

INTERPRETIVE TRAILS AND ENVIRONMENTAL EDUCATION IN CAATINGA: A PROPOSAL FOR THE AÇU NATIONAL FOREST - RN

Luciana Reis da Silva

<https://orcid.org/0000-0001-7353-9689>

Universidade do Estado do Rio Grande do Norte – UERN

lucianareis993@gmail.com

Ana Luiza Bezerra da Costa Saraiva

<https://orcid.org/0000-0002-7906-5098>

Universidade do Estado do Rio Grande do Norte – UERN

anasaraiva@uern.br

Rafael Pereira da Silva

<https://orcid.org/0000-0002-5224-8724>

Universidade do Estado do Rio Grande do Norte – UERN

rafaelsilva.geo@gmail.com

ABSTRACT:

The National Forest of Açú – Flona of Açú is located in the municipality of Assú/Rio Grande do Norte, It has Caatinga vegetation and its total territorial area borders the Piató lagoon. The headquarters of this conservation unit – UC is inserted in the urban portion. These characteristics, as well as all the biodiversity and scenic beauty, provide a rich and diverse environment for field classes, ecological trails and for environmental education activities. The Flona of Açú already has actions aimed at environmental education, but activities and actions developed today are insufficient and do not cover its potential, as the unit's management plan highlights. In front of the potential that the trails have for conducting field classes and for environmental education actions related to the caatinga and semi-arid region, this work aims to propose a trail roadmap for the Flona of Açú, highlighting its potential for environmental education through the interpretation of natural elements and the importance of the unit for the preservation of Caatinga. The methodology used for producing the work consisted of the following steps: theoretical framework; field visits in the Flona of Açú; selection and interpretation of attractive points based on the IAPI method (Attractiveness Indicators of Interpretive Points) planning the interpretive trails roadmap based on (Furlan, 2011); analysis and interpretation of data. As a result, the main trail was selected for scripting. Through the IAPI Method, four main points were selected in the attractive infrastructure zone, a rest point and nine attractive points along the trail walk, a visit itinerary was planned based on the interpretation of the selected point. The expected results of the method are important, as well as for different similar results, improving the different characteristics of the different method, improving the different characteristics of the local method.

Keywords: Interpretive Trails; Flona of Açú; Environmental Education; Caatinga

TRILHAS INTERPRETATIVAS E EDUCAÇÃO AMBIENTAL NA CAATINGA: UMA PROPOSTA PARA A FLORESTA NACIONAL DE AÇU – RN

RESUMO

A Floresta Nacional de Açu – Flona de Açu está localizada no município de Assú/Rio Grande do Norte, possui vegetação de caatinga e a sua área territorial total margeia a lagoa do Piató. A sede dessa Unidade de Conservação – UC está inserida na porção urbana. Essas características, bem como toda a biodiversidade e beleza cênica, propiciam um ambiente rico e diverso para a realização de aulas de campo, trilhas ecológicas e para atividade de educação ambiental. A Flona de Açu já possui ações direcionadas à educação ambiental, porém as atividades desenvolvidas na atualidade são insuficientes e não abarcam sua potencialidade, como bem destaca o plano de manejo da unidade. Diante do potencial que as trilhas possuem para a realização de aulas de campo e para ações de educação ambiental relacionada à caatinga e ao semiárido, este trabalho tem como objetivo propor um roteiro de trilhas para a Flona de Açu, destacando suas potencialidades para educação ambiental por meio da interpretação de elementos naturais e da importância da unidade para preservação da Caatinga. A metodologia para produção do trabalho consistiu nas seguintes etapas: referencial teórico; visitas a campo na Flona de Açu; seleção e interpretação dos pontos atrativos com base no método IAPI (Indicadores de Atratividade dos Pontos Interpretativos), planejamento do roteiro de trilhas interpretativas com base em (Furlan, 2011); análise e interpretação dos dados. Como resultado, foi selecionado para roteirização a trilha principal. Através do Método IAPI, foram selecionados quatro pontos principais na zona de infraestrutura, uma área de descanso e nove pontos atrativos ao longo da caminhada na trilha, foi planejado um roteiro de visita a partir da interpretação de cada ponto atrativo selecionado. Diante disso, conclui-se que os resultados do método IAPI foram satisfatórios para a seleção dos pontos atrativos, como também para diferenciar possíveis interpretações semelhantes, enfatizando características potenciais e informações importantes do local estudado.

Palavras-chave: Trilhas Interpretativas; Flona de Açu; Educação Ambiental; Caatinga

INTRODUCTION

As a result of the socio-environmental, political, economic and landscape transformations throughout history, discussions have arisen about the environmental impacts and alternatives of nature protection and, in this context, areas were created as a possibility of protection against the threats suffered. The first protected areas were created between 1776 and 1976 (Purity, Pellin, & Padua, 2015, p. 24).

According to Borrini-Feyerabend et al. (2017, p. 5), a protected area is "[...] a clearly defined geographical area, recognized, with the specific objective and managed through effective means, whether legal or otherwise, to achieve nature conservation in the long term [...]". And while man's interest in protecting some special places on the planet is very old, "only in 1872 was the landmark of the current policy of conservation of natural resources – the creation of Yellowstone National Park in the United States." (FONSECA; SLAMAS; KASECKER, 2010, p. 18).

However, over time, the objectives of the protected areas existing in the world presented changes, thus pointing to changes in the functions and nomenclatures of these areas. The first functions and categories emerged through the International Union for the

Protection of Nature (IUPN), an agency linked to the United Nations Educational, Science and Culture Organization (UNESCO).

As Rylands and Brandon (2005, p. 28) "The Forest Code of 1934 established the legal framework for national parks (Decree 23,793 of January 23, 1934). The first Brazilian park was the Itatiaia Park created in 1937, in the Atlantic Forest Mountains of the state of Rio de Janeiro." According to Hassler (2005, p. 83), "The first conservation units created from 1937 to 1970 were not through technical and scientific criteria, but through scenic beauties and/or political opportunity." And also according to Fonseca, Lamas and Kasecker (2010, p. 18), "[...] in 2000, the National Service of Conservation Units (SNUC) was published.

Currently, the Conservation Units (UC) are organized from the normative point of view by the National System of Conservation Units (SNUC) and are divided into two groups, which are: Integral Protection Units and Sustainable Use Units, which present very important potentials. According to the MMA (2007, p. 42) "The SNUC was established by Law 9,985 of 7/18/2000, which, when regulating Article 225 of the Federal Constitution, established criteria and standards for the creation, implementation and management of conservation units in Brazil".

