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Environmental education and sustainability: a case study in the Ponta da Serra community (Amajari) in the Amazon region

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ABSTRACT

Natural environments have been increasingly impacted; there are virtually no untouched environments, and human presence is everywhere. In indigenous communities, it is no different, even when these people are considered environmental stewards due to their dependence on natural resources for survival. The main objective of this article is to demonstrate the environmental practices that the inhabitants of the Ponta da Serra community use as a way of conserving the environment, including the flora resources obtained in their daily routine. The study is based on field activities and bibliographic research. It was possible to observe that some practices, such as seed collection, the establishment of nurseries, educational activities in the school, and the agroforestry field, are the main practices evidenced in this community. In particular, environmental education plays a crucial role, as it raises awareness among community members, especially the younger generation, about the importance of preserving natural resources. Through educational programs and hands-on activities, the community fosters a sense of responsibility and connection to the environment, ensuring that sustainable practices are passed down and maintained for future generations.

KEYWORDS: Culture. Natural resources. Indigenous community. Conservation. Preservation.

Educação ambiental e sustentabilidade: um estudo de caso na comunidade Ponta da Serra (Amajari) na região amazônica

RESUMO

Os ambientes naturais têm sido cada vez mais impactados; praticamente não existem ambientes intocados, e a presença humana está em toda parte. Nas comunidades indígenas não é diferente, mesmo quando essas pessoas são consideradas guardiãs do meio ambiente devido à sua relação de dependência dos recursos naturais para a sobrevivência. O principal objetivo deste artigo é demonstrar as práticas ambientais que os habitantes da comunidade Ponta da Serra utilizam como forma de conservar o meio ambiente, incluindo os recursos florísticos obtidos em sua rotina diária. A investigação baseia-se em atividades de campo e pesquisa bibliográfica. Foi possível observar que algumas práticas, como a coleta de sementes, a implantação de viveiros, as atividades educativas na escola e o campo agroflorestal, são as principais práticas evidenciadas nesta comunidade. A educação ambiental desempenha um papel crucial, pois sensibiliza os membros da comunidade, especialmente as gerações mais jovens, sobre a importância da preservação dos recursos naturais. Por meio de programas educativos e atividades práticas, a comunidade promove um senso de responsabilidade e conexão com o meio ambiente, garantindo que práticas sustentáveis sejam transmitidas e mantidas para as futuras gerações.

PALAVRAS-CHAVE: Cultura. Recursos naturais. Comunidade indígena. Conservação. Preservação.

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Introduction

The 1988 Brazilian Federal Constitution recognizes indigenous peoples as the first and natural owners of the land. Its Article 20, however, establishes that these lands are assets of the Union, while Article 231 guarantees indigenous peoples "permanent possession" and "exclusive usufruct of the riches of the land, the rivers and the lakes existing therein". Article 231 further defines traditionally occupied lands as those inhabited by indigenous peoples "on a permanent basis, those used for their productive activities, those indispensable to the preservation of the environmental resources necessary for their wellbeing and for their physical and cultural reproduction, according to their habits, customs and traditions" (BRASIL, 2022).

The Ponta da Serra Indigenous Land (IL), object of this article, has three communities: Ponta da Serra, Juracy, and Urucuri. It belongs to the ethnoregion of Amajari, located in the municipality of Amajari, Roraima State, Brazil. Its area was approved by Decree No. 86,935, published on February 19, 1982, in conservation islands, and measures approximately 16,000 hectares, in a transitional zone between savanna and forest (TERRAS INDÍGENAS NO BRASIL, n/d). The region is traditionally occupied by approximately 315 indigenous people of Macuxi and Wapichana origin, whose languages belong to the Cariban and Arawakan families, respectively.

The main threats identified include land conflicts and logging (considering that the *lavrado* ecosystem is predominant in the Ponta da Serra IL,[6] the existing forest is essential for the communities' wood reserves), mineral exploitation, and invasions by fishermen and hunters, which cause a reduction of essential natural resources for the maintenance of the way of life of these indigenous communities.

Mining is a recurring threat in indigenous lands. This activity causes deforestation, contamination of soils and rivers, impacts on fauna, flora, and overall biodiversity, in addition to damaging places considered sacred to indigenous culture. The "Majariana" project, carried out by Instituto Socioambiental (ISA) and the Indigenous Council of Roraima (Conselho Indígena de Roraima, CIR), revealed issues of water shortages for residents, a demand of the indigenous community that was resolved in 2015 with the construction of an artesian well.

According to ISA (2016), 120 people live in the Ponta da Serra community and practice Macuxi and Wapichana cuisine, apply traditional knowledge in agricultural production, cultivating bananas, sweet potatoes, papaya, corn, cassava, wild manioc, beans, pumpkin, pineapple, watermelon, and pepper, saving the seeds that they buy in the city or exchange with other families

[6] *Lavrado* is the popular term used to define the savanna ecosystem (a natural environment made up of sparse arboreal trees and many grasses) which, according to some authors, differs from the Brazilian savanna due to its floristic composition, which is more similar to the Venezuelan savannas, as they are part of the same geological group, the Guiana Shield.

in the community; and also in hunting and health, with the transmission of traditional knowledge, particularly regarding medicinal plants. However, even though some of these families now live in the city, they maintain gardens in the community. The project also found that natural resources, such as forest fruits, materials for making handicrafts, wood and straw for building houses, hunting and fishing are at medium or low levels of availability, as well as the perception that the areas of swiddens, the diversity of cultivated species, and animal husbandry are insufficient, negatively impacting food variety.

