

## THE PAMPA BIOME AND SCIENCE TEACHING: A BIBLIOGRAPHIC ANALYSIS ON GOOGLE ACADEMIC


### O BIOMA PAMPA E O ENSINO DE CIÊNCIAS: UMA ANÁLISE BIBLIOGRÁFICA NO GOOGLE ACADÊMICO

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**Abstract:**The study identified how the Pampa biome has been approached in relation to Science teaching in scientific articles on Google Scholar, between 2011 and 2023. Methodologically, it is a qualitative and exploratory study and bibliographical research, where Content Analysis was used to analyze the data. After the search and verification, thirty-five (35) articles were identified, grouped into three categories: Approaches to the Pampa biome in Science teaching; The Pampa biome as a theme for Environmental Education; and Understandings of the authors, of the articles researched, about the Pampa biome. The results indicate that the Pampa biome is little discussed in relation to teaching, and demonstrate the possibility of linking the theme to Environmental Education. Finally, we suggest a reorganization in teaching and, in practice, with the inclusion of content that involves the Pampa biome, as well as carrying out more research in this area.

**Keyword:**Environmental Education; Science Education; Pampa biome.

**Resumo:** O estudo identificou como o bioma Pampa tem sido abordado em relação ao Ensino de Ciências em artigos científicos no Google Acadêmico, entre 2011 a 2023. Metodologicamente, é um estudo qualitativo e exploratório e pesquisa bibliográfica, onde para análise dos dados foi utilizado Análise de Conteúdo. Após a busca e verificação, identificou-se trinta e cinco (35) artigos, agrupados em três categorias: Abordagens do bioma Pampa no Ensino de Ciências; O bioma Pampa como Tema Gerador no estudo da Educação Ambiental; e Compreensões e Percepções sobre o bioma Pampa. Os resultados apontam que o bioma Pampa é pouco abordado em relação ao ensino, e demonstram a possibilidade de vincular a temática à Educação Ambiental. Por fim, sugere-se uma reorganização no ensino e, na prática, com a inserção de conteúdos que envolvem o bioma Pampa, bem como a realização de mais pesquisas nessa área.

**Palavras-chave:** Educação Ambiental; Ensino de Ciências; Bioma Pampa.

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## INTRODUCTION

Brazil has the greatest biological diversity on the planet, housing between 15% and 20% of all global biodiversity, where more than 120,000 species of invertebrates, around 9,000 vertebrates, and more than 4,000 species of plants are found (UN, 2019). The biological richness of the Brazilian territory is manifested through the variety of ecosystems, which differ in unique characteristics due to its great biodiversity of biomes, namely: Pampa, Atlantic Forest, Cerrado, Pantanal, Caatinga, and Amazon (IBGE, 2019).

However, there is an accelerated loss of species and ecosystems caused by the intensification of deforestation in tropical ecosystems, where the majority of biodiversity is concentrated (ANDRADE *et al.*, 2020). Furthermore, some factors have contributed to changes in land management, such as the increase in eucalyptus planting, the growth of livestock activity, and agricultural expansion, which accelerate soil erosion, reduce fertility, and cause negative socioeconomic impacts on local communities (ANDRADE, 2021).

In this context, Science Teaching (ST) and Environmental Education (EE) can stimulate the development of a more responsible attitude towards environmental care, forming citizens ecologically committed to sustainability (COMIS *et al.*, 2022). These educational processes seek a balance between human actions and the use of natural resources, because in addition to the acquisition of knowledge, they promote reflection, enhancing the adoption of more sustainable habits, as they can awaken the feeling of belonging to the environment in which they live.

According to Fröhlich and Wenzel (2020, p. 44), ST "configures a set of knowledge that can instigate curiosity, questioning, and enable children to understand nature, the physical, and social world from the perspective of Science." Thus, this type of teaching provides an understanding of the mechanisms that govern ecosystems and shows how our daily actions can directly impact the environment.

Environmental themes are therefore effective alternatives for the elaboration of contextualized school plans, integrating formal content with the students' reality. This approach favors student involvement in their learning, as addressing everyday aspects piques curiosity. Maestrelli and Lorenzetti (2021) understand that students need to engage in conscious and engaged training to take actions in search of environmental awareness.

Among environmental themes, Brazilian biomes stand out for their great potential in the development of ST, as pointed out by Belmont, Dinardi, and Pessano (2019). The authors argue that experiencing in practice and providing students with outdoor walks makes it possible to

visualize the colors, shapes, textures, and the diversity of animal and plant species that exist in the environment that surrounds them.

Therefore, in this study, the approach of the Pampa biome in the classroom stands out, given the plant diversity existing in this biome, presenting its own characteristics with unique fauna, flora, and biodiversity. Furthermore, it presents great uniqueness and ecological importance, located exclusively in the state of Rio Grande do Sul, housing most of the Guarani Aquifer, constituting a natural, genetic, and cultural heritage of national and global importance (MMA, 2000).

According to research carried out by Castro (2023) and Pinto, Baccin, and Pessano (2020), Basic Education students in Rio Grande do Sul have superficial and generic perceptions about the Pampa biome. Despite being part of this biome, many do not recognize it, nor its characteristics or the species of plants and animals that live there.

Given the context developed, this study is based on the following guiding research question: How do ST and EE influence students' perception of the preservation of the Pampa biome and their attitudes towards the environment? Thus, the article aims to identify how the Pampa biome has been approached in relation to ST, in scientific articles available on the Google Scholar platform from 2011 to 2023.

This work presents, in addition to the introductory and concluding points, a literature review section, presenting a discussion on the diversity of the Pampa biome and its importance in the environmental and educational context. Followed by a topic on the methodology used, which is a qualitative, exploratory, and bibliographical analysis, where the research was carried out on Google Scholar from 2011 to 2023, totaling thirty-five scientific articles selected. To analyze the data, the Content Analysis (CA) methodology was applied, resulting in three categories: i) Approaches to the Pampa biome in ST; ii) The Pampa Biome as a Generating Theme in the EE study; iii) Understandings and Perceptions about the Pampa Biome.

