ETHNOBIOLOGY AND CONSERVATION

RESEARCH ARTICLE

Ethnobiology and Conservation, 9:33 (20 August 2020)
doi:10.15451/ec2020-08-9.33-1-9
ISSN 2238-4782 ethnobioconservation.com

Ethnozoological Uses and Local People's Perceptions of a Competitor Primate in the Fringe of the Kundelungu National Park, D.R. Congo

Paul Kaseya Kazaba[1,2,*]; Gordon Tinaye Mandamombe[3]; Didier Kambol Tshikung[4]; Akindayo Abiodun Sowunmi[5] and Albert Orodena Aweto[6]

ABSTRACT

Several studies investigate the human dimension of human-wildlife conflicts, but human attitudes towards forest-dependent animals such as primates in the context of competition for forest resources are still under-researched. We used a semi-structured questionnaire and conducted ethnozoological surveys in order to identify the uses of Kinda baboons (*Papio kindae* Lönnberg) and the main factors associated with local people's attitudes towards this frugivorous primate, at the periphery of the Kundelungu National Park, Democratic Republic of Congo. This study indicates that Kinda baboons are important to community members, essentially for consumptive uses, namely as bushmeat and medicinal animals. The association between local peoples' anti-conservation attitudes towards these baboons and observation of the depletion of co-used indigenous trees has been confirmed statistically, suggesting the perception of baboons as competitors. Also, even though the majority of respondents recognized the vulnerability of baboons to the depletion of co-used indigenous trees, against our hypothesis, most of them were not inclined to use these resources sustainably. However, an association between the frequency of encounters with Kinda baboons and park-adjacent dwellers' willingness to conserve baboon-edible trees has been established. We therefore support the view that improving the availability of co-used trees through reforestation or agroforestry is likely to alleviate the prevalence of negative attitudes towards tree-dependent animals. Also, in order to gain community support to protected areas and wildlife, pro-conservation campaigns in similar settings should not merely highlight the vulnerability of animals to the depletion of their resources, but also promote the responsible access of local people to protected areas.

Keywords: Human-wildlife Conflicts; Kinda Baboon; Ethnozoological Uses; Human-Primate Interactions; Kundelungu National Park.

1 Unité de Recherche en Ecologie, Restauration écologique et Paysage (EREP), Département de Gestion des Ressources naturelles renouvelables, Faculté des Sciences Agronomiques, Université de Lubumbashi. Route Kasapa, Campus de l'Université de Lubumbashi, BP 1825, Lubumbashi, D.R. Congo.

2 Department of Environmental Management, Pan African University Life and Earth Sciences Institute (PAULESI), University of Ibadan. Ibadan, Nigeria.

3 Environmental Management, Renewable Energy and Climate Change Center, Harare Insitute of Technology, Harare, Zimbabwe.

4 Département des Sciences de Base, Faculté de Médecine vétérinaire, Université de Lubumbashi. Lubumbashi, D.R. Congo.

5 Department of Zoology, University of Ibadan. Ibadan, Nigeria.

6 Department of Geography, University of Ibadan. Ibadan, Nigeria.

* Corresponding author. E-mail address ✉: PKK (paulkazaba@gmail.com)

SIGNIFICANCE STATEMENT

This study involved local communities and the underresearched Kinda baboon in a context of competition for forest resources, at the fringe of a renascent protected area. The underlying factors of human pro- and anti-baboon attitudes it discusses are relevant to both ethnozoology and conservation. The key findings from this study are susceptible to enhance the analysis of human-wildlife conflicts and to fuel the ongoing debates on community conservation at the human-wildlife interface.

INTRODUCTION

Increasing trends in human-driven degradation and encroachment of wildlife territories observed worldwide are accompanied with the prevalence of negative impacts on both humans and wildlife. Human-wildlife conflicts take many forms and have been studied from various perspectives. In conservation and protected areas management, among their adverse effects, these conflicts promote negative human attitudes towards wildlife (Dickman and Hazzah 2016; Larson et al. 2016; Megaze et al. 2017; Talukdar and Gupta 2018). Therefore, understanding anthropogenic drivers of such conflicts, and identifying underlying factors of human attitudes towards wildlife are of high relevance for conservation.

