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ENVIRONMENTAL PERCEPTION OF RURAL COMMUNITIES AND ANALYSIS OF LANDSCAPE: SUBSIDIES FOR PRIORITY AREA FOR CONSERVATION PROPOSITION IN THE RIO GRANDE DO NORTE SEMIARID, BRAZIL

PERCEPÇÃO AMBIENTAL DE COMUNIDADES RURAIS E ANÁLISE DA PAISAGEM: SUBSÍDIOS À PROPOSIÇÃO DE ÁREA PRIORITÁRIA PARA CONSERVAÇÃO NO SEMIÁRIDO DO RIO GRANDE DO NORTE/BRASIL

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Abstract

Priority Areas for Conservation are defined in order to protect environments that are home to a richness of species, endemisms and/or endangered species. However, besides these factors, additional studies such as Environmental Perception of local communities and Landscape Analysis are relevant to assess and minimize the negative effects caused to natural environments. In this context and in this perspective, the Mountain Range Complex João do Vale was studied, located in the state of Rio Grande do Norte, which holds a set of landscapes with different vegetation types that are being replaced by various economic activities resulting from disordered population growth and consequent exploitation of natural resources' potential. The use of these resources, in most cases, occurs improperly, leading to a depletion of this potential. This study proposes to combine Analysis of Landscape, through a Geographic Information System (GIS), to the Environmental Perception of rural communities in order to define Priority Areas for Conservation. Perception data were obtained through direct observation, questioning, interviews and application forms (n = 240); as to the landscape, data from slope maps, Permanent Preservation Areas (PPA) and Environmental Vulnerability were used. The Content Analysis used for perception data showed that respondents have a sense of topophilia regarding

where they live, hold a vast knowledge about natural resources and responded positively when asked about the choice of an exclusive area for conservation. These results coupledwith the Analysis of Landscape allowed with of Priorty Areas for Conservation in this Mountain Range Complex with three categories of priority low, medium and high.

Keywords: Semiarid, Rural communities, Conservation, Environmental perception, Mountainous environments.

Resumo

As Áreas Prioritárias para Conservação são definidas para a proteção de ambientes que abrigam riqueza, endemismos e/ou espécies ameaçadas de extinção. No entanto, além destes fatores, estudos sobre Percepção Ambiental de comunidades locais e de Análise da Paisagem são relevantes para avaliar e minimizar os efeitos negativos causados ao ambiente. Nesse contexto e perspectiva, foi estudado o Complexo Serrano João do Vale, Estado do Rio Grande do Norte, que apresenta um conjunto de paisagens com diferentes fisionomias, as quais vêm sendo substituídas por diversas atividades econômicas, resultantes do crescimento populacional e consequente exploração das potencialidades dos recursos naturais. O uso desses recursos, na maioria das vezes, ocorre de modo inadequado, levando ao esgotamento dessas potencialidades. Este estudo propõe aliar a Análise da Paisagem, por meio do Sistema de Informação Geográfica (SIG), com a Percepção Ambiental de comunidades rurais para a definição de Áreas Prioritárias para Conservação. Os dados de percepção foram obtidos por meio de observação direta, questionamentos, entrevistas e aplicação de formulários (n=240); para a paisagem foram utilizadas as análises dos mapas de declividade, Áreas de Preservação Permanente- APP e Vulnerabilidade Ambiental. A Análise de Conteúdo utilizada para os dados de percepção, evidenciou que os entrevistados apresentam um sentimento de topofilia pelo lugar onde vivem, detêm um vasto conhecimento sobre os recursos naturais existentes nesse ambiente, e responderam positivamente quanto à escolha de uma área exclusiva para conservação. Esses resultados, aliados à Análise da Paisagem, possibilitaram definir um Mapa de Áreas Prioritárias para Conservação nesse Complexo Serrano, com três categorias de prioridade: baixa, média e alta.

Palavras-chave: Semiárido, Comunidades rurais, Conservação, Percepção Ambiental, Ambientes serranos.

1. INTRODUCTION

The definition of Priority Areas, whosepurpose is to establish biodiversity conservation priorities, is one of the strategies used for the creation of Protected Areas (MARGULES; PRESSEY, 2000). In Brazil, this strategy was used for all biomes in obedience to the decisions of the Convention on Biological Diversity

signed at the United Nations Conference on Environment and Development in 1992 in Rio de Janeiro (MMA, 2007; GOUVEIA *et al.*, 2010).

Global priority regions for conservation have already been defined by the combination of data on a large scale on habitat loss and levels of endemism. However, detailed area selection analyses are needed to transform global priorities into concrete actions in nature (NOGUEIRA *et al*., 2009).

In this perspective, the inclusion of local communities in a Priority Area identification process is of fundamental importance as a way to include them in the conservation process. Thus, it becomes essential to know the wishes and perceptions of communities that inhabit natural areas or their surroundings, so that a co-participation in the process of conservation of natural resources can be achieved, as it is a right provided by the National Protected Areas System (SNUC), Brazil, but that in fact has not been hold (ALMUDI; KALIKOSKI, 2009).

Lima *et al*. (2011) argue that priority areas are only one of the methods of territorial space conservation planning. However, this planning has followed relatively subjective criteria mainly based on opinions of consultants *ad hoc* in specific workshops and it was aided by the little available literature. The authors suggest the need to establish more objective technical criteria that can be added to the subjective knowledge of the group of consultant researchers.

In the specific case of the Caatinga Domain, the definition of Priority Areas is relevant, since this domain is unique and exclusive to Brazil (MMA, 2007), considered rich in biodiversity and endemic species, butfacing serious environmental problems and itis probably the most endangered and already transformed environmentby human action (SILVA *et al*., 2003; ALBUQUERQUE *et al*., 2012). Moreover, it is one of the less studied and less protected natural semiarid, besides word most populous (LEAL *et al*., 2003), thus its conservation is a major challenge for science, it oneincreased vulnerability and poverty are noted (MOURA, 2010).

Given these facts, this study proposes the challenge of social inclusion in the conservation process of natural areas based on the studies of the Environmental Perception of local communities (*sensu* WHYTE, 1978; TUAN, 1980; RAMOS; HOEFFEL, 2011), such as works done in similar areas of semiarid (SILVA; FREIRE, 2009; SILVA *et al*., 2009; LUCENA; FREIRE, 2011; LUCENA; FREIRE, 2012).

Coupled with the empirical knowledge of local communities, an integrated landscape analysis and its spatial representation are proposed by using geoprocessing techniques in order to define Priority Areas for Conservation of natural resources. The landscape here is considered as the result of a dynamic combination of physical, biological and man-made elements that, by reacting dialectically, make this a unique and indivisible whole in perpetual evolution (BERTRAND; BERTRAND, 2009).

Therefore, this study proposed an integrated analysis for Conservation of the Mountain Range Complex João do Vale, state of Rio Grande do Norte, which includes both the Environmental Perception of local communities and the Analysis of Landscape as additional criteria in Priority Area for Conservation propositions.

1.1. Study area

The "Mountain Range Complex João do Vale" consists of a set of landscapes with different vegetation types. It covers an area with 370 km², with altitudes between 100 and 747 meters, distributed in mesoregions of West Potiguar and Sertão of Paraíba, covering the municipalities of TriunfoPotiguar, Campo Grande and Jucurutu in the state of Rio Grande do Norte, and Belém do Brejo da Cruz in the state of Paraíba (UTM 690822W - 9348788S and 716460W - 9324737S; Figure 1).

Approximately 1,800 inhabitants reside in the mountain plateau, being 971 men and 829 women (IBGE, 2010). The plateau area is occupied by five "chãs", which are local names created by the former owners of the land in the Mountain Range, and are locally known as Chã Felix, Chã das Cacimbas, Chã dos Cajueiros and Chã da Caponga (belonging to the municipality of Jucurutu) and ChãVelha (belonging to the municipality of TriunfoPotiguar).

“Chãs” have certain infrastructure, such as health centers, church, schools, cemetery, clubs, among others. However, the relations established in this living space are given according to the policies of each municipality to which the chã belongs, being considered traditional communities due to the lifestyle of the people. According to the Decree No. 6,040 of February 7, 2007, traditional communities are definedas culturally different groups that recognize themselves as such, that have

their own forms of social organization, that occupy and use territories and natural resources as a condition for its cultural, social, religious, ancestral and economic subsistence, using knowledge, innovations and practices generated and transmitted by tradition.

