

Status of the avifauna in the construction zone of the Singrobo - Ahouaty hydroelectric dam (Tiassale - Cote D'ivoire)

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Abstract

An ornithological study was carried out in the construction zone of the Singrobo-Ahouaty (Tiassale) hydroelectric dam in central Côte d'Ivoire, with a view to assessing the avifaunal population prior to the implementation of the dam construction project. The surveys were carried out in the dry and rainy seasons. In the terrestrial environment, the method of listening points coupled with point indices of abundance was used to inventory birds. However, in the vicinity of watercourses, the main method used was a slow itinerant walk with stops to observe and count the birds. A total of 243 bird species belonging to 54 families from 20 orders were inventoried. Of these species, seven (07) are recognised as bird species of global conservation interest, twelve species are endemic to West Africa and six (06) others are species of restricted distribution. In addition, 90 of the 185 species of the guinean-congolese forest biome and 36 migratory species have been inventoried in the area. The species richness in the dry season is higher than in the rainy season. From the perspective of protecting and sustainably managing biodiversity, this study is of vital interest. It enabled an inventory to be made of the birds in the area, which will make it possible to plan appropriate conservation measures for bird species with special status in the biodiversity management plan proposed at the end of the environmental and social impact study for the project.

Keywords: Avifauna; Hydroelectric dam; Environmental impact; Biodiversity

1 Introduction

In the wake of the Rio and Kyoto conferences on the sustainable management of biodiversity and the greenhouse effect, almost all the countries of the world have committed themselves to reducing greenhouse gas emissions and developing other forms of renewable energy [1]. In West Africa, mastery of the energy mix and self-sufficiency in renewable energies are at the heart of the sustainable development needed to ensure the well-being of the population. Indeed, the technological evolution and economic development so sought-after by these developing countries require a growing need for electricity consumption [2]. This imperative has led the countries of the sub-region to build numerous dams. In Côte d'Ivoire, the creation of dams dates back to the mid-sixties [3]. On the one hand, it responds to the country's quest for energy independence, with an option in favor of hydroelectricity, and on the other, to a political desire to reduce inter-regional disparities. Although the construction of these hydroelectric infrastructures contributes to development in general and to human advancement [4], it is a source of numerous problems, such as the forced displacement of populations [5,6] and the multiple disruptions to ecosystems [7], the corollary of which is the considerable loss of biodiversity [8,9,10]. Nowadays, there is more and more talk of preserving natural environments with a view to conserving biodiversity, which is considered to be the determining factor in sustainable development. Aware of these facts and with a view to reconciling the environment and sustainable development, the Ivorian

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government has included in its development program the carrying out of an environmental and social impact assessment (ESIA) prior to the implementation of any project likely to have an impact on the environment [11]. Thus, in the context of the construction of the Singrobo-Ahouaty hydroelectric dam, birds, which occupy an important place in biodiversity [12], through their active contribution to the functioning of ecosystems (pollination, seed dissemination, etc.) and their ecological role as regulators of certain invertebrates [13], their visibility, the extent and diversity of their habitats [14], as important indicators of ecosystem health [15], etc., were all inventoried in and around the project area. The aim of this study was to assess and characterize the initial state of the avifauna in the Singrobo-Ahouaty hydroelectric dam construction zone, with a view to providing site managers with reliable baseline data for decision-making with a view to long-term management of the site's natural resources for current and future generations.

2 Material and methods

2.1 Study site

The Singrobo-Ahouaty hydroelectric scheme is located on the Bandama River, 3.5 km from the village of Singrobo in the Taabo department, which lies between 6°05'35" N and 4°55'15" W (Figure 1).

The region is under the influence of the transitional tropical regime, with two rainy seasons and two dry seasons [16]. Average annual rainfall is 1105 mm, with an average annual temperature of 27 [17]. The area belongs to the mesophilic sector, characterized by semi-deciduous vegetation. There is a pre-forest savannah zone to the north and a forest savannah zone to the south. The pre-forest zone is made up of gallery forests, forest islands and savannas [18]. The zone's hydrographic network comprises two rivers, the Bandama and N'zi [16].

2.2 Technical equipment

A pair of binoculars and a spotting scope were used to observe the birds. A digital camera was used to take photos of the birds, and a GPS was used to locate and geolocate the listening and observation stations. A dictaphone was used to record the birds' vocalizations. Two guides to West African birds [19] and compact discs (CDs) of the songs and calls of West African birds [20] were used to identify the birds.

2.3 Bird inventory

Five localities in the dam construction zone were selected for the bird inventory: Singrobo, Pacobo, Kotiessou, N'Denou and Ahouaty. These sites have diverse ecological characteristics (Figure 2).

For each of these study methods, all the bird species seen or heard were counted and noted, along with their abundance. Unknown vocalizations were recorded either for later identification using the CD Rom of the calls and songs of West African birds by [20], or for replaying vocalizations for species identification purposes on site. The recordings were made between 07:00 am and 18:00 pm. At the end of the various surveys, the index of abundance (IPA) for each species recorded was retained, retaining only the highest value for all the surveys. For each of the study sites, the geo-referential coordinates and habitat characteristics were noted. Surveys were carried out in the rainy and dry seasons.

Several methods were used to count the birds:

- Pedestrian counts on transects, which consisted of observing birds by walking slowly along the tracks or even in the various habitats of the sites in the study area.
- In wooded and closed environments, the method used was listening points coupled with point indices of abundance (IPA) [21].
- At the water's edge, the method used is that of the itinerant route (along the water's edge) at slow speed, punctuated by stops to observe and count the birds.

2.4 Data analysis

The data collected were used to determine various parameters, including species richness (S), which expresses the number of species observed in a stand ($S = \sum \text{species}$), and relative frequency (Fr), which is the relative importance of each species compared with all those recorded in a given habitat ($Fr = (n_i/N) \times 100$ where n_i = population size of species i and N = sum of the population sizes of the species making up the stand). Excel was used to calculate observation frequencies within each site surveyed.

The conservation status of each of the species surveyed was determined according to the categories of the International Union for Conservation of Nature [22]. Biogeographical status and endemism were also identified for these bird species

according to [19]. Biome information for these species was taken from [15]. The families, genera and scientific names of the bird species follow the taxonomic order and nomenclature according to IOC World Bird Names, version 13.2, as proposed by [23].

3 Results

3.1 Overall species composition

A total of 243 bird species were inventoried, with a total of 6399 individuals belonging to 60 families and 20 orders (Table 1). Figure 3 shows photographs of some of the bird species observed in the study area. In terms of vulnerability, seven (07) of the species inventoried benefit from worldwide protection [22]. These are Grey Parrot *Psittacus timneh* in the category Endangered EN; Yellow-bearded Bulbul *Criniger olivaceus* in the category Vulnerable (VU) and Green-tailed Bulbul *Bleda eximius*; Hooded Bathmocerque *Bathmocercus cerviniventris*; Eisentraut's Indicator *Melignomon eisentrauti*, Rufous-winged Akalat *Illadopsis rufescens* and Bronze-tailed Jackdaw *Hylopsar cupreocauda* are classified as Near Threatened (NT). The other species are classified as Least Concern (LC). In terms of irreplaceability, six (06) of the bird species inventoried, namely *Bleda eximius*, *Criniger olivaceus*, *Bathmocercus cerviniventris*, *Illadopsis rufescens*, *Hylopsar cupreocauda* and *Apalis sharpii*, are recognized as Restricted range species. Similarly, 12 species (Table I) are endemic to West Africa. It should also be noted that 90 species observed are characteristic of the guinean-congolese forest biome (Table 1). The results also indicate that 36 migratory bird species (Table 1) were observed at the survey sites.

3.2 Species composition by season

The avifauna data from the parameters assessed overall (Figure 4) and by study site (Figure 5) are greater in the dry season than in the rainy season. For example, in the overall analysis, the species richness and number of individuals, which are 229 species and 4151 individuals respectively in the dry season, are only 229 species and 2248 individuals in the rainy season. On the other hand, for the vulnerability categories, apart from Least Concern (LC) where the number of species in the dry season (222) is higher than in the rainy season (205), the other categories have the same number of species in the dry and rainy seasons (Figure 6). The characteristics of the different avifauna populations revealed that, apart from the « uncommon species U » component, the other components (fairly common species, common species and rare species) are more important in the dry season (Figure 7). In terms of migrations, we also note that for all categories, the numbers of migratory species in the stands are higher in the dry season (Figure 8).