Several studies have analyzed the human perceptions of wildlife, mainly with a particular regard to the extent of wildlife damages, in both protected and non-protected areas. The most discussed damages include crop raiding (Agyeman and Baidoo 2019; Alelign and Yonas 2017; Larson et al. 2016; McGuinness and Taylor 2014; Talukdar and Gupta 2018), livestock predation (McManus et al. 2015; McNutt et al. 2018; Megaze et al. 2017; Ontiri et al. 2019) and attacks to humans (Dhanwatey et al. 2013; Landy et al. 2018; Packer et al. 2005). These damages involve a wide range of vertebrate animals, including reptiles, birds and diverse mammal taxa such as rodents, carnivores, ungulates, and nonhuman primates (hereinafter referred to as primates).

Most of primates depend on forest and are facing habitat loss and poaching, among other anthropogenic threats, throughout their range countries (Estrada et al. 2017). A number of primate species are surviving in expanding human-dominated environments. The spatial overlap between humans and primates induced long-term modifications of the ranging behavior, as well as the diet of some species. For example, a number of primates, maintly Cercopithecine monkeys such as macaques (Talukdar and Gupta 2018), grivet and vervet monkeys (Alelign and Yonas 2017; Cancelliere et al. 2018) and baboons (Kazaba 2019; Schweitzer et al. 2017), were reported exploit modified habitats and exotic food (such as crops) in close proximity to humans, and mostly in agricultural settings. An increasing number of studies investigate the human dimension of human-primate conflicts, but the human attitudes towards primates in the context of competition for co-used wild food resources are still under-researched.

This study used the Kinda baboon (*Papio kindae* Lönnberg), a frugivorous primate deemed able to survive in human-dominated habitats, to explore the human dimension of human-primate conflicts in a context of spatial and dietary overlap, at the fringe of the Kundelungu National Park (KNP), Democratic Republic of Congo (DRC). Its main objective was to identify the uses of baboons and the main factors associated with park-adjacent dwellers' attitudes towards these primates. We hypothesized that local peoples' anti-conservation attitudes towards Kinda baboons are associated with mentions of the depletion of co-used indigenous trees, while their willingness to conserve these trees is associated with the recognition of baboons' vulnerability, high levels of education, and the lack of experience of baboon-caused damages.

MATERIAL AND METHODS

Study Area

The study was carried out in Lukafu (10°30'35.03"S; 27°32'55.36"E) and Mulenga (10°40'20.15"S; 27°38'40.02"E) villages, the main human settlements located between the Integral Zone and the Annex of the KNP, south-eastern DRC (Figure 1). The KNP is part of the Upemba-Kundelungu National Parks Complex.

The climate is hot and humid and marked by distinct wet and dry seasons. The rainy season lasts from November to March and the dry season from April to October. The vegetation is dominated by Miombo woodlands and savannas. Miombo woodlands are the major forest type of the Southern part of Africa, distinguished from other African savanna, woodland and forest formations by the dominance of tree species in the family Fabaceae, particularly in the genera *Brachystegia, Julbernardia* and *Isoberlinia* (Frost 1996). In the study area, some Miombo fleshy-fruited trees edible for baboons and with multiple uses in local communities (Kazaba et al. 2020) are also part of the tree layer. The most common include the Wild loquat tree (*Uapaca kirkiana*), the Mobola plum tree (*Parinari curatelifolia*), some Monkey orange tree species (*Strychnos* spp.), and the Snot-apple tree (*Thespecia garck-*