Given the categories presented by SNUC, this work will have as spatial clipping the Açú National Forest - Flona de Açú, located in the municipality of Assú in the State of Rio Grande do Norte and, therefore, inserted in the semi-arid potiguar, in the correigion of the caatinga, with the presence of undergrowth and arboreal shrub. In addition, the UC is bordered by the Piató lagoon, presenting an area composed of carnaúbas, aims to "protect the typical and threatened species of the biodiversity of the caatinga (Seasonally Dry Tropical Forest), as well as in combating the desertification process of the semi-arid, contributing to the construction of knowledge, public use and socio-environmental activities" (ICMBio, 2019, p. 19).

Given the potential of conservation units for scientific research actions, this work aims to propose a trail script for Flona de Açú, highlighting its potential for environmental education through the interpretation of natural elements and the importance of the unit for the preservation of the Caatinga. The specific objectives are: to identify areas conducive to interpretive trails in the UC; elaborate interpretative scripts for environmental education; and provide data and information in order to facilitate the use of trails as a means of environmental education.

The choice of this study cut is justified by the fact that the Açú/RN Conservation Unit presents, in the Management Plan (2019), high potential rates for Ecotourism, the Visitation of Attractions and Environmental Interpretation and Education, as well as a high need for environmental education planning as a way of sensitizing the surrounding communities.

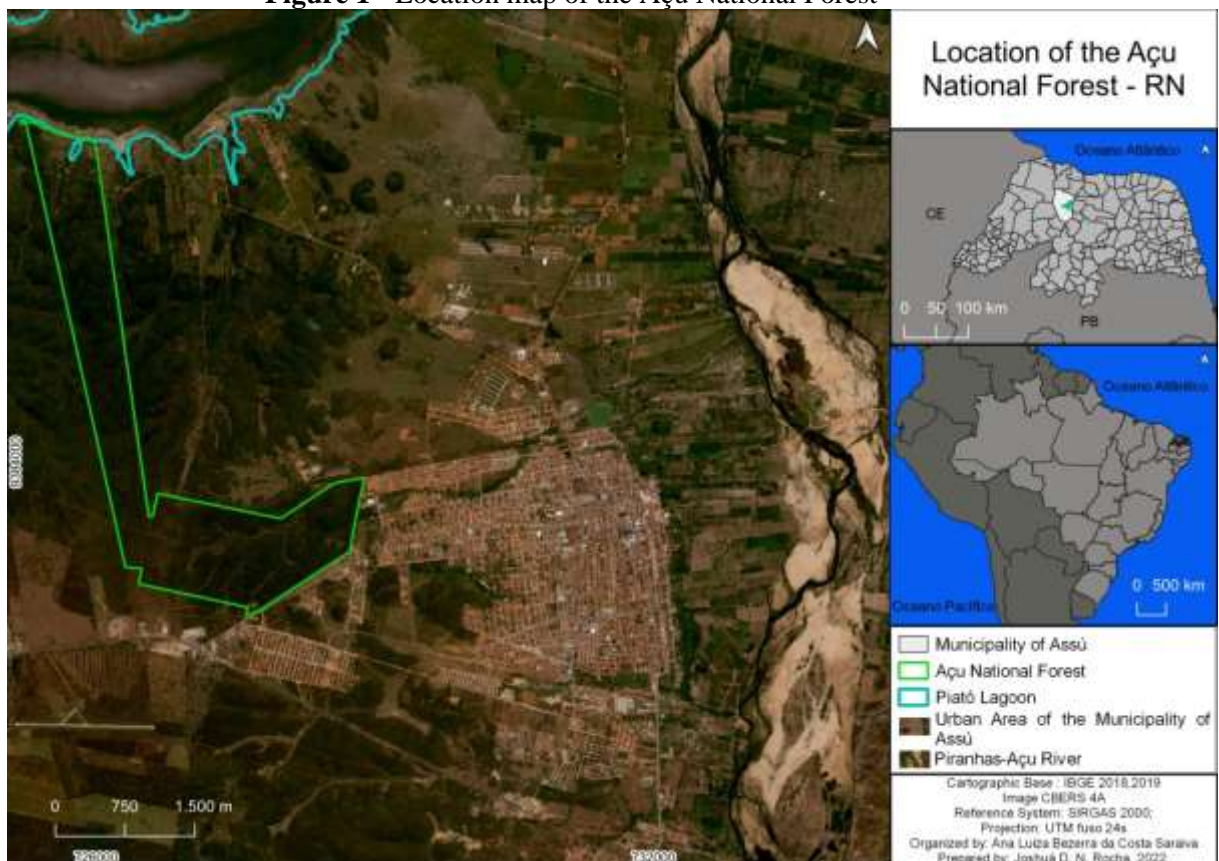
According to the Management Plan (2019), the UC presents reasonable conditions to bad as to the exploitation of its visitation potential and the data, information and ecotourism definitions of its trails and its attractions, clearly presenting the need for signs in the trails of the Unit.

Flona was created in 1950 from a forest garden that was altered by Ordinance No. 245 of July 18, 2001, modifying its forest garden nomenclature for Açú National Forest and

its objectives. "The Açu National Forest preserves important forest matrices of species characteristic of the caatinga for seed collection and seedling production, aiming at ecological restoration and the fight against desertification in the semi-arid" [...], (ICMBio, 2019, p.19).

Açu Flona presents in its vegetation an important amount of high and medium-sized trees, as well as carnaúbas and cacti. As the (ICMBio, 2019), "Its vegetation is predominantly shrub-tree, with more than 60 woody species standing out: marmeleiro, jurema, catingueiro, cumaru - da - caatinga, imburana, pereiro, purple ipê and angico", the relief of the region is considered flat, without many slopes facilitating access and walking on the trails present in the Conservation Unit. This relief feature also facilitates visitation. Thus, as we can see in Figure 1, the location of Flona.

Figure 1 - Location map of the Açu National Forest



Source: Saraiva (2022).

