

# Ethnozoological Annotations on Wild Mammals from the Gulf of Morrosquillo, Sucre, Caribbean, Colombia

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## Abstract

**Objective:** An ethnozoological evaluation was carried out on the wild mammals to establish the regional link between the fauna and human populations. **Methods/Statistical Analysis:** The study area was located in the Morrosquillo sub-region of Sucre, Caribbean, Colombia, and was carried out between November, 2017 and March, 2018. The information on exploitation and other considerations, along with the analysis of the obtained data, was gathered with the application of 100 semi-structured surveys, with  $p = 0.05$ , alpha 99% and  $d = 5\%$ . For the determination of the species of wild mammals, an illustrated catalog was developed, which sought to facilitate the identification of the collected species. For the analyzes, descriptive statistics were used and the following were calculated: Cultural Importance Index and Total Cultural Importance Index. **Findings:** 22 species in 13 ethnozoological categories were identified, of which the most significant in terms of number of associated mammals were trade, pet and consumption species; in addition, the cultural importance for *Sylvilagus floridanus* and *Notosciurus granatensis* was noteworthy; the latter had the largest number of linked ethnozoological categories. **Application:** From the conservationist point of view, knowledge on a given area in terms of the human-wildlife relationship is very important, especially when taking into account perceptions that come from culture, economy, history, society and individual thought, which are also related to the biological characteristics of harvested species or other considerations.

**Keywords:** Exploitation, Caribbean, Colombia, Ethnozoology, Wild Mammals

## 1. Introduction

Traditionally, in Latin America, the use of faunal resources by communities is linked to the selective use of species, such as food, scientific, commercial, pet and ornamental, ecological, educational, ethical, medicinal, political, traditional, religious, and recreational, among others<sup>1-4</sup>. This use has played a transcendental role in the sociocultural aspects of human populations<sup>5,6</sup>, relying on various social, economic, cultural and environmental factors<sup>7</sup>. It is also important to point out that different human groups, especially those located in rural or jungle areas, possess valuable knowledge on the diversity of their natural resources and uses specific to the animal species<sup>1</sup>; the collection of this knowledge is valuable, serving as a primordial tool in conservation processes<sup>7</sup>.

Studies on culture and fauna diversity are very important<sup>6,8</sup>. However, in Colombia, ethnozoological research has not been fully integrated<sup>1</sup>, even though Colombian human societies have placed significant importance on fauna, which has been directly involved in their development<sup>9</sup>.

These contributions have been notable in the departments Caldas<sup>10</sup>, Chocó<sup>11</sup>, Cundinamarca<sup>12</sup>, Orinoquia and Amazonia<sup>13-15</sup>, Quindío<sup>16</sup>, Risaralda<sup>17</sup> and Valle del Cauca<sup>18</sup>. Studies have provided data on relationships and the importance of wildlife for some communities in Colombia and for the possible implications of traditional knowledge in aspects related to conservation of natural resources that contribute to their livelihoods<sup>1</sup>.

However, Colombian research on this subject for mammals is sporadic, providing few details on related aspects<sup>19,20</sup>, which is unfortunate because they form one

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of the most conspicuous groups of terrestrial vertebrate communities<sup>21</sup>; in addition, they form part of the environmental, social and cultural aspects of communities; roles that are not understood because characteristics such as size, behavior and conspicuity are not known<sup>16</sup>. Different studies have shown that there is a general preference for wild mammals as a group<sup>22</sup>.

In the Department of Sucre, Caribbean region of Colombia, the ethnozoological perspective has focused with great emphasis on patterns of use, importance and use of wildlife by the inhabitants of the geographical sub-regions Montes de María, Mojana and San Jorge<sup>4,22-27</sup>, but there is little information related to the ethnozoology of wild mammals in the area<sup>28,29</sup>.

In this research, an evaluation was carried out on the uses and considerations of mammals in the Morrosquillo sub-region of Sucre, Colombia to identify valued species using ethnozoological categories while determining the mammal species with the greatest cultural importance at the local and sub-regional levels. Finally, the cases of ethnozoological exploitation were described according to the study locations.

