ARE ANIMALS AND FORESTS FOREVER? PERCEPTIONS OF WILDLIFE AT CANTANHEZ FOREST NATIONAL PARK, GUINEA-BISSAU

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ABSTRACT

The world's natural forests, whose rich ecosystems support wildlife and human populations, are declining and facing unprecedented changes. As human population rises and globalization disrupts local and more traditional communities around the planet, the fate of biodiversity seems condemned. It is people's behaviour and the economic and political factors (ethnosphere) who will determine the survival of wildlife and forests. We assessed how local communities living inside the Cantanhez Forest National Park (hereafter CFNP) in Guinea-Bissau Republic (hereafter GB) perceived their faunal and floral *millieux*. We provide a background context of GB and our study site. During data collection we used both qualitative and quantitative methods. Survey questionnaires and interviews were conducted. Regarding the way individuals perceive other animals, we found that aesthetical values of animals overlap survival/economic concerns being the most beautiful animals (e.g. gazelle) simultaneously the most edible. Chimpanzees are considered to be ugly, non-edible and are seen as the non human most similar to humans. Many respondents can not conceive the notion of extinction (of forests and wildlife). Reasons for this will be discussed and final remarks presented.

Key-words: Guinea-Bissau; human dominated landscape; non human primate conservation, local perceptions of wildlife;

1. INTRODUCTION

The world's natural forests, whose rich ecosystems support wildlife and human populations, are rapidly declining (Brooks, Mittermeier, Fonseca,

Gerlach, Hoffmann, Lamoreux, Mittermeier, Pilgrim e Rodrigues 2006). Forest ecosystems are facing unprecedented changes. The biggest challenges currently imposed on wildlife and biodiversity [1] occur in the realm of the larger and complex domain of relationships between ecosystems and human cultures (Davies-Case 2001): *ethnosphere* (Sheridan and Nyamweru 2008). Ethnospheres are defined as political, religious, economical, and normative perceptions and attitudes towards ecosystems and its wildlife (Sheridan and Nyamweru 2008). Ethnosphere may be seen as the sum of *all thoughts, beliefs, myths and institutions made manifest today by the myriad cultures of the world* (Davis 2001:8). Such thoughts incorporate the complex web of human-ecosystem relationships (Garibaldi and Turner 2004) which include human perceptions of wildlife. Humans perceive and value biodiversity and wildlife elements differently (Davis 2001, Casanova 2008). While some animal species may be positively perceived because they can be eaten and do not damage crops or do not compete over natural resources with human populations, others, due to their behaviour (e.g. crop-raiding) may be seen as pests (Davies 2001, Garibaldi and Turner 2004, Gillingham and Lee 2003).

Specific trees may be *valuable* to humans. For instance, in our study site (CFNP) in GB, kapok trees or *poilão* (*Ceiba pentandra*) are seen as *valuable* because these are used to produce traditional soap. *Poilão* is also perceived as a ceremonial tree not only in GB but also in other African countries due to its majestic size and roots, and the shadow its foliage produces. Animistic ritual practices are performed underneath the shadow of *poilões*. Formal traditional power ceremonies may also take place under the shadow of kapok trees or other majestic trees. Palm trees (*Elaeis guineensis)* are also perceived as valuable. These trees are not only used to produce soap but also to produce wine, to build houses, to build small basket containers and to eat (e.g. *chabéu* [2]), among other uses [3].

Ethnosphere knowledge is also important for conservation purposes as it may help to better understand the relationships between humans, ecosystems and wildlife thus allowing for the design of appropriate environmental protection actions (Newmark and Hough 2000). Human cultures are crucial components of nature and wildlife conservation and restoration (Garibaldi and Turner 2004). Both social and ecological dimensions within ecosystems have co-evolved in a balanced way. The maintenance of wildlife and biodiversity by

[1] Animal and plant biodiversity

[2] Typical traditional dish from GB consisting of the rice plus some vegetable items with smoked fish dressed with palm oil previously grinded and cooked

[3] Different attributes and significances can also be given to different landscapes (Casanova 2008).

native communities, for example, has been well documented (Blackburn and Anderson 1993, Anderson 1996, Gadgil, Herman and Reddy 1998, Turner 1999, Minnis and Elisens 2000). Traditional conservation practices are unlikely to be accidental artifacts of specific cultures: they are more likely to be the result of long series of reciprocal evolutionary interactions between ecologically intimate organisms (humans included) over long time spans (Gadgil and Berkes 1991).

Over the years forest perceptions in industrialized countries have changed radically. Post World War II forests were seen as industrial plantations and wood production infrastructures. Between the 50's and the 70's this post war views were began to be seen as ethnocentric (e.g. Eurocentric), derived mostly from capitalist-like economies and lacking in integration of both local and native knowledge (Davies-Case 2011). After the seventies the complexity and resilience of ecosystems were considered but only within the boundaries of the present dominant economic and political, market- and profit-oriented systems (Dowie 2005, Castree 2008, Igoe and Brockington 2007, Fletcher 2010).

Wildlife conservation views can be *traditional* or *new* (e.g. Campbell 2000, 2002). While the former is exclusive and deals with conservation in parks and protected areas, the latter is inclusive, taking into account land use patterns and sustainable use of wildlife (see Western and Wright 1994 for an example). *New* conservation (the counter narrative) argues that wildlife conservation must be a bottom-up process (controlled and managed by the communities acting as *stakeholders* [4]) while the *traditional conservation* is a top-down process [under institutional/state control (Campbell 2000, 2002)].

As human population rises and globalization disrupts local and more traditional communities around the globe, the fate of biodiversity seems to be doomed in a profit driven global economy. Today the threats to biodiversity and wildlife conservation are stronger and broader than even before (Brooks et al. 2006), as difficulties in providing well-being to many human communities increase in spite of humanity's many achievements. Consequently, human–wildlife conflicts are on the rise across Africa (Hill 1998, Madden 2004, Browne-Nuñez and Jonker 2008) as human population rises and demand for land intensifies throughout the continent. Conflict between people and wildlife has become an increasingly important issue for conservationists over the last 30 years, as the need for cultivated land continues to increase rural Africa (Lee et al. 1986, Lee 2010). Much of this conflict takes the form of crop-

[4] A village, group of villages, an individual or group of individuals with shared interests in the resources are considered stakeholders

raiding by wild species. Such conflicts are only predicted to increase further, decreasing land availability for other animals (Lee 2010). Forest systems will likely to be dependent on more and more fragmented patches of land, often already occupied by people.

In addition, many national parks lack funding and law-enforcement. With decreasing budgets and amidst increasing criticism regarding *fortress conservation* approaches (Campbell 2000, 2002; Brockington and Igoe 2007), some protected areas are increasingly adopting *community-based conservation* approaches (Adams & McShane 1992, Adams & Hulme 2001, Bauer 2003, Campbell 2002). Nowadays, even national park managers collaborate with local communities in order to improve conservation effectiveness, with approaches ranging from park outreach to co-management (Barrow & Murphree 2001, Bauer 2003). The concept of conservation implies protection, maintenance, rehabilitation, restoration, enhancement and sustainable use of populations and ecosystems (IUCN 1991). The *conservation narrative* includes several dimensions that range from the ethics of using wildlife as a resource to the ability of a free market economy to adequately regulate wildlife use. Promoting the sustainable use of wildlife by conservation organizations is in part based on the perceived need to give wildlife an economic value (Roe 1991). However, giving wildlife a market value without implementing control regimes might encourage unsustainable exploitation of species (Freese 1996). Furthermore, it has often been assumed - particularly in developing countries - that economic benefits are key to gaining support for conservation. However, this assumption has proven false in some situations (Roe 1991). If economic benefits are not perceived or valued as *significant* by its users, conservation will not be sufficiently supported.

Ultimately, it is people's behaviour towards wildlife that will determine the survival of biodiversity (Lee 2010). Biodiversity, wildlife and human cultures are linked since the decline of biological diversity often means the loss of cultural diversity (Garibaldi and Turner 2004). Understanding the relationships between human settlements, ecosystems, hunting and agricultural patterns is fundamental for predicting the viability of wildlife populations. Positive attitudes towards nature and wildlife may act as good indicators for conservation. Biodiversity conservation works where people have a positive attitude towards nature. Also, if there is a territory rich in biodiversity and where people have positive attitudes towards nature, such area may be a good place to start to conserve. An attitude is a relatively enduring organization of beliefs about an object or a situation predisposing one to respond favourably or unfavourably to a commodity, person, institution or

event. Hence, attitude is an antecedent or determinant of behaviour (Ajzen and Peterson 1988, Rokeach 1966). A positive attitude regarding a specific species may determine its survival [5].

