Original Research Article

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A Survey of Avian fauna in KabaleMunicipality,South western Uganda

Abstract

Collection of data on avifaunal diversity is a crucial component for monitoring the effects of habitat changes on biodiversity. A rapid cross sectional survey to document common bird species present in Kabale municipality was conducted over a period of 3 months. Birds were categorized into families and the Shannon–Weaver (H') diversity index and the abundance of all the species was calculated.A total of 1770bird individuals consisting of 67 species, 34 families were recorded, with an overall species diversity of 3.41.The Grey Crowned Crane (*Balearica regulorum*) an endangered speciesand the Woolly–necked Stork (*Ciconia episcopus)*avulnerable species were among the species recorded. The relatively high diversity is probably attributed to the presence of trees on farmland areas within the municipality. This combination seems to provide various food sources or nesting and perching grounds for the birds. Information generated by this study will serve as a benchmark for monitoring of changes in species diversity and composition over time. In addition, the list of birds will be useful to residents of the area and the many ecotourists who visit Kabale town.

Keywords: Kabale municipality,Shannon–Weaver, Endangered, Vulnerable, ecotourists

Introduction

Birds represent an important component of global biodiversity and fulfill many ecological functions, which include disease regulation, biomass recycling, seed dispersal of fleshy fruits, and pollination [1]. Land-use change resulting from urbanization is a key driver of current and future biodiversity change. These land use changes often results in homogenous and artificial environments which are dominated by many exotic communities of flora and

fauna [2]. A study of avifaunal diversity is therefore essential considering that birds have been known to be indicators of good environmental conditions [3].

Kabale municipality has been gazetted as a city, and as a result, huge infrastructure developments within and around the town are anticipated.Given that there is a positive correlation between availability of vegetation cover and bird biodiversity [4], the habitat changes resulting from urbanization are predicted to impact on this biodiversity.Besides, urban development scenarios such as roads and highways have been found to cause significant impact on bird assemblages [5]. In some birds' surveys, studies have shown that abundance, occurrence, and species richness of breeding birds are heavily impacted near roads, with larger declines near high-traffic roads than near lower traffic roads [6]. The main goal of this survey was therefore to document bird diversity in Kabale municipality for future conservation planning and action. The information generated from this study will also be useful to residents of the area and the many ecotourists who visit Kabale town.

Study Area

Kabale municipality is located in Kabale district of the Kigezi sub-region, approximately 420kms (260 miles), southwest of Kampala city. It lies at 1° 14' S, 29° 58' E; 2,000m (6,600 ft) asl. This sub-region is composed of three (3) administrative units/divisions: Northern, Southern and Central Divisions. Being part of Kabale district, the municipality experiences an average annual temperature of 17.2 °and a precipitation of about 1018 mm per year. The municipality is located about 42 km from the famous Bwindi Impenetrable Forest via Kabale- Kisoro road and 7km from Lake Bunyonyi, both of them, biodiversity hotspots.

Data was collected from 3 sites within the municipality namely: Kabale University main campus located at Kikungirihill in central division;White horse Inn located at Makanga hillin central division; and Uganda Christian University, Bishop Burham campus located onRugarama hill (Figure 1).These were chosen mainly for their relatively high tree cover. Currently, all these places have mainly exotic vegetation dominated by silk oak(*Grevillea robusta)*, Pine(*Pinus*)*spp* and (*eucalptyus*)*spp*. Land use around and within the municipality includes, small gardens mainly of mixed agriculture and the major cultivated crop species were banana/plantain (*Musa spp)*, sorghum (*Sorghum bicolor. L)*, peas (*Pisumsativum. L)*, beans (*Phaseolus vulgaris)*, potato (*Solanumtuberosum. L*) and sweet potatoes (*Ipomea batatas).* Minor crops grown include Yams (*Dioscoreaspp*), cassava (*Manihotesculenta)*, maize (*Zea mays L)*, fruits and Vegetables.