## **THE DIVERSITY OF THE PAMPA BIOME AND ITS IMPORTANCE IN ENVIRONMENTAL EDUCATION**

The name originates from the aboriginal language of South America, also spoken in the Inca empire, Quechua (or Quichua), which means pampa, that is, 'flat region'. It is associated with the landscape of extensive plains covered in undergrowth, characterizing the extreme south of Brazil (BENCKE; CHOMENKO; SANT'ANNA, 2016).

The Pampa biome is a complex system of grassland plant formations, forming an ecological unit with the existing fields to the north of Rio Grande do Sul. It covers higher and flatter areas of the South-Brazilian Plateau, extending across the southern and western half, across the border with Uruguay and Argentina (forming the Pastizales del Rio de la Plata) (BENCKE, 2016; IBGE, 2019).

According to Bencke (2016, p. 61), the Pampa presents: "[...] a floristic diversity rarely found in other rural biomes on the planet," placing it among the biomes with one of the greatest diversities in the world. The fields constitute the natural vegetation of this landscape, presenting a wide variety of species and ecosystems adapted to their habitat, housing around 2,817 species of native plants.

For this author, the flora of this biome displays a remarkable diversity of grasses, such as forkgrass, carpet grass, flechilhas, goat's beards, pig's hair, among others, and legumes, such as field aloe, native peanut, and native clover. It is also worth highlighting the existence of areas of rocky outcrops, with the presence of cactus species endemic to the Pampa, and in the natural field areas, species of composites (Family of Asteraceae) also stand out, which includes daisies, carquejas, and the myo-myo, represented by 480 species (BOLDRINI; OVERBECK; TREVISAN, 2015).

According to the Chico Mendes Institute for Biodiversity Conservation (ICMBIO), in 2018, 956 species of Pampa fauna were recorded, with 78 of them standing in some category of threat of extinction (ICMBIO, 2018). One of the biggest concerns regarding this biome is the growing expansion of monocultures for the production of pastures. Furthermore, the introduction of exotic species leads the biome to rapid degradation and decharacterization of natural landscapes (VERRASTRO; BORGES-MARTINS, 2015).

The loss of biodiversity in this ecosystem compromises the environmental balance of existing species, the sustainable development of the region, and the environmental services provided by rural vegetation, such as soil erosion control and carbon sequestration that mitigate climate change (FABRIM, 2020).

Consequently, the Pampa biome is a region of great biological and cultural diversity. Therefore, studies about its diversity can contribute to respecting nature and the different forms of life present in the terrestrial biosphere, in addition to valuing the traditional knowledge of local communities (Mazurana; Dias; Laureano, 2016). Thus, ST can play a fundamental role in the conservation of the Pampa biome, being a means by which students can understand the scientific and natural aspects of this ecosystem (SCHLEE; BARROS, 2020).

By learning about the richness and fragility of the Pampa, students can develop a greater awareness of the importance of conserving this ecosystem and realize that its preservation is essential for maintaining biodiversity, quality of life, and the sustainability of the planet as a whole. In this context, it is essential to implement actions that promote conservation and the sustainable use of environmental resources. Additionally, it is important to offer holistic teaching in schools aimed at Environmental Education (EE), providing practical activities and projects that involve the community, developing collective environmental awareness, and promoting sustainability in everyday life (CAMPELO; MELO, 2018).

## **METHODOLOGICAL PROCEDURES**

The methodology used in this study is qualitative-exploratory, aiming for greater understanding and familiarity with the problem addressed (GIL, 2010). As for the method, we opted for a bibliographical research approach, based on pre-existing material, such as books and scientific articles, allowing the researcher to cover a wider variety of phenomena than would be possible to investigate directly (GODOY, 1995).

The research was carried out on Google Scholar. The platform was chosen for being considered a versatile research source with quick access, in addition to being a free tool, providing access to academic works of the most diverse types (GAUDÊNCIO; FIGUEIREDO; LEITE, 2009).

To accomplish the search for publications, a period from 2011 to 2023 was determined, aiming to get an overview of the most recent publications. To search for publications, on the Google Scholar home page, access the "Advanced Search" option. In the "Find articles with all words" field, the keywords "Pampa biome" and "Science Teaching" were inserted. Then, in the "Where my words occur" section, select the option "Anywhere in the article". In the "Display articles with date between" field, the period from 2011 to 2023 was specified. Finally, the "Search" button was clicked to perform the search.

Thus, based on the data obtained in this first search, approximately two hundred and ninety-six (296) publications were identified. Of these, one hundred and ninety-nine (199) were discarded because they were various documents, such as theses, dissertations, books, lists of works accepted at events, repeated publications, in a foreign language, among others, which were not of interest to the research. Finally, ninety-seven (97) scientific articles remained for floating analysis.



From the selected sample, the Content Analysis (CA) methodology was applied to verify hypotheses and/or discover what is behind each content (Bardin, 2016), enabling a deeper understanding of the analyzed texts. The different phases of CA are organized around three stages: pre-analysis; exploration of the material; treatment of results, inference, and interpretation.

In pre-analysis, the organization and systematization of ideas took place. Then, the articles were skimmed. From this analysis, sixty-two (62) were discarded as they did not suit the research objective, leaving thirty-five (35) articles for the next stage. In exploration of the material, after defining the corpus to be analyzed, categorization was carried out, allowing similar ideas to be grouped into pre-established categories.

Finally, the treatment of results, inference, and interpretation occurred. At this moment, there was intuition, reflective and critical analysis of the material. This step is essential, as it allows the researcher to make the significant and valid results found.

To better tabulate the data, the manuscripts found were designated by the letter A and sequential Arabic numerals (A1, A2, A3...). The categories were subdivided into: i) Approaches to the Pampa biome in the ST; ii) The Pampa Biome as a Generating Theme in the EE study; iii) Understandings and Perceptions about the Pampa Biome.

## **RESULTS AND DISCUSSION**

The results of this search will be presented and discussed according to the three predefined categories. In the category “Approaches to the Pampa Biome in the ST”, articles were grouped that addressed concepts related to teaching the Pampa biome in the classroom, in addition to research carried out in non-formal teaching spaces that used the theme to contextualize the ST content.