Perceptions (and attitudes) are partly [6] culturally constructed and are influenced by several variables such as age, gender, religious affiliation and ethnic identity (Aslin and Bennett 2000; Bauer 2003; Browne-Nuñez & Jonker 2008; Casanova 2008; Dougherty, Fulton and Anderson 2003; Gillingham and Lee 2003; Hill 1998, 2004; Infield and Namara 2001; Ite 1996; Kuriyan 2004; Lee and Graham 2006; Manfredo and Dayer 2004; Miller and McGee 2000; Noss and Cuéllar 2001; Oba and Kaitira 2006; Oba and Kotile 2001; Sarfo-Mensah and Oduro 2010; Sekhar 2003; Soto et al. 2001; White 1967; Zinn and Pierce 2002).

In this article we examine local perceptions and attitudes towards wildlife and conservation - focusing mainly on non human primates (hereafter NHP) - among local communities living inside a recently created national Park in GB, the CFNP. NHP are of special importance given their IUCN conservation status: for example chimpanzees (*Pan troglodytes verus*) are endangered, Guinea baboons (*Papio hamadryas papio*) are near threatened, black and white western colobus monkeys (*Colobus polykomos*) are considered vulnerable, western red colobus (*Procolobus badius temminckii*) are categorized as endangered and the sooty mangabey (*Cercocebus atys*) is classified as vulnerable. Many of these NHP can be seen in the CFNP. Also, NHP play a special role in the park because one species (the chimpanzee) was chosen as a flag-species by the main local NGO to represent the park (Costa 2010).

The CFNP is an important biodiversity hotspot (Guinean Forest) where other animals are also reported: for example the forest elephants (*Loxodonta africana cyclotis*), leopards (*Panthera pardus*) and manatees [*Trichechus senegalensis* (for a mammal overview in GB see Reiner and Simões 1999)].

The CFNP was established by the governmental organization IBAP (Instituto da Biodiversidade e das Áreas Protegidas), some NGO's (e.g. AD, Tiniguena, etc.) and several communities living inside the CFNP. Part of the CFNP territory (which encompasses ~ 1067.67 km^2) borders with the Republic of Guinea. In the CFNP decision-making processes are in the hand of local traditional authorities. But in the last decades the declining power of traditional

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[5] International conservation organizations and NGO's have already understood the importance of perceptions and attitudes and have tried to influence these via "traditional conservation" and "new conservation" narratives [(Campbell 2000, Bauer 2003) but see also Roe (1991) and Hoben (1996) for examples of different views].

[6] Individual experience also shapes perceptions and attitudes.

institutions has been accompanied by a weakening authority over forests and its resources (Casanova and Sousa 2006 and 2007; Temudo 2009a, 2011). Yet, institutions (traditional and "modern") play a key-role in maintaining the condition of the forests and ecosystem resources by indirectly mediating the effects of social and cultural norms, state policies, technological variables, market levels and demographic pressures (Agrawal 1995, 1996). Local rules and regulations designated by local traditional institutions can be effective in natural resource management because they are considered to be more relevant to local situations and are considered as legitimate by the local communities. On the other hand these regulations and rules are not always combined with effective monitoring and enforcement (Ostrom 2000). Some even argue that *traditional institutions* are relics of the past and are too weak to mediate the underlying drivers of forest and biodiversity degradation today (McKean 2000). The weakening of the culturally-based institutions has been attributed to the adoption of Western religious beliefs, the erosion of traditional environmental knowledge systems, the ethnic diversity and the increased inequality of its users (Fortmann and Nihra 1992).

With this article we aim to provide an overall view of the main variables influencing wildlife perceptions in the CFNP.

The present work is an exploratory and descriptive study of our sample with four major aims:

i) To characterize socio-demographic and economic data (e.g. income and household features, trends between certain variables, material possessions and main income-earning activities);

ii) To characterized diet and nutritional data (e.g. hunting habits inside the CFNP and potential bushmeat practices);

iii) To assess attitudes towards forests and wildlife (e.g. how locals classify wildlife), and to characterized the aesthetical perceptions of wildlife along with the connotations associated with specific species (e.g. pests) and;

iv) To understand if the notion of extinction (wildlife and forest extinction) is present in the communities living inside CFNP.

We expect to find a correlation between the economic data collected (e.g. wealth) and perceptions and attitudes towards the forest and its wildlife. Economic data, especially those regarding wealth, are not easy to measure in some rural African settings as it is the case here. In some of the villages visited (Casanova and Sousa, personal observation 2007) products are exchanged instead of money. Thus, some of the indicators used in industrialized countries (e.g. salary, bank account, etc) were not applicable to this context. On the other hand, the existence of products, material possessions and its circulation can be

seen. For example, in GB not everybody has money to buy houses with zinc roofs but buying a radio or a flashlight does not imply such a great financial burden (as buying a house with zinc roofing). Different degrees of wealth can be identified according to the amount of money needed to acquire material possessions. The amount of material possessions an individual of family has maybe a good indicator of cash crop existence or of other activities that generate economic feedback.

We expect hunting to be common, although not at a professional level. We expect bushmeat practices to be infrequent and a rare phenomenon since we are conducting this study inside a protected area.

We expect to find positive attitudes towards wildlife with the exception of species that crop-raid or may constitute a danger to humans. Regarding NHP, we predict that specific species will be perceived as pests due to stronger crop-raiding behaviour, while others - such as the chimpanzee - although also involved in crop-raiding incidents, may be seen in a more positive way due to (a) their similarity to humans and (b) the fact that crop-raiding damage by them is not as serious as in other NHP [7].

Finally, since we are collecting data in a protected area, we expect the idea of wildlife extinction and forest degradation to be present and to have influence over local attitudes.

Results are expected to vary across ethnic groups and religious affiliation as in other similar conservation settings (Browne-Nuñez & Jonker 2008; Gillingham and Lee 2003; Hill 1998, 2004; Infield and Namara 2001; Ite 1996; Kuriyan 2004; Lee and Graham 2006; Manfredo and Dayer 2004; Noss and Cuéllar 2001; Oba and Kaitira 2006; Sekhar 2003; Zinn and Pierce 2002).

Such hypothesis and predictions are important as these have implications for conservation (Lee 2010).

2. METHODS

2.1 Study area: background and context

Guinea-Bissau is one of the smallest countries in the western coast of Africa, with a total area of 36.120 km^2. It shares its northern border with Senegal and its south-east border with the Republic of Guinea. It is located at 10°55'–12°40'N and 13°38'–16°43'W. The country is made up of the mainland and several offshore islands (Bijago´s Archipelago). The Guinea-Bissau islands are

[7] When crop-raiding on cashew field plantations, chimpanzees are not negatively perceived since they do not eat the nut but only the fruit (Casanova and Sousa, personal observation 2005, Hockings and Sousa 2012).

almost linked to the continent by wide intertidal mud flats. The topography of the country is low-lying, rising eastwards from sea level (highest point at 260m). Small areas of primary subtropical forest (the Guinean Forest which constitutes a biodiversity hotspot) are found in the south-west (Tombali and Quínara regions) and in the north-west (Cacheu region). The biologically richest area of this country, with extensive mangroves, mudflats and sub-humid forest fragments is located on the basin of the Tombali, Cumbija and Cacine rivers, and where the CFNP is located. The CFNP was created in 2007 and is the most recent protected area in GB.

While some advocate that the CFNP is a set of several forest fragments that were once a continuous forested area (e.g. Cleaver 1992), other argue that some forests are the *by-product* of human communities, created and maintained events for several reasons: protection during colonial wars, protection against fire, economic benefits, etc. (Fairhead and Leach 1995, Sheridan and Nyamweru 2008). Since the 15th Century (see D'Almada 1594 or Casanova 2012 for a review of early descriptions of GB) that many parts of Africa have become humanized dominated landscapes with numerous villages, roads, paths, water holes, crops and other signs of human activity.

The Park is composed of a mosaic of different ecosystems. Mangrove swamp rice areas occupy around 8959.499 ha of the CFNP while other food crops occupy ~ 7319.236 ha (Simão et al 2004).

The CFNP is composed of a mix of different forest fragments (ranging from sub-humid forests to dry and disturbed forest), different savannah types and it also contains mangrove. Most questionnaires were conducted in villages near important forest fragments [Amidara fragment (~ 2.507,5 ha), Cambeque fragment (~1.285,5 ha), Canamina fragment (~ 1.067,5 ha), Cibe de Cadique (~ 552,5), Cafatche fragment (~ 457,5 ha), Caghode fragment (~ 442,5 ha), Catomboi fragment (~437,5 ha), Lautchande fragment (~ 405 ha), Madina fragment (~ 402,5 ha), Caiquéne fragment (~ 362,5), Cabum fragment (~ 232,5 ha), Muna fragment (~ 102,5 ha), Cungha fragment (~ 75 ha) and Capicada fragment (~ 47,5 ha)]. These fragments are located in the Central and Southern areas of the CFNP (Simão et al. 2004).

