

# Trade and belief-based use of Marabou Stork *Leptoptilos crumenifer* in Nigeria, West Africa

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**Abstract** Trade and belief-based use has not previously been reported on Marabou Storks *Leptoptilos crumenifer* despite being one of the largest stork species in the world. We collected data on trade and belief-based use of Marabou Storks in Nigeria from eight areas between July and October 2021 using oral interviews and direct observations. We observed widespread trade in Marabou Storks and its parts even though the species is legally protected in Nigeria. Marabou Stork parts were used for traditional medicine, and the most utilised parts were the gular sac, intestines, and head. These parts, as well as the bird's skin, were used as a vest to provide protection against witchcraft and bad luck. Marabou Stork parts were also recommended as a remedy for dizziness and rheumatism, loss of memory, and as an aphrodisiac. The trade in Marabou Stork parts was economically lucrative, with individual storks sold for up to USD\$ 90 per bird. This financial reward is expected to increase the exploitation of the already-declining population in Nigeria. Belief-based uses of Marabou Storks were not previously known to be such an important factor for its decline in Nigeria. To help conserve Marabou Storks, we recommend awareness programmes that focus on the ecological importance of this bird and also emphasise the use of plants in traditional medicine. Our work adds another stork species to the list of animals threatened by trade and belief-based use, underscoring the urgent need to uncover the scale of this threat and to take steps to curtail it.

**Keywords** Bird trade, ethno-ornithology, local extinction, law enforcement.

## Introduction

On a continental scale, human activities such as illegal trade and belief-based use of wildlife, including bird parts, threaten many species across Africa (Ortiz-von Halle 2018). Trade and belief-based uses of vulture parts are common and relatively well documented (for example, Saidu and Buij 2013; Williams *et al.* 2021). However, similar data on waterbirds such as Marabou Storks *Leptoptilos crumenifer* are lacking. In Nigeria, as elsewhere in Africa, the use of bird parts, Marabou

Storks included, has a very long history in cultural practises (e.g., king's coronation ceremonies), traditional medicine, and rituals (Adeola 1992).

Although it appears that the global population of Marabou Stork is unknown, generally increasing, and considered not threatened by the IUCN (BirdLife International 2021a), the population of this species has severely declined or been completely extirpated in many localities, including West Africa (Monadjem and Bamford 2009; Gula and Barlow, in prep.). Decreases in the population of Marabou Stork in certain localities across its range have been associated with hunting for food and trade in feathers (Roy 1973; per. obs). The Marabou Stork is listed as endangered in the

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Second Schedule under the Nigeria Endangered Species Act, 2016 (<https://www.cbd.int/doc/world/ng/ng-nr-04-en.pdf>), which legislates their trade may only be conducted with a permit. The primary objective of this study was to provide a preliminary account of the use of Marabou Storks in Nigeria in trade and traditional belief-based uses to determine whether such traditional practices could be potentially affecting the conservation of this iconic bird species.

## Study area

The study was conducted in northern Nigeria across five states: Bauchi, Kano, Jigawa, Borno, and Yobe (Figure 1). The region falls within the savanna ecosystem. Although the area has experienced some seasonal climatic variation in recent years, it has two primary seasons based on precipitation: the wet season, ranging from May to October, and dry season, from November to April (Eludoyin and Adelekan 2013). Annual temperature ranges from 12°C (during the cool season, from December to February) to 40°C (during the hot season, from March to May).

People in the area are predominantly Muslim, with Hausa Fulani as the dominant ethnic group. The inhabitants of the area support themselves through activities such as agriculture, livestock grazing, and fishing.

The two important sites that form the main distribution range of the Marabou Stork in the region are the Lake Chad basin and the Hadejia-Nguru wetlands (HNWs; Figure 1). In recent decades, even in the Lake Chad

basin that is believed to support the remaining wild population of Marabou Stork in Nigeria, the bird is considered uncommon in the area (Gustafsson *et al.* 2003). Both these wetlands areas have been designated as Important Bird and Biodiversity Areas, in addition to HNWs being the first Ramsar site in Nigeria (BirdLife International 2021b).

## Methods

We collected data on trade and belief based-uses of Marabou Stork between July and October 2021 from eight wildlife markets located in Azare, Badegana, Buni Yadi, Dutse, Fika, Hadejia, Kano, and Potiskum (Figure 1). The interviews were conducted in Hausa and transliterated into English.