According to the National Common Curricular Base (BNCC), scientific knowledge provides the awareness of subjects with histories and knowledge for living in society, and for this, the school must be a: “forming and guiding space for conscious, critical, and participatory subjects” (BRASIL, 2018, p. 60). Thus, it is understood that schools share the autonomy and competence to combine the approach of contemporary themes with the curricula and also with pedagogical proposals, making this work even more significant by influencing the life of the school community as a whole (BRASIL, 2018).

Approaching the Pampa biome in the classroom not only allows students to expand their scientific knowledge about a specific ecosystem but also promotes greater appreciation and

awareness about biodiversity. By contextualizing Science content with local and contemporary themes, teachers are able to arouse students' interest, making learning more effective and relevant (LUNETTA; GUERRA; ROZENDO, 2023).

Therefore, the inclusion of the theme in the school curriculum, in accordance with BNCC guidelines, strengthens the relationship between theory and practice, promotes interdisciplinarity, and encourages the active participation of students in the educational process. This not only enriches learning but also prepares students to face contemporary environmental and social challenges, fostering an education focused on sustainability and global citizenship (GALVÃO, CASIMIRO, 2023).

The next category of analysis, “The Pampa Biome as a Generating Theme in the Study of EE,” brought together articles that dealt with the use of the Pampa biome theme to incorporate new knowledge and develop aspects related to EE. It also discussed the relationship between human beings, nature, and socio-environmental formation, which has increasingly become necessary, as “[...] new ways and methods of thinking and acting towards society, as well as the way of living, end up directly reflecting on the environment” (SILVEIRA; LORENZETTI, 2021, p.03).

According to the authors:

Problematizing the relevance of environmental education, from a critical perspective, enhances the premises for the formation of a subject with social responsibility and understands their role as a citizen, to mitigate problems of a cultural, economic and/or environmental nature (SILVEIRA; LORENZETTI, 2021, p.03).

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In the last category, “Understandings and Perceptions about the Pampa Biome,” articles that addressed the understandings of the authors about the Pampa biome were grouped. Understanding these perceptions allows for theoretical deepening and a more critical stance on the concepts investigated. Furthermore, by knowing the relationships between human beings and the space in which they live, it is possible to contribute to promoting awareness and understanding of the environment around them, from a perspective of caring for the environment (SAMPAIO, 2021).

For Marques, Rios, and Alves (2022, p.531), it is necessary to address environmental perception in schools, as this “[...] enables the school community itself to think about its local



reality not separately, but in an integrated, systemic way, leading the student, subject-citizen, to reflect on the complexity of the theme.” By developing environmental perception in different spaces, it is possible to adopt more sustainable practices, considering that one of the difficulties in preserving natural spaces lies in the different conceptions and values that individuals have.

Data relating to each category will be presented and discussed in the following topics.

### **APPROACHES TO THE PAMPA BIOME IN SCIENCE TEACHING**

In this category, seventeen (17) articles were gathered, representing 48.6% of the total, which addressed the importance of the Pampa biome in ST, as shown in the table below.

Table 01 - Articles gathered in Category 1.

<b>Identification</b>	<b>Title/Reference</b>
<b>TO 1</b>	Problem situations in interdisciplinary practices: integrating science and mathematics in a didactic experience
<b>A2</b>	Native and exotic species in science teaching: the construction of educational practices for elementary school
<b>A3</b>	The local context as a link between natural sciences and rural education
<b>A4</b>	Brazilian Biomes in Science textbooks: A look at Pampa Gaúcho
<b>A5</b>	Teaching zoology through observation challenges: the scientific method as a learning tool
<b>A6</b>	The Pampa biome in the early years: an investigation with teachers and in PNLD textbooks
<b>A7</b>	Curricular Environmentalization in the Degree Course in Natural Sciences and Local and Global Contextualization
<b>A8</b>	The Pampa biome in the pedagogical project of a Degree course in Natural Sciences in Rio Grande do Sul
<b>A9</b>	The station rotation model as a strategy for teaching ecology: an experience report in the education of young people and adults
<b>A10</b>	Pibid Natural Sciences pedagogical practices: mapping trends
<b>A11</b>	Ethnoherpetological knowledge in the municipality of Caçapava do Sul, Southern Brazil
<b>A12</b>	Comic book about the pampas biome as a teaching resource in elementary school
<b>A13</b>	Symbols and Gaucho tradition: a biological approach
<b>A14</b>	The Pampa Biome in Biology Textbooks in Brazil: a Look at the City of Uruguaiana-RS

<b>A15</b>	Pedagogical Workshop on the Training Process in Teaching Science and Ethnobotany
<b>A16</b>	Ecos do Pampa radio program: Dialogue of knowledge about native plants
<b>A17</b>	Textbook and teachers' perception in the field of ethnobotany

**Source:** Prepared by the authors, 2023.

When analyzing the publications selected for this category, the incorporation of the Pampa biome into schools is evident through the development of works that allowed for a contextualized approach to the theme, as demonstrated in the selected publications below.

A3 highlights the possibility of valuing and including the Pampa biome in school curricula through field trips, where students observe the species that make up this biome and their significance in the regional ecosystem. Furthermore, as noted in A13, aspects of Gaucho culture can permeate the school space in the approach to the Pampa biome. Here, the “identity role is vital within the school context as it is linked to local culture, and its significance in the life of students, as with any regional custom, can be lost if not passed on [...]" (A13, p. 285).

For A1, the resolution of problem situations in increasing complexity, involving mathematics and incorporating aspects related to the Pampa biome, such as ecological relationships between animal species and cattle health concerning tick parasitism (A1, p. 32). In this study, problem-based learning was employed alongside interdisciplinary educational practices, integrating various possibilities for developing content based on everyday subjects.

From this perspective, A10 emphasizes that the Pampa biome was contextualized based on themes such as the quero-quero bird, pitanga fruit, ecological niche, greenhouse effect, aloe vera, milk production, endangered animals, medicinal plants, Brazilian biomes in general, and biotic and abiotic aspects of the biome, including its fauna, flora, climate, and relief.

Therefore, the importance of this approach is underscored as it allows the content to establish connections with other areas of study and with students' reality (MARQUES, MOTA, SOUZA, 2020). It is believed that dissociating experiences from what is learned in the classroom makes teaching uninteresting and devoid of meaning for students.