In terms of income, the families of the Ponta da Serra IL have as their main sources social benefits related to retirement, the *Bolsa Família* program, maternity salary, and the Social Credit program, which the families complement with the sale of products from the swidden, such as flour, small animals, and cattle. Given the socio-environmental scenario presented, this article aims to relate the environmental practices used by residents of the Ponta da Serra community as a way of conserving the environment (ISA, 2016).

In this context, the environmental practices adopted among residents of the Ponta da Serra community are key instruments for the conservation of natural resources in this indigenous land. The study is justified by the continuous use of flora resources, more specifically wood species, which were widely used in the community's tasks and have suffered a significant decline.

The objectives of the work consist of identifying the cultural practices that are decisive for the conservation of the environment in the Ponta da Serra community as a way of maintaining natural resources, and, to that end, it was necessary to characterize the conservation strategies adopted by the Ponta da Serra community as a means of environmental conservation.

1. Theoretical framework

1.1. Culture and indigenous communities

The English anthropologist Edward Burnett Tylor (1832–1917), a proponent of social evolutionism, was the one who formulated a synthesis of the concept, in the ethnographic sense, contained in the English word *culture*, which includes knowledge, beliefs, art, morals, laws, customs, and other habits acquired by man as a member of a society. In Tylor's definition, a single word encompassed all possibilities of human achievement, with great emphasis on the idea that the acquisition of culture is innate and biologically transmitted.

This is not exactly what anthropology currently believes. According to Santos (2005 [1996], p. 22–3), "[…] there are several ways of understanding what culture is […]", which generate "[…] two basic concepts". One that is concerned with aspects of social reality, in other words, that understands culture as "[…] everything that characterizes the social existence of a people or nation

[…]" (SANTOS, 2005 [1996], p. 24); and another that refers to "[…] to knowledge, ideas, and beliefs and how they exist in social life" (SANTOS, 2005 [1996], p. 25). However, if we understand culture as "[…] a system of ideas, knowledge, techniques and artifacts, of patterns of behavior and attitudes that characterize a given society" (PELLEGRINI; SANTOS, 1989, p. 21), and a "[…] a set of ways of being, living, thinking, and talking about a given social formation" (BOSI, 1992, p. 319), we realize that culture is a living element, constantly changing, linked to situations of time and space and to people's experiences.

According to the definition proposed by the United Nations Educational, Scientific and Cultural Organization (UNESCO),

> [f]olklore (or traditional and popular culture) is the totality of tradition-based creations of a cultural community, expressed by a group of individuals and recognized as reflecting the expectations of a community in so far as they reflect its cultural and social identity; its standards and values are transmitted orally, by imitation or by other means. Its forms are, among others, language, literature, music, dance, games, mythology, rituals, customs, handicrafts, architecture and other arts (UNESCO, 1990, p. 239).

Thus, when approaching the aspects that conceptualize "culture" in its broad sense, we can better understand both our own culture and the indigenous culture in the Ponta da Serra Indigenous Land, more specifically in the Ponta da Serra community, composed of Macuxi and Wapichana indigenous peoples, located in the municipality of Amajari, State of Roraima.

As noted by Dom Aldo Mongiano, Bishop of Roraima, in CIDR (1989), indigenous peoples constitute groups that recognize themselves through shared sociocultural affinities and have the right to inhabit their own geographic spaces, in accordance with their particular characteristics.

The Macuxi people define themselves geographically as "people from the mountains and *lavrado*". Linguistically, their language is classified as a member of the Cariban family. Historically, amid conflicts with the Spaniards and involvement in Caribbean wars, the Macuxi moved to the regions between the Branco and Rupununi rivers in the mid-16th century.

Currently, they inhabit the areas of *lavrado* and mountains in the northeast of the State of Roraima, Brazil, and in the northwest region of Guyana, bordering Brazil. They live in villages composed of single-family houses, usually located near rivers or streams, where people cultivate gardens for personal consumption, with minimal surplus production. In terms of the sexual division of labor, women process cassava to make beiju and flour and to take care of the house and children. The Macuxi diet is based on manioc, forest fruits (banana, papaya, watermelon, etc.), and meat from animals they breed, hunt, or fish in the lakes and rivers of the region.

Furthermore, the artisanal production of the Macuxi is primarily for household use and, only occasionally, for exchange with relatives or for sale. Of the traditional products, hammocks, and

clay pots are produced less frequently, as they thave been largely replaced by similar products sold by non-indigenous people. The Macuxi tend to maintain their own cattle, poultry, and swine farms, due to the historical decline in hunting and fishing, caused by the invasion by cattle ranchers and mining operations.

