# Culture and the illegal trade in vultures in southwestern Nigeria: conundrums and recommendations.

Stephen M. Awoyemi<sup>1\*</sup>, Laura Thomas-Walters<sup>2</sup>, Brandon P. Anthony<sup>3</sup>, Dhaval Vyas<sup>4</sup>, Ralph Buij<sup>5,6</sup> and Tajudeen O. Amusa<sup>7</sup>

<sup>1</sup>57 Ajeigbe Street, Ring Road, Ibadan, Oyo State, Nigeria

<sup>2</sup> Biological and Environmental Sciences, University of Stirling, Stirling, FK9 4LA, Scotland

<sup>3</sup> Department of Environmental Sciences and Policy, Central European University Quellenstraße 51 | A-1100 Wien, Austria

<sup>4</sup> Department of Biological Sciences, University of Denver, Iliff Ave. 80208 Denver, Colorado, USA

<sup>5</sup> Wageningen University and Research, Wageningen, Droevendaalsesteeg 3A, 6708 PB Wageningen, Netherlands

<sup>6</sup> The Peregrine Fund, Boise, Idaho, USA

<sup>7</sup> Department of Forest Resources Management, University of Ilorin, PMB 1515, Kwara State, Nigeria

\*Corresponding author: sawoyemi@gmail.com

http://dx.doi.org/10.4314/vulnew.v83i1.2

#### Abstract

The illegal wildlife trade problem is worldwide in scope, affecting biodiversity conservation and human wellbeing. However, the trade has cultural dimensions. In addition to economic gain, cultural influences drive the illegal wildlife trade. This paper examines the cultural drivers of illegal trade in vultures in southwestern Nigeria, a pressing but understudied example which is believed to be a major driver of population declines in West Africa. Semi-structured interviews revealed that Yoruba communities in southwestern Nigeria have practiced belief-based use of wildlife for generations, with participation in vulture trade passed vertically within families and horizontally between unrelated persons. Vulture products are used for a range of purposes, from healing to spiritual protection or good fortune. The cultural beliefs underlying use of vultures have a strong syncretic religious component and evolved from primordial myths based on the behavioural and morphological characteristics of vultures. We propose potential interventions that include re-establishing existing social norms that forbid the killing of vultures and engaging religious leaders to discourage trade.

### Introduction

Including fisheries and timber, the illegal wildlife trade is worth billions of dollars a year (Nellemann *et al.* 2014; 't Sas-Rolfes *et al.* 2019). Beyond monetary gain however, this trade is shaped by the cultural influences that govern human relationships with wildlife. People's perceptions of wildlife are inextricably linked with their symbolic systems, and it is through their worldviews that people construct meaning concerning species (Aslin & Bennett 2000). These perceptions and worldviews may span local communities and societies, and can even be transmitted to other cultures (Nieman *et al.* 2019; Nekaris *et al.* 2010; Sukanan & Anthony 2019). When an issue like species' declines is the result of the collective behaviour of a group (e.g., traders and buyers of wildlife products), it can become a cultural problem requiring widespread interventions to instigate behaviour change (Malott

#### Vulture News 83

& Glenn 2006). Given the pressure on biodiversity and the public health risks associated with illegal wildlife trade, we must explore ways to foster cultural change that is proconservation (Scheffers *et al.* 2019; Lam *et al.* 2020).

Vulture populations are severely threatened in Nigeria. Five of the six vulture species assessed in Nigeria have declined by > 50% in the last three decades, with the remaining species declining > 25% in the same period (Ogada et al. 2016). Trade is likely a major driver in their decline (Buij et al. 2016). There are estimates of >1,500 vultures traded per year in the country (Awoyemi 2014; Buij et al. 2016) and, within West Africa, 73% of vulture carcasses found are linked to the trade in Nigeria (Buij et al. 2016). More broadly, 29% of nearly 8000 vulture deaths recorded across 26 countries in Africa were attributed to belief-based trade (Ogada et al. 2016). Indeed, the Hooded Vulture (Necrosyrtes monachus) and Rüppell's Vulture (Gyps rueppelli), known as Igun and Akala respectively in the Yoruba language, are two of the most used raptors for belief-based purposes in southwestern Nigeria (Buij et al. 2016). Therefore, it is imperative we understand and can respond to cultural practices surrounding vulture trade in Nigeria.

Culture can both help and hamper conservation goals. For example, connotations of sacredness afford vultures protection in Burkina Faso (Daboné *et al.* 2019), but cultural beliefs drive the illegal trade in vultures and their body parts in other parts of West and Southern Africa (Nikolaus 2001; Beilis & Esterhuizen 2005). Culture encompasses the socially transmitted knowledge and behaviour shared by some group of people (Peoples & Bailey 2014). Vertical cultural transmission is the transfer of cultural traits across family lineage (i.e., mothers to children and to grandchildren and so forth), while horizontal cultural transmission is transfer of the same cultural traits across unrelated persons such as vulture traders and apprentices (Awoyemi 2021). Belief-based use of wildlife or wildlife parts results from cultural knowledge that is transmitted across generations, and generally revolves around beliefs about purported medicinal and magico-religious benefits. In southwestern Nigeria, belief-based use of vultures can cover a wide span of medicinal, spiritual, and ritual practices that require the harvest and consumption of vultures or their body parts, including claws, bones, skulls, kidneys, and skin (Gore *et al.* 2020).

In this paper, we examine the cultural drivers of illegal trade in vultures in southwestern Nigeria, (selected because of the high density of beliefbased trade in this region) drawing upon existing literature (see Supporting Information 1), our experiences of working in the region, and a series of qualitative semi-structured interviews conducted with nine consumers and 30 traders (see Methods). We finish by proposing potential strategies to resolve illegal vulture trade by disseminating culturally sensitive and vulture-friendly messages among Yoruba traders and buyers.

