

THREATENED PRIMATES OF THE DJA FAUNAL RESERVE (CAMEROON): DIVERSITY, ECOLOGY AND CONSERVATION ISSUES-A LITERATURE REVIEW

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Abstract. This paper explores the ecology and conservation issues of five threatened primate species inhabiting the Dja Faunal Reserve in Cameroon: the western lowland gorilla (*Gorilla gorilla gorilla*), central chimpanzee (*Pan troglodytes troglodytes*), drill (*Mandrillus leucophaeus*), mandrill (*Mandrillus sphinx*), and white-collared mangabey (*Cercocebus torquatus*). The main goal is to assess their ecological status and identify key conservation challenges affecting their long-term survival. A descriptive analytical method was applied, combining literature review, field survey reports, and conservation data from international organizations such as UNESCO, IUCN, and the Zoological Society of London. The study reveals that although the Dja Reserve is a UNESCO World Heritage Site and one of Central Africa's most important protected areas, its biodiversity remains under threat from illegal hunting, habitat loss, weak law enforcement, and limited funding. Findings emphasize that the success of conservation initiatives depends largely on strengthening anti-poaching measures, increasing the conservation budget, and providing regular training for eco-guards and management personnel. Additionally, the research underscores the importance of environmental education and community participation in promoting sustainable resource use and reducing dependence on bushmeat. While constrained by limited recent field data, the study's novelty lies in integrating ecological, socio-economic, and governance perspectives to propose actionable, context-specific solutions. The implications are significant for policymakers and conservation practitioners seeking to enhance biodiversity management and ensure the long-term protection of primate populations within the Dja landscape and across Central Africa.

Keywords: primates, Dja Faunal Reserve, Cameroon, endangered species, biodiversity, conservation, Gorilla gorilla gorilla, *Pan troglodytes*, *Colobus satanas*, *Cercopithecus preussi*, and *Mandrillus sphinx*.

INTRODUCTION

Cameroon is widely recognized as one of Africa's richest countries in terms of biodiversity. Known as "Africa in miniature," it encompasses more than 90 % of the continent's major ecosystem types: tropical rainforests, savannas, mountainous zones, mangroves, and coastal formations (WWF Africa, 2024). The country hosts over 9,000 plant species and about 409 mammal species, placing it among the world's "megadiverse" nations (Cuvillier, 2008). This exceptional richness makes Cameroon a critical site for biodiversity conservation in Africa.

At the heart of this natural wealth lies the Dja Faunal Reserve (DFR), located in southeastern Cameroon. The protected area was established in 1950 and was reclassified as a Biosphere Reserve in 1981 and further upgraded to a World Heritage Site in 1987 (Muchaal & Ngandjui 1999). It represents one of the most intact and ecologically significant tracts of tropical rainforest in the Congo Basin.

The DFR covers about 526,000 hectares, with nearly 90 % of its area remaining undisturbed by human activity (UNESCO, 2024). According to a systematic inventory of the

fauna taken between 1993 and 1995 under the auspices of ECOFAC (*Conservation and Utilisation Naturelle des Ecosystemes Forestiers d'Afrique Centrale*), 109 species of mammals in 34 families were recorded within the Reserve, and a possible 176 species in both Reserve and its surroundings (ECOFAC Cameroun, 1998). The site is designated an Important Bird Area by BirdLife International. A 1993 inventory of the avifauna recorded 349 resident species and some 80 more or less regular migrants. The area has a wide range of primate species including western lowland gorilla *Gorilla gorilla gorilla* (CR) and western chimpanzee *Pan troglodytes troglodytes* (EN; total numbers of both ape species: >4000, WHRC, 2005). The reserve making it one of the richest primate habitats in Central Africa (Global Conservation, 2024).

