

TITLE

Preserving Preuss's red colobus (*Piliocolobus preussi*); an analysis of hunting and changing perceptions of primates in Ikenge-Bakoko, Cameroon

AUTHORS

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ABSTRACT

The futures of nonhuman primate species and human communities in shared landscapes rely on our ability to engage with and understand the complex histories and multi-scalar aspects of human-animal relationships. We use the Critically Endangered Preuss's red colobus (*Piliocolobus preussi*) as a case study to examine the important ways in which histories of multi-scalar human-primate interactions play out in the village of Ikenge-Bakoko, Korup National Park, Cameroon. We contextualize ethnographic and catchment data from adult men (n=32) and women (n=31) within long-term diurnal primate monitoring datasets to better understand the relationships between hunting practices, local perceptions of diurnal primates, populations of *P. preussi*, and conservation management. Our data indicate a disconnect between local cultural definitions of "hunter" and Western assumptions as to the make-up and nature of this and other categories. We show that such contradictions can have negative outcomes for conservationists seeking to turn the science of establishing accurate off-take rates of prey species into practical management solutions. Using a single village as a focal point, we highlight the importance of an ethnoprimateological approach to understanding the intricate entanglements between conservation histories, subsistence strategies, and human and nonhuman primate lives. The application of ethnoprimateology is critical for 21st century primatologists who must navigate conservation concerns while also

acknowledging and valuing the experiences of the human communities living alongside the primates we study.

KEY WORDS

Bushmeat, ethnography, ethnoprimateology, hunters, West Africa

As nonhuman primate species (hereafter primates) face extinction on a global scale, researchers and the broader public are increasingly aware of the linkages between declining biodiversity and human activities (Estrada *et al.* 2017). Mixed theoretical and methodological approaches emphasize and help to articulate the shared ecological and social spaces of humans and primates (Fuentes 2012; Nekaris *et al.* 2013; Riley 2006). Documenting the dynamic, mutually affective relationships between humans and their environments, and increasing our understanding of the choreography of everyday life for human communities living in and around protected areas, are critical to primate conservation in the 21st century (Hill 2002; Setchell *et al.* 2016; Sunderland *et al.* 2008). Too often, conservation campaigns do not reflect an articulation of global conservation concerns with local needs (Bowen-Jones and Entwistle 2002; Remis and Hardin 2009). For example, the creation of protected spaces for wildlife often results in a loss of access to land and natural resources for local human communities (Igoe and Brockington 2007; Mbile *et al.* 2005; West *et al.* 2006).

Adams (2017) outlines the complex and competing realities of top-down vs. bottom-up approaches to conservation, and speaks to the importance of understanding the intersubjective natures of humans and nonhuman organisms in natural resource management. Top-down conservation strategies that attempt to maintain “human-free” forest areas are criticized for their

negative impacts on social and economic processes and unsatisfactory protection of natural resources (Newmark & Hough 2000). Nearly 10% of West African landscapes are designated as having protected areas status (CILSS 2016). When coupled with the importance of primates and other species to human health and nutrition, as well as to the social and spiritual lives of human communities, primatologists must attend to the interdependent connections between the futures of humans and other species (Fa *et al.* 2015; Golden 2009; Loudon *et al.* 2006; Malone *et al.* 2014).

Investigations of the interplay between natural resources management and local livelihoods in political ecology and ethnoprimateology confirm that forest resources are at the forefront of the economic, political, and cultural lives of local people (Escobar 1998; Malone *et al.* 2014; Wolverton *et al.* 2014). Primate and other wild meat (commonly referred to as bushmeat) serves as a conspicuous example of the role that forest resources play in the daily lives of human communities. The term bushmeat refers to any wild meat derived from wildlife species (Jost Robinson 2017a). The persistence of hunting across West and Central Africa (Fa and Brown 2009), requires researchers to examine more explicitly how hunting and expanding wildlife economies in protected areas shapes humans' interactions with forest ecosystems (Milner-Gulland *et al.* 2003). Studying these zones of interaction between wildlife and local communities as a dynamic mutual ecology can provide a nuanced understanding of the relationships specifically between primates and hunters (Fuentes 2012; Jost Robinson and Remis 2014). At the Dzanga-Sangha Reserve in the Central African Republic, for example, long-term studies of the complexity of human-wildlife relationships show that population size, behavior, and activity patterns of primates are shifted or altered in response to changing human forest use and perceptions brought on by economic, ethnic, and political realities (Jost Robinson *et al.* 2011; Jost Robinson and Remis 2014). Similar patterns are observed in Bioko where primate carcass volumes increased in parallel with the growth of

Equatorial Guinea's Gross Domestic Product, which contributed to the available disposable income of its citizens, and accessibility of shotguns (Cronin *et al.* 2015).

Despite the limitations they impose on human communities, the implementation of protected areas is imperative for maintaining wild primate populations (Estrada *et al.* 2017; Macdonald *et al.* 2012). The establishment of Korup National Park (Korup hereafter) as a protected area in southwestern Cameroon was tied to the region's rich biological and cultural diversity (Gartland 1984). Of particular interest to conservation biologists and primatologists was the documented regional presence of the rare *Ptilocolobus preussi* (Oates 1999; Siewe *et al.* 2017). The establishment of Korup represented a radical shift in management practices (Mbile *et al.* 2005; Siewe *et al.* 2017), as initial park mandates attempted to bridge "top-down" conservation management with "bottom-up" local community development, to improve the living standards and the accessibility of resources for villagers living within reserve borders (Adams 2017; Mbile 2009; Roschenthaler 2000).

Since its inception, Korup has undergone numerous management changes, ultimately leading to the park's northerly expansion in 1986. During this expansion, in addition to the previously engulfed village of Erat, four villages (Ikenge, Bera, Baraka-Batanga, Esukutan) became enclaved by the park (Mbile 2009; Roschenthaler 2000). Only one village, Ikondokondo, was resettled during the park's implementation. The creation and expansion of Korup meant that communities living inside park boundaries lost their rights to use forest resources. These communities were and still are completely dependent upon the land and its resources for their livelihood practices including; bushmeat extraction, fishing, and collection of non-timber forest products (Siewe *et al.* 2017). Their ability to access these resources and to provide for themselves and their families as farmers is strictly regulated by conservation agreements which control the

zoning of community farms and resource access (Malleeson 2002). Further, the failure to resettle all but one village, even after the development agreements regarding relocation and compensation, fueled anger and mistrust between local communities, the government, and conservation practitioners (Siewe *et al.* 2017).