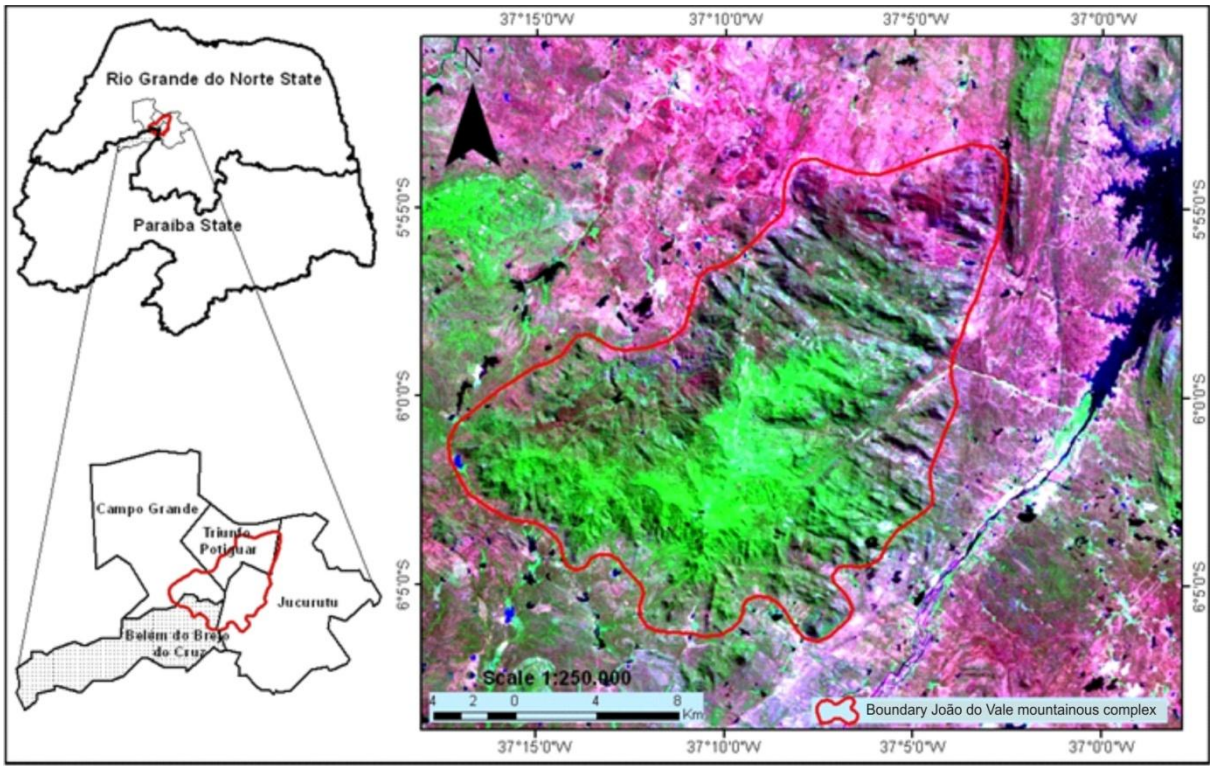

Figure 1: Delimitation of Mountain Range Complex João do Vale and its location in the municipalities of Jucurutu, TrinfoPotiguar, Campo Grande, in the state of Rio Grande do Norte, and Belém do Brejo da Cruz in the state of Paraíba.
Source: Prepared by the authors (2013).

2. MATERIAL AND METHODS

Initially, exploratory studies on communities were conducted through area visits. Community informants were predefined among those aged over 18, giving priority to the elderly and those with a residence time above 10 years; only one person per household was interviewed following the adaptation of the method used by Lucena; Freire (2011).

From February to August 2011, forms were given to 240 people, corresponding to 100% of occupied households in all communities/"chãs". Although spatially separated, the whole of the inhabitants of the chãs was considered in this study as a community in order to evaluate environmental perception. However,

regarding the evaluation of the importance of demarcation of exclusive areas for conservation and regarding the location of this area, each chã was analyzed as a community. This research was approved by the Research Ethics Committee (CEP) of the Federal University of Rio Grande do Norte (CAAE Protocol: 0177.0.051.000-11).

Among field research techniques used for studies of Environmental Perception, observation and questioning through interviews and application of forms were used as proposed by Whyte (1978), Tuan (1980), Machado (1999), Cavalcante; Maciel (2008), Lucena; Freire (2011), Ramos; Roeffel (2011). Using these techniques and based on the theoretical framework proposed by Tuan (1983), which uses as topophiliaformation the perceptions and attitudes in order to know the different perceptions of local communities, we sought to understand the perceptions of the community on the conservation of nature and Priority Area for Conservation definition in the Mountain Range Complex João do Vale.

For the analysis of these results, the Content Analysis technique was used (BARDIN, 2010) as an analytical and understanding tool of interviewees' statements. The content of the interviews was converted into thematic categories, which in turn were tabulated in Excel software and organized in contingency tables. The perception of communities on the proper place for the demarcation of an exclusive area for conservation was assessed by correspondence analysis (CA).

The nonparametric data were analyzed by chi-square test (X^2) to compare the knowledge of fauna and flora according to gender and the perception of the importance of demarcating the area for conservation considering the education level of the respondents.The Kruskal-Wallis test was used to compare the perceptions on the importance of the demarcation of this area among communities. All statistical tests were performed on IBM SPSS v.20 software, and a 5% significance was adopted.

For the scientific identification of fauna and flora species mentioned by communities using their vernacular names experts were consulted for the identification of birds (Dr. Mauro Pichorim), reptiles (Dr. Eliza Freire), plant species (MSc. Alan Roque) and also specialized literature for mammals (FEIJÓ; LANGGUTH, 2013), amphibians, fish and arachnids (SILVA; FREIRE, 2009; LUCENA; FREIRE, 2012).

For the Analysis of Landscape, a systemic view was used,in which all elements are integrated.It resulted in a dynamic combination of physical, biological and man-made elements (BERTRAND; BERTRAND, 2009).

For the production of maps, the following materials were used:Topographic maps with a 1:100,000 scale from the Superintendência do Desenvolvimento do Nordeste (SUDENE), SB Paper, 24-ZBI Caicó and SB-24-X-D-IV Augusto Severo; Municipal boundaries provided by the website of the Instituto Brasileiro de Geografia e Estatística (IBGE) in shapefile format; Geological Map of the state of Rio Grande do Norte with a 1:500,000 scale produced by the Companhia de Pesquisa dos Recursos Minerais (CPRM; ANGELIM *et al*., 2006); Soil Map from the Empresa Brasileira de Pesquisa Agropecuária (EMBRAPA, 2011), Brazilian System of Soil Classification, with a 1:5,000,000 scale, available in shapefile format in EMBRAPA's website; Image from satellite Landsat-5, TM sensor, 215/64 scene, of 2010, provided by the Instituto Nacional de Pesquisas Espaciais (INPE); Image from the *Shuttle Radar Topography Mission* (SRTM), of 2000, available on the website of the National Aeronautics and Space Administration (NASA).

The thematic maps drawn were rocky basement, relief, soil, land cover, slope, environmental vulnerability and Permanent Preservation Areas (PPA). The last three were considered as main criteria for defining and then drawing the map of Priority Areas for Conservation in Mountain Range Complex João do Vale.

The slope map was drawn from a DTM model (Digital Terrain Model) using the 3D analyst tool and the Slope extension. The intervals were defined in percentage according to Duarte *et al*. (2004).The following slope classes and their limits were adopted: 0-3% (flat relief); 3-8% (gently rolling relief); 8-20% (undulated relief); 20-45% (strong undulated relief); 45-75% (mountainous).

The environmental vulnerability map was drawn from crossing relief, geology, soil and land cover maps. In this crossing, the attributes were valued based on the classification of stability of environments and its elements, as shown in Table 1.

Table 1: Values of stability of landscape units according to Tricart (1977).

UNIT	PEDOGENESIS/MORPHOGENESIS RELATION	VALUE
Stable	Pedogenesis prevails	1.0
Intermediate	Balance between morphogenesis and pedogenesis	2.0
Unstable	Morphogenesis prevails	3.0

The integration of thematic data was performed according to the model used by Costa *et al.* (2006) and Grigio *et al.* (2003), where the degree of vulnerability assigned to each class (unit) of each theme (topography, geology, soil and land cover) was distributed in a range from 1.0 to 3.0 with an interval of 0.5 (Table 2).

Vulnerability values of classes (units) were assigned according to the relation pedogenesis/morphogenesis. However, for land cover, regarding vegetation, the established criterion was the density of vegetation cover: values close to stability (1) to scrub caatinga and tree-shrub vegetation; intermediate values (2) to caatinga shrub vegetation; and near vulnerability (3) to the presence of an anthropic area.

Table 2: Vulnerability degree of thematic maps

THEME MAP/CLASS	DEGREE OF VULNERABILITY
RELIEF	
Residual massifs	2.0
Plateau of Borborema	1.0
Depressão Sertaneja	3.0
ROCKY BASEMENT	
Serra dos Martins Formation	2.0
Marble Jucurutu Formation	1.0
Jucurutu Formation	2.5
Intrusive Suite Dona Inês	3.0
Itaporanga Suite	2.5
Poço da Cruz Suite	3.0
Caicó Complex	3.0
SOIL ASSOCIATION	
Yellow Latosols + Argisols	2.0
Chromic Luvisols + Litolic Neosols	1.5
Litolic Neosols + Rocky outcrops	3.0
SOIL COVERAGE	
Caatinga scrub	1.5
Caatinga tree vegetation	1.0
Caatinga tree-shrub	1.0
Exposed soil	3.0
Water bodies	1.0
Anthropic area	3.0

Source: Adapted from Costa *et al.* (2006) and Grigio *et al.* (2006).

The intersection of these data was performed by ArcGIS 10 software using the Spatial Analyst Tools tool, allowing algebraic operations between maps in raster formats. To produce the environmental vulnerability map, the method of weighting factors was applied. It allowed the possibility of compensation among factors through a set of weights that indicate the relative importance of each factor (Table 3).

Table 3: Calculated weights for each factor in environmental vulnerability analysis adapted from Grigio *et al.* (2006).