Primates hold a special place within this ecosystem as flagship species of tropical forests. Their diversity and abundance reflect both the ecological integrity and the conservation status of these forests. The Dja Reserve provides refuge for several globally threatened primates such as the Western lowland gorilla (*Gorilla gorilla gorilla*) and the chimpanzee (*Pan troglodytes ellioti*), which persist in relatively undisturbed forest blocks (UNESCO World, 2023).

Despite its protected status, the reserve faces increasing human pressures: bushmeat hunting, illegal logging, road expansion, and agricultural encroachment are the most serious threats to primate survival (UNESCO, 2024). In this context, conducting a literature-based review of the threatened primates of the DFR is crucial to update existing knowledge, synthesize ecological and conservation data, and identify future research and management priorities.

The aim of this review is therefore threefold: (i) to compile published data on primate species within the DFR and its periphery; (ii) to analyze their diversity, ecological distribution, and the threats they face; and (iii) to identify research gaps and suggest directions for improved conservation efforts.

MATERIAL AND METHODS

Study approach

This paper is based on a comprehensive review of published literature concerning threatened primates within the Dja Faunal Reserve (DFR) and its surrounding areas in southeastern Cameroon. Instead of conducting field observations, this work compiles and synthesizes information from scientific publications, technical reports, and institutional documents to assess the current state of primate diversity, ecology, and conservation in the DFR (Amin et al., 2023; Maisels et al., 2021; WWF Cameroon, 2022).

Study area

The Dja Faunal Reserve is located on Congo Rain Forest On and nearly surrounded by the Dja River in the Centre-Sud and Est regions of Cameroon, 243 km south-east of the capital, Yaoundé, and 5 km west of Lomié. The river forms a natural boundary except to the northeast. Coordinates: 2°49'-3°23'N, 12°25'-13°35'E.

It covers approximately 5,260 km², bordered by the Dja River on three sides, and forms part of the Congo Basin rainforest complex—one of the largest continuous tropical forest blocks in the world (Amin et al., 2023). The reserve is dominated by semi-evergreen lowland forest interspersed with swampy and secondary formations.

There are four main seasons: the long rains (August-November); the dry season (November-March); the small rains (March-May); and a shorter dry season (June-July) (MINFOR & IUCN 2015). During the dry season there is on average < 100ml of rainfall of

Dja is located between the Gulf of Guinea and the Congo Basin in a transitional zone between the Atlantic equatorial coastal forests of southern Nigeria and western Cameroon and the evergreen forests of the northwestern Congo lowlands. There are four main forest types: Atlantic, semi-deciduous, Congolese and monospecific. The forests of the region have long been a resource to local people and were even farmed in places, now secondary forest, but have remained 90% entire. Its tree cover is as almost much semi-deciduous as evergreen, but is dominated by the dense semi-evergreen Congo rain forest with a canopy at 30-40m rising to 60m.

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Data collection

Literature sources

174

Inclusion and exclusion criteria

Studies were included if they:

- (a) focused on primates known to occur within or adjacent to the DFR;
 - (b) presented data or discussion on diversity, ecology, or conservation; and
 - (c) were published between 1980 and 2025
- Sources were excluded when they lacked geographical specificity, presented anecdotal evidence, or failed to indicate species identity or conservation relevance (Morgan et al., 2013; Oates et al., 2016).

Data analysis

Extracted information was organized into four thematic categories:

- (1) Species diversity and taxonomy;
- (2) Ecological distribution and habitat use;
- (3) Anthropogenic threats; and
- (4) Conservation actions and management initiatives (Amin et al., 2023; WWF Cameroon, 2022).

RESULTS AND DISCUSSION

The 2018 Full-Reserve Faunal Inventory for the Dja Faunal Reserve (DFR) has reported the presence of different primates including 934 Central Chimpanzee (*Pan troglodytes troglodytes*), 817 Western Lowland Gorilla (*Gorilla gorilla gorilla*), 25 Agile mangabey (*Cercocebus agilis*), 8 Moustached guenon (*Cercopithecus cephus*), 8 De Brazza's guenon (*Cercopithecus neglectus*), 174 Putty-nosed guenon (*Cercopithecus nictitans*), 40 Crowned monkey (*Cercopithecus pogonias*), 12 Black & White colobus (*Colobus guereza*), 6 Satanic colobus (*Colobus satanas*), 10 Grey-cheeked mangabey (*Lophocebus albigena*) and 19 Primate spp (Bruce, Tom et al, 2018).

