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Preliminary Insights into Avian Diversity in the Kokolopori Nature Reserve, Central Congo Forest Ecoregion.

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ABSTRACT

The diversity of birds in the Kokolopori Nature Reserve has not yet been the subject of scientific publications. However, a comprehensive knowledge regarding this fauna is necessary to formulate effective conservation strategies. In order to fill the aforementioned knowledge gap, a preliminary avian inventory was conducted within the Kokolopori Nature Reserve (KBNR). The sampling was random and stratified, and the method was mist netting, supplemented by observation at transect points. 69 bird species were recorded, spanning 29 families and 14 orders. Highlights included rare forest specialists like the Congo peacock and African grey parrot - species that rely on intact, primary forest ecosystems. These findings underscore the ecological value of Kokolopori and highlight the need for targeted conservation efforts to protect the Congo Basin's avian diversity and the integrity of its remaining primary forests. They are of the utmost importance since produced for the first time in an unstudied area targeted for conservation.

Introduction

Conservation in the Kokolopori Nature Reserve (KBNR) takes place in a global context of biodiversity loss (Ceballos et al. 2010; Barnosky et al. 2011) impacting trophic chains (Mace et al. 2012), ecosystem degradation, climate change, and overexploitation of natural resources. These challenges require a collaborative approach involving governments, non-governmental organisations, researchers and local communities to find sustainable solutions. Furthermore, industrialisation, urbanisation, intensive non-organic agriculture and the climate crisis are the main causes of the high rate of extinction of living creatures that can be observed around the world today (Kolbert, 2015), including birds.

Birds are good indicators of the health of ecosystems, so it is important to study them, especially in the Kokolopori Nature Reserve, which is a little-studied area. This reserve may contain endangered bird populations or undescribed species, the knowledge of which could advance science.

According to the work carried out by Bailey et al. 2004 and Samraoui et al. 2012, the results converge on the biodiversity crisis facing our planet. The decline in bird populations is mainly attributed to the intensification of agricultural practices, which leads to the loss and degradation of natural habitats, in this case the increased use of pesticides and chemical fertilisers that disrupt food chains by eliminating insects and plants essential to the survival of many species (Devictor et al., 2023). In addition, forest degradation, particularly through intensive logging, is reducing habitat diversity and seriously affecting species that depend on natural forests. The Congo Basin is the largest expanse of continuous forest in the world after Amazonia and is one of the world's great reservoirs of biodiversity, with around 1,110 species of birds (datazone.birdlife.org, 2025). The Kokolopori Nature Reserve is located in the central Congolese lowland forests and is home to a wide variety of flora. However, ornithological studies have not yet been undertaken in this reserve. On the other hand, its integral zone has been encroached upon by fields belonging to local communities, which further underlines the importance of this inventory.

The aim of this study is to inventory the birds of the KBNR, to highlight its diversity and to contribute to the knowledge of endemic, rare birds or birds of national and international conservation interest.

2. Study Area And Methods

2.1. Study Area

The Kokolopori Nature Reserve is located in the Democratic Republic of Congo (4.0383^0 S; 21.7587^0 E), in the Tshuapa province, Djolu territory. It covers a total area of 4,875 km^2, of which 785 km^2 is fully protected (Journal Officiel, 2009). The topography, climate and vegetation of the Kokolopori Nature Reserve are better described elsewhere (Georgiev et al, 2011).

2.2. Methods

Each stratum of our sample was described so that we could then analyse the conditions favourable to the various species at the different stations. The habitats in which the

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birds were to be captured were identified one day before sampling, between 09:30 and 15:30. The geographical coordinates of each habitat were taken using a Garmin64 GPS.

Two techniques were used: capture with mist nets and observation. Each habitat was surveyed using mist nets, a commonly used method (Lieury et al., 2017; Lövei et al., 2001; Députier, 2022). We used a total of 10 mist nets, each 7 to 10 m long and with a mesh size of 2. Capture surveys using mist nets target bird species with very small home ranges and require stable bird populations (Koudri & Kassed, 2022). The 10 nets were set systematically at intervals of 20 metres. The mist nets, tied between two poles, were set up in special areas that were either passageways, feeding areas or refreshment areas for the birds in each habitat type. Surveys were carried out twice a day, in the morning from 7am to 11am and in the evening from 2pm to 5pm. The nets were left in one place for 2 weeks and then moved to another, taking care to analyse the cumulative species curves.