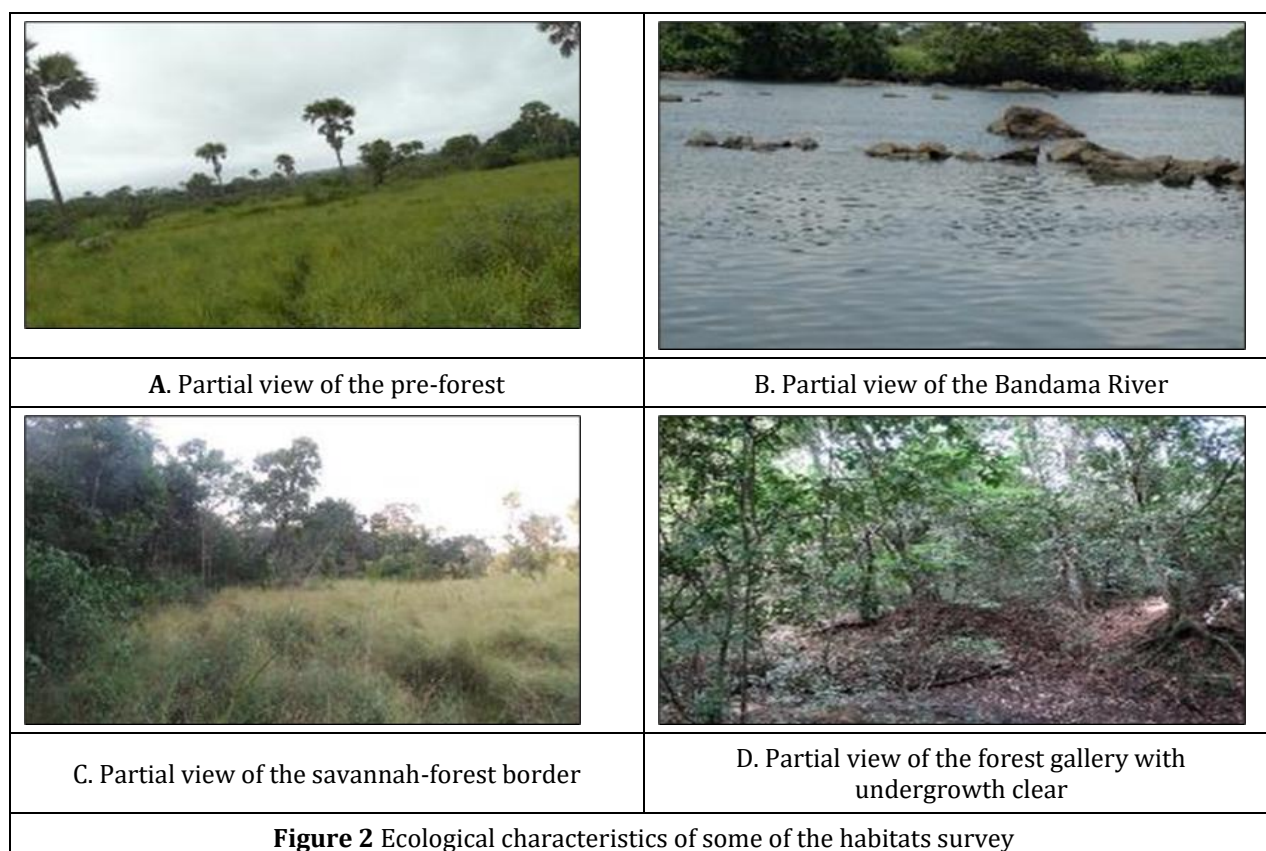
4 Discussion

A total of 243 bird species were inventoried in the study area, representing 31.11% of the 781 bird species recorded in Côte d'Ivoire [24]. This species richness is relatively high in view of the many threats that birds face in their natural environments in terms of deforestation [25], extensive agriculture, mining, etc., which affect the majority of forest ecosystems in Côte d'Ivoire [26, 27, 28]. Similarly, to meet their need for animal protein, large birds such as hornbills, Touracos, eagles, guinea fowl and Francolins, pigeons, etc., are increasingly being poached by local populations [29, 30]. Other species, such as parrots, falcons, hawks and some passerines [31], are used in the international wildlife trade. These various threats could explain the absence of certain bird species whose range covers the study area. The species richness of birds obtained in this study is higher than those obtained in other studies in biotopes with comparable physiognomies. For example, the data from the work of [8] and [28] respectively in the biodiversity conservation zone of the Soubré hydroelectric dam (190 species) and in the future M'Brimbo Voluntary Nature Reserve (204 species). The avifaunal species richness in this study varies according to the season. This variation could be explained by the availability of food resources in the natural environments. According to [32], climatic conditions have a major influence on bird food consumption. Similarly, the availability of food resources influences their distribution in natural environments [33]. In terms of conservation, there are seven globally protected bird species [22]; six of the 14 species with restricted distribution recorded in Côte d'Ivoire, i.e. land bird species with a breeding range of less than 50,000 km² that make up the Upper Guinean Forest Bird Endemism Zone [15, 34]; 12 qualified as West African endemics; 36 migratory species [32] and 90 species, i.e. 42.45% of the 185 species confined to the guineo-congolese forest biome known in Côte d'Ivoire, indicates that the Singrobo-Ahouaty hydroelectric dam construction zone contains a significant avifaunal potential that deserves special attention with a view to its sustainable management. Indeed, it is almost certain that the construction of the dam in this area would be a threat to avifauna, as according to [35] the construction of a hydroelectric dam profoundly modifies ecosystems. Nevertheless, monitoring and taking into account the measures to mitigate the negative impacts proposed at the end of the environmental impact study could avoid, mitigate and compensate for the loss or displacement of certain bird species in this area.

The high number of migratory species in the dry season is due to the fact that during this period a high proportion of migrants descend towards the wettest savannahs, in order to follow fluctuations in food resources and their conditions of exploitation. During the dry season, African migrants concentrate in the southern savannahs [36]. The dry season corresponds to the period of greatest availability of food resources for migratory insectivorous species. During this period, the environment is favorable to many migratory species, which disappear when the rains reduce access to food through the growth of tall, dense vegetation [36]. Similarly, during the dry season, many non-migratory species make seasonal local movements and have fluctuating numbers [32].



Figure 1 Location map of the study area



	
A. African Green-pigeon <i>Treron calvus</i>	B. Senegal Parrot <i>Poicephalus senegalus</i>
	
C. Great-blue Turaco <i>Corythaeola cristata</i>	D. Broad-billed Roller <i>Eurystomus glaucurus</i>
	
E. Lizard Buzzard <i>Kaupifalco monogrammicus</i>	F. African Jacana <i>Actophilornis africanus</i>
	
G. Splendid Starling <i>Lamprotornis splendidus</i>	H. Chestnut-breasted Nigrita <i>Nigrita nigrita bicolor</i>
Figure 3 Photographs of some of the bird species inventoried in the study area	

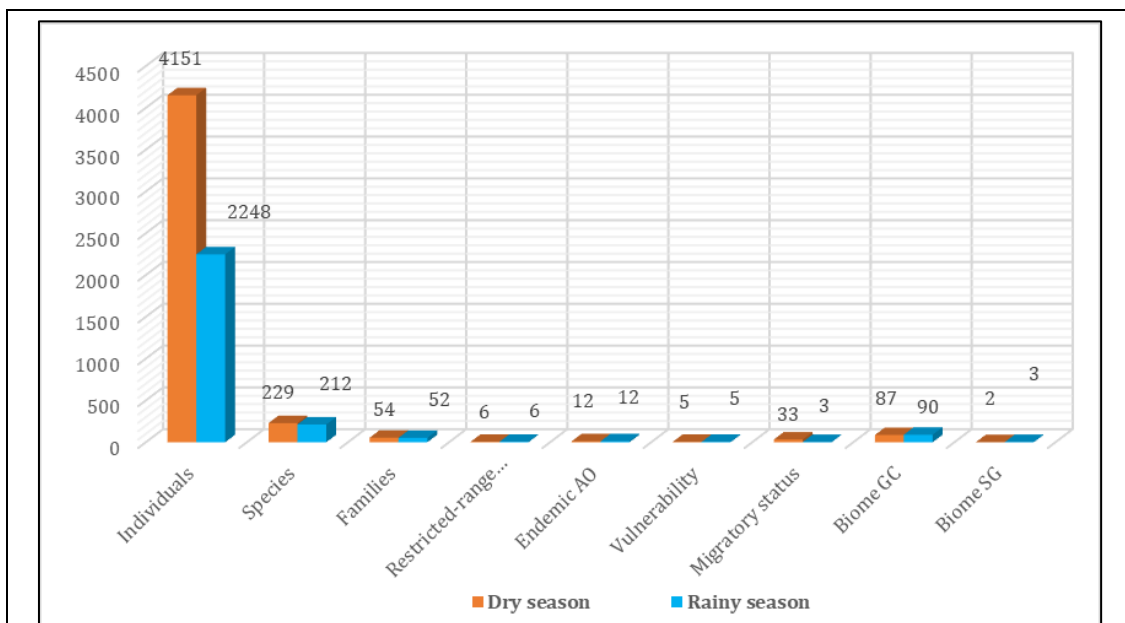


Figure 4 Overall distribution of avifauna data for the parameters assessed by season

