

ENVIRONMENTAL FEASIBILITY STUDY FOR THE ESTABLISHMENT OF A CONSERVATION UNIT IN BURACO DA ONÇA, SALOÁ/PARANATAMA, PERNAMBUCO, BRAZIL

*Estudo da viabilidade ambiental para criação de Unidade de Conservação no
Buraco da Onça, Saloá/Paranatama–PE, Pernambuco, Brasil.*

*Estudio de la viabilidad ambiental para la creación de una unidad de
conservación en Buraco da Onça, Saloá/Paranatama–PE, Pernambuco,
Brasil*



Tiago Silva de Souza 
Universidade de Pernambuco (UPE)
E-mail: tiago.silvas@upe.br

Deivide Benicio Soares 
Universidade de Pernambuco (UPE)
E-mail: deivide.benicio@upe.br

ABSTRACT

Given the constant advance of anthropogenic activity over the natural environment, it has become necessary to develop effective strategies for environmental preservation and conservation. In Brazil, the National System of Conservation Units (SNUC) stands out as an important instrument for the creation and management of protected areas. In this context, this research aims to analyze the environmental potential of Buraco da Onça, located between the municipalities of Saloá and Paranatama, for its possible transformation into a Conservation Unit (CU), considering its natural characteristics and its relevance for the protection of the existing natural resources. For this analysis, the study was based on the criteria established by the Ministry of the Environment (MMA) for the creation and recognition of protected areas, through which bibliographic surveys, cartographic production using QGIS software, and field visits were carried out, allowing the identification of the environmental attributes and potentialities present in the study area. The results revealed the environmental and landscape relevance of the site, as well as its fragilities and anthropogenic pressures, highlighting the need for measures aimed at its protection and environmental maintenance.

Keywords: Protected areas; Environmental planning; Environmental preservation.

Article History

Received: 05 march, 2026
Accepted: 19 may, 2026
Published: 13 july, 2026

<https://doi.org/10.33237/2236-255X.2026.7852>



RESUMO

Diante do constante avanço da ação antrópica sobre o meio natural, torna-se necessário desenvolver estratégias eficazes para a preservação e conservação do meio ambiente. No Brasil, o Sistema Nacional de Unidades de Conservação (SNUC) destaca-se como um importante instrumento para criação e gestão de espaços protegidos. Nesse contexto, esta pesquisa tem como objetivo analisar o potencial ambiental do Buraco da Onça, localizado entre os municípios de Saloá e Paranatama, para sua possível transformação em Unidade de Conservação (UC), considerando suas características naturais e sua relevância para a proteção dos recursos presentes. Para essa análise, este trabalho fundamentou-se nos critérios estabelecidos pelo Ministério do Meio Ambiente (MMA) para criação e reconhecimento de áreas protegidas, a partir dos quais foram realizados levantamentos bibliográficos, produções cartográficas no software QGIS e visitas de campo, permitindo identificar os atributos e potencialidades ambientais presentes na área de estudo. Com isso, constatou-se a relevância ambiental e paisagística do local, bem como as fragilidades e pressões antrópicas presentes, evidenciando a necessidade de medidas voltadas à sua proteção e manutenção ambiental.

Palavras-chave: Áreas protegidas; Planejamento ambiental; Preservação ambiental.

RESUMEN

Ante el constante avance de la acción antrópica sobre el medio natural, se hace necesario desarrollar estrategias eficaces para la preservación y conservación del medio ambiente. En Brasil, el Sistema Nacional de Unidades de Conservación (SNUC) se destaca como un importante instrumento para la creación y gestión de espacios protegidos. En este contexto, esta investigación tiene como objetivo analizar el potencial ambiental de Buraco da Onça, ubicado entre los municipios de Saloá y Paranatama, para su posible transformación en una Unidad de Conservación (UC), considerando sus características naturales y su relevancia para la protección de los recursos existentes. Para este análisis, el estudio se fundamentó en los criterios establecidos por el Ministerio de Medio Ambiente (MMA) para la creación y reconocimiento de áreas protegidas, a partir de los cuales se realizaron levantamientos bibliográficos, producciones cartográficas mediante el software QGIS y visitas de campo, permitiendo identificar los atributos y potencialidades ambientales presentes en el área de estudio. Con ello, se constató la relevancia ambiental y paisajística del lugar, así como las fragilidades y presiones antrópicas existentes, evidenciando la necesidad de medidas orientadas a su protección y mantenimiento ambiental.

Palabras clave: Áreas protegidas; Planificación ambiental; Preservación ambiental.

1 INTRODUCTION

Over the course of human evolution, humans have transitioned from being mere observers of natural phenomena to becoming agents of environmental transformation, developing adaptive strategies and driving significant changes in natural landscapes. In this context, environmental preservation has emerged as both a necessity and a collective responsibility, aimed at minimizing the impacts resulting from interactions between society and nature (Fonseca *et al.*, 2019).



To mitigate the impacts of anthropogenic activities on natural ecosystems, Conservation Units (CUs) were established in Brazil as key instruments for environmental preservation and conservation. Their legal framework was formalized through Law No. 9,985 of July 18, 2000, which established the National System of Nature Conservation Units (SNUC).

Under Brazilian legislation, CUs are legally protected territorial areas, including waters under national jurisdiction, recognized for their significant natural attributes. They are established by the government for specific conservation purposes, have clearly defined boundaries, and are governed by a special management regime intended to ensure their effective protection (Brazil, 2000).

Located between the municipalities of Saloá and Paranatama in the Agreste region of Pernambuco, the Buraco da Onça area is characterized by unique environmental features, including vegetation typical of an ecological enclave and considerable ecological significance. However, the lack of effective protection measures leaves the area vulnerable to anthropogenic pressures, including deforestation and uncontrolled resource exploitation.

Accordingly, this study aims to assess the environmental potential of Buraco da Onça for designation as a CU based on the criteria established by the Brazilian Ministry of Environment and Climate Change (MMA). To this end, the area's environmental attributes were investigated to evaluate its ecological potential and the feasibility of its designation as a legally protected area.