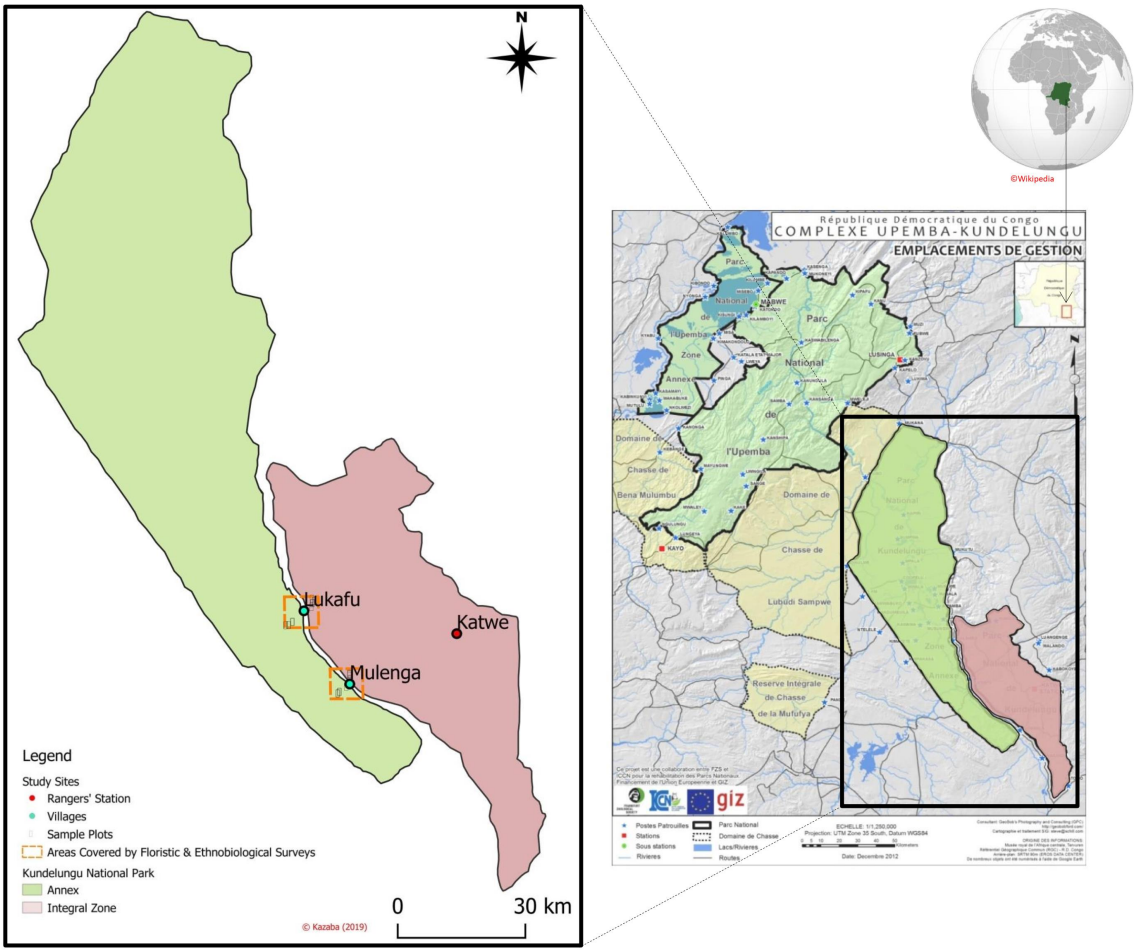

Figure 1. Location of Lukafu and Mulenga villages between the Integral Zone and the Annex of the Kundelungu National Park, southeastern D.R. Congo.

eana). The KNP harbors many primate species, of which Kinda baboons are among the most frequently observed (Vanleeuwe 2008). These diurnal primates are found around Katwe, a Station within the Integral zone of KNP, and also in the vicinities of park-adjacent villages such as Lukafu and Mulenga (Figure 1).

Communities around the KNP practice subsistence farming, breeding of small livestock, fishing and hunting (Vanleeuwe 2008). The limits of the KNP have been modified several times and the longstanding land conflicts with the evicted communities remain unresolved. In both Lukafu and Mulenga villages, local community members still claim some areas of the KNP and its Annex, where they practice crop farming and extract forest resources such as fuelwood and non-timber products (Kazaba et al. 2020). These activities resulted in typical human-modified habitats.

Data Collection and Analysis

To assess the research hypothesis, a range of data was collected through ethnozoological surveys. These were carried out in Lukafu and Mulenga, from May to June 2019. Given the lack of reliable demographic data on these villages, the number of respondents was fixed, instead of being proportional to the population of the villages. Accordingly, under the logistic limitations, semi-structured interviews involved a total of 141 respondents aged over 18 years and belonging to different households.

A survey questionnaire was designed and used for the collection of data related to the research objectives. Socio-demographic information such as respondents' age, level of education and main activity were also collected for analysis purposes. Frequencies of responses to close-ended questions were calculated and compared based on descriptive statistics. We used the R software (Version 3.6.1) and performed Chi-square tests of association in order to analyze the respondents' attitudes towards baboon conservation and their willingness to

sustainably exploit baboon-edible indigenous trees, in relation to socio-demographic parameters and factors such as the availability of these trees, the vulnerability of baboons and the occurrence of human-baboon conflicts.