FACTOR			
Relief	Rocky Basement	Soil	Land Cover
0.2	0.1	0.1	0.5

These weights were applied to the following formula 1:

$$\{0.2 \cdot [Factor\,1] + 0.1 \cdot [Factor\,2] + 0.1[Factor\,3] + 0.5 \cdot [Factor\,4]\} \quad (1)$$

Where: Factor 1 = relief map; Factor 2 = rocky basement map; Factor 3 = soil map; and Factor 4 = land cover map.

The environmental vulnerability map was thus drawn in order to identify the susceptibility of the environment to human pressures in the Mountain Range Complex João do Vale.

As for the map of Permanent Preservation Areas (PPA), it was based on SRTM imaging and slope map, vectoring PPA areas in tops above 100 meters and in steepness of slopes above 45º in accordance to the terms of the Law nº. 12,651 of May 25, 2012, repealing Law nº. 4,771/65 of the Brazilian Forest Code, and complemented by CONAMA Resolution nº 303/2002.

Finally, the Priority Area for Conservation map of the Mountain Range Complex João do Vale was made from the interpretation of slope, ground cover, and environmental vulnerability and Permanent Preservation Areas maps coupled with the knowledge of communities of this yet to be preserved area. Finally, the map in three distinct categories of priority (low, medium and high) was drawn.

3. RESULTS AND DISCUSSION

3.1. Community's Environmental Perception of Mountain Range Complex João do Vale

Of the 240 people interviewed, 134 (56%) were female and 106 (44%) were male. For the educational level prevailed for literate (28%), followed by for incomplete elementary school (19%) and 10% no education; only 1% with higher education. As

to the higher incidence of low educational levels, this is due to poor accessibility to school because the community is provided with education only up to primary school I. Most respondents have a low income. 49% earn less than one minimum-wage salary monthly and 33% earn one minimum-wage salary.

Regarding the perception of the community of what means conservation/preservation of nature, 133 respondents (55%) could not answer, while 107 individuals (45%) respondents that knew its meaning.This demonstrates that the degree of knowledge of residents regarding the term “conservation/preservation of nature” is not low, considering the limited access to education. Although there have been statistically significant differences between the responses of people who could not answer and respondents who answered the questions according to the level of education ($x^2 = 51.893$, df = 8, p = 0.000), the understanding of these meanings could be identified in interviewees' answers:*"To preserve and not destroy nature"* (merchant, 43 years old);*"Protect the environment, not deforest native plants"* (farmer, 31 years old);*"Let a piece of nature without using it"* (farmer, 70 years old).

Regarding knowledge on existing animals in the Mountain Range Complex, 233 respondents (97%) knew the fauna species; only 7 (3%) did not know them. This differs from the study by Lucena; Freire (2011) in a community around a Private Reserve of Natural Heritage (PRHN) in the semiarid region, where most did not know the local fauna. 1,602 mentions of animals occurring in Mountain Range Complex João do Vale were made. They were classified into 69 species and 74 vernacular names (Appendix 1). Some of these species are mentioned in the list of endangered species, such as *Zenaida auriculata* (Des Murs, 1847), eared dove; *Sicalis flaveola* (Linnaeus, 1766), saffron finch; and *Tolypeute stricinctus* (Linnaeus, 1758) Brazilian three-banded armadillo (MMA, 2008).

Some respondents were concerned with the conservation of the species most commonly used by the community, for example, the three-banded armadillo, as it is often used for consumption and acquired through hunting. This fact is similar to the observed for community residents of the Divino Espírito Santo in Amazonas (MARQUES *et al*., 2013), which shows a concern for variety reduction and quantity of some animal species of EPA Nhamundá, for they depend on these resources for subsistence.

The fact that the vast majority of respondents knew the animals in the study area is justified by the time of residence in the community and a 40-year average age, hence the importance of considering local knowledge in the conservation process. However, in this study, there were no significant differences regarding knowledge on the fauna according to gender ($x^2 = 0.002$, df = 1, p = 0.961), being the species known by 131 women and 101 men, unlike the study by Alves *et al*. (2012), in which more men mention fauna species than women.

Mentioned species occurring in Mountain Range Complex João do Vale are distributed, in percentage terms, in the following zoological groups: birds (45%), reptiles (27%), mammals (25%), amphibians (1%), fish (1%) and arachnids (1%). The group “bird” had the highest number of vernacular names identified by respondents (36, corresponding to 49%). However, mammals had the highest number of mentions (1084) with 17 identified vernacular names. This may be a result of the visibility of the mammals and its growing use by the community either for food or other uses as reported by Razera *et al.* (2006); Lucena and Freire (2012).

The species most frequently mentioned by the studied community were three-banded armadillo (*Tolypeute stricinctus*; Linnaeus, 1758): 217 mentions; Argentine black and white tegu (*Salvator merianae*; Duméril et Bibron, 1839): 100 mentions; and red-cowled cardinal (*Paroaria dominicana*; Linnaeus, 1758): 30 mentions (Appendix 1). All these species are part of everyday life and are related to food, medicinal and commercial uses, according to community members. These results agree with those obtained by Alves (2009) for rural communities in the Northeast. Similar data regarding the number of species known by rural communities were also found in the studies conducted by Silva and Freire (2010) and Lucena and Freire (2012).

As for the number of species known by each respondent, around eight (8) or more were mentioned. This may be a result of the relation, knowledge and interaction with natural resources from where they live, because, according to Tuan (1983), these "places are centers to which we assign some value and where the biological food, water, rest and breeding needs are satisfied". In the specific case of this study, by experience and contact of the researcher with the community, it was found that people's lives are closely related to agriculture, hunting of animals for consumption

and manufacturing of home medical products;in short, to the use of natural resources.

Regarding knowledge about plants, the majority of respondents (226;94%) said to know the plants of this Mountain Range Complex. 83 plant species were mentioned (89 vernacular names; 1,218 mentions). The most frequent species were "black Jurema" (*Mimosa tenuiflora* Willd, Poir.): 185 mentions; quince (*Croton blanchetianus* Baill.): 102 mentions; and "brejuí" (*Myroxylon peruiferum* L. f.): 94 mentions (Appendix 2). All the species mentioned by the community are used for medicinal purposes and selling of tree bark and wood. The study "black jurema" (*Mimosa tenuiflora*) of Guerra *et al*. (2012), was the most mentioned and identified as most important for general and current use values.The species mentioned in the studied area, *Myracroduon urundeuva* (cashew) and *Schinopsis brasiliensis* (barauna), according to MMA (2008), are on the list of endangered species.Thus, the preservation of this area becomes relevant.

The fact that many people know both animals and plants shows the high level of knowledge and relation of the community with the local environment. In this study, there were no significant differences regarding gender and knowledge of plants (x^2 = 1,392, df. = 1, p = 0.238): they were known by 125 women and 100 men.

This result can be explained by the interaction of both women and men with nature and its elements, since in this community women are involved with domestic activities and take part of cashew crops and small vegetable farming, while men are engaged in agriculture or hunting. These practices are found in other traditional communities in the Brazilian northeastern semiarid, as shown in the work by Lucena and Freire (2012), Roque and Loyola (2013).

When respondents were asked about the importance of demarking an exclusive area for conservation/preservation in that Mountain Rage Complex, 128 (53%) answered positively and 112 (47%) could not answer. However, when that answered positively were asked about the reason for the importance of a demarcated area, 116 (48%) knew how to respond and 124 (52%) could not answer.

Among those who could not answer why an area for conservation should exist, 21% answered "for the protection of species" and "for conservation/preservation", 17% answered "it is important to nature" and 8% answered "to avoid hunting in the

Mountain Range Complex". The emphasis on protection and conservation/preservation is clear in the account of the respondents: "*Because whenever an animal is endangered... they could put it in that corner and no one was going to kill it there"* (farmer, 25 years old); *"Because people are not going to cut, mess with and burn it"* (stateemployee - ASG, 31 years old). These interests conservationists on natural resources are positive fact proposition part demonstrated the perspective of protection of this proposition of Mountainous Complex as Priority Area for Conservation.

The perceptions of respondents who answered about the importance of the demarcated area for conservation, there was no significant difference among the communities/ chãs (Kruskal- Wallis; H = 5.388, df = 4, p = 0.250). Demonstrating that the whole community has similar perceptions about the conservation of this area and that they are related culturally and emotionallyto the environment in which they live.

Significant differences were found between the answers of those who said that the demarcation of an exclusive area for conservation is important and those who could not answer according to education level (x^2 = 23.963, df = 8, p = 0.002). Figure 2 clearly shows that among people who could not answer, most werebarely literate or had no education. In a study conducted by Miranda and Souza (2011) on environment and natural resources in rural communities in Palmas (TO), most could not answer the question regarding the concept of environment, had little education and its relation with the environment was more experiential than conceptual.

Among positive responses regarding the location for demarcation of an area for conservation/preservation in this Mountain Range Complex, the ideal place mentioned by the communities was "the grotas", steep slopes in the mountain (84, corresponding to 35%). However, 129 (54%) could not answer. The AC method, whose result is shown in Figure 3, in axis 1 (communities- self-value 0.052, 56% of inertia) and axis 2 (Priority Areas-self-value 0.059, 49% of inertia), showed that “the grotas” had the highest variability of responses by communities, i.e., empirical knowledge stood out among the options "chãs" and "all mountain".