## Methods

Data were collected through semi-structured interviews and non-participant observation of traders and buyers of vultures and their body parts in wildlife markets in Ibadan, Abeokuta, Ijebu-Ode, and Ilorin, southwestern Nigeria. We took an ethnographic approach which focuses on the richness and depth of the data rather than aiming to achieve a particular sample size. Given the relatively small number of people known to be trading vulture parts, however, we were able to interview all of them (n = 30) in the four cities we studied. This included ten traders in Ibadan, nine in Abeokuta, seven in Ilorin, and four in Ijebu-Ode. We were able to ascertain that we had covered all of the traders in these markets when we, with the help of other vulture traders, using the snowball technique, could not find any other trader. Further,

we know that our sample of traders account for the majority in the area when including the cities in the south, because we visited the major and most popular wildlife markets in the south (Nikolaus 2001, 2011). Our interview guide can be found in the supporting information. There are five other towns/cities (Lagos, Ife, Ilesa, Osogbo, and Epe) in southwestern Nigeria with bird markets, but there is no reason to believe that traders there differ significantly from the ones we interviewed (Nikolaus 2001). In addition, we opportunistically interviewed nine buyers of vulture body parts to triangulate the data collected from traders. Since our initial interview of traders of vultures and throughout the field work, we questioned various people outside the project to have a more robust understanding of our findings.

The following steps were taken for data collection via semi-structured interviews and subsequent qualitative data analysis. For willing participants, interviews were recorded with a digital voice recorder, but written notes of interview responses were taken for participants that were unwilling or apprehensive to be recorded. Recorded interview responses were transcribed and partially edited for clarity (e.g. filler words, repetition and inaudible words were not included in the transcript). All interview transcripts were read several times to gain a good understanding and familiarity with the content. Observations and other field notes were also made and digitally archived alongside the interview transcripts.

The interview transcripts were then coded for further analysis. There are two general types of codes: descriptive (description of the data content) and interpretative (interpretation of the data content) (Braun and Clarke 2012). This study used interpretative codes. Open, axial, and selective coding were used in assembling, categorizing, and thematically sorting the collected data with QDA Miner Lite software (Williams and Moser 2019). Open coding involved scanning through the pages of text (imported into the QDA Miner Lite software) and highlighting segments of the text of invariant meaning related to the research aim and theoretical framework. The next stage, axial coding, involved the categorization of emergent relationships between open codes to form core codes (Strauss and Corbin 1998). Selective coding, which was the final stage, is the integration of categories from axial coding into themes (Williams and Moser 2019). The identified themes informed a thoughtful evidence-based interpretation of the data with support from the theoretical framework of the dissertation research. We used ODA Miner Lite to inform the thematic analysis of the qualitative data for our study. There is increasing use of professional software for qualitative data analysis (Chomczynski 2008). Software makes conceptual work more efficient, facilitating work with large data that would take more time with conventional methods (Chomczynski 2008). QDA Miner Lite is the free version of QDA Miner and is a qualitative data analysis software package made for coding textual and photographic data (LaPan 2013; Provalis Research 2020). We used the software to organize our data for coding, text retrieval and storage. The software also enabled us to identify patterns and themes.

### **Results and Discussion**

Our results indicated that, for traders of vulture parts, socio-cultural factors through cultural transmission (vertical and horizontal transmission) were the main determinants in shaping behavioural patterns for trade of vulture parts for belief-based use. Also, cultural transmission (vertical and horizontal) was also a determining factor in influencing buyers' behaviour to purchase vulture parts. Socio-demographic attributes for sampled vulture traders in the study area were: ages ranging from 22 to 86 years (mean = 47); the majority of traders were women (90%) rather than men; all traders originated from the same city that they traded in; the level of education ranged from none (6.7%) to HND (Higher National Diploma) (6.7%), with SS3 (Senior Secondary 3) having the highest percentage (46.7%), followed by Primary 6 (26.7%); the majority of interviewees were Muslim (Awoyemi 2021, Figure 1). All nine interviewed buyers of vulture body parts were men, with eight indicating that they were Muslim and one as Christian.

It is common to see vulture body parts in open markets in Nigeria and other West African countries where they are sold for belief-based use, and a strong market presence for vulture parts has been observed in both southwest and northern Nigeria (Nikolaus 2011; Saidu & Buij 2013; Awoyemi 2014). Although vultures are protected under the National Wildlife Species Protection Act 2015 of Nigeria, sale of vulture parts continues unabated in open wildlife markets in southwestern Nigeria (The National Wildlife Species Protection Act 2015; Awoyemi, pers. obs.).

Wildlife traders in Nigeria are mostly of the Yoruba ethnic group from the southwest (Nikolaus 2001). Yoruba traditions involving animals have been preserved through generations, and these traditions still have a major influence today (Alves et al. 2012; Owoseni 2014). Beyond Nigeria, the Yoruba live in southern Benin, Togo, Sierra Leone, Ghana, and countries outside Africa such as Cuba, Brazil, Trinidad, and Tobago (Lovejov & Trotman 2003; Rucken 2006; Owoseni 2014). The beliefbased use of wildlife in Brazil is tied to Yoruba ethnicity and traditions introduced by ancestral slaves (Voeks 1997; Alves et al. 2012). Similar beliefs and practices drive the vulture trade in Yoruba communities in southwestern Nigeria. Although the sample cannot be representative of the larger consumer population, common themes emerged which supported our findings from the traders.