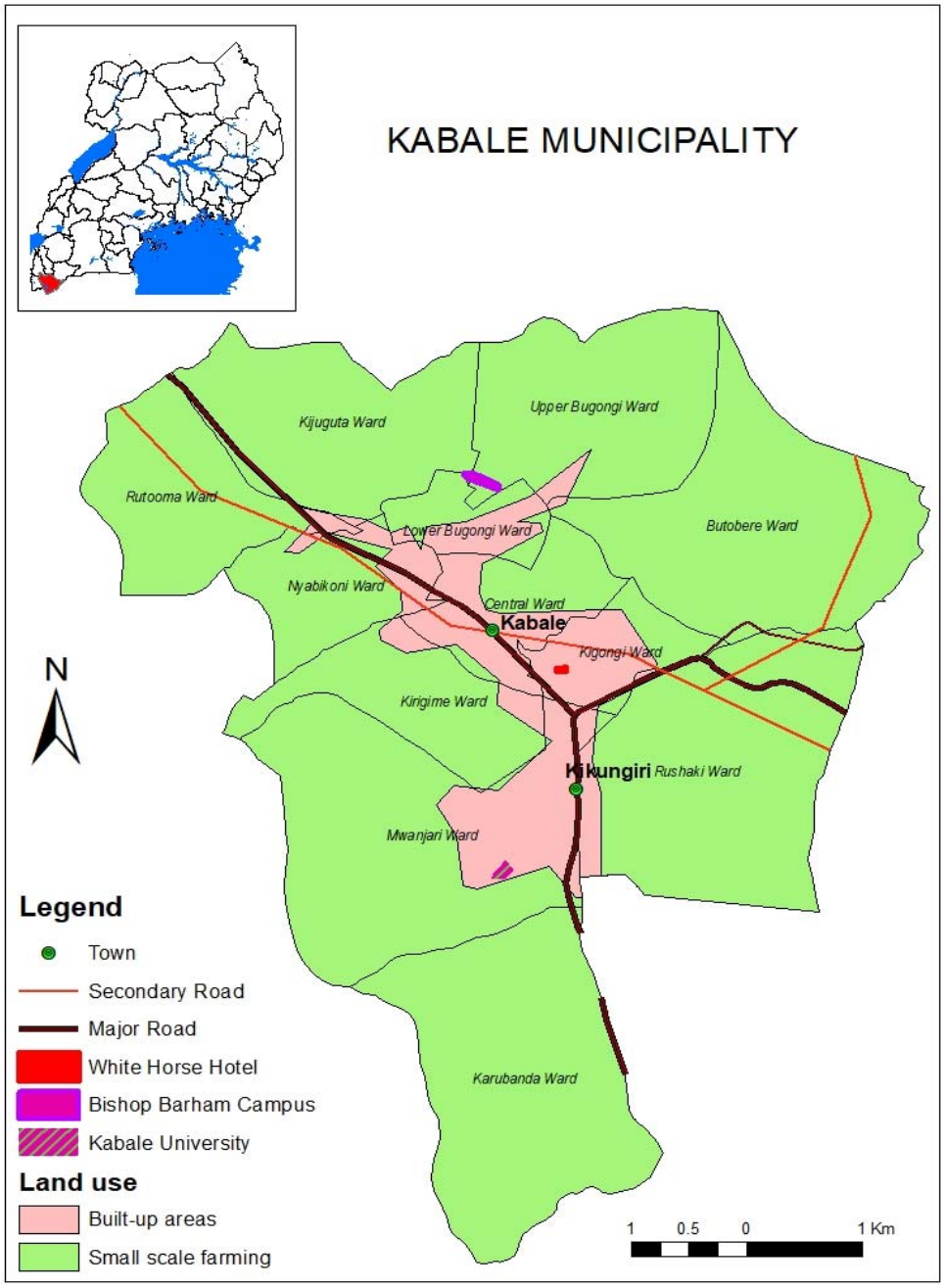

Figure 1: Location of study sites within Kabale municipality

Methods

Bird Survey

I conducted a general avian survey in Kabale municipality between 20thNovember2019 and 20thJanuary 2020. A total of 30 point counts (10 at each study site) over a period of six days were made. I spent 15 minutes at each point and using binoculars [7] observed and recorded all birdsseen including those flying over. Surveys were conducted in the mornings as this is the time birds are most active [7]. Abundance estimates of small secretive species and/or camouflaged ones may have been underestimated due to low detectability.