Piliocolobus spp. are particularly vulnerable to hunting pressure and ecological change (Oates 1996; Struhsaker 2005, 2010). The vulnerability of red colobus genera to hunting pressure is attributable to large body size, large social groups, and slow movement patterns, making them easy targets for hunters (Oates 1996; Struhsaker 2005, 2010). *Piliocolobus preussi* has been listed as Critically Endangered since 2008 by the Red List of the International Union for Conservation of Nature (IUCN). This species of red colobus is endemic to western Cameroon and southeastern Nigeria, with the largest populations found in and around Korup (Forbeseh *et al.* 2007). To date, there has been no comprehensive assessment of the distribution and abundance of *P. preussi*, but it is apparent that bushmeat hunting and deforestation have led to extirpation across much of their original range (Linder *et al.* in prep., Struhsaker 1999). Early socio-economic and ecological surveys report *P. preussi* as a favorable target among Korup gun hunters (Infield 1988; Vabi 1999). Given that there has been no commercial logging in Korup, changes in populations of *P. preussi* can be directly linked to bushmeat hunting (Linder and Oates 2011).

Persistent hunting, declining encounter rates, and its Critically Endangered status make *Piliocolobus preussi* a focal point in regional conservation efforts and scientific studies (Edwards 1992; Linder and Oates, 2011; Waltert 2002). *Piliocolobus preussi* was used as a “flagship” species in the creation and expansion of Korup (Diaw *et al.* 2003; Siewe *et al.* 2017). Our local collaborators confirm scholarly accounts that it was *P. preussi* which attracted early conservationists to the region (Diaw *et al.* 2003). Its confirmed presence in what was considered a

pristine, “eden-like” landscape was used as a catalyst for the promotion of Korup as a protected area (Siewe *et al.* 2017). Despite the role that the identification of species like *P. preussi* played in shaping current land-use restrictions, researchers rarely focus on the roles that this and other primate species fill for human communities across Korup. Research conducted north of Korup and in the Nkwende Hills Forest Reserve (adjacent to Korup) represents the few attempts to examine the cultural contexts and uses of wildlife in southwestern Cameroon (Bobo *et al.* 2014; Ngoufo *et al.* 2014).

We use ethnography and hunter catchment surveys, contextualized within long-term primate population studies, to examine how changes in primate abundance and conservation practice in Korup National Park, South West, Cameroon, have shaped the ways in which people perceive and interact with the Critically Endangered, *Piliocolobus preussi*. Our overall objective was to examine relationships between livelihood strategies, hunting behavior, and perceptions toward wildlife and conservation in a rural locality of Korup National Park. We were particularly interested in exploring these concepts in the northern part of the park, where the documentation of *P. preussi* was instrumental in the long-term presence of conservation Through a combination of ethnographic inquiry and a review of longitudinal diurnal primate monitoring, we aim to address the following research questions: Is *P. preussi* a favored prey item for Ikenge hunters? How do Ikenge hunters view *P. preussi* as prey? How do we reconcile conservation concerns of *P. preussi* with village perceptions of the species? Further, we highlight the importance of ethnoprimate contributions to understanding the entanglements and potential imbalances between conservation histories, subsistence strategies, and human and nonhuman primate lives.

METHODS

Study site

Korup (1,260 km²), located in Ndian Division, South West, Cameroon (Fig.1) is contiguous with the Oban Division of Nigeria's Cross River National Park and the Ejagham Forest Reserve in Cameroon. Established in 1937, the Korup Native Administration Forest Reserve (also known as the Korup Forest Reserve) was initially set aside for timber production although it was never logged (Ministry of Environment and Forest, Cameroon, 2003). In 1986, the government of Cameroon declared Korup a national park (Presidential Decree N° 86-1283), and expanded its borders to encompass the northern region of the forest, including the focal village of Ikenge-Bakoko (Ikenge hereafter) (Mbile 2009). The habitat of Korup is primarily lowland evergreen forest, characterized by a low to moderate elevation with undulating surfaces and a south-to-north gradient of steeper slopes and increasing elevation, and one annual wet (June to October) and dry season (December to February) (Edwards 1992). As part of a Pleistocene refugium, Korup is recognized for having high levels of species richness, diversity, and endemism across a variety of taxa (Gartlan 1986; Oates *et al.* 2004). Korup is home to eight diurnal primate species (Table 1).

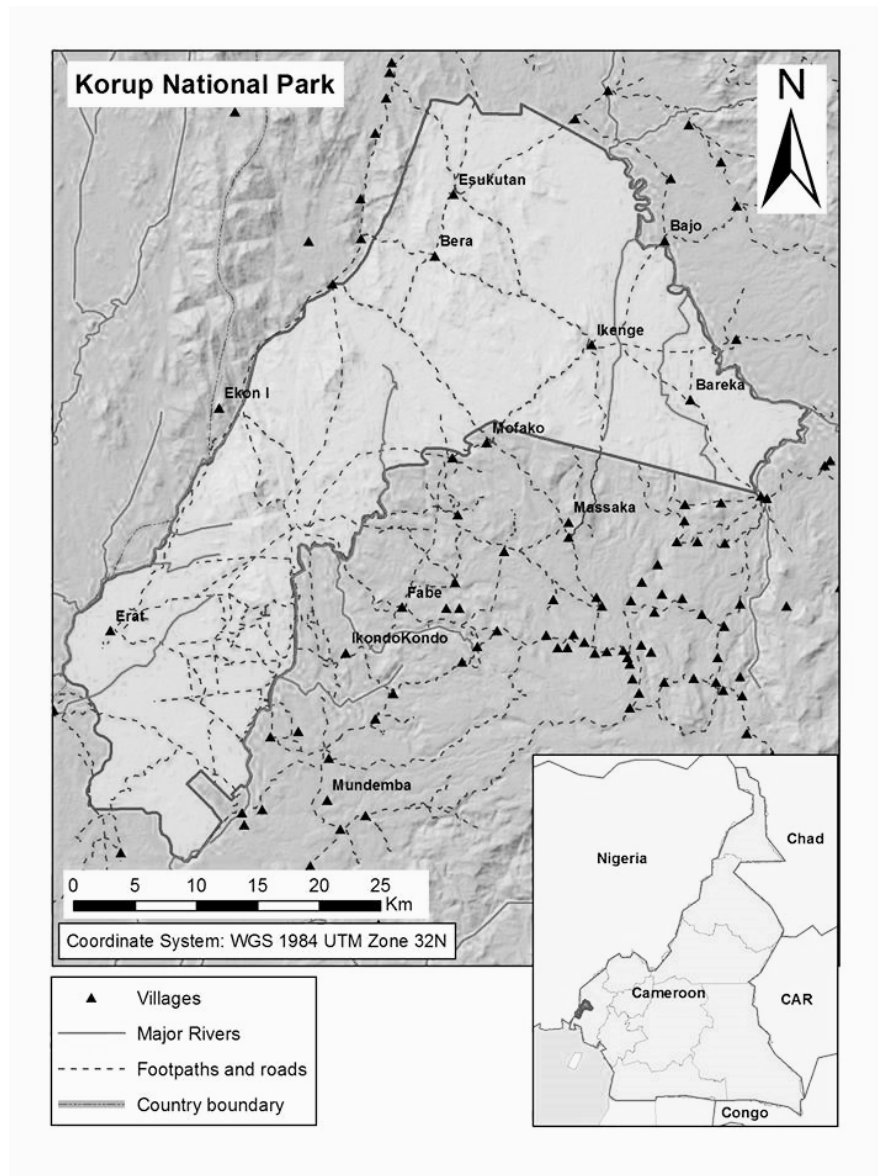


Fig. 1 Korup National Park in the Southwest region of Cameroon. Map created by Kelly Boekee.