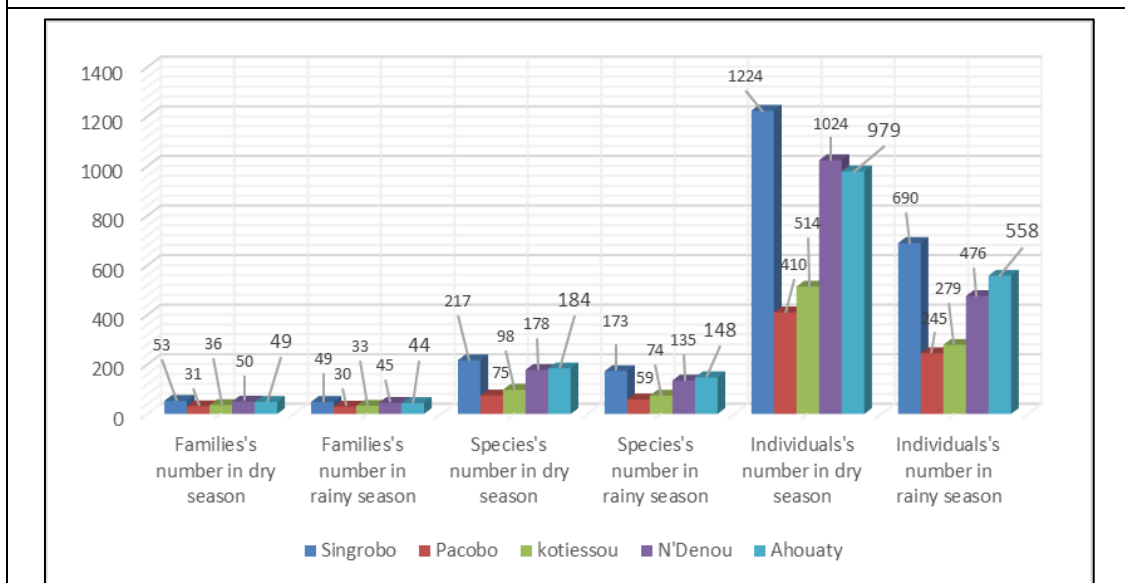


Figure 5 Distribution of bird populations by site and season

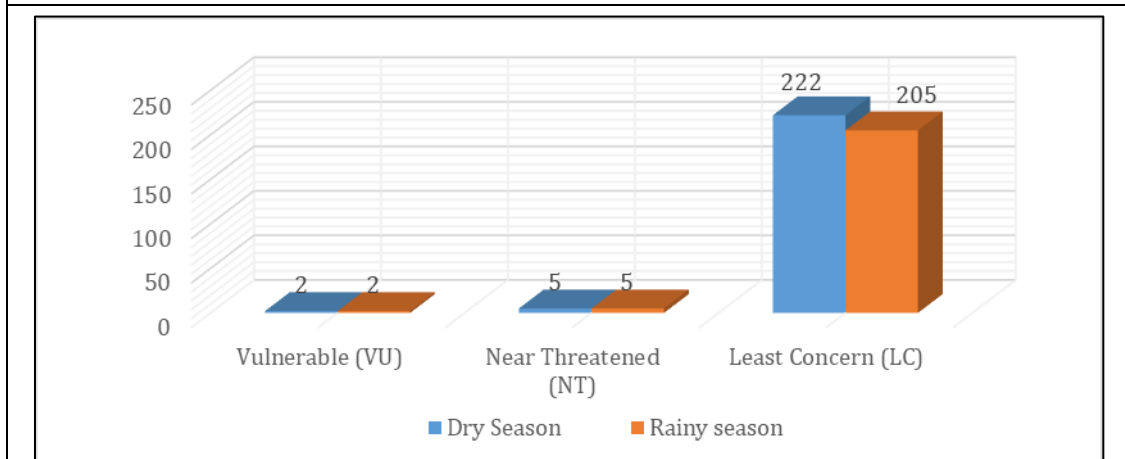


Figure 6 Comparison of bird vulnerability categories by season

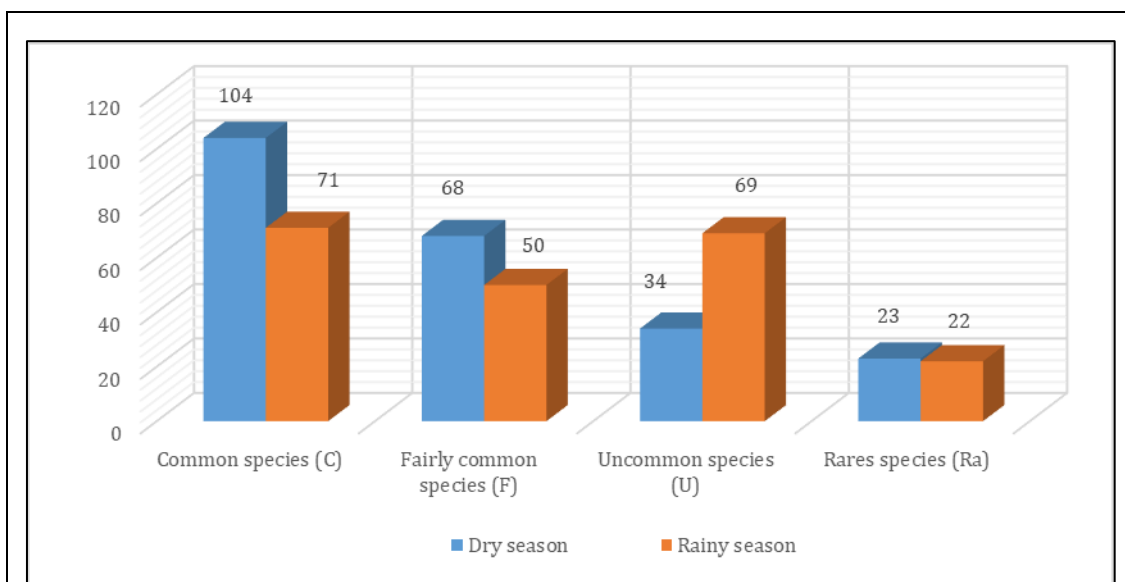


Figure 7 Comparison of bird population characteristics by season

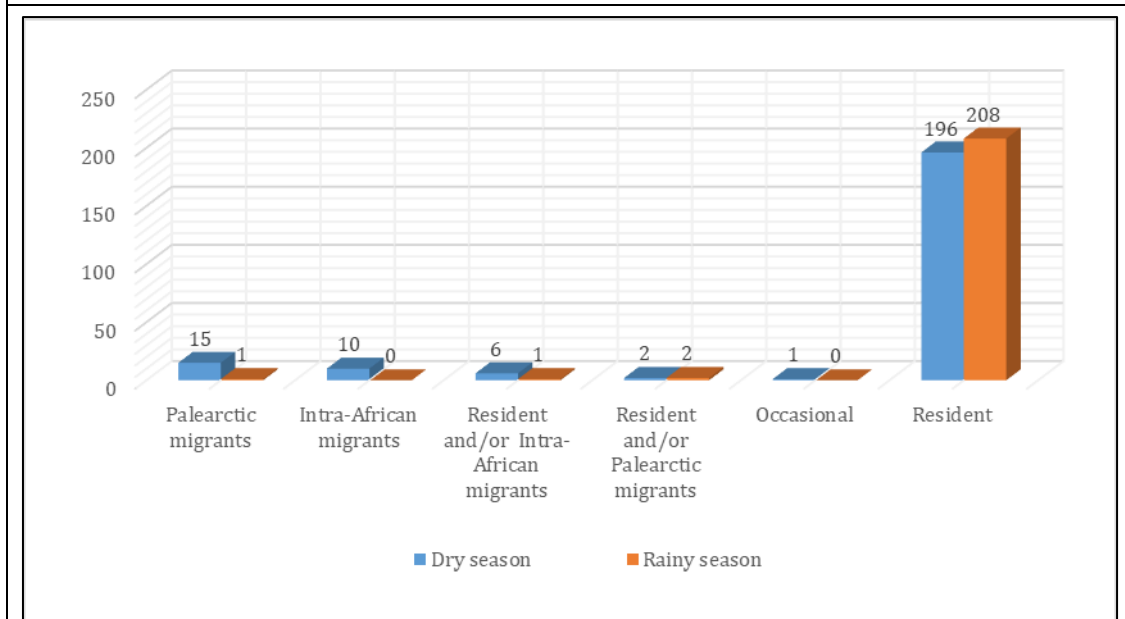


Figure 8 Comparison of biogeographical categories of birds according to season

Table 1 List, abundance and status of bird species observed in the study area during the two survey seasons

			Study sites: Dry season										Study sites: Rainy season											
NE	ORDERS/FAMILIES/SPECIES	English names	Si	Pa	Ko	Nd	Ah	Rs.	Fr. (%)	A b.		Si	Pa	Ko	Nd	Ah	Rs.	Fr. (%)	A b.	SC .	SB.	En d.	Bi o.	
	PODICIPEDIFORMES																							
	PODICIPEDIDAE (1)																							
1	<i>Tachybaptus ruficollis</i> (Pallas, 1764)	Little Grebe	5			8		13	0.31	F		3			4		7	0.31	U	LC	R			
	SULIFORMES																							
	PHALACROCORACIDAE (2)								-															
2	<i>Phalacrocorax carbo</i> (Linnaeus, 1758)	Great Cormorant						0	-			1					1	0.04	Ra	LC	R			
3	<i>Microcarbo africanus</i> (Gmelin, 1789)	Long-tailed Cormorant	2			3	2	7	0.17	F		2			1	2	5	0.22	U	LC	R			
	ANHINGIDAE (1)								-															
4	<i>Anhinga rufa</i> (Daudin, 1802)	African Darter	3			2	3	8	0.19	F		3				2	5	0.22	U	LC	R			
	PELICANIFORMES																							
	ARDEIDAE (13)								-															
5	<i>Ixobrychus sturmii</i> (Wagler, 1827)	Dwarf Bittern	2				2	4	0.10	U		2					2	0.09	U	LC	R			
6	<i>Gorsachius leuconotus</i> (Wagler, 1827)	White-backed Night Heron						0	-			2					2	0.09	U	LC	R			
7	<i>Tigriornis leucolopha</i> (Jardine, 1846)	White-crested Tiger-heron					1	1	0.02	Ra		1				1	2	0.09	U	LC	R		GC	
8	<i>Nycticorax nycticorax</i> (Linnaeus, 1758)	Black-crowned Night Heron						0	-	U		1					1	0.04	Ra	LC	R			
9	<i>Ardeola ralloides</i> (Scopoli, 1769)	Squacco Heron						0	-							1	1	0.04	Ra	LC	R/P			

