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Knowledge And Attitude Towards Tree Hyrax (*Dendrohyrax arboreus*) Among Baka People In The Boumba Bek National Park (BBNP), Cameroon

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Abstract*—The understanding knowledge and attitude as indigenous science of the local population against wildlife is an important tool for management. This tool can contribute to the improvement of decision-making and ameliorate the coexistence between humans and wildlife in protected areas. This study aimed at examining the understanding knowledge and attitude of tree hyrax among the Baka[1] in the Boumba Bek National Park, South-east of Cameroon. Data were collected between October and November in 2018 using semi-structured questionnaires (*n* = 128) in communities adjacent to BBNP. We targeted the Baka people as our sampling. The tree hyrax is commonly called *yoka* among the Baka in Cameroon. Our results show that 64.1% of the respondents revealed that hole in trees are preferred habitat of the tree hyraxes and its favorite diet is constituted the *Ngetum africanum* (46.9%), commonly called *koko*, followed by epiphytic plant (35.1%). The majority of respondents had negative attitude towards tree hyrax when they emit a loud vocalisation near to the village during the daytime. The Baka people interpret these vocalisations as a misfortune. Gender had no significant effect on negative attitude (X^2 = 4.929, df = 2, *p* = 0.085). Additionally, Baka people believe that *yoka* is a strange animal. According to them, tree hyrax can bring bad luck if it appears in or around dwellings during the day. By its fruit-eating diet, this animal helps the natural regeneration through seed dispersal, thus contributing to maintaining the ecosystem. Illegal hunting, excessive exploitation of forests by several logging companies constitute a major threat to the survival of this animal species.

Keywords— Baka; Boumba Bek National Park; Traditional knowledges and attitudes; Tree hyrax and Wildlife conservation

1. INTRODUCTION

The knowledge necessary for wildlife conservation may require dedicated efforts and heavy financial resources (Djekda *et al*., 2020). The use of local knowledge becomes even more valuable, it can be a more efficient method of acquiring information in less time and at less cost than formal ecological research (Rist *et al*., 2010). Perceptions provide an important means of assessing the performance of conservation projects so that better policies may be developed for effective biodiversity protection and the wellbeing of people living near protected areas. (Abukari & Mwalyosi, 2020). The local community is one of the most important stakeholders in wildlife conservation and protected area management because local people share the ecosystem with wildlife and interact with it (Nepal, 2002). Understanding local community attitudes toward wildlife is critical for making context-sensitive conservation planning and management decisions that may facilitate better human-wildlife coexistence (Niu et al., 2019). Wildlife play a very significant role in forest regeneration via the dissemination of seeds (Fleming & Sosa 1994; Schupp *et al.,* 2010). Inspite of the role they play, the majority of wildlife used in traditional medicines is gotten from the wild; hence the demand by traditional medicine is a cause of overexploitation of wild animals (Soewu & Adekanola, 2011). Some animals have also being used for religious and cultural purposes such as sacrifices for appeasing and invoking spirits and gods while some others have played important roles in magic rituals and mysticism (Lev, 2003; Soewu, 2006). The protected areas and its periphery represent a global strategy for combating the loss of biodiversity (Bawa *et al.,* 2011; Laurance *et al.,* 2012; Barnosky *et al.,* 2013). The local community which lives around the protected area has a good knowledge on forest resources and their purpose (Trakolis, 2001). But sometimes there is a conflict associated conservation with this traditional practice and provides necessary information for managing such conflict

[1] The Baka are an ethnic group inhabiting the southeastern rain forests of Cameroon. Still leading a primitive life, Baka spend most of their time hunting in the deep forests and gathering fruit.

(Oliva *et al.,* 2014). Hyraxes are small animals, of about 30 cm in height with a length of up to 75 cm (Stevenson & Hesse, 1990). In the wild, adult hyrax weight range between 2.8 and 3.6 kg for females and 2.6 and 4.6 kg for males (Mendelssohn, 1965; Olds & Shoshani, 1982; Stevenson & Hesse, 1990). The tree hyrax is classified as Least Concern (LC)[2] by the IUCN Redlist (IUCN, 2020) and as a Class C under the Cameroonian law[3]. The conservation status of this species needs special attention. Our latest review indicates that the global wild population of tree hyrax in the BBNP was estimated around 1,015 individuals using line transect (Author in prep.). No study has been done on this species to understand the attitudes of local people that shares the same habitat. Local ecological knowledge may serve as a valuable source of ecological information and could compliment scientific information on wildlife conservation and management, particularly in community-based natural resources management programs (Gandiwa, 2012).

