out, "awareness of the past is an important element in the love for the place", which reinforces the understanding that urban water bodies are carriers of collective memories and social trajectories.

In this sense, the stream is configured as a fundamental element for the historical and territorial reading of the urban space. In addition, the professors highlight the stream as a natural source essential to life and as an environment that shelters biodiversity, evidencing the socio-environmental richness present in the area.

4.3 ENVIRONMENTAL EDUCATION AS AN INSTRUMENT OF SOCIO-ENVIRONMENTAL TRANSFORMATION OF THE PIABAS STREAM

The teachers show a consistent understanding of education as a central element for the conservation and enhancement of the Piabas Stream. In general, teachers associate environmental education with training processes capable of promoting knowledge, awareness and socio-environmental responsibility, recognizing its transformative potential both in the school environment and in the community.

The participants highlight educational actions of an informative and experiential nature, such as lectures, visits to the stream and the study of its history, fauna and flora, indicating that direct contact with the territory is perceived as an important strategy for strengthening the environmental awareness of students. These practices dialogue with the understanding that schools play a crucial role in the implementation of Critical Environmental Education, since, by promoting environmental projects, such as awareness campaigns, they can constitute learning spaces focused on sustainability (Antunes; Lehner; Ribeiro, 2025).

Other teachers expand this understanding by relating environmental education to principles of sustainability, such as the promotion of sustainable living, safe food, the conscious use of natural resources and solid waste management, in addition to the articulation with the Sustainable Development Goals (SDGs).

There is also an emphasis on awareness and sensitization projects, aimed at preserving the surroundings of the stream. In this approach, education is understood as a

means to mobilize responsible attitudes and behaviors, stimulating the active participation of students in the protection of the environment in which they are inserted.

Finally, some teachers emphasize the role of education in the formation of subjects aware of their environmental co-responsibility. By recognizing that students are also responsible for caring for the environment, the teachers point to a conception of environmental education that goes beyond the transmission of content, focusing on the transformation of the perception and posture of individuals in the face of socio-environmental issues. In this sense, by encouraging active social participation and the development of problem-solving skills, environmental education contributes significantly to the construction of a fairer and more sustainable future (Antunes; Lehner; Ribeiro, 2025).

5 CONCLUSION

The results of this study show that the science teachers of the schools located in the vicinity of the Piabas Creek have, at different levels, knowledge about this watercourse and recognize its historical, environmental and social relevance. Although the degree of familiarity varies among the participants, there is a common perception that the stream is an important element of the territory, with educational potential for the community.

The professors associate the Riacho das Piabas with aspects such as environmental preservation, biodiversity, water resources and historical memory, demonstrating an integrated understanding of the environment. This socio-environmental perception is fundamental for the construction of contextualized pedagogical practices, capable of bringing the teaching of Science closer to the reality experienced by students and strengthening links between school and territory.

In this sense, the findings of the research indicate that the initial hypothesis is confirmed, since teachers who demonstrate knowledge and appreciation of the Piabas Stream also recognize Environmental Education as a central element for the transformation of the socio-environmental reality of the territory. The teachers point to environmental education as a strategic instrument, highlighting educational actions aimed at raising awareness, sensitization and training responsible subjects, understanding it as a means of promoting changes in attitude and expanding the understanding of co-responsibility in environmental conservation.

Thus, the study indicates the existence of a teacher's educational potential, especially with regard to the contextualization of science teaching from the territory. In this sense, the results point to the importance of investments in continuing education processes and in the production of didactic materials contextualized with natural attributes of the school

environment, capable of strengthening and expanding pedagogical practices aligned with Environmental Education, contributing to the consolidation of more critical educational actions committed to sustainability.

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