RESULTS

Sighting, Utilizations and Significance of Baboons

Of the 141 respondents who participated in the semi-structured interviews, 126 (or 89%) declared they have already seen free-ranging Kinda baboons in the vicinities of their village during the 12 months preceding the survey. They (126 respondents) were then asked to give an estimate of how often they see these primates. The majority (62%) of respondents claimed they have seen baboons once only in the considered period; a quarter of them claimed they saw baboons either once a week or once a month.

Baboons are utilized mainly for consumptive purposes ($\chi^2 = 110, df = 2, p < 0.0001$). Eighty-two percent of the respondents observed that baboons provide bushmeat; 17% claimed they can be used as pets, and only 1% said they are medicinal animals. Also, of the 78 respondents who claimed to have already utilized any organ or body part of a Kinda baboon, 70 (or 90%) declared they have consumed the flesh the most frequently (Figure 2). Nevertheless, eight female respondents observed they avoid baboon meat during pregnancy because of "fear of giving birth to a baby resembling a monkey". Only two respondents were aware of non-consumptive utilizations of baboons: the first mentioned ecosystem services provided, namely seed dispersal, and, for the second, baboons are important for biomedical research.

Some respondents suggested the importance of baboons in zootherapy. According to local traditional beliefs, the consumption of baboon bone meal is deemed to increase agility in children. Also, baboon hands were mentioned by 4% of the 78 respondents as utilized in football-related magical practices, for their "power to improve goalkeepers' performances in ball catching". It should be noted that some respondents mentioned also other monkeys of the area, such as the Malbrouck *Chlorocebus synosuros* and the blue monkey *Ceropithecus mitis*, for such utilizations.

Attitudes towards the Conservation of Baboons and Co-used Resources

On the 141 respondents, 58 (41%) observed they have experienced baboon-caused damages in the area. The results presented in Figure 3 suggest that for most of them, negative attitudes towards baboons are related to their crop-raiding behavior (mentioned by 93% of the 58 respondents) and attack and/or injury to humans (only 7%). The respondents practicing crop farming were the most to mention damages to crops ($\chi^2 = 21$, $df = 2$, $p < 0.001$).

When asked on their views about the necessity of baboon conservation, only 36% of 138 respondents considered baboons as animals of a particular significance and worthy of protection. The results of a Chi-square test ($\chi^2 = 18, df = 1, p < 0.01$) suggest that pro-conservation attitudes towards baboons were weakly expressed among the respondents who observed decreasing tendencies in the availability of indigenous trees (most of which being co-used with baboons) in the forests of the neighboring protected area.

Concerning the awareness of the vulnerability of baboons to extinction caused by the human over-exploitation of tree species, most respondents (67%) observed that the depletion of baboon-edible trees "...primarily threatens baboons", while 19% declared it "threatens both humans and baboons" and the remaining 14% were of the view that it "has no influence on both". The threat to baboons was justified by their dependence on indigenous trees. Indeed, according to most of the respondents who recognized the vulnerability of baboons, unlike humans, "baboons do not have a wide range of alternative food resources in the wild" and for others, these primates "cannot grow their food". When asked "If you are informed that the over-exploitation of co-used indigenous trees by humans is a source of threat to baboons only, will you be ready to operate notable changes in your ways of exploiting these resources?", about 54% of respondents replied by "yes". Proposed changes included "decrease the harvests of co-used tree products"; "grow trees through production systems such as agroforestry", and "stop harvesting products from co-used trees". For some respondents among the 46% who said "no", however, baboons are just "wild animals" and can "easily cope in the wild". It should be highlighted that the recognition of baboons as the party affected the most by the depletion of forest resources did not influence positively ($\chi^2 = 3.45, df = 2, p = 0.18$) the respondents' consent to adopt strategies for the sustainable use of these resources.