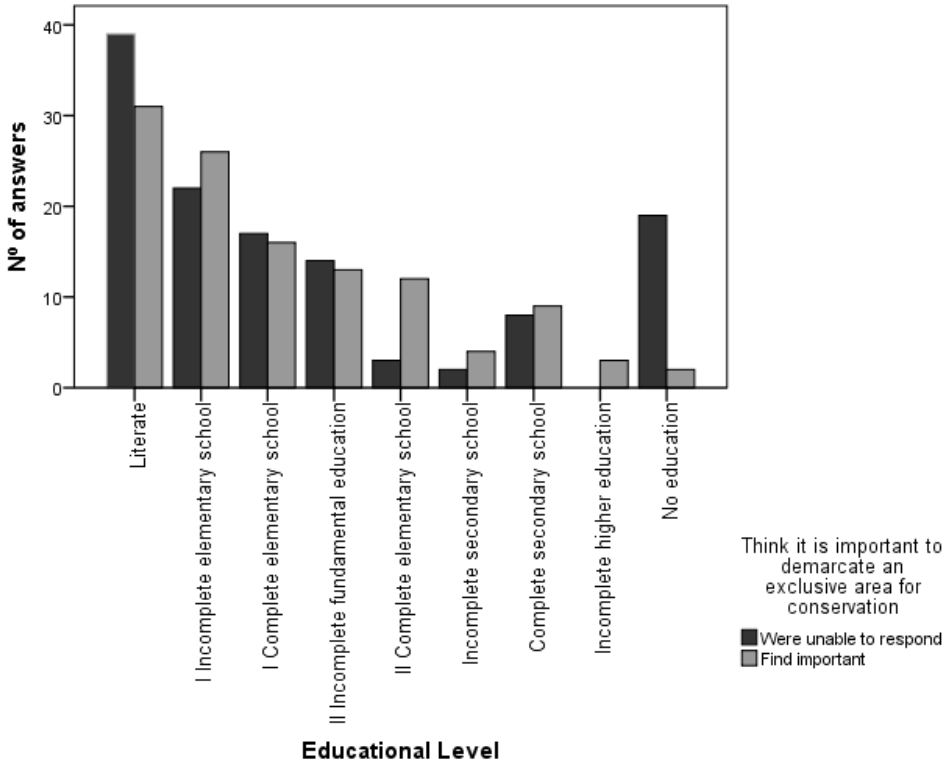

Figure 2**:** Number of respondents who answered about the importance of demarcating an exclusive area for conservation, according to education level, and those who could not answer.
Source: Field Research, 2011.

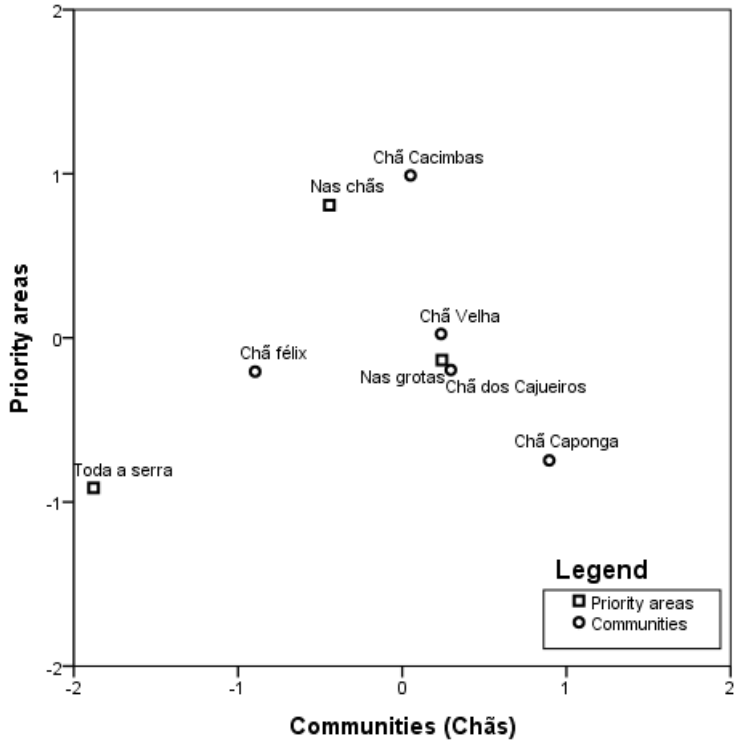

Figure 3: Correspondence of the perception of communities on the location for the demarcation of an exclusive area for conservation in Mountain Complex João do Vale.
Source: Field Research, 2011.

This result demonstrated that the choice of "the grotas" suits the knowledge of these people, which define these places as "where no one lives", "are not devastated," "because they house animals", "people do not use the resources of the grotas" and "they are already preserved". These grotas are steep areas that, because they are difficult to access and little used by communities, should be fit for conservation. In addition, it is noted in this study that these “grotas” are more preserved than the mountain plateau and contemplate the tree vegetation characteristic of the area.

Overall, the community demonstrated a sense of topophilia with the place where they live, which probably comes from the tradition of a direct contact with nature and the strong dependence of resources of this mountainous environment. For Tuan (1980), topophilia is the affective link between the person and the place or physical environment.

Considering that the environmental perception of this rural community has proven to be relevant, this instrument may be used as an additional criterion for defining Priority Areas for Conservation.

Thus, the establishment of this criterion is defended, because this mountain complex is an exception area among Caatinga Domains, and it may be an area directed to the development of mountainous tourism activity. Therefore, it is essential that the community is active and take part in proposals to be implemented in this area.

3.2. Landscape Analysis of Mountain Range Complex João do Vale

Still with regard to the delimitation of Priority Areas for Conservation in Mountain Range Complex João do Vale, the landscape was analyzed as to slope, Permanent Preservation Areas and Environmental Vulnerability.

3.2.1. Slope

The Mountain Range Complex João do Vale presents a plan slope (from 0 to 3%), mildly undulated (from 3 to 8%), wavy (from 8 to 20%), strong corrugated levels (from 20 to 45%) and mountainous (from 45 to 75%; Figure 4).

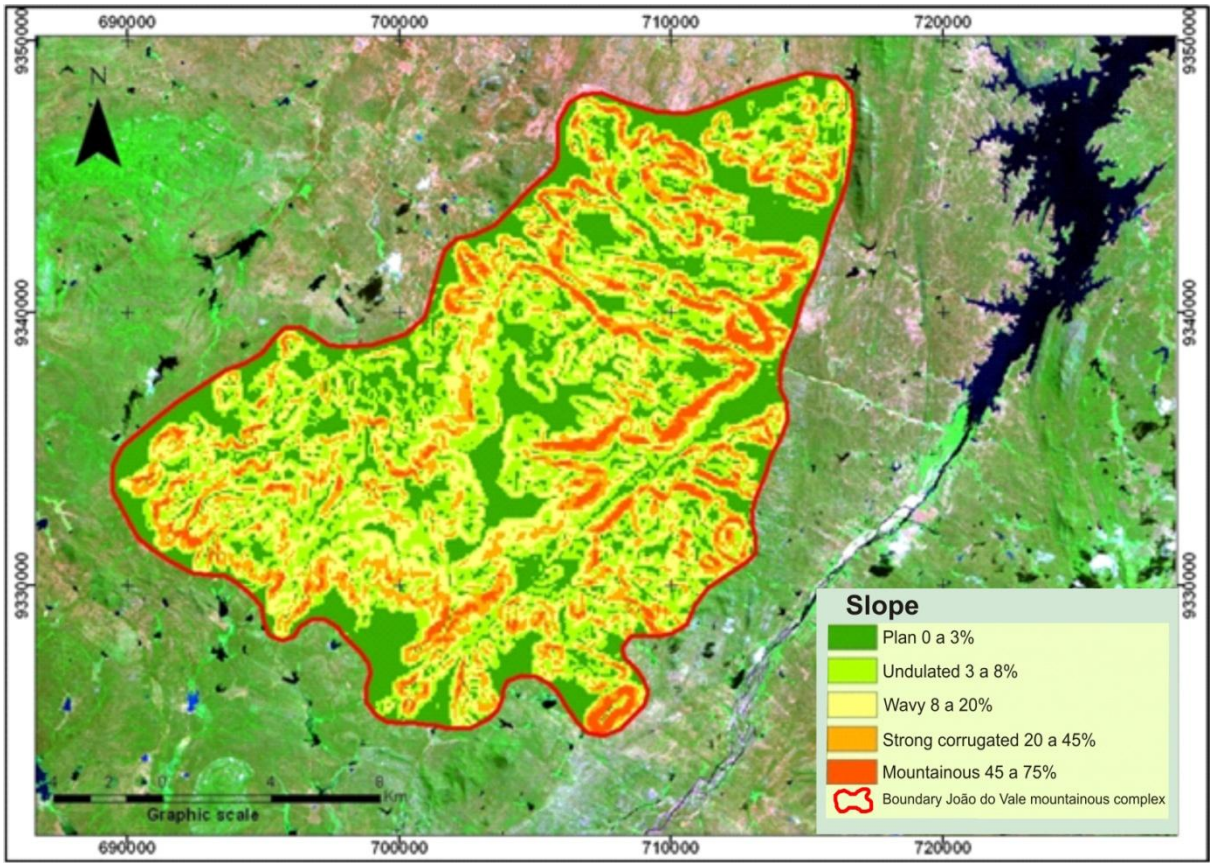

Figure 4: Slope map of the Mountain Range Complex João do Vale/RN.
Source: Prepared by the authors (2013).