The Wapichana are a people historically constituted by the mixture of multiple Arawakan-speaking peoples, who grouped together over centuries and occupied the regions of the Branco, Uraricoera, and Surumu rivers. The Wapichana people inhabit areas surrounded by the Macuxi people, with whom they have united and intermixed, in the municipalities of Amajari and Serra da Lua. The Wapichana culture has changed over the years as a result of incursions by non-indigenous settlers. The first major changed occurred after their in the war with the Macuxi, when they had to adopt various cultural traits from both peoples.

Thus, most of the Wapichana live in villages composed of single-family houses, located slightly away from the central nucleus of the village, following the courses of rivers or streams. Internal relationships in the *maloca* are maintained through family ties or economic interests. Among the important occasions are the festivities, in particular the Parixara, a Cariban dance adopted from the Macuxi.

The Wapichana adopt the model of private gardens, where they grow manioc, corn, beans, rice, fruits, among other crops. They seek to produce surplusesto obtain income and influence through commercialization. However, the custom of cultivating community gardens occurs through the exchange of work for *caxiri* and food,[7] and the owner of the garden must offer the same help when necessary.

1.2. Conceptions of environmental preservation and conservation

Historically, the concepts of environmental preservation and conservation have been used as equal or synonymous terms; however, they have distinct meanings. Thus, differentiating the meanings of these concepts becomes essential to sharpen the understanding of protection of natural resources vital for the survival and development of human societies (COSTA *et al.*, 2018).

The Houaiss (2015) dictionary provides the following definitions of the respective concepts in Portuguese. *Preservação* is defined as “the act of freeing from harm, keeping safe from danger or damage, conserving, defending, and safeguarding, maintaining something in good condition and/or with its natural characteristics” (“o ato de livrar de algum mal, manter livre de perigo ou dano, conservar, defender e resguardar, manter em bom estado e/ou com suas características naturais”). By contrast, the word *conservação* is defined as the “act or effect of conserving; protection against

[7] *Caxiri* is a drink made from manioc, which is pressed to remove a liquid called *tucupi*; the *tucupi* is then left to ferment. The drink is served during rituals and work in indigenous communities.

damage, loss, or waste; and a set of practices aimed at the use of natural resources in a way that allows them to be preserved and renewed" ("*ato ou efeito de conservar-se; preservação contra dano, perda ou desperdício; e conjunto de práticas que visa à utilização dos recursos naturais, de modo a permitir que se preservem e renovem*"; HOUAISS, 2015). This fluctuation of definitions and concepts can also be observed in Brazilian environment-related legislation. In this context, Law 9,985, of July 10, 2000, Article 2, provides the following definitions of preservation and conservation:

> […] II – Nature conservation: the management of human use of nature, comprising the preservation, maintenance, sustainable use, restoration, and recovery of the natural environment in order to can produce the greatest benefit on a sustainable basis to current generations, while maintaining its potential to satisfy the needs and aspirations of future generations and ensuring the survival of living beings in general;
>
> […] V – Preservation: a set of methods, procedures, and policies aimed at the long-term protection of species, habitats, and ecosystems, in addition to the maintenance of ecological processes, preventing the simplification of natural systems;
>
> […] VII – *In situ* conservation: the conservation of ecosystems and natural habitats, and the maintenance and recovery of viable populations of species in their natural environments, and, in the case of domesticated or cultivated species, in the environments where they have developed their characteristic properties (BRASIL, 2000).

The law itself approaches environmental preservation in the light of the meaning of conservation, which shows yet another example of dichotomy in the use of the respective terms. Padua (2006) argues that the terms *conservation* and *preservation* have become common and confusing. Although both are used to mean the same thing, they actually express ideas that have origins in different roots and postures. *Preservationism* and *Conservationism* are ideological currents that represent different relationships between human beings and nature (PADUA, 2006).

Given the above, within the framework of Preservationism, Diegues (2008) states that preservation can be described as reverence for nature, in the sense of aesthetic and spiritual appreciation of wildlife. It aims to protect nature against modern, industrial, and urban development. For Diegues (2008), "[…] in North American environmental history, the conflict between Gifford Pinchot and John Muir is usually analyzed as an archetypal example of the differences between the conservation of resources and the pure preservation of nature". Gifford Pinchot advocated Conservationism, while John Muir championed preservationism. Another influence on preservationism was the author Marsh, who analyzed for the first time the negative impacts of human civilization on the environment; he also stated that "[…] man forgot that the land was given to him for usufruct and not for consumption or degradation" (DIEGUES, 2008, p. 32).

In the same vein, Sachs (2009), from an ecological perspective, presents the *preservation* of nature's potential in its production of renewable resources and the limit in the use of non-renewable resources. In contrast, *conservation* is the management of human use of the biosphere to produce the greatest sustainable benefit for the present generation, while maintaining the potential to serve future generations (BARBIERI, 2020). In this sense, the focus of Conservationism is based on sustainable development, and they are mutually dependent.

In Guifford Pinchot's conception, nature is often slow and, consequently, management processes can make it efficient. Therefore, three pillars should support conservation: the use of natural resources by the present generation, the prevention of waste, and the use of natural resources for the benefit of the majority of citizens (DIEGUES, 2008). Thus, from these ideological currents, *conservation* and *preservation* are not synonymous, so that preservation protects nature itself and conservation challenges humankind to live with nature; however, both are important, as they aim to protect the environment (PADUA, 2006).