Oral interviews were conducted across a wide spectrum of people that included traditional healers, hunters, bird trappers, bird traders, and vigilante groups. Prior to interviews, we obtained verbal consent of all interviewees. They were informed that all interviews would be anonymous, that they could choose to voluntarily participate themselves in the interview or assign a more knowledgeable individual, or decline the interview in accordance with standard guidelines of ethical practice (Assou *et al.* 2021).

We interviewed 11 people, apart from two others who declined to participate in the interviews. During visits, we also made observations of whether storks were visible in markets and with people.

The questions we posed to interviewees focused on trade of Marabou Storks, stork parts sold, specific use of stork parts, prices, and sources of the birds. We also asked interviewees about their awareness of the legal framework that protected Marabou Storks in Nigeria.



**Figure 1.** Map of Nigeria showing the study area where interviews about Marabou Stork trade were conducted.



## Results

### Trade

We observed two live Marabou Storks in the markets, one each in Dutse and Jambel (Figure 2). In Kano, we found a complete carcass of a Marabou Stork, a hand fan made from feathers in Buni Yadi and Fika (Figure 3), a pair of wings of Marabou Stork in Buni Yadi (Figure 4), and a Marabou Stork leg as well (Figure 5).



**Figure 2.** Live Marabou Stork on display for sale/traditional medicine at Shiwarin weekly market, Dutse, Jigawa State (above). Marabou Stork trapped by hunter at Jambel, Jakusko, Yobe State (below).

The interviewees confirmed that they trade or sell parts of Marabou Storks for use in traditional medicine. All the interviewees mentioned that they received financial reward from the trade of Marabou Storks and other wildlife species. Within the span of a year, an interviewee from Badegana mentioned that he sold parts of Marabou Storks equivalent to two individual birds in 2017. In Hadejia, one of the interviewees estimated the cost of an individual Marabou Stork at ca. USD\$ 90. Few interviewees also reported that people frequently purchased bird feathers to make hand fans for traditional leaders (Figure 3)



**Figure 3.** Complete carcass of a Marabou Stork at a wildlife market in Kano, Kano State (above). Hand fan made from feathers of a Marabou Stork in Fika, Yobe State (below).

### Belief-based use

All the interviewees mentioned that Marabou Stork parts were also popular in belief-based uses. An interviewee indicated that people used different parts of the bird for traditional medicine. One reported use was the gular sac mixed with milk fat and ashes, or burned with nesting materials of White-billed Buffalo Weaver *Bubalornis albirostris*, to be applied on the foreskin for good luck and protection against bad luck. Similarly, an informant from Buni Yadi reported that the complete wings of Marabou Stork were used as a vest to protect the wearer against misfortune (Figure 4). An interviewee in Fika reported that partially burned legs or skins of the Marabou Stork crushed and mixed with milk fat are used as a cure for excessive cold.





**Figure 4.** Under side (above) and upper side (below) of a pair of wings of Marabou Stork from Buni Yadi, Gujba, Yobe State.

The interviewees indicated that the head and legs covered with droppings of Marabou Storks are among the most frequently sold parts (Figure 5). The other parts that were preferred for belief-based use were the intestines and gular sac that were believed to cure forgetfulness and loss of memory. Interviewees reported that the oesophagus was believed to cure dizziness, bone marrow was used as a cure for rheumatism, and bones mixed and burnt with garlic were believed to help cure internal rheumatism. The burnt feathers and droppings were also utilised as protection against ghosts and spirits. In Kano, interviewees additionally reported the use of feathers, head, and droppings to make oneself more attractive.

The majority of the interviewees reported that the stork's meat is mixed with moringa seeds, cooked, and eaten to help repel witchcraft. The heart when mixed in with Morning Glory *Evolvulus alsinoides* (Kafi Malam) or *Crotalaria arenaria* (Manta Uwa) and eaten with other meats, such as fish, were believed to attract partners or lovers. Additionally, the bird's heart when cooked with other meats and blended in with date fruit was thought to be an aphrodisiac for men. Women

suffering from decreased sexual desire or lacking vaginal wetness were suggested to use Marabou Stork bone marrow mixed with milk fat.