According to the IUCN Red List (2024), more than half of these species are currently threatened, falling into categories ranging from *Vulnerable* to *Critically Endangered*.

Species diversity and conservation status

Western Lowland Gorilla (*Gorilla gorilla gorilla*)

The International Union for Conservation of Nature (IUCN) officially listed the western lowland gorilla in 2008 as *Critically Endangered* under criterion A, which indicates a population reduction of more than 80% over three generations (about 66 years for gorillas)



Figure 2. *Gorilla gorilla gorilla* (autor: Pierre Fidenci CC ASA 2.5 , 2008
https://upload.wikimedia.org/wikipedia/commons/3/36/Gorilla_gorilla04.jpg, 2025.10)

Central Chimpanzee (*Pan troglodytes troglodytes*)

The Central Chimpanzee (*Pan troglodytes troglodytes*) has been classified as Endangered by the IUCN in 2008 due to a projected population decline of over 50% between 1975 and 2050, driven by habitat loss, poaching, and disease. Pan Troglodytes Troglodytes subspecies of common chimpanzees is the human's closest living connection (Caldwell, 2017).



Figure 3. *Pan Troglodytes Troglodytes* -Central Chimpanzee autor David Paul
(<https://images.pexels.com/photos/30929410/pexels-photo-30929410.jpeg>, 2025.10)

White-collared Mangabey (*Cercocebus torquatus*)

The White-collared Mangabey (*Cercocebus torquatus*), also known as the collared mangabey, red-crowned mangabey, or red-capped mangabey was classified as *Endangered* by the IUCN due to a projected population decline of over 50% between 2001 and 2028, primarily caused by habitat loss and hunting for bushmeat.



Figure 4. *Cercopithecus torquatus*

(autor: BS Thurner Hof

https://upload.wikimedia.org/wikipedia/commons/thumb/e/ec/Affe_Rotscheitelmangabe_Cercopithecus_torquatus_torquatus_05090.jpg/960px, 2025.10)

Drill (*Mandrillus leucophaeus*)

Concern for the Drill's survival was noted as early as 1962 for populations in Nigeria (Petrides 1965) and as early as 1968 in Cameroon (Gartlan 1970, 1975). Reasons included the very limited range with relatively high human population, ongoing habitat loss and fragmentation, and hunting. The Drill is currently listed as *Endangered* under the IUCN Red List, reflecting its high risk of extinction in the wild.



Figure 5. Drill (*Mandrillus leucophaeus*) (Sursa:wikipedia commons, foto Bernard Dupont, licenta CC BY-SA2.0, 2025.10)

Mandrill (*Mandrillus sphinx*)

Mandrillus sphinx is listed as Vulnerable in view of the widespread hunting pressure on this species, combined with habitat degradation across most of its range. It is suspected that these threats have resulted in a population decline exceeding 30% over the past 24 years (three generations) and which is unlikely to abate in the near future.



Mandrillus sphinx (Sursa:

Sanjay Acharya, <https://commons.wikimedia.org/w/index.php?search=Mandrill>, 2025.10.)

ECOLOGY OF THE FIVE THREATENED PRIMATES OF THE DJA FAUNAL RESERVE

Western Lowland Gorilla (*Gorilla gorilla gorilla*)

The western lowland gorilla inhabits lowland and swamp forests of the Dja Faunal Reserve, favoring areas with abundant fruiting trees and dense understory vegetation. It is primarily a frugivore–folivore that feeds on fruit, leaves, stems, and bark. Gorillas form cohesive groups led by a dominant silverback, with group movements and nesting patterns influenced by fruit availability. The Dja population is among the largest remaining in Cameroon and represents a significant portion of the regional metapopulation. Major threats include hunting for bushmeat, habitat degradation near reserve boundaries, and potential disease outbreaks such as Ebola (Amin et al., 2022; Rowcliffe et al., 2022; IUCN, 2023).