The 2007 population census (INEP/INEC 2007) states that more than 25.000 people living in the CFNP. However, most censuses conducted after colonial times are not considered reliable (Costa 2010). Regardless, it is widely accepted that human populations living inside the CFNP boundaries are rising, hindering conservation.

Several growing settlements near the border with Guinea are mainly inhabited by citizens of Guinea and they are suspiciously looked upon by GB locals.

The CFNP houses a complex mix of many ethnic groups (e.g. Fulbe, Nalu, Susu, Balanta, Tanda, among others).

The diverse range of ethnic groups engage in different agricultural practices ranging from cultivating specialized mangrove swamp rice/paddy rice (performed mainly by Balanta), to rain-fed rice in the uplands (see Temudo 2011 for more details on rice crops)]. The latter implies yearly clearing of forest areas (*shifting*/*swidden* cultivation). Fulbe, Nalu and other ethnic groups use such technique (Casanova 2008). Rice is the major food item in the diet of the communities living in GB [8]. Large cashew-nut plantations are found across the park along with several fruit crops (orchards with orange, lemon, pineapple and other fruits). Some of these cashew-nuts plantations, fruit orchards and rain fed rice plantations (along with cassava, sweet potato and other crops) are located within forest fragments. Apart from protected forest fragments, the CFNP also encloses buffer zones. Very small areas within forest fragments are considered *sacred* [9] since several ceremonial rituals often take place there. Only certain people are allowed to enter these sacred spaces. We were often told by many villagers that people who enter without permission will never come back because the irãs[10] may get upset and punish the *intruders*. Physical access to the different parts of a forest fragment is based on different *degrees of behavioural freedom.*

Some of the crops inside the CFNP (e.g. cashew-nut) are mainly cash-crops (Temudo 2011). As a highly fragmented habitat, the CFNP can be characterized as a human dominated landscape, where both wildlife and humans share and compete for natural resources (Casanova 2008).

The basic social unit in the CFNP (and GB) is the *morança*, a residential area composed of one or more houses and households. Villages in rural areas (*tabancas*) are usually made up of several *moranças*.

The first settlers and traditional owners of CFNP territory (which mainly occupies a large peninsula) are the Nalu and they named the area Cubucaré [Cubucaré Peninsula (CP)]. All other ethnic groups who subsequently settled there are considered *guests*. Although collective use of land occurs in the CP, land use in GB has been suffering under the influence of countless individual and State-driven land processes. During colonial times, specific models were imposed to exploit the land. Today land exploitation continues as a results

[8] When rice is not available, even with other food items available, villagers speak of *hunger* (Costa 2010).

[9] Sacred-forest is a highly dynamic concept (see also Sheridan and Nyamweru 2008). Additionally, spatially speaking, the territory occupied by sacred-forests also changes.

[10] *Irãs* are magical and religious entities that live in the forest. As expected, in many African communities due to marked age roles, elder people can provide more information regarding the *irãs* than young people.

of globalization and neo-colonial impositions [e.g. in the 1980's structural adjustment programs and the market economy were adopted (Temudo 2011)].

In CFNP, resistance to such influences can only be seen in some traditional and local/regional authorities: the *regulados* (chieftaincies). *Regulados* are acknowledged by GB formal and national authorities (e.g. regional and national governments) and pay an important role in decision-making processes regarding land use. *Régulos* (chieftains who have several villages under their authority) and *tabanca chefes* (village chiefs) are the ones who can decide the location of a new *morança*, where crops may be cultivated, the specific kapok (or other) trees that can be cutted and the areas of the forest fragment to be cleared. *Social acceptance* is often the main technique used to enforce this type of local power. The establishment of CFNP changed some of these rules but law and enforcement by governmental authorities are not present in the territory (such control is achieved by co-operation between local authorities and staff from NGO's). The decisions of local authorities are sometimes combined with legal land-possession where administrative processes may contribute to strengthen traditional decisions. Thus, in most of the CP, access to the forest and its resources are still mediated by traditional figures of power.

To certain extend the colonial land reform and "modern" land "rationalization" diminished the importance of traditional rules. The communities within and around the CFNP have been exposed to the erosion of the globalization process and to the market economy values (e.g. forest and wildlife are perceived as *products* that have specific *prices*). In most African countries, common-access forests are frequented by many groups - such as nomadic herders and villagers – who have free access and rights to much of the forest land as long as certain rules are adhered to. Even if local governments state that free access is illegal, the practice is tolerated because it is impossible to police the forest and its borders or because there is an implicit approval (Davies-Case 2011) sometimes even by some State agents. Thus, tribal lands are owned communally and to which usufruct rights are granted to local populations by traditional authorities such as *régulos* and *chefes*. This is the case of the CP where traditional power is recognized and shapes many interactions between the ecosystem and its human communities. Nonetheless the influence of local NGO's in the traditional decision-making processes and its connection to local authorities (Costa 2010, Temudo 2009a) is contributing to the shift in perceptions and attitudes.

In CFNP there are more than thirty sacred sites valued and protected by local people (Costa 2010). Chimpanzees and most NHP can be found in most of CFNP (e.g. colobus monkeys, green monkeys, Guinea baboons, etc.). Other mammals such as buffalos (*Syncerus caffer namus),* Roan antelopes (*Hippotragus*

equinus), warthogs (*Phacochoerus*), bush pigs *(Potomochoerus porcus) and duikers (Cephalophus*) can also be seen. Biodiversity is also rich regarding plant species (e.g. *Anisophyllea laurina*, *Parinari excelsa*, *Dialium guineense*, *Alstonia congensis*, *Albizia gummifera*, etc.) and as mentioned previously, some of these floral species are consumed by both humans and wildlife.

The degradation of numerous forest fragments in the CFNP (Casanova & Sousa 2005, 2006 and 2007), including sacred-forests[11], has led us to think that "traditional" rules and regulations alone are not sufficient to mediate the effect of the increasing demographic and market pressures on local natural resources (Casanova e Sousa 2005, 2006 and 2007).

Swidden (itinerant) cultivation implies that large portions of forest are being cleared every year. The generalized use of rifles for hunting (used also to feed the bushmeat market in the urban areas) is an additional threat to CFNP's wildlife (Casanova & Sousa 2007). Snares can be easily found within CFNP (Casanova & Sousa 2007).

2.2 Data collection

Between 2007 and 2010 we used attitudinal questionnaires (with both open-ended and closed questions) to gather data from villagers belonging to two major ethnic groups living inside the CFNP territory: the Balanta and the Nalu. These two ethnic groups were chosen for specific reasons: the Nalu are the oldest group living in the CP (D'Almada 1594) and thus its people are fairly represented inside the Park and in our sample. Although the Balanta have been present within park boundaries for a lesser time than the Nalu, the Balanta present a very different identity and way of life in comparison to most other ethnic groups living in GB (Cardoso 1996, Pélissier 1989, Temudo 2009b, van Gent and Ukkerman 1993). The Balanta seem to be less affected by external influences [e.g. globalization, Muslim influence, agricultural practices, etc. (Lundy 2012, Temudo 2009b)]. Thus their perceptions towards wildlife and the forest are important to understanding a significant part of the sample population living inside the park and with a different religious affiliation.

Most questionnaires were conducted in villages near important forest fragments (see section 2.1). Surveys were not self-administered since most of our respondents were illiterate. All surveys were conducted by interviewers.

Although the present study was conducted with IBAP's authorization, permission was also sought from the traditional power institutions (*régulos* and *chefes*) and the respondents. Interviewers (N=271) belong to different villages

[11] The today's concept of sacred-forest is not immune to external variables.

(*tabancas*) to ensure that answers would not represent specific villages and to reach as many as different areas of the park as possible.

The surveys focused on the four major dimensions previously mentioned. Control questions were used to triangulate information and to check the reliability of the data provided by respondents. Due to the ethnic diversity within CFNP where many respondents do not speak Creole (the national language), we used both wild and domestic local animal photographs to make sure that both interviewers and respondents were referring to the same animals. Wild and domestic species were randomly selected from a set of reported animals for the region. A control photo with an American mammal (capuchin monkey, *Cebus apella*) was also used. Interpreters were used, especially, but not limited to, when individuals did not speak Creole. Interpreters were instructed on how to ask the questions and all the goals and meanings of each question (and specific words) were previously given.