2 MATERIALS AND METHODS

2.1 Study Area Location

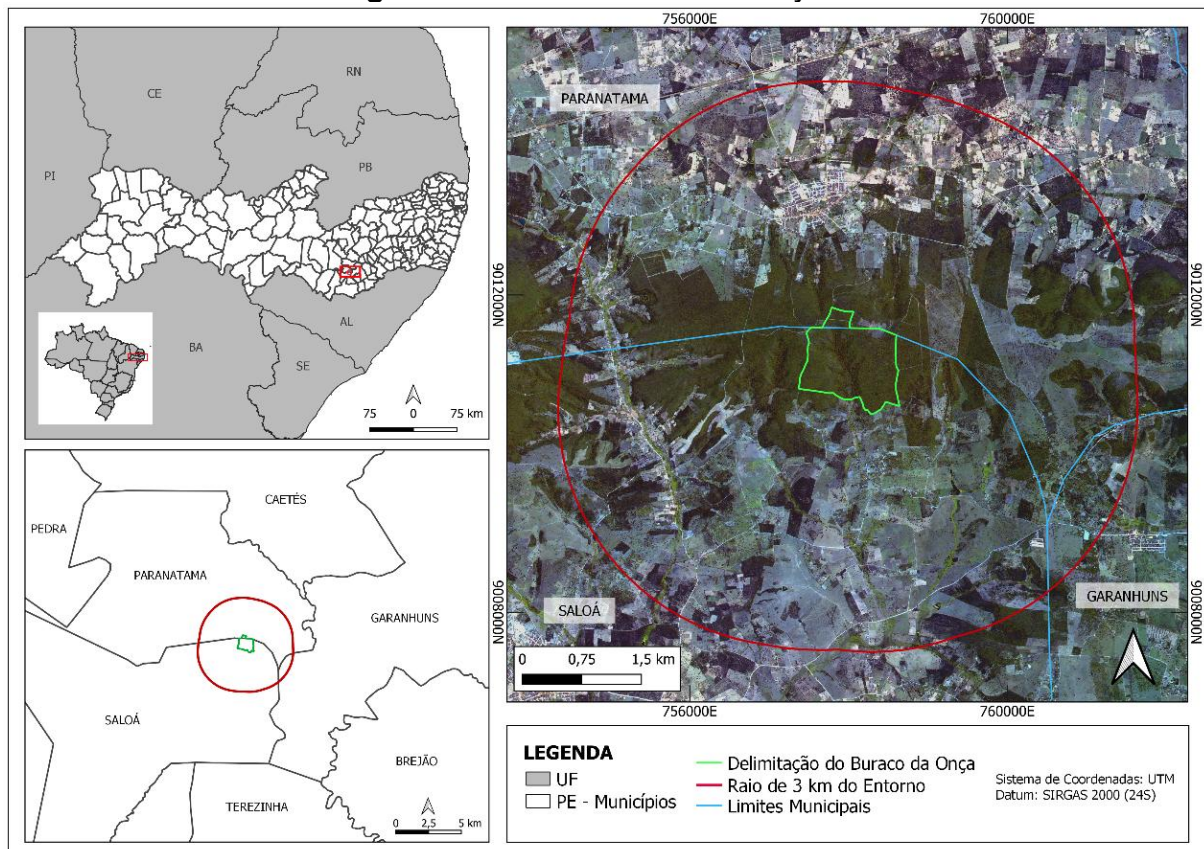
Buraco da Onça is situated along the boundary between the municipalities of Saloá and Paranatama, in the state of Pernambuco, Brazil. Both municipalities are located within the Agreste Pernambucano mesoregion and belong to the Garanhuns microregion (IBGE, 2023). The municipal seats of Saloá and Paranatama are located approximately 249 km and 261 km, respectively, from the state capital, Recife. Access to the study area is primarily provided via the BR-423 highway in Paranatama and the PE-223 state highway in Saloá. Figure 1 illustrates the boundaries of Buraco da Onça and its location across the two municipalities.

It is important to note that no officially established boundary exists for the area. Accordingly, a provisional boundary was defined for the purposes of this study to support its spatial delimitation and environmental analysis. This delimitation was based on physical and landscape features, using the watershed divide (drainage divide) and surrounding roads to define the northern, western, and eastern boundaries. The southern boundary was delineated according to the extent of arboreal vegetation identified in satellite imagery, marking the transition between denser vegetation cover and the surrounding land uses.

Another important element shown in the Location Map is the delineation of a 3-km buffer surrounding the study area, representing the potential Buffer Zone (BZ) of the proposed CU. Under Article 2 of the SNUC, a BZ is the area surrounding a CU where human activities are subject to specific regulations and restrictions intended to minimize adverse impacts on the protected area (Brazil, 2000).

Buraco da Onça is a steep-sided valley covering approximately 1.55 km². Figure 02 presents a representative view of the study area.

Figure 01 – Location of the study area



Source: INPE (2024) and IBGE (2024). Prepared by the authors.

Figure 02 – Panoramic view of Buraco da Onça



Source: Silva (2025).

2.2 Research Stages

The research was conducted in three main stages: literature review, cartographic analysis, and fieldwork.

Literature Review: This stage consisted of a review of the scientific literature based on the analysis of books and peer-reviewed journal articles addressing the establishment of protected areas.

Cartographic Production: This stage involved the preparation of thematic maps using QGIS software. A comprehensive cartographic database was compiled from publicly available datasets, primarily provided by governmental institutions. All cartographic products were standardized using the official Brazilian spatial reference system, SIRGAS 2000, with the Universal Transverse Mercator (UTM) projection, Zone 24S.

The main cartographic datasets used in this study included:

- **Location Map:** municipal boundary data provided by the Brazilian Institute of Geography and Statistics (IBGE) and a CBERS-4A satellite image acquired on October 9, 2024, and freely distributed by the National Institute for Space Research (INPE).

- Protected Area Priority Level Map: shapefile data provided by the Ministry of the Environment (MMA), referring to the Priority Areas for Conservation in the Caatinga Biome (2018).
- Land Use and Land Cover Map and NDVI Map: raster images from the CBERS-4A satellite, acquired on October 9, 2024, and made available by INPE, using the WGS84 reference system. The images included the blue, green, red, and near-infrared bands, with an 8-meter spatial resolution. These bands were combined and subsequently fused with the 2-meter panchromatic band to enhance spatial detail.
- Drainage Network Map: vectorized in QGIS from the PE3D Digital Elevation Model (DEM), with support from Google satellite imagery as a basemap.
- Groundwater Wells Location Map: based on the database provided by the Geological Survey of Brazil (SGB) for the municipalities of Saloá and Paranatama. The available coordinates enabled the creation of a point layer in QGIS, resulting in the spatial representation of groundwater wells in the Buraco da Onça area and its surroundings.
- Elevation and Slope Maps: raster data derived from the Digital Terrain Model (DTM) provided by the Pernambuco Tridimensional Project (PE3D).

Fieldwork: Field surveys were conducted to assess the environmental and socioeconomic conditions of the study area. These surveys enabled the identification of remaining vegetation fragments, local hydrological features, and the main anthropogenic pressures affecting the area. Moreover, they documented key environmental attributes, including scenic beauty and conservation potential.

Field visits were conducted on December 2, 2024, and April 10, 2025, to characterize the socioenvironmental context of the study area and its local hydrological features. These surveys enabled the identification of remaining vegetation fragments, the assessment of physical, biotic, and socioeconomic characteristics, and the documentation of environmental attributes relevant to the establishment of a CU. Photographic records and field observations supported the integration and validation of the collected data, reinforcing the area's importance for conservation.

The findings from the field investigations, cartographic analyses, and photographic records formed the basis for the proposal to establish a CU. In the final stage of the study, the collected data were evaluated according to the criteria established by the MMA, enabling the identification of the requirements for the establishment of a CU within the Buraco da Onça area.



3 RESULTS

Within the SNUC, CUs are classified into groups and categories according to their conservation objectives and permitted land uses. The system comprises two main groups: Strict Protection Units and Sustainable Use Units. Both may be established on public or private land, depending on the characteristics and intended purposes of the protected area.

Strict Protection Units are intended primarily to preserve natural ecosystems by allowing only the indirect use of natural resources, thereby minimizing human interference. This group includes the following categories: Ecological Station, Biological Reserve, National, State, or Municipal Natural Park, Natural Monument, and Wildlife Refuge. Although these categories differ in their levels of protection, they share the common objective of conserving biodiversity and ensuring environmental protection (Brazil, 2000).

