Serra Da Penanduba: A Biogeographical Study focused on Thebrazilian Semi-Arid Dry Forest

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Abstract

This work seeks to present a biogeographically study aiming the proposition of a wildlife corridor in the Serra da Penanduba area (Ceará, Brazil), as an important alternative to mitigate the isolation effects among the conservation units and, mostly, the environmental impacts on this region. To this end, this work is divided into three parts: the first is a previously established planning conduction (laboratory), the second is the performing of fieldwork (observation, collection and herbarizing) and the third is the produced data analysis. The main results shows that Serra da Penanduba presents, in its slopes, a preserved vegetation of Arboreal Caatinga in its top, typical species of Dry Forests besides being a transition between the Caatinga Enclaves Moist Forest and the Caatinga of Sertaneja Surface, characterizing itself as a propitious environment to the flora conservation, to the fauna protection and to the proposition of a wildlife corridor.

Keywords: Dry Forest; Biogeographical Study; Wildlife Corridor.

1.Introduction

The Brazilian Caatingas Domain, also known as the Brazilian Northeast Semi-arid Interplanaltic Depressions, outstands because it is one of the three semiarid spaces amid the predominantly humid South American continent. As described by Ab'Saber (2003), it presents different relief shapes, types of soils, climatic and hydrological conditions and unique vegetation, factors which are determinant in the integrality of landscapes that make up the *sertão*. It is a region expressed by Interplanaltic Depressions reduced to real erosion plains and the vast Sertaneja Surfaces that surround some specific elevations, such as the humid and dry residual reliefs (massifs, ridges and inselbergs), the result of pediplanation centered "[....] in the type of regional semi-arid climate, very hot and seasonally dry, which projects radical derivatives to the world of waters, the organic world of caatingas and the socioeconomic world of the *sertão* dwellers" (AB'SABER, op cit, p.85). While discussing this domain characteristics, Velloso (2002) cleared up the wrong fact of the existence of a landscape uniformity as previously presented by many people, exposing the astonishing environment diversity and delivering a mosaic of the types of vegetation, usually deciduous, xerophile and at times thorny, changing according to the different types of soil and the water availability in a semi-arid framework.

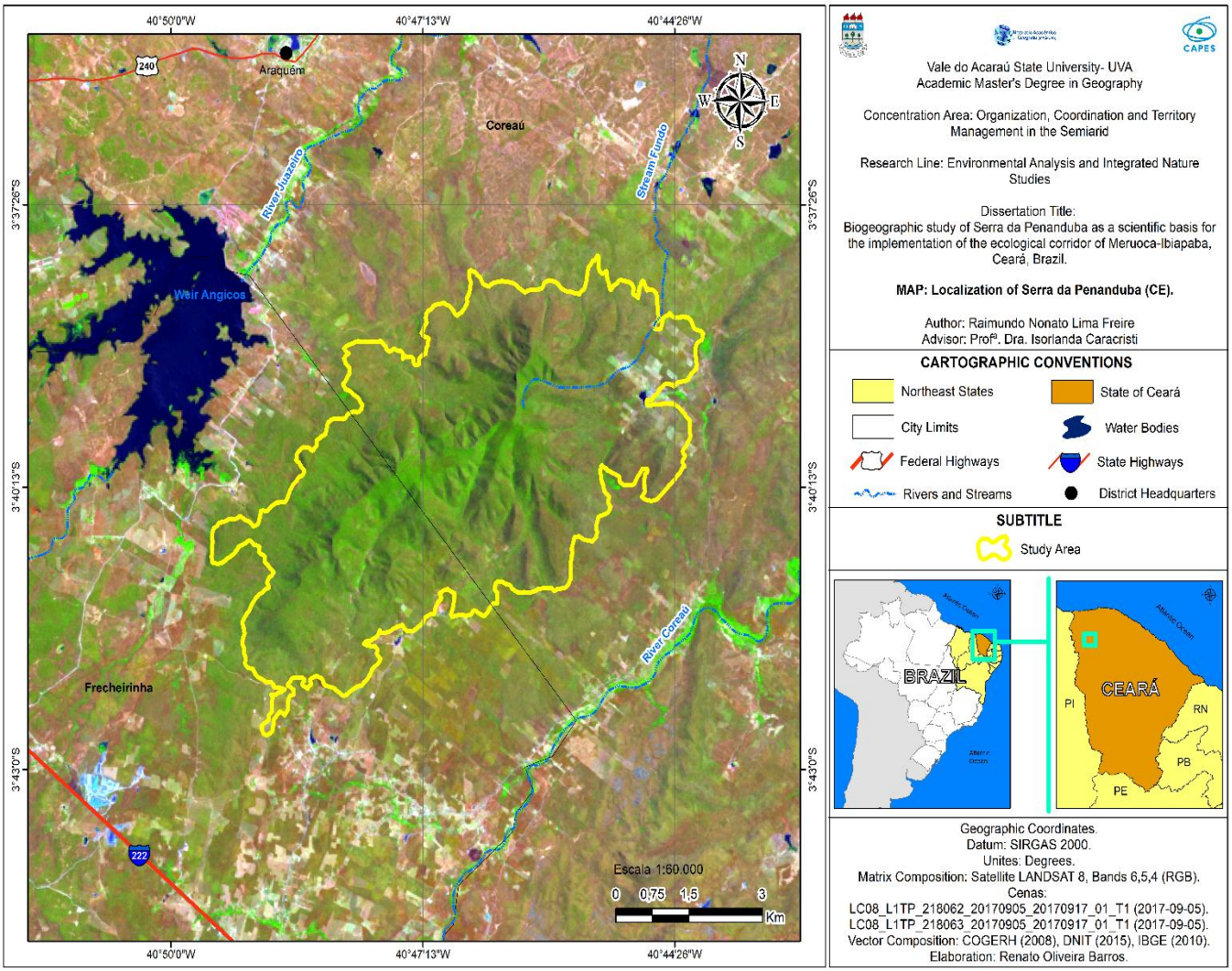
Most of the wrong ideas about the Caatingas, according to Ganem (2017), are due to the aspects emphasized by many researchers, which are the lack of information about their biodiversity with the inclusion of recent and detailed cartographical data of their plant cover, mainly the vegetational and faunal identification and classification. The very use of the term in the plural (Caatingas) reflects and justifies their complexity and refers to the importance of specific studies about this domain since this erroneous understanding persists (Tabarelli and Vicente, 2002) that the Brazilian semi-arid region is claimed to be an environment poor in endemic species with a low conservation value and is inserted in an ecosystem that is considered "fragile" and "vulnerable" in face of the current socio-economic system of the land use and occupation. Actually, what exists is different natural organization patterns that maintain themselves through the recursive relations dynamism internal and external to the system (CARACRISTI, 2007). Regarding this process, Conty & Furlan (2009) explain that just like in other spaces, the Brazilian Caatingas has been intensively degraded over the last decades and the rest of the vegetation is now less than 50% of the original area and less than 1% of this remnant is under protection by conservation units (CUs).In short, the vegetation becomes an essential factor to understand the landscape dynamism from the human scale point of view.