In this way, the biodiversity present in the Pampa biome can serve as a tool to enhance environmental education in schools in the southern region of Brazil, showcasing the richness it offers in its unique ecosystems that influence social, economic, and environmental issues. Playing a fundamental role in the development of Gaucho identity, the Pampa biome can make the school curriculum a broad space where different narratives can be addressed. Additionally,

cultural aspects afford teachers the opportunity to raise students' awareness of the preservation, appreciation, and dissemination of scientific knowledge of the biodiversity of the Pampa biome (GOLDSCHMID JÚNIOR *et al.*, 2023).

At this juncture, teachers need to engage in debates on issues relevant to society, thus encouraging students to begin their critical training process through scientific knowledge learned during classes (FERNANDES; MARQUES; DELIZOICOV, 2016).

It was also found that some articles discussed the use of textbooks to teach the Pampa biome. In their studies, A4, A10, and A14 found that the books presented misleading and outdated information about the Pampa biome or barely mentioned it in their content. According to authors Martins and Klein (2020), textbooks are commonly used by teachers due to their organized and summarized content. However, this ease of use may prevent teachers from seeking additional materials and information to supplement their teaching practices. This factor contributes to the superficial and out-of-context approach to the Pampa biome theme in the classroom.

Additionally, when analyzing the 2016 Early Years National Textbook Plan, A6 observed the existence of only five collections that contextualized the Pampa biome theme, limiting the available options of materials for teachers. Consequently, the Pampa biome is often not characterized in these pedagogical resources, with an emphasis on the predominance of grasses and lacking illustrations of such vegetation (CASTRO *et al.*, 2019).

In this context, Pinto, Baccin, and Pessano (2020) argue that regional books are crucial in developing Pampa biome content as they contextualize regional issues and locations. However, there is a need to update these teaching resources to contribute to a more appropriate and contextualized teaching practice.

The importance of a contextualized approach to the Pampa biome in teaching is emphasized in the publications selected in this category, allowing content to relate to students' reality and other areas of knowledge (CASTRO *et al.*, 2023). Furthermore, the inclusion of Gaucho culture in schools helps maintain local traditions and customs, making learning more relevant and strengthening students' bonds with their cultural heritage (GOLDSCHMID JÚNIOR *et al.*, 2023).

It is observed that the use of contextualized educational practices provides meaningful experiences for learning various content, enabling students to develop autonomy and critical and reflective skills essential for their development as conscientious and responsible citizens. This aligns with the proposed goals of the Common National Curriculum Base (BNCC), where

contextualization in teaching must go beyond “the simple exemplification of concepts with facts or everyday situations” (BRASIL, 2018, p. 549).

In summary, the integration of the Pampa biome into the school curriculum is fundamental to promoting ecological, cultural, and scientific awareness among students. However, this integration faces significant challenges, primarily related to the quality and availability of teaching materials. Overcoming these challenges and enriching teaching about the Pampa biome requires the adoption of integrated and contextualized approaches, as well as the updating of educational resources, to preserve the cultural and environmental identity of the southern region of Brazil.

### THE PAMPA BIOME AS A GENERATING THEME IN THE STUDY OF ENVIRONMENTAL EDUCATION

For this category, twelve (12) articles were selected, representing 34.28% of the data, which dealt with the use of the Pampa biome theme to approach EE, as can be seen in the table below:

Table 02 - Articles selected for Category 2.

Identification	Title/Reference
A18	Video documentary as a tool to raise awareness of environmental education, in Butiazais de Tapes (RS)
A19	The study of the Pampa biome: a possibility through ecological trails/
A20	Environmental education and university extension: a brief look at the true grouper ( <i>Epinephelus marginatus</i> ) and coastal fish in the extreme south of Brazil
A21	Teaching through research. Investigative experience report
A22	On the Pampa trail: a game for the development of environmental education in the context of Pampa in Rio Grande do Sul
A23	Providing sustainability and health through guided ecological trails – experience report
A24	Analysis of the potential of birdlife as a theme for Environmental Education
A25	Pampa Biome and its floristic diversity: reports from a field trip
A26	Development and application of environmental education activity: dune gecko ( <i>Liolaemus arambarensis</i> ) in focus
A27	. Environmental Education and social movements: a documentary study on campaign newspapers

<b>A28</b>	The lack of insertion of the Espinilho State Park as a space for environmental training
<b>A29</b>	Environmental perception of elementary school students about the Morros Municipal Natural Park (Santa Maria, RS, Brazil)

**Source:**Prepared by the authors, 2023.

When analyzing the articles gathered in this category, some examples are presented below that use EE to contextualize the Pampa biome:

The authors in A24 discuss that EE, taking local birdlife as its thematic approach, constitutes an important element in the preservation of the Pampa biome, given that “[...] the local extinction of species due to the fragmentation of their habitat can cause the elimination of ecological processes that are important for maintaining diversity.” Thus, the importance of debating the impacts of changes that occur in the environment and their consequences, as they alter the dynamics of the entire ecosystem that exists there, stands out.

In A18, an activity was conducted to emphasize and highlight the importance of preserving Butiazais<sup>5</sup> together with school coordinators and teachers, showing the video documentaries “Cultural Rescue - Conservation of Butiazais in the Pampa Biome<sup>6</sup>” and “We Love Butiá<sup>7</sup>” Subsequently, EE workshops were developed, addressing today's main environmental conflicts, especially the problem of pollution caused by solid waste near preservation sites.

Seeking to combine the approach to the Pampa biome with EE, A23 suggests that trails are tools capable of sharpening students' curiosity, providing them with in-depth knowledge about local flora and fauna species. However, it is pointed out that this new educational itinerary needs to be planned so that it does not become mere outings but moments of teaching and apprenticeship.

In A26, the authors analyzed the application of two virtual and interactive activities based on the production of teaching material referring to endangered species of fauna in the Restinga da Lagoa dos Patos. In their conclusions, the authors inferred that “[...] the significant majority of students enjoyed the activities and retained objective knowledge about the species,

<sup>5</sup> The butiazeiro is a naturally occurring palm tree in southern Brazil that produces the much-appreciated fruit, the butiá. Adapted to the climatic conditions of the Pampa biome, which include cold temperatures in winter and high temperatures in summer, the butiazeiro thrives in this environment. Unfortunately, the butiá faces a great risk of extinction due to several factors, including the destruction of natural habitat due to agricultural expansion, urbanization, and livestock farming.