In contrast, Sustainable Use Units are intended to reconcile environmental conservation with the sustainable use of natural resources by integrating human activities with nature protection. This group includes the following categories: Environmental Protection Area, Area of Relevant Ecological Interest, National Forest, Extractive Reserve, Wildlife Reserve, Sustainable Development Reserve, and Private Natural Heritage Reserve. These categories allow different forms of land use and natural resource exploitation, provided that such activities are carried out in an environmentally sustainable manner (Brazil, 2000).

Protected areas play a fundamental role in promoting a sustainable future by providing legal mechanisms for nature conservation. Their establishment helps reduce the overexploitation of natural resources and mitigate the impacts of environmental degradation on ecosystems. However, the legal designation of protected areas alone does not guarantee the effective achievement of these objectives (Soares, Spinola, & Reis, 2022). Therefore, active engagement by public authorities and society in the management, monitoring, and conservation of these areas is essential to ensure that the environmental objectives of the conservation system are effectively achieved.

According to the Brazilian Ministry of the Environment (MMA, 2019), areas considered suitable for designation as CUs should exhibit characteristics such as well-preserved forest remnants; the presence of threatened, rare, endemic, or migratory species; recognition as Priority Areas for Biodiversity Conservation; scenic beauty or ecotourism potential; high biodiversity and/or the occurrence of rare natural features; the availability of



water resources; potential for the sustainable use of natural resources; and the presence of traditional communities or resident populations.

In the case of Buraco da Onça, several of these criteria are met and are discussed in the following sections. However, some criteria, such as the potential for the sustainable use of natural resources, are not applicable to the area's context, as its highly valuable vegetation requires preservation rather than resource use, making strict protection the most appropriate management approach. Likewise, the occurrence of rare natural features and the presence of traditional communities are not defining characteristics of the region, further supporting a management approach focused primarily on environmental conservation.

Furthermore, the presence of threatened, rare, migratory, or endemic species is an important criterion for the establishment of a CU. However, the identification and classification of such species were beyond the scope of this study, as they require specific biological surveys and specialized ecological assessments.

3.1 Priority Area for Conservation Unit Designation

The identification of Priority Areas for Biodiversity Conservation is a public policy instrument that provides an objective and participatory framework for decision-making related to the conservation, restoration, and sustainable use of ecosystems and species. The designation of these areas is based on Systematic Conservation Planning (SCP), which integrates the collection and analysis of spatial data on the distribution of species and ecosystems while accounting for conservation costs and opportunities (MMA, 2023).

For a region to be formally recognized for environmental protection, it must be classified by the MMA as a Priority Area for Biodiversity Conservation, as this represents one of the criteria for the establishment of a protected area. To support this process, the Ministry maintains a database containing detailed information on conservation priorities for each area, considering both its biological importance and the various uses of natural resources (MMA, 2023).

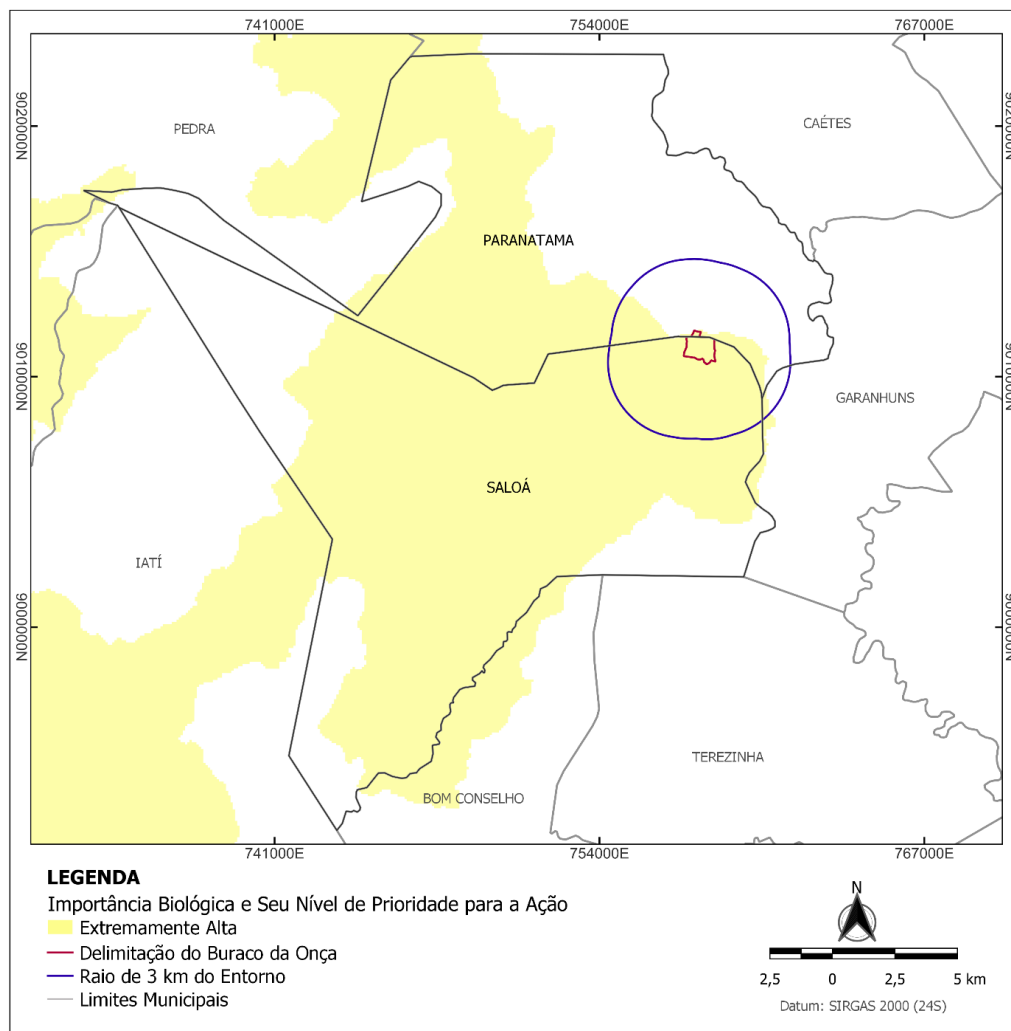
Each area recognized as a Priority Area for Biodiversity Conservation is evaluated according to two criteria: its biological importance and its conservation priority level. The latter is classified into four categories: Extremely High, Very High, High, and Insufficiently Known, with Extremely High representing the highest priority level.

Figure 3 shows that the study area lies within one of the Priority Areas for Biodiversity Conservation in the Caatinga biome, known as IATI–Santana do Ipanema (code CA189).



This area is characterized by well-preserved Caatinga vegetation, particularly inselbergs and arboreal Caatinga formations (MMA, 2023).

Figure 03 – Conservation priority level for the establishment of a CU in Buraco da Onça



Source: MMA (2018). Prepared by the authors.

With both its biological importance and conservation action priority classified as Extremely High, the highest category in this assessment framework, Buraco da Onça meets this criterion for designation as a CU, underscoring its importance for environmental conservation.