Table 1. The scientific and the corresponding common, scientific, and local vernacular names (in Oroko) of the diurnal primates that live in Korup National Park, their red list category and status inside Korup.

Common name	Scientific Name*	Local Name (Oroko)	Red List Category	Status in northern Korup*
Mona monkey	<i>Cercopithecus mona</i>	<i>Punge</i>	Least Concern	Very common
Putty-nosed monkey	<i>Cercopithecus nictitans ludio</i>	<i>Koi</i>	Least Concern	Very common
Golden crowned monkey	<i>Cercopithecus pogonias pogonias</i>	<i>Mboma</i>	Vulnerable (A2cd)	Common
Cameroon red-eared monkey	<i>Cercopithecus erythrotis camerunensis</i>	<i>Nwate</i>	Vulnerable (A2cd)	Common
Red-capped mangabey	<i>Cercocebus torquatus</i>	<i>Mbi</i>	Vulnerable (A2cd)	Rare
Preuss's red colobus	<i>Piliocolobus preussi</i>	<i>Mberi</i>	Critically Endangered (A2cd)	Very rare
Mainland drill	<i>Mandrillus leucophaeus leucophaeus</i>	<i>Sumbo</i>	Endangered (A2cd)	Very rare
Nigeria-Cameroon chimpanzee	<i>Pan troglodytes vellerosus</i>	<i>Njeow</i>	Endangered (A4cd)	Very rare

*Though the taxonomy of Preuss's red colobus is debated, we follow Groves (2007) and represent this species as *Piliocolobus preussi*.

*Comments on status taken from Linder and Oates 2011 and Hofner 2016.

Study population and sampling

Ikenge (N5° 16.575' E9° 06.269') is located on a small plateau in the northeastern part of Korup. Its inhabitants belong to the Bakoko subclan of the larger Oroko ethnic group. We selected Ikenge as the site of this research for two reasons. Firstly, the forests surrounding Ikenge have been identified as a stronghold for *Piliocolobus preussi* (Bobo *et al.* 2017; Edwards 1992; Linder 2008). Secondly, oral histories collected by AUTHOR corroborate the historical and scholarly records indicating that the presence of *P. preussi* was a primary catalyst for protectionist approaches to conservation in Korup (Gartlan 1998; Siewe *et al.* 2017). The rich and fraught history of the relationships between conservation, development, and the village of Ikenge is a

common topic of discussion among researchers who have frequented the area. This history stems directly from the placement of Ikenge squarely in a national park after expansion of the original Korup Forest Reserve, and villagers' perceptions that they have gained little from the presence of conservation (Roschenthaler 2000). Early attempts to resettle Ikenge outside the park were unsuccessful and undoubtedly contributed to the current perceived conflicts between Ikenge residents and researchers (Diaw and Tiani 2010). Regionally, ethnographic work has focused primarily on concerns of resettlement and the potential success or failure of the Integrated Conservation Development Program approach implemented with the park's creation (Diaw and Tiani 2010; Malleson 2002; Mbile 2009; Roschenthaler 2000).

Reaching Ikenge from the town of Mundemba, headquarters for the conservation project, requires a two-hour motor bike ride and seven-hour hike (22 km) through the park. Ikenge is only reachable by foot. As of 2016, there were 34 occupied houses in Ikenge, representing several smaller households and approximately 200 residents. In Cameroonian villages, survey effort is better described at the household level, as one house may contain more than one household (husband and his family) (Vabi 1999). The main source of income for Ikenge residents comes from farming and bushmeat hunting (Vabi 1999). Hunting methods include use of wire traps (snare) and locally made shotguns ("*dem guns*"). Locally made, artisanal, shotguns are more affordable than commercial products, although they are not as well made, accurate, or reliable.

Data collection

Thirty-one of the 34 households participated in this study. Participants ranged from ages 17 to 65 years (n= 31 women, n= 32 men). We designed semi-structured interviews and administered them separately to men and women from May-July 2016. All interviews were administered by AUTHOR and a Cameroonian field assistant. Across groups, we framed interview

207 questions and discussions of *Piliocolobus preussi* within broader questions regarding basic
208 demographic variables, culture and tradition, wildlife, perceptions of the forest and conservation
209 more generally. All men and women were free to self-select for study participation. All participants
210 speak local dialects, Pidgin English, and English. Interviews were conducted in English; however,
211 where participants were more comfortable speaking in Pidgin English or local dialects, interviews
212 were translated to English.

213 All of the women that we interviewed were established residents of Ikenge, though most
214 are migrants from nearby villages who arrived in Ikenge in their teenage years after marrying a
215 male resident. We targeted female heads of house for interviews, or the eldest woman living in a
216 given household, because these women have deeper forest knowledge than younger women who
217 have spent less time in the village. We invited every female head of house present in the village
218 during study months to participate, and interviewed each participant during her free hours in the
219 morning or afternoon in her home. Two women declined an interview. If the female head of the
220 house declined an interview or was not available, we interviewed a daughter or sister in her place
221 (Marchal and Hill 2009). We focused interviews on local wildlife, livelihood preferences, and
222 perceptions of conservation generally.

223 All men were established members of Ikenge, though some are migrants from nearby
224 villages. Given the potentially sensitive and illegal nature of hunting discussions and bushmeat
225 consumption, we recruited men opportunistically through snowball sampling (Trotter and
226 Schensul 1998). We identified one key consultant that worked with us throughout the project. This
227 consultant aided in identifying men who were willing to participate in the study. Hunting within
228 the park is illegal. As such, we administered each interview away from the village center to ensure
229 privacy.

Initially, we asked each man about their primary occupation and if they “hunted.” Our preliminary discussions with men quickly revealed that linguistic categories used by Ikenge men to identify if and how they participated in hunting did not match those used by researchers. Therefore, rather than identifying only “hunters,” we invited all men in the village to complete an interview. Participants explained that all men in the village harvest animals from the forest, even if they do not identify as a “hunter.” Villagers expressed discomfort with questionnaires used by previous researchers. We adapted our interview approach, adopting a more open-ended format and research probes to guide conversation when necessary. Interviews included questions about what animals were being hunted and why, followed by more specific questions about hunting preferences and *Piliocolobus preussi* as a target prey species.

