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The Ecological Crisis: Vulture Decline and Public Health risks in Nigeria

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ABSTRACT

Vultures are vital scavengers that play a critical role in maintaining ecological balance and public health by rapidly removing animal carcasses, thereby reducing the spread of zoonotic diseases. In Nigeria, vulture populations have plummeted due to multiple threats, including habitat destruction, poisoning, poaching for traditional medicine, and the continued use of toxic veterinary drugs such as diclofenac. This review highlights the ecological significance of vultures, particularly in nutrient cycling, disease regulation, and pest control. The decline of vultures has resulted in increased populations of secondary scavengers such as feral dogs and rats, contributing to the rise of diseases like rabies and anthrax. The economic and health implications of this decline are profound yet underreported. Current conservation measures remain insufficient, hampered by weak enforcement, limited public awareness, and persistent illegal wildlife trade. Strategies such as the establishment of vulture-safe zones, stricter anti-poaching laws, the use of vulture-safe veterinary alternatives like meloxicam, and community education are urgently needed. Additionally, the creation of vulture safe zone and reinforcement of wildlife laws facilitate recovery.

Without immediate and effective intervention, Nigeria may face severe ecological degradation and public health crises due to the continued disappearance of its vulture populations.

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Introduction

Nigeria, a nation abundant in natural resources, possesses an impressive array of ecosystems, which includes mangroves, rainforests, savannas, and semi-arid regions. This heterogeneous ecological framework sustains a vast array of flora and fauna, establishing Nigeria as one of the most biodiverse nations within the African continent (Oluduro and Gasu, 2012). The fauna of Nigeria is similarly varied, featuring a diverse assemblage of mammals, avians, reptiles, amphibians, and aquatic species (Mafiana, Jayeola, and Iduseri, 2022).

The conceptual framework of ecosystem services is integral to the conservation of biodiversity and is extensively utilized in the formulation of environmental management and policy objectives (Turner et al., 2007). Avian species play a vital role in providing ecosystem services, including pest regulation, pollination, ecotourism, and organic waste decomposition (Kitamura, 2015). Notably, vultures are recognized for their significant contribution to waste management, as they are the sole vertebrate group that operates as obligate scavengers, thus exemplifying this essential ecological service.

Definition of Zoonotic Disease

Zoonotic diseases are infections that can be transmitted from animals to humans, encompassing a variety of pathogens including bacteria, viruses, fungi, and parasites (Couvillion, 2016).

Role of Vultures in Disease Mitigation

Vultures play a significant role in mitigating the spread of these diseases through their scavenging behavior, which helps to clean the environment by consuming carcasses that may harbor zoonotic pathogens, vultures consume decomposing carcasses, which are breeding grounds for pathogens, thus preventing the spread of diseases like rabies and brucellosis. This ecological function is crucial for

public health, as it reduces the risk of disease transmission from infected animals to humans (Jalihal et al., 2022).

Vultures contribute to pest and disease control by swiftly consuming organic waste that might otherwise draw mammalian scavengers, such as feral dogs, to a single location. The gathering of these scavengers in one area increases the likelihood of contact and interaction among them, potentially enhancing disease transmission within their population and to other species, including domestic animals and humans (Ogada et al., 2012; Markandya et al., 2008).

In rural areas of Nigeria, vultures play a crucial role in disposing of waste from both urban and slaughterhouses and animal carcasses. However, their population decline has sparked concerns about the possible ecological impacts, such as a higher risk of disease transmission and disturbances in nutrient cycles (Ta, 2023; Nyirenda et al., 2023).

The Ecological Role of Vultures

Vultures are obligate scavengers that play a crucial role in maintaining ecosystem stability by rapidly consuming decomposing carcasses. This process helps to reduce the spread of zoonotic diseases and contributes to nutrient recycling (Ogada et al., 2012). Their highly acidic digestive systems allow them to neutralize harmful pathogens such as anthrax, rabies, and brucellosis (Markandya et al., 2008). By efficiently disposing of carcasses, vultures prevent the proliferation of disease vectors such as feral dogs and rats, which can transmit infections to livestock and humans (Ogada, 2014). However, the ongoing decline of African vulture populations poses serious threats to this ecological balance.