The predominance of steep areas in this complex, a limiting factor becomes for the development of agricultural activities and consequently for its intensive use by local communities, while the flat areas are intensively exploited. That is, the natural conditions of these mountainous landscapes impose restrictions on their use due to steep slopes, but flat top areas are an exception to this rule (ROCHA *et al*., 2009).

Despite limiting factors to the use of steep areas, there has been a removal of vegetation for agricultural activities, causing soil erosion. This is alarming because there is no environmental protection instrument for this area, and, in the future, it may cause an imbalance in landscape dynamics. Studies show that the primary vegetation of most enclaves is strongly decharacterized due to disordered uses (SOUZA; OLIVEIRA, 2006; OLIVEIRA *et al*., 2009).

As defined by Law nº. 12,651 of May 25, 2012, repealing Law nº. 4,771 of September 15, 1965 (Brazilian Forest Code), Permanent Preservation Areas must be physical-protected natural areas, covered or not by native vegetation, with an environmental function of preserving soil protection and ensuring the well-being of

human populations. However, not always the law is respected by the owners and/or local communities. This has serious consequences on these mountainous areas in particular.

3.2.2. Permanent Preservation Areas

The greatest PPA is at the top of the Mountain Range Complex, which, according to the Law No. 12,651 of May 25, 2012, should be preserved. However, because it has a public utility, there is an exception for intervention, according to CONAMA Resolution No. 369 of March 28, 2006. Therefore, this PPA is fully occupied by local communities,which develop various activities such as agriculture, horticulture and livestock. That is, it is in this environment that virtually all uses and occupations are focused, because it is the only area in this Complex that is favorable to housing due to its plan relief formation (Figure 5).

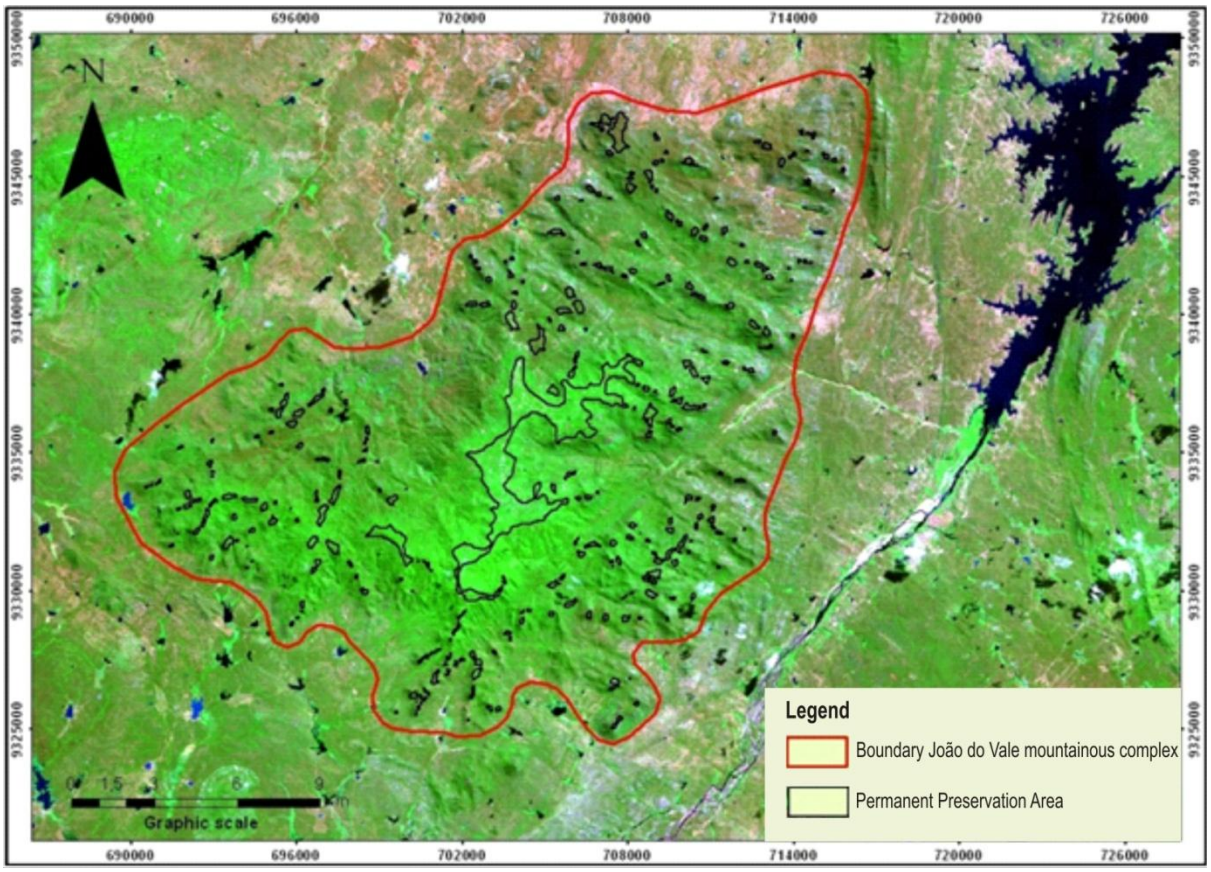

Figure 5: Permanent Preservation Areas in Mountain Range Complex João do Vale.
Source: Prepared by the authors (2013).

The PPAs defined in this study totaled 1,999 hectares, accounting for only 5% of the total area of the Mountain Range Complex. Still, conservation becomes relevant for the dynamic and ecological balance of the area.

According to the Law nº. 12,651 of May 25, 2012, the Permanent Preservation Areas in mountains are, according to its Article 4: slopes or parts thereof with a declivity greater than 45 degrees, equivalent to 100% in the line of maximum slope; top of hills and mountains, with a minimum height of one hundred (100) meters and an average slope higher than 25º; areas demarcated from the corresponding contour line of two thirds (2/3) of the minimum height always relative to the base, which is defined by the horizontal plane determined by a plain or adjacent reflecting pool, or, in case of wavy reliefs, by the share of the saddle point nearest to the elevation.

Although generally the Brazilian Forest Code has not met the expectations of the scientific community, it showed innovative efforts for Permanent Preservation Areas for mountains.While,according to the CONAMA resolution nº. 303/2002, the top of hills and mountains were considered as PPAs in the areas defined by the contour line corresponding to two thirds of the minimum height from the base,in the code in force it has a minimum height of 100 meters. Therefore, all mountain range complexes similar to João do Vale must be preserved.

3.2.2. Environmental vulnerability

Five environmental vulnerability classes were identified for Mountain Range Complex João do Vale, namely: very low, low, medium, high and very high (Figure 6).

Environmental areas with low vulnerability, as recognized in this study, are those with the presence of tree vegetation. For being in steep areas, agricultural activities are made difficultto the residents of local communities. As to areas with a medium environmental vulnerability, that is, those that show a relative anthropic pressure, they are distributed in levels where the presence of tree-shrub vegetation occurs amid the presence of farming activities.

The very high vulnerability area is the largest area in the Complex (Figure 6). It is located in the depressions with the presence of scrub vegetation, various types of human activities, especially agricultural, and removal of vegetation, causing soil

erosion and making it a more vulnerable environment. Considering environmental vulnerability, according to Tagliani (2002), it means a greater or lesser susceptibility of an environment to a potential impact caused by any anthropogenic use.