Additionally, we asked each man to participate in a modified catchment survey (n= 30) to provide a cursory assessment of bushmeat offtake. While researchers often suggest that recall surveys can be limited by the respondents’ ability to accurately “recall” data over an extended period, studies have found it to be a useful method when assessing patterns of bushmeat hunting and consumption (Jones *et al.* 2008; Golden *et al.* 2013). Using freelist techniques and pile-sorting, we asked each man to recall all the animals he hunted on a regular basis and the total number of each species he killed in the month of June 2016. During these pile-sorts, we used laminated photo cards of wildlife species to ensure positive identification. To avoid bias, we included species cards of several species not present in this part of Korup. Two men were not hunting at the time of the interview and did not participate. A single month of catchment data is not representative of yearly offtake; however, these data allow us to corroborate reports from hunter interviews and informal conversations, making them critical to our study.

We contextualize our 2016 interviews within long-term diurnal primate population trends in Korup (Edwards 1992; Infields 1988; Linder and Oates 2011; Waltert *et al.* 2002). To broaden our understanding of Ikenge residents' relationships to *Piliocolobus preussi* and conservation, we include ethnographic data available from previous trips to Ikenge by AUTHOR. This allowed us to create a more grounded understanding of Ikenge village and its inhabitants' relationships with the forest. Similarly, we include data from participant observation—living among informants and joining in their activities— during 2016 forest trips, village celebrations, and friendly conversations in our analysis.

Ethical note

We took precautions to ensure the anonymity of all participants, and any person was free to withdraw information from the study at any time. We ensured that all interviews follow ethical guidelines proposed by the Association of Social Anthropologists of the United Kingdom and Commonwealth. Our research was preapproved by the Research Ethics Committee of Oxford Brookes University (Committee reference UREC 15). This research was approved by the Ministry of Scientific Research and Innovation and The Ministry of Forests and Wildlife (Cameroon).

Data analysis

While previous Korup studies employ quantitative analysis of Korup inhabitants' socio-economic lives (Edward, 1992; Infield 1988; Mbile *et al.* 2005; Vabi, 1999), we analyze the text of interviews by identifying important emerging patterns to gain a more robust understanding of the mechanisms driving Ikenge residents' choices and perceptions. We juxtapose traditional Western interpretations of primate behavior and conservation with the lived experiences of Ikenge residents' and their interactions with *Piliocolobus preussi*. We entered all interview responses into Microsoft Excel and used open coding to analyze responses to open-ended questions from both

semi-structured interviews and comments during more relaxed conversations. Open coding of semi-structured interviews revealed themes in the text as they are observed during data analysis (Bernard and Ryan 1998). We present the main findings with direct quotes and phrases by participants to enable a better understanding than is possible with paraphrasing. With qualitative results, we report descriptive statistics regarding hunter catchment and villager responses.

RESULTS

Livelihoods in Ikenge

Participants reported farming as the primary source of income for both men and women. Data from an earlier socio-economic survey indicate a mean yearly income from farming of 272,571CFA (463.55USD) (Range: 60,000-700,000CFA/102.04-1,190.48USD) for residents of Ikenge (n = 35; Jost Robinson unpublished). The most commonly farmed crops are cocoa (*Theobroma cacao*), cassava (*Manihot esculenta*), corn (*Zea* spp.) and several varieties of cocoyam (*Colocasia* spp.). Three women in this study identified their primary source of income as “other,” including work as a cook, a saleswoman, and a seamstress. One man reported being a shoe maker/tailor, and all others identified as farmers or students. Of the 32 men interviewed, 94% reported that their income comes from *both* farming and bushmeat sales, but within this group the majority (88%) reported farming, particularly cocoa farming, as the greater source of income. All villagers reported the constraints of living in a village that is “enclaved” by park boundaries, reachable only on foot over uneven bushtrails and steep terrain. Both men and women commented on the difficulty of carrying heavy (50 kg) loads of cocoa and other crops from Ikenge to regional markets. Participants explained that the difficulties faced in transporting agricultural goods is a reason why exporting relatively light loads of bushmeat was an attractive form of household revenue.

Despite the primary occupation of farming, bushmeat remains an important source of supplemental monthly income in Ikenge (10,000-150,000 CFA; 17.00-256.00 USD). Men reported that they keep little meat for themselves and their families, as most is sold in regional and international markets (e.g. Nigeria). They also explained that it is typically only species too small to make a profit, such as nocturnal primates like Milne-Edwards' potto (*Perodicticus edwardsi*), pangolins (*Manis spp.*), giant pouched rats (*Cricetomys spp.*), and others that are locally consumed. For larger species (e.g. large duikers and primates), men and women explained that only the organs and head are consumed by the household.

When male participants were asked why they continued to harvest bushmeat illegally, they reported it as an economic necessity to generate and/or supplement income. One 33 year old hunter said: "In this, our area, if you don't have anyone who can sponsor you further [support you financially], you decide to hunt, to earn your living." Participants further explained that subsistence practices of harvesting bushmeat and farming generated money in different ways. Income from bushmeat is referred to as "fast money." A 32 year old man defined these differences in income generation, noting: "When you farm cocoa, you make a lot of money, enough money to build a house, but the money comes in blocks. You will get a lot of money once or twice in the year. Now hunting, hunting brings fast money, enough money to buy things for your house. When I need money for small things for house, I go out, I catch my one, two *frutambu* [blue duiker, *Philantomba monticola*]. My one, two porcupine [brush-tailed porcupine, *Atherurus africanus*]. Then I have the money I need. And when I run out of money, I go back out for hunting again."

Hunters and hunted

Of the 32 men interviewed, 23 (72%) self-identified specifically as a "hunter," in addition to their primary occupation as a farmer. Men who identified as hunters often explained that the act

of hunting is dangerous, strenuous, and tiring work, requiring long treks into the forest. Participants explained that hunting was simpler in the past, when the animals were closer to the village. The absence of wildlife today is attributed to the persistence of loud gun shots driving monkeys away and decreasing population numbers.

The men who did not call themselves a hunter reported that they are not “hunters” because they do not own a gun or have never learned how to use one. Men who did not identify as a hunter catch wildlife using sedentary wire traps (snares). Most often these individuals referred to themselves as farmers rather than “trappers,” even though they make trips to the forest specifically to set snares. Young men who borrow a gun from a family member to make sporadic “hunting” trips to the forest, or to carry when farming to shoot “nuisance” or crop-foraging wildlife, also do not identify as hunters. One participant in his twenties, who had recently reported killing more than 15 “*frutambo*” or blue duiker in a single month remarked: “No, no I am not a hunter man, since I have been born I don’t carry a gun. I never shoot a gun.”