#### Trapping, trade, and awareness of legal framework

Some of the interviewees, particularly hunters and bird trappers, reported that they used light to lure, trap, or kill Marabou Storks at roost sites in areas around Hadejia. The majority of the interviewees were aware of legislation protecting the trade and killings of Marabou Stork and other wildlife species in Nigeria.

#### Discussion

Our surveys showed that live Marabou Storks and their parts were sold openly in northeastern Nigeria, and that their parts were used in traditional medicine and aesthetics while providing substantial economic benefits to traders. The traditional healers and hunters interviewed indicated that they have been in the business for many decades and the business has provided them with all their needs. The fetish wildlife trade market in Kano and the weekly Hadejia market are famous for illicit wild bird trade and the derivatives of wildlife parts continue to prevail openly. This is worrisome and underscores poor wildlife law enforcement in the country, which is in part due to high poverty and corruption (Usman and Adefalu 2010), and inadequate funding and patrol equipment for wildlife officers (Nchor et al. 2021).

Parts such as the gular sac, intestine, and head of vultures have previously reported as important ingredients of belief-based uses (Muhammad and Mustapha 2020). The same parts were also used of Marabou Storks and for similar ailments as those



**Figure 5.** Leg of Marabou Stork in Fika, Yobe State.



reported for vultures (Saidu and Buij 2013; Boakye *et al.* 2019; Owolabi *et al.* 2021). Also similar to use of vultures was the sale of Marabou Stork parts as aphrodisiacs for both men and women (Sodeinde and Soewu 1999). While vulture feathers were prescribed as a cure for dizziness (Porter and Suleiman 2012), the oesophagus of Marabou Storks were used as a treatment for this ailment in Nigeria. Similarly, both vulture and Marabou Stork bones are used as a cure for rheumatism (e.g., Boakye *et al.* 2019).

The general decline of vulture populations and consequent scarcity of their parts for traditional medicine in Nigeria could perhaps be the reason Marabou Storks are utilised for belief-based uses. Because Marabou Storks are scavengers (Monadjem and Bamford 2009), it is likely that this similar scavenging behavior shared with vultures may have led traditional healers to consider them as having the same ‘powers.’ The role of scavenging birds in traditional medicine therefore appears to be far more important than was previously known, and the decline of vultures may be having previously unknown consequences for populations of other bird species such as the Marabou Stork.

The use of poison, dart gun and decor to trap and kill wild birds is a common practice around the world (MaMing *et al.* 2012). However, we found that hunters/bird trappers in our study area use light to lure and kill Marabou Storks at roost sites, suggesting that hunters in Nigeria have refined their hunting practises to enhance more exploitation of the Marabou Storks.

In order to addressing the trade and belief-based use of the Marabou Stork and its parts in Nigeria, we strongly believe that there is a need to enhance awareness amongst the traditional healers and the users of Marabou Stork parts about the use of plants to treat diseases and other ailments (for details see, for example, Erhenhi and Obadoni 2015; Schultz *et al.* 2020). It is essential to specifically target traditional healers, hunters, and bird trappers for such programmes across West Africa. Since most of the interviewees were aware of legislation protecting the Marabou Stork and other wildlife species in Nigeria, awareness raising through workshops targeted at the critical stakeholders and through larger-scale media such as radio and television programs is urgently needed to promote Marabou Stork conservation.

There are many conservation issues arising from the trade and belief-based uses of Marabou Storks because it is listed as endangered in the Nigeria Endangered Species Act. On a continental scale, Marabou Stork is classified as Least Concern by the IUCN (BirdLife International 2021a). However, robust population estimates and an understanding of potential variations in local populations remains unknown, especially in West Africa. Although Gula and Barlow (in prep.) have highlighted a precipitous decline of the Marabou Stork in West Africa, our preliminary work in Nigeria explains the extirpation of Nigeria’s breeding population in the last 50 years. It is also worth noting that demand for Marabou Stork parts in Nigeria may promote international trade in West Africa given the scarcity of the species in Nigeria now, i.e., live storks and parts may be imported from nearby populations to supply the trade in Nigeria. This suggests that the Marabou Stork could likely face further declines across its West African range in the near future.

While our study shows that Marabou Storks are being used in trade and belief-based medicines, the extent of the trade in Nigeria and across Africa is unknown. Our results suggest that there is an urgent need to initiate a national and regional conservation action plan for the Marabou Stork in West Africa, focusing not only on ecological aspects of the species but also its use in traditional medicine and belief-based remedies.

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