3.2 Well-Conserved Forest Remnants

The presence of well-conserved forest remnants is also one of the primary criteria for the establishment of a CU. This criterion is clearly met within the study area. As shown in Figure 4, the regional vegetation cover comprises forest remnants that are in an excellent



state of conservation. The high vegetation density and structural integrity, together with the absence of significant signs of degradation, such as deforestation or excessive fragmentation, indicate that the ecosystem remains healthy and ecologically functional. These characteristics further underscore its importance for environmental conservation and the maintenance of local biodiversity.

Figure 04 – Vegetation cover of Buraco da Onça



Source: Silva (2025).

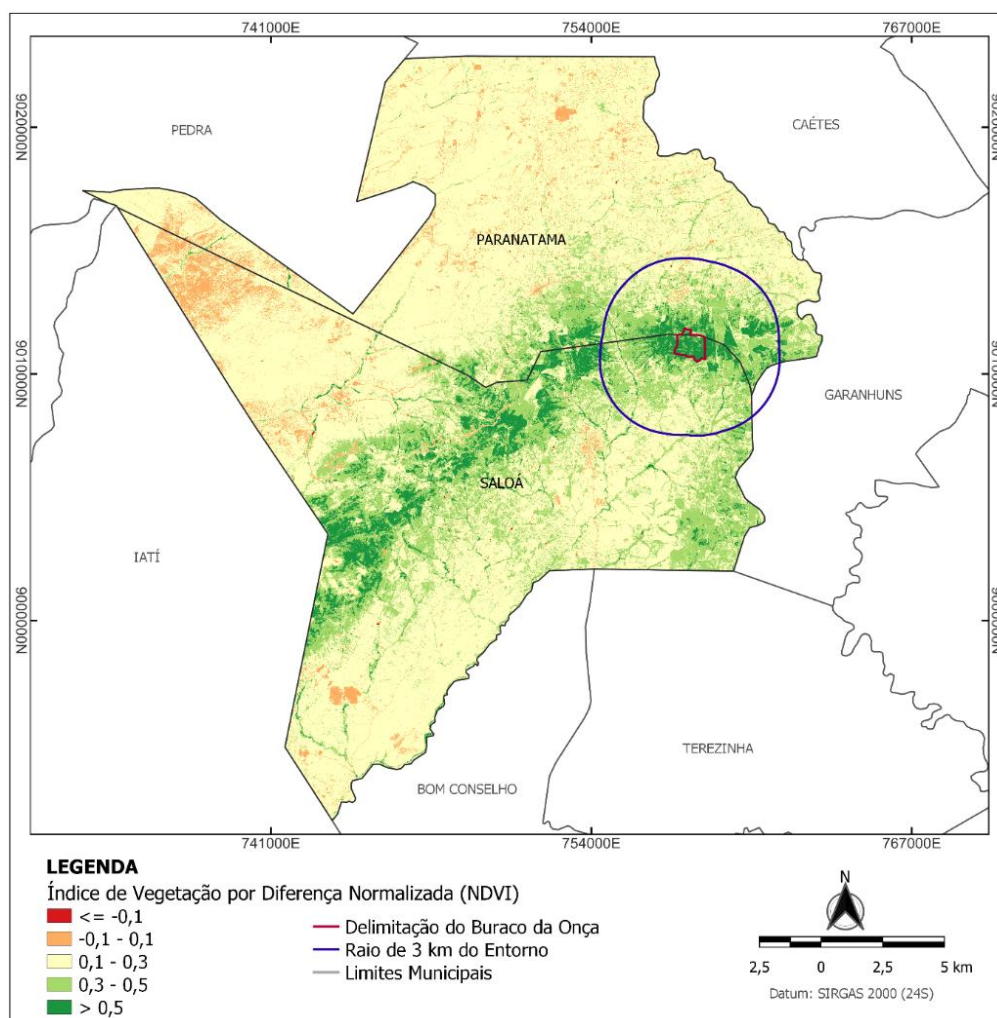
The study area lies within an ecological transition zone between Seasonal Forest and Steppe Savanna vegetation (IBGE, 2012). This transitional environment constitutes an ecotone, where floristic and physiognomic elements of both vegetation types overlap. This vegetation mosaic reflects the region's environmental complexity, resulting from climatic fluctuations that favor the coexistence of species adapted to both the more humid conditions of forest environments and the drier, more open conditions characteristic of savanna ecosystems.

The Normalized Difference Vegetation Index (NDVI) is a widely used indicator of vegetation cover. According to Melo, Sales, and Oliveira (2011), NDVI values range from -1 to $+1$. Values close to $+1$ indicate dense vegetation, typically associated with well-preserved, humid environments. Conversely, values approaching -1 generally correspond to non-vegetated surfaces, such as water bodies and urban areas, whereas values near zero indicate exposed soil or sparse vegetation.



Within the study area, NDVI values are predominantly around 0.5, indicating the presence of moderately dense vegetation with relatively high moisture content and suggesting a generally well-preserved environment (Figure 5).

Figure 05 – Normalized Difference Vegetation Index (NDVI) of Saloá and Paranatama



Source: INPE (2024). Prepared by the authors.

Figure 05 highlights the importance of this vegetated area within the municipalities of Saloá and Paranatama. Together, the two municipalities cover 437.24 km². Based on the interpretation of Figure 5 and the data presented in Table 1, only 28.78 km² exhibited NDVI values above 0.5. Of this total, 7.43 km² are located within the study area and its 3-km buffer zone. Thus, Buraco da Onça and its surrounding area comprise approximately 25.82% of all areas with NDVI values above 0.5 across the two municipalities.



Table 1 – Quantification of NDVI in the municipalities of Paranatama and Saloá and the surrounding area of the study site.

NDVI classes	Total Area in the Municipalities	3-km Buffer Surrounding Buraco da Onça
≤ -0.1	0.07 km ²	0.004 km ²
-0.1 – 0.1	41.4 km ²	0.75 km ²
0.1 – 0.3	278.88 km ²	15.74 km ²
0.3 – 0.5	87.95 km ²	17.92 km ²
> 0.5	28.78 km ²	7.43 km ²

Source: The authors (2025).

Therefore, Buraco da Onça represents one of the most environmentally significant areas within the municipalities analyzed. Its high biodiversity and well-preserved forest remnants highlight its important role in maintaining local ecosystem integrity. Given its ecological significance at the municipal scale, the implementation of effective conservation measures is essential to preserve these ecosystems and ensure the long-term conservation of their biodiversity.

3.3 Scenic Beauty and Tourism Potential

Another criterion for the establishment of a CU is the presence of scenic beauty and tourism potential, both of which are evident in Buraco da Onça. Its extensive forest cover enhances the area's scenic appeal while offering visitors a sense of tranquility and a close connection with nature.

The area is well known, particularly within the municipality of Paranatama, due to its considerable scenic value. One of its most distinctive features is the rock formation marking the entrance to the valley (Figure 6), which has become a local landmark. Visitors to the site frequently document their experience by taking photographs against the backdrop of the impressive cliff landscape.



Figure 06 – Scenic beauty of Buraco da Onça, highlighting its well-preserved native vegetation and distinctive landforms



Source: The authors (2024).