10	<i>Bubulcus ibis</i> (Linnaeus, 1758)	Cattle Egret	17	15	24	35	14	105	2.53	F	5	3			8	0.36	F	LC	R/M		
11	<i>Butorides striata</i> (Linnaeus, 1758)	Green-backed Heron	1			2	1	4	0.10	U	1			1	2	0.09	U	LC	R		
12	<i>Egretta ardesiaca</i> Wagler, 1827	Black Heron	1			1		2	0.05	U				1	1	0.04	Ra	LC	R		
13	<i>Egretta gularis</i> (Bosc, 1792)	Western Reef'-egret	1					1	0.02	Ra	1				1	0.04	Ra	LC	R		
14	<i>Egretta garzetta</i> (Linnaeus, 1766)	Little Egret	4			12	5	21	0.51	C	2			3	4	9	0.40	F	LC	R	
15	<i>Egretta intermedia</i> (Wagler, 1829)	Aigrette intermédiaire				8		8	0.19	U				5		5	0.22	U	LC	R	
16	<i>Ardea purpurea</i> Linnaeus, 1766	Purple Heron						0	-					1	1	0.04	Ra	LC	R/P		
17	<i>Ardea cinerea</i> Linnaeus, 1758	Grey Heron	1			1		2	0.05	U					0	0.00		LC	R/P		
	THRESKIORNITHIDAE (2)								-												
18	<i>Bostrychia hagedash</i> (Latham, 1790)	Hadada ibis	2					2	0.05	Ra	2				2	0.09	U	LC	R		
19	<i>Bostrychia rara</i> (Rothschild, Hartert et Kleinschmidt, 1897)	Spot-breasted ibis						0	-			1			1	0.04	Ra	LC	R		GC
	ANSERIFORMES																				
	ANATIDAE (2)								-												
20	<i>Pteronetta hartlaubii</i> (Cassin, 1860)	Hartlaub's Duck	3					3	0.07	Ra	1				1	0.04	Ra	LC	R		
21	<i>Dendrocygna viduata</i> (Linnaeus, 1766)	White-faced Whistling-duck	5			8	12	25	0.60	F	3			4	5	12	0.53	C	LC	R	
	ACCIPITIFORMES																				
	PANDIONIDAE (1)								-												

22	<i>Pandion haliaetus</i> (Linnaeus, 1758)	Osprey	1			2	1	4	0.10	U						0	0.00		LC	P		
	ACCIPITRIDAE (14)								-													
23	<i>Aviceda cuculoides</i> Swainson, 1837	African Cuckoo-hawk	1			1		2	0.05	Ra	1					1	0.04	Ra	LC	R		
24	<i>Macheiramphus alcinus</i> (Bonaparte, 1850)	Bat Hawk						0	-		1					1	0.04	Ra	LC	R		
25	<i>Elanus caeruleus</i> (Desfontaines, 1789)	Black-winged Kite	1			1	1	3	0.07	U	1			1		2	0.09	U	LC	R		
26	<i>Milvus aegyptius</i> (Boddaert, 1783)	Yellow-billed kite	12	14	9	39	10	84	2.02	C						0	0.00		LC	M		
27	<i>Gypohierax angolensis</i> (Gmelin, 1788)	Palm-nut Vulture	2			2	1	5	0.12	F				1	1	2	0.09	U	LC	R		
28	<i>Circaetus cinereus</i> Vieillot, 1818	Brown-Snake-eagle						0	-					1		1	0.04	Ra	LC	R		
29	<i>Polyboroides typus</i> Smith, 1829	African Harrier-hawk	2	1		1	2	6	0.14	F	2			1	2	5	0.22	U	LC	R		
30	<i>Circus aeruginosus</i> (Linnaeus, 1758)	Western-Marsh-harrier	1			1	1	3	0.07	U	1			1	1	3	0.13	U	LC	P		
31	<i>Accipiter erythropus</i> (Hartlaub, 1855)	Red-legged Sparrowhawk						0	-						1	1	0.04	Ra	LC	R		GC
32	<i>Accipiter tachiro</i> (Daudin, 1800)	African Goshawk	1	1		2	1	5	0.12	F	1			2		3	0.13	U	LC	R		
33	<i>Accipiter badius</i> (Gmelin, 1788)	Shikra	2	2	2	2	2	10	0.24	F	2			2	2	6	0.27	F	LC	R		
34	<i>Accipiter melanoleucus</i> (Smith, 1830)	Black Sparrowhawk	1					1	0.02	Ra	1					1	0.04	Ra	LC	R		
35	<i>Kaupifalco monogrammicus</i> (Temminck, 1824)	Lizard Buzzard	3	2	2	1	2	10	0.24	C	1	2	1	1	2	7	0.31	F	LC	R		
36	<i>Buteo auguralis</i> Salvadori, 1865	Red-necked Buzzard	2	2	1	3	2	10	0.24	F						0	0.00		LC	R/ M		

	FALCONIFORMES																					
	FALCONIDAE (4)							-														
37	<i>Falco ardosiaceus</i> Vieillot, 1823	Grey Kestrel	3	2	1	2	1	9	0.22	F	1	1	1		1	4	0.18	U	LC	R		
38	<i>Falco cuvierii</i> Smith, 1830	African Hobby	2	3	2	2	2	11	0.26	F	2	1	2	1	2	8	0.36	F	LC	R		
39	<i>Falco biarmicus</i> Temminck, 1825	Lanner Falcon	2	2	1	2	2	9	0.22	F	2	1	1	1		5	0.22	U	LC	R		
40	<i>Falco peregrinus</i> Tunstall, 1771	Peregrine Falcon	2				2	4	0.10	U						0	0.00		LC	R/P		
	GALLIFORMES																					
	PHASIANIDAE (4)							-														
41	<i>Peliperdix lathamii</i> (Hartlaub, 1854)	Forest Francolin	3			3	2	8	0.19	F	3			3	2	8	0.36	F	LC	R		GC
42	<i>Campocolinus albogularis</i> (Hartlaub, 1861)	White-throated Francolin						0	-						2	2	0.09	U	LC	R		
43	<i>Pternistis ahantensis</i> (Temminck, 1854)	Ahanta Spurfowl	2			3	2	7	0.17	F	2			3	2	7	0.31	F	LC	R		GC
44	<i>Pternistis bicalcaratus</i> (Linnaeus, 1766)	Double-spurred Spurfowl	6	8	5	5	3	27	0.65	C	4	3	3	5	3	18	0.80	C	LC	R		
	NUMIDIDAE (1)							-														
45	<i>Guttera pucherani</i> (Hartlaub, 1861)	Eastern Crested Guinea fowl					4	4	0.10	U					4	4	0.18	U	LC	R		
	GRUIFORMES																					
	RALLIDAE (2)							-														
46	<i>Himantornis haematopus</i> Hartlaub, 1855	Nkulengu Rail	2		5	1	3	11	0.26	C	2		3	1	3	9	0.40	F	LC	R		GC
47	<i>Zapornia flavirostra</i> (Swainson, 1837)	Black Crane	2			3	1	6	0.14	F				3	1	4	0.18	U	LC	R		
	SAROTHRURIDAE (1)																					

48	<i>Sarothrura pulchra</i> (Gray, 1829)	White-spotted Flufftail	3			2	2	7	0.17	F	3				2	5	0.22	U	LC	R		GC
	HELIORNITHIDAE (1)								-													
49	<i>Podica senegalensis</i> (Vieillot, 1817)	African Finfoot	3			5	2	10	0.24	F	3			3	2	8	0.36	F	LC	R		
	CHARADRIIFORMES																					
	JACANIDAE (2)								-													
50	<i>Actophilornis africanus</i> (Gmelin, 1789)	African Jacana	9	3	3	8	4	27	0.65	C	5	3	2	8	4	22	0.98	C	LC	R		
51	<i>Microparra capensis</i> (Smith, 1839)	Lesser Jacana	3	2		5		10	0.24	F						0	0.00		LC	M		
	BURHINIDAE (1)								-													
52	<i>Burhinus senegalensis</i> (Swainson, 1837)	Senegal Thick-knee	3			2	2	7	0.17	F	3			2		5	0.22	U	LC	R		
	CHARADRIIDAE (3)								-													
53	<i>Pluvialis fulva</i> (Gmelin, JF, 1789)	Pacific Golden Plover	2			3		5	0.12	U						0	0.00		LC	O		
54	<i>Vanellus albiceps</i> Gould, 1834	White-crowned Lapwing	2		3	2	2	9	0.22	F	2		3		2	7	0.31	F	LC	R		
55	<i>Vanellus spinosus</i> (Linnaeus, 1758)	Spur-winged Lapwing	4			3	2	9	0.22	F						0	0.00		LC	M		
	SCOLOPACIDAE (4)								-													
56	<i>Numenius phaeopus</i> (Linnaeus, 1758)	Whimbrel	5		2	2	3	12	0.29	F						0	0.00		LC	P		
57	<i>Tringa nebularia</i> (Gunnerus, 1767)	Common Greenshank	3			3		6	0.14	U						0	0.00		LC	P		
58	<i>Tringa ochropus</i> Linnaeus, 1758	Green sandpiper	2			3		5	0.12	U						0	0.00		LC	P		
59	<i>Actitis hypoleucos</i> Linnaeus, 1758	Common sandpiper	3			4	5	12	0.29	C						0	0.00		LC	P		