<sup>6</sup> Cultural Rescue Video - Conservation of butiazais in the Pampa Biome, produced by Terra Sul. Available at: [https://www.youtube.com/watch?v=ec0\\_4h9Xydc](https://www.youtube.com/watch?v=ec0_4h9Xydc)

<sup>7</sup> Video We Love Butiás, produced by the Ministry of Environment and Climate Change. Available at: <https://www.youtube.com/watch?v=YCcYtkaymdw>



in addition to contemplating the action and importance of Environmental Education” (p.02). After carrying out this activity, the authors highlighted that the “[...] students believe that playful and interactive environmental education activities are capable of nurturing feelings of affection and protection regarding biodiversity” (p.15).

From the different publications selected in this category, it is corroborated with Kocourek, Tolfo, and Peransoni (2018, p. 669) when they affirm that EE is a “way of promoting awareness about the importance of using resources sustainably, a tool capable of enabling citizens to take ownership of these concepts, making them part of their daily lives.”

Therefore, when analyzing the articles grouped in this category, the relevance of EE is present in school curricula, being an important ally in contextualizing content in the classroom. As pointed out by Gregol *et al.* (2021, p.18), “you only protect what you know, and environmental education is a way of obtaining knowledge about the environment.” Furthermore, EE is considered a great ally in the development of critical thinking in relation to the environment and the major environmental transformations that we are experiencing. It is also believed that only through a change in attitude can we preserve our ecosystems and all biodiversity existing within them.

## UNDERSTANDINGS AND PERCEPTIONS ABOUT THE PAMPA BIOME

From the analysis, six (06) articles were found, representing 17.14% of the data, which dealt with the authors' understanding of the Pampa biome, as shown in the table below.

Table 03 - Articles grouped in this category.

Identification	Title/Reference
A30	Perceptions of elementary school students about the Pampa biome, in the west of Rio Grande do Sul
A31	Perceptions of students in the early years of Elementary School about the Pampa biome
A32	The perspective of high school youth on the Pampa biome
A33	Perceptions about the Pampa biome of students from a degree course in Natural Sciences in southern Brazil
A34	Perceptions of natural science graduates about the Pampa biome
A35	The Pampa biome in the eyes of high school students, in the west of Rio Grande do Sul

Source: Prepared by the authors, 2023.

From the reading and analysis of the selected articles, elements that exemplify this category are highlighted below.

In a study conducted by A31, the authors sought to understand the perceptions of students completing the Initial Years, from the municipalities of Jaguari and Uruguaiana. They concluded that students have comprehensive and distorted perceptions about the natural environment, describing the Pampa in terms of forests, trees, nature, flowers, and rivers. Furthermore, the anthropization of the natural environment was observed due to the presence of elements such as garbage, deforestation, pollution, and urbanization.

A30 investigated the perceptions of 9th-year elementary school students from a city in the west of Rio Grande do Sul about their knowledge of topics related to the Pampa biome. The results showed that the majority of students have inadequate and fragmented perceptions about this biome.

In A32, when carrying out a survey of high school students in two regions of the state of RS, they identified and characterized the perceptions of these students about the Pampa biome through drawings. At the end of the study, they pointed out that the students presented little knowledge about the biodiversity of the Pampa. Furthermore, they noted that the location (rural and urban) where students live interferes with their perceptions about the biome.

In research carried out by A33 on the importance and perception of Natural Sciences academics in the South of Brazil regarding the Pampa biome, it was demonstrated that the majority of responses were classified as fragmented, leading to confusing or incomplete responses. Furthermore, from the data, it was possible to infer a certain weakness in the approach to the topic, in addition to the use of generalist answers, with few characteristics about the Pampa.

Analyzing the excerpts mentioned above, it is observed that negligence in approaching the topic occurs at different school levels, creating a cycle that contributes to ignorance of the topic. When reflecting on the research carried out with students from the Natural Sciences course, it is observed that even the students in initial training are unaware of the Pampa, so this will reflect in their performance in the classroom, whether in internships or as teachers, continuing this cycle.

Furthermore, expanding knowledge about the Pampa biome in the classroom contributes to its preservation and recognition as an important space for the economic development of the southern region of Brazil. In the region, its unique biodiversity favors opportunities for tourism, promoting the maintenance of its rich cultural heritage and protection of its valuable natural

heritage. Investing in the conservation and responsible management of this biome is essential to guarantee a sustainable and prosperous future for the region and for future generations.

## **FINAL CONSIDERATIONS**

Based on the objective proposed in this study, which aimed to identify how the Pampa biome has been approached in the EC in scientific articles available on the Google Scholar platform from 2011 to 2023, several considerations can be made.

Through the analysis of the thirty-five (35) selected articles, they were classified into three categories: i) Approaches to the Pampa biome in the EC; ii) The Pampa biome as a generating theme in the study of EE; and iii) Understandings and perceptions about the Pampa biome.

In the category "Approaches to the Pampa biome in the EC," it was observed that the articles developed the theme in specific situations, based on examples of fauna and flora species, contributing to the development of contextualized learning about the Pampa. However, the results revealed that the biome is poorly developed in textbooks, and some presented summarized and misleading definitions on the topic.

The category "The Pampa biome as a generating theme in the study of EE" brought together articles that sought to work on aspects of EE combined with the contents of the Pampa biome. The studies highlighted the need to develop actions that enhance the sense of responsibility and critical thinking in students, combined with the problematization of environmental themes. Therefore, choosing the Pampa biome as the theme for EA is an effective strategy to form future generations committed to protecting the environment and building a more sustainable future.

When analyzing the category "Understandings and perceptions about the Pampa biome," it was observed that the studies only sought to carry out a diagnosis of the students' perception/view through questionnaires and drawings, identifying understandings that were often distorted and fragmented, a result of the fragility in approaching the topic. In this sense, it is inferred that this approach is a consequence of a negligent cycle that occurs due to a simplistic relationship imposed on teaching the Pampa biome in different instances of basic and higher education and in textbooks.