## 2. Materials and Methods

### 2.1 Study Area

This research was carried out in the Gulf of Morrosquillo sub-region in the north of the Department of Sucre, Colombia (9°35'00 "N and 75°40'00" W), which covers an approximate area of 1,886 km<sup>2</sup>. Phytoclimatically classified as a tropical dry forest<sup>30</sup>, part of the Caribbean.

### 2.2 Description of Categories

Aphrodisiac: consumption to increase sexual desire. Amulet: attributed to animal magical power, protection or luck. Artisanal: for handmade manufacture of various objects; Commercial: can be bought or sold; Consumption: food; Pet: pet animals; Medicinal: use of parts as medicine; Ornamental: used as an ornament or decoration; Conflict: animal whose behavior can affect humans; Protection: used to care for residential or production areas; Taxidermy: conservation of stuffed animals; Taboo: Prohibition or prejudices of a social nature respecting the animal; Breeding: captive breeding of wild animals.

### 2.3 Fieldwork

The fieldwork was developed from November, 2017 to March, 2018. In each of the five municipalities that make up the Gulf of Morrosquillo sub-region: Coveñas, San Antonio de Palmito, San Onofre, Santiago de Tolú and Toluviéjo, information related to the ethnozoological aspects was sought<sup>31</sup>. Subsequently, to start sampling, the first person was selected at random and the Snowball criterion was applied, with the purpose of using as many references as possible<sup>6</sup>. Semi-structured surveys were applied as the main instrument for obtaining the required information<sup>32</sup>, with special designs and modifications for the study type<sup>33-35</sup>.

Parallel to the survey application, an illustrated catalog of species of the regional wild mammals was created, which was based on a bibliographic search, to aid in the identification of the harvested species<sup>22,25,27</sup>. The taxonomic classification was based on related studies<sup>36,37</sup>.

For the calculation of the representative sample for finite populations<sup>38</sup>, a sample of 500 persons of a legal age, previously identified as potential users of the wild fauna resource, was taken into account, with  $p = 0.05$ , alpha 99% and  $d = 5\%$ , which resulted in a total of 100 surveys that were applied randomly. With the permission of the subjects, it was decided to document the ethnozoological exploitation with photographic evidence in order to be certain of the assessment.

### 2.4 Data Analysis

Percentage calculations were carried out and the Cultural Importance Index (IIC) was used<sup>16</sup> in order to estimate the cultural value of the species, which was calculated with the equation  $IIC = (Iu + Nr)/Neu$ , where  $Iu$  was the intensity of use per species (number of uses),  $Nr$  the number of reports, and  $Neu$  the number of useful species. This index goes from 0 to 1, with 1 being a highly used species.

## 3. Results

The demographic information obtained with the surveys showed an illiteracy rate of 35% and occupations that included: Not defined or various tasks (28%), farmer (18%), fisherman (12%), trader (10%), transporter (8%) and hunter (5%) (Table 1).

**Table 1.** Social and cultural aspects of the respondents

Aspects	Results %
Generic distribution	Men = 74. Women = 26.
Age ranges (years)	14 – 34 (31), 35 – 55 (23), 56 – 76 (32) 77 + (14).
Education level	None of them (35), basic (14), media (33), higher (18).
Ethnic identity	Indigenous (Zenú) (36), mestizo (33), afrodescendants (31).

22 species with ethnozoological value were registered, in agreement with the 13 proposed ethnozoological categories. The ethnozoological categories to which more mammals were added were commercial or pets (12 species) and consumption (11 species) (Table 2). Likewise, the data for the species used ethnozoologically with the Index of Cultural Importance - IIC, are presented in Table 2. *Sylvilagus floridanus* (Eastern Cottontail) was the most important species, followed by *Notosciurus granatensis* (Red-tailed Squirrel).

Aphrodisiac powers are conferred to the flesh of *Didelphis marsupialis*. Sporadic consumption data of *Coendou prehensilis* and *Notosciurus granatensis* were recorded, being a viable option in times of food scarcity. For meat consumption, the desired species included: *Odocoileus cariacou*, *Dasybus novemcinctus*, *Silvilagus floridanus*, *Hydrochoerus isthmus*, *Cuniculus paca*, *Pecari tajacu* and *Dasyprocta punctata*. Primate neonates and juveniles are commercialized as pets, including: *Aotus lemurinus*, *Alouatta seniculus*, *Saguinus oedipus* and *Cebus capucinus*. There is sporadic consumption of *A. seniculus* meat, which does not taste very pleasant unless it is properly seasoned.