Our survey sample (N=271) was composed of individuals of both sexes and of different age groups (non-probabilistic quota and multiphase sampling)[12]. The age groups chosen for our study were: 14-19; 20-39 and 40 years old or more (Table 1). The wide intervals between age groups were adopted because many respondents did not know their exact age. Most knew only that they were born in the dry or wet season. Our multiphase sample was a non random procedure which means that our conclusions can not be generalized to the rest of the population living inside CFNP.

As some practices are illegal inside the park territory (hunting specific animals and NHP bushmeat trade) we also conducted semi-structured interviews with local hunters to gather more information on these practices. The interviews (N=32) took place between 2007 and 2010. During this period we went to the field every year and we remained in the field between three weeks to three months, during the dry season (from October to May). Interview scripts were based on topics connected with hunting, bushmeat trade, domestic animals, law enforcement and other park rules. We asked *regulos* and *chefes* to identify the hunters to be interviewed.

2.3 Data analysis

We computed *Kolmogarov-Smirnov Z* to test for data normality and the result was significant (p=0.03) which meant the data were not normally distributed.

[12] We chose a non-probabilistic sample because the total N of people living inside the park was not available. As previously mentioned, current censuses are not reliable and thus probabilistic sample could not be used. Though we did interview respondents of both sexes and of different group ages, we did not match correspondent proportions of the sample population strata with the universe (all people living inside CFNP).

Thus, non parametric tests were used. The *Wilcoxon Mann Whitney-U* test was computed to test for a significant difference between two samples of independent observations. We also computed the *Kruskal-Wallis One-Way Analysis of Variance* for comparing if three or more samples were independent. Results were considered significant when $p \leq 0.05$.

Table 1. Features of non random sample

AGE	Ethnic Group: Nalu		Ethnic Group: Balanta	
	SEX		SEX	
	Male	Female	Male	Female
14-19	25	20	25	20
20-39	30	20	31	20
40 and +	20	20	20	20
Totals	75	60	76	60

3. RESULTS

3.1 Socio-demographic and economic data

Here we present a figure which provides a general overview of the sample population.

Figure 1 presents information about the religious affiliations of the respondents. Contrary to variables such as *ethnic group* (p=0.07) or *age* (p=0.09) belonging to a specific *religious affiliation* did have a significant statistical correlation (p=0.03) with specific answers regarding the way animals are classified and perceived. Thus,

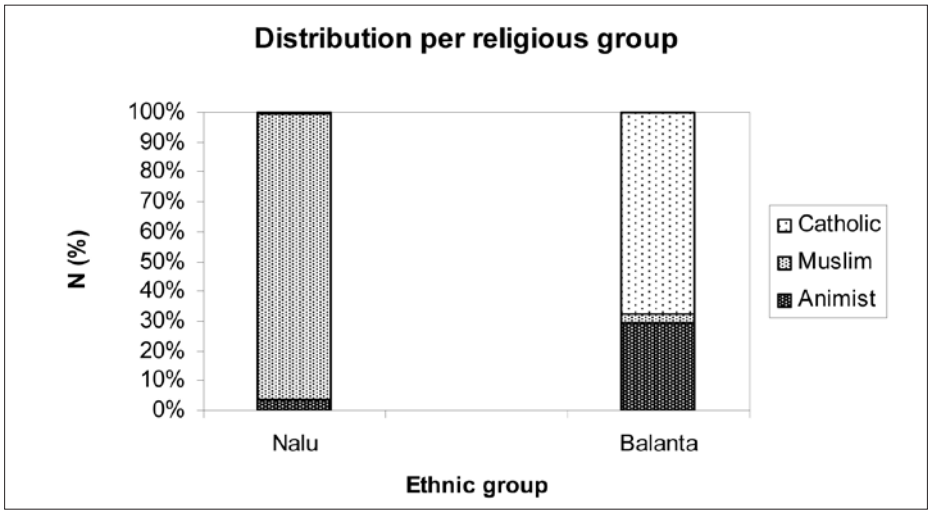

Figure 1: Distribution of Nalu and Balanta per major religious groups (N=271)

all results presented here are mainly connected with the significant statistical differences between the variable *religious affiliation* and a specific variable of our study (e.g. aesthetic value of animals, hunted species, beliefs of forest and animal survival/conservation, etc.). Most responses had a significant statistical correlation with *religious affiliation* [and *gender* (although gender issues will be discussed in a future publication)].

Most Nalu are Muslim while most Balanta are Catholic or Animists. Although most Nalu, identify themselves as Muslims, they also engaged in animistic practices and beliefs, such as various *irãs*. *Irãs* are animistic magic and religious entities. The same was true for most Catholic Balanta. This religious syncretism has been previously described by many authors for this country (e.g. Dias 1956; Gonçalves 1958, 1961; Harrison 1998; Mota 1954). Our data suggests that there may be different Muslim categories because when discussing practices such as eating specific food items and/or earning money from specific activities which are considered inappropriate or unethical according to Islamic principles, while some Muslims were named *pure*, other were called *impure*. Many Muslim respondents draw a straightforward and clear separation between *pure* and *impure* (Casanova and Sousa, in preparation). *Pure* Muslims do not drink alcohol, do not eat warthogs, bush pigs and NHP and are not involved in the bushmeat trade of these species. The *impure* Muslims, however, drink alcohol, eat and/are involved in the bushmeat trade of such species, and such behaviours are tolerated (Casanova 2008).

Figure 2 represents the Nalu's main income-earning activities. Respondents were asked which activity brought the most income to the household. Most

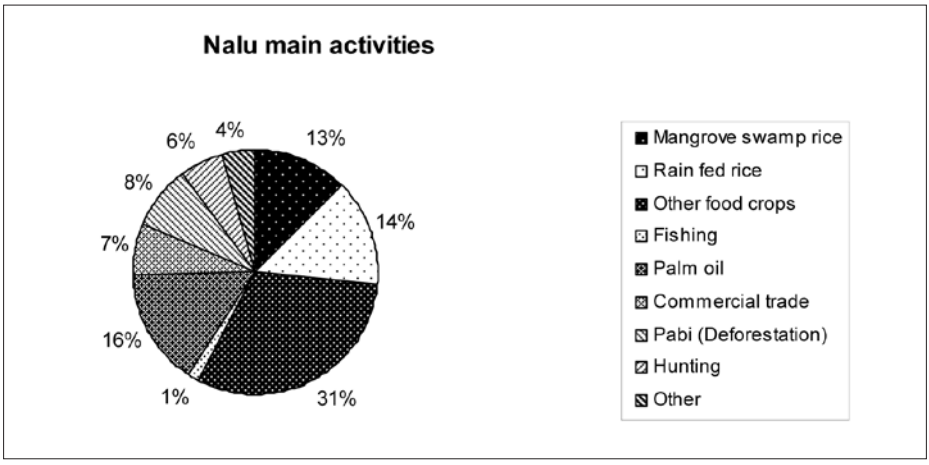

Figure 2: Income per activity among Nalu (n=135)

individuals stated that their crops (e.g. cassava, sweet potato, peanuts, cashew plantation, orchards, etc.) represented the highest income activities earned and flowed evenly by rice crops (mangrove and rain fed) and oil palm production.

Forest clearing[13], commercial trade and hunting also represent important activities (time-consuming) for the Nalu.

Swamp rice (30%) and palm oil production (24%) followed by other food crops provide the most income to the Balanta (Figure 3). Rain fed rice and fishing are also an important source of income for the Balanta. The Balanta rely more on mangrove swamp rice while the Nalu rely on other food crops. Some of these food crops are cash-crops: that is the case of cashew or peanuts (Temudo 2011).

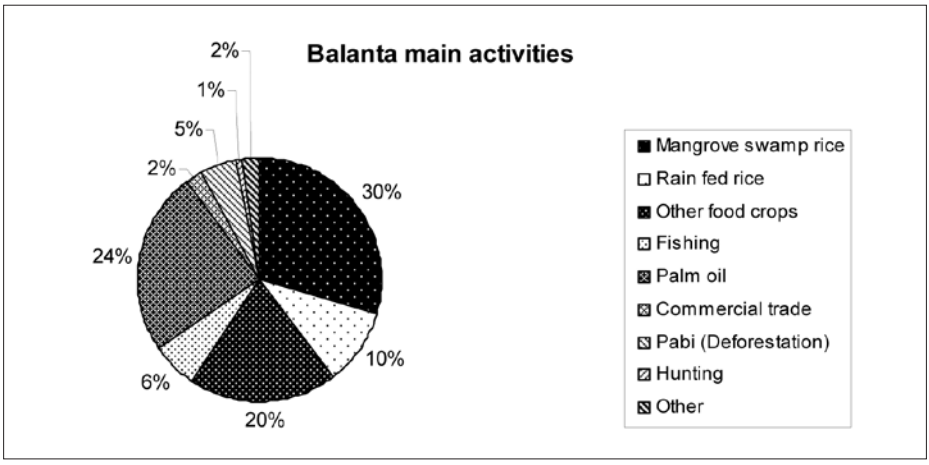

Figure 3: Income per activity among Balanta (n=136)

To measure wealth among both ethnic groups, we asked questions regarding material possessions, such as houses with zinc roofs, the ownership of radios, bicycles, motorbikes, mobile phones or flashlights.