Economic and Sanitation Costs

The economic value of vultures in providing ecosystem services is widely recognized, particularly in reducing waste management costs and preventing disease outbreaks (Ogada et al., 2012). However, the long-term public health costs of vulture decline remain largely unquantified. The increasing incidence of zoonotic diseases resulting from ineffective carcass disposal could impose significant healthcare and economic burdens on communities (Heever et al., 2021). Addressing vulture conservation is, therefore, not only an ecological necessity but also a critical public health concern.

Aim/objectives

In this review article, we like to address the issue of declining vulture population, Vultures play a vital role in regulating zoonotic diseases and understanding the mitigating strategies adopted for their conservation.

Methodology

This research was conducted through an in-depth review of existing literature, drawing on academic journals, environmental publications, and other reliable sources that focus on vulture ecology and conservation in Nigeria. The gathered materials were examined to explore the ecological significance of vultures, the factors contributing to their population decline, and the resulting environmental and public health implications. This approach provided a broad understanding of current knowledge while highlighting areas requiring further conservation attention.

Significance of the study

This study is significant as it brings to light the crucial ecological roles vultures play in Nigeria's ecosystems, particularly in waste removal, disease control, and nutrient cycling. It also emphasizes the potentially disastrous consequences of their declining populations, including increased disease transmission and disrupted food chains. By synthesizing existing research, the study raises awareness among conservationists, policymakers, and the general public on the urgent need for targeted conservation actions to protect vultures and the ecological services they provide. This work contributes to filling the knowledge gap and advocates for stronger enforcement of wildlife protection laws and community engagement in vulture conservation efforts.

Literature review

Some notable Species of Vulture in Nigeria

Nigeria historically had seven species of vultures, including the Egyptian Vulture (*Neophron percnopterus*), White-backed Vulture (*Gyps africanus*), White-headed Vulture (*Trigonoceps occipitalis*), Rüppell's Griffon Vulture (*Gyps rueppelli*), Palm-nut Vulture (*Gypohierax angolensis*), and Lappet-faced Vulture (*Torgos tracheliotos*). However, due to anthropogenic activities, most of these species have become extinct in the country. Currently, only the Hooded Vulture (*Necrosyrtes monachus*) and Palm-nut Vulture (*Gypohierax angolensis*) remain (Schlee & Iorgulesco, 2003).

Hooded Vulture (*Necrosyrtes monachus)*

- Coloration: Characterized by a dark plumage with a distinctive white neck ruff.
- Size: Medium-sized, with a wingspan of approximately 1.8 meters.
- Habitat Preference: Often found near urban areas and abattoirs, indicating a reliance on human activity for food sources (Mundy & Cook, 2024) (Mundy, 2022).
- Behavior: Known for scavenging and often seen in groups, which aids in locating food (Nosazeogie et al., 2018).

Palm-nut Vulture (*Gypohierax angolensis*)

- Coloration: Features a striking black and white plumage, with a distinctive yellow bill.
- Diet: Uniquely feeds on palm nuts, differentiating it from other vultures that primarily consume carrion (Skoruppa & Lee, 2008).
- Habitat: Prefers wetlands and areas with palm trees, showcasing its specialized feeding habits (Williams et al., 2024).

Current Status of Non-Extinct Vulture Species in Nigeria

According to the (IUCN Red list 2024) update {Accessed on 08- 04-2025} the population status of Hooded Vulture (*Necrosyrtes monachus)* is classified as Critically Endangered.

The population status of the palm-nut vulture (Gypohierax angolensis) in Nigeria is not well-documented, but it is inferred to be affected by broader vulture population declines in the region (Schlee & Iorgulesco, 2003).