	COLUMBIFORMES																						
	COLUMBIDAE (8)							-															
60	<i>Treron calvus</i> (Temminck, 1811)	African Green-pigeon	10	5	4	9	14	42	1.01	C		25	5	11	9	14	64	2.85	C	LC	R		
61	<i>Turtur brehmeri</i> (Hartlaub, 1811)	Blue-headed Wood-dove	3	1	2	4	5	15	0.36	C		3		2	2	5	12	0.53	C	LC	R		GC
62	<i>Turtur tympanistria</i> (Temminck, 1809)	Tambourine Dove	3	2	1	2	4	12	0.29	C		3	2	1	2	1	9	0.40	F	LC	R		
63	<i>Turtur afer</i> (Linnaeus, 1766)	Blue-spotted Wood-dove	29	12	19	38	25	123	2.96	C		14	8	8	4	5	39	1.73	C	LC	R		
64	<i>Columba iriditorques</i> Cassin, 1856	Western Bronze-naped Pigeon	1	1		2	1	5	0.12	F		1	1			1	3	0.13	U	LC	R		GC
65	<i>Columba uncinata</i> Cassin, 1860	Afep Pigeon	1				1	2	0.05	Ra		1				1	2	0.09	U	LC	R		GC
66	<i>Streptopelia semitorquata</i> (Rüppell, 1837)	Red-eyed Dove	38	21	24	52	28	163	3.93	C		18	10	8	15	20	71	3.16	C	LC	R		
67	<i>Streptopelia senegalensis</i> (Linnaeus, 1766)	Tourterelle maillée	19	8	22	36	19	104	2.51	C		11	10	10	8	15	54	2.40	C	LC	R		
	PSITTACIFORMES																						
	PSITTACIDAE (4)							-															
68	<i>Psittacus timneh</i> Fraser, 1844	Timneh Parrot				2		2	0.05	Ra					2		2	0.09	U	E N	R		
69	<i>Poicephalus senegalus</i> (Linnaeus, 1766)	Senegal Parrot						0	-				2				2	0.09	U	LC	R		SG
70	<i>Agapornis swindernianus</i> (Scopoli, 1769)	Rose-ringed Parakeet						0	-					2			2	0.09	U	LC	R		GC
71	<i>Poicephalus gularis</i> (Jardine, 1849)	Perroquet à calotte rouge	2			2	3	7	0.17	F					2		2	0.09	U	LC	R		
	MUSOPHAGIFORMES																						
	MUSOPHAGIDAE (4)							-															

72	<i>Corythaeola cristata</i> (Vieillot, 1816)	Great-blue Turaco	3		2	4	3	12	0.29	F			2			2	0.09	U	LC	R		
73	<i>Tauraco persa</i> (Linnaeus, 1758)	Green Turaco	3		5	6	5	19	0.46	C	3	5	2	3	5	18	0.80	C	LC	R		GC
74	<i>Tauraco macrorhynchus</i> (Fraser, 1839)	Yellow-billed Turaco	3	2	4	9	3	21	0.51	C		2		3	4	9	0.40	F	LC	R		GC
75	<i>Crinifer piscator</i> (Boddaert, 1783)	Western Plantain-eater	12	8	5	14	10	49	1.18	C	11	5	3	4	2	25	1.11	C	LC	R		
	CUCULIFORMES																					
	CUCULIDAE (13)								-													
76	<i>Clamator jacobinus</i> (Boddaert, 1783)	Jacobin Cuckoo	2		2	1	2	7	0.17	F						0	0.00		LC	M		
77	<i>Clamator levaillantii</i> (Swainson, 1829)	Levaillant’s Cuckoo	3			3	4	10	0.24	F						0	0.00		LC	M		
78	<i>Cuculus solitarius</i> Stephens, 1815	Red-chested Cuckoo	2			1	3	6	0.14	F						0	0.00		LC	M		
79	<i>Cuculus gularis</i> Stephens, 1815	African Cuckoo	1				2	3	0.07	U						0	0.00		LC	M		
80	<i>Cercococcyx olivinus</i> Sassi, 1912	Olive Long-tailed Cuckoo	2			1	2	5	0.12	F				1	2	3	0.13	U	LC	R		GC
81	<i>Cercococcyx mechowi</i> Cabanis, 1882	Dusky Long-tailed Cuckoo	1				2	3	0.07	Ra					2	2	0.09	U	LC	R		GC
82	<i>Chrysococcyx cupreus</i> (Shaw, 1792)	African Emerald Cuckoo	2		1	2	3	8	0.19	C	2		1		1	4	0.18	U	LC	R		
83	<i>Chrysococcyx klaas</i> (Stephens, 1815)	Klaas’s Cuckoo	3	1	2	2	3	11	0.26	C						0	0.00		LC	R/M		
84	<i>Chrysococcyx caprius</i> (Boddaert, 1783)	Diederik Cockcoo	5	2	3	5	6	21	0.51	C						0	0.00		LC	R/M		
85	<i>Ceuthmochares aereus</i> (Vieillot, 1817)	Chattering Yellowbill	5	3	2	4	3	17	0.41	C	3	1	2	3	1	10	0.44	C	LC	R		

86	<i>Centropus leucogaster</i> (Leach, 1814)	Black-throated coucal	2			1	2	5	0.12	C		5	2		1	2	10	0.44	C	LC	R		GC
87	<i>Centropus grillii</i> Hartlaub, 1861	Black Coucal	1	2		1	3	7	0.17	F							0	0.00		LC	M/R		
88	<i>Centropus senegalensis</i> (Linnaeus, 1766)	Senegal Coucal	3	2	2	5	3	15	0.36	C		3	2	2	3	1	11	0.49	C	LC	R		
	STRIGIFORMES																						
	TYTONIDAE (1)								-														
89	<i>Tyto alba</i> (Scopoli, 1769)	Common Barn-owl	2				1	3	0.07	U		2					2	0.09	U	LC	R		
	STRIGIDAE (2)								-														
90	<i>Bubo poensis</i> Fraser, 1854	Fraser's Eagle-owl	2			1	1	4	0.10	U		2					2	0.09	U	LC	R		GC
91	<i>Strix woodfordii</i> (Smith, 1834)	African Wood-owl	2			3	1	6	0.14	F		2			1	1	4	0.18	U	LC	R		
	CAPRIMULGIFORMES																						
	CAPRIMULGIDAE (2)								-														
92	<i>Veles binotatus</i> (Bonaparte, 1850)	Brown Nightjar	2					2	0.05	Ra		2					2	0.09	U	LC	R		GC
93	<i>Caprimulgus climacurus</i> Vieillot, 1824	Long-tailed Nightjar	2			2	3	7	0.17	F							0	0.00		LC	R/M		
	APODIDAE (6)								-														
94	<i>Rhaphidura sabini</i> (Gray, JE, 1829)	Sabine's Spinetail	22			12	14	48	1.16	C		11			12	16	39	1.73	C	LC	R		GC
95	<i>Telacanthura melanopygia</i> (Chapin, 1915)	Black Spinetail	10	15				25	0.60	C		10	25				35	1.56	C	LC	R		GC
96	<i>Telacanthura ussheri</i> (Sharpe, 1870)	Mottled Spinetail	15		11		24	50	1.20	C		28		11		11	50	2.22	C	LC	R		
97	<i>Cypsiurus parvus</i> (Lichtenstein, 1823)	African Palm Swift	13	10		18	25	66	1.59	C		13	15		18	10	56	2.49	C	LC	R		
98	<i>Apus apus</i> (Linnaeus, 1758)	Common Swift	18	8	12	31	18	87	2.10	C							0	0.00		LC	P		

99	<i>Apus affinis</i> (Gray, 1830)	Little Swift	25			21	36	82	1.98	C	8			21	12	41	1.82	C	LC	R		
	TROGONIFORMES																					
	TROGONIDAE (1)								-													
100	<i>Apaloderma narina</i> (Stephens, 1815)	Narina Trogon	2					2	0.05	Ra	1					1	0.04	R	LC	R		
	CORACIIFORMES																					
	ALCEDINIDAE (9)								-													
101	<i>Halcyon leucocephala</i> (Müller, 1776)	Grey-headed Kingfisher	1			2	1	4	0.10	U						0	0.00		LC	M		
102	<i>Halcyon malimbica</i> (Shaw, 1812)	Blue-breasted Kingfisher	2			1		3	0.07	U	2	2		1	2	7	0.31	F	LC	R		
103	<i>Halcyon senegalensis</i> (Linnaeus, 1766)	Woodland Kingfisher	3	1	2	2	3	11	0.26	C	2	1	2	2	3	10	0.44	C	LC	R		
104	<i>Ispidina lecontei</i> Cassin, 1856	African Dwarf-kingfisher						0	-		1					1	0.04	Ra	LC	R		
105	<i>Ispidina picta</i> (Boddaert, 1783)	African Pygmy-kingfisher	4	2	3	2	2	13	0.31	C	1		3	1	2	7	0.31	F	LC	R		
106	<i>Corythornis leucogaster</i> (Fraser, 1843)	White-bellied Kingfisher	2			1	2	5	0.12	F	2			1		3	0.13	U	LC	R		GC
107	<i>Corythornis cristatus</i> (Pallas, 1764)	Malachite Kingfisher	2			1		3	0.07	U				1		1	0.04	Ra	LC	R		
108	<i>Megaceryle maxima</i> (Pallas, 1769)	Giant Kingfisher	2				1	3	0.07	U	2				1	3	0.13	U	LC	R		
109	<i>Ceryle rudis</i> (Linnaeus, 1758)	Pied Kingfisher	3			1	2	6	0.14	F	5			2	4	11	0.49	C	LC	R		
	MEROPIDAE (3)								-													
110	<i>Merops gularis</i> Shaw, 1789	Black Bee-eater	2			1	1	4	0.10	C				1	1	2	0.09	U	LC	R		GC
111	<i>Merops pusillus</i> Müller, 1776	Little Bee-eater	14	14	10	25	17	80	1.93	C	3	5	2		7	17	0.76	C	LC	R		
112	<i>Merops albicollis</i> (Vieillot, 1817)	White-throated Bee-eater	22	20	28	32	21	123	2.96	C						0	0.00		LC	M		
	CORACIIDAE (3)								-													