Differences between Nalu and Balanta are significant for almost all items ($p \leq 0.05$). Flashlight ownership represents the most significant difference between both groups ($p=0.031$). Nalu respondents appear to have more material possessions than the Balanta [with the exception of the flashlight which is the only that is better represented among the Balanta (see Figure 4)].

[13] Some farmers pay individuals to clear specific forested areas so that they can, later, plant crops. This activity is named *pabi* (Creole).

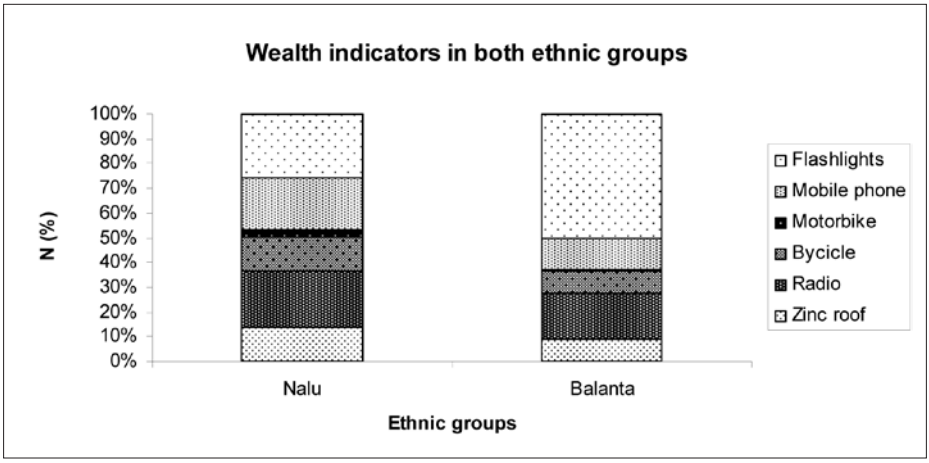

Figure 4: Wealth in both ethnic groups (N=271)

3.2 Diet, hunting habits and bushmeat practices

We asked respondents to look at the photographs previously selected and to point to the animals that were edible and non edible. Answers varied with religious affiliations but not with ethnicity. Gazelles are the preferred wild animal to eat for all religious affiliations followed by other animals such as warthog or bush pigs. Muslims (pure) are an exception to this trend for obvious religious reasons. Thus a statistical difference was found between Muslims, Catholics and Animists (p=0.004). NHP are considered edible animals but mainly by Animists (see Figure 5).

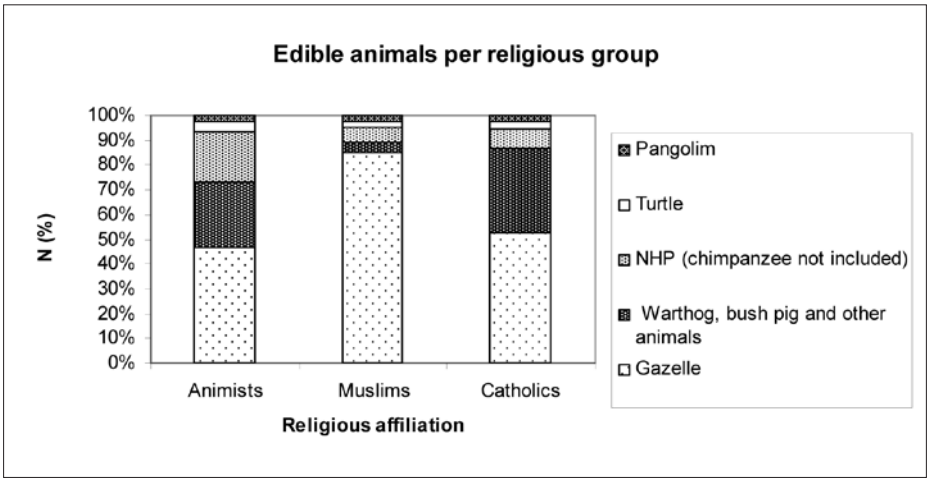

Figure 5: Edible animals per religious group (N=271)

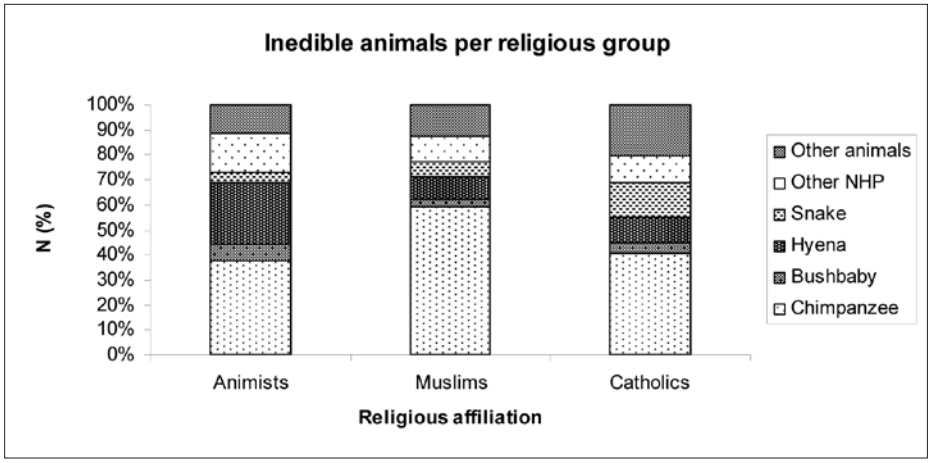

Figure 6: Inedible animals per religious group (N=271)

Turtles (e.g. *Kinixys belliana nogueyi*) and pangolins (*Manis tetradactyla)* are also edible options but to a lesser extent than the previously mentioned animals (there were no significant differences for both turtles and pangolins regarding the three religious affiliations).

Chimpanzees and hyenas (*lobo* in Creole) seem to be the less preferred wild animals to eat, as indicated by all respondents, from all religious affiliations (see Figure 6). Snakes are mostly perceived by Catholics as inedible.

Interesting information that emerged from the interviews with hunters is that domestic animals (e.g. pigs, goats or cows) are, where possible, kept as protein *reservoirs* for harsh periods in contrast with what happens with wild animals.

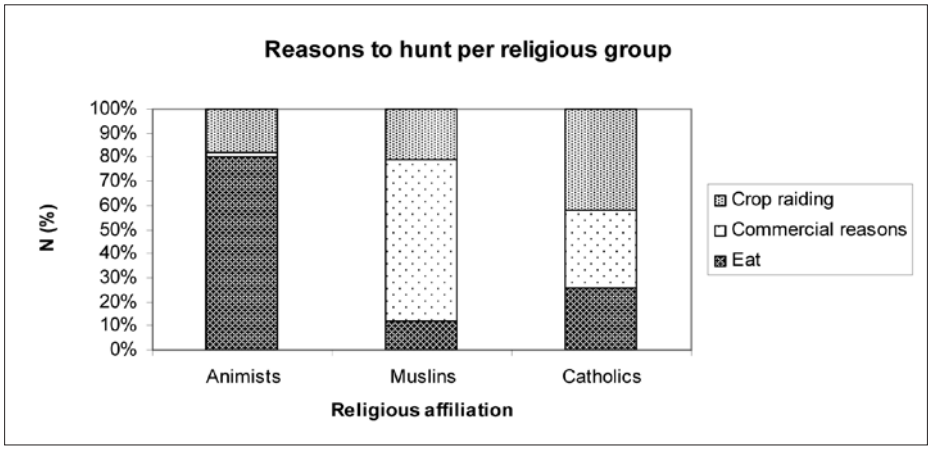

Figure 7: Why do locals hunt? (N=271)

Figure 7 clearly shows that although Muslims may not eat certain animals (e.g. NHP) on a regular basis, they do hunt and/or sell these animals. People who described themselves as animists say they hunt mainly to provide food. In all other religious affiliations reasons given for hunting are commercial activities and defense against crop-raiders.

Animists (mainly the Balanta) have little involvement in commercial hunting. In fact, when asking which type of weapons are used during hunting, some Balanta did not have any weapons and reported to hunt with the help of dogs (n=2/45 or 4.4%/100%). Catholics and Muslims always used firearms. Thus, there were significant differences in the way the three religious affiliations hunted for food (p=0.026) and their reasons for hunting [commercial purposes (p=0.039)].