Associations between the respondents' willingness to improve their uses of baboon-edible indigenous trees and each of the factors such as the level of education, the experience of baboon-caused damages, and the frequency of encounters with baboons in the wild were examined. Despite the fact that most of the respondents who completed secondary education and those who did not mention problems involving baboons were mainly those who expressed the wish to conserve baboon-edible fruit trees, the only association confirmed statistically was that of the frequency of encounters with

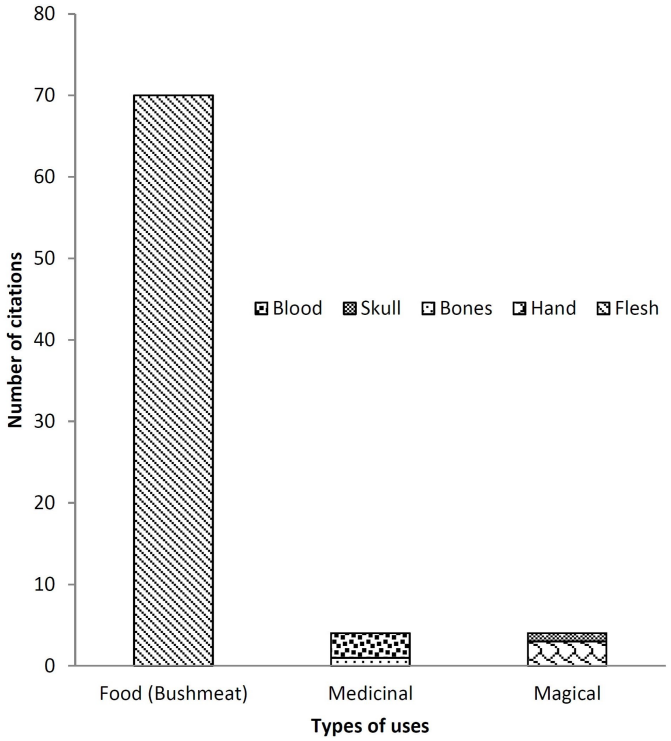

Figure 2: Main utilizations and body parts of Kinda baboons (*Papio kindae* Lönnberg) used in two villages at the periphery of the Kundelungu National Park, D.R. Congo.

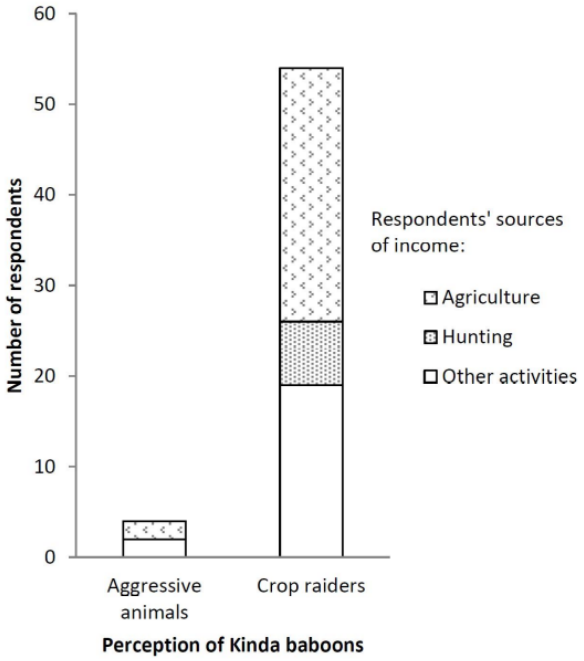

Figure 3. Park-adjacent dwellers' (n=58) sources of income and negative perceptions of Kinda baboons (*Papio kindae* Lönnberg) of Kundelungu National Park, D.R. Congo. Other activities (sources of income) include handicraft, small-sized breeding, and trade.

free-ranging baboons ($\chi^2 = 9.36, df = 2, p < 0.01$).

DISCUSSION

Results of this study suggest that the value allocated to baboons by park-adjacent dwellers is related mainly to consumptive uses. Primate meat consumption has been reported previously in many countries (Ali et al. 2017; Blair et al. 2017; De Thoisy et al. 2005; Kazaba 2019; Shaffer et al. 2018; Tshikung et al. 2019). In southeastern DRC for example, Kazaba (2019) identified a notable quantity of baboon carcasses from parks and natural reserves illegally sold in urban markets of Lubumbashi, a city located nearly 150 km from the study area. The study suggested increasing trends in the consumption of primate meat and suspected the decline in commonly consumed taxa, such as artiodactyls, to increase the hunting pressure on primates, which are considered as alternative sources of bushmeat. Kinda baboons are also utilized in traditional medicine and magical practices in the vicinities of the KNP. The utilization of primates in traditional medicine has been reported in a number of previous studies as well (Alves et al. 2010; Blair et al. 2017; Svensson et al. 2015; Williams and Whiting 2016). Involving a wide range of species, zootherapy is mostly motivated by the search to transfer animal aptitudes for health (Castillo and Ladio 2019). Moreover, according to Simelane and Kerley (1998), animals are utilized in traditional medicine or magical practices based on their appearance and behavior. From the results of this study, the consumption of baboon bone meal relates to the agility of monkeys, while the magical utilization of baboon hands by goal keepers is due to their hand prehensility.