113	<i>Coracias cyanogaster</i> Cuvier, 1816	Blue-bellied Roller	1	8		2	3	14	0.34	F		1	3		4	3	11	0.49	C	LC	R		SG
114	<i>Eurystomus gularis</i> (Vieillot, 1819)	Blue-throated Roller	2	1	2	2		7	0.17	F			1	1	2		4	0.18	U	LC	R		GC
115	<i>Eurystomus glaucurus</i> (Müller, 1776)	Broad-billed Roller	12	3	1	3	2	21	0.51	C		2					2	0.09	U	LC	R/M		
	BUCEROTIFORMES																						
	BUCEROTIDAE (4)								-														
116	<i>Horizocerus albocristatus</i> (Cassin, 1848)	Western Long-tailed Hornbill	2				2	4	0.10	C		2				2	4	0.18	U	LC	R		GC
117	<i>Lophoceros semifasciatus</i> (Hartlaub, 1855)	West African Pied Hornbill	25	5	5	10	14	59	1.42	C		5	10	8	3	10	36	1.60	C	LC	R		GC
118	<i>Lophoceros nasutus</i> (Linnaeus, 1766)	African Grey Hornbill	28		20	14	17	79	1.90	C				2	3	2	7	0.31	F	LC	R		
119	<i>Bycanistes fistulator</i> (Cassin, 1852)	Western Piping Hornbill	21	17	12	10	13	73	1.76	C		14				10	24	1.07	C	LC	R		GC
	PICIFORMES																						
	LYBIIDAE (9)								-														
120	<i>Gymnobucco peli</i> Hartlaub, 1857	Bristle-nosed Barbet	3				2	5	0.12	F						2	2	0.09	U	LC	R		GC
121	<i>Gymnobucco calvus</i> (Lafresnaye, 1841)	Naked-faced Barbet	11			5		16	0.39	C		11			5		16	0.71	C	LC	R		GC
122	<i>Pogoniulus scolopaceus</i> (Bonaparte, 1850)	Speckled Tinkerbird	6			5	4	15	0.36	C		5			5	4	14	0.62	C	LC	R		GC
123	<i>Pogoniulus atroflavus</i> (Sparrman, 1798)	Red-rumped Tinkerbird	2			2	43	47	1.13	C		2			2	1	5	0.22	F	LC	R		GC
124	<i>Pogoniulus subsulphureus</i> (Fraser, 1843)	Yellow-throated Tinkerbird	2			3	2	7	0.17	C		2			3	2	7	0.31	F	LC	R		GC
125	<i>Buccanodon duchaillui</i> (Cassin, 1855)	Eastern Yellow-spotted Barbet	3			3	2	8	0.19	F		3			3	2	8	0.36	F	LC	R		GC

126	<i>Tricholaema hirsuta</i> (Swainson, 1821)	Hairy-breasted Barbet	2		2	1	2	7	0.17	F	2		2	1	2	7	0.31	F	LC	R		GC
127	<i>Lybius vieilloti</i> (Leach, 1815)	Vieillot's Barbet	6	2	5	3	4	20	0.48	Ra	8	2	3	3	5	21	0.93	C	LC	R		
128	<i>Trachyphonus purpuratus</i> (Verreaux & Verreaux, 1851)	Eastern Yellow-billed Barbet	3			1	2	6	0.14	F	3			1		4	0.18	U	LC	R		GC
	INDICATORIDAE (3)								-													
129	<i>Prodotiscus insignis</i> (Cassin, 1856)	Cassin's Honeybird	2					2	0.05	Ra	1					1	0.04	Ra	LC	R		GC
130	<i>Melignomon eisentrauti</i> Louette, 1981	Yellow-footed Honeguide	2				3	5	0.12	U	2			1	3	6	0.27	F	N T	R	AO	GC
131	<i>Indicator maculatus</i> Gray, 1847	Spotted Honeguide	2			2		4	0.10	U	1			2		3	0.13	U	LC	R		GC
	PICIDAE (2)								-													
132	<i>Campethera maculosa</i> (Valenciennes, 1826)	Pic barré					5	5	0.12	U					3	3	0.13	U	LC	R		GC
133	<i>Chloropicus pyrrhogaster</i> (Malhebe, 1824)	Fire-bellied Woodpecker	3			5	8	16	0.39	C	3			4	8	15	0.67	C	LC	R		GC
	PASSERIFORMES																					
	HIRUNDINIDAE (7)								-													
134	<i>Cecropis senegalensis</i> (Linnaeus, 1766)	Mosque Swallow	5					5	0.12	F	22					22	0.98	C	LC	R		
135	<i>Cecropis abyssinica</i> (Guérin-Meneville, 1843)	Lesser Striped Swallow	21				12	33	0.79	C	15				12	27	1.20	C	LC	R		
136	<i>Cecropis daurica</i> (Laxmann, 1769)	Red-rumped Swallow	12				5	17	0.41	C	8					8	0.36	F	LC	R		
137	<i>Hirundo nigrita</i> , Gray, 1845	White-bibbed Swallow	3		10	5		18	0.43	C	3		5	6		14	0.62	C	LC	R		GC
138	<i>Hirundo lucida</i> Hartlaub, 1858	Red-chested Swallow	25			15		40	0.96	C	18			10		28	1.25	C	LC	R		
139	<i>Hirundo rustica</i> (Linnaeus, 1758)	Barn Swallow	18		10	22	11	61	1.47	C						0	0.00		LC	P		

140	<i>Delichon urbicum</i> (Linnaeus, 1758)	Northern House Martin	15					15	0.36	F						0	0.00		LC	P		
	MOTACILLIDAE (3)								-													
141	<i>Motacilla flava</i> Linnaeus, 1758	Western Yellow Wagtail	3			6		9	0.22	U						0	0.00		LC	P		
142	<i>Motacilla aguimp</i> Dumont, 1821	African Pied Wagtail	3					3	0.07	F	5					5	0.22	F	LC	R		
143	<i>Anthus leucophrys</i> Vieillot, 1818	Plain-backed Pipit	7			5	3	15	0.36	C	3			21	3	27	1.20	C	LC	R		
	PYCNONOTIDAE (13)								-													
144	<i>Eurillas virens</i> (Cassin, 1858)	Little Greenbul	8	3	5	8	10	34	0.82	C	6	3	2	6	7	24	1.07	C	LC	R		
145	<i>Eurillas gracilis</i> (Cabanis, 1880)	Grey Greenbul	3			4	3	10	0.24	C	1			1	2	4	0.18		LC	R		GC
146	<i>Eurillas ansorgei</i> (Hartert, 1907)	Ansorge's Greenbul	2				6	8	0.19	U	2				3	5	0.22	U	LC	R		GC
147	<i>Stelgidillas gracilirostris</i> (Strickland, 1844)	Slender-billed Greenbul	8			3	3	14	0.34	C	3			3	2	8	0.36	F	LC	R		
148	<i>Eurillas latirostris</i> (Strickland, 1844)	Yellow-whiskered Greenbul	3		2	4	3	12	0.29	C	1		2	1	3	7	0.31	F	LC	R		
149	<i>Calyptocichla serinus</i> (Verreaux & Verreaux, 1855)	Golden Greenbul	3			2	2	7	0.17	U	2			2	2	6	0.27	F	LC	R		GC
150	<i>Baeopogon indicator</i> (Verreaux & Verreaux, 1855)	Honeyguide Greenbul	2			2	3	7	0.17	F	4			2		6	0.27	F	LC	R		GC
151	<i>Thescelocichla leucopleura</i> (Cassin, 1856)	Swamp Palm Bulbul	3			5	3	11	0.26	C	2			5		7	0.31	F	LC	R		GC
152	<i>Pyrrhurus scandens</i> Swainson, 1837	Leaf-love	3			4	5	12	0.29	F	3				5	8	0.36	F	LC	R		GC
153	<i>Bleda eximius</i> (Hartlaub, 1855)	Green-tailed Bristlebill	2			2	3	7	0.17	C	2				3	5	0.22	F	N T	R	AO	GC