Therefore, *preservation* can be understood as the protection of nature from the perspective of something untouchable, without human interference, being necessary when biodiversity is at risk, both at the species level and at the ecosystem or biome level (PADUA, 2006); and *conservation* is intrinsically rooted in sustainable development, and can be understood as humankind developing techniques to use resources rationally so that present and future generations can enjoy natural resources.

1.3. Natural resources of the Ponta da Serra indigenous community in Roraima

The relationship between natural resources and indigenous peoples is very old. Since their earliest existence, these peoples have had a direct relationship with the environment and, consequently, with natural resources. This relationship is linked to the very survival of these peoples, since most indigenous ethnicities, whether in Roraima or elsewhere, rely on what they obtain from the environment for their subsistence, from cultivable to non-cultivable forms, as is the case of some uncontacted groups in the Amazon.

Culturally, the first settlers of the continent were nomadic hunters, gatherers, and fishers; they obtained their food from nature and did not yet have techniques for cultivation. According to Ribeiro (1997), two great waves of adaptation took place: one of a culture adapted to open environments, and another of adaptation to closed environments, the forests, such as the Amazon rainforest. The author states that Roraima was reached by this second wave.

Thus, each population has its own ideas about its relations with the environment. These ideas and theories are, largely, mere reflections of the general situation of that society within the

world. A relatively autonomous society, such as, for example, some ethnic groups in the Amazon, has intimate relationships and a deep familiarity with the environment on which it depends to meet its needs (MORÁN, 1990). Indigenous communities of Roraima state are not different, regardless of the specific ethnic group; thus, somehow, these people have a direct relationship with the environment. Some relationships are more intense, such as those of the Yanomami, Yekuana, and Waiwai peoples, who live in forest environments; others are more mixed, such as in the case of the Wapichana and Macuxi peoples, who live in open environments, the savannas (*lavrados*).

Considering that the last two have a much closer relationship with the municipal seats and the state capital, due to geographic proximity, we can say that one of the reasons for this human–environment relationship is currently in a phase of change, but not in oblivion, as there are still people that survive directly from the community's natural resources.

This use of natural resources is often observed in hunting, fishing, and domestic and community activities, that is, daily family or communal tasks. Among these, we highlight the harvesting of straw from a palm tree called buriti (*Mauritia flexuosa*), which is widely used on the roof of houses, community sheds, flourmills, etc. In addition, every part of the plant is used: the straw, the fruit, which is consumed as juice or eaten *in natura*, and the pulp, which is sold. Therefore, it is evident that this relationship is very close, as the environment provides all these resources to the people who depend on it for survival.

In the Ponta da Serra indigenous community, the situation is no different. About 20 years ago, it was common to see families using the natural resources that the environment provided, such as wood, straw, animals that were hunted or fished, and even exchanging them with others who lacked these resources but had other products, mainly industrial goods such as sugar, oil, or salt. It can also be observed that products from the fields, such as watermelon, papaya, banana, sweet potato, cassava, and manioc were easy to find in the community. Today, these products are harder to find, since only a few families cultivate them, not in swiddens, but in *caiçaras* close to their homes, where cattle used to roam. These areas are naturally fertilized by cattle dung and urine, creating favorable conditions for the cultivation of these crops.

As for the type of ecosystem in which the community is situated, the savannas (*lavrados*) are characterized by abundant undergrowth and few large trees. This environment is considered poor in nutrients, because its formation process is as old as the Earth itself. In addition, it often suffers from natural weathering and frequent human-caused disturbances, such as fires.

The main resources still available in the community are fish, but in very small quantities; one has to walk long distances to find a variety of species. Hunting has practically disappeared, with rare exceptions; animals such as armadillo, tortoise, deer, and wild pig can still be found. It is

evident that the community now relies more on the animals they raise in their backyards, such as chickens, pig, and oxen, the latter originally introduced in the communities as a way of securing land.

Currently, the resources most exploited by the Ponta da Serra community are those linked to flora, as they have two forest islands (forest fragments) from which all the wood is extracted to buils houses, corrals, fences, pigsties, bridges, etc. Moreover, they still harvest wood to sell to other communities that no longer have this resource. Firewood is usually also harvested, as thin woods are unsuitable for the tasks mentioned above. Therefore, specimens of mirixi (*Byrsonima crassifolia*), paricarana (*Bowdichia virgilioides*), and angico (*Anadenanthera peregrina*) are sought near the residences; these species are considered good for firewood because they burn easily. Nevertheless, some of these species can also be used to make fences or other constructions; that is, resources are classified according to how each family or resident uses them.