The site is also valued as a refuge from urban pressures, largely because its landscape remains largely free from anthropogenic disturbance. Moreover, the trails that traverse the area enhance visitors' immersion in the natural environment by providing opportunities for direct interaction with local ecosystems. The site is frequently used for contemplation, meditation, and relaxation, benefiting from the sense of tranquility associated with close contact with nature.

This scenic appeal also contributes to the area's tourism potential. The site attracts visitors, with small groups regularly exploring its trails. However, ecotourism initiatives could further promote public access through strategies that encourage the sustainable use and appreciation of the area's natural resources. In this context, the establishment of a legally recognized protected area could provide an appropriate framework for reconciling nature conservation with tourism activities.

At present, Buraco da Onça is visited primarily by people familiar with its trails, which require a moderate degree of physical effort and local knowledge to access. The formal designation of the area as a protected site could also promote environmental awareness, strengthen community-based tourism, and contribute to income generation for surrounding communities.

However, for Buraco da Onça to develop under a truly sustainable tourism framework, its management should incorporate measures beyond the formal guidelines established by the SNUC. These include the provision of trained guides, appropriate visitor signage, and the development of additional trails to promote controlled and responsible access. The implementation of such measures, however, depends on the area's formal legal recognition as a protected area.

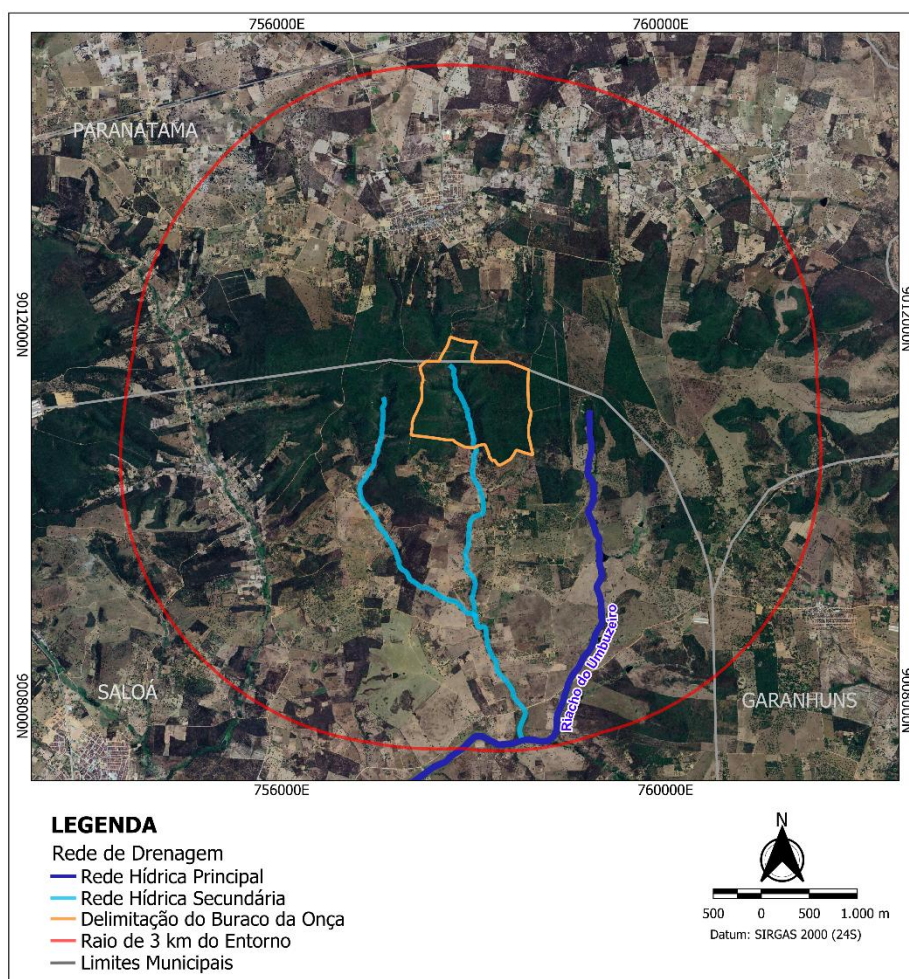
3.4 Water Resources

The presence and environmental condition of surface and groundwater resources are important criteria in the establishment of a protected area. These characteristics are also evident in Buraco da Onça.

Surface water resources in the study area consist of an intermittent stream that flows through Buraco da Onça. This stream belongs to the Ipanema River hydrographic microregion, which forms part of the São Francisco River watershed (APAC, 2024).

Within the study area, a secondary drainage network drains into the main watercourse, Riacho do Umbuzeiro, one of the municipality's principal tributaries (Figure 7). The drainage network has an intermittent flow regime and exhibits a dendritic drainage pattern (SGB, 2005).

Figure 07 - Drainage network of Buraco da Onça

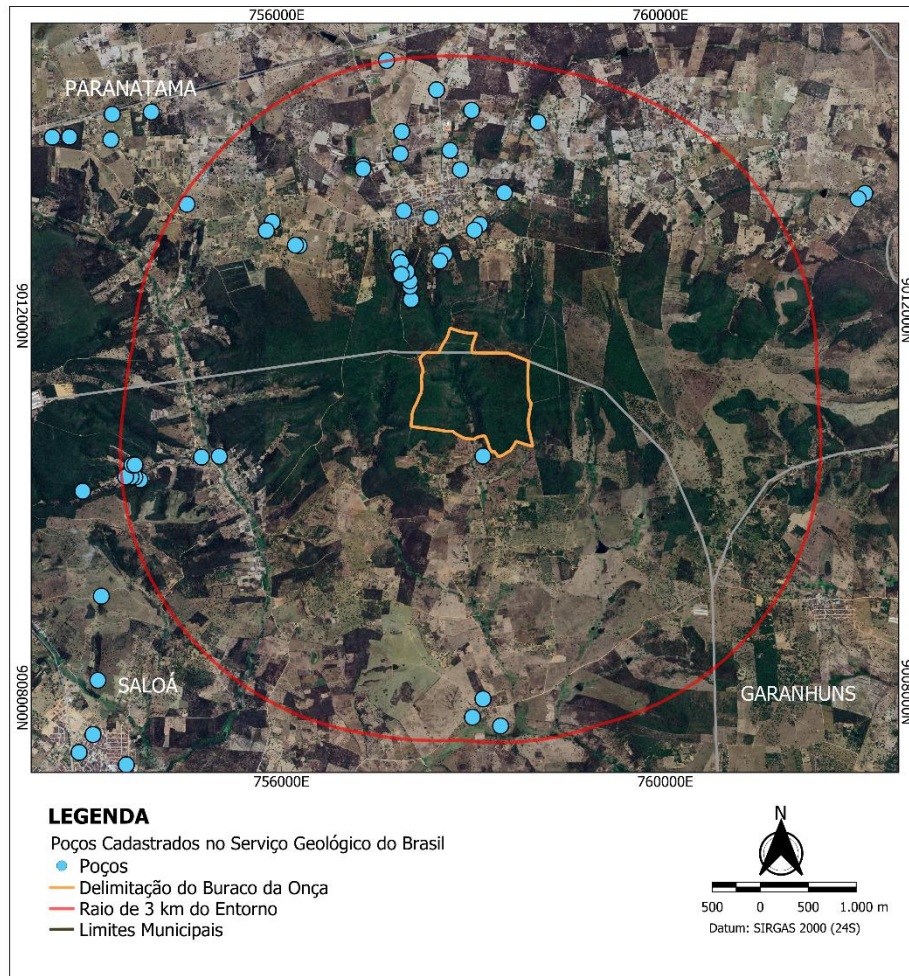


Source: PE3D (2024) and Google Satellite (2025). Prepared by the authors.