The diversity of consumptive utilizations of Kinda baboons may constitute an additional factor to the prevalence of human-baboon conflicts. However, it should be noted that these baboons are not specifically targeted for these utilizations, as for most of the questions on the uses of baboons, respondents mentioned also other diurnal monkeys of the study area. The very low number of informed respondents on non-consumptive importance of baboons suggested in this study appears to be explained by lower levels of education and/or the lack of sensitization campaigns. However, this was not confirmed statistically.

The fact that respondents who suggested decreasing trends in the availability of co-used indigenous trees were significantly less favorably disposed towards baboon conservation in the park is illustrative of the perception of baboons as competitors for forest resources. This may also be supported by the fact that even though the majority of respondents recognized the vulnerability of baboons due to the depletion of indigenous fleshy-fruited trees, this recognition did not motivate them to adopt specific strategies for the sustainable exploitation of these resources. However, park-adjacent dwellers who claimed they have seen free-ranging baboons more than once in the area appears to be the most inclined towards the conservation of baboon-edible indigenous fruit trees. Such sympathy suggests the conservation benefits of human-wild animals encounters, if such encounters did not result in attacks. Indeed, the encounters with wild animals in their natural environments have been reported to induce human positive attitudes towards wildlife and conservation (Larm et al. 2018; Moss and Pavitt 2019). Therefore, the development of wildlife-based ecotourism and encouraging local peoples' responsible access to neighboring protected areas is likely to contribute not only to raising the public awareness of the status and significance of wildlife, but also to promoting pro-conservation attitudes.

Attitudes towards wildlife may be influenced by education, among other factors. The effect of education on the perceptions of wildlife and conservation has been largely examined in various settings. For example, according to Hazzah et al. (2013), the high level of education was among the factors associated with pastoralists' positive attitudes towards lions in the context of authorized access to livestock grazing inside some protected areas of Kenya. Likewise, the study of Megaze et al. (2017) along the boundary of an Ethiopian park suggested an association between better education and positive attitudes towards wildlife among communities who cultivate crops and rear livestock as the main means of livelihood. However, this study did not statistically confirm such a suggestion in the peripheries of the KNP, possibly due to the particular socioeconomic context of the area. Indeed, the study concerned villages and local people practicing crop farming as the main source of income, on disputed lands. In such a setting, experience and/or reports of baboon crop-raiding, as well as land conflicts with the park, can justify the lack of sympathy towards Kinda baboons and conservation.

CONCLUSIONS

Exploring the human-primate conflicts in a context of spatial and dietary overlap, this study analyzed the uses and perceptions of Kinda baboons among local community members at the periphery of the KNP. Key results and conservation implications include:

(i) Considered as sources of bushmeat and medicinal animals, Kinda baboons are important to communities essentially for consumptive uses. With the potential hunting pressure on these primates, the competition for wild fruits constitutes an additional factor to the conflicts with humans in shared environments.

(ii) As was expected, the association between local people's anti-conservation attitudes towards Kinda baboons and observation of the depletion of co-used indigenous trees has been confirmed, suggesting the perception of baboons as competitors. Therefore, the improvement of the availability of co-used indigenous trees through reforestation or agroforestry (for example) is likely to alleviate the prevalence of negative attitudes towards tree-dependent animals.

(iii) Even though the majority of respondents recognized the vulnerability of baboons to the depletion of indigenous fleshy-fruited trees, against our hypothesis, a significant proportion of them did not consent to sustainably use these resources. However, unexpectedly, an association between the frequency of encounters with Kinda baboons and park-adjacent dwellers' willingness to conserve baboon-edible trees has been established. Hence, this study is supportive of the view that in order to gain community support for conservation in a context of human-wildlife conflict, the advantage of ecotourism (involving the local people) should be recognized and utilized. Raising environmental awareness and pro-conservation attitudes among local communities in such a context should not merely highlight the vulnerability of wild animals to the depletion of their resources, but also promote the responsible access to neighboring protected areas.

