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Bird diversity in Nyassang Forest Park, The Gambia

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Summary

The bird diversity of Nyassang Forest Park on the River Gambia has not previously been studied. I report 113 bird species in the park in Jul–Aug 2005, and predict the forest's maximum wet season bird diversity to be 300 species. Out of five habitats studied, forest canopy contained the most bird species, and a cultivated rice field the fewest.

Résumé

Diversité des oiseaux dans le Parc de la Forêt de Nyassang, La Gambie. La diversité des oiseaux dans le Parc de la Forêt de Nyassang sur le fleuve Gambie n'avait pas encore été étudiée. J'y ai noté 113 espèces en juillet–août 2005 et prédis un maximum de 300 espèces pour la forêt en saison humide. Sur les cinq habitats étudiés, c'est la canopée forestière qui a le plus d'espèces et la rizière cultivée le moins.

Introduction

Nyassang Forest Park (13°38´30´´N, 14°59´40´´W), is situated in the Central River Division of The Gambia, covering *c.* 2500 ha. It lies on the mainland opposite the River Gambia National Park (RGNP), which was founded in 1977 to rehabilitate and conserve chimpanzees *Pan troglodytes* on its Baboon Islands. However, little is known about the wildlife of Nyassang. This paper presents the first published bird survey of Nyassang Forest Park, based on observations in the wet season, Jul–Aug 2005, and examines bird diversity in different habitats. The results are used to predict maximum wet season bird diversity for each habitat.

Study areas

Five habitats were studied: a used rice field (currently in cultivation), a disused (formerly cultivated) rice field, open water (the River Gambia), a waterside habitat

and the canopy of tertiary forest, defined as forest in its third successive generation after felling of primary and secondary forest.

The used rice field, of *c*. 3 ha, consisted of paddies separated by small mud walls. Some of the paddies had recently been cultivated and did not have long grass sprouting from the water within the paddy. Some of the cultivated paddies contained lily-pads. The muddy water in each paddy was *c.* 1 m deep. Some areas of the field had grass approximately 2.5 m tall. At cross-sections of the walls stood viewing huts which, as well as 3 m tall sticks projecting from some of the paddies, were used by birds as perching posts. Hay was strewn at muddy wall cross points. One palm was located in the field. Tertiary forest surrounded the field.

The disused rice field (*c*. 3.5 ha) had uniform short grass except for some areas of taller grass (> 2.5 m), standing water, and a line of sparse trees of various species in the centre. No mud walls separated individual paddies, so the field could only be viewed from its periphery. Tertiary forest surrounded the tear-drop shaped field.

The open water habitat consisted of a section (< 1 km) of the River Gambia, which flows between Island 2 of Baboon Islands and the mainland. The river was tidal. Vegetation hung over the river edge.

Waterside was a zone up to 30 m from the River Gambia, and included a narrow 394 m trail that meandered parallel to the river, *c.* 3–8 m from it, and in places was on a slope. Beyond the track, the slope rose *c*. 6 m. Small areas of the slope were covered in long grass. Beyond the track and grass, the area was backed by thick mixed vegetation.

The tertiary forest canopy surrounded the Forest Park camp and stretched from camp *c.* 1 km to the disused rice field and 766 m to the used rice field. It consisted of thick diverse vegetation, with a canopy height noticeably less than that of the primary forest on Baboon Islands opposite.

Methods

The MacKinnon List technique (Bibby *et al* 1998) was used to record bird species in relation to habitat. Five different points within each habitat were noted on sketched maps, (six points on the waterside, and four points for the open water due to the wide view). Points were chosen for accessibility and good views. The forest canopy was viewed from five platforms constructed on a hill above the canopy. A list of the first eight different bird species seen or heard was made while sitting at a point, then the list was stopped. In the waterside habitat, the view was restricted by trees, so a 15 m radius was estimated around a point, within which the observer could move to get better views. The date, habitat and point were recorded for each list completed. The record of which habitats and points had been recently used was checked before each new day, and the habitats and vantage points that had the fewest lists completed were chosen to do that day.

Lists were completed in the morning (6h30–12h00), afternoon (12h00–16h30) and dusk (16h30–18h00). Usually at least three lists were completed in a day, one in each of

the three periods, usually in different habitats, but often time would allow more lists to be completed. Over a six week period (Jul–Aug), 16 lists were completed in each habitat.