By analyzing the vegetation, it is possible to establish which have been the forms/types and intensities of environmental impacts over the history, once productive activities usually starts from a direct action addressed to vegetation, mostly by deforestation (GONÇALVES, 2017). Therefore, for establishing sustainable socio-environmental terms of use and occupation is necessary, first and foremost, to establish impact mitigation strategies suitable to the studied reality considering the processes and social and natural agents that are part of the dynamism and the biogeographically composition of this complex of semi-arid landscapes, as it is the case of the Dry Forests (a term proposed by Souza (2000) and used according to the geoenvironmental subdivision to the state of Ceará) which make up the Ceará northwestern region. In geographical science, in general, the biogeography scientifical contributions aids in the conduction of environmental preservation and conservation works/proposals, consequently providing, according to Camargo (2000), the study of distribution, adaptation and explanation of living organisms, whether they are animals or plants in geographical space. In this context, this work seeks to analyze and clarify the importance of creating wildlife corridors in the Ceará northwestern region (Brazil), contributing with knowledge about the wealth of caatinga's species, the strengthening of conservation units and conservation areas in the region, which would fight against the mitigation of anthropogenic action effects, mainly against the deforestation of areas that connect the Meruoca and Ibiapaba Coating Enclaves Moist Forests, being the Penanduba Dry Forest the principal element of biogeographically connection and dispersion.

2. Material and Methods

2.1. Location and characterization of the studied area

The Serra da Penanduba is placed in the top course of the Coreaú river hydrographical basin, in the Ceará northwestern region, more specifically in the boundary that divides the municipalities of Frecheirinha and Coreaú (Map 1). Based on the field measures carried by Costa (2015), the area reaches a maximum altitude of 650 m above the sea level and extends over a 42 km² area.



Map 1- The studied area location map. Source: Freire, Barros (2019).

Penanduba acts like a superficial water disperser and a local aquifer, where is found plenty of temporary springs responsible for draining creeks that pour their waters in the Coreaú and Juazeiro rivers, two important hydric resources for their own regions, besides containing sub-perennial springs in its slopes forming small flooded areas which work as moisture sources. According to Costa (2015), there is a predominance of two types of soil in the area, namely Litholic Neosols and Red-Yellow Argisols, which are both eutrophic. The area is geologically framed inside the Trapiá formation, which belongs to the Ubajara group, generalized by conglomerate quartzites and fine to medium metarenits (CPRM, 2018), Which are incipiently metamorphosed sedimentary rocks whose remaining grains are preserved not reaching total recrystallization of their primitive crystals. Furthermore, as Ponte has already recalled (1979), the Serra da Penanduba presents a distinct morphological panorama of its surrounds, through a mountainous relief with steep slopes and a medium-sized dense vegetation cover. As for its climatic and biogeographically aspects (fauna and flora), they are going to be soon discussed in the results and discussion section of this research.

According to some authors such as Souza (2000), Penanduba is geomorphologically classified as a residual or quartzitic crest and in a more recent characterization, it is a resistant residual relief with more expressivity in crystalline rocks of the kind *inselgeberge* (CAVALCANTE; BASTOS, 2019).