Decline of Vultures in Nigeria

Surveys conducted across five Nigerian states have revealed a drastic reduction in vulture populations, with species such as Hooded Vultures (*Necrosyrtes monachus*) and Palm-nut Vultures (*Gypohierax angolensis*) becoming increasingly rare (Williams et al., 2024). Similar trends have been observed in neighboring countries like Benin, where Hooded Vultures are nearing extirpation (Daboné et al., 2024). This decline is attributed to habitat destruction, poisoning, illegal wildlife trade for traditional medicine, and reduced food availability (Botha et al., 2017).

Threats to Vulture Populations

According to Muhammad and Mustapha's (2020) study, vulture populations are declining in Katsina State, Nigeria, due to the trade in birds for traditional medicine.

Growth of Fetish Stalls	**Katsina Town**	**Mashi**	**Dankama**	**Batsari**	**Charanci**
Before 2000	5	2	0	2	3
2000-2005	4	3	2	2	3
2006-2010	3	4	3	3	2
2011-2015	3	4	1	5	4
2016-2019	2	5	5	2	7
Total Stalls	17	18	11	14	19
Mean Price of Parts (#)					
Whole Carcass	#19,000	#20,000	#21,000	#22,000	#27,000
Head	#6,000	#7,500	#7,000	#7,500	#8,000

Wing	#3,500	#3,500	#3,000	#3,000	#3,500

Table 1: Presents a consolidated view of vulture trade statistics, categorized by location within Katsina State, Nigeria.

The data presented in the above table reveal a persistent and, in some areas, in some areas, increasing trend in the trade of vulture parts across five locations in Katsina State from 2000 to 2019. Charanci recorded the highest number of fetish stalls (19), with a notable rise between 2016 and 2019, while Dankama had the fewest stalls (11) but experienced a late increase in activity. Mashi and Katsina Town also maintained steady levels of trade.

Prices for vulture parts, such as whole carcasses (₦19,000–₦27,000) and heads (₦6,000–₦8,000), reflect significant economic incentives, with Charanci again showing the highest values. These trends underscore the ongoing cultural demand for vulture parts and highlight the severe threat this trade poses to vulture populations. This situation emphasizes the urgent need for conservation efforts and public awareness campaigns in the region

Poaching for Belief-Based Use

Vultures face intense poaching pressure due to their high demand in traditional medicine and cultural rituals. In northern Nigeria, a significant proportion of wildlife traders engage in the sale of vulture parts, with **78% of traders specifically dealing in vulture-derived materials for spiritual healing,** thereby contributing to the species' population decline **(Saidu & Buij, 2018**).

Other wild animal species in Nigeria vulnerable to poaching:

The most vulnerable wild animal species in Nigeria to poaching include:

- Forest elephants *(Loxodonta cyclotis).*
- Drill monkey (*Mandrillus leucophaeus*).
- African tree pangolin (*Phataginus tricuspis*).
- Nigerian-Cameroon chimpanzee (*Pan troglodytes vellerosus*).

These species face significant threats from hunting and habitat loss, prompting various conservation efforts aimed at their protection (Omoregie & R.I, 2020).

Decreasing Food Availability

Habitat destruction and declining food availability, driven by expanding human activities, have significantly impacted vulture populations. The conversion of natural landscapes for agriculture, urbanization, and infrastructure development has reduced suitable nesting and foraging areas. Additionally, the decline in wild herbivore populations and changes in livestock management practices have led to **a reduction in available carcasses,** further exacerbating food scarcity for vultures (**Daboné et al., 2024; Manja et al., 2021**).

Toxicological Effects of Diclofenac

The widespread use of **veterinary pharmaceuticals**, particularly **non-steroidal anti-inflammatory drugs (NSAIDs) like diclofenac**, has had devastating consequences for vulture populations. **Vultures are exposed to diclofenac through the consumption of livestock carcasses that have been treated with the drug**, leading to acute toxicity and high mortality rates. This has been a major factor in the **catastrophic population declines of several vulture species**, with reductions of up to **95% recorded in some regions**, particularly in Asia (**Margalida et al., 2014**). While diclofenac remains the most studied threat, **other NSAIDs, including flunixin and ketoprofen, also pose significant but less-studied risks**, highlighting a broader conservation concern for avian scavengers (**Jimenez-Lopez et al., 2021**).