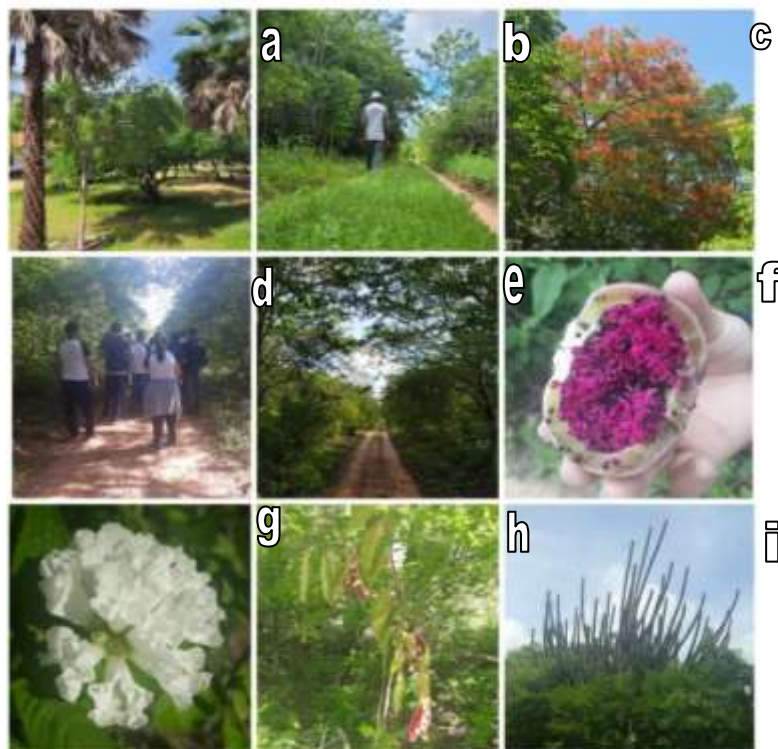
In addition, Flona has an important proximity to the Piató Lagoon, a space that has some potentialities such as preservation, conservation and where scientific research is also carried out by higher education institutions in different cities.

In addition to the biodiversity of Flora, Flona-Açu has characteristics to benefit the local microclimate; the environment is potential for environmental interpretation, as well as to house some species of fauna. According to (ICMBio, 2019) "the species of avifauna found in Flona are: nambu, white wings, rolinha, meadow rooster, song and thrush, as

well as various types of reptiles: snake and weaves, in addition to mammals such as armadillo, preá, deer Campeiro and Sagüi of the northeast".

The trails are used for the development of environmental education activities, but the activities and actions are still insufficient; they are also used for other purposes, such as forest monitoring and maintenance of power transmission lines. The connection of the Conservation Unit with environmental education and interpretation are very important factors for the use of trails as a more critical form of knowledge of reality. In Figure 2, we can see the landscapes found on the Açú national forest trail and in its Infrastructure area.

Figure 2 - Açú Flona



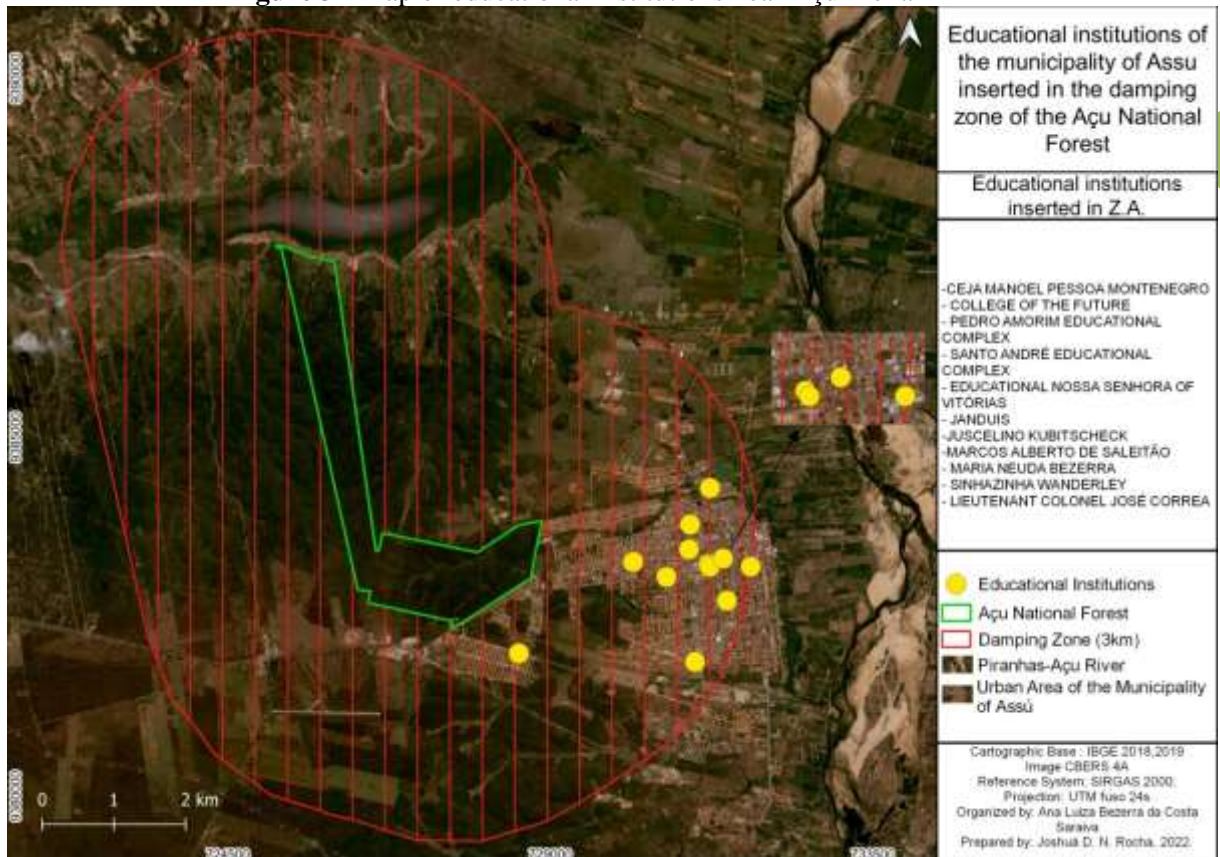
Source: Prepared by the author.

Legend: (a) infrastructure area of Açú Flona(April 2022); (b) ICMBio server in the ecological trail corridor (April 2022); (c; g) flora species present in Açú Flona(March 2020); (e) main track corridor (April 2022); (f) fruit of cacti (March 2020); (h) wild beans (March 2020); (i) facheiro (March 2020).

Two other important factors refer to its location near the urban network of the municipality of Assú and the significant number of educational institutions present in the region, which allows the containment of expenses in a possible displacement of students to the Conservation Unit, as well as encourages the use of this place by public and private elementary and secondary education institutions in the region, contributing to a greater exploration of the visitation potential of the Assú Conservation Unit. As we

can see in Figure 3, in the damping area of Açu Flona there are some elementary and secondary, public and private educational institutions.

Figure 3 - Map of educational institutions near Açu Flona



Source: Prepared by the author (2022).

In the Damping area of Flona are present 11 educational institutions between public and private. Such institutions present greater possibilities of planning and realization, containment of expenses for a possible visitation to the site. It is important to highlight that Açu Flona can receive visits not only from educational institutions in the city of Assú, but from any other city that is in its surroundings.

MATERIALS AND METHODS

The methodology for the production of the work consisted of the following steps:

1 Theoretical framework

Searches were made in books, scientific articles, publications in journals, UC documents, with the objective of better understanding the structural organization of the Conservation Units and their main characteristics.