Vulture traders are largely influenced by

economic gain, but underlying cultural beliefs also drive the behaviour of traders and buyers of vulture products in Nigeria (Head et al. 2005). Most vulture traders (93%) had inherited the business from their mothers or grandmothers, a form of vertical cultural transmission. This is illustrated in the following exemplar quote from one respondent: "I inherited it from my grandmother. It is the situation of the country that has led us into this kind of business. Since there is hardship, we had to take up our family business" (Trader 4, Ilorin, Male, 36 years old) (Awoyemi 2021). Buyers on the other hand, may be influenced by cultural and religious beliefs, or purported medicinal uses of vultures which are both vertically transmitted in their families. One buyer narrates this from the following quote: "My father taught me what one can use vultures to do. I tested it and saw it was true" (Buyer 6, Abeokuta, Male, 35 years old) (Awoyemi 2021). Cultural transmission of these beliefs is achieved through storytelling and demonstration (Garfield et al. 2016). For instance, an interviewed herbalist shares a myth concerning vultures:

"In the beginning when the world was in confusion and there was no dew and rain and all the rivers were dry, our ancestors made consultations with the oracle. And the oracle told them to make a sacrifice and that the sacrifice must be taken to heaven to Olodumare, the creator. They were told to take the sacrifice to heaven and none of the ancestors could fly. They called all the birds who assembled. Who will go on an errand to heaven? None of the birds could go. Only the vulture volunteered to go on this mission. The vulture flew with the sacrifice to heaven to meet the creator and the problem on earth was solved.

When the vulture was about to go on the assignment, it demonstrated, dancing and spreading its wings and then put its head under the sacrifice and flew to heaven. This is what made the vulture's head bald. Therefore, a Yoruba proverb goes thus: 'It was an assistance the vulture rendered that made the vulture have a bald head'". The only other documented motive for using vultures is for food, and it is uncommon among Yoruba people since it is generally a taboo to eat vultures for food (Adewoye 2007; Ogada *et al.* 2011).

Belief-based use of vultures includes *inter alia* the perceived treatment of mental illness, epilepsy, and strokes, safe birthing in women, spiritual protection against evil spirits and witchcraft, good fortune, and clairvoyant powers (Nikolaus 2011; Saidu & Buij 2013). The cultural beliefs have a strong syncretic religious component and evolved

from primordial myths based on the behavioural and morphological characteristics of vultures (Soewu 2008; Balogun 2011; Awoyemi 2014; Adeduntan 2019). In our interviews with consumers of vulture products, we have also found that some buyers are motivated by 'the doctrine of signatures' in which the morphology or signatures of animals are the determining factor in their choice of product (Williams & Whiting 2016). For example, according to a buyer, the long-life span of a vulture is believed to confer an increased life span for consumers of vulture products (Grayson 2000).



Figure 1: Education level of traders of vulture parts interviewed for this study (n = 30). None; Primary 6; SS3 (Senior Secondary 3; the final level of senior secondary equivalent to 12<sup>th</sup> grade); NCE (Nigeria Certificate in Education; awarded to graduates of colleges of education); OND (Ordinary National Diploma awarded at a polytechnic, a two year course qualification that is sufficient for employment in some cases and to get admission for a HND or direct entry into 200 level in a university); HND (Higher National Diploma awarded at a polytechnic; sometimes referred to as equivalent of a first degree).

Another buyer stated, "*The vulture feeds on the carcass of any animal including humans, which makes it very powerful*". These practices and narratives concerning vultures are passed vertically within families and horizontally between unrelated persons of the same culture (Guglielmino *et al.* 1995; Nikolaus 2001; Awoyemi 2014). Overall, the primary motivations for vulture use are perceived medicinal and magico-religious value (Saidu & Buij 2013).

Previous research into ethnozoological practices among the Yoruba found no acceptable faunabased alternatives for vulture products, and it is unknown whether there are equivalent plant-based substitutes for the many non-medicinal motivations for vulture use (Soewu 2008). Cultural beliefs about the ability of vultures to increase business success, spiritual power, or good fortune are based on the ritualistic and symbolic power of the vulture rather than their perceived medicinal benefits (Herbert *et al.* 2003). This may complicate attempts to find culturally acceptable and sustainable alternatives to vultures for belief-based use.

Social scientists have raised concerns that the embedded nature of values and their stability across generations mean deliberate efforts to change social values to aid conservation are unlikely to be effective (Manfredo et al. 2017). Instead, conservationists may need to work within existing cultural systems to stimulate behavioural change that helps protect vultures (Infield et al. 2017; Manfredo et al. 2017; Thomas-Walters et al. 2020a). These efforts ought to be informed by relevant behavioural science research, and conservation practitioners can learn from the success and failures of previous interventions (Baum & Cohen 1998; Cutler 2004; Delaney et al. 2004). Admittedly, many behavioural interventions have been carried out in developed countries and may not match socio-economic realities in Africa (Cinner 2018; Thomas-Walters et al. 2020b).

Behavioural interventions are context-specific, and when there is a move to a new context (whether a different region or product), audience research needs to be conducted to establish whether interventions are likely to be transferable. However, the existential threats facing vultures in West Africa demand bold approaches and innovative strategies to foster proconservation behaviour among local communities, while still being culturally sensitive.

To effectively impact Yoruba communities steeped in generations of cultural transmission, interventions into the vulture trade in Nigeria may need to be large-scale (reaching a broad audience), and focused on influencing the culture of beliefbased use and the familial traditions of selling vultures. Any behaviour change interventions should incorporate audience segmentation, as Yoruba communities are not homogeneous, and age and education levels may vary among vulture traders (Awoyemi 2014; Kidd et al. 2019). For example, the traders we interviewed ranged in age from 22 to 86, and although 47% had completed secondary education, a substantial minority (27%) had not gone past primary school. Messages would need to be tailored to different levels of comprehension, and media strategies selected for specific age groups. Although ambitious, such large-scale interventions targeting cultural level problems have been conducted before, changing behaviours such as drunk driving, smoking, or the use of seat belts (Geller & Lehman 1991; Cutler 2004).

#### **Re-establishing pro-vulture norms**

Myths about vultures are prevalent among the Yoruba, and some of these are beneficial to vulture conservation (Olusola 2005). For example, there is an ancient proverb concerning the vulture, which states "*a ki pa igun, a ki je igun, a ki fi igun bori*".