2.2. Methodology: procedures and techniques

The principal methodological steps traced so this research could be developed were first the theoretical basement and enhancement, then fieldwork activities and, finally, the analysis of collected data and results. Therefore, the methodological procedures were divided into:

2.2.1. Laboratory or pre-field stage

Research-related information was collected, selected and recorded, in principle, scientific articles, annals and governmental documents, both in terms of theoretical and methodological foundations and specific knowledge about the area. For the specific analysis of the local flora, the biogeography techniques used by Furlan (2005) proved essential themselves, and the classification proposed by Figueiredo (1997) was taken into account to characterize it. For the fauna, only citations of readings presented by authors who studied the area or something alike, such as the authors Costa (2015) and Albuquerque (2015), were addressed.The elaboration of the area delimitation map was performed using the tools of the free software program QGIS (version 2.8.7), adopting 150 mas the basic delimiting altimetric coordinate, since it corresponds to the beginning of the slope of Serra da Penanduba. Subsequently, the processing of shapefile images was performed in the form of a Digital Elevation Model (DEM), acquired at theInstituteNational de Pesquisas Avançadas(INPE) (National Institute for Advanced Researches), with contour lines of 30 meters, providing the appropriate altimetric detailing for biogeographical studies. Shapefile format files were acquiredfrom the website of the following organs: Instituto Brasileiro de Geografia e Estatística (IBGE) (Brazilian Institute of Geography and Statistics) and the Instituto de Pesquisa e Estratégia Econômica do Ceará (IPECE) (Research and Economic Strategy Institute of Ceará).

2.2.2.Fieldwork

The floristic survey, in order to characterize and know the vegetation present in the mountain range, was performed based on altimetric parameters, a sampling technique without area, where a line (a 60 meters measuring tape) was stretched out in the vegetation forming a catena (three catenas were sampled in the area) with a distance of 200 m altitude from one to the other, also, all samples of individuals who touched the line or positioned themselves near it were collected.Thus, the collections were sequentially made at the altimetric coordinates of 200 m, 400 m and 600 m (in the latter, the species that were visually different from those that were found throughout the entire extension of the mountain were collected at random). The definition of these points was established according to the accessibility in the mountain range and for being the region where there are changes in temperature parameters since every 200 meters occurs an increase of about 1°C, a fact that produces biogeographical diversification (Figure 1).

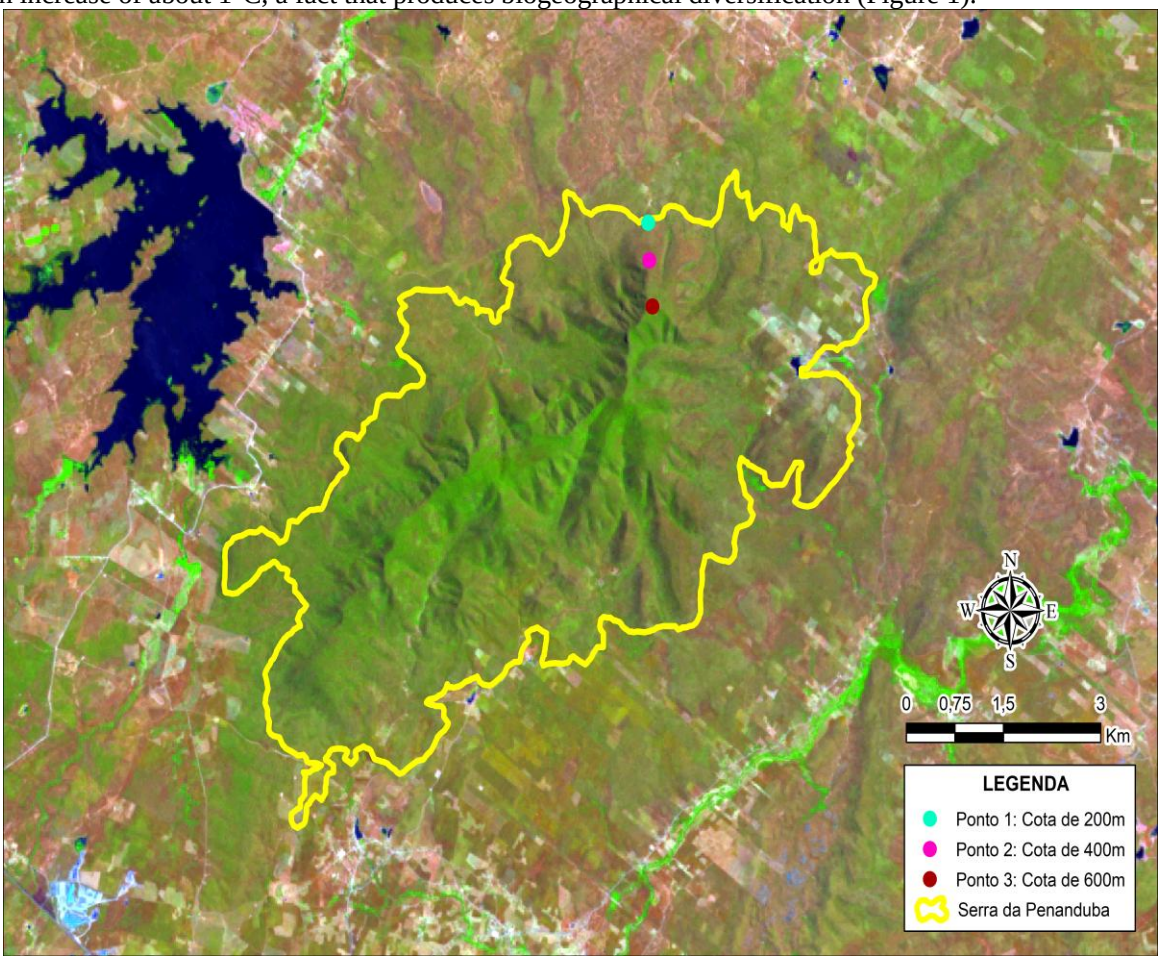


Figure 1- Identification of points and coordinates used in the collection. Source: Freire, Barros (2019).