For used and disused rice fields, birds heard or seen within the field, at the edge and flying over the fields were included. Open water included birds seen flying over the river or at the water's edge, but birds heard in the overhanging forest canopy were not noted. In waterside, birds heard or seen on the river were excluded but birds perching on trees over-hanging the river were included, as were birds flying into or over the waterside habitat. Tertiary forest canopy included birds flying over or in the canopy but birds flying along the river next to the canopy were not noted. Birds were identified using Barlow *et al*. (1999) and Barlow (2002).

To predict maximum wet season bird species for each habitat, an antilog graph was produced for each habitat from the MacKinnon lists (Bibby *et al* 1998). The graphs plot number of new species recorded for each list completed against log cumulative number of species for that habitat. A negative slope results and the intercept of the regression line with the x-axis is the predicted number of bird species for that habitat. The Minitab statistics program produced regression lines that did not cut the x-axis, therefore the lines were extrapolated.

From the MacKinnon lists a Relative Abundance Index (RAI) can be produced to examine which bird species are most abundant in which habitats (Bibby *et al.* 1998). The RAI is the proportion of the lists completed in which the species occurs. However, rather than dividing by total number of lists to give maximum RAI of 1, as the number of lists in all habitats was the same (16 in each) I simply use number of lists recorded as RAI. An RAI of 16 therefore indicates that a species was recorded in all 16 lists, and a score of 1 indicates that a species was noted only once in a habitat.

Results

The tertiary forest canopy had the highest observed and predicted bird diversity and the used rice field the lowest (Table 1). The whole park has a predicted bird diversity of 300 species, more than double the 113 observed.

Table 1. Observed (Jul–Aug 2005) and predicted Jul–Aug bird diversity for habitats in Nyassang.

	Observed bird species	Predicted wet season bird diversity
Tertiary forest canopy	56	110
Disused rice field	51	90
Open water	43	61
Waterside	38	50
Used rice field	34	43
Nyassang all habitats	**113**	**300**

Observed species are listed in Table 2. In the tertiary forest, Yellow-crowned Gonolek, Broad-billed Roller, Western Grey Plantain-eater, Red-billed Hornbill and Mourning Dove had the highest RAI and 31 species were noted only once. In the waterside habitat, Vinaceous Dove, Long-tailed Glossy Starling and Yellow-crowned Gonolek had the highest RAI, and 18 species noted only once. In the open water habitat, Mourning Dove, Rose-ringed Parakeet and Long-tailed Glossy Starling had the highest RAI, while 19 species were noted only once. In the used rice field, African Jacana, Village Weaver, Squacco Heron and Striated Heron were the most abundant birds, while 17 species were noted only once. In the disused rice field, Vinaceous Dove, Yellow-crowned Bishop, African Jacana and Mourning Dove had the highest RAI, with 29 species noted only once.

Table 2. Species list for Nyassang, with Relative Abundance Index values (range 0–16) for the study period. Species that were observed only when not recording lists are marked X in the relevant habitat column(s) and NH where the species was seen in the Park but habitat not noted.

	UR	DR	OW	WS	TF
Phalacrocoracidae					
Phalacrocorax africanus Long-tailed Cormorant		2	2		
Anhingidae					
Anhinga rufa African Darter	2	3	5	1	
Ardeidae					
Nycticorax nycticorax Black-crowned Night Heron	1				
Ardeola ralloides Squacco Heron	15	4	6		2
Bubulcus ibis Cattle Egret		2	3		
Butorides striatus Striated Heron	12	1	5	1	
Egretta ardesiaca Black Egret			2		
E. garzetta Little Egret	1	2			2
E. intermedia Intermediate Egret	3	1	3		1
E. alba Great Egret	7		7	1	
Ardea purpurea Purple Heron	1	1			
A. cinerea Grey Heron		1			
A. melanocephala Black-headed Heron	1				
Threskiornithidae					
Plegadis falcinellus Glossy Ibis					1
Bostrychia hagedash Hadada	1	1	4		1
Threskiornis aethiopicus Sacred Ibis (NH)					
Anatidae					
Dendrocygna viduata White-faced Whistling Duck	3				
Plectropterus gambiensis Spur-winged Goose		1	1		
Nettapus auritus African Pygmy Goose	1				