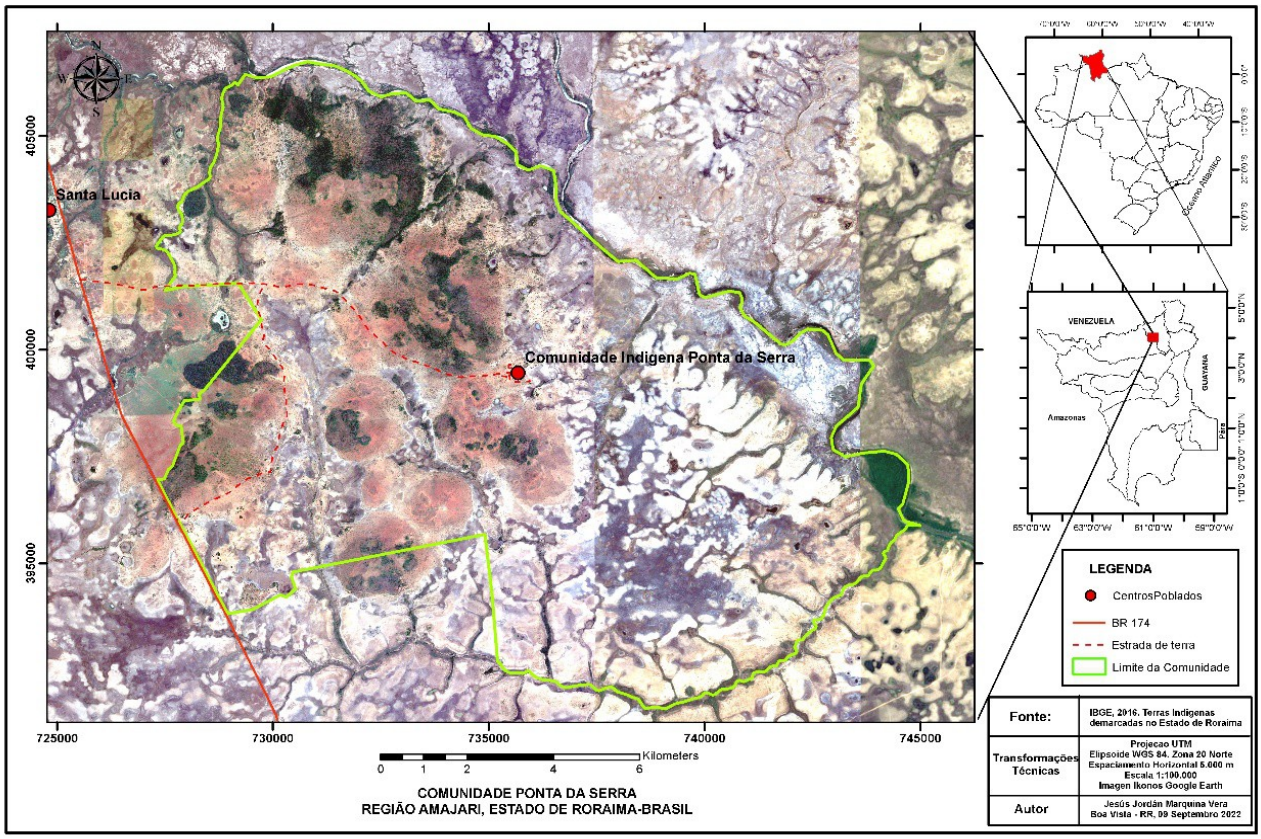
In this context, there is a direct relationship between natural resources and people in the community, even though this relationship has recently weakened due to environmental imbalance, as too many resources have been removed and not replaced, despite being renewable and capable of reestablishing themselves in the environment. However, it is clear that constant use, combined with the long time each species takes to reestablish itself, compromises this this relationship. In light of this, the community has sought alternatives to use resources in ways that guarantee their conservation for younger generations, who may need them in the future. According to the statements of community residents, some proposed activities to minimize these impacts include the collection of seeds from timber species, the establishment of a nursery, and environmental education activities within the community.

2. Materials and methods

2.1. Location and characterization of the study area

The Ponta da Serra Indigenous Land (Figure 1) is located in the municipality of Amajari, 92 km from Boa Vista, the state capital. The community is characterized by the low vegetation typical of the *lavrado* ecosystem (savannas), which naturally has few trees. However, larger trees are found in forest islands (forest fragments), gallery forests within the communities, and along *buritizais* paths (*igarapés*) (Carvalho *et al.*, 2016), which characterize the local landscape and surroundings.

Figure 1. Ponta da Serra Indigenous Land.



Source: Jesús Jordán Marquina, 2022.

The Ponta da Serra community is part of the Amajari ethnoregion according to the sociopolitical classification adopted by indigenous organizations in Roraima, which divides the state of Roraima into twelve ethnoregions, with Amajari being one of them. The Amajari ethnoregion corresponds to the area of the municipality of Amajari, located in the savanna region, which has a predominance of latosols and argisols. Within the ethnoregion, there are twenty communities across eight Indigenous Lands, with Ponta da Serra being one of them.

In the community, fields and plowed areas predominate, distributed among the following phytophysiognomies: woody/grassland savanna (Sg) and parkland savanna (Sp), according to Barbosa & Miranda (2005), as well as forest islands (forest fragments). These forest islands serve as sources of timber and other plant resources for use by the community.

2.2. Planning and definition of actions with the community

With the increase in population and the growing use of flora resources in the community's tasks, residents expressed concern about these resources, as they noticed a significant waste of wood. In response, the issue was discussed at a community meeting, where residents explained how they perceived that situation. It was then concluded that action was necessary, because it is not enough to

simply remove plant resources; they must be replaced to minimize the impacts of their extraction. Based on this, the following practices were considered:

1. Division of groups to carry out activities, in which children, adolescents, and adults could participate;
2. Seed collection, involving trips to the forest to gather seeds available at that time;
3. Construction of a vivarium.