Central Chimpanzee (*Pan troglodytes troglodytes*)

Chimpanzees in the Dja landscape occupy primary and secondary forests and exhibit a diverse diet including fruit, seeds, leaves, insects, and occasionally vertebrates. They live in multi-male, multi-female communities with fission–fusion dynamics, nesting primarily in trees. Camera-trap and nest surveys confirm their widespread distribution across the reserve. A lot virus that affects humans also affects chimpanzees due to the close relationship of their gene to humans, being the closest living relatives. Some of the diseases that these primates are vulnerable to include common cold, pneumonia, influenza, whooping cough, measles, tuberculosis, yellow fever and Human Immunodeficiency Virus (HIV)(Caldwell,2017). Despite

Dja's legal protection, chimpanzees face continued threats from poaching, snaring, and logging pressures at the periphery (Amin et al., 2022; Rowcliffe et al., 2022; IUCN, 2023).

White-collared (Red-capped) Mangabey (*Cercocebus torquatus*)

The white-collared mangabey, also called the red-capped mangabey, inhabits the mid- and upper-canopy layers of mature evergreen forest within Dja. It feeds on fruits, seeds, nuts, invertebrates, and occasionally fungi. The species forms large, noisy social groups that rely on continuous forest cover for foraging and protection from predators. Its populations have declined in many parts of its range, mainly because of intensive bushmeat hunting and forest fragmentation; Dja remains one of the few protected refuges for this primate (ZSL & UNEP-WCMC, 2023; IUCN, 2023; UNESCO World Heritage Centre, n.d.)

Mandrill (*Mandrillus sphinx*)

Mandrills are semi-terrestrial primates that prefer lowland tropical forests and forest-savanna mosaics. Within Dja, they feed on fallen fruit, seeds, roots, and invertebrates, often forming large mixed-sex groups that travel extensively. Mandrills use mineral licks and open forest patches, indicating their need for heterogeneous habitats. Although relatively common in the interior forest, they are heavily hunted near villages, leading to local declines (Amin et al., 2022; IUCN, 2023; UNESCO World Heritage Centre, n.d.).

Drill (*Mandrillus leucophaeus*)

The drill is a close relative of the mandrill and occupies dense lowland and hill forests of the Dja Reserve. It is largely terrestrial, moving in multi-male troops that forage for fruits, seeds, leaves, and small animals. Drills require extensive, undisturbed forest tracts and are highly sensitive to human disturbance. The species is threatened mainly by bushmeat hunting and habitat fragmentation, though Dja remains a key refuge for viable populations (ZSL & UNEP-WCMC, 2023; IUCN, 2023; Rowcliffe et al., 2022).

CONSERVATION ISSUES

Despite its legal protection, the reserve faces several major conservation challenges that threaten its ecological integrity and the survival of its endangered primate populations (UNESCO World Heritage Centre, n.d.; ZSL & UNEP-WCMC, 2023).

1. Poaching and the Bushmeat Trade

The most pressing conservation issue in Dja is illegal hunting for bushmeat. Primate species such as gorillas, chimpanzees, drills, and mangabeys are frequently targeted for local consumption and commercial sale. Poaching persists due to poverty, limited enforcement capacity, and weak judicial follow-up on wildlife crimes (Amin et al., 2022; Rowcliffe et al., 2022).

2. Habitat Loss and Fragmentation

Encroachment from agriculture, logging, and infrastructure development has caused significant forest degradation around the reserve's boundaries. Habitat fragmentation also disrupts primate movement corridors, reducing gene flow and increasing isolation of small populations (ZSL & UNEP-WCMC, 2023; UNESCO World Heritage Centre, n.d.).