This translates as: "we do not kill the vulture, we do not eat the vulture and we do not use the vulture as sacrifice to the gods to remedy human destiny" (Adewoye 2007: 54). Unfortunately, this social norm against killing vultures is less prevalent today. Vultures are used for Yoruba rituals to supposedly solve a myriad of problems. Targeting the existing values of a particular audience is one approach that is already being promoted to design effective wildlife demand reduction campaigns (Thomas-Walters *et al.* 2020a). In southwestern Nigeria, re-establishing norms to protect vultures could help generate social pressure on traders and buyers of vultures and their body parts (Nyborg *et al.* 2016).

In the following sections, we outline strategies for influencing buyers and traders of vulture parts in Nigeria. As vulture traders are generally affiliated with Islam, we believe religious opinion leaders could be a powerful source of influence.

Using the media to change buyer behaviour: With its capacity to reach a very large and varied audience, the media is one channel for reestablishing cultural respect for vultures through widespread circulation of protective social norms (Pearson et al. 2011). Using insights on effective messaging strategies from behavioural science, conservation scientists leverage can communication channels such as radio, TV, print media, and social media to bring about cultural change that is pro-conservation among buyers. However, any interventions would need to be carefully worded to avoid mistakenly spreading descriptive norms around the prevalence of vulture use, making it clear that the behaviour is not widespread (Thomas-Walters et al. 2020c; Cialdini et al. 1990).

The media can build social pressure to shift behaviour among buyers of vultures based on culturally sensitive, strategic conservation messaging (Wakefield *et al.* 2010; Nyborg *et al.*  2016; Kidd et al. 2019). The radio is the most popular media channel in Nigeria, with more than 70% of the population across all major demographic groups stating they use the radio for news, and it has been used to spread conservation messages in other contexts (BBG 2014). For Ranomafana example. in National Park. Madagascar, an IUCN funded project "Echoes of the forest (Akon' ny ala)" used storytelling to promote community pride in lemurs and to foster emotional connections with the forest through a 10episode radio series (Fernandez-Llamazares & Cabeza 2018). Local enthusiasm generated because of the project led to the creation of a communityled radio governing body with the aim of linking the local communities to conservation challenges in culturally appropriate (Fernandezways Llamazares & Cabeza 2018).

Television is another medium that has been used by government and health organizations to spread targeted mass media messages to influence important health behaviours (Pearson et al. 2011). Examples of successes include influencing behaviours on smoking, road safety, and cardiovascular disease prevention (Wakefield et al. 2010). In conservation, visual media has been used to increase knowledge, and influence attitudes and conservation behaviours concerning orangutans and marine mammals (Fortner 1985; Pearson et al. 2011). Television drama and radio messages laced with cultural values (such as the non-killing traditions concerning vultures and their veneration) in the Yoruba language could reach the hearts and minds of consumers, creating a social milieu that discourages the sale and use of vultures for medicinal and magico-religious purposes. Messages that focus on re-establishing pro-vulture social norms could resonate with Yoruba buyers because the messages are part of Yoruba culture. Women or men who understand the Yoruba culture, history and speak the language

fluently would be responsible for anchoring dissemination of these messages on radio and will be trained and selected based on leadership and communication skills, ethnic membership and prestige and sympathies for vultures (Hodge *et al.* 2002).

Using opinion leaders to re-establish protective beliefs amongst traders: Cultural change may also be instigated by influential members of society (Guglielmino et al. 1995). Opinion leaders can facilitate the rapid diffusion of new ideas and practices in society, influencing social norms and accelerating behaviour change (Valente & Davis 1999; Valente & Pumpuang 2007). They provide access and legitimacy to those conducting interventions and can help establish a dialogue with target communities (Valente & Pumpuang 2007). They also serve as 'back-up' after the program change agents have left the community, thus institutionalizing program goals (Valente & Pumpuang 2007). For example, in Thailand Buddhist leaders have led initiatives to eliminate the use of ivory as part of Buddhist tradition (Martin 2019). In 2006, the Dalai Lama intervened by making a call to ban the use of tiger and leopard skins in Tibet and in response thousands of Tibetans burned their animal skins in a huge bonfire (Office of The Dalai Lama 2006). Thus, opinion leaders can serve as an important avenue to influence cultural change among traders of vulture parts.

Syncretism, the combining of different religions or cultures, is common among the Yoruba, and as has been stated, most traders selling vulture parts in southwest Nigeria are Muslims (Balogun 2011; Soewu *et al.* 2012; Awoyemi 2014). Historically, this combination of worldviews of traditional religion (giving rise to the fetish trade) and Islam may have been facilitated by Islamic magicoreligious practices, such as the use of Arabic script in amulet writing (Mommersteeg 1990), which are similar to Yoruba traditional religious practices of the creation of amulets and charms (Jegede 2002; Borokini & Lawal 2014). Given that most traders are Muslim, we recommend engaging with Islamic clerics to promote a refusal to sell vulture parts. This approach has been previously successful in altering the health behaviours of Muslims in Nigeria (Olivier 2016; Walker *et al.* 2019).

By entering into a mutual dialogue with Islamic clerics, conservationists could explore the faith to find relevant values and precepts that are provulture. One way of doing this would be to adapt a model of leadership development for Islamic scholars that was developed in the health sector (Walker 2015; Figure 2). This model uses four key stages to engage Islamic clerics to work as ambassadors to change the attitudes and practices of the Muslim Ummah. First, we would identify Islamic clerics in southwestern Nigeria who are likely to have pro-conservation interests and develop a relationship built on trust with them. Throughout this process, maintaining openness, speaking the truth, showing respect and modelling integrity would be crucial. We would then educate sympathetic clerics about vulture declines and the impacts of the vulture trade, including the extinction of local vulture populations and resulting loss of vital ecosystem services. Next, participatory workshops could explore Islamic perspectives on vulture use through the discussion of important precepts which would support the urgent need to halt vulture killing and trade such as khalifah, stewardship of Allah's creation, and how this could be communicated to the Muslim Ummah. Finally, clerics would work with conservationists to disseminate messages that encourage community members to refrain from participating in the vulture trade. These messages would be disseminated through the radio and during prayer meetings at the mosques attended by traders of vulture body parts.