In our analysis of bushmeat off-take for June 2016 (collected from both hunters and trapper, 824 individual carcasses), we found that species of ungulates (36.7%), followed by rodents (29%) and primates (14.9%) were most often killed. The remaining 19.4% was comprised of various carnivores (11.3%), pangolins (6.5%), and red river hogs (*Potamochoerus porcus*) (1.6%). During interviews, all 32 men reported that non-primate species (porcupines and duikers), particularly Ogilby’s duikers (*Cephalophus ogilby*) and brushed-tailed porcupines, contributed the most to annual income. Further, ethnographic data show that those species most likely caught in traps (i.e. pangolins, duikers, and porcupines) are the more preferred food items among Ikenge residents. Primates were less desirable as food items among men and woman, and are also considered more difficult prey.

Hunters described monkeys as more challenging prey than other taxa. Of the 107 individual diurnal primate carcasses reported in our catchment survey, the most commonly hunted species were putty-nosed monkeys (*Cercopithecus nictitans*) and mona monkeys (*C. mona*) (Fig. 2). Twenty-two hunters also reported these species as the easiest and most profitable monkey species to hunt. Even among polyspecific groups, hunters reported that they target smaller-bodied, lower canopy species. *Ptilocolobus preussi* represents 3% of primate offtake and was among the least reported species in this catchment survey. Of the 63 villagers interviewed, fifty-nine were aware that *P. preussi* is a Class A species protected by law and that killing them is illegal.

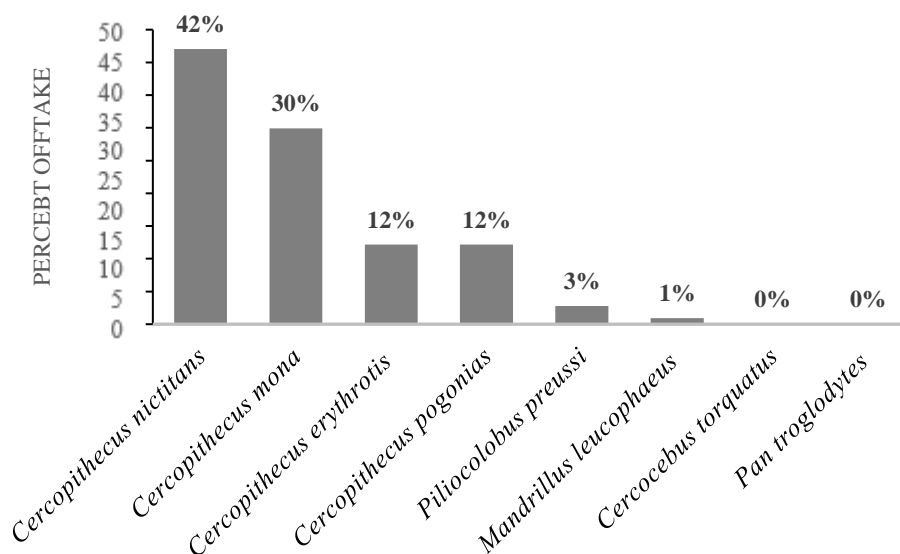


Fig. 2 Break down of the representation of diurnal primates (n= 107) reported in our June 2016 catchment survey in Ikenge-Bakoko, Cameroon.

Perceptions of primate prey

The most commonly avoided primate prey is *Cercopithecus erythrotis*. Our participants noted that if this species is consumed during pregnancy, the child will be born with a cough similar to the vocalization of *C. erythrotis*, and a red face. Villagers also commented on the “human-like”

361 features of primates as a reason to avoid eating primate meat. Men and women commonly reported
362 that it is necessary to avoid the consumption of chimpanzee meat during pregnancy, for fear that
363 the child will be born with the face of a chimpanzee. Female participants commented that
364 *Piliocolobus preussi* is not a preferred food item because it has a “face like a human.” A single
365 male participant preferred to eat *P. preussi* over other monkeys. One woman, whose husband
366 identified as a hunter, specifically chose *mberi* [*P. preussi*] as her favorite food item: “The best
367 monkey to eat is *mberi* because it is big and the meat is fat.” Most participants, both male and
368 female, commented on the bad taste of *P. preussi*, noting its pungent “odor” and “strong taste.”
369 Villagers also identified these characteristics as a hindrance to the sale of *P. preussi* within Ikenge,
370 and at other regional markets. Only one hunter reported *P. preussi* as more profitable than other
371 monkeys based on its large size.

372 Twenty-eight of the 32 men interviewed described *Piliocolobus preussi* as “difficult” to
373 hunt, ascribing qualities of strength and resilience to the animal (Table 2). Only two men remarked
374 that *P. preussi* is a good monkey to hunt. Most men described the challenge of bringing the animal
375 down with a single cartridge or artisanal (locally-made) gun. Participants commented that *P.*
376 *preussi* “chop [eat]” bullets and subsequently money: “The hardest is *mberi*, it is so
377 powerful...there are guns that you use to kill them, be we have no good guns.” Hunters also noted
378 that *P. preussi* flees to even higher canopy levels during encounters, attributing avoidance behavior
379 to their fear of the increasing presence of humans and guns. “When you have a good gun *mberi* is
380 very easy to kill... but when I shoot, *mberi* will climb to heaven. There are many *mberi*, but we
381 have no good guns.” Three men attributed the difficulty of hunting *P. preussi* to ecological niche
382 rather than implicit strength, commenting that their vertical location in the forest canopy makes
383 them a difficult target. Women also reported on the difficulty of hunting *P. preussi*. One 58 year

old woman commented that: “[The] thing has power- without a good gun, you cannot put it [*P. preussi*] down.”

Table 2. Common responses about hunting *Piliocolobus preussi* among Ikenge men interviewed in Ikenge-Bakoko, Cameroon. Frequency represents the number of times hunters used the phrase during interviews. One hunter may use more than one phrase.

Context	Phrase	Frequency
Reason not to hunt	<i>Scarce/ difficult to find</i>	13
	<i>Chops bullets</i>	6
	<i>Strong/ powerful/ difficult to kill</i>	11
	<i>Too high in a canopy</i>	3
Reasons to hunt	<i>Has good money/ is a big monkey</i>	2

Men described the difficulty of locating colobus as an additional reason for the low representation of *Piliocolobus preussi* in hunter offtake. Hunters reported *P. preussi* as rare during hunting trips. Hunters reported that they must walk 2-12 km from the village edge before locating *P. preussi*, and that the once plentiful monkey is now rare. A 29 year old trapper explained the current scarcity of *P. preussi* by describing the increase in overall bushmeat hunting over his lifetime: “[*Mberi*] in those days there were much... and now it is just luckily that you see them. In those days, the hunters were not much and now there are much. Now people kill the meat to sell to have more money.” In this statement, the man is referring to the increase of gun hunting throughout his lifetime. A hunter, age 60 years, also noted: “There were plenty them [*P. preussi*], but they are now inside the bush far far far! They heard the guns and they all ran inside,” indicating that the monkeys have left in response to increased hunting pressures. Women also commented on their rarity, even though some female heads of house do not go beyond their farms to the forest. One 35 year old women remarked that: “The thing [*P. preussi*] is so low [in number] that people don’t kill it.”