However, the region's most significant hydrological feature is its groundwater resources, which are essential to local communities. These resources play a fundamental role in water supply and in supporting the human activities carried out throughout the region.

Both the municipalities of Saloá and Paranatama lie entirely within the Fractured Hydrogeological Domain, which comprises crystalline basement rocks, including the metamorphic subdomains of the Belém do São Francisco Complex and the Cabrobó Complex (SGB, 2005). This geological setting directly influences groundwater availability, as groundwater is stored and circulates through fractures and fissures within these rock formations. Figure 8 shows the wells located in the vicinity of the study area.

Figure 08 – Distribution of Groundwater Wells in the Surrounding Area of Buraco da Onça



Source: SGB (2025) and Google Satellite (2025). Prepared by the authors.

Figure 09 presents photographs from Buraco da Onça and its surrounding area, illustrating different forms of water supply and storage in the region. Images A and B show dug wells (Amazonas wells), manually excavated structures used to access shallow groundwater. Images C and D depict drilled wells (boreholes), which tap groundwater stored in fractured aquifers, and often allow water to reach the surface with relative ease. Finally, Image E shows a reservoir (*açude*), one of the most traditional forms of surface water storage in the region.

Figure 09 – Water Resources in the Region: (A) and (B) Amazonas wells; (C) and (D) drilled wells for groundwater extraction; and (E) a reservoir used for surface water storage.



Source: The authors (2025).

The municipalities of Saloá and Paranatama benefit from relatively easy access to fresh groundwater, further highlighting the area's importance in terms of water resources. This is particularly significant when compared with neighboring regions, where access to groundwater is considerably more limited.

In light of these findings, the region's water resources hold not only social but also environmental value, further reinforcing the need for strategies that support their conservation and sustainable management. The establishment of a legally protected CU represents an important measure to ensure the long-term conservation of these resources while promoting their responsible and sustainable use.

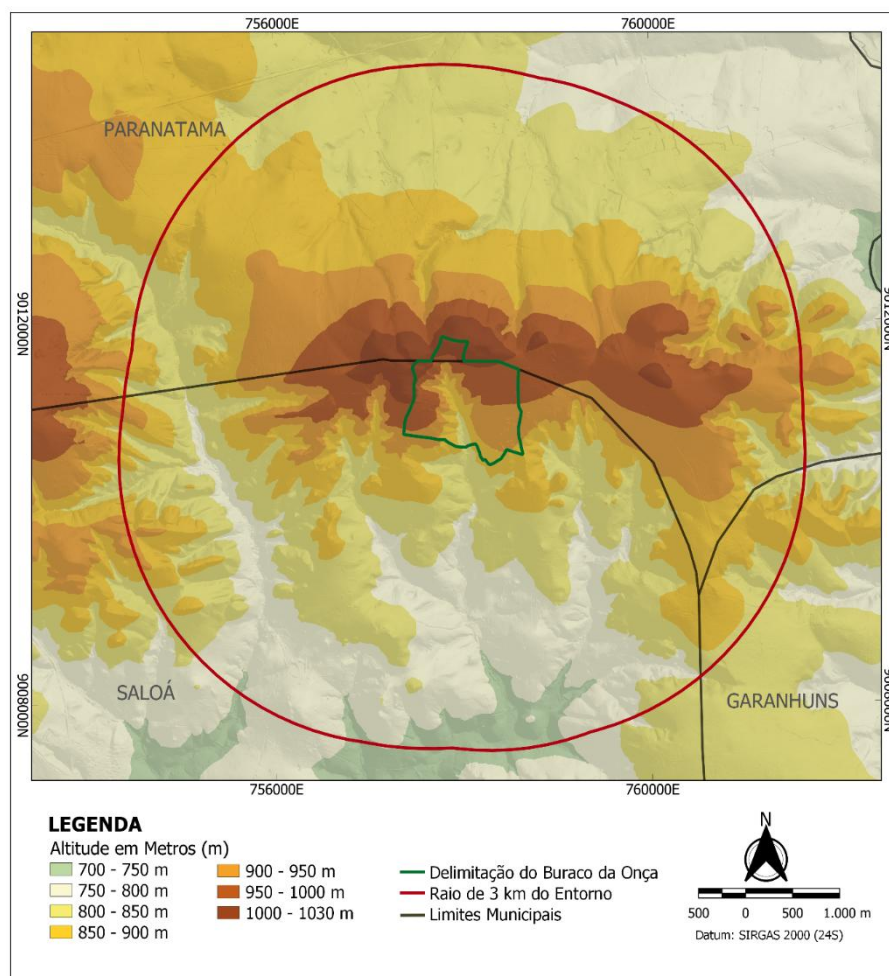
3.5 Other Relevant Aspects

3.5.1 Erosion Vulnerability

Certain physical and anthropogenic factors present in the area contribute to intensified erosion, underscoring the need for measures to protect and conserve this environment. Such measures are essential to prevent further environmental degradation and ensure the area's long-term sustainability.

Buraco da Onça is located within the Borborema Plateau, a region characterized by high elevations. As shown in Figure 10, the highest points within the study area reach approximately 1,030 m above sea level. In the surrounding areas, elevations decrease to approximately 700 m above sea level.