154	<i>Bleda canicapillus</i> (Hartlaub, 1854)	Grey-headed Bristlebill	6			7	2	15	0.36	C		6			7	2	15	0.67	C	LC	R		GC
155	<i>Criniger olivaceus</i> (Swainson, 1837)	Yellow-beardeb Greenbul	2					2	0.05	Ra		1					1	0.04	Ra	V U	R	AO	GC
156	<i>Pycnonotus barbatus</i> (Desfontaine, 1789)	Common Bulbul	22			14	9	45	1.08	C		22	10	8	5	9	54	2.40	C	LC	R		
	NICATORIDAE (1)																						
157	<i>Nicator chloris</i> (Valenciennes, 1826)	Western nicator	2		2	3	4	11	0.26	C		2			3	4	9	0.40	F	LC	R		GC
	TURDIDAE (2)								-														
158	<i>Neocossyphus poensis</i> (Strickland, 1844)	White-tailed Ant-thrush	3			4		7	0.17	F		2			1		3	0.13	U	LC	R		GC
159	<i>Stizorhina finschi</i> (Sharpe, 1870)	Finsch's Flycatcher-thrush	2					2	0.05	Ra		1					1	0.04	Ra	LC	R		
	ACROCEPHALIDAE (3)																						
160	<i>Acrocephalus schoenobaenus</i> (Linnaeus, 1758)	Sedge Warbler	10		3		8	21	0.51	C							0	0.00		LC	P		
161	<i>Acrocephalus scirpaceus</i> (Hermann, 1804)	Common Reed-warbler	11	10		7		28	0.67	C							0	0.00		LC	P		
162	<i>Acrocephalus arundinaceus</i> (Temminck & Schlegel, 1847)	Great Reed-warbler	8		5	5		18	0.43	C							0	0.00		LC	P		
	CISTICOLIDAE (9)																						
163	<i>Bathmocercus cerviniventris</i> Sharpe, 1877	Black-headed Rufous Warbler	4			3	5	12	0.29	F		6			2		8	0.36	F	N T	R	AO	GC
164	<i>Cisticola lateralis</i> (Fraser, 1843)	Whistling Cisticola	5	21		14	5	45	1.08	C		5	10		5	7	27	1.20	C	LC	R		
165	<i>Cisticola galactotes</i> (Temminck, 1821)	Rufous-winged Cisticola	8		5	21	4	38	0.92	C		5		5	3	4	17	0.76	C	LC	R		
166	<i>Cisticola brachypterus</i> (Sharpe, 1870)	Short-winged Cisticola	7				3	10	0.24	F		3				3	6	0.27	F	LC	R		

167	<i>Prinia subflava</i> (Gmelin, 1789)	Tawny-flanked Prinia	8		4	5	2	19	0.46	C		3		4	2	2	11	0.49	C		LC	R		
168	<i>Apalis sharpii</i> Shelley, 1884	Sharpe's Apalis	3		3	2	1	9	0.22	C		1			2	1	4	0.18	U		LC	R	AO	GC
169	<i>Camaroptera brachyura</i> (Vieillot, 1820)	Bleating Camaroptera	5	5	3	3	4	20	0.48	C		1	2	3	1	4	11	0.49	C		LC	R		
170	<i>Camaroptera superciliaris</i> (Fraser, 1843)	Yellow-browed Camaroptera	3			2		5	0.12	U		2			2		4	0.18	U		LC	R		GC
171	<i>Camaroptera chloronota</i> Reichenow, 1895	Olive-green Camaroptera	5		2	6	6	19	0.46	C		2		2	3		7	0.31	F		LC	R		GC
	MACROSPHENIDAE (1)																							
172	<i>Sylvietta virens</i> Cassin, 1859	Green Crombec	8				7	15	0.36	F		5				7	12	0.53	C		LC	R		GC
	SYLVIIDAE (1)																							
173	<i>Sylvia borin</i> (Boddaert, 1783)	Garden Warbler	6		2		5	13	0.31	F							0	0.00			LC	P		
	SCOTOCERCIDAE (1)																							
174	<i>Hylia prasina</i> (Cassin, 1855)	Green Hylia	11	3	3	8	5	30	0.72	C		5	1	2	5	4	17	0.76	C		LC	R		GC
	MUSCICAPIDAE (10)								-															
175	<i>Stiphrornis erythrothorax</i> Hartlaub, 1855	Orange-breasted Forest-robin	3			1	2	6	0.14	F		1			1		2	0.09	U		LC	R		GC
176	<i>Alethe diademata</i> (Bonaparte, 1850)	White-tailed Alethe	2			3	1	6	0.14	C		1			1	1	3	0.13	U		LC	R		GC
177	<i>Fraseria ocreata</i> (Strickland, 1844)	African Forest -flycatcher	5		4			9	0.22	F		3		4			7	0.31	F		LC	R		GC
178	<i>Melaenornis pallidus</i> Müller, 1851	Pale Flycatcher				2	8	10	0.24	U					2	2	4	0.18	U		LC	R		
179	<i>Muscicapa striata</i> (Pallas, 1764)	Spotted Flycatcher	5		3	2	3	13	0.31	C		2		3	1	3	9	0.40	F		LC	R		
180	<i>Fraseria caerulescens</i> Hartlaub, 1865	Ashy Flycatcher	8	3	4	3	6	24	0.58	C		2	1	2	3	3	11	0.49	C		LC	R		

181	<i>Muscicapa cassini</i> Heine, 1859	Cassin's Flycatcher	3	3	5	2	3	16	0.39	C			3	2	2	3	10	0.44	C		LC	R		GC
182	<i>Fraseria olivascens</i> (Cassin, 1859)	Olivaceous Flycatcher	2			5	4	11	0.26	F		2			5	4	11	0.49	C		LC	R		GC
183	<i>Artomyias ussheri</i> (Sharpe, 1871)	Ussher's Flycatcher	8	2	6	5	5	26	0.63	C		3	1	2	5	5	16	0.71	C		LC	R	AO	GC
184	<i>Ficedula hypoleuca</i> (Pallas, 1764)	European Pied Flycatcher	9	3	3	8	2	25	0.60	C							0	0.00			LC	P		
	MONARCHIDAE (1)								-															
185	<i>Terpsiphone rufiventer</i> (Swainson, 1837)	Red-bellied Paradise-Flycatcher	2	1	2	1	2	8	0.19	C		2	1	2	1	2	8	0.36	F		LC	R		GC
	PLATYSTEIRIDAE (3)								-															
186	<i>Dyaphorophya castanea</i> Fraser, 1843	Chestnut Wattle-eye	5	8	6	3	4	26	0.63	C				6	3	4	13	0.58	C		LC	R		GC
187	<i>Dyaphorophya concreta</i> Hartlaub, 1855	Rufous-bellied Wattle-eye	3	2	4	2	4	15	0.36	C		3	2	4	2	3	14	0.62	C		LC	R		
188	<i>Platysteira cyanea</i> (Müller, 1776)	Brown-throated Wattle-eye	5	3	3	2	3	16	0.39	C			3	2	2	2	9	0.40	F		LC	R		
	PELLORNEIDAE (3)								-															
189	<i>Illadopsis cleaveri</i> (Shelley, 1874)	Black-capped Illadopsis	1			2		3	0.07	U		1					1	0.04	Ra		LC	R	AO	GC
190	<i>Illadopsis rufescens</i> (Reichenow, 1878)	Rufous-winged Illadopsis					1	1	0.02	Ra						2	2	0.09	U		N T	R	AO	GC
191	<i>Illadopsis fulvescens</i> (Cassin, 1859)	Brown Illadopsis	3	5	3	5	3	19	0.46	C			5		5	2	12	0.53	C		LC	R		GC
	NECTARINIIDAE (11)								-															
192	<i>Anthreptes gabonicus</i> (Hartlaub, 1861)	Mouse-brown Sunbird	4		1	3	2	10	0.24	F		2		1		2	5	0.22	F		LC	R		GC
193	<i>Anthreptes rectirostris</i> (Shaw, 1811)	Yellow-chinned Sunbird	2	1	2	3	1	9	0.22	C		2		2	2	1	7	0.31	F		LC	R		GC

194	<i>Deleornis fraseri</i> (Jardine & Selby, 1843)	Fraser's Sunbird	4		2	3	2	11	0.26	C				2	3	2	7	0.31	F		LC	R		GC
195	<i>Cyanomitra verticalis</i> (Latham, 1790)	Green-headed Sunbird	3		2		3	8	0.19	F				1		1	2	0.09	U		LC	R		
196	<i>Cyanomitra olivacea</i> (Smith, 1840)	Olive Sunbird	3	2	1	4	5	15	0.36	C		2		1	3	5	11	0.49	C		LC	R		
197	<i>Chalcomitra adelberti</i> (Gervais, 1834)	Buff-throated Sunbird	4	1	2	2	8	17	0.41	C		2	1		2	8	13	0.58	C		LC	R	AO	GC
198	<i>Hedydipna collaris</i> (Vieillot, 1819)	Collared Sunbird	5	2	1	5	5	18	0.43	C		1	2		3	1	7	0.31	F		LC	R		
199	<i>Cinnyris chloropygius</i> (Jardine, 1842)	Olive-billed Sunbird	2	1	2	3	2	10	0.24	C		5	3	2	4	2	16	0.71	C		LC	R		
200	<i>Cinnyris johannae</i> (Verreaux & Verreaux, 1855)	Johanna's Sunbird	4					4	0.10	U		2					2	0.09	Ra		LC	R		GC
201	<i>Cinnyris superbus</i> (Shaw, 1811)	Superb Sunbird	3		2	3	4	12	0.29	C		3		2	3	4	12	0.53	C		LC	R		GC
202	<i>Cinnyris cupreus</i> (Shaw, 1811)	Copper Sunbird	2				3	5	0.12	U		1				3	4	0.18	U		LC	R		
	LANIIDAE (1)								-															
203	<i>Lanius collaris</i> Linnaeus, 1766	Common fiscal	3		5	2		10	0.24	F		3		8	2		13	0.58	U		LC	R		
	MALACONOTIDAE (2)								-															
204	<i>Tchagra senegalus</i> (Linnaeus, 1766)	Black-crowned Tchagra	6	2	3	5	2	18	0.43	C		2			2	2	6	0.27	F		LC	R		
205	<i>Laniarius barbarus</i> (Linnaeus, 1766)	Yellow-crowned Gonolek	2					2	0.05	Ra		1					1	0.04	Ra		LC	R	AO	
	VANGIDAE (2)								-															
206	<i>Prionops plumatus</i> (Shaw, 1809)	White-crested Helmetshikre	5	6	3	4	3	21	0.51	C			6	4	4	3	17	0.76	C		LC	R		

