Biological Conservation 191 (2015) 614–622

Contents lists available at ScienceDirect

Biological Conservation

journal homepage: www.elsevier.com/locate/bioc

An assessment of socio-economic drivers of avian body parts trade in West African rainforests

Fidelis A. Atuo [a,*], Timothy J. O'Connell [a], Peter U. Abanyam [b]

[a] Department of Natural Resource Ecology and Management, Oklahoma State University, Stillwater, OK 74078, USA
[b] Wildlife Conservation Society, GPO Box 796, State Housing, Calabar, Nigeria

ARTICLE INFO

Article history:
Received 20 February 2015
Received in revised form 30 July 2015
Accepted 7 August 2015
Available online xxxx

Keywords:
Wildlife trade
Avian body parts
Socio-economic drivers
Poaching
Protected areas
Traditional practices

ABSTRACT

Several species of wildlife are hunted around the world for the perceived potency of certain parts of their bodies in traditional medicine and in fetish practices. In Africa, many cultures require animal parts for a wide range of traditional and religious practices. This has resulted in the persecution of more than 354 bird species across the continent. In this study, we evaluated the drivers and frequency of human-related avian mortality focusing on the trade in avian body parts around major protected areas in the Cross River region of southeastern Nigeria. We conducted personal interviews with men from 18 villages in proximity to four natural areas in the region, and asked the men questions related to their knowledge of trade in avian body parts. From the responses obtained, we identified 27 bird species from 13 families in regional trade. Three of the top 5 most reported species are globally threatened. Both knowledge of and participation in the trade were pervasive across the study sites and across different occupational groups. 94% of respondents claimed knowledge of trade in avian body parts; 66% had participated in that trade in the last 2 years. To identify predictors of participation in the avian body part trade, we fitted all possible model combinations using the Generalized Linear Mixed Model approach and ranked them based on their AICc values. The top-ranked model identified age, average monthly income, perceived personal need for avian body parts, and number of wives as the top socio-economic drivers of participation. Younger people and villagers with low monthly income were more likely to participate in the trade. Probability of involvement also increased with the number of wives and a perceived personal need for avian body parts. The former may be an indication of a larger household that requires more resources to sustain it; the latter likely reflects personal conviction of the efficacy of using avian body parts in traditional medicine and other cultural practices. Our study highlights the importance of targeting socio-economic factors and integrating cultural needs of the people into conservation planning aimed at reducing human–wildlife conflicts.

1. Introduction

Wildlife persecution is a major human-related threat to many species of mammals, birds, and reptiles across the globe (Djagoun et al., 2013; Nijman et al., 2012; Williams et al., 2012; Williams et al., 2014). Across Africa, wildlife are killed daily for subsistence or for extraction of valuable body parts. According to data collected under a global elephant monitoring initiative: Monitoring the Illegal Killing of Elephants (MIKE) an estimated 22,000 African elephants were poached for their ivory in 2012 alone (Blanc et al., 2013), Other species whose body parts are sought for local or international markets (e.g., rhinoceroses, tigers, etc.) are illegally and unsustainably traded as well. While anti-poaching attention has been focused on a relatively small number of large mammals, many lesser-known species are also victims of unsustainable harvest for subsistence and to support local markets for traditional practices. The use of animal parts (feathers, hair, fur, bones, head, feet, etc.) for cultural purposes often reflects ancient traditions common to several cultures across the globe. In many Asian cultures, tiger bones and rhinoceros horns are believed to possess healing properties. For example, tiger bones are highly valued in China for the perceived treatment of rheumatism, weakness, loss of mobility, and paralysis, especially in the lower back and legs (Mills et al., 1994). Among aboriginal peoples in North America, eagle feathers are frequently considered sacred and play prominent roles in traditional religious and healing rites (Davidson, 2008; De Meo, 1994). In Brazil, Alves and Rosa (2010) confirmed 97 wildlife species traded for a variety of traditional purposes. The choice of species for traditional practices is often guided by factors such as perceived bioactive constituents, morpho-physiological characteristics, biogeography, behavioral ecology, or mythological conceptions associated with the animal (Soewu, 2013). Although the efficacy of using wildlife parts to treat disease is highly dubious, Jacobo-Salcedo et al. (2013) found immunostimulatory

* Corresponding author.
E-mail addresses: fidelis.atuo@okstate.edu, fidelatuo@yahoo.com (F.A. Atuo), tim.oconnell@okstate.edu (O. Timothy J.), peterabanyam@yahoo.com (A. Peter U.).

and cytotoxic effects of turkey vulture (*Cathartes aura*) extract on some in vitro cancer lines. This finding potentially provides empirical support for the traditional Mexican practice of treating cancer patients with a soup made from vulture meat.

The use of wild animals for traditional purposes occurs irrespective of the rarity or conservation status of those species. Rare, declining and threatened species frequently appear in traditional markets. If anything, the perceived value of a species increases as its population declines, leading to even more aggressive exploitation. This can lead to additive population stress, thereby hastening species' extinction (Saikku, 1990; Snyder, 2004).

Hunting pressure for traditional markets is more severe in Africa than in other continents (Williams et al., 2012). Among African nations, Nigeria ranked first in the specific targeting of birds, including species of conservation priority (Soewu, 2013; Williams et al., 2014). While it is often desirable to sustain traditional cultural practices, it is important to balance those practices against biodiversity conservation as population declines threaten both species' survival and the continued cultural practice. In this study, we evaluated the socio-economic drivers of avian persecution around a tropical biodiversity hotspot in southeastern Nigeria. We specifically focused on the growing trade on avian body parts for traditional practices which has been identified as one of the most significant human-related causes of avian mortality and population decline (Alves and Rosa, 2014). To provide perspective on the current and potential impact of this trade on the region's avifauna, we investigated the frequency of the trade in communities within and around protected areas and identified bird species that might be most vulnerable.