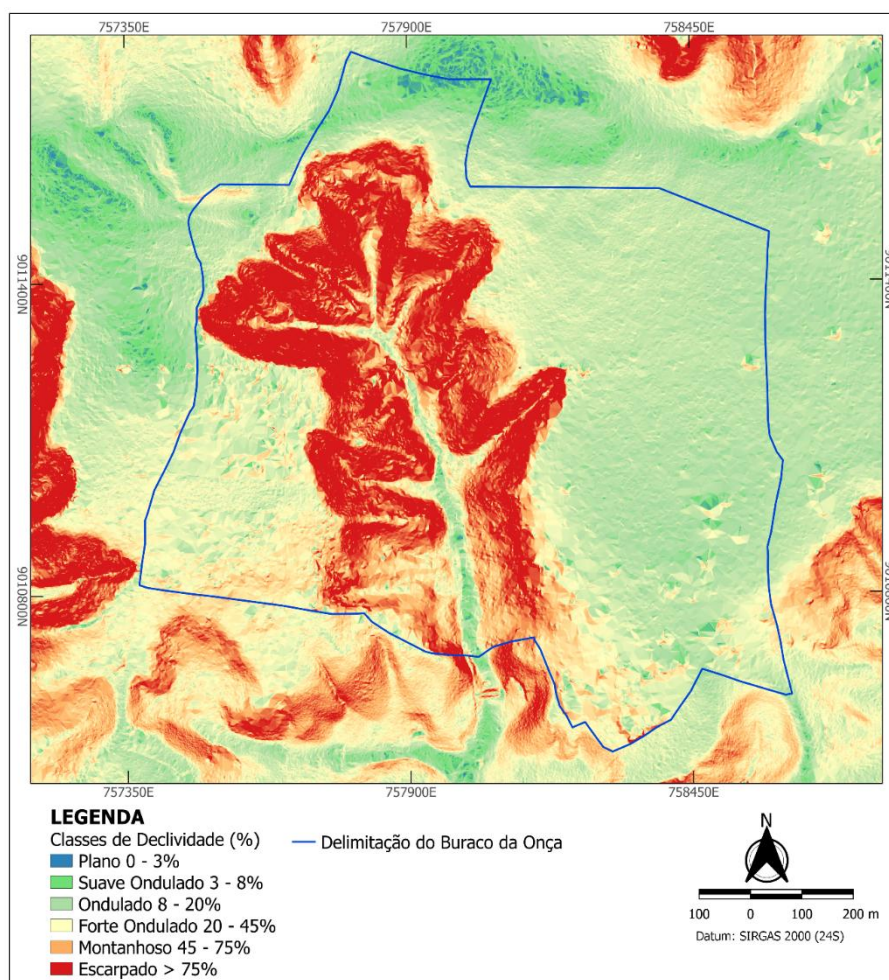
Figure 10 – Elevation of Buraco da Onça



Source: PE3D (2024). Prepared by the authors.

The elevation difference between the highest point of Buraco da Onça (1,030 m) and its lowest point (850 m) is approximately 180 m. As illustrated in Figure 11, this pronounced topographic gradient characterizes the area as a steep escarpment, with slopes exceeding 75%.

Figure 11 – Slope gradient of Buraco da Onça



Source: PE3D (2024). Prepared by the authors.

The region's topography strongly influences the development of erosive processes. In Buraco da Onça, elevations reach up to 1,030 m above sea level, and slopes exceeding 75% are predominant (Figure 11). According to Trentin, Santos, and Robaina (2012), terrain with these characteristics is inherently more susceptible to erosion, particularly where adequate vegetation cover is absent.

IBGE (2019) classifies slope gradients on a scale from 1 to 10, where 1 represents the lowest erosion potential and 10 indicates the highest susceptibility to mass movements and landslides (Table 2). Slopes exceeding 75%, which occur within the study area, fall into

the highest susceptibility class, highlighting the elevated risk of soil instability associated with these terrains.

Table 02 – Slope classes and corresponding landslide susceptibility ratings

Slope Class	Slope (%)	Landslide Susceptibility Rating
Flat	0 – 3	1
Gently Undulating	3 – 8	3
Undulating	8 – 20	5
Strongly Undulating	20 – 45	8
Mountainous	45 – 75	9
Steep	>75	10

Source: IBGE (2019). Adapted by the authors.

The intensification of human activities is also a major concern in the region, particularly due to land-use practices involving the removal of native vegetation for agriculture and livestock production. These activities reduce soil stability, increasing its susceptibility to erosive processes and accelerating environmental degradation.

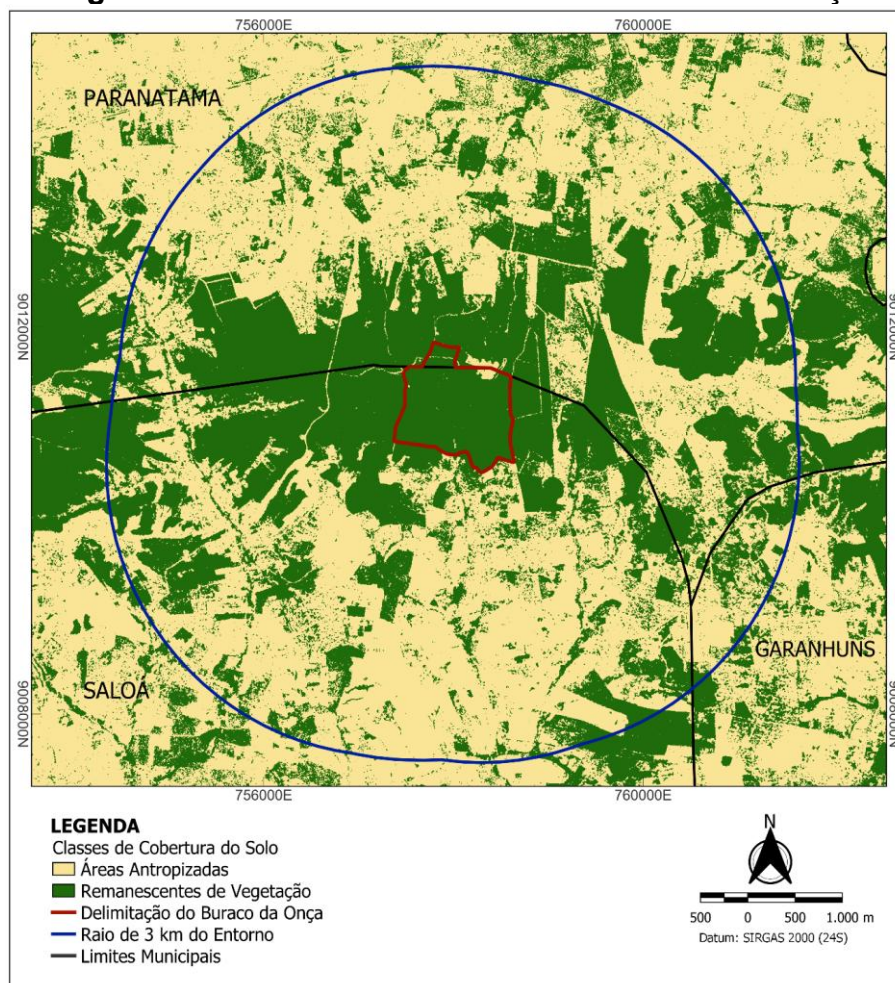
Although erosive processes have not yet become pronounced, the removal of vegetation cover could accelerate their development. At present, the dense vegetation identified through the NDVI analysis plays a fundamental role in protecting the area against erosion. However, the physical characteristics of the terrain, combined with increasing anthropogenic pressures, render the region inherently vulnerable. Therefore, preserving this vegetation is essential. In this context, the establishment of a CU constitutes an urgent measure to safeguard these ecosystems and prevent future environmental degradation.

3.5.2 Anthropogenic Pressures in the Surrounding Area

According to the Land Use and Land Cover Map (Figure 12), the study area and its surroundings comprise two main land-cover classes: anthropogenically altered areas and vegetation remnants. Within the boundaries defined for this study, vegetation remnants predominate, indicating the extensive presence of natural vegetation cover.



Figure 12 – Land use and land cover of Buraco da Onça



Source: INPE (2024). Prepared by the authors.

Analysis of the Land Use and Land Cover Map indicates a total mapped area of 71.173 km². Of this total, 60.42% consists of anthropogenically altered areas, whereas 39.58% is covered by vegetation remnants. Notably, most of these vegetation remnants are concentrated within Buraco da Onça and its surrounding area.

As human activities continue to expand across the landscape, a range of environmental impacts and challenges has emerged, and Buraco da Onça has likewise been affected.

The area is under intense anthropogenic pressure, with substantial portions of its native vegetation already cleared for a variety of economic activities. This trend is particularly concerning given the area's high biodiversity and important environmental attributes, which are increasingly threatened by ongoing land-use change.