Amulets for good luck and protection arise from cultural perceptions of the power of nature and wildlife; some body parts of certain species can be used for that purpose. *D. novemcinctus* tails are kept by hunters for luck in subsequent hunts of the same species although others display them in their homes as an object of ornamentation. For *S. floridanus*, the legs and ears are preserved by hunters and non-hunters for good luck; live individuals of *A. seniculus* are kept in captivity as a means of protection from evil or witchcraft.

Some mammals are considered charismatic and, therefore, can sometimes be used as pets, captured and maintained, sometimes without age distinction, including

the above-species and *S. floridanus*, *Bradypus variegatus*, *Choloepus hoffmanni* and *N. granatensis*.

*Desmodus rotundus* and *D. punctata* are the two species used for medicinal purposes; the first is used to treat asthma with a broth made from its meat; while the latter is used to avoid pregnancy by consuming a brew composed exclusively of the bile of the animal; however, this species is also used as a pet.

*Cercodyon thous* is considered an animal that protects people from other animals; however, it is viewed as dangerous, leading to the capture of pups to be raised as pets.

The carnivores *Leopardus pardalis*, *Puma concolor* and *Procyon cancrivorus* are seen as problematic and hunted as a control measure; in some cases, the hide was removed for exhibition and/or sale locally. *L. pardalis* is also used as a pet.

The “problem species” include *D. rotundus*, *D. marsupialis* and *N. granatensis*; the first transmits rabies to cattle, the second consumes poultry, and the third tends to damage crops, especially corn; so control is carried out by hunting. Additionally, *N. granatensis* hides are used for ornamental purposes and for the manufacture of key rings with the tail, which is considered an amulet.

Taxidermy, usually considered, incorrectly, locally as embalming, is based on a traditional technique of extracting organs and bones, drying skin and later filling it with items such as bags and pieces of cloth or cotton; this use was observed for *S. floridanus* and *N. granatensis*.

Three species were recorded for the breeding category, with rudimentary and artisanal methods: *D. punctata*, *H. isthmus* and *O. cariacou*, which are used for consumption and sale of meat. In some cases, *O. cariacou* skin is used for making or manufacturing furniture or leather goods. On the other hand, *H. isthmus* (lesser capybara) is also considered a pet.

**Table 2.** Valuation of the categories of use by species and calculation of the Index of Specific Cultural Importance (IIC). [] Status IUCN, AF = Aphrodisiac, AM = Amulet, AR = Artisanal, CM = Commercial, CO = Consumption, MA = Pet, ME = Medicinal, OR = Ornamental, PR = Conflict, PO = Protection, TA = Taxidermy, TE = Taboo, ZO = Breeding

Taxon	Common name	Local name	English common name	Ethnozoological categories										Number of reports	IIC				
				AF	AM	AR	CM	CO	MA	ME	OR	PR	PO			TA	TE	ZO	
Didelphimorphia																			
Didelphidae																			
Didelphis marsupialis Linnaeus, 1758 [LC]	Comadreja grande	Zorra chucha	Common Opossum	x				x						x				3	0,02
Cingulata																			
Dasypodidae																			
Dasypus novemcinctus Linnaeus, 1758 [LC]	Cachicamo	Armadillo	Nine-banded Armadillo															6	0,06
Pilosa																			
Bradypodidae																			
Bradypus variegatus Schinz, 1825 [LC]	Perezoso tridáctilo	Perezoso	Brown-throated Sloth															3	0,02
Megalonychidae																			
Choloepus hoffmanni Peters, 1858 [LC]	Perezoso	Perico ligero	Hoffmann's Two-toed Sloth															1	0,01
Chiroptera																			
Phyllostomidae																			
Desmodus rotundus (É. Geoffroy Saint Hilaire, 1810) [LC]	Murciélago vampiro	Vampiro	Vampire Bat															3	0,02
Carnivora																			
Felidae																			
Leopardus pardalis (Linnaeus, 1758) [LC]	Ocelote	Tigrillo	Ocelot															3	0,04