Poisoning and Habitat Loss

Poisoning and habitat degradation pose significant threats to vulture populations, severely impacting their survival. **The widespread use of toxic pesticides and poisoning incidents,** whether intentional or accidental, has led to high mortality rates among vultures, disrupting their ecological role as scavengers. Additionally, **habitat destruction caused by deforestation, agricultural expansion, and infrastructure development** has resulted in the loss of crucial nesting and roosting sites, further endangering vulture populations (**Owolabi et al., 2021; Asso et al., 2024).**

Cultural and Economic Drivers of Vulture Decline

Deep-rooted **cultural beliefs and economic incentives** are major drivers of the illegal vulture trade, leading to unsustainable exploitation. In many communities, particularly in southwestern Nigeria, **vulture parts are highly valued for traditional healing, spiritual rituals, and perceived supernatural benefits,** creating a continuous demand in local markets. This trade is further fueled by **economic motivations, where traders and hunters profit from supplying vulture-derived materials** to meet consumer needs **(Awoyemi et al., 2023; Owolabi et al., 2021).**

Year	Population status	Main causes of downturn	Reference
2000-2010	Significant decline observed, with no comprehensively documented in exact number.	Anthropogenic threats identified as major causes of decline in West Africa, including Nigeria.	(Ogada et al., 2016; WAVCAP, 2023).
2016-2019	Continued decline; proliferation of vulture trade in northern Nigeria.	Over 50% of vulture stalls opened during this period in Katsina State due to illicit trade for traditional medicine.	(Muhammad & Mustapha, 2022)
2020	Mass mortality event of over 2,000 hooded vultures in West Africa.	Poisoning and belief-based use identified as primary drivers of decline	(Ogada et al., 2016; WAVCAP, 2023).
2023	Vulture populations critically endangered across Nigeria and West Africa.	Conservation efforts initiated under WAVCAP (West African Vulture Conservation Action Plan).	(Ogada et al., 2016; WAVCAP, 2023).
2024	Research underway to assess population trends using spatial modeling and environmental contaminant analysis.	Focus on hooded vultures and other species impacted by threats like poisoning and habitat loss.	(Williams, 2024).

Table 2: Indicates qualitative data of the trends observed in the decline of vulture population in Nigeria.

The timeline in Table 2 illustrates the progressive decline of vulture populations in Nigeria from 2000 to 2024, detailing key events and causes. Between 2000 and 2010, vultures experienced a significant population downturn due to anthropogenic threats across West Africa. This decline worsened between 2016 and 2019.

In 2020, a mass mortality event claimed over 2,000 hooded vultures across West Africa, primarily due to poisoning and belief-based practices. By 2023, vultures were classified as critically endangered in the region, prompting conservation initiatives under WAVCAP (West African Vulture Conservation Action Plan). In 2024, research efforts began focusing on hooded vultures, employing spatial modeling and contaminant analysis to understand ongoing threats such as poisoning and habitat loss.

This timeline underscores an urgent conservation crisis requiring immediate intervention, sustained research, and community engagement to halt further population collapse. The data provided is qualitative, as no statistical figures are available to quantify the decline.

Public Health Implications of Vulture Decline

The drastic decline in **vulture populations** has led to a noticeable increase in **secondary scavengers,** such as **feral dogs and hyenas**, which are **less effective in controlling disease transmission (Ogada, 2014)**. Unlike vultures, which rapidly consume carcasses and prevent the spread of harmful pathogens, these scavengers tend to **linger around human settlements**, increasing **human-wildlife interactions** and heightening the risks of **zoonotic diseases** such as **rabies and canine distemper (O'Bryan et al., 2018).** Additionally, in areas where **vultures have vanished,** research has shown **a surge in disease outbreaks, including anthrax and tuberculosis**, due to **the prolonged presence of infected carcasses in the environment (Markandya et al., 2008).** The absence of vultures within the **scavenger community** allows **harmful pathogens to persist for extended periods**, significantly increasing the **risk of disease transmission** to both **humans and wildlife**. This underscores the **crucial role of vultures in maintaining ecological and public health balance**, highlighting the urgent need for conservation interventions.