For this purpose, the materials used in the fieldwork were pruning shears and a press made of cardboard and newspaper sheets, arranged in an interspersed manner and tied with string. In addition, photographs of the area and the use of GPS by the researcher were used as aid.

2.2.3.Post-field data processing

As scientific evidences, the collected species were treated, cataloged and stored in the Prof. Francisco José de Abreu Matos herbarium at Universidade Estadual Vale do Acaraú – UVA, taking a sample of each different species in order to identify the species present in the area under consideration and make a comparison with species found in other nearby mountains, the rest being counted only for the purpose of knowledge about their prevalence.

3.Results and Discussion

The Serra da Penanduba is located between two areas with fragments of Atlantic Forest vegetation and conservation units – Serra da Meruoca and Serra da Ibiapaba (Figure 2) - and is an area of vegetational exception because it has preserved Arboreal Caatinga remnants and because it shelters endangered species such as the primate Maranhão red-handed howler (*Alouatta ululata,* Elliot, 1912- Figura 3a) and the mountain lion or puma (*Puma concolor*, Linnaeus,1771- Figura 3b).

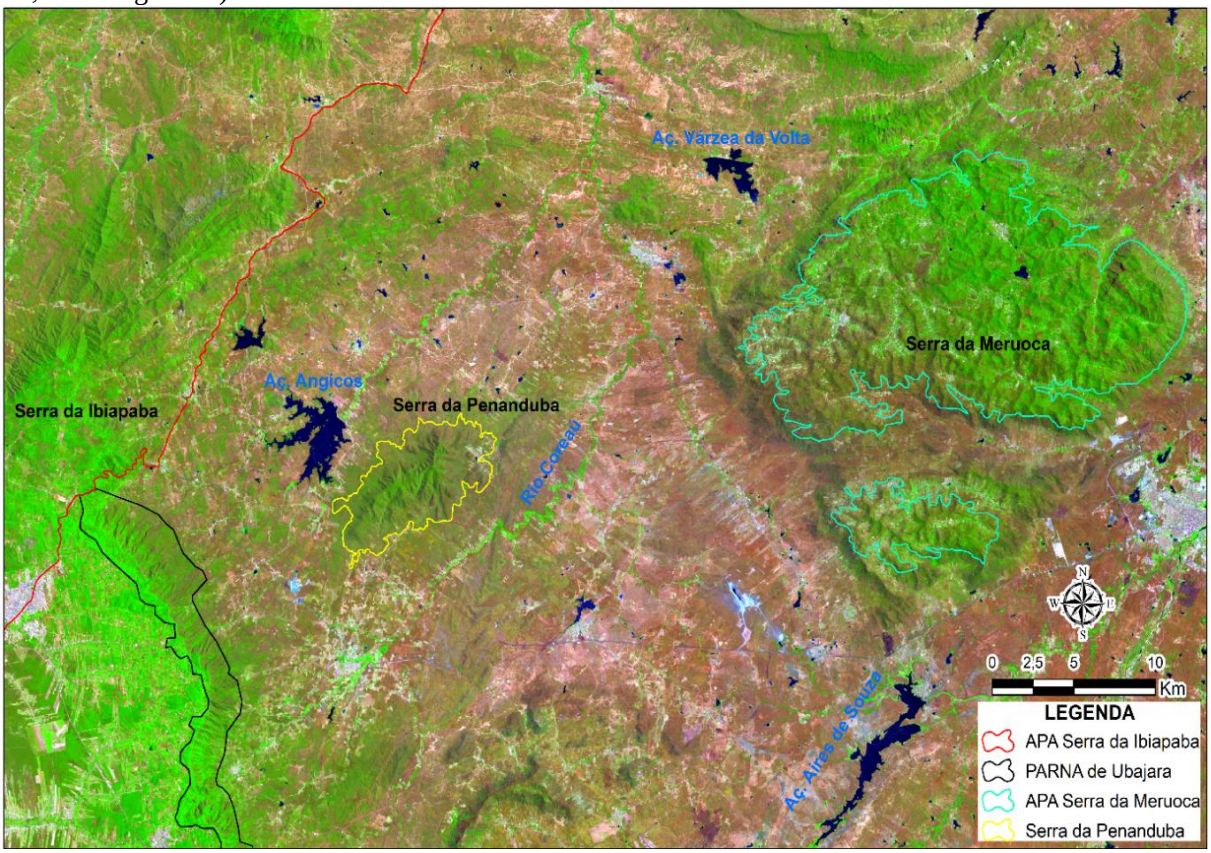


Figure 2- Overview of the area for the wildlife corridor proposal. Source, FREIRE, BARROS (2019)

By presenting itself as a relief characteristic of a residual crest with elongated slopes and sharp tops, there are several areas difficult to be accessed and this factor derailed the development of agricultural practices, which promoted and justifies the permanence, throughout the year, of the primate Maranhão red-handed howler (*Alouatta ululata*, Elliot, 1912) that finds food amidst the conserved arboreous vegetation with little human interference. It was not possible to obtain an image of this primate in this research, it was only visualized in the middle of the large-sized and dense forest, making it difficult to photograph it.