2 Field visitation at Açu Flona

The field research is characterized as exploratory-descriptive with a direct observation and occurred through 4 visits to the Conservation Unit. At that moment, photos of the demarcated points and the filling out of field forms I, II and III present in the appendices (1, 2 and 3) of this investigation were taken. The observation was attended by approximately six subjects (author, research advisor, servers (guides) of ICMBio, visitor (Professor of Geography graduated from the University of the State of Rio Grande do Norte - UERN) was performed from reality, using the interpretation of the natural elements as well as the senses (vision, hearing, touch, etc.); and occurring during the day (morning and afternoon) from February to May, which is understood as a rainy season with alternation between sunny and cloudy times.

Moreover, the observation was carried out systematically and occurred in the ecological trails of Açú Flona, in a way directed to environmental education, using the scientific and structured techniques of Furlan (2011), which consists of detailed observations and evaluations that may contain notes, maps, collections, photographs, field records, interpretations, among other instruments. The points of interpretation will be based on the landscape view that presents characteristics and relationship with themes that involve the teaching of Geography.

The observation is also classified as non-participant, that is, there will be no presence of large groups or teams can be performed individually or with the presence of a maximum of six subjects the authors and advisors of the research and visitors who are even guides and interpreters of the UC. These subjects were invited to participate voluntarily based on an invitation made informally, a simple direction to be carried out. And the research included the use of resources such as cameras, field records and drone.

3 Selection and Interpretation of attractive points;

For the selection and interpretation of the attractive points of the trail, field forms I, II and III were used, presented in the appendices (1, 2 and 3) of this research, which were completed by the participants (authors). These forms were elaborated based on the IAPI method (Attractive Indicators of Interpretative Points), described according to the authors Magro and Freixêdas (1998) and adapted to the Flona path of Açú, obtaining the need to insert specific evaluations that are related to geography teaching. According to these authors, this IAPI method consists of characterization through five stages, they are:

Survey of potential points for interpretation;

At this stage, the natural, cultural and structural resources existing in the site were observed and then pre-selected the main points that present potential for interpretively, which can be used in the teaching of geography. This pre-selection occurred in the two study areas of this research, i.e.: the Infrastructure Zone (ZI) and the Forest Management Zone (ZMF), and within the ZMF the main focus studied was the ecological trails existing in this location. Therefore, potential points will be pre-selected.

Survey and selection of Indicators;

It was performed the following of photographic records, the interpretation of natural, cultural and structural resources, as well as the analysis through the score of greater interpretivity for the teaching of geography. In the table in Appendix 4, the most relevant indicators for the analysis of potential points will be presented.

Preparation of field records;

The field forms were elaborated based on the IAPI method and adapted to the Açú Flona, and the questions focused on interpretation with general and geographical aspects, which were called indicators. These files can be found in appendices 1, 2 and 3 at the end of this research. They were elaborated following the order of the indicators proposed in Table I (Appendix 1) and are divided into rows and columns forming a table, which presents the indicators and the top of each indicator is stipulated the weight (score) that it will be worth. In this case, the weight of the indicator varies from 1 to 3 points.

Form I evaluates general aspects, such as the period, visitation time and spaces found in Flona Açú's infrastructure, and presents a legend explaining what type of evaluation the indicators need and how they should be filled out. The indicators of form I should be filled in with X = presence; XX= large quantity.

The evaluation of the general aspects is very important so that we can analyze the amount of visiting people that the location of potential points can support and the time and period of greater interpretivity. It is important to emphasize that this evaluation proposes that these potential points be used as a stop for a possible visitation and observation in team or larger groups, such as students and teachers.

Form II assesses the presence of aspects related to geographic themes, such as stimulus (visual, audible or touch); vertical line (trees, trunks or shoots); horizontal line (thorny or undergrowth); soil (composting or erosive); water (visual or sound); animals (footprints, faeces or burrows); temperature (hot, pleasant with wind or without wind); plants (flowering, fruiting or foliage); luminosity (medium or high); the form also has explanatory legend and should be filled with X = presence; XX= large quantity; or XXX= predominance.

Form III evaluates the personal interpretation of each interpreter and, therefore, assists in the evaluation of the potential point, and there may be interpretations that were not addressed by the indicators of form I and II. This form will indicate through the score of the indicators the level of interpretivity of the potential points and the relationship with subjects addressed in the teaching of geography of elementary school final years.

Application of field sheets;

The application of the forms was performed by the subjects participating in the research by means of on-site visitation and occurred at different times of the day (morning or afternoon) and in different climatic periods (rainy season or drier period). The interpretations present in the forms are of a personal nature, and there may be differentiated interpretations of the same potential point.

Final selection

After filling out forms I and II by the participants, the forms were analyzed for their score, so each X filled in the field forms was replaced by the score presented above each indicator that ranges from 1 to 3. The intensity of each indicator could vary resulting in an index of higher or lower interpretation. The interpretative points and the trails that obtain a higher sum in score presented in field sheets I and II, as well as new

interpretations described in form III, were selected as main and official attractive points and main potential trails for Environmental Education and geography teaching.

Analysis and interpretation of the data.

The field forms were analyzed and interpreted by the author of the research and their results presented in the form of tables, and the sum of each indicator was performed according to its weight presented at the top of the forms. Therefore, the point that presents the highest score will be selected as the attractive point with the highest index of interpretive elements and, with a lower score, excluded.

Planning of the interpretative route of trails;

After the interpretative evaluation of the potential points of interpretivity for the teaching of geography, an interpretative script was planned as a proposal of interpretive trail in the Açú National Forest, presenting photos and interpretations of the attractive points of the trail, based on the planning of field classes (Furlan, 2011).

RESULT AND DISCUSSION

Selected Trails and Points

The two field visits were held in 2020 and 2022. During the visits were observed the area of Açú Flona and also field classes and lectures held on site, this as a means of obtaining information of the place from the servers and guides of ICMBio.

On April 5, 2022, from 07:00 to 12:00 (morning), a field visitation was held at Açú Flona and ecological trails existing in the Conservation Unit were analyzed through the interpretation of the author and reality, using the natural elements and the senses (vision, hearing, touch, etc.). This interpretation was performed on the trail as to its degree of difficulty, the type of trail, the extension, the elements for interpretivity and the visitation capacity.

It is important to highlight that the month of visitation comprises the rainy season, with alternation between sunny and cloudy times, presenting a well-closed vegetation with an important scenic beauty and some difficult passages.

Following the analysis criteria, two trails were visited. The first comprises the main trail, which has a round trip along the same path, characterized as a connecting trail; displays a significant amount of environmental interpretation points; and its route to the end can be considered a moderate walk, that is, good physical conditions are necessary for its realization, besides containing moderate ascents.