During interviews participants referenced the possibility of traditional medicine or supernatural intervention as a factor driving the general difficulty of locating wildlife, including primates in the Ikenge forest. One participant commented that species like *Piliocolobus preussi* that are difficult to find in the forest may be “cloaked” by witchcraft, making its visibility limited. Several participants suggested that the colobus monkeys must be consuming medicinal leaves, like those used by local communities, to gain strength and power, making them harder to kill.

Perceptions and understandings of conservation

When asked about the history of Korup and the role of *Piliocolobus preussi* in the park’s northern expansion, only two villagers commented on the history of the park. One male participant was aware that Ikenge is important to the history of conservation in Korup, but did not know the story. Another male participant outlined the role of *P. preussi* in the expansion and establishment at Korup. He commented that: “According to others there was one German who was passing, he saw these animals, like this *mberi*, and he was interested, so he started making history about the place, and some few years behind about eighteen to twenty years we saw people here researching. They really struggled to remove us, but some people did not accept it and then they stopped trying.” Women did not know why Ikenge was now part of a protected area, though some did mention that it was because of “the animals.” When we asked participants what conservation meant to people of Ikenge, the most common sentiment was that conservation is the “government telling Ikenge not to kill animals.” Most participants went on to express discomfort with the fact that conservation did not allow hunting and therefore limited livelihood options. Few explained that conservation can save animals for future generations, but many also explained that no animal could truly be lost [extinct] because the animals are continuously reproducing.

DISCUSSION

This case study demonstrates the importance of situating an ethnographic understanding of hunting practices and livelihood strategies of villagers, as well as the relationship between hunters and nonhuman primates, in a conservation context. People in Ikenge described hunting with shotguns as strenuous and difficult work, in comparison to farming. In this enclaved village, people identify farming as the preferred and most profitable form of income generation for both men and women. Although hunting is illegal, all men in this study choose to engage in this economic strategy to access “fast money” as a supplemental income. Through ethnographic data we show that historic overhunting, use of varied hunting technology (guns vs. traps), and individual perceptions of livelihood activities result in a renegotiation of the relationships between Ikenge hunters and *Ptilinopus preussi* and other wildlife, signaling a change in the ways that the hunters value and interact with *P. preussi* (Remis and Hardin 2009). Perceptions of *P. preussi* in Ikenge are not always consistent with Western perceptions of this species. Long-term quantitative data on the abundance of *P. preussi* indicate consistent declines in encounter rates on ecological transects, and catchment surveys show that the rate of hunting of this species has declined over time. Lower off-take is likely to be related to lower population sizes, and hunters report that *P. preussi* is not as easy to locate as it was in the past.

Livelihood choices and conservation

A 2017 study examining food security and hunting in the Global South (24 countries across Latin America, Asia, and Africa) found that the income derived from “wild-meat” or bushmeat in served primarily as a “gap-filling” economic strategy that is inversely related to the accessibility of alternative income generating strategies (Neilsen *et al.* 2017). Those results show that the long-term sustainability of hunting, and ultimately the success of conservation programming, is tied to

the ability to understand economic choices and food security (Neilsen *et al.* 2017). Site-specific studies of bushmeat hunters in Tanzania and Equatorial Guinea yield similar results. For example, attempts to regulate hunting in Kilombero Valley, Tanzania, using guard patrols and fines had little influence on an individuals' choice to hunt or trade bushmeat (Nelson *et al.* 2014). Rather, the most important element affecting the choice to hunt or not to hunt was the potential daily salary in of an alternative occupation. In Equatorial Guinea, the commercial bushmeat trade declined following the outmigration of hunters seeking employment in the construction industry in a period of rapid economic growth (Gill *et al.* 2012). The socio-economic and ethnographic data we collected in Ikenge also point to the overall desire of men to generate income in other ways (i.e. cocoa farming). Through closer examination of income strategies within an ethnographic context at Ikenge and other sites, we can better understand why individuals, in this case men, choose to trade bushmeat and farm. Our participants are well aware of the possible repercussions of hunting within park borders; yet, all men choose to continue these activities as a form of "gap-filling" supplemental revenue. For all men in this study, "fast money" generated from bushmeat appears to represent a fallback subsistence strategy, supplementing the "slower" income generated from agricultural crops.

The livelihood choices of residents in the enclaved village of Ikenge are limited by structures of conservation. For residents of Korup National Park, the allotment of farmlands and access to forest products are regulated by the establishment of community agreements with development agencies and park authorities (Siewe *et al.* 2017). For foraging communities in Central Africa, conservation structures similarly limit access to traditional hunting territories through the creation of park boundaries that are predicated upon the locations of wildlife rather than resource-use patterns (Jost Robinson and Remis 2014; Jost Robinson *et al.* 2016). Options

for mitigating the effects of bushmeat hunting and consumption in protected areas are dependent on site-specific economic and cultural context (Albrechtsen *et al.* 2005; Schneck *et al.* 2016; van Vliet *et al.* 2012). Without a deep understanding of why people hunt and the ways in which they engage with money and trade items in a broader cultural context, it is difficult to adequately address the needs of human communities who feel as though the forest is valued more than they are. Subsequently, it becomes difficult to accurately assess the cascading effects of human subsistence choices on nonhuman lives. As nonhuman lives become increasingly threatened, primatologists and ethnoprimateologists alike will benefit from learning to better situate our methods and results within broader contexts of political ecology and anthropology. In doing this, we can elaborate the intricate ways in which political and economic structures shape the choices made by both individual participants and collectives in communities when interacting with their environments (Brockington *et al.* 2012; Fletcher 2010).

Hunters, hunted, and patterns of primate hunting

To address issues of the sustainability of wildlife economies effectively, we must also develop a better understanding of prey population dynamics, human motives, and land-use practices beyond traditional definitions of “hunter” and “prey” (Davies and Brown 2007; Jost Robinson 2012). The problem with the application of categories, like hunter, stems not only from the dilution of the heterogeneity implicit within these categories, but also applies the use of etic terminology to represent emic experiences (Agrawal and Gibson 1999; Jost Robinson 2012). Hunted species are represented in Western perspectives of the bushmeat trade and conservation in very explicit, and often limiting, ways, with particular attention paid to charismatic megafauna (Leader-Williams & Dublin 2000). However, across Afrotropical forest zones, other species (i.e. duikers and various cercopithecoid monkeys) are often the primary targets of subsistence, and

increasingly commercial, hunting (Fa and Brown 2009). Therefore, researchers must be cautious of inadvertently imposing a potentially limited understanding hunting on indigenous communities, rather than allowing them to define themselves which species are important and why (Jost Robinson 2012; Papworth *et al.* 2013).