Figure 3- Species of fauna present in Serra da Penanduba. a. Guariba of the caatinga; b. Mountain lion or puma Source: a. Filho(2016); b.Azevedo et al., (2013).

In focus, Souza & Oliveira; Tabarelli & Santos, 2004 apud Filho (2016) collaborate by pointing out that, in the state of Ceará, the Maranhão red-handed howlers are more restricted to areas of humid enclaves since they present average temperatures below those recorded on the Sertaneja Surface and Dry Forests that have, in their majority, altimetry below 500 m altitude (Figure 4).

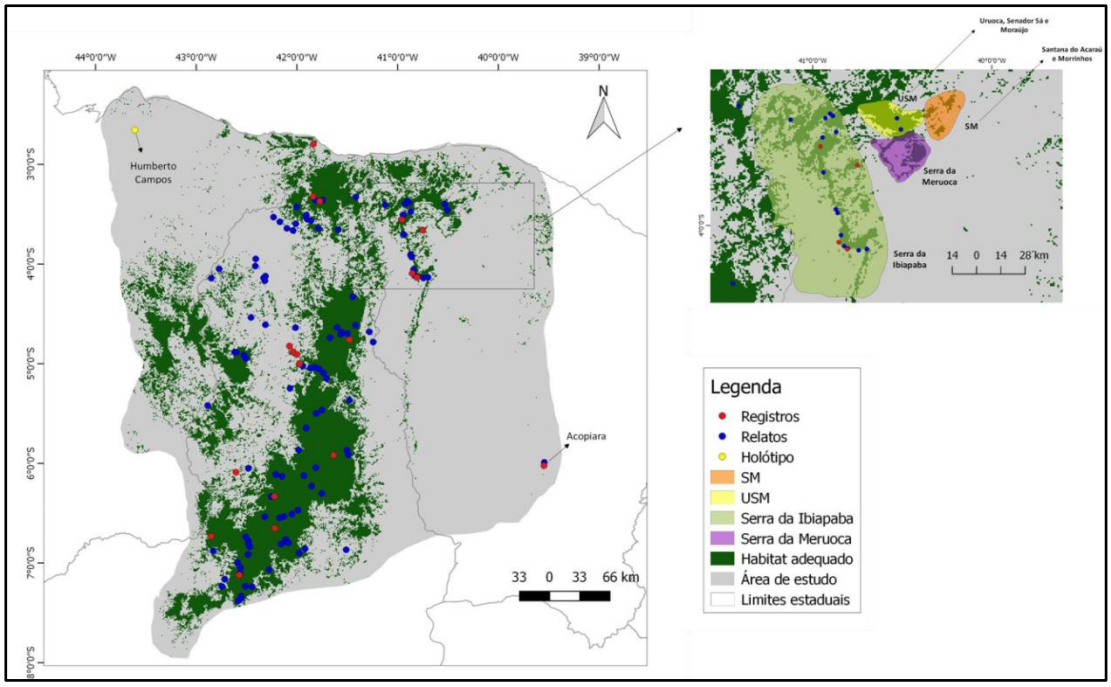


Figure 4- Map of points of record and occurrence of the species *alouatta ululata* in the states of Maranhão, Piauí and Ceará with focus on the northwest region of the state of Ceará, Brazil. Source: FILHO (2016).

Another highlight given to Serra da Penanduba is the distribution of the flora along its slopes, with an expressive visual differentiation when comparing the lowest sectors with the top. In the summit areas and in altimetric elevations higher than 500 m of altitude, the topo-climatic conditions are differentiated, mainly by a low thermal sensation, exhibiting the most dense presence of arboreous vegetation.In this regard, Costa (2015), in his fieldwork, analyzes the comparisons of the temperature between the top of the mountain range and the nearest district, Araquém, which is considered to be on a Sertaneja Surface.It is impossible to disagree with Costa (2015) when he points out that the first aspect to be considered in the analysis of the data concerns the diurnal variations in temperature between the top of Serra da Penanduba (above 500m) and Araquém (Sertaneja Surface).

According to the data obtained, there was a slight easing of the temperature recorded at the top of the mountain, especially in the daytime period; where, according to the data from this station, the temperature range was 11ºC, with a maximum of 33ºC and a minimum of 22ºC. In the station located in the district of Araquém (Let's not go into the questioning of the values, although we consider very high, especially the records of 44°C and 48°C!), there was an extrapolation of data, being necessary to verify the conditions of use of equipments, but it is necessary to record here the data collected in the Sobral meteorological station by the Instituto Nacional de Meteorologia (INMET) (National Institute of Meteorology) on that same date. In the Sobral station, which is the closest to the area and is at the same altitudes and environmental conditions covering a radius of 100 km of coverage (parameters that cover the district of Araquém), for this date the maximum was 36.3ºC. Even based on INMET data, the diurnal difference remains significant.