	UR	DR	OW	WS	TF
Accipitridae					
Milvus migrans Black Kite					2
Haliaeetus vocifer River Eagle			1		
Gypohierax angolensis Palm-nut Vulture	2	2	3	1	2
Necrosyrtes monachus Hooded Vulture (NH)					
Gyps africanus White-backed Vulture					1
Circaetus gallicus Brown Snake-Eagle			X		
Aquila wahlbergi Wahlberg's Eagle					1
Lophaetus occipitalis Long-crested Eagle		2	1		
Phasianidae					
Ptilopachus petrosus Stone Partridge				X	
Rallidae					
Amaurornis flavirostris Black Crake		1			
Heliornithidae					
Podica senegalensis African Finfoot			X		
Jacanidae					
Actophilornis africanus African Jacana	16	13			
Columbidae					
Treron waalia Bruce's Green Pigeon			X		
Turtur tympanistria Tambourine Dove		1			
T. afer Blue-spotted Wood Dove		1	1		
T. abyssinicus Black-billed Wood Dove		2	1	1	
Oena capensis Namaqua Dove		1		1	1
Streptopelia semitorquata Red-eyed Dove	1	2	1		2
S. decipiens African Mourning Dove		9	12	8	6
S. vinacea Vinaceous Dove	3	14	3	13	3
S. roseogrisea African Collared Dove	X	X			
S. senegalensis Laughing Dove		1	2	1	
Psittacidae					
Poicephalus senegalus Senegal Parrot		1	2		2
Psittacula krameri Rose-ringed Parakeet	9	1	10	9	4
Musophagidae					
Musophaga violacea Violet Turaco		2			1
Crinifer piscator Western Grey Plantain-eater	1	3	5	3	7
Cuculidae					
Oxylophus levaillantii Levaillant's Cuckoo		1			
Centropus grillii Black Coucal	1		1		
C. senegalensis Senegal Coucal	3	3	2	3	1
Strigidae					
Bubo lacteus Verreaux's Eagle Owl					X
Glaucidium perlatum Pearl-spotted Owlet					1

	UR	DR	OW	WS	TF
Apodidae					
Cypsiurus parvus African Palm Swift (NH)					
Apus affinis Little Swift	1				
Alcedinidae					
Halcyon leucocephala Grey-headed Kingfisher					2
H. malimbica Blue-breasted Kingfisher	1			3	1
H. senegalensis Woodland Kingfisher		1			1
Ceyx picta African Pygmy Kingfisher	1	1		1	1
Corythornis cristata Malachite Kingfisher	1	1			
Ceryle rudis Pied Kingfisher			1		1
Meropidae					
Merops hirundineus Swallow-tailed Bee-eater					1
Coraciidae					
Eurystomus glaucurus Broad-billed Roller	5	3	2	5	10
Phoeniculidae					
Phoeniculus purpureus Green Wood-hoopoe				1	
P. aterrimus Black Wood-hoopoe		1	1	1	3
Bucerotidae					
Tockus erythrorhynchus Red-billed Hornbill	3	3	1	2	6
Capitonidae					
Lybius dubius Bearded Barbet					2
Indicatoridae					
Indicator indicator Greater Honeyguide				1	
Picidae					
Campethera punctuligera Fine-spotted Woodpecker				1	
Dendropicos goertae Grey Woodpecker				X	
Hirundinidae					
Hirundo senegalensis Mosque Swallow					1
Oriolidae					
Oriolus auratus African Golden Oriole			1		1
Campephagidae					
Coracina phoenicea Red-shouldered Cuckoo-shrike				2	
Dicruridae					
Dicrurus adsimilis Fork-tailed Drongo					1
Pycnonotidae					
Chlorocichla flavicollis Yellow-throated Leaflove (NH)					
Pyrrhurus scandens Leaflove			1		
Turdoides reinwardtii Blackcap Babbler			1	3	1
Pycnonotus barbatus Common Bulbul	1		1	2	2
Turdidae					
Cossypha niveicapilla Snowy-crowned Robin-Chat				7	2