This trail features stretches with the presence of soft sand and other stretches of rolled pebbles, usually found near the riverbed. These characteristics make it difficult for disabled people to access, such as wheelchair users.

The walk on the main trail has stretches of high light, as well as low-light stretches closed by the forest; presents along its nice temperature walk and, dry and warm climate; besides having a very long extension of 7,500 meters, presenting the presence of water in its final route through the Piató Lagoon.

During the visitation of the first trail, we observed the existence of other smaller routes, starting from this same main trail, which will designate in small circular trails formed from a larger trail, however, the closed forest made it impossible to visit the field of

these adjacent trails. Therefore, the smaller trails showed inability to visit during the rainy season.

It is important to highlight that for the analysis of the main track, due to its long extension and moderate difficulty classification, it was necessary to use a car to carry out the route to the end, requested from the administrative management of the Conservation Unit. This journey was carried out with the presence of three subjects: author, advisor and server guide of ICMBio.

The second track analyzed comprises a trail of smaller length when compared to the main trail, its path presents the circular shape and it is located next to the main auditorium of the Conservation Unit, being close to the main trail. Due to the rainy season that was in the month of visitation, the closed vegetation made it impossible to access this second trail, as well as a more complete analysis. Thus, we request from the administrative management of the UC the possibility of reopening the trails to facilitate access. Thus, the second trail also presented the inability to visit during the rainy season.

Due to the inability to visit the second trail and adjacent trails formed from the main trail, we selected for the scripting study the first trail or main trail on its same round trip. However, it is worth mentioning that as its path to the end is characterized as moderate, we analyze the need to script only the most accessible part of the trail, thus characterizing this stretch studied as light walking, that is, anyone can perform the trail (young, elderly, children), without the need for many physical efforts and with little or no elevation.

Thus, the scripted area is equivalent to approximately 1,500 meters of the trail, starting the route at its entrance gate and ending in the area of eucalyptus species. Soon after selecting the trail to be scripted, we made a new visit to the main trail, demarcating the pre-selected attractive points with ribbons of vibrant colors and indicative numerals. To perform the demarcations, the selection proposal suggested earlier in this research was followed.

On April 5, 2022, from 14:00 to 17:00 (afternoon), the new route was visited. In this second moment of visitation, we walk only on the trail with the pre-selected demarcations and carry out the completion of the field forms referring to each attractive point and the taking of photos of each point. The visitation was attended by five subjects: author and advisor of the research, two servers (guides) of ICMBio and a visitor (Professor in Geography graduated from the State University of Rio Grande do Norte - UERN).

Approximately 4 main points and 1 rest area located in the infrastructure area of the Conservation Unit were analyzed through the field records. Table 1 below shows the result of the main points and rest area that were preselected.

Table 1 - Result of the main points and pre-selected rest areas

P1 Flona Entrance Gate	P4 Auditorium
P2 Medicinal Garden	P5 Rest área
P3 Administrative Zone	

Source: Prepared by the author (2022).

Table 2 - Result of pre-selected attraction points on the main track

P1 Trail Entrance Gate	P8 Facheiro and Power Transmission Pole
P2 Yellow Ipê	P9 Mandacaru
P3 Meteorological Shelter	P10 Catandubas Portal
P4 Catingueiro	P11 Power pole
P5 Animal drinking fountain	P12 Water tower
P6 Xiquexique	P13 Eucalyptus
P7 Cumaru and transmission line	

Source: Prepared by the author (2022).

Approximately 13 potential attractive points along the main trail were demarcated and analyzed through the field records. Table 2 above shows the results of the pre-selected attractive points in the main track; while the demarcated attractive points are shown in Figure 4 which appears next.

Figure 4 - Map of demarcated attractive points



Source: Prepared by the author (2022).

The demarcated attractive points, as we can see in Figure 4, form a round-trip connection track along the same route and have the following distances between them; from P1 to P2 0, 024 km; from P2 to P3 0, 043 km; from P3 to P4 0.030 km; from P4 to P5 0.026 km; from P5 to P6 0.013 km; from P6 to P7 0.065 km; from P7 to P8 0.039 km; from P8 to P9 0.037 km; from P9 to P10 0.082 km; from P10 to P11 0.134 km; from P11 to P12 0.107 km; from P12 to P13 0.896 km.

The records were analyzed and summed according to the weight of each indicator and as postulated by the authors Magro and Freixêdas (1998). The analyses of the main points and rest area of the Assú Conservation Unit obtained the results in Table 3.

Based on the data analyzed, we obtained the following scores: P1=15 (selected); P2=17 (selected); P3=19 (selected); P4=25 (selected); P5=26 (selected). In the analysis of the main points and the rest area, as we can observe there was no point excluded, due to the fact that the points presented constitute mandatory passage to the trail and there is no point with similar interpretations. Therefore, all points will be selected and the information analyzed will be used as subsidies for a future visitation.

Table 3- Result of The Main Points Indicators

Nº	Space (people)			Infrastructure.				Access point and rest				Track distance		Suggested theme to address								
	10	20	30	Bathroom	Accommodation.	Kitchen	Auditorium	Guardhouse	Plates	Panels	Signage	Content	Benches or chairs	+3 Meters	-3 meters	Relief	Environmental Impacts	Climate	Soil	Biodiversity	Water Resources	Conservation Unit
P1			X					X	X			X		X								X
P2			X							X		X			X		X			X		
P3			X	X	X	X	X						X	X								X
P4			X	X			X			X		X	X		X		X					X
P5			X						X	X	X	X		X	X	X	X		X			
Peso	1	2	3	3	2	2	2	2	3	3	3	3	3	1	2	3	3	3	3	3	3	3

Legend: (plug I main points and rest area) P Points analyzed; X gift

Source: Prepared by the author (2022).

From the analysis imposed in this research, we can realize that the physical infrastructure of the Assú Conservation Unit does not support the visitation of more than 30 people. The unit's infrastructure has 1 kitchen, lodgings, administrative structures, 4 bathrooms for public use, housing of the unit manager, as well as furniture for public use with 34 chairs present in an auditorium, 25 chairs and 1 plastic tables. The rest area has 3 wooden benches produced in a rustic way with tree trunks and some fixed panels containing poetic phrases that indirectly present information contents.

The forms were analyzed and their indicators added according to the weight of each presented below the analyzed theme. The analysis obtained the results that are shown in Table 4 and 5 - Result of indicators and potential points - sheet I and sheet II.