It can be noted that there is an expressive thermal variation, i.e., the Serra conditions a different environment from its surroundings. Meanwhile, the data of the nocturnal values are closer for both locations, with less difference in temperatures.When presenting studies of the flora, this same author affirms that in the area were found specimens of arboreal size such as Braúna (*Schinopsis brasiliensis*), Angico (*Anadenanthera colubrina*), Courbaril (*Hymenaea courbaril*), Aroeira-do-sertão (*Myracrodruon urundeuva*), Argentine cedar (*Cedrela fissilis*), Barriguda(*Ceiba glaziovii*), Sabiá (*Mimosa caesalpinifolia*) and Pau D'Arco Roxo (*Tabebubia impetiginosa*). And the most intriguing about it is that there are species of other biomes such as Little Guava (*Psidium sartorianum*), which according to the author is typical of the Cerrado.

In the process of field verification of bibliographic information, it was sought to identify the plant species found in the area, and for this, the scientific evidence was used as a basis by means of a direct collection according to the technique previously indicated in the methodology section. The identification and cataloging in the laboratory followed the UVA's herbarium methodology. 58 individuals were counted in the collections around 200 m altitude, outstanding the specimens of Mofumbo (*Combretum leprosum* Mart), Pau-d'arco amarelo(*Handroanthus serratifolius* Vahl S.O.Grose), Pereiro (*Aspidosperma pyrifolium* Mart), Little Guava (*Psidium sartorianum*), Angico (*Anadenanthera macrocarpa* (Benth.) Brenan), Sabiá (*Mimosa caesalpiniifolia* Benth), Feijão Bravo (*Cynophalla flexuosa* L. J.Presl) and Juazeiro (*Ziziphus joazeiro* Mart).As for the 400 m altitude, 68 individuals were recorded distributed among the species of Maniva-brava (*Manihot sp*), Mofumbo-roxo (*Combretum leprosum* Mart), Melosa (*Dicliptera mucronifolia* Nees), Melosa II (*Ruellia cf. aspérula*), Pereiro (*Aspidosperma pyrifolium* Mart), Sabiá (*Mimosa caesalpiniifolia* Benth), Feijão Bravo (*Cynophalla flexuosa* L. J. Presl) and Amargoso (*Machaerium sp*.).At last, in the 600 m elevation, the predominance is of large preserved trees with a strong presence of plant species that work as though they were a biological moisture indicator. 20 of these species were collected (Table 1) and 12 of them have already been cataloged by the herbarium, among them the Rabuja or Rabugem (*Platymiscium floribundum* Vogel), Marmeleiro (*Croton sonderianus*), Cipaúba (*Combretum glaucocarpum* Mart), Pata-de-vaca (*Bauhinia ungulata* L.), unha-de-gato*(Dolichandra unguis-cati* (L.) L.G. Lohmann) and Feijão Bravo (*Cynophalla flexuosa* L. J. Presl).

Table 1: List of the flora of Serra da Penanduba – Current stage of the research..

Family	Species	Popular Name	Occurrence
Fabaceae	*Platymiscium floribundum* Vogel	Rabugem or rabuja	Endemic to Brazil, common in Piauí, Ceará, Pernambuco and Bahia. There are records in the northwestern region of Ceará in Serra das Matas, in Ibiapaba Glint and in Serra da Meruoca.
Euphorbiaceae	*Croton sonderianus*	Marmeleiro	__
Fabaceae	*Poiretia punctata* (Willd.) Desv.	__	Not endemic to Brazil, common in the North, Northeast, Midwest and Southeast. In Ceará, samples of it were collected in Serra das Matas, Serra da Meruoca and in the region of Cariri.
Combretaceae	*Combretum glaucocarpum* Mart.	Cipaúba	Not endemic to Brazil but exclusive from South America, found in Peru, Bolivia and Brazil. There are records in Serra da Meruoca.
Fabaceae	*Bauhinia ungulata* L.	Pata-de-vaca	Widely distributed in Ceará, occurring from the coast to Cariri, in an environment of Tableland Forest, Caatinga, Cerrado and Seasonal Tropical Forest. In the northwest region, it was registered in Ibiapaba Glint and Serra da Meruoca.

Acanthaceae	*Justicia aequilabris* (Nees) Lindau	__	Widely distributed in Ceará, going from the coast to the South and Southwest of the state, in Caatinga and Seasonal Tropical Forest. In the northwestern region, it was found in Ibiapaba Plateau, Pacujá, Granja and Serra das Almas in Crateús.
Acanthaceae	*Pseuderanthemum congestum* (S. Moore) Wassh.	__	Not endemic to Brazil, occurring in the North, Northeast and Midwest regions. In Ceará, there are few registers of this species, more specifically in Serra da Meruoca and Ibiapaba Glint.
Capparaceae	*Cynophalla flexuosa* (L.) J. Presl	Feijão-bravo	Species widely distributed around Brazil in all regions. In Ceará, it occurs from the coast to Cariri. In the northwestern region of the state, there are registers in Serra da Meruoca, Sobral and Santa Quitéria, with vegetation typical of Caatinga, Arboreal Caatinga and Seasonal Tropical Forest.
Poaceae		Capim-de-mata	__
Malvaceae	*Byttneria fernandesii* Cristóbal	__	Endemic species to Ceará, with records only in the northwestern region, in Serra da Meruoca, Santa Quitéria and Itatira, with vegetation typical of Caatinga and Seasonal Tropical Forest.
Bignoniaceae	-*Dolichandra unguis-cati* (L.) L.G. Lohmann	Unha-de-gato	Species widely distributed around Brazil, yet not endemic. In Ceará, there are registers on the coast, Chapada do Araripe and Ibiapaba Plateau, with vegetation typical of Tableland Forest, Caatinga and Seasonal Tropical Forest.
Bignoniaceae	*Fridericia s.it*	__	Quite common in the Seasonal Tropical Forest and in Caatinga.