3. Weak Law Enforcement and Governance

Although the Dja Reserve is managed by the Ministry of Forestry and Wildlife (MINFOP), limited funding, staff shortages, and inadequate training have weakened anti-

poaching efforts. Enforcement teams often lack logistical support to cover the reserve's 5,260 km² area effectively.

4. Disease Risks and Climate Change

Emerging diseases such as Ebola and other zoonoses pose serious threats to great ape populations in Central Africa. Although no major outbreaks have been recorded in Dja in recent years, the proximity of human settlements and hunting of wildlife elevate transmission risks. Climate change may alter fruiting patterns, water availability, and species distribution, potentially impacting primate feeding ecology and habitat use (IUCN, 2023; Amin et al., 2022).

5. Limited Community Participation in Conservation

While several NGOs promote community-based conservation projects, local participation in decision-making remains limited. The lack of tangible economic benefits for communities living near the reserve weakens support for conservation measures.

CONCLUSIONS

The Dja Faunal Reserve remains one of Cameroon's most vital ecosystems, supporting globally threatened primates such as the western lowland gorilla (*Gorilla gorilla gorilla*), central chimpanzee (*Pan troglodytes troglodytes*), drill (*Mandrillus leucophaeus*), mandrill (*Mandrillus sphinx*), and white-collared mangabey (*Cercocebus torquatus*). This literature review has examined the diversity, ecology, and conservation challenges facing by these ones.

Despite its designation as a UNESCO World Heritage Site, the Dja Faunal Reserve faces mounting threats. Habitat fragmentation due to logging, mining, and agricultural expansion continues to erode primate habitats. Poaching and the bushmeat trade, driven by socio-economic pressures and weak enforcement, have significantly reduced primate populations. Additionally, infrastructure development and human encroachment are intensifying deforestation and disrupting wildlife corridors.

To address these urgent conservation issues, the following recommendations are proposed:

Strengthen Protection and Enforcement Enhance anti-poaching efforts through increased ranger deployment, improved training, and the use of modern surveillance technologies such as drones and camera traps.

Restore and Connect Habitats Implement reforestation programs and establish ecological corridors to maintain genetic flow and support species resilience.

Support Research and Monitoring Invest in long-term ecological studies and systematic primate population monitoring to inform adaptive management strategies.

Mobilize Policy and Funding Support Advocate for stronger national conservation policies and secure international funding through biodiversity and climate finance mechanisms.

Foster Environmental Education Launch targeted awareness campaigns to cultivate a conservation ethic among local populations, particularly youth and community leaders.

In conclusion, the survival of threatened primates in the Dja Faunal Reserve depends on integrated conservation strategies that combine scientific research, community engagement, policy reform, and sustained financial investment. Protecting these species is not only vital for biodiversity conservation but also for maintaining the ecological balance and cultural heritage of the region.