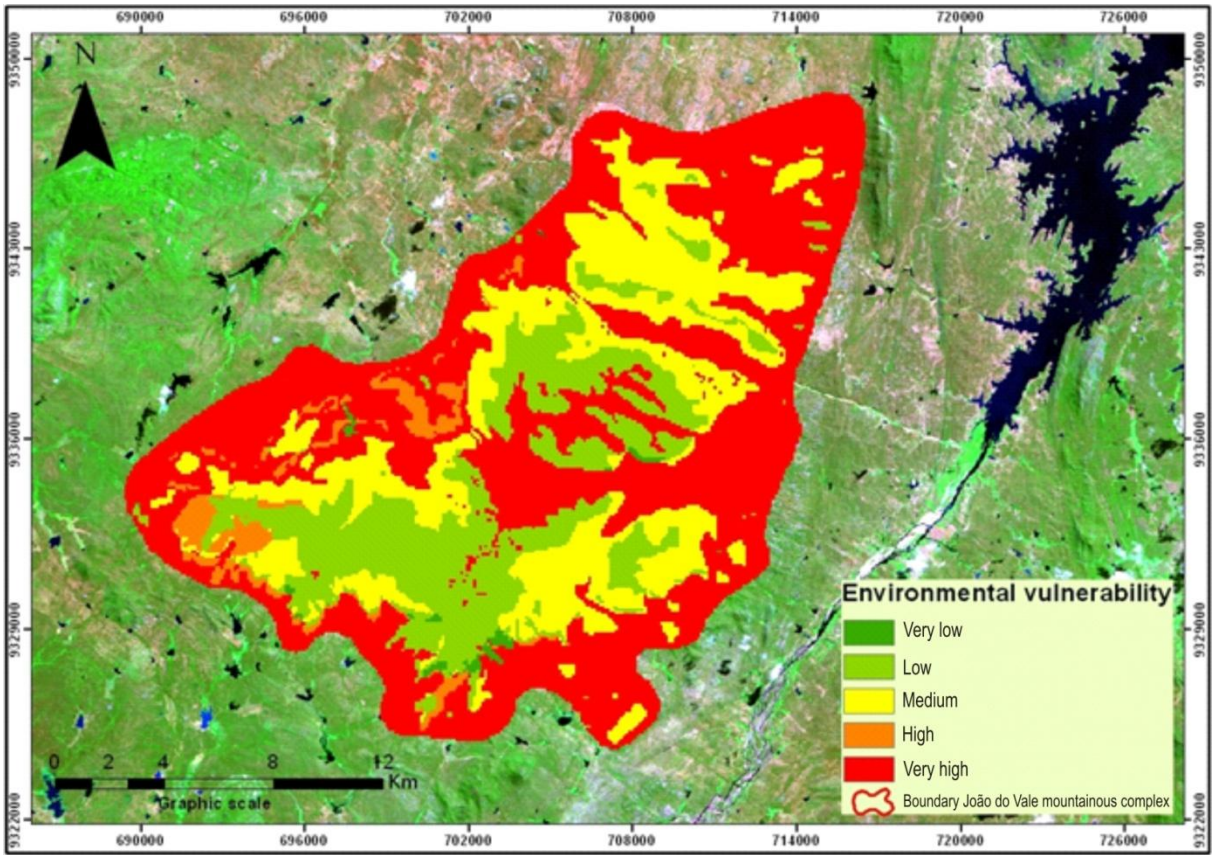

Figure 6: Environmental vulnerability map of the Mountain Range Complex João do Vale.
Source: Prepared by the authors (2013).

It is clear, therefore, that, for the use and occupation of land in any environment, prior knowledge is needed about the way the environment reacts to imposed human pressures and what is the capacity to withstand these pressures.

3.3. **Priority Areas for Conservation**

The categories of Priority Areas for Conservation in Mountain Range Complex João do Vale were defined and delimited in this study as Low, Medium and High (Figure 7).

The low priority degree that is found in plateau areas and depressions of the Complex and it comprises an area of 20,567 hectares (56%; Table 5). It should be noted that this low priority area is also the most vulnerable (Figure 6).

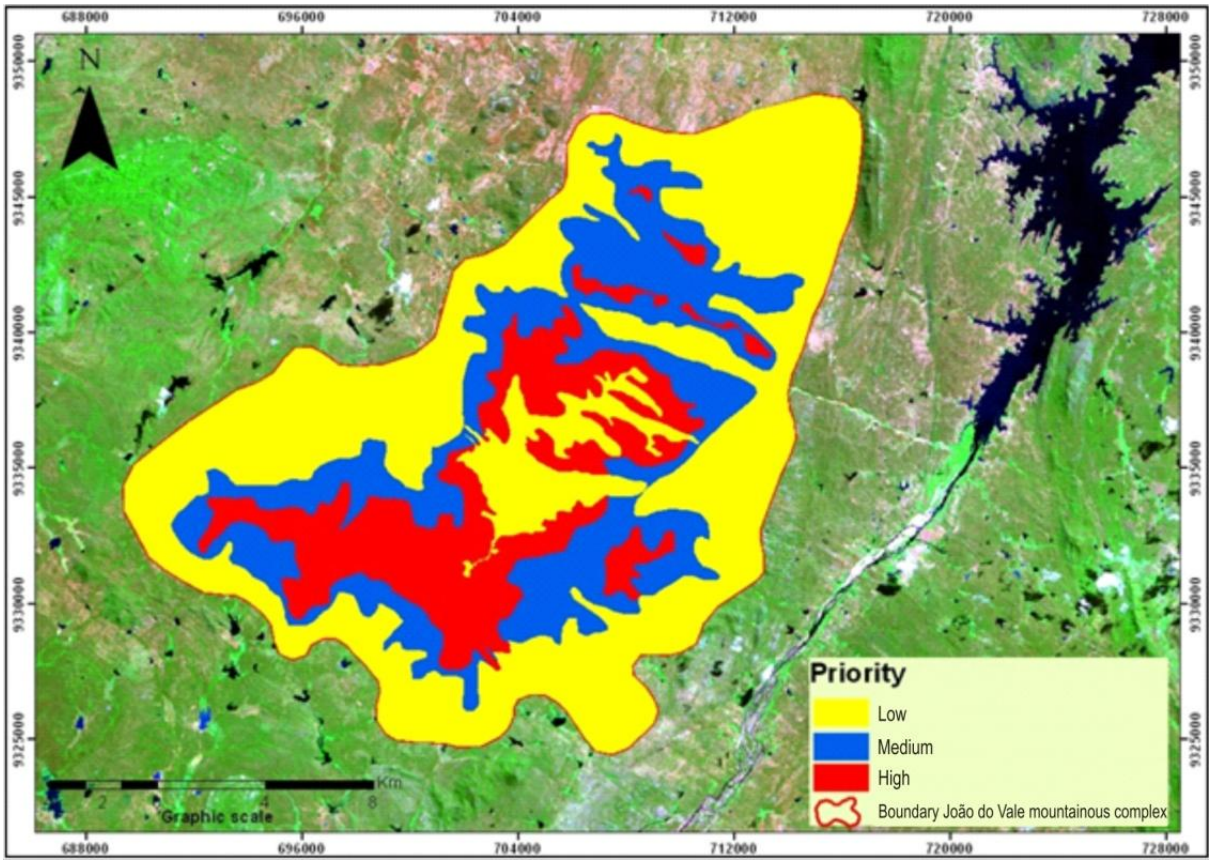

Figure 7: Priority Areas for Conservation of Mountain Range Complex João do Vale.
Source: Prepared by the authors (2013).

Table 5: Categories of priorities for conservation in the Mountain Range Complex João do Vale.

Classification of Priority Areas for Conservation			
Priorities	**Categories**	**(ha)**	**(%)**
Low	Plateau areas and depressions	20.567	56
Medium	Caatinga and tree-shrub vegetation	7.479	20
High	Steep areas with a predominance of typical mountainous environment trees	8.972	24
TOTAL		37.018	100

Source: Field Research (2013).

The medium priority area, with the presence of tree-shrub caatinga vegetation typical of this mountainous environment (VELLOSO *et al*., 2002), comprises a total of 7,479 ha (20%). It is found in smaller declivities, making the access by local communities easier to various uses such as wood, hunting, removal of parts of the vegetation for traditional medicine, among others.

The high priority degree, with 8,972 ha (24%), is mainly in steep areas with predominance of typical mountainous environment trees (VELLOSO *et al*., 2002). The conservation priority of this area is enhanced for it harbors a unique biodiversity (BORGES-NOJOSA; CARAMASCHI, 2003), constituting a natural refuge for animals and a possible area of endemism at high altitudes. These forests enclaves in the

semiarid also contribute to the relictual distribution pattern of some species (GOGLIATH *et al*., 2010).

From slope and environmental vulnerability analyses, it was possible to recognize environments with higher or lower land use potential. In this sense, the most appropriate usable relief forms have the least potential for conservation.

It is noteworthy that areas of medium and high priority total 16,451 ha (44%). That is, they are representative and relevant to the conservation of natural resources in this Complex, for they harbor a greater biodiversity and have higher restrictions for local communities to exploit natural resources, as previously confirmed in other studies on mountainous environments (SOUSA *et al*., 2004).

Considering the results of this study, which highlight the importance of conservation of the Mountain Range Complex João do Vale, despite the occupation of mountain tops by communities that historically use natural resources, the designation of that area as Priority for Conservation becomes essential, considering even to take into account Environmental Perception of local communities as an additional criterion. It is worth noting that it has been statistically and qualitatively proven that all communities possess a substantial knowledge of the fauna and flora of the Mountain Range Complex João do Vale, a relevant factor for the environment conservation process of this area.

4. FINAL CONSIDERATIONS

Environmental perception and the local empirical knowledge of the community that inhabits the Mountain Range Complex João do Vale proved to be relevant as additional criteria for the definition of Priority Areas for Conservation, since the respondents have knowledge of that environment and recognize the best area to be preserved in this Complex.

The community expressed concerns with conservation actions and a vast knowledge on the natural resources from where they live. The majority of respondents know local fauna and flora, mentioning a large number of species, as well as the uses assigned to them, being the medicinal use the most mentioned for

flora, and food for fauna.Statistically, local knowledge did not differ regarding gender, for both men and women showed a wealth of knowledge on the species.

The respondents were favorable as to the importance of demarcating an exclusive area for conservation in this Complex. The significant difference in the level of education among those who could not answer the questionnaire and those who answered it may explain the absence of most answers.

The popular knowledge of the local community, together with landscape analysis, gave support to the definition of Priority Areas in the Mountain Range Complex. Slope and environmental vulnerability maps permitted to identify that areas with high slopes (“grotas”) are a limiting factor for its occupation by communities and therefore relevant and capable of being conserved, as suggested by the community, which indicated “the grotas" as areas designated for conservation.

Permanent Preservation Areas proved to be relevant from a conservation point of view.By law,they should be protected, but due to the occupation by the local community at the top of the Mountain Range Complex they are totally unprotected and vulnerable.

The Priority Area for Conservation map of the Mountain Range Complex João do Vale highlights three degrees of priority: low (plateau and depression areas), medium (caatinga tree-shrub vegetation areas) and high (steep areas with vegetation predominant to typical mountainous environments), which proved to be representative and relevant to the conservation of natural resources, considering that these mountainous environments house a great biodiversity and have endemic species.