Furthermore, in relation to the sample of selected articles, in the final stage of this research, it is worth highlighting the existence of a very small number of productions considering the twelve (12) years researched. Additionally, we emphasize that conducting the

research based on the database of Academic Google may have impacted the results obtained, as some academic journals may not be linked to the platform. Despite using the same search parameters, sometimes the results found did not coincide, causing some insecurity regarding the reliability of the data.

In conclusion, there is an indisputable need to expand research related to the Pampa biome given its importance and uniqueness for the southern region of Brazil. This diverse ecosystem is a treasure trove of cultural and natural biodiversity that deserves in-depth attention. Furthermore, Pampa is also a source of wealth, with its heritage and traditions that deserve to be studied and preserved for posterity.

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## REFERENCES

AMARAL, Cislara P. et al. Oportunizando a sustentabilidade e a saúde através de trilhas ecológicas orientadas – relato de experiência. **Brazilian Journal of Development**. Paraná, v. 5, n. 11, p. 28040-28048, 2019.

ANDRADE, Natália G. et al. Entre a agroecologia e a “Eucaliptização” da paisagem rural. In: Congresso Brasileiro de Agroecologia, 10, São Cristóvão. **Anais...** São Cristóvão/SE, p. 01-05, 2020. DOI: <https://doi.org/10.34117/bjdv5n11-391>.

ANDRADE, Natália Gonçalves. **A eucaliptização da capital catarinense da agroecologia: uma análise da expansão dos monocultivos de eucaliptos em santa rosa de lima no sul do Brasil**. 2021. 71f. Dissertação (Mestrado em Agroecossistemas) - Universidade Federal de Santa Catarina. Florianópolis, Santa Catarina, 2021.

ÁVILA, Maurício C. do N.; MACHADO FILHO, Márcio da M.; PESSANO, Edward Frederico C. Percepções sobre o bioma Pampa de acadêmicos de um curso de licenciatura em Ciências da Natureza no sul do Brasil. **Revista Cocar**, Pará, v.15 n.33, p. 1-21, 2021.

ÁVILA, Maurício C. do N. et al. O bioma Pampa no projeto pedagógico de um curso de Licenciatura em Ciências da Natureza no Rio Grande do Sul. **Góndola, Enseñanza y Aprendizaje de las Ciencias**, Bogotá, v. 16, n. 3, p. 636-650, 2021.

BARDIN, Laurence. **Análise de Conteúdo**. São Paulo: Edições 70, 2016.

BELMONT, Thamires V.; DINARDI, Ailton Jesus; PESSANO, Edward Frederico C. Análise do potencial da avifauna como temática para a Educação Ambiental. **Revista Educação Ambiental em Ação**, Novo Hamburgo, v. 17, n. 67, 2019.

BENCKE, Glayson Ariel; CHOMENKO, Luiza; SANT'ANNA, Danilo Menezes. O que é o Pampa? In: CHOMENKO, Luiza, BENCKE, Glayson Ariel. (Orgs.). **Nosso Pampa Desconhecido**. Porto Alegre: Fundação Zoobotânica do Rio Grande do Sul, 2016.

BOLDRINI, Ilsi Iob; Overbeck, Gerhard; Trevisan, Rafael. Biodiversidade de plantas. PILLAR, Valério De Patta; LANGE, Omara (Eds.) **Os Campos do Sul**. Porto Alegre: Rede Campos Sulinos – UFRGS, 2015. 192p.

BORGAS, Edna Mara Da Silva; FERRARESE, Marina Deon; DO CANTO-DOROW, Thaís Scotti. Percepção ambiental de estudantes do ensino fundamental sobre o Parque Natural Municipal dos Morros (Santa Maria, RS, Brasil). **Revista Insignare Scientia-RIS**, v. 6, n. 6, p. 1-21, 2023.

BRASIL. **Base Nacional Comum Curricular**. Ministério da Educação. Brasília, DF, 2018.

CAMPELO, Ana Karine R.; MELO, Juliana B. de. A importância de projetos de educação ambiental em uma unidade de conservação no semiárido nordestino. **Revista Brasileira de Ciências Ambientais**, Rio de Janeiro, n. 49, p. 81-94, 2018.

CAMINHA, Jussara R.; COUTINHO, Cadidja; SGANZERLA, Francieli L. Bioma Pampa e sua diversidade florística: relatos de uma saída de campo. **Revista Vivências**, Erechim, v. 17, n. 32, p. 235-252, 2021.

CASTRO, Luis Roberval B. et al. Os Biomas Brasileiros nos livros didáticos de Ciências: Um olhar ao Pampa Gaúcho. **Revista Electrónica de Investigación en Educación en Ciencias**, Argentina, v. 14, n. 1, 2019, p. 38-49.

CASTRO, Luis Roberval B.; CARVALHO, Andriéli V. de; PESSANO, Edward Frederico C. Percepções de alunos do ensino fundamental sobre o bioma pampa, no oeste do Rio Grande do Sul, Brasil. **Revista Exitus**, Pará, v. 9, n.4, p. 290-318, 2019.

CASTRO, Luis Roberval B. et al. Percepções de licenciandos em ciências da natureza sobre o bioma pampa. **South American Journal of Basic Education, Technical and Technological**, Acre, v. 8, n. 2, p. 731-750, 2021.

CASTRO, Luis Roberval B. et. al. O bioma Pampa no olhar de estudantes do ensino médio, no oeste do Rio Grande do Sul. **Revista Multidisciplinar de Ensino, Pesquisa, Extensão e Cultura**, Rio de Janeiro, v.10, n.25, p. 42-62, 2021a.

CASTRO, Luis Roberval Bortoluzzi et al. O Bioma Pampa nos Livros Didáticos de Biologia no Brasil: um Olhar Sobre a Cidade de Uruguaiana-RS. **Revista de Ensino, Educação e Ciências Humanas**, v. 24, n. 2, p. 241-250, 2023.

CERVA FILHO, Osmar Antônio et al. Situações-problema em práticas interdisciplinares: integrando ciências e matemática em uma experiência didática. **Educação Matemática em Revista**, Brasília, n.13, v.2, p. 31-40, 2012.