For this study, we chose to work with timber species, relying both on published studies and traditional knowledge to identify the common names and the scientific names of the species.

For the construction of the vivarium, materials available in the community were used, such as manure, scorched earth, and other substrates. The wood used consisted of leftovers found in the forest, considered unsuitable by those who had previously harvested it.

3. Results and discussion

Sparse vegetation, with few tree and timber species, already characterizes the environment in the Ponta da Serra community. Excessive use for individual and collective tasks, as well as the large-scale removal and sale of wood from the forest islands, led residents to collectively seek activities that could minimize the impacts of their own actions on the community environment. This environment is composed of woody/grassland savanna, parkland savanna, and some enclaves of forest islands along the edges of the mountains and scattered throughout the savannas (Figure 2). Forest islands are more diverse than the plowed areas, as they contain a greater variety of forest tree species; for this reason, they are heavily exploited.

Figure 2. Ponta da Serra Indigenous Land.

Source: own work, 2018.

According to Pedreira *et al.* (2013), forest islands are essential for indigenous populations in the savanna region, not only for agricultural practice, but also for logging, hunting, and other activities. The forest formations of the savannas are represented by the *buritizais* and gallery forests around watercourses, and also by the areas of semideciduous forest that occur in the form of "islands" in the middle of the savanna, called "forest islands" (BARBOSA; MIRANDA, 2005; SANTOS *et al.*, 2013).

In a study carried out by Bortolon (2014) in the same region, the author notes that the vegetation in the forest islands is quite different from that found in the plowed areas, and the soil in the plowed area is highly acidic due to the high concentration of aluminum, resulting in its saturation. In the forest islands, the soil contains higher levels of nutrients and organic matter due to nutrient cycling. It is in these areas that the indigenous people of the Araçá Indigenous Land cultivate their gardens, using cutting and burning techniques and harvesting wood to cover their houses.

It is no different in the Ponta da Serra indigenous community: the species found in the forest islands are more varied and larger, and, therefore, the community uses them the most. This underscores the need to conserve these areas.

3.1. Species identification

Eight botanical families were identified, distributed in 13 species, which are the most frequent, as well as a palm tree that is widely used in the community (Table 1). These botanical species are the ones that still exist in the communities. It is necessary to conserve them, as they are important for maintaining the culture and subsistence of indigenous peoples. In Table 1, we list the cataloged species with their common and scientific names and indicate their habitats and uses.

Table 1. Species cataloged in the savannas and forest islands in the Ponta da Serra community

common name (Portuguese)	**scientific name**	**habitat**	**uses**
mirixi	*Byrsonima crassifolia*	savanna	firewood, fences, medicinal, edible
paricarana	*Bowdichia virgilioides*	savanna	firewood, fences, corral
angico	*Anadenathera peregrina*	savanna	firewood, fences
sucuba	*Himatanthus articulatus*	savanna	medicinal
caimbé	*Curatella americana*	savanna	medicinal
pau-rainha	*Centrolobium paraense*	forest island	house building, corrals, fences
ipê amarelo/ pau d'arco	*Tabebuia serratifolia*	forest island	corrals, fences
copaíba	*Copaifera landesdorffi*	forest island	medicinal

common name (Portuguese)	scientific name	habitat	uses
jatobá	*Hymenaea courbaril*	forest island and agroforestry backyards	houses, corrals, fences, edible
pau-brasil	*Caesalpinia echinata*	agroforestry backyards	house building
freijó	*Cordia sp*	forest island	furniture, house building
cedro	*Cedrelo odorata*	forest island	furniture, house building
sucupira	*Pterodon pubescens*	forest island	furniture
buriti	*Mauritia flexuosa*	*buritizais* paths	straw for house building

Source: own work, 2018.

It is important to note that plant species have different forms of use by the community, ranging from food to general purposes. According to the frequency of use, some species, such as pau-rainha, freijó, and cedro, are the most exploited and are now found in smaller quantities or no longer reach the ideal diameter for use, as there are few specimens.

Perez (2010) states that pau-rainha is the most used wood by the Araçá community, and it is similarly the most used by the *lavrado* communities in general (FUNAI, 2007). Pau-rainha can be used for various purposes, such as support wood, rafters, and fences, among others, with its main use being support wood. For this purpose, it is preferable to cut the tree when it reaches a diameter suitable for use without the need to split it vertically, since not all residents have a chainsaw. Other species can also serve this construction purpose; however, they require much more work, so pau-rainha is generally preferred.

Freijó is another species in high demand for construction (rafters) as well as for furniture and boards; hence the need to replace this species in the community environment as well. Another widely used species is the buriti palm, whose use is related to the covering of houses, *malocão*, chicken coops, and other structures. This has led to a decrease in the availability of buriti near the community, with the remaining specimens found increasingly farther away.

The high demand for these species has reduced their numbers in the community environment. In this context, the establishment of the vivarium was conceived as a way to propagate seedlings and reintroduce them into the forest islands, ensuring that they will be available for future generations of the indigenous community.