Studies of hunters rarely address the importance of ethnicity and individual backgrounds. Rather, hunters are included in a single category of hunter or as sub-categories distinguished by socioeconomic and demographic variables of income, education level and marital status (Gill *et al.* 2012; Kümpel *et al.* 2009). Providing a more detailed examination of individual backgrounds of hunters across villages in the Dzanga-Sangha Dense Forest Reserve in Central Africa demonstrates how unique environmental histories influence hunting practices and human-wildlife interactions (Jost Robinson 2012). In Ikenge, there is a clear distinction between categories of hunter vs. trapper. Men identify as hunters only if they carry a gun, but not if they catch wildlife using sedentary traps. This self-identification is a departure from the way that conservation practitioners might define the category of “hunter” in Korup. The category of hunter is described as any individual who shoots, traps, nets, etc. any species of wild animal for consumption or sale across a range of markets, if it is defined it all (Bobo *et al* 2012; Linder 2008; Linder and Oates 2011; Vabi 1999). How Ikenge men identify themselves is a clear example of the need for closer examination of perceived homogenous human categories that can have serious implications for data collection, as well as conservation practice. For example, previous surveys in Korup which used Western definitions of “hunter” may underestimate the number of individuals who harvest wildlife by only obtaining data on men who carry guns. In Ikenge village, if a researcher applies only the term “hunter,” they will be targeting data on the primary prey species most accessible using a shotgun (e.g. primates, red river hogs, larger-bodied duikers), and may be undercounting

those species most often caught in traps (e.g. pangolins, brush-tailed porcupines, blue duikers etc.). Across protected areas, these types of datasets ultimately guide the development of guard patrols and other management practices. If research hypotheses and conservation protocols are assessed and developed using inaccurate datasets then we are not only misrepresenting how humans interact with their environments, but are further limiting the potential success of conservation efforts.

Although limited, our reported bushmeat offtake, in terms of proportions of species, is similar to that reported in market surveys across Cameroon and Nigeria, although other variables, such as seasonality and access to hunting technologies, may have influenced these results and warrant further study (Fa *et al.* 2015). Among species hunted, duikers and other ungulates made up the largest percentage of offtake, followed by rodents, and primates. Past socio-economic and hunter catchment surveys in Korup report *Ptilocolobus preussi* as one of the most hunted primate species in Ikenge (Infield 1988; Linder 2008). Our catchment data, supported by ethnographic data, suggest that this is no longer the case (Fig. 3). Declining presence of *P. preussi* in catchments at Ikenge is likely influenced by multiple factors including: declining prey populations related to overhunting and an increase in accessibility to fire arms, cultural perceptions of and preferences for different primate species, and varied local hunting strategies (Linder and Oates 2011; Vabi 1999; Waltert *et al.* 2002). During interviews, men explained that *P. preussi* are increasingly difficult to locate in the forest, and that even when found, locally made guns (“*dem guns*”) are not accurate enough to shoot high into the forest canopy. With limited capital to purchase bullets and declining abundance, the smaller, more abundant, lower canopy dwelling species are now considered preferable and “easy” to kill (i.e. *Cercopithecus nictitans* and *C. mona*).

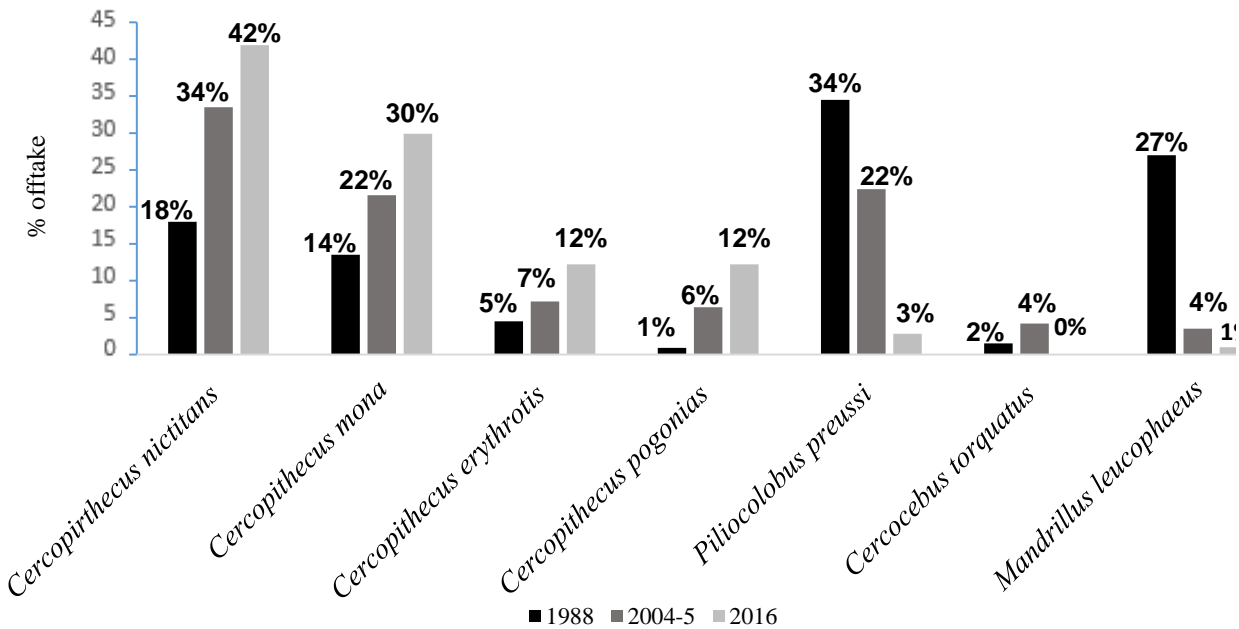


Fig. 3 Comparison of diurnal primate catchments between a bushmeat survey conducted by Infield (1988) in three Korup Bakoko villages (Esukutan, Bera, and Ikenge) over nine months in 1988, Linder and Oates (2011) catchment survey of 30 (107 carcasses) hunters in Ikenge village over 12 months in 2004-2005, and our survey of 30 Ikenge hunters in June 2016.