COMIS, Amonaga de Fátima et al. Trilha inclusiva da consciência ecológica. **Research, Society and Development**, São Paulo, v. 11, n.12, p. 01.-13, 2022.



CUNHA, Janine H da. Ensino através da pesquisa. Relato de experiência investigativa. **Revista Latino-Americana de Estudos em Cultura e Sociedade**, Paraná, v. 4, ed. especial, p. 01-11, 2018.

FABRIM, Elisiane. **Plano diretor do município de três de maio/RS**: uma análise da sua contribuição para a conservação de biomas. 2020. 85f. Dissertação (Mestrado em Ambiente e Desenvolvimento) - Universidade do Vale do Taquari, Lajeado, 2020.

FEIFFER, Allyson Henrique Souza et al. A falta de inserção do Parque Estadual do Espinilho enquanto espaço de formação ambiental. **Revista Educar Mais**, v. 6, p. 46-58, 2022.

FERNANDES, Carolina dos S.; MARQUES, Carlos Alberto; DELIZOICOV, Demétrio. Contextualização na formação inicial de professores de ciências e a perspectiva educacional de Paulo Freire. **Ensaio: Pesquisa em Educação em Ciências**, Belo Horizonte, v. 18, n. 2, p. 09-28, 2016.

FERREIRA, Éderson G. de S.; LIMBERGER, Daniela C. Haas. Vídeo-documentário como ferramenta sensibilizadora de educação ambiental, nos Butiazais de Tapes (RS). **Revista Eletrônica Científica da UERGS**, Porto Alegre, v. 3, n. 4, p. 764-775, 2017.

FONSECA, Eril M. da; BIERHALZ, Crisna Daniela K. O contexto local como elo entre ciências da natureza e educação do campo. **Educação & Formação**, Ceará, v.3, n.7, p. 66-84, 2018.

FONSECA, Eril M. da; BIERHALZ, Crisna Daniela K. Práticas pedagógicas do Pibid Ciências da Natureza: mapeando tendências. **Revista de Iniciação à Docência**, Bahia, v.6, n.2, p. 91-105, 2021.

FRÖHLICH, Alécia Birck; WENZEL, Judite Scherer Afinal, por que ensinar ciências na educação infantil?. In.: Santos, Antônio V. dos et al. (Orgs.). **Ensino de Ciências Naturais e Exatas**. Cruz Alta: Ilustração, 2020. 390 p.

GALVÃO, Maycon Ribeiro; CASIMIRO, Sonia Aparecida Alves de Oliveira. O papel do professor na escola: educação e transformação. **Revista Interdisciplinar de Ensino e Educação (OWL Journal)**, v. 1, n. 2, p. 134-148, 2023.

GAUDÊNCIO, Sale Mário; FIGUEIREDO, Jéssica; LEITE, Rodrigo de A. **Guia de Fontes Eletrônicas de Informação**: um contributo à pesquisa acadêmica, 2009.

GIL, Antonio Carlos. **Métodos e técnicas de pesquisa social**. 6a ed., São Paulo: Editora Atlas S.A., 2010.

GODOY, Arilda Schmidt. Pesquisa qualitativa: tipos fundamentais. **Revista de Administração de Empresas**, v. 35, p. 20-29, 1995.

GOLDSCHMID JÚNIOR, José Luiz et al. Símbolos e tradição gaúcha: um enfoque biológico. **Humanidades & Inovação**, v. 10, n. 1, p. 282-301, 2023.

GREGOL, Rafaela K. et al. Desenvolvimento e aplicação de atividade de educação ambiental: lagartixa das dunas (*Liolaemus arambarensis*) em foco. **Educação Ambiental**, Ceará, v.2, n.3, p. 002-024, 2021.

IBGE. Instituto Brasileiro de Geografia e Estatística. **Biomass e sistema costeiro-marinho do Brasil**: compatível com a escala 1:250.000. Rio de Janeiro, Coordenação de Recursos Naturais e Estudos Ambientais, p.168, 2019.

ICMBIO. Instituto Chico Mendes de Conservação da Biodiversidade. **Livro Vermelho da Fauna Brasileira Ameaçada de Extinção**. 1. ed., Brasília: ICMBio/MMA, 2018. 492 p.

KOCOUREK, Sheila; TOLFO, Silvana D.; PERANSONI, Ademir de Cássio M. A educação ambiental como uma ferramenta para o desenvolvimento sustentável nas instituições públicas. **Revista Valore**, Rio de Janeiro, v.3, n.2, p.663-673, 2018.

LUNETTA, Avaetê de; GUERRA, Rodrigues; ROZENDO, Jefferson Florencio. A interdisciplinaridade como ferramenta de sucesso no ensino de matemática e educação física no proeja. **Revista Acadêmica de Tecnologias em Educação**, v. 3, n. 3, 2023.

MAESTRELLI, Sandra G.; LORENZETTI, Leonir. A abordagem CTSA nos anos iniciais do ensino fundamental: contribuições para o exercício da cidadania. **Revista Brasileira de Ensino de Ciências e Matemática**, Passo Fundo, v.4, n.1, p. 14-57, 2021.

MACHADO, Éverton Fernandes; LINDEMANN, Renata Hernandez; FREITAS, Diana Paula Salomão de. Educação Ambiental e movimentos sociais: um estudo documental sobre os jornais da campanha. **Revista Brasileira de Educação Ambiental (RevBEA)**, v. 17, n. 3, p. 110-130, 2022.

MACHADO, Bianca Larrea et al. História em quadrinhos sobre o bioma pampa como recurso didático no ensino fundamental. **Revista Signos**, v. 44, n. 1, p. 339-353, 2023.

MARQUES, Denirio Itamar L.; GRANDO, Sílvia Regina. O estudo do bioma pampa: uma possibilidade através das trilhas ecológicas. **Multiciência Online**, Santiago, v.2, n.3, p. 169-181, 2017.

MARQUES, Aline Mattos De Souza; MOTA, Marina de Souza; SOUZA, Maria Alice Veiga Ferreira de. Aula de campo no ensino de geografia: uma visão pela literatura científica brasileira. **Revista Brasileira de Educação em Geografia**, v. 10, n. 20, p. 357-372, 2020.