Current Conservation Initiatives in Nigeria

- **Awareness Campaigns and Community Engagement**

  In Nigeria, conservation organizations are intensifying awareness campaigns to tackle cultural and belief-driven factors contributing to vulture exploitation. These efforts focus on educating local communities about vultures' ecological significance and the effects of their decline. For instance, the Nigerian Conservation Foundation is actively working to dispel misconceptions about vultures and advocate for their protection (Mundy, 2022; Daboné et al., 2022).

- **Strengthening Wildlife Protection Laws**

  Enhancing wildlife protection laws and enforcement is crucial in curbing the illegal trade of vulture parts. However, inadequate policies and weak enforcement mechanisms pose major obstacles. Effective solutions require coordinated efforts among government agencies, conservation groups, and local communities (Muhammad & Mustapha, 2020; Pariente, 2022; Nyirenda et al., 2023).

- **Vulture Feeding Stations for Conservation**

  Creation of vulture feeding stations, known as "vulture restaurants," has been suggested as a conservation measure. These sites offer vultures a secure and consistent food supply, minimizing their reliance on contaminated or overexploited sources. This strategy has proven effective in other regions and could be tailored for implementation in Nigeria (Daboné et al., 2024; "Hooded Vulture *Necrosyrtes monachus* at Risk of Extinction in Benin," 2023).

Conservation Recommendations

Immediate conservation initiatives are imperative to address the swift reduction of vulture populations in Nigeria. A pivotal approach involves the augmentation of public awareness via strategic educational campaigns, which can facilitate communities' comprehension of the essential function vultures fulfill in preserving ecological equilibrium.

Moreover, fortifying law enforcement frameworks is critical to counteract the illicit trade of vultures and their anatomical components, thereby ensuring that extant wildlife protection statutes are rigorously enforced and that transgressors encounter stringent repercussions.

To ensure the long-term survival of vulture populations, it is recommended that **vulture-safe zones** be established and effectively managed across critical habitat, within these zones awareness programs should be launched to educate local communities about the ecological importance of vultures, while also promoting **safe livestock carcass disposal practices**.

The execution of robust conservation initiatives, including the replacement of diclofenac with vulture-compatible alternatives such as meloxicam, is essential for diminishing the hazards associated with toxic veterinary pharmaceuticals. These initiatives, in conjunction with habitat preservation and sustainable conservation efforts, will be pivotal in safeguarding the future of vulture populations in Nigeria.

Conclusion

The decline of vulture populations in Nigeria poses significant ecological and public health risks. Key findings indicate that habitat destruction, poisoning, poaching for traditional medicine, and the use of harmful veterinary drugs are the primary drivers of this decline. The inadequacy of current conservation efforts, characterized by weak enforcement and a lack of public awareness, exacerbates the problem. The ecological consequences of vulture decline include increased disease transmission, disruption of nutrient cycling, and proliferation of less efficient scavengers. To mitigate these impacts, urgent and coordinated actions are required. Strengthening conservation policies, enforcing stricter anti-poaching laws, conducting comprehensive public awareness campaigns, and establishing vulture-safe zones are essential steps. Addressing the cultural and economic drivers of vulture exploitation and promoting the use of vulture-safe veterinary drugs are also critical. Without immediate and sustained intervention, the continued decline of vultures will lead to severe ecological imbalances and increased public health burdens in Nigeria.

To strengthen future research efforts, it is essential to prioritize the collection of quantitative data to establish statistically significant trends in vulture population decline in Nigeria. Implementing methodologies such as occupancy surveys, camera trapping, and spatial modeling will provide robust, evidence-based insights. These data are critical for formulating targeted conservation strategies, monitoring population dynamics, and evaluating the effectiveness of interventions ultimately contributing to more informed and impactful conservation management.

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