2. MATERIALS AND METHODS

2.1 Study area

The study was conducted in the Boumba Bek National Park (BBNP) and its periphery. The geographic position of the survey area is Northern latitudes (2°09'-2°20'N) and Eastern longitudes (15°35' to 15°50'E). The Figure 1 shows the study area in the eastern region of Cameroon. The region has an equatorial climate with about 1.6m of rain per year. There are two wet and two dry seasons. The mean monthly temperature is about 25°C or 26°C and fluctuates lightly (Ekobo, 1998). The vegetation of the region is a mosaic of semi-deciduous, evergreen, and swamp forest types (Letouzey, 1985). The topography is gently undulating, with valleys and ridges among flat basins, ranging in elevation from 300 m to 700 m. The Soil types are red and red-brown clay with little organic material and are relatively infertile.

2.2 Methods

Demography and local perception

This study was carried out between February and March in 2017. Semi-structured questionnaires were used to interview local people who live around the BBNP of East Cameroon. Our target population were those who grew up in the village. We had to book appointments with the targeted population, reason being that most of them are hunters usually gone during the day in the forest. Once the appointments were made, we took time and asked them questions. Each interviewee was isolated in order to avoid common answers. The questionnaires focused on general knowledge of the animals such as, preferred habitat, favourite diet, potential predator of tree hyraxes and attitudes towards hyraxes.

2.3 Data Analysis

We used MS Excel to enter and code data. We computed the relative frequencies based on the total number of responses. Regarding attitude toward tree hyraxes, we used Pearson's chi-square test to assess the relationship between genders and the significance level was set at $P<0.05$. We conducted statistical analysis using SPSS 19.0 software.

3. RESULTS

3.1 Socio-demographic characteristics of the respondents

The study respondents consisted of 96 (75%) males and 32 (25%) females, lived in the 27 households. The mean household size was 4 ± SD 2 people. Almost all of the respondents (96.1%) were Traditionalist/Spiritualist. The majority of the respondents (43.0%) were 50+ years old.

Table 1. Socio-demographic characteristics of respondents.

Characteristic	Number (n=128)	(%)	Mean± SD
Gender			
Male	96	75	
Female	32	25	
Age			32 ± 17
[20-30[	32	25	
[30-40[	14	10.9	
[40-50[	27	21.1	
50+	55	43.0	
Religion			
Traditionalist/Spiritualist	123	96.1	
None	5	3.9	
Family size (person)			4 ± SD 2
Educational level			
Primary	18	14.1	
None	110	85.9	
Marital status			
Married	123	96.1	
Divorced	5	3.9	
Occupational status			
Farming	9	7.0	
Hunter-gatherer	119	93.0	

[2] The situation needs to be closely monitored to determine if this species should be re-assessed to Near Threatened in the future, based on decline under criterion A. the current population trend is decreasing.

[3] The Government of Cameroon grouped animals into three classes such as, A, B and C, according to Law No. 94/01 of 20 January 1994 to lay down Forestry, Wildlife and Fisheries Regulations; Decree No. 95/466/PM of 20 July 1995 to lay down the conditions for the implementation of Wildlife Regulations and Order No. 0648/MINFOF of 18 December 2006 to set the list of animals of classes A, B and C. Class C comprises mammals, reptiles and batrachians other than those of class A and B and birds of the annexes III of the CITES. In class C, species of Appendix III at the national level of CITES classification or belonging to groups of minor preoccupation according to IUCN.

The mean age of respondents was 32 ± SD 17 years old. Few (14.1%) had received primary education and 85.9% had none education. Most respondents (96.1%) were married and 93.0% were hunter-gathered (Table1).