Source: Freire, Caracristi (2019).

The *Platymiscium floribundum* Vogel, known as Rabugem, is endemic to Brazil according to the research on the website of Lista de Espécies da Flora do Brasil (2019) (List of Brazilian Flora Species), and it is possible to be found in the states of Piauí, Ceará, Pernambuco and Bahia. According to Virtual Herbarium – REFLORA, some specimens of this species were found all in the same altimetric coordinates in Serra das Matas, Meruoca and Ibiapaba, which are in the northwestern region of the state of Ceará.Another species worthy of attention is the *Byttneria fernandesii* Cristóbal from the Malvaceae family, also endemic to Brazil, with records only in the northwestern region of Ceará, in Serra da Meruoca, Santa Quitéria and Itatira, according to data from the Rede de Catálogos Polínicos (2018) (Pollinic Catalogue Network).From the current results, it was verified that some identified species are common and found at the same altitudes in other nearby mountains, such as in Serra da Meruoca and Ibiapaba, presenting, besides the remnants of the Arboreal Caatinga, a vegetation similar to the one seen in Dry Forest or typical flora of the Tropical Rainforest.Therefore, based both on literature research (Costa 2015 and Albuquerque, 2015), as well as on fieldwork and the herbarium analyses, four classes of vegetation were identified in the area under consideration. Based on the Figueiredo's classification (1997), what is seen is the presence of species of the Open Shrubby Caatinga (Figure 5a), the Arboreal Thorny Caatinga Tropical Forest (Figure 5b), the Riparian Mixed Dicotyledons and Palm Trees Riparian Forest (Figure 5c) and the Dry Tropical Rainforest (Figure 5d).

Figure 5- phytoecological unitsfound in Serra da Penanduba. Source: FREIRE (2019).

According to Gomes et al (2011), the Dry Tropical Rainforest has characteristics of transition between the Tropical Rainforest and the Sertaneja Caatingas. Regionally, it occupies the low and middle levels of Meruoca Residual Massif and Ibiapaba Glint, ranging in altitude between 330 and 500 meters. On slopes higher than 25º, it has a greater size when compared to the Arboreal Caatinga, even in shallow soil areas.In Fernandes' analysis (1998), the main species that characterize the Dry Forest are: the Pau d'arco (*Tabebuia serratifolia*), Angico (*Anadenanthera macrocarpa*), Imburana (*Amburana cearensis*), Aroeira (*Myracrodruon urundeva*), Pitomba (*Talisia esculenta*), and Barriguda (*Ceiba glaziovii*).Regarding the fauna present in and around this mountain, the data collected by the environmental survey conducted by COGERH (2011) on the Angicos dam, a water resource near Serra da Penanduba, where the dominant animals are birds and, out of the invertebrates, the insects stand out. In ornithology, the following species stand out: *Crotophaga ani* (smooth-billed ani); *Reinardas quammta* (swallow); *Pitangus sulphuratus* (great kiskadee); *Volatinia jacarina* (blue-black grassquit); *Molothrus bonariensis* (shiny cowbird); *Columbina talpacoti* (ruddy ground dove); *Spinus yarrellii* (yellow-faced siskin);*Crypturellus noctivagus* (yellow-legged tinamou).

Regarding the mammals, reptiles and amphibians, terrestrial species are the ones representing them. Amongst the mammals are:*Mus musculus* (house mouse); *Euphractus sexcinctus* (six-banded armadillo); *Callithrix jacchus* (common marmoset) etc. Amongst the reptiles are:*Tropidurus torquatus* (amazon lava lizard); *Tupinanbis teguixin* (gold tegu); *Iguanaiguana* (green iguana); *Oxybelis sp.* (vine snake); *Cleria sp.* (mussurana); *Bothrops erytrhomelas* (Caatinga lancehead), etc.Due to its difficult access with a steep slope and the highest local altitude, Serra da Penanduba is unsuitable for agricultural activities, making of it an important area for the vegetation and preservation conservation of species of fauna in the region, a spatially central element important for the implementation of an wildlife corridors.