All specimens captured were labelled, photographed and preserved in a plastic box containing formalin (5%). Biopsies were preserved in Eppendorf tubes containing alcohol (98%) or, occasionally, 2 feathers from the rectrix were preserved in a paper envelope. Identification was carried out using the identification key from Nik Borrow & Ron Demey, 2014 and the Birds of Africa software.

In addition to capture using mist nets, observations were made 100 m from the net installations at a specific observation point. At the observation point, 2 observers placed back to back at an angle of 180° each, observed all the birds that were passing through, feeding or resting. The observers spent 10 minutes at each observation point.

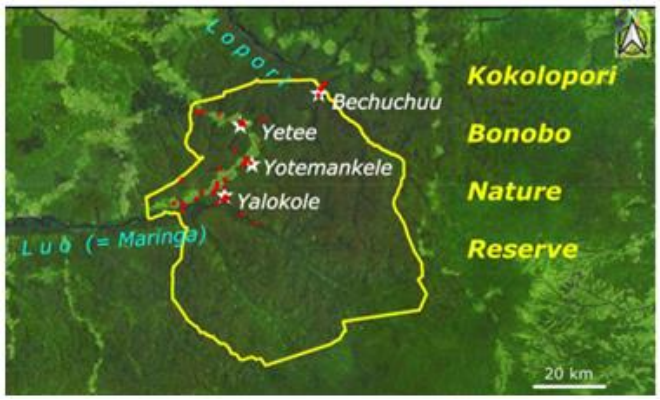

Figure 1: *Geographical map of the RNBK (source: Max Plank, 2020).*

3. Results and Discussion

3.1. Bird Diversity in the RNBK

A total of 768 bird specimens were collected, divided into 69 species, 29 families and 14 orders. The order Passeriformes was the most represented with 12 families. This order was followed by the Galliformes with 3 families. The Coraciiformes and Piciformes were each represented by 2 families. The orders Strigiformes, Cuculiformes, Anseriformes, Psittaciformes, Musophagiformes, Columbiformes, Falconiformes, Caprimulgiformes, Accipitriformes and Bucerotiformes were each represented by one family and were the least represented orders in this collection. The Pycnonotidae family was the most represented with 11 species. This family was followed in descending order by the Nectarinidae (6 species), Bucerotidae, Columbidae and Ploceidae with 5 species each, and Cuculidae (4 species). The families Alcedinidae, Estrildidae, Monarchidae, Musophagidae were represented by 2 species each, the others Passeridae (1 species), Motacillidae (1 species), Platysteiridae (1 species), Strigidae (1 species), Lybiidae (1 species), Falconidae (1 species), Phasianidae (1 species) were the least represented families. In terms of species abundance, *Ploceus cucullatus* was the most abundant species with 132 specimens (19.52%), followed by *Ploceus nigerrimus* (89 specimens: 13.16%), *Quelea erythrops* (27 specimens: 3.99%), *Psittachus erythacus* (24 specimens: 3.55%), *Eurillas latirostris* (21 specimens: 3.10%), *Platysteira castanea* (9 specimens: 1.33%), *Terpsiphone viridis* (7 specimens: 1.03%), *Malimbus nitens* (6 specimens: 0.88%), *Phyllastrephus scandes* (5 specimens: 0.73%), *Horizocerus albocristatus* (3 specimens: 0.44%), *Caprimulgus batesi* (2 specimens: 0.29%) and *Chrysococcyx cupreus* (one specimen: 0.14%).

There have been a few attempts to rear *Pteronetta hartlaubi* at Kokolopori but these have been unsuccessful. Domestic ducks incubate *Pteronetta* eggs well and hatching is successful. However, the two species have different developmental ecologies and the wild ducklings return to the forest.

Alcyon senegalensis and *Ispidana picta* dominate the numbers of coraciiformes. *Alcyon senegalensis* was often seen near watercourses, while *Ispidina picta* was mainly found near termite burrows.

Figure 2 illustrates some of the bird species found at Kokolopori

Figure 2:*Turtur afer* (A), *Ploceus nigricollis* (B), *Hylia prasina* (C), *Spermophaga haematina* (D), *Merops variegatus* (E), *Cyanomitra olivacea* (F), *Eurillas latirostris* (G), *Sarothroura pulchra* (H) et *Pogoniulus bilineatus* (I)

4. Discussion

The results of this survey (69 species or 5.71%) are in linewith the great ornithological diversity found in the DRC (1207 species inventoried) https://www.oiseaux.net/oiseaux/republique.democratique.du.congo.html).