BIBLIOGRAPHY

- AMIN, RAJAN. 2022 - Conservation status and threats to primates in the Dja Landscape. Yaoundé: Zoological Society of London, Camerun. pp. 1–36.
- AMIN, RAJAN; MAISELS, FIONA; ET AL. 2023 - Primate diversity and monitoring in the Dja Faunal Reserve. Yaoundé: Zoological Society of London, Camerun. [Report]. pp. 1–42.
- BRUCE, TOM; ET AL. 2018 - Full-Reserve Faunal Inventory: Dja Faunal Reserve (DFR). Yaoundé: MINFOF, ZSL, AWF, Camerun. [Report]. pp. 1–88.
- CALDWELL, ALISON. 2017 - Chimpanzees and human disease susceptibility. Chicago: University of Chicago, SUA. [Article]. pp. 1–12.
- CUVILLIER, PIERRE. 2008 - Biodiversité du Cameroun: richesse et enjeux. Paris: L'Harmattan, Franța. [Book]. pp. 1–240.
- ECOFAC CAMEROUN. 1998 - Inventaire systématique de la faune du Réserve de Faune du Dja (1993–1995). Yaoundé: ECOFAC, Camerun. [Raport]. pp. 1–75.
- GLOBAL CONSERVATION. 2024 - Dja Faunal Reserve: biodiversity profile. San Francisco: Global Conservation, SUA. [Report]. pp. 1–28. Disponibil la: globalconservation.org
- IUCN. 2023 - The IUCN Red List of Threatened Species – Gorilla gorilla gorilla; Pan troglodytes troglodytes; Mandrillus leucophaeus; Mandrillus sphinx; Cercocebus torquatus. Gland: IUCN, Elveția. [Database]. pp. 1–10.
- IUCN. 2024 - The IUCN Red List updates for Central African primates. Gland: IUCN, Elveția. [Update]. pp. 1–12.
- MAISELS, FIONA; ET AL. 2021 - Great apes in Central Africa: status and trends. Gland: IUCN/WCS, Elveția. [Report]. pp. 1–40.
- MINFOF. 2020 - State of Conservation Report: Dja Faunal Reserve. Yaoundé: Ministry of Forests and Wildlife, Camerun. [Raport]. pp. 1–30.
- MINFOF; IUCN. 2015 - Plan de gestion du Réserve de Faune du Dja. Yaoundé: MINFOF & IUCN, Camerun. [Plan de management]. pp. 1–60.
- MORGAN, DAVID; ET AL. 2013 - Primate communities in the Congo Basin: composition and pressures. New York: Springer, SUA. [Journal]. pp. 500–520.
- MUCHAAL, NGANDJUI, GERMAIN. 1999 - The Dja Reserve, Cameroon: status and conservation. Yaoundé: WWF Cameroun, Camerun. [Raport]. pp. 1–48.
- OATES, JOHN F.; ET AL. 2016 - Primates of West-Central Africa: distribution and conservation. Arlington: Conservation International, SUA. [Monograph]. pp. 1–70.
- ROWCLIFFE, J.; ET AL. 2022 - Camera-trap monitoring of apes in the Dja Landscape. Londres: UCL, Regatul Unit. [Report]. pp. 1–25.
- SONKÉ, BONAVENTURE. 1998 - Floristic diversity and climate in southeastern Cameroon. Yaoundé: Université de Yaoundé I, Camerun. [Journal]. pp. 1–20.
- UNESCO. 2010 - State of Conservation – Dja Faunal Reserve. Paris: UNESCO World Heritage Centre, Franța. [Raport]. pp. 1–15.
- UNESCO. 2024 - Dja Faunal Reserve (Cameroon) – World Heritage Brief. Paris: UNESCO WHC, Franța. [Raport]. pp. 1–12.
- UNESCO WORLD HERITAGE CENTRE. n.d. Dja Faunal Reserve: Description, values and threats. Paris: UNESCO WHC, Franța. [Web/Brief]. pp. 1–10. Disponibil la: <https://whc.unesco.org/en/list/407> [Accesat la: 5 oct. 2025].
- WHRC (Woods Hole Research Center). 2005 - Great ape numbers in Central Africa. Woods Hole (MA): WHRC, SUA. [Report]. pp. 1–35.
- WWF AFRICA. 2024 - Cameroon: “Africa in miniature” – ecosystems and biodiversity overview. Nairobi: WWF Regional Office for Africa, Kenya. [Raport]. pp. 1–22.
- WWF CAMEROON. 2022 - Conservation initiatives in the Dja Landscape. Yaoundé: WWF, Camerun. [Raport]. pp. 1–30.
- ZSL; UNEP-WCMC. 2023 - Protected Areas and Key Biodiversity Areas: Dja Faunal Reserve profile. Londra/Cambridge: Zoological Society of London & UNEP-WCMC, Regatul Unit. [Raport]. pp. 1–18.