Figure 1 shows the location of the study area. Two ethnic groups inhabit the area that is the Baka Pygmies and Bantu. The first group called the Baka Pygmies are found everywhere around the protected area and the other group, the Bantu are the commonly called the traditional village people practicing farming, (Ekobo, 1998). The local activities practices are mostly subsistence hunting and collecting non timber forest product.

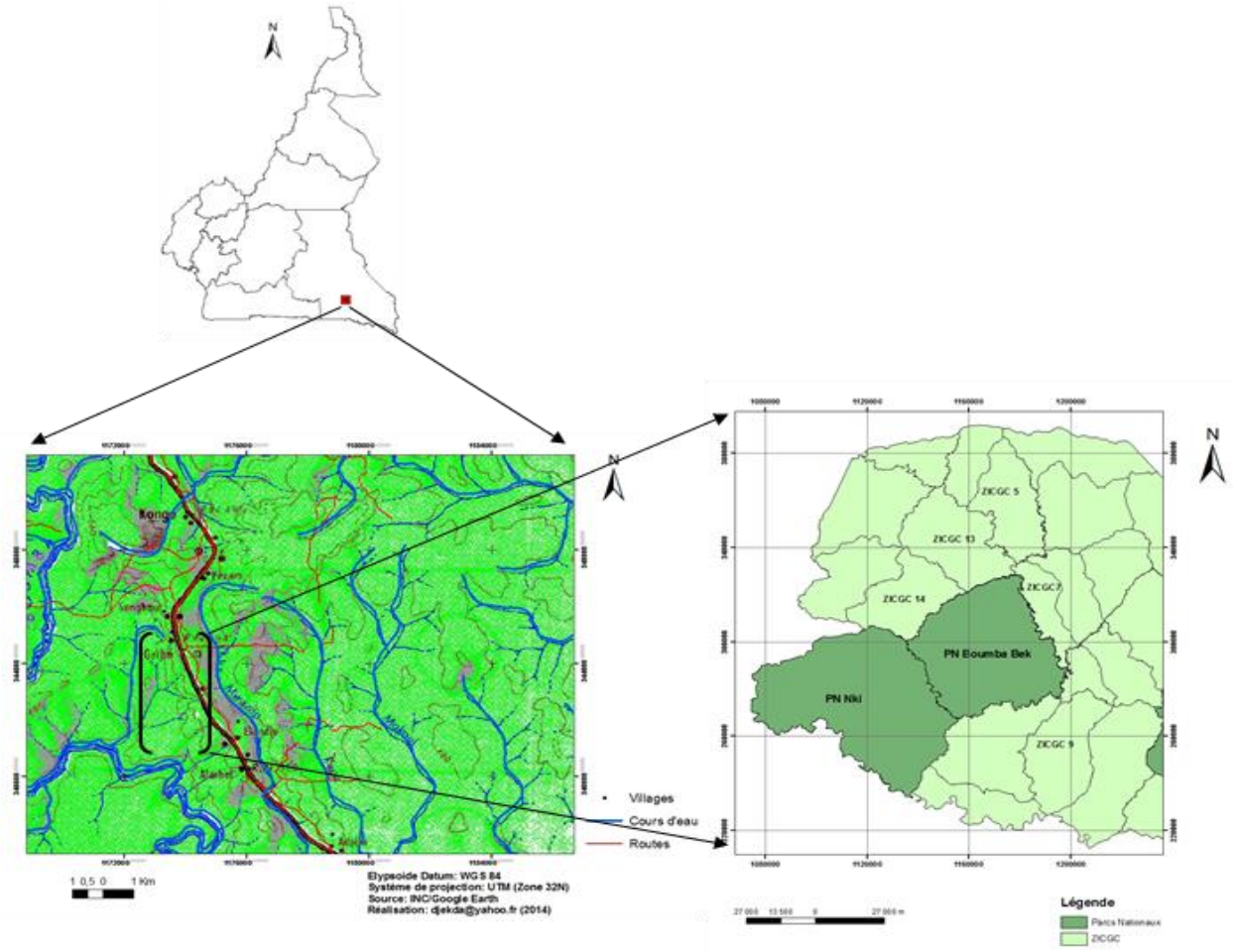

Figure 1. Location of the study area.