ACKNOWLEDGEMENTS

We thank the African Union Commission for funding this research, as part of the Pan African University initiative, and the anonymous reviewers for their insightful comments and suggestions on early versions of this paper.

DATA AVAILABILITY

The data used to support the findings of this study are available from the corresponding author upon reasonable request.

CONFLICT OF INTEREST

The authors have no conflict of interest to declare.

CONTRIBUTION STATEMENT

Conception of the idea: PKK, DKT, AAS, AOA.
Data collection and analysis: PKK.
Drafting of the manuscript (first version): PKK and GTM.
Review and final writing of the manuscript: DKT, AAS and AOA.
Supervision: DKT, AAS and AOA.

REFERENCES

Agyeman YB, Baidoo S (2019) **Farmers' perceptions of the effectiveness of strategies for managing wildlife crop depredation in Ghana.** International Journal of Biodiversity and Conservation 11(6):165-74.

Alelign A, Yonas M (2017) **Community perceptions of grivet monkey crop depredation in the Ethiopian Highlands: implications for primate conservation.** Human–Wildlife Interactions 11(2):8.

Ali ME, Raifana Abdul Rashid N, Bee Abd Hamid S, Hossain SA, Asing A, Hossain MM, Zaidul ISM (2017) **Development and validation of short-amplicon length PCR assay for macaques meat detection under complex matrices.** International Journal of Food Properties 20(1):231-245.

Alves RRN, Souto WMS, Barboza RRD (2010) **Primates in traditional folk medicine: World overview.** Mammal Review 40(2):155-180.

Blair ME, Le MD, Thach HM, Panariello A, Vũ NB, Birchette MG, Sethi G, Sterling EJ(2017) **Applying systems thinking to inform studies of wildlife trade in primates** American Journal of Primatology 79(11):10.1002/ajp.22715. https://doi.org/10.1002/ajp.22715

Cancelliere EC, Chapman CA, Twinomugisha D., Rothman JM (2018) **The nutritional value of feeding on crops: Diets of vervet monkeys in a humanized landscape.** African Journal of Ecology 2018: 1–8.

Castillo L, Ladio A (2019) **Zootherapy and rural livestock farmers in semiarid Patagonia: the transfer of animal aptitudes for health.** Ethnobiobiology and Conservation 8:2.

De Thoisy B, Renoux F, Julliot C (2005) **Hunting in northern French Guiana and its impact on primate communities.** Oryx 39(2):149-157.

Dhanwatey HS, Crawford JC, Abade LA, Dhanwatey PH, Nielsen CK, Sillero-Zubiri C (2013) **Large carnivore attacks on humans in central India: a case**

study from the Tadoba-Andhari Tiger Reserve. Oryx 47:221-227.

Dickman AJ, Hazzah L (2016) **Money, Myths and Man-eaters: Complexities of Human-wildlife Conflict. In: Angelici FM (ed) Problematic wildlife: A cross-disciplinary approach.** Springer, Germany, pp. 339-356.

Estrada A, Garber PA, Rylands AB, Roos C, Fernandez-Duque E, Di Fiore A, Nekaris KAI, Nijman V, Heymann EW, Lambert JE, Rovero F, Barelli C, Setchell JM, Gillespie TR, Mittermeier RA, Arregoitia LV, de Guinea M, Gouveia S, Dobrovolski R, Shanee S, Shanee N, Boyle SA, Fuentes A, MacKinnon KC, Amato KR, Meyer ALS, Wich S, Sussman RW, Pan R, Kone I, Li B (2017) **Impending extinction crisis of the world's primates: Why primates matter.** Science Advance 3: e1600946.

Frost P (1996) **The ecology of miombo woodlands. In: Campbell B (ed) The Miombo in Transition: Woodlands and Welfare in Africa.** Center for International Forestry Research (CIFOR), Bogor, Indonesia, pp. 11-57.

Hazzah L, Dolrenry S, Kaplan D, Frank L (2013) **The influence of park access during drought on attitudes toward wildlife and lion killing behaviour in Maasailand, Kenya.** Environmental conservation 40(3):266-76.

Kazaba PK (2019) **'Non-protected' primates as bushmeat, pets and pests in southeastern Democratic Republic of Congo.** Journal of Threatened Taxa11(3): 13251-13260.