## Conclusion

Culture and the illegal wildlife trade are inextricably linked as traders and buyers alike are influenced by cultural transmission. Therefore, to address the illegal trade in vulture parts we must endeavour to influence those cultural traditions that guide traders and buyers in southwestern Nigeria. This may be challenging, but we have outlined some potential strategies. Culture itself is a dynamic process, which continually evolves (Kashima 2014; Hamedani & Markus 2019). Cultural evolution could establish deeper understanding and greater motivation to engender renewed respect for the ecological and existential role of vultures. By utilizing the aforementioned approaches, solely or in an integrated fashion, conservationists can work with policymakers and Yoruba communities to help shape culture concerning belief-based use of vulture body parts. Cultural interventions could help in better enforcement of laws on vulture trade by increasing their social acceptance.

Finally, we acknowledge the limited current state of published literature on this topic, and we have made our recommendations based on existing literature and professional experience. However, our suggestions could be applied to Yoruba communities in other countries with similar cultural influences. We outline future research needed to design behavioural change interventions on vulture conservation grounded in evidence and enabling evaluation of impacts, particularly testing messaging about pro-vulture norms and audience research on consumer motivations and user behaviours from representative samples.



Figure 2: Model for engaging Muslim opinion leaders to facilitate behavioural change of traders of vulture body parts in southwest Nigeria (Adapted from Walker 2015).

## Acknowledgements

Thanks to P. F. Ejiofor, P. Barnard, N. Steiner who commented on initial drafts of this paper. The research behind this article was partially sponsored by Central European University Foundation, Budapest (CEUBPF). The theses explained herein represent the ideas of the authors, but do not necessarily reflect the opinion of CEUBPF.

## References

- Adeduntan, A. 2019. *What the forest told me: Yoruba hunter, culture and narrative performance*. NISC (Pty) Ltd, 155pp.
- Adewoye, S. 2007. Legal Framework for Animals and Game Management in Nigeria. Ibadan:
- Positive Press, 280pp.
- Alves, R.R., Rosa, I.L., Neto, N.A.L. & Voeks, R. 2012. Animals for the gods: magical and religious faunal use and trade in Brazil. *Human Ecology* 40: 751-780.
- Aslin, H.J. & Bennett, D.H. 2000. Wildlife and world views: Australian attitudes toward wildlife. *Human Dimensions of Wildlife* 5: 15-35.
- Awoyemi, S. 2014. Vulture declines in West Africa: investigating the scale and (socioeconomic) drivers of the trade in vulture parts for traditional medicine. Thesis, University of Cambridge, UK.
- Balogun, A.M. 2011. Syncretic Beliefs and Practices amongst Muslims in Lagos State Nigeria; With Special Reference to the Yoruba Speaking People of Epe. DPhil Thesis. University of Birmingham, UK.
- Baum, A. & Cohen, L. 1998. Successful behavioural interventions to prevent cancer: the example of skin cancer. *Annual Review of Public Health* 19: 319-333.
- Beilis, N. & Esterhuizen, J. 2005. The potential impact on Cape Griffon *Gyps coprotheres* populations due to the trade in traditional medicine in Maseru, Lesotho. *Vulture News* 53: 15-19.
- Borokini, T.I. & Lawal, I.O. 2014. Traditional medicine practices among the Yoruba people of Nigeria: A historical perspective. *Journal of Medicinal Plants Studies* 2: 20-33.
- Broadcasting Board of Governors (BBG). 2014. Contemporary media use in Nigeria. [tinyurl.com/333gclnl] Accessed 15/6/2021.
- Buij, R., Nikolaus, G., Whytock, R., Ingram, D.J. & Ogada, D.L. 2016. Trade of threatened vultures and other raptors for fetish and bushmeat in West and Central Africa. *Oryx* 50: 606-616.
- Cialdini, R. B., Reno, R. R. & Kallgren, C. 1990. A focus theory of normative conduct: Recycling the concept of norms to reduce littering in public places. *Journal of Personality and Social Psychology* 58: 1015–1026.
- Cinner, J. 2018. How behavioural science can help conservation. Science 362: 889-890.
- Cutler, D.M. 2004. Behavioural health interventions: what works and why. *Critical Perspectives on Racial and Ethnic Differences in Health in Late Life* 643: 674.