Table 4 - Results of Indicators and Potential Points - sheet I

N°	Scale		Distance from track bed		Position		Space (people)			Access point and rest					Suggested theme to address								
	1° Plan	Medium	Bottom +3 Meters	-3 Meters	Level	Inferior	Higher	10	20	30	Plates	Panels	Signage	Content	Banks and Chairs	Relief	Environmental Impacts	Climate	Soil	Biodiversity	Water Resources	Conservation Units	
P1	X			X	X					X							X						X
P2	X						X			X							X		X	X			X
P3			X	X	X				X								X	X					
P4		X			X		X			X							X		X	X			X
P5			X	X		X				X							X				X		X
P6			X	X			X			X							X		X	X			X
P7	X			X			X			X							X			X			X
P8			X	X			X			X						X				X			X
P9	X				X		X			X							X	X	X	X			X
P10	X			X			X			X							X	X		X			X
P11	X				X		X			X			X				X						
P12			X	X			X			X							X						X
P13			X	X			X			X							X		X	X			X
Peso	3	2	1	2	3	1	1	2	1	2	3	3	3	3	3	3	3	3	3	3	3	3	3

Legend: (fact Sheet I attractive points for interpretation)P Points analyzed; X gift

Source: Prepared by the author (2022).

Table 5 - Results of Indicators and Potential Points - sheet II

N°	Stimulus		Horizontal Line				Soil	Water		Animals			Temperature		Vertical Line			Plants				Luminosity		
	Visual	Sound	Tact	Prickly vegetation and roots	Undergrowth	Composting	Erosive	Visual	Sound	Footprints	Faeces	Dens	Hot	Nice with wind	Nice with wind	Trees	Trunks	Roots	Flowering	Fruiting	Foliage	Little	Average	Discharge
P1	XXX	XXX	XXX	XXX	XXX	XXX								XXX		XXX			XXX	XXX	XX			
P2	XXX			XXX	XXX	XXX								XX		XXX			XXX	XXX			XX	
P3	XXX	XXX	X	XXX	XXX	XXX								XX		XXX			XXX	XXX			XX	
P4	XXX	XXX	XX	XXX	XXX	XXX								XX		XXX			X	XXX				XXX
P5	XXX	XXX		XXX	XXX	XXX	X		XXX	XXX				XXX		XXX			XX	XXX				XXX
P6	XXX			XXX	XXX	XXX								XXX		XXX								XXX
P7	XXX			XXX	XXX	XXX									XXX	XXX			X	XXX				XXX
P8	XXX	XXX	X	XXX	XXX	XXX			X						XXX	XXX			X	XXX				XXX
P9	XXX	XXX	X	XXX	XXX	XXX					XXX			XXX		XXX			X	XXX				XXX
P10	XXX	XXX		XXX	XXX	XXX					X			XXX		XXX		XXX	X	XXX				XX
P11	X		X	XXX	XXX	XXX							XXX					XXX		XX				XXX
P12	XXX			XXX	XXX	XXX		XXX					XXX			XXX	XXX	XXX		XXX				XXX
P13	XXX	XXX		XXX	XXX	XXX	X		XXX	XXX	XXX				X		XXX			XXX				XXX
Peso	3	3	3	3	3	3	3	3	2	3	3	3	1	2	3	3	3	3	3	3	3	3	2	2

Legend: (fact Sheet II attractive points for interpretation) P point analyzed; X present; XX large presence; XXX predominance

Source: Prepared by the author (2022).

The analysis of the attractive points presented was performed through the interpretation of the author of the research. . Thus, it is worth mentioning that the same attractive point can present different interpretations, depending on the period visited (rainy or drier), the visiting hours (morning, afternoon or night) or even different observers.

The indicators were analyzed, as shown in Table 4 and Table 5, and obtained the following scores in the sum of sheet I and sheet II: P1=109 (selected); P2=91 (excluded); P3=98 (selected); P4=107 (selected); P5=109 (selected); P6=86 (excluded); P7=91 (excluded); P8=104 (selected); P9=116 (selected); P10=110 (selected); P11=74 (excluded); P12=101 (selected); P13=116 (selected).

As you can see above, the attractive points P2; P6; P7; P11 were excluded because they obtained a low score when compared to the other points. Thus, we conclude that they present few indicators of interpretivity for environmental education.

In general, the açu forest trail presented high visual, sound stimuli and attractive points that allow the observer's contact with the species, emphasizing that it is necessary to care for the thorny species found in high amounts during the trail walk. In the results of the ii forms, we can observe the predominant presence of undergrowth with shrubby formations of median heights with constant presence of cacti palmas. In addition, the area has a high presence of natural composting fertilizer, which is present in all species visited during the walk.

As a result of the field visitation occurs in a rainy season with alternating between sunny and cloudy times, the Native forest of the Açu Forest is well closed, and this characteristic allowed the predominance of pleasant temperatures, but without wind. Another important factor analyzed is the predominance of tree vegetation with the presence of very tall species and predominance of flowering strains and foliage presenting a scenic, sensational and characteristic beauty of the rainy season.

In the field survey carried out on the trail, we observed the lack of rest areas in its route, as well as the lack of information boards and contents and signs, lack of prohibition signs. Thus, the information on plates helps about species found in the region, endangered species, maps of location of the area. Therefore, these elements are important because it facilitates the transmission of knowledge and information on a trail.

Possibility of route for the Açu Flona Trail

The itinerary for the Açu Flona Trail will be planned based on a guided interpretation trail and the teacher will be the guiding monitor of the walk. Thus, it is important that this professional comes before the day of visitation, obtain information of the place, mark the possible days for the trail, next to the administrative sector of the Unit.

Performing a bibliographic research before going to the field is very important, because it allows better knowledge of the place to be studied, facilitating the planning of field activities. In addition to the bibliographic survey on the general aspects of the area (history, land use, etc.), thematic

maps (vegetation, soil, geological, geomorphological, etc.) and aerial photographs or satellite image should be searched. (FURLAN, 2011, p. 149)

In addition, it is necessary that the themes explained during the walk on the trail are addressed and presented to students previously in the classroom; as well as it is important that "The date of the realization or time when the observation will be made should count significant periods from the biological point of view of what will be observed, for example, the seasons, day cycle, tidal cycle, etc." (Furlan, 2011, p.150).

In addition, it is necessary to plan the transport of students to the Unit, the time available for visitation, and may not exceed the five times proposed in a classroom, also counting on the time of the school's journey to the place. Therefore, this only reinforces the imperative that there should be a prior visitation of the teacher to obtain the time spent in the school's journey to the Unit.