2. Methods

2.1. Study area

For this study, we focused on 18 communities living in proximity to protected areas in the Cross River State of southeastern Nigeria (Fig. 1). Primary study areas included the Cross River National Park (Okwangwo and Oban divisions), Afi Mountain Wildlife Sanctuary (hereafter, Afi), and the Mbe Mountains Community Wildlife Sanctuary (Mbe) (Fig. 1). The Cross River National Park is the largest protected area in the southeastern region of Nigeria and covers an area of ~4000 km^2. Its two divisions are separated by ~60 km of disturbed forests, farm lands, villages, and towns. The Afi Mountain Wildlife Sanctuary and the Mbe Mountains covers an area of ~100 km^2 and ~85 km^2 respectively. Both protected areas lie to the west of the Okwangwo Division of Cross River National Park and are considered important sites for several endemic and threatened species including the Gray-necked Picathartes (*Picathartes oreas*), Cross River Gorilla (*Gorilla gorilla diehli*), and Nigeria–Cameroon chimpanzee (*Pan troglodytes ellioti*). The Cross River forest area lies to the west of the Central Africa equatorial tropical rain-forest zone (5° 14′–6° 22′N and 8° 37′–9° 20′E), between the rivers Cross and Sanaga, including the continental-shelf island of Bioko and the associated Cameroon Highlands (Bergl et al., 2007; Oates et al., 2004). The area is possibly the largest remaining relatively undisturbed block of contiguous forest in West Africa (Oates et al., 2004). The vegetation is a combination of montane and lowland rainforest and forms part of the hygrophilous coastal evergreen rainforest along the Gulf of Biafra. The forest blocks are contiguous with those of southwestern

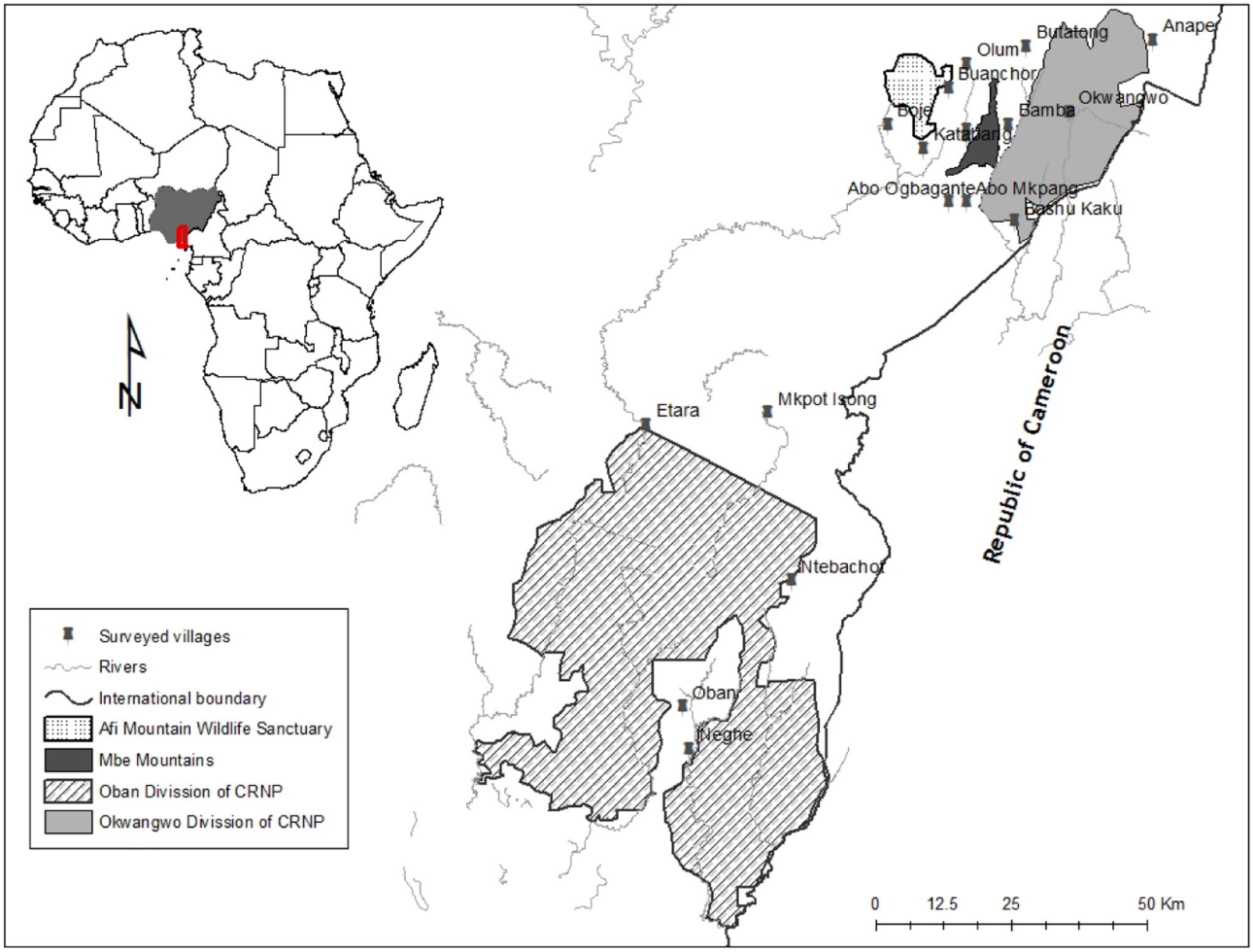

Fig. 1. Map of the study area showing the surveyed villages around major protected areas in the Cross River region of southeastern Nigeria.