Taxon	Common name	Local name	English common name	Ethnozoological categories											Number of reports	IIC			
				AF	AM	AR	CM	CO	MA	ME	OR	PR	PO	TA			TE	ZO	
<i>Panthera onca</i> (Linnaeus, 1758) [NT]	Jaguar	Tigre	Jaguar															2	0,01
<i>Puma concolor</i> (Linnaeus, 1771) [LC]	Puma	León	Puma															3	0,02
Canidae																			
<i>Cerdocyon thous</i> (Linnaeus, 1766) [LC]	Zorro perruno	Zorro perro	Crab-eating Fox							x								2	0,01
Procyonidae																			
<i>Procyon cancrivorus</i> (G. Cuvier, 1798) [LC]	Mapache cangrejero	Zorra patona	Crab-eating Raccoon															1	0,01
Artiodactyla																			
Tayassuidae																			
<i>Pecari tajacu</i> (Linnaeus, 1758) [LC]	Pecari de collar	Zaino	Collared Peccary															5	0,03
Cervidae																			
<i>Odocoileus cariacou</i> (Boddaert, 1784) [LC]	Venado cola blanca	Venado cola blanca	White-tailed Deer															9	0,07
Primates																			
Callitrichidae																			
<i>Saguinus oedipus</i> (Linnaeus, 1758)* [CR]	Tití cabeza blanca	Tití	Cotton-headed Tamarin															5	0,03
Cebidae																			
<i>Cebus capucinus</i> (Linnaeus, 1758) [LC]	Capuchino	Carita blanca	Colombian White-faced Capuchin															3	0,03
Aotidae																			

Taxon	Common name	Local name	English common name	Ethnozoological categories											Number of reports	IIC				
				AF	AM	AR	CM	CO	MA	ME	OR	PR	PO	TA			TE	ZO		
<i>Aotus lemurinus</i> (L. Geoffroy, 1843) [VU]	Mono nocturno	Martica	Colombian Night Monkey				x				x							2	0,01	
Atelidae																				
<i>Alouatta seniculus</i> Linnaeus, 1766 [LC]	Mono aullador rojo	Mico colorado	Colombian Red Howler	x			x				x							2	0,02	
Rodentia																				
Sciuridae																				
<i>Notosciurus granatensis</i> (Humboldt, 1811) [LC]	Ardilla cola roja	Ardita	Red-tailed Squirrel	x			x				x							6	0,08	
Erethizontidae																				
<i>Coendou prehensilis</i> (Linnaeus, 1758) [LC]	Puercoespín	Puercoespín	Brazilian Porcupine	x														2	0,01	
Caviidae																				
<i>Hydrochoerus isthmus</i> Goldman, 1912 [DD]	Chigiüro	Ponche	Lesser Capybara				x				x							9	0,07	
Cuniculidae																				
<i>Cuniculus paca</i> (Linnaeus, 1766) [LC]	Paca	Guartinaja	Spotted Paca				x											5	0,05	
Dasyproctidae																				
<i>Dasyprocta punctata</i> Gray, 1842 [LC]	Aguti	Ñeque	Central American Agouti				x				x							5	0,06	
Lagomorpha																				
Leporidae																				
<i>Sylvilagus floridanus</i> (J.A. Allen, 1890) [LC]	Conejo castellano	Conejo	Eastern Cottontail	x			x				x							20	0,16	

## 4. Discussion

The social information regarding the demographic aspects and the occupational activities of the sample of respondents of this research agrees with that determined regionally, with a high illiteracy rate, higher than the country's average<sup>6,27,35,39</sup>.

A difference in the disposition and the informative contribution of men with respect to women was evidenced. Males have greater access to resources as a function of the division of labor and social roles<sup>6,35</sup>.

It is important to highlight the role of age, economy and education of the participating individuals. The information was obtained mostly from older adults whose activities impart a broader life history in relation to ethnozoological interactions<sup>22,24,25</sup>.