It helped shortlist 69 bird species. The data obtained in the Kokolopori Nature Reserve are higher than those found by Koudri and Kassed, (2022) (32 species) in the suburban forest of Sidi Bentamra-Tissemsilt (Algeria). This difference could be justified by the difference in topography, vegetation and climate. Algeria has a lower bird diversity (462 species) than the DRC (1207 species). In 2008, Murhabale inventoried 25 species in Lake Kivu, a figure even lower than that obtained by this study. The difference with Murhabale can be

explained by the fact that Lake Kivu and the RNK are two structurally different ecosystems. Furthermore, Lake Kivu is used frequently by the population of two provinces that are always on the move, which is not the case for the Kokolopori Nature Reserve, which is a classified ecosystem. The species richness of this study appear to be lower than that obtained by Kougoum et al. in 2024, who sampled up to 97 species in the Sena Oura National Park (Chad); KOUADIO et al, (2005) who identified 132 species in the N'ganda classified forest (Côte d'Ivoire); Zean, in 2022 who inventoried 196 species in the Haut-Sassandra region and Yaokokoré-Béibro et al., in 2010 with 93 species inventoried in the Téné classified forest, Centre-West Côte d'Ivoire. These differences in numbers can be explained by differences in environments and research efforts.

Conclusions

The identification of 69 bird species within the Kokolopori Nature Reserve, including *Afropavo congensis*, *Ceratogymna attrata* and *Psittacus erythacus*, provides strong evidence of the site's high conservation value. The confirmed presence of the Congo peafowl (*Afropavo congensis*), a species listed as Vulnerable on the IUCN Red List and protected under CITES, reinforces the importance of preserving this relatively undisturbed habitat. These findings emphasize the role of Kokolopori as a critical refuge for avian biodiversity in the Congo Basin and highlight the urgent need for targeted conservation strategies to ensure the continued protection of its primary forests and endemic wildlife.

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Table 1 lists the bird species of the Accipiteriformes, Anseriformes and Bucerotiformes orders collected in the Kokolopori Nature Reserve over a 6-month

Orders	Families	Species	Numbers	%
Accipiteriformes	Accipiteridae VIGORS, 1924	*Milvus migrans* (BODDAERT, 1783)	10	1.30
		Polyboroides typus SMITH, 1829	7	0.91
Anseriformes	Anatidae LEACH, 1820	*Pteronetta hartlaubi* (CASSIN, 1860)	9	1.17
Bucerotiformes	Bucerotidae RAFINESQUE, 1815	*Lophocerus fasciatus* (SHAW, 1812)	17	2.21
		Bycanistes albotibialis (CABANIS & RICHENOW, 1877)	7	0.91
		Ceratogymna attrata (TEMMICK,1835)	4	0.52
		Lophocerus camurus (CASSIN, 1857)	2	0.26
		Horizocerus cassini (OTTO FINSCH, 1903)	3	0.39

Table 2 lists the birds of the Caprimulgiformes and Coraciiformes orders.

Orders	Families	Species	Numbers	%
Caprimulgiformes	Caprimulgidae VIRGORS, 1825	*Caprimulgus batesi* SHARPE, 1936	2	0.26
Coraciiformes	Alcedinidae RAFFINESQUE, 1815	*Ispidina picta* (BODDAERT, 1783)	8	1.04
		Alcedo quadribrachys BONAPARTE, 1850	3	0.39
		Halcyon senegalensis (LINNAEUS, 1766)	12	1.56
	Meropidae, RAFFINESQUE, 1815	*Merops variegatus* VIEILLOT, 1817	2	0.26

Tale 3 lists the birds species of the Columbiformes and Cuculiformes, Falconiformes, Galliformes, Musophagiformes and Piciformes orders.