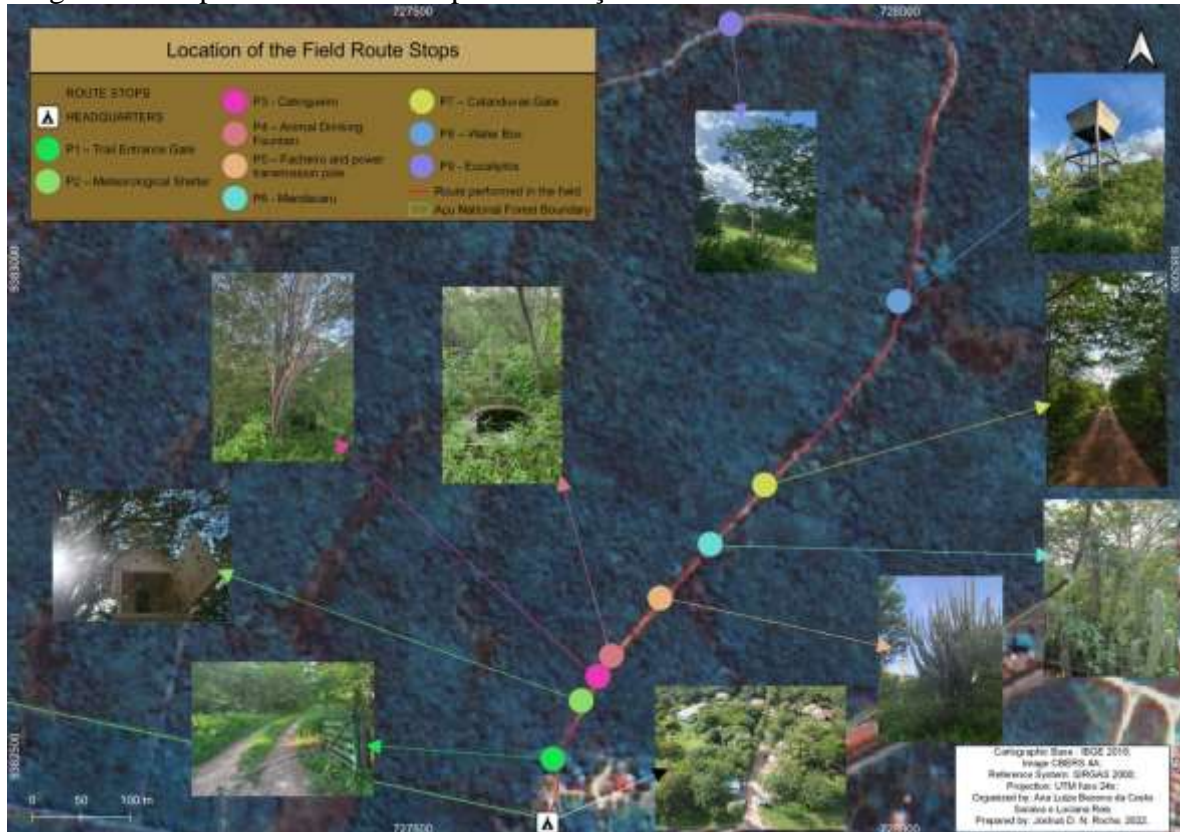
It is also up to this professional to identify the age and limitations of each visitor. If you have children under the age of 11 years of age or some disabled (wheelchair users, for example) new planning is important, with smaller routes, which do not exceed approximately two to three stops, since long routes for disabled wheelchair users are not recommended on the trail because it presents stretches with sand and rolled pebbles, thus making it difficult to get around the chairs.

Com base nas análises realizadas nesta pesquisa, será proposto um Roteiro de visitação para a Trilha Principal da Flona de Açú. O roteiro apresentará possíveis pontos de paradas nos quais é possível abordar explicações sobre temáticas da geografia, história da UC, assim como realizar atividades didáticas ao longo da caminhada.

According to the proposal of this study, three quick stops will be made at the main points of the UC infrastructure zone and nine stops during the trail walk, thus presenting a course of approximately 1,500 meters of walking. This itinerary will be intended for the age group of visitors from 11 to 50 years. The estimated visitation time will not exceed 4 hours, which is the time assigned to a school shift. And as the trail corridor in this rainy season is more closed by the native forest, we suggest that the amount of visitors on the trail does not exceed 30.

The walk of this course is considered light, without high levels of slope. As the trail selected for studies is classified as a link track, since its round trip is located in the same location, we plan from the way trip to the route didactic activities that involve interpretation, recreation and information, as shown in Figure 5 below.

Figure 5 - Map of the route of stops of the Açú Flona trail



Source: Prepared by the author (2022).

Visitation to UC (one-way route)

1° initial moment (UC Entrance Gate): this will be our entry point on the Flona de Açú trail; the teacher will explain at the initial moment what a Conservation Unit is, how it is divided; then we will walk to the administrative area, always observing the landscape of the vegetation.

During the walk on the trail, explanations of topics of geography discipline will be carried out, as well as recreational and didactic activities.

2° reception moment (UC Administrative Zone): at this second point, the professor will present the uc administrative manager's office, the kitchen, the lodgings, the medicinal garden, the auditorium, the bathrooms and water fountains until you reach the open rest area. On this occasion, he will always emphasize about the biodiversity of medicinal species found at the site and the different species that is endangered.

3° dialogue moment (Rest area): at this point in the open, we will all remain seated on the handmade benches or in the chairs, as the students/visitors prefer, and we will

dialogue about the Conservation Units, what the function of the National Forests, why before it was IBAMA and currently is SNUC, explain a little about ICMBio, the importance of the servers in that place, urban impacts on this area, among other themes that arise. It is important to highlight that we will take a walk on the ecological trail considering a course of 1,500 meters, with nine stops to explain subjects of geography, as well as for didactic activities along the walk. It is also necessary to dialogue about the importance of moisturizing, of wearing long clothes due to the presence of insects such as mutucas, which in this period are quite common on site, and the use of sunscreen hat and proper sneakers.

1^a one-way interpretive stop (Main Track Entrance Gate): at the entrance gate of the Trail, we will make a stop. Here, the UC teacher or guide can explain a little about how visitors should act while hiking the trail, introducing some bans and explaining the need not to kill the animals or break the native plants found along the route.

2^a one-way interpretive stop (Meteorological Shelter): at this stop, we will focus on the microclimate theme. Thus, the teacher should present the meteorological equipment, always emphasizing the curiosity and interpretation of the visitors; and should explain the presence of different microclimates, making comparisons between the forest and the urban, for example.

3^a one-way interpretive stop (Catingueiro): at this stop, we will emphasize the theme biodiversity (species of flora). In this perspective, the teacher should dialogue about the undergrowth, shrubby- tree found in the forest; and present the catingueira species found at the parade; as he should explain about other species found on the site, such as "marmeleiro, jurema, catingueiro, cumaru da caatinga, imburana, pereiro, ipê roxo and angico" (ICMBio, 2019).

4^a one-way interpretive stop (Animal drinking fountain): at this stop, we will focus on biodiversity (fauna species). The teacher should present the drinking fountain of the animals, as well as why the drinking fountain is surrounded, "the fence was placed due to wild animals such as the wild deer, for example, drinking water from the drinking fountain that was created for smaller animals" (informal interpretation of the ICMBio guide, 2022); should also dialogue about the smaller and larger animal species found on the site, such as "nambu sabiá, campina rooster, white wings, snakes, wets, peba, preá, deer campeiro and marmai of the northeast" (ICMBio, 2018).