Therefore, as additional to criteria of biodiversity (richness of species, endemism and/or endangered species) terms should be inserted environmental perception studies of local communities and landscape analysis as relevant Conservation subsidies, particularly in the case this Mountain Range Complex João do Vale, which is essential for creating of Priority Area for Conservation area exception amidst the Caatinga.

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ENVIRONMENTAL PERCEPTION OF RURAL COMMUNITIES AND ANALYSIS OF LANDSCAPE: SUBSIDIES FOR PRIORITY AREA FOR CONSERVATION PROPOSITION IN THE RIO GRANDE DO NORTE SEMIARID, BRAZIL

Appendix 1: Animals cited by the local community of João do Vale Mountainous Complex, according to the vernacular name, scientific identification, number of citations and value categories or related use (1 – Trade, 2 - medicinal, 3 - food, 4 - to be planted at home, 5 - only occurrence, without value or use).

VERNACULAR NAME / SCIENTIFIC / FAMILY	N°	USE				
BIRDS	**MENTIONS.**	**1**	**2**	**3**	**4**	**5**
Guira Cuckoo/ Anun branco/ *Guira guira* Gmelin, 1788/ Cuculidae	1					1
Eared dove/ Arribaçã/ *Zenaida auriculata* (Des Murs, 1847)/ Columbidae	9			2	1	6
Picazuro Pigeon/ Asa branca/avoeta/*Patagioenas picazuro* (Temminck, 1813)/ Columbidae	2					2
Ultramarine Grosbeak/ Azulão/ *Cyanoloxia brissonii* (Lichtenstein, 1823)/ Cardinalidae	3				1	2
Glittering-bellied Emerald/ Beija-flor-do-bico-vermelho/ *Chlorostilbon lucidus* (Shaw, 1812)/ Trochilidae	1					1
Great Kiskadee/ Bem-ti-vi/ *Pitangus sulphuratus* (Linnaeus, 1766)/ Tyrannidae						
Ferruginous pygmy owl/ Caboré/ *Glaucidium brasilianum* (Gmelin, 1788)/ Strigidae	3				1	2
Saffron finch/ Canário-da-terra/ *Sicalis flaveola* (Linnaeus, 1766)/ Emberizidae	1					1
White-naped Jay/ Cancão/ *Cyanocorax cyanopogon* (Wied, 1821)/ Corvidae	3					3
Campo Troupial/ Concriz/ *Icterus jamacaii* (Gmelin, 1788)/ Icteridae	5					5
Chopi blackbird/ Craúna/ *Gnorimopsar chopi* (Vieillot, 1819)/ Icteridae	5				1	4
Barred antshrike/ Chorró/ *Thamnophilus capistratus* Lesson, 1840/ Thamnophilidae	2					2
Chupa-caju*	1					1
Campo Troupial/ Curupião/ Corrupio/ *Icterus jamacaii* (Gmelin, 1788)/ Icteridae	1					1
Spot-backed puffbird/ Fura-berreira/ *Nystalus maculatus* (Gmelin, 1788)/ Bucconidae	6					6
Savanna Hawk/ Gavião vermelho/ *Heterospizias meridionalis* (Latham, 1790)/ Accipitridae	1					1
Red-cowled cardinal/ Galo-de-campina/ *Paroaria dominicana* (Linnaeus, 1758)/ Thraupidae	2					2
White-throated Seedeater/ Golinha/ *Sporophila albogularis* (Spix, 1825)/ Emberizidae	30				3	27
White-browed Guan/ Jacu/ *Penelope jacucaca* Spix, 1825/ Cracidae	8				1	7
White-tipped Dove/ Juriti/ *Leptotila verreauxi* Bonaparte, 1855/ Columbidae	4					4
Small-billed tinamou/ Lambu/ *Crypturellus parvirostris* (Wagler, 1827)/ Tinamidae	17			6	1	11
Blue-Fronted Amazon/ Louro/ *Amazona aestiva* (Linnaeus, 1758)/ Psittacidae	19			9		9
Dark-billed cuckoo/ Papa-lagarta/ *Coccyzus melacoryphus* Vieillot, 1817/ Cuculidae	5					5
Cactus Parakeet/ Periquito-da-caatinga/ *Aratinga cactorum* (Kuhl, 1820)/ Psittacidae	1					1
Yellow-faced Siskin/ Pinta-silva/ *Sporagra yarrellii* (Audubon, 1839) **/** Fringilidae	4					4
Picui ground dove/ Rolinha-branca/ *Columbina picui* (Temminck, 1813)/ Columbidae	6					6
Scaled Dove/ Rolinha cascavilha/ *Columbina squammata* (Lesson, 1831)/ Columbidae	20			2	1	17
Chalk-browed Mockingbird/ Sabiá/ *Mimus saturninus* (Lichtenstein, 1823)/ Mimidae	1					1
Sansu/ sansu do brejo*	9					9
Red-legged seriema/ Siriema/ *Cariama cristata* (Linnaeus, 1766)/ Cariamidae	10					10
Solitary cacique/ Xexéu/ *Procacicus solitarius* (Vieillot, 1816)/ Icteridae	2					2
* Species unknown to expert	3					3
REPTILES						
Tropical house gecko/ Briba/ *Hemidactylus mabouia* (Moreau de Jonnès, 1818)/ Gekkonidae	1					1
Calango/ *Ameivula ocellifera* (Spix, 1825)/ Teiidae						
Green iguana/ Camaleão/ *Iguana iguana* Linnaeus, 1758/ Iguanidae	1					1
Cágado*	26		1	1		26
Cobra salamanta/ *Epicrates assisi* Machado, 1945/ Boidae	4					2
Cobra-de-viado/ *Boa constrictor* Linnaeus, 1758/ Boidae	19		8			19
Mexican vine snake*/ Cobra-cipó/ *Oxybelis aeneus* (Wagler, 1824)/ Colubridae	35					27
Greem snake/ Cobra-corre-campo/*Philodryas nattereri* Steindachner, 1870/ Dipsadidae	3					3
Coral snakes/ Cobra coral/ *Micrurus ibiboboca* (Merrem, 1820)/ Elapidae	1					1
Tropical rattlesnake/ Cobra cascavel/ *Crotalus durissus cascavella* Wagler, 1824/ Viperidae	16					16
Caatinga lancehead/ Cobra jararaca/ *Bothrops erythromelas* Amaral, 1923/ Viperidae	63		8			55
Worm-lizard/ Cobras-duas-cabeça/ *Amphisbaena alba* Linnaeus, 1758/ Amphisbaenidae	44					44
Boa constrictor/ Cobra jibóia/ *Boa constrictor constrictor Linnaeus, 1758/ Boinae*	3		1			3
Green snakes/ Cobra tabuleiro/ *Philodryas nattereri Steindachner, 1870/* Philodryadini	11					10
Coral preta*	3					3
Coral vermelha*	1					1
Iguana/ Lagartixa/ *Tropidurus hispidus*(Spix, 1825)/ Tropiduridae	1					1
Argentine black and white tegu/ Tejo/ *Salvator merianae* Duméril & Bibron, 1839/ Teiidae	1					1
*Species can correspond to several ones in region, according to E. Freire	100	5	13	20		62
MAMMALS						
Little Grison/ Furão/ *Galictis cuja* Molina, 1782/ Mustelidae	4					4
White eared Opossum/ Gambá/ *Didelphis albiventris* Lund, 1840/ Didelphidae	18			2		16
Eyra cat/ *Gato-vermelho/ Puma yagouaroundi* (É. Geoffroy, 1803)/ Felidae	8			1		7
Tiger cat/ Gato-do-mato/ *Leopardus tigrinus* (Schreber, 1775)/ Felidae	38	2	1			35
Crab-eating raccoon/ Guaxinim/*Procyon cancrivorus* (G. Cuvier, 1798)/ Procyonidae	19		1		1	17
Capuchin Monkey/ Macaco/ *Sapajus xanthosternos* (Wied-Neuwied,1826)/Cebidae	43		1		1	41
Rock cavy/ Mocó/ *Kerodon rupestris* (wied, 1820)/ Caviidae	59	7	6	25		21
Jaguar/ Onça/ *Panthera onca* (Linnaeus, 1758)/ Felidae	2					2
Spix's yellow-toothed cavy/ Preá/ *Galea spixii* (Wagler, 1831)/ Caviidae	93	10	2	38		43
Common punare/ Punaré/ *Thrichomys apereoides* (Lund, 1839)/ Echimyidae	31	1		9		21
Crab-eating fox/ Raposa/ *Cerdocyon thous* (Linnaeus, 1766)/ Canidae	71		4		1	66
Red-nosed mouse/ Rato/ *Wiedomys pyrrhorhinus/* Muridae	4					4
Common marmoset/ Soinho/ *Callithrix jacchus (Linnaeus, 1758)/* Callithrichidae	9	1				8
Striped hog-nosed skunk/ Tacaca/ *Conepatus semistriatus* (Boddaert, 1785)/ Mustelidae	102	1	3	22		76
Collared anteater/ Tamanduá-pequeno/ *Tamandua tetradactyla* (Linnaeus, 1758)/ Myrmecophagidae	165	6	5	68		86
Brazilian three-banded armadillo/Tatu-bola/ *Tolypeutes tricinctus* (Linnaeus, 1758)/ Dasypodidae	217	9	4	123		81
Nine-banded armadillo/ Tatu-verdadeiro/ *Dasypus novemcinctus* (Linnaeus, 1758)/ Dasypodidae	198	9	7	99		83
AMPHIBIANS						
Toad/ Sapos/ *Rhinella jimi* (Stevaux, 2002)/ Bufonidae	1					1
FISH						
butterfly peacock bass/ Tucunaré/ *Cichla ocellaris* (Schneider, 1801)/ Cichlidae	1					1
ARACHNIDS						
Brazilian Salmon Pink Bird-eating Tarantula / Aranha caranguejeira/ *Lasiodora sp./* Theraphosidae	1					1

Source: Field Research, 2011.