Orders	Families	Species	Numbers	%
Columbiformes	Columbidae ILLIGER, 1811	*Turtur tympanistra* (TEMMICK, 1809)	10	1.30
		Turtur afer (LINNAEUS, 1766)	7	0.91
		Treron calvus (LINNAEUS, 1766)	8	1.04
		Streptopelia semitorquata (RUPPEL, 1837)	5	0.65
Cuculiformes	Cuculidae VIGORS, 1825	*Centropus monachus* RUPPEL, 1837	4	0.52
		Cuculus solitarius STEPHENS, 1815	4	0.52
		Chrysococcyx caprius (BODDAERT, 1782)	3	0.39
		Chrysococcyx cupreus (SHAW, 1792)	1	0.13
Falconiformes	Falconidae LEACH, 1820	*Falco peregrinus* TUNSTALL, 1771	5	0.65
Galliformes	Numidae SELYS LONGCHAMPS, 1842	*Numida meleagris* LINNAEUS, 1758	13	1.69
	Phasianidae HORSFIELD, 1821	*Afropavo congensis* CHAPIN, 1936	5	0.65
	Sarothruridae VERHEYEN, 1957	*Sarothrura pulchra* (GRAY, 1829)	2	0.26
Musophagiformes	Musophagidae LESSON, 1828	*Corythaeola cristata* (VIEILLOT, 1816)	12	1.56
		Tauraco shuettii (CABANIS, 1879)	7	0.91
		Pogoniulus atroflavus (SPARRMAN, 1798)	1	0.13
Piciformes	Lybiidae SIBLEY & AHLQUIST, 1985	*Pogoniulus bilineatus* (SWAINSON, 1821)	8	1.04
	Picidae LEACH, 1820	*Campethera maculosa* (VALENCIENNES, 1826)	22	2.86
Psittaciformes	Psittacidae ILLIGER, 1811	*Psittacus erythacus* LINNAEUS, 1758	24	3.12
Strigiformes	Strigidae VERGORS, 1825	*Strix woodfordii* (SMITH, 1834)	4	0.52

Table 4 lists bird species of the Passeriformes order

Order	Families	Species	Numbers	%
Passeriformes	Platysteiridae SUNDEVALL, 1872	*Platysteira castanea* FRASER, 1843	9	1.17
	Muscicapidae FLEMING, 1822	*Alethe castanea* CASSIN, 1856	2	0.26
	Ploceidae SUNDEVALL, 1836	*Ploceus nigerrimus* VIEILLOT, 1819	89	11.58
		Ploceus cucullatus (MULLER, PLS, 1776)	132	17.18
		Ploceus nigricollis (VIEILLOT, 1805)	14	1.22
		Quelea erythrops (HARTLAUB, 1848)	27	3.51
	Dicruridae VIGORS, 1825	*Dicrurus atripennis* SWAINSON, 1837	3	0.39
	Estrildidae BONAPARTE, 1850	*Spermestes bicolor* (FRASER, 1843)	10	1.30
	Monarchidae BONAPARTE, 1854	*Estrilda melpoda* (VIEILLOT, 1817)	20	2.60
	Corvidae VIGORS, 1825	*Pyrenestes ostrinus* (VIEILLOT, 1805)	3	0.39
	Nectarinidae VIGORS, 1825	*Spermophagahaematina* (Vieillot, 1807)	6	0,78
		Terpsiphone viridis (STATIUS MÜLLER, 1776)	7	0.91
		Terpsiphone rufiventer (SWAINSON, 1837)	5	0.65
	Pycnonotidae G. R. GRAY, 1840	*Corvus albus* STATIUSMULLER, 1776	20	2.60
		Cinnyris chloripigius (JARDINE, 1842)	4	0.52
		Cinnyris minullus REICHENOW, 1899	9	1.17
		Cinnyris superbus (SHAW, 1812)	7	0.91
	Passeridae ILLIGER, 1811	*Cyanomitra olivacea* (SMITH, 1840)	12	1.56
	Motacillidae HORSFIELD, 1821	*Cyanomitra verticalis* (LATHAN, 1790)	8	1.04
	Cisticolidae SUNDEVALL, 1872	*Hedydipna collaris* (VIEILLOT, 1819)	6	0.78
		Ixonotus guttatus VERREAUX & VERREAUX, 1851	7	0.91
		Pycnonotus tricolor (HARTLAUB, 1862)	15	1.95
		Bleda syndactylus (SWAINSON, 1837)	1	0.13
		Thescelocichla leucopleura (CASSIN, 1855)	6	0.78
		Criniger calurus (CASSIN, 1856)	2	0.26
		Baeopogon indicator (VERREAUX & VERREAUX, 1855)	1	0.13
		Passer griseus (VIEILLOT, 1817)	13	1.69
		Motacilla aguimp TEMMINCK, 1820	4	0.52
		Camaroptera breuvicaudata (CRETZSCHMAR, 1830)	14	1.82
		Cisticola anonymus (VON MÜLLER, 1855)	11	1.43

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