3.3 How locals see wildlife

Wildlife was perceived in different ways according to its features: from crop raiding and having a negative impact on economic feedback (and other utilitarian dimensions of wild species), to harmless wild animals that do not compete for resources with humans. Several characteristics were considered by locals to *classify* an animal: the aesthetic dimension of animals represented one category. Aesthetic perceptions were related to animal edibility for many animals [e.g gazelle (see Figure 8)]. Some domestic animals are perceived as equally beautiful. Such visions of biodiversity organisms are highly *utilitarian* (Casanova 2008) where aesthetic values are generally, but not always, linked to daily food safety concerns (Casanova 2008; see Roque de Pinho 2009 for interesting data on aesthetic values for Maasai).

Animals perceived as ugly are mainly the chimpanzee, other NHP and the hyena. But there are differences since Muslims are much more *adverse* to NHP (at least 60% of these respondents' perceived chimpanzees as the ugliest animal and exhibited disgust in reference to NHP). NHP are considered to be similar to humans but chimpanzees are seen as being more similar to humans than any other animal, especially by Animists and by Muslin (see Figure 10).

3.4 Local perceptions of sustainability

Regarding perceptions of forest resource sustainability [forests and wildlife (Figures 11 and 12)] it is clear that the notion of *extinction* is hard to imagine for some respondents (although the same was not true for all the hunters interviewed – see also Casanova 2008). When interviewed, villagers appear to understand the concept of *extinction*: they would mention examples of animals that have disappeared from GB (e.g. lion). However, for some it

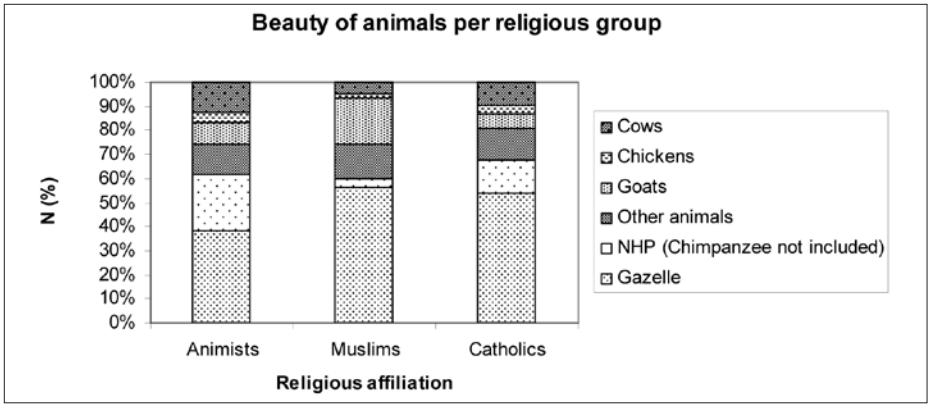

Figure 8: Beautiful animals per religious group (N=271)

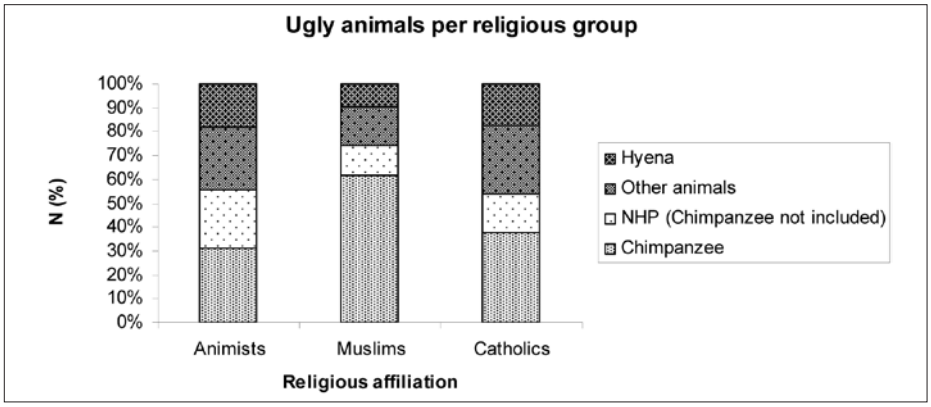

Figure 9: Ugliness in animals per religious group (N=271)

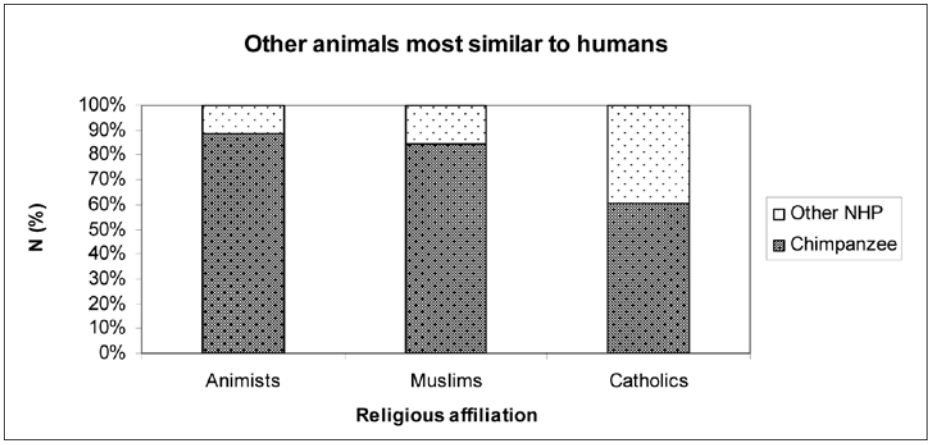

Figure 10: Perceptions of species' similarity with humans (N=271)

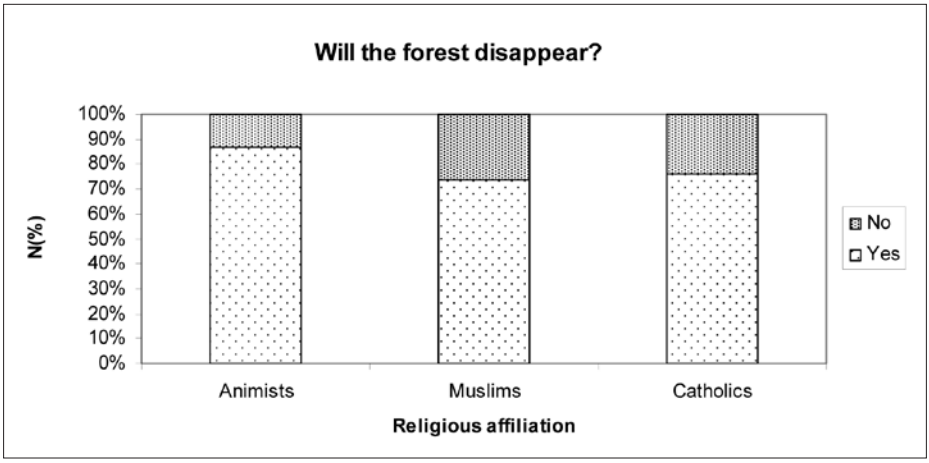

Figure 11: Forest conservation and sustainability (N=271)

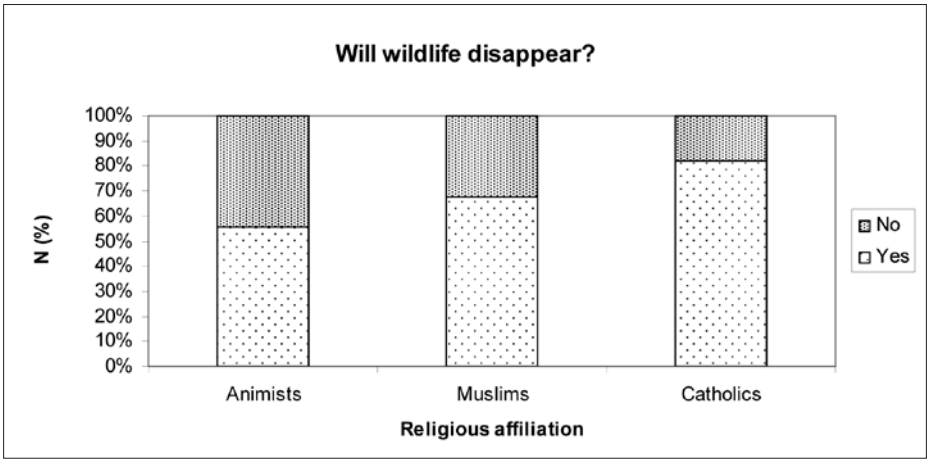

Figure 12: Wildlife conservation and sustainability (N=271)

was quite difficult to apply this notion to daily-living contexts. Although many respondents understood that forests could disappear [pointing out the most frequent reasons (e.g. deforestation and other human activities)], some respondents could not even consider such a notion. People in CFNP are completely dependent on forest resources to survive (see Figure 13) and therefore may take forest existence for *granted*.