207	<i>Prionops caniceps</i> (Bonaparte, 1850)	Red-billed Helmetshrike					2	2	0.05	Ra					2	2	0.09	U	LC	R		
	ORIOLIDAE (2)								-													
208	<i>Oriolus nigripennis</i> (Verreaux & Verreaux, 1855)	Black-winged Oriole	3	2	1	2	3	11	0.26	C	3	2	1	2	3	11	0.49	C	LC	R		GC
209	<i>Oriolus brachyrhynchus</i> Swainson, 1837	Western Black-headed Oriole	2			1	3	6	0.14	F	2			1	3	6	0.27	F	LC	R		GC
	DICRURIDAE (3)								-													
210	<i>Dicrurus adsimilis</i> (Bechstein, 1794)	Fork-tailed Drongo	5	2	7	2	3	19	0.46	C	5	2	7	2	3	19	0.85	C	LC	R		
211	<i>Dicrurus atripennis</i> Swainson, 1837	Shinning Drongo	3			4	2	9	0.22	F	3			4	2	9	0.40	F	LC	R		GC
212	<i>Dicrurus modestus</i> Hartlaub, 1849	Velvet-mantled Drongo	7		2	5	3	17	0.41	F	7		2	5	3	17	0.76	C	LC	R		
	CORVIDAE (2)								-													
213	<i>Ptilostomus afer</i> (Linnaeus, 1766)	Piapiac	8					8	0.19	C	8					8	0.36	F	LC	R		
214	<i>Corvus albus</i> Müller, 1776	Pied Crow	15	10	8	8	10	51	1.23	C	9	10	8	8	10	45	2.00	C	LC	R		
	STURNIDAE (5)								-													
215	<i>Onychognathus fulgidus</i> Hartlaub, 1849	Chestnut-winged Starling	8				5	13	0.31	F	3				2	5	0.22	F	LC	R		
216	<i>Hylopsar cupreocauda</i> (Hartlaub, 1857)	Copper-tailed Starling					2	2	0.05	Ra					2	2	0.09	U	N T	R	AO	GC
217	<i>Lamprotornis purpureus</i> Müller, 1776	Purple Starling					2	2	0.05	Ra					1	1	0.04	Ra	LC	R		SG
218	<i>Lamprotornis splendidus</i> (Vieillot, 1822)	Splendid Starling	5	2	5	4	7	23	0.55	C	2		5	4	2	13	0.58	C	LC	R		
219	<i>Cinnyricinclus leucogaster</i> (Boddaert, 1783)	Violet-backed Starling	8					8	0.19	F						0	0.00		LC	M		
	PASSERIDAE (1)								-													

220	<i>Passer griseus</i> (Vieillot, 1817)	Northern Grey-headed Sparrow	14	21	14	10	11	70	1.69	C	8	5	15	4	11	43	1.91	C	LC	R		
	PLOCEIDAE (13)								-													
221	<i>Malimbus scutatus</i> (Cassin, 1849)	Red-vented Malimbe	2			1	1	4	0.10	U	1				1	2	0.09	U	LC	R	AO	GC
222	<i>Malimbus nitens</i> (Gray, 1831)	Blue-billed Malimbe	2				1	3	0.07	Ra	1				1	2	0.09	U	LC	R		GC
223	<i>Malimbus malimbicus</i> (Daudin, 1802)	Crested Malimbe					2	2	0.05	Ra					2	2	0.09	U	LC	R		GC
224	<i>Malimbus rubricollis</i> Swainson, 1837	Red-headed Malimbe	3			2		5	0.12	U	1			2		3	0.13	U	LC	R		GC
225	<i>Ploceus nigrigollis</i> (Vieillot, 1805)	Black-necked Weaver	2			5	3	10	0.24	F	2			2	3	7	0.31	F	LC	R		
226	<i>Ploceus aurantius</i> (Vieillot, 1805)	Orange Weaver	5				10	15	0.36	F	3				10	13	0.58	C	LC	R		GC
227	<i>Ploceus heuglini</i> Reichenow, 1886	Heuglin's Masked Weaver						0	-		2					2	0.09	U	LC	R		
228	<i>Ploceus nigerrimus</i> Vieillot, 1819	Vieillot's Black Weaver	11	4	18	8	18	59	1.42	C	5	4	5	8	10	32	1.42	C	LC	R		GC
229	<i>Ploceus cucullatus</i> (Müller, 1776)	Village Weaver	14		6	8	9	37	0.89	C	14		6	10	9	39	1.73	C	LC	R		
230	<i>Ploceus tricolor</i> (Hartlaub, 1854)	Yellow-mantled Weaver	3			2		5	0.12	U	2			3		5	0.22	F	LC	R		GC
231	<i>Quelea erythropis</i> (Hartlaub, 1848)	Red-headed Quelea						0	-						3	3	0.13	U	LC	R/M		
232	<i>Euplectes macroura</i> (Gmelin, 1789)	Yellow-mantled Widowbird						0	-		6	3	4	2	4	19	0.85	C	LC	R		
233	<i>Euplectes hordeaceus</i> (Linnaeus, 1758)	Black-winged Bishop	5	14	8	3	16	46	1.11	C	2	5	8	3	6	24	1.07	C	LC	R		
	ESTRILDIDAE (9)								-													

234	<i>Nigrita canicapillus</i> (Strickland, 1841)	Grey-headed Nigrita	6		2	3	4	15	0.36	F		2			3	4	9	0.40	F		LC	R		
235	<i>Nigrita bicolor</i> (Hartlaub, 1844)	Chestnut-breasted Nigrita	5	3	2	3	2	15	0.36	C		2	3		3	2	10	0.44	C		LC	R		GC
236	<i>Nigrita fusconotus</i> Fraser, 1843	White –breasted Nigrita	9	2	4		9	24	0.58	F		4	2	1		3	10	0.44	C		LC	R		GC
237	<i>Estrilda melpoda</i> (Vieillot, 1817)	Orange-cheeked Waxbill	7	6	7	3	5	28	0.67	C		5	6	7	3	5	26	1.16	C		LC	R		
238	<i>Spermophaga haematina</i> (Vieillot, 1807)	Western Bluebill	8	3	2	4	7	24	0.58	F		3	1		4		8	0.36	F		LC	R		GC
239	<i>Pyrenestes sanguineus</i> Swainson, 1837	Crimson Seedcracker	5		2	3	8	18	0.43	F				2	3	2	7	0.31	F		LC	R		GC
240	<i>Spermestes cucullatus</i> Swainson, 1837	Bronze Mannikin	11	12	8	14	8	53	1.28	C		5	8	8	3	8	32	1.42	C		LC	R		
241	<i>Spermestes bicolor</i> (Fraser, 1843)	Black-and-white Mannikin	12	4	5	6	5	32	0.77	C		8	3	6	7	3	27	1.20	C		LC	R		
242	<i>Spermestes fringilloides</i> (Lafresnaye, 1835)	Magpie Mannikin	5		4			9	0.22	F		3		3			6	0.27	F		LC	R		
	VIDUIDAE (1)								-															
243	<i>Vidua macroura</i> (Pallas, 1764)	Village Indigobird	15	5	8	18	17	63	1.52	C		10	3	4	8	11	36	1.60	C		LC	R		
	Total		122 4	41 0	51 4	102 4	97 9	415 1	100.0			69 0	24 5	27 9	47 6	55 8	224 8	100.0 0						

NF: Number of families; NE: Number of species Rs: Specific richness Fr. (%): Relative frequency; Study sites: Si: Singrobo; Pa: Pacobo; Ko: Kotiessou; Nd: N'Denou; Ah: Ahouaty; Biome (Bio): GC: Confined to the Guinean-Congolian forest biome; SG: Sudano-Guinean savannah; Endemism (End.): AO: West African endemic; RR: Restricted distribution. Conservation status (CS): VU - Vulnerable NT - Near Threatened, LC - Least Concern; Abundance (Ab.): C - Common or very common: seen daily, singly or in significant numbers; F - Fairly common: seen almost every day; U - Uncommon: seen irregularly and not every day; Ra - Rare: rarely seen, one or two sightings of solitary individuals; Biogeographical or migratory status (SB): R - Resident; M - Intra-African migrant; P - Palearctic migrant; R/M- Resident and/or intra-African migrant; R/P- Resident and/or Palearctic migrant; O - Occasional.

5 Conclusion

At the end of this study, it emerged that, with 243 bird species, the study area contains a large and highly diverse bird community. In terms of avifaunal potential, it should be noted that the area is home to seven bird species whose protection is of worldwide interest; six bird species of restricted distribution; 12 West African endemic species; 90 bird species confined to the Guineo-Congolese forest biome and 36 migratory species. This study is of vital interest because it has enabled us to take stock of the birds in the study area. This area, which is an ecotone, is home to many migratory species that stay there during the dry season. The construction of the hydroelectric dam could therefore disrupt bird habitats. It is clear that the construction and impoundment of the dam will have a considerable impact on the quantitative and qualitative composition of the area's avifauna. With a view to the protection and sustainable management of biodiversity, it is therefore strongly recommended that the promoters of the Singrobo-Ahouaty hydroelectric dam project plan appropriate mitigation measures to minimize the environmental impact of the project. This will make it possible to reconcile the need for electricity with respect for the ecological balance.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors declare that they have no conflict of interest regarding the conduct of this study.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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