5^a one-way interpretative stop (Facheiro and transmission pole): at this stop, we will highlight the themes of biodiversity and environmental impacts. In this sense, the teacher will present the facheiro species present at the parade and dialogue about the environmental impacts that the UC suffers due to the location of the forest being close to the urban network of the city of Assu. It is important that this stop presents signs with informative content, such as forest location maps, in order to facilitate for the visitor the interpretation of what is being explained; the presentation of the location of the

COSERN or CHESF energy transmission pole is a factor to be interpreted in this stop as one of the environmental impacts carried out through human activities.

6^a one-way interpretive stop (Mandacaru): at this stop, we will focus on biodiversity and soil conservation themes. The teacher will present a new species found in the forest, the mandacaru he can make a brief explanation about soil conservation, as well as the importance of conservation, soil types, the presence of sand and rolled pebbles. In this bias, it is extremely relevant that the teacher presents to visitors the different soil textures found in the trail walk, as well as the great presence of organic composting present in high predominance in this parade. Moreover, it is necessary to emphasize that the species of mandacaru has large thorns and is less than three meters from the bed of the trail, therefore, it is considerable that the teacher explains to visitors the care not to cause accidents.

7^a one-way interpretive stop (Catanduvás Portal): as the main trail of Açu Flona does not present any rest area in its route, this stop will become the rest area of visitors due to the point presenting a pleasant temperature, although there are no strong winds, and a medium luminosity due to the species of Catanduvás close the path of the trail; in addition to the high levels of scenic beauty of the landscape, in this case, the senses (vision, hearing and touch) of visitors can be stimulated by the teacher through the beautiful interpretations of nature.

8^a one-way interpretive stop (Water box): at this stop, we will focus on the themes of water resources and hydrological cycle. Thus, the teacher can present the water box present at the parade, which was built through human action; as well as explain about the proximity of Flona to the Piató lagoon, the importance of the UC for the protection and conservation of this water resource, the relevance of this lagoon to the community of Piató that is very close to this region, the need to build the water box to supply the communities surrounding the forest, dialogue on the movements and important stages of the hydrological cycle, among other aspects. It is important that, at this point of the walk, the teacher presents photos, maps of the Piató lagoon so that visitors can perform the interpretation, since we will not make the route of the trail until its end.

9^a one-way interpretive stop (Eucalyptus): at this stop, we will focus on biodiversity themes and Conservation Units. Here, the professor may present the eucalyptus species present in the parade to emphasize the protection and conservation of this endangered species by the UC, explain a little about the remaining communities that lived in the Forest and that are no longer in place. Similarly, it is valid that at this time there are information boards, maps, photographs and content about the precise location of the community in the Forest and what are the remaining communities. These information plates of both the species found and the most general information of the place is of great relevance to stimulate the interpretation of visitors.

In the visitation to the UC (route back on the trail), the stops will be the attraction points excluded and didactic activities that involve leisure, information and recreation will be carried out.

1ª stop back (Power Pole): the teacher will give each visitor a plaque in which on one side, he will have the symbology of one hand with his thumb up and, on the other side, the symbology of a hand with his thumb down. At this moment, questions will be asked about the preservation of Açu Flona and visitors should respond true with the symbology of the thumb up or false the symbology of the thumb down. This activity will have approximately six questions, presented below. Is it possible to live without destroying the environment?

1. Are conservation units spaces for environmental preservation?
2. Currently, there are traditional communities located in the interior or surrounding the Conservation Unit?
3. It is important to preserve the deforested areas?
4. Conservation Units are not effective for the protection of species?
5. I have as request support for the prevention and fire fighting in the Açu National Forest?

2ª stop back (Cumaru and transmission line):the teacher will ask visitors to split in pairs; from then on, he will ask questions for guessing purposes; the answers will be natural elements found during the walk on the trail; the pair who discover the answer should raise their hand and answer the divination.

3ª stop back (Purple Ipê):the teacher will ask visitors to make a circle, close their eyes and, from the total silence, perceive the sound of the environment and identify what the present sound is.

4º final moment (Auditorium): This will be our last stop. The teacher will direct visitors to the auditorium, presenting the toilets and the fountain of the place; then, everyone will follow in a quick explanation of the visitation in the auditorium, as well as perform their interpretation of the trail by performing a drawing, a sentence or text, as students/visitors prefer.

CONCLUSIONS

The trails of the Açu National Forest were analyzed for certain characteristics that would enable its use as a means of interpretative visitation. In this sense, the main trail was selected for scripting, due to the trail already presenting works related to environmental education and other smaller and circular trails presenting impossibility of access.

Even though the main trail has a link track classification with a long route, it was possible to script 1500 meters of the trail, covering a route of round-trip activities.

Moreover, the stretch of the trail chosen for the scripting has few slopes and can be carried out by a larger age group of visitors.

The previous plan for the scripting was carried out through the selection of the points of greatest attractiveness found in the place. Thus, through the IAPI Method, four main points were selected in the infrastructure area, a rest area and nine attractive points along the trail walk. Given the presence of points with great landscape and interpretation similarity, the results of the IAPI method were satisfactory for the selection of attractive points, as well as for differentiating possible similar interpretations, emphasizing potential characteristics and presenting unique information of the observed location.

From the selected points, a visitation route was planned, presenting the round trip of the trail and the interpretation of each attractive point related to other factors of geography. On the return route, playful and didactic activities were presented that can possibly be performed on new trails. The activities proposed in the trail walk route aim to involve knowledge, information, interpretation, life experiences, recreation and leisure, and it should be emphasized that, at the time of the activities, other themes or doubts may arise with visitors. In this case, the teacher will be the visitation monitor and can assist with the questions.

In view of the analyses carried out during the research, we emphasize the satisfactory result of the use of Açú Flona main trail as a means of interpretation and environmental education, emphasizing the importance of opening circular trails with less long paths for possible scripting planning, which include smaller age groups of visitors. Other factors analyzed that hinder possible visits are the lack of signs and information signs about the trails, the native species found in the route, the lack of rest areas on the trail walk, the difficult access for disabled wheelchair users and the lack of specific monitors or guides focused on environmental education.

An important suggestion regarding the lack of signs on site is that the indications can be made with rustic and accessible materials of the locality and that they can be elaborated by the visitors themselves, through didactic activities carried out in partnership with the educational institutions and the Conservation Unit.

Therefore, this research presented satisfactory results, contributing with knowledge about the Açú National Forest Trails; as well as provided possible information for unit visitation planning.

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