- Daboné, C., Buij, R., Oueda, A., Adjakpa, J.B., Guenda, W. & Weesie, P.D. 2019. Impact of human activities on the reproduction of Hooded Vultures *Necrosyrtes monachus* in Burkina Faso. *Ostrich* 90: 53-61.
- Delaney, A., Lough, B., Whelan, M. & Cameron, M. 2004. A review of mass media campaigns in road safety. *Monash University Accident Research Centre Reports*, 220, 85. [https://www.handicapinternational-road-safety.org/sites/default/files/pdf/section/mass-awareness-campaign-monashuniversity-2004.pdf]. Accessed 18/12/2020.
- Fernández-Llamazares, Á. & Cabeza, M. 2018. Rediscovering the potential of indigenous storytelling for conservation practice. *Conservation Letters* 11:1-12.
- Fortner, R.W. 1985. Relative effectiveness of classroom and documentary film presentations on marine mammals. *Journal of Research in Science Teaching* 22: 115-126.
- Garfield, Z.H., Garfield, M.J. & Hewlett, B.S. 2016. A cross-cultural analysis of hunter-gatherer social learning. In: Terashima, H. & Hewlett, B.S. (Eds). Social learning and innovation in contemporary hunter-gatherers, pp. 19-34. Springer.
- Geller, E.S. & Lehman, G.R. 1991. The buckle-up promise card: A versatile intervention for large-scale behavior change. *Journal of Applied Behavior Analysis* 24: 91.
- Gore, M.L., Hübshle, A., Botha, A.J., Coverdale, B.M., Garbett, R., Harrell, R.M., Krueger, S., Mullinax, J.M., Olson, L.J., Ottinger, M.A. & Robinson, H.S. 2020. A conservation criminology-based desk assessment of vulture poisoning in the Great Limpopo Transfrontier Conservation Area. *Global Ecology and Conservation* 23: e01076.
- Grayson, S.M. 2000. Symbolizing the Past: Reading Sankofa, Daughters of the Dust, & Eve's Bayou as *Histories*. University Press of America, 108pp.
- Guglielmino C.R., Viganotti C., Hewlett B. & Cavalli-Sforza, L.L. 1995. Cultural variation in Africa: Role of mechanisms of transmission and adaptation. *Proceedings of the National Academy of Sciences of the United States of America* 92: 7585-7589.
- Hamedani, M.Y.G. & Markus, H.R. 2019. Understanding Culture Clashes and Catalyzing Change: A Culture Cycle Approach. *Frontiers in Psychology* 10: 700.
- Head L., Trigger D. & Mulcock, J. 2005. Culture as concept and influence in environmental research and management. *Conservation and Society* 3: 251-264.
- Herbert, D.G., Hamer, M.L., Mander, M., Mkhize, N. & Prins, F. 2003. Invertebrate animals as a component of the traditional medicine trade in KwaZulu-Natal, South Africa. *African Invertebrates* 44: 327–344.
- Hodge, F.S., Pasqua, A., Marquez, C.A. & Geishirt-Cantrell, B. 2002. Utilizing traditional storytelling to promote wellness in American Indian communities. *Journal of Transcultural Nursing* 13:6-11.
- Infield, M., Entwistle, A., Anthem, H., Mugisha, A. & Phillips, K. 2017. Reflections on cultural values approaches to conservation: Lessons from 20 years of implementation. *Oryx* 52: 1–11.
- Jegede, A.S. 2002. The Yoruba cultural construction of health and illness. *Nordic Journal of African Studies* 11: 14-14.
- Kashima, Y. 2014. How can you capture cultural dynamics? Frontiers in psychology 5: 995.

- Kidd, L.R., Garrard, G.E., Bekessy, S.A., Mills, M., Camilleri, A.R., Fidler, F., Fielding, K.S., Gordon, A., Gregg, E.A., Kusmanoff, A.M. & Louis, W. 2019. Messaging matters: A systematic review of the conservation messaging literature. *Biological conservation* 236: 92-99.
- Lam, T.T. *et al.* 2020. Identifying SARS-CoV-2-related coronaviruses in Malayan pangolins. *Nature* 583: 282–285.
- Lovejoy, P.E. & Trotman, D.V. eds., 2003. *Trans-Atlantic dimensions of ethnicity in the African diaspora*. Bloomsbury Publishing, 288pp.
- Malott, M.E. & Glenn, S.S. 2006. Targets of intervention in cultural and behavioural change. *Behavior* and Social Issues 15: 31-57.
- Manfredo, M. J., Bruskotter, J. T., Teel, T. L., Fulton, D., Schwartz, S. H., Arlinghaus, R., Oishi, S., Uskul, A. K., Redford, K., Kitayama, S. & Sullivan, L. 2017. Why social values cannot be changed for the sake of conservation. *Conservation Biology* 31: 772–780.
- Martin, B.V. 2019. Survival or extinction? How to save elephants and rhinos. Springer, 567pp.
- Mommersteeg, G. 1990. Allah's words as amulet. Etnofoor 1: 63-76
- Nekaris, K.A.I., Shepherd, C.R., Starr, C.R. & Nijman, V. 2010. Exploring cultural drivers for wildlife trade via an ethnoprimatological approach: a case study of slender and slow lorises (*Loris* and *Nycticebus*) in South and Southeast Asia. *American Journal of Primatology* 72: 877-886.
- Nellemann, C., Henriksen, R., Raxter, P., Ash, N. & Mrema, E. 2014. *Environmental crime crisis: threats to sustainable development from illegal exploitation and trade in wildlife and forest resources*. UNEP, GRID, Nairobi, Arendal.
- Nieman, W.A., Leslie, A.J. & Wilkinson, A. 2019. Traditional medicinal animal use by Xhosa and Sotho communities in the Western Cape Province, South Africa. *Journal of Ethnobiology and Ethnomedicine* 15: 34.
- Nikolaus, G. 2001. Bird exploitation for traditional medicine in Nigeria. Malimbus 23: 45-55
- Nikolaus, G. 2011. The fetish culture in West Africa: An ancient tradition as a threat to endangered birdlife? In: Bonn.Schuchmann, K.L. (Ed). Tropical Vertebrates in a Changing World, pp. 145-151.Bonner Zoologische Monographien, Zoologisches Forschungsmuseum Alexander Koenig.
- Nyborg, K., Anderies, J.M., Dannenberg, A., Lindahl, T., Schill, C., Schlüter, M., Adger, W.N., Arrow, K.J., Barrett, S., Carpenter, S. & Chapin, F.S. 2016. Social norms as solutions. *Science* 354: 42-43.
- Office of The Dalai Lama. 2006. Animal Skin Clothes Burned in Tibet After Dalai Lamas Call. [https://www.dalailama.com/news/2006/animal-skin-clothes-burned-in-tibet-after-dalai-lamas-call] Accessed 18/12/2020.
- Ogada, D., Keesing, F. & Virani, M.Z. 2011. Dropping dead: causes and consequences of vulture population declines worldwide. *Annals of the New York Academy of Sciences* 1249: 57-71.
- Ogada D., et al. 2016. Another continental vulture crisis: Africa's vultures collapsing toward extinction. *Conservation Letters* 9: 89-97.
- Olivier, J. 2016. Interventions with local faith communities on immunization in development contexts. *The Review of Faith & International Affairs* 14: 36-50.