3.2 Knowledge and perception about tree hyraxes

The result of the Knowledge and perception about tree hyraxes of local people living in around the BBNP is showed in Table 1. A total of 128 respondents were interviewed. All the respondents were from "Gribe and Mwamebem" village near to the BBNP.

About sixty four point one (64.1%) of the respondents revealed that woodland particularly the hole in trees are preferred habitat of the tree hyraxes (Table 2). With regard to the favourite diet of tree hyraxes to the community around the BBNP, good proportion of the respondents (46.9%) reported that the *Ngetum africanum* (*Koko* in the Baka's language) was the predominant diet, followed by epiphytic plant (35.1%). When asked regarding the birth, about 39.1% responded that hyraxes give birth at one or two young. On the other hand, snakes (43.8%), eagles (21.1%) of respondents were the potential predator of hyraxes' specie, followed by the African civet (21.1%). Most of the respondents (63.3%) believed that there are no risks to consume the hyrax's meat, but 36.7% of the respondents said that, it is prohibited for pregnant women. A good proportion of the respondents (60.9%) reported that most active time of

hyraxes is at night. As concern traditional medicine, 39.1% of the respondents affirmed that its teeth are attached around the neck like necklace. The Baka (7.0%) said that, the hyraxes' teeth are used as poison. Concerning about hunting tree hyraxes, 75% informed us, when you need to hunt hyraxes, you have climb on a tree with a machete and a spear.

Table 2. Knowledge and local perception on tree hyraxes' specie in the survey area.

Interview questions	Responses Number (%)			
Preferred habitat	In rivers edge 27 (21.1)	Woodland 82 (64.1)	Presence of liana 19 (14.8)	
Favourite diet	*Ngetum Africanum* 60 (46.9)	Fruits 23 (18)	Epiphytic plant and grass 45 (35.1)	
Birth	One 46 (35.9)	One or two 50 (39.1)	Unknown 32 (25)	
Potential predators	Eagle 27 (21.1)	Civet 27 (21.1)	Panther 18 (14.0)	Snake 56 (43.8)
Negative effect of consumption the hyrax meat	Prohibited for pregnant women 47 (36.7)	No risk 81 (63.3)		
Favourite time of hyraxes	Daytime 50 (39.1)	Night 78 (60.9)		
Why hyraxes like to emit a loud voice?	Hunger 27 (21.1)	Its nature 51 (39.8)	Unknown 50 (39.1)	
Use in traditional medicine and cultural practice	Use teeth as a necklace 50 (39.1)	Moustache (shield) and teeth 9 (7.0)	Head 18 (14.1)	unknown 11 (39.8)
Hunting technique	Climb on the tree 96 (75)	Unknown 32 (25)		

3.3 Attitudes toward tree hyrax

Finally, as a supplemental question, the Baka people were asked to express their attitude towards tree hyraxes near to the village (table 3). Only one positive respondent female was unable to clearly articulate the reason for her response. Positive attitudes for the male (6%) expressed the presence of the meat near the village. According to them, there is easy to hunt the tree hyrax near the village than inside the forest. The local people are heavily depend on natural resources. The majority of interviewees (80% of females vs. 88% of males) had negative attitudes towards tree hyraxes when they make loud voice near to the village during daytime. The Baka people interprets these strong vocalisations as a misfortune. There were no significant differences regarding the negative attitude of tree hyraxes near the village in terms of gender ($x^2 = 4.929$, df = 2, $p > 0.05$).

Of unsure respondents, most of them was unable to articulate the reason for her response. Most of the respondents say they do not remember having seen this animal near the village. The presence of this animal near the village could help them discover the species being studied. No significant difference between female and male (17% vs. 6%).

Table 3. Attitude of Baka toward animal (tree hyraxes) near to the village during daytime.

Attitude	♀ n (%)	♂ n (%)	p-value
Positive	1 (3%)	5 (6%)	
Negative	32 (80%)	78 (88%)	
Unsure	7 (17%)	5 (6%)	
Total	40	88	$x^2 = 4.929$; $p = 0.085$

♀ = female; ♂ = male; n = number of respondent expressed their attitude toward hyrax near to the village; $p = 0.085$ is considered not significant.