Perceptions of Piliocolobus preussi

The disconnect between externally-conceived, etic definitions of categories like “hunter,” and “hunted” can be extended to the ways that people engage with and perceive nonhuman primates and population dynamics. In contrast to primatological descriptions of red colobus as large, slow moving, easy targets (Struhsaker 2005, 2010), Ikenge residents consider *P. preussi* as strong and resilient. This is mirrored in hunter interviews from villages surrounding the neighboring Nwende-Hills Forest Reserve, Cameroon where participants note that *P. preussi* is “difficult to die when shot” (Bobo *et al.* 2012: 34). Therefore, despite its large body size and potential to yield a large profit, hunters cite the perceived strength and power that accompanies a large body size as a reason to avoid shooting *P. preussi*. Hunters do confirm that in the past, *P. preussi* was considered an ideal target because of its body size in addition to population abundance,

however, these sentiments appear to have shifted given increasing scarcity, as well as the increasing cost of munitions (Linder and Oates 2011; Waltert *et al.* 2002).

Villagers draw upon both human action and primate agency as reasons for the scarcity of *Piliocolobus preussi* in the forests surrounding Ikenge. Scarcity can have different meanings for Ikenge villagers and conservationists. For the latter, it implies documented declines in population densities (animals/km²). For villagers, it might imply that animals are simply difficult to find, are declining in numbers, have left the area, or are cloaked by witchcraft. We do see overlap in explanations by previous conservation researchers and residents regarding changing population abundance, however, researchers have yet to grapple with deeper cultural models for the scarcity of *P. preussi*. Different interpretations of scarcity have also been documented in the Dry Chaco region of Argentina. Indigenous *Wichí* communities recognize species abundance and extirpation as spiritual processes rather than ecological responses to anthropogenic disturbances (Camino *et al.* 2016). In Ikenge, men and women commented that *Piliocolobus preussi* had “left” the immediate area to live farther away from the village to avoid human pressures. These types of conversations imbue *P. preussi* with agentic qualities. In “leaving the area” these monkeys are responding and adapting to negative interactions with their human counterparts. Fuentes (2010) and Jost Robinson and Remis (2014) address the ways in which humans and their nonhuman primate counterparts mutually shape each other’s behavior as they behaviorally and ecologically adapt in shared spaces landscapes. Residents of Ikenge illustrate the intersubjective nature of human-nonhuman primate relationships within the context of hunting. Here the residents themselves inadvertently associate their own exploitation of wildlife and its mutual effects in changing the behavior of *P. preussi* and the hunter who must venture further to find them.

Ikenge residents also draw upon local cosmology and the permeable dichotomies of humans-animal when characterizing the forest and the behavior of wildlife. If forest animals behave in ways that are identified as a deviation from behavior that is understood as typical or natural, the behaviour may be attributed to witchcraft. For example, when discussing elephants, cane rats, and other crop-foraging species, residents of Korup more broadly identify crop-foraging as “not natural” animal behavior (Jost Robinson unpublished.) In these instances, the animals are thought to embody the spirit of a human counterpart. Such cosmologies of shape-shifting have been documented across Africa (Kohler 2005; Richards 2000; Sousa *et al.* 2017), and south-east Asia (Knight 1999) and are particularly salient for nonhuman primates whose similarity to humans transgresses accepted boundaries of human-animal, nature-culture, village-forest (Haraway 1989; Mullin 1999). Examinations of the cultural roles of *Ptilocolobus preussi* (Bobo *et al.* 2012; 2014) also implicate witchcraft through discussions of *P. preussi* as human-incarnated animals with human feelings. In Ikenge, *P. preussi* is not a prominent figure in local cosmology, however, its human-like appearance serves as a reason not to consume it. Such relationships with the forest undoubtedly influence regional understandings of conservation and participation forest management, warranting further study.

Feeding taboos, folklore, regional cosmologies, and religious ideologies are often provided as reasons for avoiding the hunting, sale, and consumption of certain forest species (Cormier 2003; Osei-Tutu; 2017; Sousa *et al.* 2017). However, cultural valuations of species must also be considered in light of broader commodity chains of wildlife (Cowlshaw *et al.* 2007; Jost Robinson *et al.* 2016). For example, research on the role of folklore and taboo in the long-term protection of Scalter’s monkey (*Cercopithecus sclateri*) in Nigeria highlights potential positive influence on regional conservation strategies (Baker 2013). However, the authors also caution against over-

looking the complex relationships between feeding taboos, population dynamics, and changing human and nonhuman primate behavior in an increasingly globalized community (Baker *et al.* 2017). The residents of Ikenge commented regularly on the scarcity of *Piliocolobus preussi*. However, few acknowledge the potential for the regional extirpation. In conversations, villagers of Ikenge indirectly take partial ownership of their behavior as driving the scarcity of *P. preussi*, but it is conservation and its associated structures that have shaped the limited livelihood choices available to this community. Despite the role of *P. preussi* in the park's expansion and changing land-tenure in Ikenge, we found that attitudes toward and patterns of colobus hunting at Ikenge more often reflected economic/subsistence concerns and changes in the availability of prey species in the forest rather than contempt for conservation. Variation in villager's discussions of why they do or do not continue to hunt or consume *P. preussi* indicates a dynamic relationship between humans and prey in a system mutually shaped by changing land-use rights, fluctuating regional and local economies, and life in a protected area.

CONCLUSIONS

Ethnographically grounded documentation of site specific variation and local perceptions of human-nonhuman interactions that are attentive to the ways communities engage with and think about the forest are a necessary, though often overlooked, component of ethnoprimateological research (Kohn 2013; Leblan 2013). While socio-cultural anthropologists accept that hunters conceive of hunting as a mutual relationship within which hunter and hunted create and maintain one another; primatologists tend to overlook these rich, intersubjective relationships which precludes their incorporation into conservation policy. In considering the multi-scalar human-nonhuman primate relationships between hunters, others, and *Piliocolobus preussi*, we are better able discern important social and cultural aspects of conservation. Understanding these

relationships is an essential entry point for future collaborations across stakeholder groups to conserve this species within its limited geographic range.

Ethnoprimateological practice, that truly combines anthropological and primateological approaches to research, can make significant contributions in protected areas, where the relationships of humans and nonhumans are important to the survival of both parties (Dore 2017; Hardin & Remis 2012; Jost Robinson 2017b; Shepard 2002; Sponsel 1997). However, this requires researches to engage in theory and practice that extends beyond our traditional primateological training to reveal the diverse social, cultural, political, and historical factors relevant to human-nonhuman primate relationships and conservation (Setchell *et al.* 2016). We set out to examine the relationship between *Ptilocolobus preussi* and Ikenge residents; however, we quickly found that other primate and non-primate species figure more prominently into the lives of Ikenge people, and that relationships with bushmeat generally are intricately tied to economic, cultural, and social realities. Participant observation and semi-structured interviews are useful methods that can guide conversations away from the preoccupations of the research team, allow our human participants to guide inquiry, and can lead to unforeseen discoveries pertinent to conservation practice (Drury *et al.* 2011). This case study highlights the critical importance of these engagements in helping researchers across disciplines to navigate immediate conservation concerns, while also acknowledging and valuing the human voices who share spaces with Critically Endangered species like *P. preussi*.

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