ENVIRONMENTAL PERCEPTION OF RURAL COMMUNITIES AND ANALYSIS OF LANDSCAPE: SUBSIDIES FOR PRIORITY AREA FOR CONSERVATION PROPOSITION IN THE RIO GRANDE DO NORTE SEMIARID, BRAZIL

Appendix 2**:** Plants mentioned by local community of João do Vale Mountainous Complex, according to the vernacular identification, scientific, number of citations and value categories or related use (1 - food, 2 - trade 3 - medicinal, 4- occurrence only, without value or use).

VERNACULAR NAME / TYPE / FAMILY	Nº MENTIONS	USES ASSIGNED			
		1	2	3	4
Urunday/ Aroeira/ *Myracroduon urundeuva* Allemão/ Anacardiaceae	88			3	17
Tiger lily/ Anil/ *Lilium L.*/ Liliaceae	1				1
Garden Angelica/ Angélica/ Angelica archangelica/ Umbelíferas	1			30	1
Sea lemon/ *Ameixa/ Ximenia americana* L./ Olacaceae	55				25
Guava tree/ *Araçá/ Psidium sp*/Myrtaceae	2			9	2
Wilco/ Angico/ *Anadenanthera colubrina* (Vell.) Brenan/ Mimosaceae	32				23
Mesquite/ Algaroba/ *Prosopis juliflora* (Sw.) DC./ Mimosaceae	2			1	2
Quebracho/ Baraúna/Braúna/ *Schinopsis brasiliensis* Engl./ Anacardiaceae	2				1
Silk floss tree/ *Barrigudinha/ Chorisia pubiflora* (A. St.-Hil.) E.Y. Dawson/ Bombacaeae	1				1
Indian jalap/ Batata-de-purga/ *Operculina macrocarpa* (Linn) Urb./ Convolvulaceae	3				3
Balso*	1			1	1
Broom weed/ Bassourinha/ Scoparia dulcis L./ Plantaginacea	1			1	23
Bugi/ *Arrabidaea díspar/* Combretaceae	1			71	10
Balsam of Peru/ Brejuí/ *Myroxylon peruiferum* L. f./ Faboideae	94				1
Big sage/ Camará/ *Lantana camara* L./ Verbenaceae	10				20
Catanduba/ *Piptadenia moniliformis* Benth./ Fabaceae	1			7	1
Catingueira/ *Caesalpinia pyramidalis* Tul./ Fabaceae	27				6
Castor oil plant/ Carrapateira/ *Ricinus communis* L./ Euphorbiaceae	1			2	7
Cabeça-de-negro/ *Apodanthera congestiflora* Cogn./ Cucurbitaceae	8			5	1
Bristly Starbur/ Carrapicho-cigano/ Carrapicho-ciagano/ *Acanthospermum hispidum* DC./ Asteraceae	5				1
Catolé/ *Syagrus cearensis/* Arecaceae	8			1	18
Carnauba palm/ Carnaúba/ *Copernicia prunifera* (Mill.) H.E. Moore./ Arecaceae	1				1
Fern tree/ Caroba/ *Jacaranda mimosaefolia*/ Bignoniaceae	1				2
Cashew tree/ Cajueiro/ *Anacardium occidentale* L./ Anacardiaceae	49			31	16
Capiraba*	1				19
Capim-de-cigano*	1			1	1
Cativo*	2				4
Coração de Nego/ *Connarus suberosus* (Planch.)/ Connaraceae	19			3	1
Cumaru/ *Amburana cearensis* (Allemão) A.C.Sm./ Faboideae	72			53	9
Embiratã/ *Pseudobombax marginatum* (A. St.-Hil., Juss. & Cambess.) A. Robyns/ Malvaceae	5			4	2
Tasmanian Blue Gum/ *Eucalyptus globulus* Labill/ Myrtaceae	5				3
Espinho de cruz*	1			1	2
Frei-jorge/ *Cordia insignis/* Boraginaceaea	13				16
Jamaican Caper/ Feijão-bravo/ *Capparis cynophallophora* L./ Brassicaceae	3			4	15
Gameleira/ *Clusia burchellii* Engl./ Clusiaceae	1			1	2
Guaribara*	3			1	8
Brazilian pawpaw/ Graviola/ *Annona muricata* L./ Annonaceae	2				10
Imburana/ *Commiphora leptophloeos* (Mart.) J.B. Gillett/ Burseraceae	25				9
Jatobá/ *Hymenaea SP/* Leguminosae	54			9	151
Brazilian Grape Tree/ Jabuticaba/ *Myrcia cauliflora* Berg/ Myrtaceae	2			39	4
João Mole/ *Pisonia tormentosa* Casar/ Nictaginaceae	10				14
Leopard tree/ Jucá/ Pau-ferro/ *Caesalpinia ferrea* Mart./ Fabaceae	14			2	3
Juazeiro/ *Ziziphus joazeiro* Mart./ Rhamnaceae	17			4	2
Tepezcohuite/ Jurema preta/*Mimosa tenuiflora* Willd.(Poir)/ Mimosaceae	185			8	1
Jurema branca/ Mimosa hostilis (Mart.) Benth./ Mimosaceae	6		1	34	7
Jurubeba/ *Solanum sp.*/ Solanaceae	15			2	3
Bay leaf/ Louro/*Laurus mobilis L. /* Lauraceae	4			1	2
Limãozinho*/ *Fagara rhoifolia* Engl./ Rutaceae	3			1	88
Macará*	1			1	1
Maniçoba/ *Manihot pseudoglaziovii* Pax et K. Hoffman/ Faboideae	8				1
Mango/ *Mangifera indica* L/ Anacardiaceae	3			1	1
Cardeiro/ *Cereus jamacaru* DC./ Cactaceae	2				11
Marmeleiro/ *Croton blanchetianus* Baill./ Euphorbiaceae	102				6
Marmeleiro-branco/ *Croton sp./* Euphorbiaceae	1			14	1
Mariponga*	1				2
Blood berry/ Maria preta/ *Cordia globosa* (Jacq. Kunth.)/ Boraginaceaea	1				2
Mofumbo/ *Combretum leprosum* Mart/ Combretaceae	14				5
Mororó-preto/ *Bauhinia cheilantha* (Bong.) Steud./ Fabaceae	9			3	
Mulungu/ Erythrina velutinaWilld./ Fabaceae	2			2	2
Niaré*	2				5
Licania/ Oiticica/*Licania rigida* Benth/ Chrysobalanaceae	2			1	1
Lavender Trumpet Tree/ Pau-d'arco roxo/ *Tabebuia impetiginosa* (Mart. ex DC.)Standl./ Bignoniaceae	5				17
Pau pedra/ *Luetzelburgia auriculata* (Allemão) Ducke/ Fabaceae	2				1
Papacunha/ *Hybanthus calceolaria* (L.) Oken / Pau-de-serrote*	16				
Pereiro/ *Aspidosperma pyrifolium* Mart./ Apocynaceae	1				2
Peroá*	20			1	2
Pitiá*/ *Aspidosperma multiflorum* A.DC./ Apocynaceae	1			11	3
Sugar-apple/ Pinha/ *Annona sp./* Annonaceae	1			3	44
Pinhão-brabo/ *Jatropha mollissima* (Pohl) Baill./ Euphorbiaceae	2				1
Wild honey-tree*/ Pitumbeira/ Casearia decandra Jacq	3			1	
Podóia/ Podói/ *Copaifera langsdorffii Desf.* / Fabaceae	6				1
Quebra-foice/ *Luetzelburgia harleyi* D. B. O. S. Cardodo et al./ Fabaceae	49			1	23
Jungleplum/ Quixabeira/ *Sideroxylon obtusifolium* (Humb. ex Roem. & Schult.) T.D. Penn./ Sapotaceae	1			3	1
Sucupira/ *Bowdichia virgilioides Kunth*/ Fabaceae	7			5	7
Purple mombin/ Siriguela/ *Spondias purpurea* L/ Anacardiaceae	45				1
Pacara Earpod Tree/ Timbaúba/ *Enterolobium contortisiliquum* (Vell.) Morong/ Fabaceae	1				1
Tira-fogo*	7			6	2
Ubaia*	1			22	6
Cat's claw creeper/ Unha de gato/ *Dolichandra unguis cati*/ Bignoniaceae	1				25
Nettle/ Urtiga/ *Cnidoscolus urens* (L.) Arthur/ Euphorbiaceae	2				5
Canopyu/ Velame/ *Croton heliotropiifolius* Kunth./ Euphorbiaceae	7				
Xiquexique/ *Pilosocereus gounellei* (F.A.C. Weber) Byles & G.D. Rowley/ Cactaceae	29			1	
	5			4	

*Unknown species to expert

Source: Field Research, 2011.