- Olusola, A.G. 2005. Animals in the Traditional Worldview of the Yoruba. *Folklore: Electronic Journal* of *Folklore* 30: 155-172.
- Owoseni, A.O. & Olatoye, I.O. 2014. Yoruba ethico-cultural perspectives and understanding of animal ethics. *Journal of Critical Animal Studies* 12: 97-118.
- Pearson, E., Dorrian, J. & Litchfield, C. 2011. Harnessing visual media in environmental education: increasing knowledge of orangutan conservation issues and facilitating sustainable behaviour through video presentations. *Environmental Education Research* 17: 751-767.
- Peoples, J. & Bailey, G., 2014. *Humanity: An introduction to cultural anthropology*. Cengage Learning, 484pp.
- Rucken, W.C. 2006. The River Flows On: Black Resistance, Culture, and Identity Formation in Early America. LSU Press, 303pp.
- Saidu, Y. & Buij, R. 2013. Traditional medicine trade in vulture parts in northern Nigeria. *Vulture News* 65: 4-14.
- Scheffers B.R., Oliveira, B.F., Lamb, I. & Edwards, D.P. 2019. Global wildlife trade across the tree of life. *Science* 366:71-76.
- Soewu, D. A. 2008. Wild animals in ethnozoological practices among the Yorubas of southwestern Nigeria and the implications for biodiversity conservation. *African Journal of Agricultural Research* 3: 421-427.
- Soewu, D.A., Bakare, O.K. & Ayodele, I.A. 2012. Trade in wild mammalian species for traditional medicine in Ogun State, Nigeria. *Global Journal of Medical Research* 12: 6-22.
- Sukanan, D. & Anthony, B.P. 2019. Community attitudes towards bears, bear bile use and bear conservation in Luang Prabang, Lao PDR. *Journal of Ethnobiology and Ethnomedicine* 15: 15.
- The National Wildlife Species Protection Act. 2015. The Federal Ministry of Environment, Abuja, Nigeria.
- 't Sas-Rolfes, M., Challender, D. W. S., Hinsley, A., Veríssimo, D. & Milner-Gulland, E. J. 2019. Illegal wildlife trade: Patterns, processes, and governance. *Annual Review of Environment and Resources* 44: 1–28.
- Thomas-Walters, L., Cheung, H., Lee, T.M., Wan, A.K.Y. & Wang, Y. 2020a. Targeted values: The relevance of classical Chinese philosophy for illegal wildlife demand reduction campaigns. *People and Nature*. https://besjournals.onlinelibrary.wiley.com/doi/pdf/10.1002/pan3.10127
- Thomas-Walters, L., McCallum, J., Montgomery, R., Wan, A.K.Y. & Veríssimo, D. 2020b. A systematic review of conservation efforts using non-monetary, non-regulatory incentives to promote voluntary behavior change. [https://osf.io/preprints/socarxiv/6dhaf/]. Accessed 18/12/2020.
- Thomas-Walters, L., Veríssimo, D., Gadsby, E., Roberts, D. & Smith, R. J. 2020c. Taking a more nuanced look at behavior change for demand reduction in the illegal wildlife trade. *Conservation Science and Practice* 2: e248. https://doi.org/10.1111/csp2.248
- Valente, T., & Davis, R. 1999. Accelerating the Diffusion of Innovations Using Opinion Leaders. *Annals of the American Academy of Political and Social Science* 566: 55–67.

- Valente, T.W. & Pumpuang, P. 2007. Identifying opinion leaders to promote behavior change. *Health Education & Behavior* 34: 881-896.
- Voeks, R. A. 1997. Sacred Leaves of Candomblé: African Magic, Medicine, and Religion in Brazil. University of Texas Press, Austin, 256pp.
- Walker, J.A. 2015. Engaging Islamic opinion leaders on child marriage: Preliminary results from pilot projects in Nigeria. *The Review of Faith & International Affairs* 13: 48-58.
- Walker, J.A., Hashim, Y. & Oranye, N. 2019. Impact of Muslim opinion leaders' training of healthcare providers on the uptake of MNCH services in Northern Nigeria. *Global Public Health* 14: 200-213.
- Wakefield, M.A., Loken, B. & Hornik, R.C. 2010. Use of mass media campaigns to change health behaviour. *The Lancet* 376: 1261-1271.
- Williams, V.L. & Whiting, M.J. 2016. A picture of health? Animal use and the Faraday traditional medicine market, South Africa. *Journal of Ethnopharmacology* 179: 265-273.

## **Supporting information**

#### Supporting information 1: Literature reviewed.

References were retrieved using the keywords "culture, wildlife trade, traditional medicine, belief-based use" through Google Scholar.

- Adeola, M.O. 1992. Importance of wild animals and their parts in the culture, religious festivals, and traditional medicine, of Nigeria. *Environmental Conservation* 19: 125-134.
- Alves, R.R.N. & Alves, H.N. 2011. The faunal drugstore: Animal-based remedies used in traditional medicines in Latin America. *Journal of Ethnobiology and Ethnomedicine* 7: 1-43.
- Alves, R.R.N., Barboza, R.R.D. & Souto, W.M.S. 2010a. A Global overview of canids used in traditional medicines. *Biodiversity and Conservation* 19: 1513-1522.
- Alves, R.R.N., Borges, A.K.M., Barboza, R.R.D., Souto, W.M.S., Gonçalves-Souza, T., Provete, D.B. & Albuquerque, U.P. 2021. A global analysis of ecological and evolutionary drivers of the use of wild mammals in traditional medicine. *Mammal Review* 51: 293-306.
- Alves, R.R.N., Souto, W.M. & Barboza, R.R. 2010b. Primates in traditional folk medicine: a world overview. *Mammal Review* 40: 155-180.
- Anthony, B.P., Abonyi, S., Terblanche, P. & Watt, A. 2011. Towards bridging worldviews in biodiversity conservation: exploring the Tsonga concept of Ntumbuloko in South Africa. *Research in Biodiversity-Models and Applications*, IntechOpen, DOI: 10.5772/30792.
- Aslin, H.J., & Bennett, D.H. 2000. Wildlife and world views: Australian attitudes toward wildlife. *Human Dimensions of Wildlife* 5: 15-35.
- Assou, D., Elwin, A., Norrey, J., Coulthard, E., Megson, D., Ronfot, D., Auliya, M., Segniagbeto, G.H., Martin, R.O. & D'Cruze, N. 2021. Trade in African Grey Parrots for Belief-Based Use: Insights from West Africa's Largest Traditional Medicine Market. *Frontiers in Ecology and Evolution* 9: 1-10.