The same is true for the notion of wildlife extinction. Many respondents said that it is a possible outcome resulting from human activities (e.g. deforestation or hunting). The notion of extinction appears to be stronger when talking about wildlife (see Figure 12) rather than forests (see Figure 11).

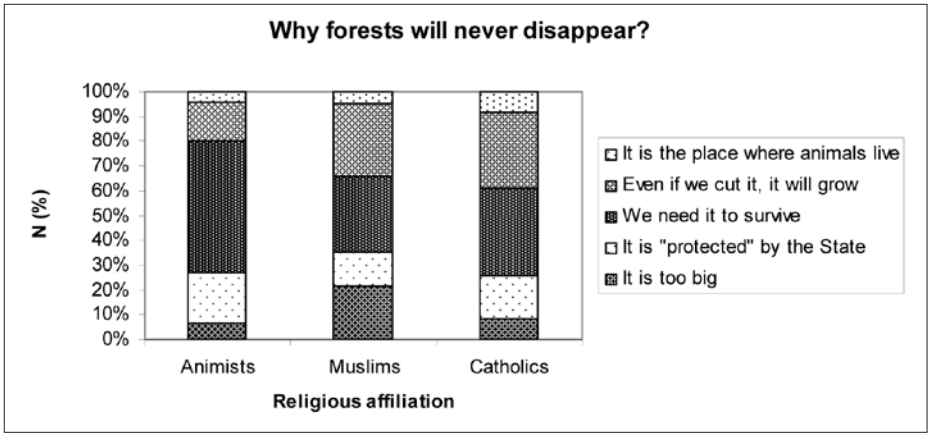

Figure 13: Reasons why forests will never become extinct (N=271)

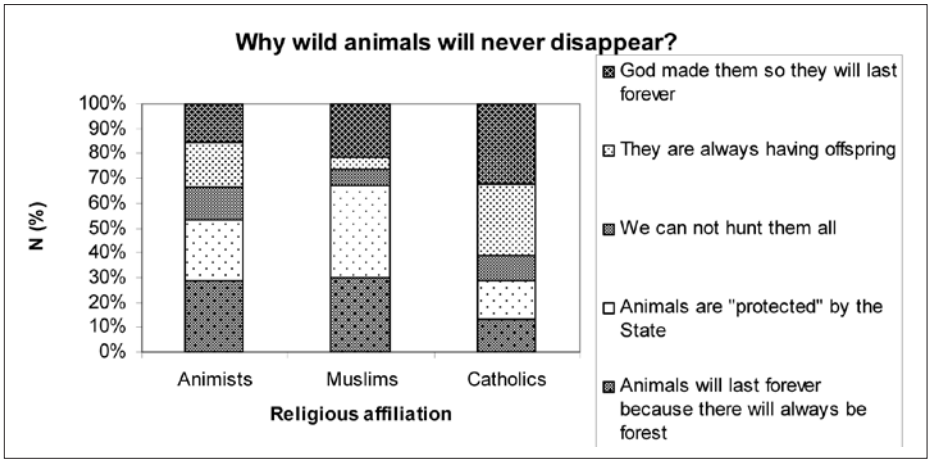

Figure 14: Reasons why animals/wildlife will never become extinct (N=271)

Why did not some respondents consider the extinction of both forests and wildlife possible? The answers were very similar across the main religious affiliations. Some thought the forests were too big and therefore an impossible commodity to run out of. Other though, mentioned that forests would never end because these were protected by the State (forest are protected areas where specific rules imposed by the State apply).

Many respondents belonging to the three main religious groups felt that forests would never become extinct because they provide the basic needs for survival.

When exploring the reasons why some of the respondents mentioned that wildlife would never become extinct, it is important to mention that

almost 95% of the respondents of both ethnic groups stated that they see fewer animals now than they used to (Casanova 2008). This is surprising given some of the data presented in Figure 12.

Figure 14 shows the main reasons why - according to the respondents perceptions - wild animals will never disappear. There are significant differences (p=0.03) between the way all religious groups see wildlife as "protected". The same is true for the notion that the birth of too many offspring will never allow for that to happen (p=0.03) or that species were created by God (p=0.04).

4. DISCUSSION

Characterizing our sample, the majority of Muslims (mainly the Nalu) had more material possessions than the other ethnic group in the sample population. This reflects the existence of cash flow most likely due to cash crops (see Temudo 2011) but also due to illegal hunting to feed the bushmeat market (Casanova & Sousa 2007, Starin 2010). Though Nalu owed more material possessions overall, Balanta respondents had more flashlights than Nalus. This is understandable since Balantas live in more isolated environments, often in their own *tabancas*. While Nalu people (mainly Muslims) are generally concentrated in large *tabancas* where there may be electricity and other energy source such as small generators (Iemberém, Madina, Guiledge, among other *tabancas*), Balanta *tabancas* are located along rivers (sometimes by the sea) and away from the rest of most ethnic groups. Balanta are more reserved and may be seen as more *environmental-friendly* rice growers (according to our data, they cultivate more swamp rice than rain fed rice – see also van Gent, and Ukkerman 1993 and Temudo 2011). Thus, the *entrepreneurship* that characterizes Muslims (mainly Nalu people from our sample) can be seen through their involvement in commercial trading via cash crops and the bushmeat market. This allows them to have more material possessions (such as a higher percentage of mobile phones, radios, houses with zinc roofs, bicycles and motorbikes). Similar results were found by Amador, Casanova and Lee (2012) between Balanta and Beafada in Cufada Lagoon Natural Park (also in GB) where Beafada (Muslims) seem to have more money than Balanta. In Cufada Lagoon Natural Park the latter also live more isolated from the main villages and therefore need flashlights when they want to move at night. The prices of flashlights are not as high as the price of most other items. Such data show us that Nalu [and Beafada (Amador et al. 2012)] are richer than Balanta if only cash flow is considered.

The perceived existence, by Muslims, of two types of Muslim (the *pure* and the *impure*), seems to have negative effects for NHP (and biodiversity) conservation because the *impure* Muslims, although they do not eat NHP,

warthogs and bush pigs, they do hunt and trade them. And within the *impure* Muslims, some even eat such wild animals during *bafatório*. *Bafatório* is known as the practice of drinking alcohol accompanied with bushmeat (usually some kind of NHP stew). Such practice is common amongst many Muslim respondents. While these argued that the NHP stew is consumed to evade the smell of alcohol, others (those describing themselves as *pure* Muslims) perceive it as "double sin". *Pure* Muslims argue that the money earned via bushmeat (NHP, warthog or bush pig) is *dirty*. For them, living from that money will *pollute* households. However, several Muslims who stated that they did not eat NHP meat during the survey, later (during the interviews that focused on hunting) admitted consuming such species. Nevertheless, Muslims hunt mainly for commercial reasons since they are involved in the bushmeat trade.

Our data show that in many villages domestic animals are primarily eaten during important celebrations such as *toca-choros* (day and night long funeral ceremonies) or village celebrations. Wild animals are perceived as *usable* on a daily basis, while domestic animals are seen as *safety nets* for war times or famine. However, in cities (e.g. Bissau), eating domestic animals is more common than eating wild species. For instance, during specific periods of the year (e.g. Easter) the price of NHP meat is much higher than livestock meat, and thus becomes too pricey for most families to buy (Casanova, personal observation 2007).

In two of the 17 *tabancas* visited in the South of CFNP (Casanova 2009 and 2010, personal observation), 2 *professional* hunters (one from each *tabanca*) were spotted. These individuals did not have any rice plantation (though one did have a cashew field) and made a living from hunting. Such a situation is highly unusual since most people living in rural areas own some kind of subsistence crop(s). The fact that a significant part of our sample was Muslim did not confer any advantage for biodiversity conservation (mainly NHP).The profitable gain from bushmeat market is appealing to Muslims.

Bushmeat routes cross the country from the South (Tombali region) to the North. Bushmeat routes coincide with most of the main roads that lead to cities such as Quebo, Buba and the capital city, Bissau (Casanova & Sousa 2005, 2006 and 2007; Starin 2010). Bushmeat cadavers are transported in 3 different contexts: i) by car/van/truck which carry passengers and/or crops and where drivers are involved in the trade – veihicles transport coal, oranges, pineapples or other crops and carry bushmeat in hidden parts of the vehicles and under the main cargo; ii) by passenger vans or cars where drivers may not be aware that the passengers are carrying bushmeat since they are often

carried by *bideiras*, women who serve as intermediaries between hunters and buyers and iii) by people who are not frequently involved in the trade but who sometimes hunt and travel to Bissau and other cities to sell the carcases and earn some money. In the latter case young adult males or teenagers may be involved in bushmeat selling. While hunting is a male activity, selling is more flexible, allowing for the participation of women as *bideiras*. Nonetheless, bushmeat is a predominantly male-based business. Women mainly cook the meat according to the traditional African gender roles (or act as intermediates within informal economy networks). When the main roads are being watched by policemen (from the Forestry Department or other governmental divisions) illegal traders drop their cargo directly to Bissau Port via sea. Bushmeat is sold in a *reserved* and *out of sight* way (when compared with livestock) but it is relatively easy to buy carcases in one of the major Bissau markets (e.g. Chapa, among other markets – see Casanova & Sousa 2007).