The participation of Zenues inhabitants in the study area was of great interest, with an undeniable ancestral interaction between this indigenous community and nature in addition to the transmission of knowledge for use, which other studies have found for other ethnic groups such as the Embera-Katíos settled in the Department of Córdoba<sup>1</sup>; nevertheless, the contribution of multiracial and African-Colombian participants indicated the existence of non-indigenous traditional knowledge on the use of fauna, as well as possible interactions with other popular cultures with knowledge transfer and feedback.

This study provided a clear ethnozoological assessment of the most common species of wild mammals. Previous research has highlighted the use of mammals as compared to all wildlife<sup>6,40-42</sup>, being of great importance to communities, especially rural and indigenous communities, not only because of the direct value from use, but also because they are an integral part of their worldview<sup>1,20</sup>, as shown by the taboo and medicinal categories.

It has been documented that consumption, pet use and commerce stand out as the most conspicuous use categories in human-mammal relationships<sup>6,17,20,22,25,27,29,39</sup>; it is noteworthy that, according to the obtained results, these processes of use are not independent. Some mammals can be traded for consumption, as pets or other uses: ornamentation with the skins for example. However, consumption, which is the most relevant use, is sometimes related to subsistence hunting without commercialization, maintaining an intrinsic relationship between exploitation and the socio-economy of human groups,

where one part is aimed at consumption and another is used as exchange of goods<sup>22,25</sup>.

There are ethnozoological coincidences when comparing the results of this study with the Colombian Andes in Pereira, Risaralda, such as: artisanal, commerce, consumption, pet use, medicinal and ritual, distributed in 25 species, with 48% in common<sup>17</sup>; in Génova, Quindío, the use of 12 species was reported in categories such as food, aphrodisiac, trade, pet, medicinal or ornament, as seen in the present study: *D. punctata*, *D. novemcinctus*, *N. granatensis* and *P. concolor*<sup>16</sup>; in Alcalá, Valle del Cauca, it was recorded that *S. brasiliensis*, *Dasyprocta* sp., *D. novemcinctus* and *D. marsupialis* had the greatest use as meat, with skins, legs and nails extracted to produce crafts and medicinal ointments from species such as *D. marsupialis*, *Metachirus nudicaudatus* and *S. brasiliensis*<sup>18</sup>.

For the Colombian Caribbean, significant coincidences were identified both in the species and the ethnozoological categories, with the main uses being consumption and sale of meat, medicine, pet ownership, conflicts between agricultural production and wildlife, as well as artisanal breeding, ornamental use and recognition of problematic or dangerous species<sup>1,18,20,26,43</sup>. Specifically for the study area, the present study determined a greater number of used species, as well as a greater number of categories of ethnozoological use<sup>22,25,27</sup>.

In general, the IIC per species was relatively low. *S. floridanus* was the most important cultural species since it is used as an amulet, pet, ornament, for trade, consumption and taxidermy. For its part, *N. granatensis* contributed the largest number of ethnozoological categories in this study, which were amulet, artisanal, commercial, consumption, pet, ornamental, problematic and taxidermy. It is recognized that both the rabbits of the genus *Sylvilagus* and squirrels of the genera *Notosciurus* or *Sciurus* are the more important and more recognized species for certain communities<sup>6,17,18,20</sup>, which supports the obtained results and may be associated with its relatively high abundance in the area according to the comments of the participants and personal observations. In addition, for species like these two, of high value and use, it seems logical to indicate an almost complete ethnozoological use with respect to its morphology and anatomy, which suggests that waste is avoided, maximizing utilization.

Although there are general patterns of utilization for the country<sup>44</sup>, at more specific scales, such as regional and local areas, variations can be found that depend on

ecological factors, especially the abundance of the species harvested, the inhabited place and environment, and the social and cultural characteristics of the related human population<sup>20,27,45</sup>.

## 5. Conclusions

When comparing localities and regions, it is not always possible to expect the same species will have the same values of utilization and, sometimes, some may have a greater appreciation even though they are not in the highest scales of use in the country or region. However, it is noteworthy that, in the present study, the local knowledge was extensive.

It is important to note that it is necessary to link traditional knowledge and the perceptions of inhabitants as an important element within the perspectives of scientific studies since they are valuable tools for the development and execution of conservation plans, as well as allowing management and use consolidation.

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