It is essential to stress the necessity for scientific studies concerning the proposal of wildlife corridors, as determined by CONAMA Resolution No. 09/96 (CONAMA, 1996), which established itself as an alternative to mitigate the effects of the conservation units isolation and allow the transition of the fauna between these units and natural areas, and also by the law of the Sistema Nacional de Unidades de Conservação (UNSC) (National System of Conservation Units), No. 9.985/00 (BRAZIL, 2000), which updates this definition by linking its concept to the territorial zones intended for

connectivity.Therefore, the wildlife corridors serve to increase the size and survival chances of different species populations, in addition to enabling recolonization with populations of locally reduced species and also allowing the reduction of pressure on the surroundings of protected areas (ARRUDA, 2003). In Brito's point of view (2012), the isolation of the protected areas of the forest fragments within the buffer zones hinders the genetic flow among populations because they are isolated from other areas of forest remnants within a radius of ten kilometers since the connection between the protected and natural areas increases the chances for survival of the species sheltered. If the conservation units are isolated by forest fragments, the chances for survival of the species decrease, jeopardizing the objective of their creation. The study of the vegetation will allow a better detailing of the ecological corridor areas, which should be tied to a program of biodiversity conservation and recovery of fragmented areas. Another important aspect concerns the inclusion in the environmental management plan of the main body of water that makes up the Coreau hydrographic basin, also preserving the conservation areas.To this end, some methodological aspects proposed for the creation of the Serra da Penanduba wildlife corridor are here presented (Table 2), linking it and strengthening the regional conservation units in Serra da Meruoca and Ibiapaba. It is based on the methodology structured by Arruda (2003) for the proposed stages of a systematized plan of a wildlife corridor, here they were adapted and complemented to the reality of the area.

Table 2: Proposed stages for the creation of a wildlife corridor in Serra da Penanduba, Ceará, Brazil.

Stage	Procedures
1 – Identification of the area environmental and economic potential.	Identify and thoroughly map the environmental components of the intended area for the corridor (geology, geomorphology, climatology, hydrology, pedology and Phyto-ecology) and the current forms of land use and occupation;
2 – Fieldwork	Check the veracity of the mapped data; Conduct floristic surveys (collection and herborization of species) and faunistic surveys (visualization and interviews with local communities).
3 – Partnership identification	Talk to and meet with local communities, landowners, municipal governments, universities, watershed committees, and others;
3 – The establishment of the area for the Ecological Corridor	Create a representative internal team and prepare a pre-project (outline of the areas to be included within the corridor).
4 – Establishing indicators	Disseminate, partner, seek funding sources, conduct technical and educational training with everybody who is involved and build on legal frameworks.
5 – Preparation of the final corridor project	Prepare (internal team) the final project of thewildlife corridor.

Source: Adapted from Arruda (2003).

In fact, the implementation of a wildlife corridor requires a range of procedures that involve the areas of interest and the economic resources that will assist the execution of all stages. What is proposed here is only an indicative and a call for future studies that reinforce the creation of conservation strategies and the connection of fragments that are isolated, all this, combined with the interaction and interest of social agents involved in the area.It is important to highlight the complexity of strategies that precede the creation of a wildlife corridor, and, even though it is supported by legal aspects working on the protection and conservation of the environment is still an arduous task (BRITO, 2012) since it involves environmental, social, cultural, economic and political aspects.Going further, it is emphasized that there are perspectives that address wildlife corridors through the definition of their ecological functions, considering that these can be habitats, filters, channels, barriers, sinkholes and sources and it is possible for the same corridor to perform more than one these function (HESS and FISCHER, 2001). As shown in Figure 6.

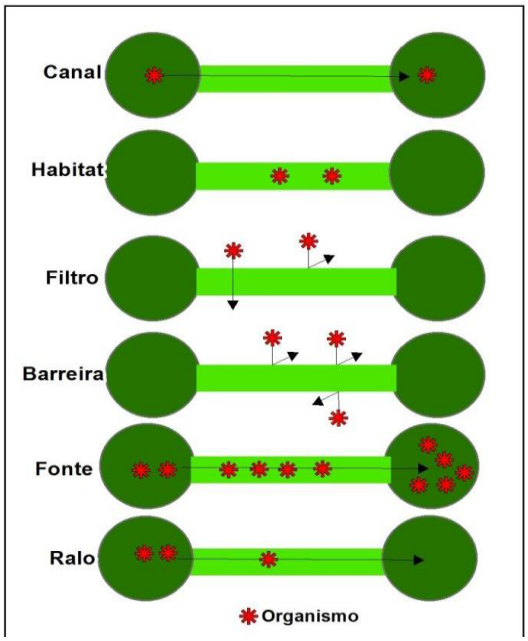


Figure 6- The wildlife corridors function. Source: Pereira*et al* (2016).

In this view, since most wildlife corridors can perform more than one function, it is proposed for this study that the corridor be framed within the functions of habitat (which is the construction of a suitable place for its reproduction and survival) and source (that is nothing more than the description of a habitat where reproduction exceeds mortality).

4.Conclusion

Although there is a growing engagement of researchers in studies about the semi-arid northeastern Caatinga, few studies involve the Dry Forest. Even more restricted are proposed studies aimed at the creation of conservation units and wildlife corridors as an important alternative for the conservation of such environments, given the country's current political and economic context.This proposal is part of those created with purposes of protection, conservation and recovery of semi-arid natural landscapes, especially those sheltering endangered species in addition to a floristic diversity still little known, by means of mitigating proposals in the midst of a spatial context increasingly degraded by human actions.Thus, it is sought here to highlight that Serra da Penanduba presents important characteristics and ecological functions in this context since it shelters natural environments still in a good state of conservation and that stands out, above all, in regional biogeographical studies.

5. Acknowledgments

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