MARQUES, Welington Ribeiro Aquino; RIOS, Diego Lisboa; ALVES, Kerley dos Santos. A percepção ambiental na aplicação da Educação Ambiental em escolas. **Revista Brasileira de Educação Ambiental (RevBEA)**, v. 17, n. 2, p. 527-545, 2022.

MARTINS, Jéssica V.; KLEIN, Delci H. O livro didático e sua (sub) utilização: possibilidades em tempos de pandemia. **Revista Acadêmica Licencia & Acturas**, Ivoti, v. 8, n. 2, p. 110-116, 2020.

MAZURAMA, Juliana; DIAS, Jaqueline E.; LAUREANO, Lourde C. **Povos e Comunidades Tradicionais do Pampa**. Porto Alegre: Fundação Luterana de Diaconia, 2016. 224 p.

MMA. MINISTÉRIO DO MEIO AMBIENTE DO BRASIL. “PAMPA”: Avaliação e ações prioritárias para a conservação da biodiversidade da Mata Atlântica e Campos Sulinos. Publicação avulsa do MMA, 2000. Disponível em: <https://antigo.mma.gov.br/biomas/pampa.html>. Acesso em: 29 abr. de 2024.

NEVES, Kerolen Rosa das et al. A educação ambiental e a extensão na universidade: um breve olhar sobre a garoupa verdadeira (*epinephelus marginatus*) e os peixes costeiros no extremo sul do Brasil. **Expressa Extensão**, Pelotas, v. 22, n. 2, p. 87-101, 2017.

NEVES, Kerolen R. das; SCHWANTES, Lavínia. Ensino de zoologia por desafios de observação: o método científico como instrumento de aprendizagem. **Revista de Ensino De Biologia da SBEnBio**, São Paulo, v.12, n.2, p. 188-206, 2019.

ORGANIZAÇÃO DAS NAÇÕES UNIDAS - ONU. **Pnuma**: Brasil possui entre 15% e 20% da diversidade biológica mundial. 2019. Disponível em: <https://news.un.org/pt/story/2019/03/1662482>. Acesso em: 17 out. 2023.

PAZINATO, Daiane Maria M. et al. Conhecimento etnoherpetológico no município de Caçapava do Sul, Sul do Brasil. **Revista de Ciências Ambientais**, Canoas, v. 15, n. 1, p. 01-12, 2021.

PÉREZ, Leonardo Fabio M.; CARVALHO, Washington Luiz P. de. Contribuições e dificuldades da abordagem de questões sociocientíficas na prática de professores de ciências. **Educação e Pesquisa**, São Paulo, v. 38, n. 03, p. 727-741, 2012.

PINHEIRO, Fernanda de L. et al. Na trilha do Pampa: um jogo para o desenvolvimento da educação ambiental no contexto do Pampa gaúcho. **Revista Metropolitana de Sustentabilidade**, São Paulo, v. 8, n. 1, p. 132-142, 2018.

PINTO, Luiza F. et al. Percepções de estudantes dos anos iniciais do Ensino Fundamental sobre o Bioma Pampa. **Ensino, Saúde e Ambiente**, Rio de Janeiro, v.13, n. 1, p. 31-56, 2020.

PINTO, Luiza F.; BACCIN, Bruna A.; PESSANO, Edward Frederico C. O bioma Pampa nos anos iniciais: uma investigação com professores e nos livros didáticos do PNLD. **Revista Exitus**, Pará, v. 10, n. 01, p. 01-31, 2020.

PROENÇA, Mariana de S., DAL-FARRA, Rossano André; OSLAJ, Eduardo U. Espécies nativas e exóticas no ensino de ciências: a construção de práticas educativas para o ensino fundamental. **Revista Contexto & Educação**, Ijuí, v. 32, n. 103, p. 213-247, 2017.

SAMPAIO, Ana Paula Dutra dos Santos. **Abordagem temática para o ensino de biologia: o rio Formate como espaço para abordar botânica e ecologia**. 2021. 126 f. Dissertação (Mestrado em Educação em Ciências e Matemática) - Instituto Federal do Espírito Santo, Vitória, 2021.

SCHLEE, Juliana C. P.; BARROS, Shirlyne Silvana U. de. Educação ambiental e biorregionalismo: entrelaçamentos possíveis para a conservação do Pampa. **Revista GepesVida**, v. 6, n. 15, 2020.

SILVEIRA, Dieison Prestes; LORENZETTI, Leonir. Estado da arte sobre a educação ambiental crítica no Encontro Pesquisa em Educação Ambiental. **Praxis & Saber**, Colombia, v.12, n. 28, p. 01-15, 2021.

SGANZERLA, Francieli Luana et al. Oficina Pedagógica no Processo de Formação no Ensino de Ciências e Etnobotânica. **Revista Electrónica de Investigación en Educación en Ciencias**, v. 18, n. 2, p. 34-47, 2023.

SGANZERLA, Francieli Luana et al. Livro didático e a percepção dos professores no âmbito da etnobotânica. **Pesquisa e Debate em Educação**, v. 13, e38720, 2023a.

SOUZA, Franciso Herculano C. de; SIMÃO, Maria Olívia de Albuquerque R.; OLIVEIRA, Irlane. M. de. **Educação Ambiental Escolar: espaço de (in)coerências na formação das sociedades sustentáveis**. 1.ed. – Curitiba: Appris, 2019.

VERRASTRO, Laura; BORGES-MARTINS, Márcio. Biodiversidade de Répteis. In: PILLAR, Valério de Patta; LANGE, Omara. (Eds.). **Os Campos do Sul**. Porto Alegre: UFRGS, 192 p, 2015.

WASZAK, Jaqueline G. N.; SANTOS, Simone V. dos. Ambientalização Curricular no Curso de Licenciatura em Ciências da Natureza e a Contextualização Local e Global. **Revista de Educação, Ciência e Cultura**, Canoas, v. 25, n. 1, p. 217-234, 2020.

ZAKRZEVSKI, Sônia Beatris B.; PARIS, Araciele Maria V.; DECIAN, Vanderlei S. O olhar de jovens do Ensino Médio sobre o bioma Pampa. **Revista Eletrônica Mestrado em Educação Ambiental**, Rio Grande, v. 37, n. 1, p. 68-88, 2020.