	UR	DR	OW	WS	TF
C. albicapilla White-crowned Robin-Chat				X	
Sylviidae					
Apalis flavida Yellow-breasted Apalis			1		1
Camaroptera brachyura Grey-backed Camaroptera					1
Zosteropidae					
Zosterops senegalensis Yellow White-eye (NH)					
Muscicapidae					
Melaenornis edolioides Northern Black Flycatcher		1		2	3
Bradornis pallidus Pale Flycatcher		1	1		
Muscicapa aquatica Swamp Flycatcher		1	1		
Ficedula hypoleuca Pied Flycatcher		1			
Monarchidae					
Terpsiphone rufiventer African Paradise Flycatcher		1			
Platysteiridae					
Platysteira cyanea Common Wattle-eye			2	9	5
Nectariniidae					
Chalcomitra senegalensis Scarlet-chested Sunbird				1	
Hedydipna platura Pygmy Sunbird					1
Cinnyris chloropygia Olive-bellied Sunbird					1
C. pulchella Beautiful Sunbird				1	
C. venusta Variable Sunbird		1			
Malaconotidae					
Malaconotus blanchoti Grey-headed Bush-Shrike (NH)					
Dryoscopus gambensis Northern Puffback				2	1
Laniarius barbarus Yellow-crowned Gonolek		4	3	10	12
Sturnidae					
Lamprotonis purpureus Purple Glossy Starling	1				2
L. chalcurus Bronze-tailed Glossy Starling (NH)					
L. chalybaeus Greater Blue-eared Glossy Starling	1			1	1
L. caudatus Long-tailed Glossy Starling	4	6	8	11	5
Passeridae					
Passer griseus Grey-headed Sparrow				1	1
Ploceidae					
Ploceus cucullatus Village Weaver	15	2	7	3	5
P. melanocephalus Yellow-backed Weaver	1		7	8	1
Quelea erythrops Red-headed Quelea					1
Euplctes franciscanus Northern Red Bishop		1			
E. hordeaceus Black-winged Red Bishop					1
E. afer Yellow-crowned Bishop	6	13	1		1
E. macroura Yellow-mantled Widowbird		1			3

	UR	DR	OW	WS	TF
Estrildidae					
Estrilda caerulescens Lavender Waxbill		1			2
Uraeginthus bengalus Red-cheeked Cordon Bleu				1	1
Lagonosticta rufopicta Bar-breasted Firefinch		1			
L. senegala Red-billed Firefinch		2	1	4	1
Euodice cantans African Silverbill		1			
Viduidae					
Vidua wilsoni Wilson's Indigobird				X	
V. chalybeata Village Indigobird	2			1	

Discussion

In total, 113 bird species were noted in Nyassang Forest Park during a six-week period in the wet season. The total predicted bird diversity for the park was 300 species. The true total will certainly be much greater than 113, because birds were only recorded in the wet season, and nocturnal surveying could not be carried out. The Gambia has been reported to have around 540 bird species (Barlow *et al*. 1999), and approximately one fifth of this total was noted in the Nyassang Forest Park, which is outstanding for a small forest park, perhaps in part because public access is restricted. The prediction of the maximum wet season bird diversity (300) seems quite high (over half of The Gambia's entire avifauna) and further work should be done to refine this estimate. None of the species recorded in Nyassang is regarded as globally threatened (Hilton-Taylor 2000), but the rare African Finfoot was observed.

The habitat with the highest bird diversity and the highest predicted bird richness was, as expected, the tertiary forest canopy, probably because it had more useful tree species, including such sources of food for frugivorous birds as Boabab *Adansonia digitata*, Tabo *Cola cordifolia*, Keno *Pterocarpus erinaceus* and *Bombax ceiba*. Also, the canopy is directly opposite and < 20 m from Island 2 of Baboon Islands which contains primary forest. The other habitats (except waterside and open water) do not have the primary forest close to them.

The disused rice field had the second highest observed and predicted bird diversity, which gives hope that other disturbed areas may revert to diverse areas. One possible reason it had such a high diversity may be that it was surrounded by tertiary forest, which allowed birds to visit the old paddies to bathe or hunt. Many trees overhanging the field edge contained small birds such as African Paradise Flycatcher and estrildids. The sparse trees in the middle were popular with birds of prey like the Long-crested Eagle, and thereby increased its diversity. The unchecked growth of the grass and reeds also contributed to the high diversity, as the tall grasses in the middle were popular with Yellow-crowned Bishop and Swamp Flycatcher.

Open water had the third highest bird diversity, with the peripheral trees overhanging the river contributing to this. The waterside habitat had the second lowest bird biodiversity, but this may have been an artefact because recording birds was more difficult there than in other habitats. The used rice field had the lowest observed and predicted bird diversity, probably because cultivation reduces vegetation diversity and human presence deters birds. Unlike the disused rice field, there were no trees in the middle to attract birds of prey.

Many birds which were most abundant in one habitat were also most abundant in others, *e.g.* Yellow-crowned Gonolek in tertiary forest canopy and waterside. The African Jacana was the most abundant bird in the used rice field and the second most abundant in the disused rice field. Thus, if one habitat is developed or fragmented then such birds may be able to survive in other undeveloped areas. Conversely, many species were only recorded once or in one habitat. Plans for ecotourism development could prejudice these rarer species, although the planned exclusive tourism will cause relatively low disturbance while providing income to help sustain Nyassang and RGNP.

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