Anthropogenically altered areas represent the dominant land-cover class in the region. These areas are characterized by exposed soil and land converted to support human



activities and economic development. Nevertheless, a substantial portion of the remaining native vegetation is concentrated within Buraco da Onça and its surrounding area. These remnants require effective management and conservation measures to mitigate the impacts of ongoing human activities. In this context, the establishment of a CU represents an important strategy for reducing pressure on the remaining vegetation and safeguarding local biodiversity.

The clearing of native vegetation for agricultural activities is widespread in the region, intensifying environmental degradation and contributing to local biodiversity loss. Areas converted for crop cultivation and livestock production are prominent features of the landscape, reflecting the long-standing practice of replacing native vegetation with agricultural land uses.

Figure 13 illustrates the intense anthropogenic pressure affecting a mountain range near Buraco da Onça, demonstrating the extent of human-induced landscape transformation in the region. This pattern highlights the need to protect the remaining native vegetation and prevent further environmental degradation. Similar landscapes are common throughout the region, reflecting the consequences of insufficient environmental protection. These findings further support the establishment of the area as a CU to safeguard its natural resources from ongoing unregulated anthropogenic pressures.

Figure 13 – Removal of native vegetation for agricultural activities



Source: The authors (2024).

Additional socioenvironmental issues are evident in the surrounding areas of Buraco da Onça. Figure 14 shows a decommissioned open-air dumpsite formerly used for the disposal of municipal solid waste from Paranatama. Although the site is no longer officially in operation, it continues to receive waste illegally, including materials generated by the Paranatama slaughterhouse.

Figure 14 – Waste disposal in the surrounding area of Buraco da Onça



Source: The authors (2024).

Given the environmental significance of Buraco da Onça, the presence of different types of waste in the area (Figures 13 and 14) further highlights its vulnerability to anthropogenic disturbance. These findings reinforce the need for formal legal protection to safeguard the area from unsustainable human activities, thereby contributing to the long-term conservation of its natural resources for future generations.

The degrading practices described above suggest shortcomings in the implementation of effective environmental protection measures in the region. Together, these pressures demonstrate the intensity of anthropogenic disturbance surrounding Buraco da Onça and reinforce the need to designate the area as a CU.

Without effective protection measures, it is only a matter of time before the impacts of human activities severely affect the area itself, jeopardizing its biodiversity and compromising its ecological functions.



4 FINAL CONSIDERATIONS

The findings demonstrate the high ecological, environmental, and social importance of Buraco da Onça for the municipalities of Saloá and Paranatama, confirming its considerable natural value. Beyond its ecological functions, the area also plays an important role in providing natural resources that directly benefit surrounding communities.

Given the fragility of the identified ecosystems and the continued expansion of anthropogenic pressures, the implementation of effective conservation measures is essential. In this context, the findings support both the feasibility and the importance of establishing a Conservation Unit in the area as a key strategy for protecting its environmental attributes over the long term.

Thus, it is recommended that Buraco da Onça be classified as a Full Protection Conservation Unit, allowing only the indirect use of natural resources, as established by SNUC (Brazil, 2000). Specifically, the creation of a Municipal Natural Park is proposed, a category intended for the preservation of ecosystems of significant ecological relevance and scenic beauty, serving as a basis for future actions by public authorities and society.

REFERENCES

AGÊNCIA PERNAMBUCANA DE ÁGUAS E CLIMAS (APAC). **Bacia do Rio Ipanema**. Disponível em: <https://www.apac.pe.gov.br/bacias-hidrograficas-rio-ipanema/166-bacias-hidrograficas-rio-ipanema/195-bacia-do-rio-ipanema>. Acesso em: 7 dez. 2024.

BRASIL. **Lei nº 9.985, de 18 de julho de 2000**. Diário Oficial da União, 2000. Disponível em: https://www.planalto.gov.br/ccivil_03/LEIS/L9985.htm. Acesso em: 8 dez. 2025.

FONSECA, A. J. S.; SILVA, H. P. B.; ALBUQUERQUE, R. C. L. Reflexões sobre a criação das unidades de conservação no Brasil e o sistema nacional de unidades de conservação. **Revista de Geografia**, Recife-PE, v. 36, n. 3, p. 97-111, 2019.

IBGE. **Manual técnico da vegetação brasileira**: sistema fitogeográfico, inventário das formações florestais e campestres, técnicas e manejo de coleções botânicas, procedimentos para mapeamentos. 2. ed. rev. ampl. Rio de Janeiro, 2012.

IBGE. **Suscetibilidade a deslizamentos do Brasil: primeira aproximação. Caracterização dos Recursos Naturais do Brasil**. Coordenação de Recursos Naturais e Estudos Ambientais. Rio de Janeiro, 2019. Disponível em: <https://biblioteca.ibge.gov.br/visualizacao/livros/liv101684.pdf>. Acesso em: 9 jan. 2025.

IBGE. **Paranatama - Cidades**. Instituto Brasileiro de Geografia e Estatística, 2023. Disponível em: <https://cidades.ibge.gov.br/brasil/pe/paranatama/panorama>. Acesso em: 17 jan. 2026.



IBGE. **Saloá - Cidades**. Instituto Brasileiro de Geografia e Estatística, 2023. Disponível em: <https://cidades.ibge.gov.br/brasil/pe/saloa/panorama>. Acesso em: 17 jan. 2026.

MELO, E. T.; SALES, M. C. L.; OLIVEIRA, J. G. B. de. Aplicação do índice de vegetação por diferença normalizada (NDVI) para análise da degradação ambiental da microbacia hidrográfica do riacho dos Cavalos, Crateús-CE. **RAEGA – O Espaço Geográfico em Análise**, Curitiba, n. 21, 2011.

MINISTÉRIO DO MEIO AMBIENTE (MMA). **Fichas das áreas prioritárias para conservação, utilização sustentável e repartição dos benefícios da biodiversidade brasileira: bioma Caatinga**. Brasília, 2023.

MINISTÉRIO DO MEIO AMBIENTE (MMA). **Roteiro para Criação de Unidades de Conservação Municipais**. Brasília, 2019.

SERVIÇO GEOLÓGICO DO BRASIL (SGB). **Diagnóstico do Município de Saloá - Estado de Pernambuco**. Recife: CPRM/PRODEEM, 2005.

SERVIÇO GEOLÓGICO DO BRASIL (SGB). **Diagnóstico do Município de Paratama - Estado de Pernambuco**. Recife: CPRM/PRODEEM, 2005.

SILVA, I. A. **Fotografia aérea do Buraco da Onça obtida por drone**. Paratama/Saloá, PE, 2025.

SOARES, A. G. L.; SPINOLA, C. A.; REIS, R. B. Avaliação da Gestão de Unidades de Conservação: Uma Análise dos Ciclos RAPPAM dos Parques Nacionais da Amazônia. **Revista Baru - Revista Brasileira de Assuntos Regionais e Urbanos**, Goiânia, Brasil, v. 8, n. 1, p. 22, 2022.

TRENTIN, R.; SANTOS, L. J. C.; ROBAINA, L. E. S. Compartimentação geomorfológica da bacia hidrográfica do Rio Itu: oeste do Rio Grande do Sul - Brasil. **Sociedade & Natureza**, v. 24, n. 1, p. 127-142, 2012.