4. DISCUSSION

Our results showed that a good proportion of respondents, said that the *Ngetum africanum* was the predominant diet, they also ate epiphytes and grass (Table 2). Despite its herbivore nature, the hyrax feeds mainly on fruit that are on the ground or on trees. A study conducted by Gaylard & Graham (1997), in South Africa showed that hyraxes feed on *Podocarpus falcatus, Scholia lalifolia, Euclea natalensis.* It has also been demonstrated by Girmay *et al*. (2015), in Northern Ethiopia that another source of food for hyraxes are Grass*, Olea europaea, Acacia etbaica* and *Combretum molle.* This diet differs from one area to another and depending on the availability of food variety. As regards the small herbivores, the ability to find the high-quality foods is rare (Gaylard & Graham, 1997), and depends sometimes on the lower quality foods (Demment & Van Soest, 1985). The knowledge of the local population demonstrate that hyrax give birth to one or two young little ones. The young are born with their fur and are able to see and to eat solid food by their 2nd or 3rd day (Gaylard & Graham, 1997).

In this study, the respondents said that, the potential predators of hyraxes are eagle, African civet and snakes. In addition to the predators mentioned above, man, through his illegal hunting activity, constitutes in the long term a threat to the survival of this species, in spite of the inadequate hunting techniques. In the same way, the study conducted by Girmay *et al*. (2015), showed that the eagle and owl are also the potential predators of tree hyraxes in the Northern Ethiopia. The main threats to this species are severe forest loss, degradation, fragmentation (mainly due to logging and burning), and hunting (Topp-Jørgensen *et al.,* 2008; Hoeck *et al*., 2015).

During this study, some respondents had a negative perception towards tree hyrax, especially regarding the consumption of its meat by pregnant women and its loud voice near the village which seem to be announcing a misfortune. The people surveyed (80% of female and 88% of male) believe that, if the tree hyrax is eaten by women who are pregnant, the child will be born like the animal, with only four fingers and child make the same vocalisations like animal. The negative attitude against this animal is also mentioned by Girmay *et al*. (2015). The eastern tree hyrax or eastern tree dassie (*Dendrohyrax validus*) is solitary and defends territories vigorously using loud calls by both sexes (Kingdon, 1971; Topp-Jørgensen *et al*., 2008). According to the respondents, few parts of the animal as its teeth are used for traditional medicine and ritual (traditional confession). The respondents, we stated that the teeth are used like poison to kill man and for shielding the body. It was revealed by Girmay *et al*. (2015) that few parts of hyraxes are used in the traditional medicine in the Northern Ethiopia. According to the Baka community, very few of them eat the hyrax's meat. The study conducted by (Topp-Jørgensen *et al*., 2008) showed that the hyraxes are hunted for meat and skin and rarely for medicine and rituals. The hunting technics used by the Baka people in this case consist of climbing on the tree with a machete and a spear in other. To hunt hyraxes, Topp-Jørgensen *et al*. (2008), made us realize that they may also be extracted from their holes using a stick, or forced from their trees by cutting or burning and then killing with spears or dogs.

5. CONCLUSION AND RECOMMENDATIONS

Most wildlife conservation projects have little interest in the traditional customs of local communities and believe that the latter are at the origin of the decline of wildlife. We are all aware that the beliefs among ethnic group have existed since the earliest days of mankind. For several decades, the Baka pygmies and animals have lived together, reflecting the impossibility of dissociating them. However, understanding the indigenous science of an animal such as the tree hyraxes and many others, contributes to protecting these species. In fact that, the right-of-use enjoyed by the local population is increasingly neglected. For example, several Baka groups have abandoned their ancestral practice of "*molongo*" which means long pilgrimage; consist of free access to the forest for several months in search of honey, game and wild yam. The restriction on the right-to-use creates conflicts between beneficiaries and ecologists, and consequently can lead to a loss of knowledge. However, it would be more appropriate to take into consideration all conservation initiatives, perceptions and knowledge of the local population about animals and how to use them. Moreover the combination of indigenous knowledge and modern science can improve the vision of conservation and therefore contribute to the well-being of the local population through the preservation of human rights.

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Conflict of Interest

Conflict of interest none declared.

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