Gazelles are the preferred wild animal to eat but NHP are also popular.

The political and military turmoil that the country has suffered since the liberation war (from the Portuguese colonialist government) in the 60's to the present may explain the need of maintaining a secure protein source (domestic animals) that provides nutrients only in special occasions of if war comes back again. In rural areas, while there is no war and there are no special celebrations, wild animals provide the necessary proteins. Civil wars, *coup d'états* or highly violent political assassinations of rivals are common in GB. The almost non-existence of the State is marked by a strong dependency for foreign aid, by the use of the country as a cocaine/drug platform (Ellis 2009, Felbab-Brown 2010) which acts as an intermediary for shipping prohibited substances to Europe, and, by the *bribe culture* well ensconced in the country (e.g. Ellis 2006, Temudo 2009a). As a result of such turmoil, domestic animals in rural areas are perceived as safety protein reservoirs. However, cash crops may also be perceived as *safety reservoirs* which, when under attack (crop-raiding by wildlife), must be defended. Animals that crop-raid are immediately perceived as having negative qualities (although these may be capitalized via bushmeat to provide economic feedback). Food security was the main concern of most respondents where aesthetic values of wildlife overlap with the preferred animals to eat: the gazelle, is, simultaneously the most *beautiful* animal and the preferred animal to eat. *Beautiful* was explained to respondents as something that is *attractive to the eye* but does not have to be good to eat. Still, the classification of animals seems to be built around principles such as food security and economic feedback (an Occidental and market economy vision). The fact that several domestic animals were also

perceived as *beautiful* (and edible) confirms such rational behind the local classification. Therefore, non edible wildlife is perceived as *ugly* (e.g. hyenas, chimpanzees, among other). Chimpanzees represent a contradiction to this line of thought, mainly due to their similarity to humans. Chimpanzees were perceived as the animal most similar to humans but also as the *ugliest* one. This is not to say that humans are ugly but that chimpanzees are perceived as imperfect (regarding humans) or almost perfect (since they are the most similar to humans). This notion is confirmed in another study where most respondents answered that, if they could not be humans, they would choose to be chimpanzees (Casanova 2008, Costa 2010).

As for resource sustainability, the strong dependence of natural resources inside CFNP may suppress a real acceptance of extinction: the dependency is so strong that some respondents can not imagine that wildlife and forests may not exist as this would deny their own existence (self-centred perspective). Respondents clearly stated that one of the reasons why forests would never disappear was because these provided the basic needs for their survival. Some of these respondents also saw the *forest* as something very variable [e.g. disturbed forest fragments or primary forests were both perceived as *forests* (the word *mato* was used)]. The scientific classification of forest is not as plastic as the local one. Scientifically, forests are classified into different types or categories but for locals these types did not exist as such. Implications of this for forest and wildlife conservation can be negative since some species can not easily survive in disturbed or too fragmented forests.

The idea of wildlife extinction appears to be more generally accepted than forest disappearance.

Our data also show that Occidental-based concepts such as *protected species* (or *protected areas*) may be wrongly perceived when introduced in different cultural contexts. The notion of *protection* is perceived by many as an approval given by the State to allow further exploitation of certain species/areas (without so many restrictions). According to the respondents, these species are not *protected from* humans but *by* humans for the benefit of people. Simplistic transpositions of concepts amongst very different cultural contexts such as these may have many negative impacts on biodiversity conservation. The State attributes the category of *protected* and the State is a category immediately below God (Temudo 2009a).

Cross-questioning confirmed that locals were aware of the concept of animal abundance. When asked if they used to see more animals in the past than in the present, most respondents said that in the past animals were more abundant.

However, the influence of God(s) in human lives also seems to be present in many answers. Respondents sometimes reply that somehow divine figure(s) created wildlife and therefore wildlife can only disappear via God(s).

Our results can not be generalized beyond the sample used. Multiphase sampling was a non random procedure which did not allow for extrapolations even within the entire CFNP. Furthermore, individuals and communities can not necessarily be considered as homogeneous categories with respect to their understanding, perceptions, expectations and behaviours towards biodiversity conservation, which could have implications for the success or failure of conservation programmes.

The extrapolations presented by some works (Ite 1996, Bollig and Schultez 1999, Hill 1998) may be incorrect from a methodological point of view since random sampling was not possible in many studies (or no information was provided regarding the target population, the sample type and the sample's representativeness). As such, the conclusions of a specific sample can not always be generalized for the rest of the population. There are standard protocols in any survey questionnaire used in social sciences (Sampieri et al 2007), which are not followed by many authors dedicated to the human-non human interface. General trends must be used with precaution (or taken with a grain of salt). Researchers face several difficulties when conducting social surveys in Africa. They battle with language barriers, cultural differences between themselves and local people, nomadicism, a lack of reliable census information, transport and other logistic concerns and many other issues. Some of these difficulties will naturally affect the methods (and techniques) used by researchers.

5. FINAL REMARKS

Perceptions and attitudes are good indicators of behaviours (Ajzen and Peterson 1988, Rokeach 1966), which ultimately will determine biodiversity sustainability (Davies-Case 2001, Lee 2010).

Traditional perceptions of nature and wildlife in Africa have been exposed to the erosion of the globalization process, to market economy values (Kuriyan 2004, Casanova 2008) to centuries of religious intervention and thought *orientation* (Harrison 1988; Gonçalves 1958, 1961; Mota 1954; Pélissier 1989). Religious affiliation is thus of great importance when considering perceptions of wildlife; religion affects the way people perceive other animals (Browne-Nuñez & Jonker 2008, Hill 2004, Ite 1996, Manfredo and Dayer 2004, Noss and Cuéllar 2001, Sekhar 2003).

Local beliefs and practices towards wildlife are changing. For some (e.g. Soto, Munthali and Breen 2002) acknowledging the fragility of certain local

practices and changing behaviours may be decisive for conservation. These argue that foreign intervention is needed (Schaller 2002).

Human communities have been adopting environmental friendly practices across time with both social and ecological ecosystem dimensions evolving in a balanced way[14] (Anderson 1996; Blackburn and Anderson 1993; Elisens 2000; Gadgil and Berkes 1991; Gadgil, Herman and Reddy 1998; Turner 1999). Local taboos (Colding and Folke 1997, 2001), environmental-friendly practices, forest-friendly traditional management systems and other phenomenon are not new and may be considered as conservation tools since they play an important role in sustainability (Casanova 2008). Whether such phenomenon will resist the changes provoked by globalization and the market philosophy is subject to debate, since traditional beliefs are not immune to external influences. Resilience to western-like values such as the market economy in the way livelihoods sustain themselves is still to be seen. In fact, traditional societies are suffering the erosion of destructive forces (e.g. market economy and globalization via the presence of NGOs with the *traditional* or *new conservation* speech, the State institutions and various other enculturation agents and organizations). In narratives (*traditional* and *new conservation*), wildlife and forests are threatened by extinction being the *crisis* context always present (Temudo 2009a). Along with such narrative, comes the free market speech to *regulate* the use of ecosystems and it's *services*. Nevertheless, there is little argument against the fact that the forests of the world (and the wildlife they sustain) are declining. The main debatable point seems to be the rate or intensity of this decline. The ecosystems that have supported the earth's diverse and complex social systems are facing unprecedented changes (Garibaldi and Turner 2004). Some authors (e.g. Schaller 2002) argue that local control over resources alone will not assure sustainability and that communities need technical assistance to determine biological limits to harvesting resources and for monitoring and managing such resources (op. cit.). This is a rather interventionist (named by some as "neo-colonialist") perspective. Others argue that local communities must be left alone, without any kind of interference.

The support of national parks by local people comes from the perception of costs and benefits against the backdrop of social, political, cultural and economic considerations (Ite 1996, Freese 1998). The protection of biodiversity is seen within a global market economy framework (Freese 1998) where everything is

[14] See also Temudo (2009a) that argues that was the case of the Nalu people and their natural resource management system.

associated to costs and benefits. Guinea-Bissau does not seem to be exempt to such influence. This is a time of change for forests, wildlife and for forest communities.

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