3.2. Environmental practices

Among the environmental practices, we highlight the collection of seeds from the forest islands and the construction of the vivarium in the center of the community (Figure 3). Among the species collected, the seeds gathered in greatest quantity were pau-rainha (a noble timber species that has become scarce due to extensive use), followed by sucupira and freijó. This was possible because it was the fruiting season for these species. Other seeds were already available for planting. In the

vivarium, the following species were sown: pau-rainha, copaíba, freijó, pau-brasil, sucupira, cedro, ipê amarelo, and jatobá, reflecting the species most used by residents for timber purposes.

Figure 3. Vivarium constructed in the center of the Ponta da Serra community.

Source: own work, 2018.

The construction of the vivarium serves as a basis for both ecological and educational practices, as it allows schoolchildren to participate in more hands-on lessons. In this process, materials that could otherwise pollute the environment, such as plastic bags from rice, sugar, beans, among others, were also used; the children brought these items from their homes, turning their participation into a meaningful environmental practice within the community.

It is worth highlighting some points from the report resulting from the seminar held in 2011, organized by the Indigenous Council of Roraima (CIR) and its partners:

> Planting trees for the reforestation of degraded lands; improving waste management in indigenous communities; supporting the work of indigenous environmental agents; holding lectures on environmental education in schools; seeking partnerships with city halls for the construction of garbage bins, the incineration of waste, and the creation of appropriate sites for organic waste; requesting transportation to remove garbage from communities and take it to suitable locations; developing specific projects for the inspection of indigenous lands; holding community meetings to discuss climate change; encouraging the production of traditional foods; avoiding uncontrolled fires and deforestation; protecting forests, *buritizais*, hunting, and fishing areas; carrying out community clean-up activities (CIR, 2011).

That said, the concern of the indigenous peoples of Roraima with environmental issues in their communities is evident, since, regardless of their location, most of these communities face one or more of the environmental problems mentioned above. Therefore, it is up to the residents themselves to seek alternatives for the use and management of these resources.

CONCLUSION

This study has shown that the Ponta da Serra community possesses traditional knowledge related to the use and management of natural resources and has already been developing relevant environmental practices, such as seed collection, nursery establishment, and educational activities. However, it must be critically acknowledged that these initiatives remain occasional and restricted to a small group of residents, which limits their transformative potential and the overall effectiveness of conservation actions.

The low level of community participation in planned activities reveals a central challenge to the sustainability of environmental practices. This scenario indicates that, despite recognition of the importance of native species and the role of forest islands in local culture and subsistence, there is still a lack of collective and continuous engagement to ensure the replacement of the most exploited species, such as rosewood and ash, and the maintenance of ecosystems.

To advance environmental conservation and strengthen indigenous identity, it is essential to invest in strategies that promote greater resident involvement by expanding dialogue, listening, and shared responsibility. In this context, the school should serve as a central space for awareness-raising and training, integrating traditional knowledge with environmental education in a practical and contextualized manner and fostering sustainability through educational practices.

In addition, it is essential to seek institutional partnerships and develop long-term projects that go beyond one-off actions and ensure the continuity of initiatives. Only through the effective participation of the entire community and a commitment to shared resource management will it be possible to ensure species conservation and the sustainability of traditional ways of life.

Thus, this study shows that, despite the progress achieved, the effectiveness of environmental practices in Ponta da Serra depends primarily on strengthening community participation and collective commitment to environmental preservation. This, in turn, requires a change in attitudes and recognition of each resident's role as an active agent in building a sustainable future for the community.

References

BARBIERI, José Carlos. *Desenvolvimento sustentável*: das origens à Agenda 2030. Petrópolis: Vozes, 2020.

BARBOSA, Reinaldo Imbrozio; MIRANDA, Izildinha de Souza. Fitofisionomias e diversidade vegetal das savanas de Roraima. *In*: BARBOSA, Reinaldo Imbrozio; XAUD, Haron Abrahim Magalhães; COSTA E SOUZA, Jorge Manoel (eds). *Savanas de Roraima*: etnoecologia, biodiversidade e potencialidades agrossilvipastoris. Boa Vista: FEMACT, 2005. p. 61–78.

BORTOLON, Dielci Maria Oliveira Bortolon. *Terra Indígena Araçá/Roraima*: continuidades e transformações envolvendo coletividades Macuxi. Master's thesis (Mestrado em Ambiente e Desenvolvimento) – Centro Universitário Univates, Lajeado: Centro Universitário Univates, 2014.

BOSI, Alfredo. *Dialética da colonização*. São Paulo: Companhia das Letras, 1992.

BRASIL. *Lei n° 9.985, de 18 de julho de 2000. Regulamenta o art. 225, § 1º, incisos I, II, III e VII da Constituição Federal, institui o Sistema Nacional de Unidades de Conservação da Natureza e dá outras providências*. Brasília: Presidência da República, Casa Civil, Subchefia para Assuntos Jurídicos, 2000. Available at: <http://www.planalto.gov.br/ccivil_03/leis/L9985.htm>. Accessed on Dec 22, 2025.

BRASIL. *Constitution of the Federative Republic of Brazil [1988]*. Brasília: Supremo Tribunal Federal, Secretaria de Altos Estudos, Pesquisas e Gestão da Informação, 2022. Available at: <https://www.stf.jus.br/arquivo/cms/legislacaoConstituicao/anexo/brazil_federal_constitution.pdf>. Accessed on Dec 22, 2025.