- Awoyemi, S. 2014. Vulture declines in West Africa: investigating the scale and (socioeconomic) drivers of the trade in vulture parts for traditional medicine. Thesis, University of Cambridge, UK.
- Boakye, M.K., Pietersen, D.W., Kotzé, A. Dalton, D.L. & Jansen, R. 2014. Ethnomedicinal use of African pangolins by traditional medical practitioners in Sierra Leone. *Journal of Ethnobiology and Ethnomedicine* 10: 1-10.
- Cocker, M. 2000. African birds in traditional magico-medicinal use a preliminary survey. *Bulletin of the African Bird Club* 7: 60-65.
- Gbogbo, F. & Daniels, J.K. 2019. Trade in wildlife for traditional medicine in Ghana: therapeutic values, zoonoses considerations, and implications for biodiversity conservation. *Human Dimensions of Wildlife* 24: 296-300.
- Gore, M.L., Hübshle, A., Botha, A.J., Coverdale, B.M., Garbett, R., Harrell, R.M., Krueger, S., Mullinax, J.M., Olson, L.J., Ottinger, M.A., & Robinson, H.S. 2020. A conservation criminology-based desk assessment of vulture poisoning in the Great Limpopo Transfrontier Conservation Area. *Global Ecology and Conservation* 23: e01076.
- Nekaris, K.A.I., Shepherd, C.R., Starr, C.R., & Nijman, V. 2010. Exploring cultural drivers for wildlife trade via an ethnoprimatological approach: a case study of slender and slow lorises (*Loris* and *Nycticebus*) in South and Southeast Asia. *American Journal of Primatology* 72: 877-886.
- Nikolaus, G. 2001. Bird exploitation for traditional medicine in Nigeria. Malimbus 23: 45-55.
- Nikolaus, G. 2011. The fetish culture in West Africa: An ancient tradition as a threat to endangered birdlife? In: (*Tropical Vertebrates in a Changing World*) {ed. Bonn.Schuchmann K.L.} Bonner Zoologische Monographien, Zoologisches Forschungsmuseum Alexander Koenig, 145-151.
- Saidu, Y. & Buij, R. 2013. Traditional medicine trade in vulture parts in northern Nigeria. *Vulture News* 65: 4-14.
- Sodeinde, O.A. & Soewu, D.A. 1999. Pilot study of the traditional medicine trade in Nigeria. *Traffic Bulletin-Cambridge-Traffic International* 18: 35-40.
- Soewu, D.A. & Ayodele, I.A. 2009. Utilisation of pangolin (*Manis sp.*) in traditional Yorubic medicine in Ijebu province, Ogun State, Nigeria. *Journal of Ethnobiology and Ethnomedicine* 5: 1-11.
- Whiting, M.J., Williams, V.L. & Hibbitts, T.J. 2013. Animals traded for traditional medicine at the Faraday market in South Africa: species diversity and conservation implications. In: (Animals in traditional folk medicine) {eds. R. R. N. Alves and I. L. Rosa} Springer, 421-473.
- Williams, M.M., Ottosson, U., Tende, T. & Deikumah, J.P., 2021. Traditional belief systems and trade in vulture parts are leading to the eradication of vultures in Nigeria: an ethno-ornithological study of north-central Nigeria. *Ostrich* 92: 194-202.

# Supporting information 2: Interview guide for interviewing traders and buyers.

# A.1. Background of Traders

- 1. Let us begin by discussing your work as a trader. How did you come to do this trade?
- 2. Most of what I know about this trade is what I have read in books. I would like to hear from you, the trader. Please tell me about how you learned this trade.
- 3. So, tell me, how old were you when you began your learning?
- 4. How old were you when you took over the trade?
- 5. Have you by any means taught anyone this trade? Can you explain why?

# A.2. Socio-demographic data

Let me conclude by getting some information about you, please, tell me about your background [the questions below will be asked if they are missed in the background information]:

- 14. How old are you?
- 15. Gender (this question will not be asked but answered through observation):
- 16. What is your religion?
- 17. What is your ethnic Group?
- 18. What is your level of education?

Thank you for your time! Please let me know if you have any questions or have anything more to add.

# **B.1.** Buyers of vulture parts (Socio-demographic data)

Let us begin by meeting you and getting some information about you. Please tell me about your background. [the questions below will be asked if they are missed in the background information].

- 1. How old are you?
- 2. Gender (this question will not be asked but answered through observation)
- 3. What is your religion?
- 4. What is your ethnic group?
- 5. What is your level of education?

# **B.2. Background for buyers**

6a. Can you please tell me the importance of this vulture part you purchased and what it is used for?

6b. Interesting. Are you the one going to use this vulture part?

a. YES \_\_\_\_\_ 6c. Can you please tell me how you learnt vulture parts may be good

for use?

b. NO

- 7. Have you recommended vulture parts for any one's use? Why and who is this person to you?
  - 8. How old were you when you first believed vulture parts may be good for use?
  - 9. What do you think of using alternative remedies to using vulture parts?

Thank you for your time! Please let me know if you have any questions or have anything more to add.

\*\*\*\*\*