Kazaba PK, Ngoie KC, Mugaruka RK, Jebiwott A, Tshikung DK, Sowunmi AA, Aweto AO (2020) **Ethnobotanical Study of the Competition between Humans and Baboons (*Papio kindae*) for Wild Fruit Trees in the Fringe of the Kundelungu National Park, D.R. Congo.** Ethnobotany Research and Applications 19(8): 1-11.

Landy F, Rodary E, Calas B (2018) **Why did leopards kill humans in Mumbai but not in Nairobi? Wildlife management in and around urban national parks.** In: Landy F (ed) From Urban National Parks to Natured Cities in the Global South. Springer, Singapore, pp. 157-179.

Larm M, Elmhagen B, Granquist SM, Brundin E, Angerbjörn A (2018) **The role of wildlife tourism in conservation of endangered species: Implications of safari tourism for conservation of the Arctic fox in Sweden.** Human dimensions of wildlife 23(3):257-272.

Larson LR, Conway AL, Hernandez SM, Carroll JP (2016) **Human-wildlife conflict, conservation attitudes, and a potential role for citizen science in Sierra Leone, Africa.** Conservation and Society 14:205-17.

McGuinness S, Taylor D (2014) **Farmers' perceptions and actions to decrease crop raiding by forest-dwelling primates around a Rwandan forest fragment.** Human Dimensions of Wildlife 19:179–190.

McManus JS, Dickman AJ, Gaynor D, Smuts BH, Macdonald DW (2015) **Dead or alive? Comparing costs and benefits of lethal and non-lethal human–wildlife conflict mitigation on livestock farms.** Oryx 49(4):687-95.

McNutt JW, Stein AB, McNutt LB, Jordan NR (2018) **Living on the edge: characteristics of human–wildlife conflict in a traditional livestock community in Botswana.** Wildlife Research 44(7):546-57.

Megaze A, Balakrishnan M, Belay G (2017) **The attitudes and practices of local people towards wildlife in Chebera Churchura national park, Ethiopia.** International Journal of Biodiversity and Conservation 9(2):45-55.

Moss AG, Pavitt B (2019) **Assessing the effect of zoo exhibit design on visitor engagement and attitudes towards conservation.** Journal of Zoo and Aquarium Research 7(4): 186-194.

Ontiri EM, Odino M, Kasanga A, Kahumbu P, Robinson LW, Currie T, Hodgson DJ (2019) **Maasai pastoralists kill lions in retaliation for depredation of livestock by lions.** People and Nature 1(1):59-69.

Packer C, Ikanda D, Kissui B, Kushnir H (2005) **Lion attacks on humans in Tanzania.** Nature 436:927–928.

Schweitzer C, Gaillard T, Guerbois C, Fritz H, Petit O (2017) **Participant profiling and pattern of crop-foraging in Chacma baboons (*Papio hamadryas ursinus*) in Zimbabwe: Why does investigating age–sex classes matter?** International Journal Primatology 38.2.

Shaffer CA, Milstein MS, Suse P, Marawanaru E, Yukuma C, Wolf TM, Travis DA (2018) **Integrating ethnography and hunting sustainability modeling for primate conservation in an indigenous reserve in Guyana.** International Journal of Primatology 39(5):945-968.

Simelane TS, Kerley GIH (1998) **Conservation implications of the use of vertebrates by Xhosa traditional healers in South Africa.** South African Journal of Wildlife Research 28(4): 121-126.

Svensson MS, Ingram DJ, Nekaris KA, Nijman V (2015) **Trade and ethnozoological use of African Lorisiforms in the last 20 years.** Hystrix 26(2): 153-161.

Talukdar S, Gupta A (2018) **Attitudes towards forest and wildlife, and conservation-oriented traditions, around Chakrashila Wildlife Sanctuary, Assam, India.** Oryx 52(3):508-18.

Tshikung KM, Pongombo SEW, Libois R, Hornick JL (2019) **Consumption of Bushmeat in Lubumbashi/DR Congo: Sociocultural Approaches.** Journal of Health Science 7:79-88.

Vanleeuwe H (2008) **Large mammals and human impact surveys. Upemba and Kundelungu National Parks, Democratic Republic of Congo.** Wildlife Conservation Society/U.S. Fish and Wildlife Service.

Williams VL, Whiting MJ (2016) **A picture of health? Animal use and the Faraday traditional medicine market, South Africa.** Journal of Ethnopharmacology 179:265-273.

Received: 24 November 2019
Accepted: 02 July 2020
Published: 20 August 2020