CIDR = Centro de Informação Diocese de Roraima. *Índios de Roraima*: Makuxi, Taurepang, Ingarikó, Wapixana. Boa Vista: Diocese de Roraima, 1989. (Coleção histório-antropológica, 1.)

CIR = Conselho Indígena de Roraima. *Seminário sobre mudanças climáticas e REDD+*: "Os Povos Indígenas são guardiões da Terra e da Natureza e têm soluções para enfrentar as Mudanças Climáticas!". Final report. 2011.

COSTA, Josinara Silva; OLIVEIRA, André Luis Nascimento de; SANTOS, Neuma Teixeira dos. Preservação e conservação ambiental: significando a proteção do meio ambiente. *RELACult – Revista Latino-Americana de Estudos em Cultura e Sociedade*, v. 4, 963, 2018. doi: 10.23899/relacult.v4i0.963

DIEGUES, Antonio Carlos. *O mito moderno da natureza intocada*. São Paulo: Hucitec & Nupaub/USP, 2008.

FUNAI = Fundação Nacional do Índio. *Projeto Integrado de Proteção às Populações e Terras Indígenas da Amazônia Legal/PPTAL. Levantamento etnoambiental do complexo Macuxi-Wapichana: relatório final integrado*. (Mimeo.) Brasília: FUNAI, 2007.

HOUAISS. *Dicionário Houaiss da língua portuguesa.* São Paulo: Moderna, 2015.

ISA = Instituto Socioambiental. *Sobre Majariana*: na luta por um futuro melhor para os povos indígenas. São Paulo: Instituto Socioambiental; Roraima: Conselho Indígena de Roraima, 2016. Available at: <https://acervo.socioambiental.org/index.php/acervo/publicacoes-isa/majariana-na-luta-por-um-futuro-melhor-para-os-povos-indigenas>. Accessed on Dec 22, 2025.

MORÁN, Emílio F. *A ecologia humana das populações da Amazônia.* Petrópolis: Vozes, 1990.

PADUA, Suzana. Afinal, qual a diferença entre conservação e preservação? *O Eco*, Feb 2, 2006. Available at: <https://oeco.org.br/colunas/18246-oeco-15564/>. Accessed on Dec 22, 2025.

PEDREIRA, Jéssica Livio; HADA, Aleksander Ribeiro; PEREZ, Inayê Uliana; PINHO, Rachel Camargo de; MILLER, Robert Pritchard; ALFAIA, Sonia Sena; ALBUQUERQUE, Carla Yamane de. Produção de alimentos e conservação de recursos naturais na Terra Indígena Araçá, Roraima. *In*: HAVERROTH, Moacir (org.). *Etnobiologia e saúde de povos indígenas*. Recife: NUPEEA, 2013. p. 187–200. (Série Estudos e Avanços, 7.)

PELLEGRINI FILHO, Américo; SANTOS, Yolanda Lhullier dos. *Antropologia cultural e folclore.* São Paulo: Olímpika, 1989.

PEREZ, Inayê Uliana. *Uso dos recursos naturais vegetais na comunidade indígena Araçá, Roraima*. Master's thesis (Mestrado em Ciências Ambientais) – Universidade Federal de Roraima, Boa Vista: Universidade Federal de Roraima, 2010.

RIBEIRO, Pedro Augusto Mentz. Arqueologia em Roraima: histórico e evidências de um passado distante. *In*: BARBOSA, Reinaldo Imbrozio; FERREIRA, Efrem Jorge Gondim; CASTELLÓN, Eloy Guillermo (eds.). *Homem, ambiente e ecologia no estado de Roraima*. Manaus: Instituto Nacional de Pesquisas da Amazônia, 1997. p. 3–23.

SACHS, Ignacy. *Caminhos para o desenvolvimento sustentável*. Rio de Janeiro: Garamond, 2009.

SANTOS, José Luiz dos. *O que é cultura?* São Paulo: Brasiliense, 2005 [1996]. (Coleção Primeiros Passos, 110.)

SANTOS, Naiara Marta Conceição dos; VALE JÚNIOR, José Frutuoso do; BARBOSA, Reinaldo Imbrozio. Florística e estrutura arbórea de ilhas de mata em áreas de savana do Norte da Amazônia brasileira. *Boletim do Museu Paraense Emílio Goeldi (Ciências Naturais)*, v. 8, n. 2, p. 205–21, 2013. doi: 10.46357/bcnaturais.v8i2.573

TERRAS INDÍGENAS NO BRASIL. *Terra Indígena Ponta da Serra.* No date. Available at: <https://terrasindigenas.org.br/pt-br/terras-indigenas/3828>. Accessed on Dec 22, 2025.

UNESCO = United Nations Educational, Scientific and Cultural Organization. *Records of the General Conference, Twenty-Fifth Session, Paris, 17 October to 16 November 1989. V. 1*: Resolutions. Paris: UNESCO, 1989. Available at <https://unesdoc.unesco.org/ark:/48223/pf0000084696>. Accessed on Dec 22, 2025.