Waterbird composition and species diversity

Waterbirds were classified into families with reference to [8] and threat categories based on the IUCN REDLIST [9]. The Shannon–Weaver (H') diversity index [10] and the abundance of all the species was also calculated.This index is based on the relative composition of species in an area and how equally the individuals are distributed among the species groups or taxa. The more equal the distribution, the greater the overall diversity [10].

The Shannon-weaver diversity index, H' was calculated for each count as:

H' = -∑(Total of bird species)/(Total birds) × (ln (Total of bird species)/(Total birds))

Results

A total of 1770 bird individuals consisting of 67 species, 34 families were recorded during this study (Table 1). The species included among othersthe Grey Crowned Crane (*Balearica regulorum*) an endangered speciesand theWoolly –necked Stork *Ciconia episcopus*avulnerable species[Table 1].Most bird species (98%) recorded are of Least Concern (Table 1).Non passerines as the Bronze Mannikin(*Spermestescucullata)* and the African Firefinch(*Lagonosticta rubricate)* comprised of slightly more than a quarter of the overall abundance.There was evidence of the Black-headed Heron breeding within the centre of Kabalemunicipality (Plate 1and 2). Overall species diversity was 3.41

Table 1. Bird species recorded within Kabale Municipality, South western Uganda. Families, common names, and scientific names follow [8]. Status follows IUCN REDLIST Category [6]: EN = Endangered, VU = Vulnerable, Least Concern = LC. B = signs of breeding recorded in this survey.

#	Common Name	Species Name	Family	Status	Abundance	% Abundance
1	Cattle Egret	*Bubulcus ibis*	Ardeidae	LC	30	1.69
2	Black-headed Heron	*Ardeamelanocephala*	Ardeidae	LC (B)	20	1.13
3	Woolly-necked Stork	*Ciconia episcopus*	Ciconiidae	VU	6	0.34
4	African Open-billed Stork	*Anastomuslamelligerus*	Ciconiidae	LC	35	1.98
5	Marabou Stork	*Leptoptiloscrumeniferus*	Ciconiidae	LC	32	1.81
6	Hammerkop	*Scopus umbretta*	Scopidae	LC	6	0.34
7	Hadada Ibis	*Bostrychiahagedash*	Threskiornithidae	LC	10	0.56
8	Sacred Ibis	*Threskiornisaethiopicus*	Threskiornithidae	LC	15	0.85
9	African Spoonbill	*Platalea alba*	Threskiornithidae	LC	6	0.34
10	Black-shouldered Kite	*Elanusaxillaris*	Accipitridae	LC	5	0.28
11	African harrier Hawk	*Polyboroidestypus*	Accipitridae	LC	2	0.11
12	Long crested Eagle	*Lophaetusoccipitalis*	Accipitridae	LC	3	0.17
13	Grey-crowned Crane	*Balearicapavonina*	Gruidae	EN	60	3.39
14	African green Pigeon	*Treroncalvus*	Columbidae	LC	25	1.41
15	Red-eyed Dove	*Streptopeliasemitorquata*	Columbidae	LC	12	0.68
16	Ring-necked Dove	*Streptopeliacapicola*	Columbidae	LC	3	0.17
17	Brown-headed Parrot	*Poicephaluscryptoxanthus*	Psittacidae	LC	18	1.02
18	Eastern Grey Plantain Eater	*Criniferzonurus*	Musophagidae	LC	5	0.28
19	White-browed Coucal	*Centropussuperciliosus*	Cuculidae	LC	4	0.23

20	Barn Owl	*Tyto alba*	Strigidae	LC	2	0.11
21	White-rumped Swift	*Aerodramusspodiopygius*	Apodidae	LC	50	2.82
22	Little swift	*Apusaffinis*	Apodidae	LC	25	1.41
23	Speckled Mouse bird	*Coliusstriatus*	Coliidae	LC	39	2.2
24	Woodland King fisher	*Halcyon senegalensis*	Alcedinidae	LC	8	0.45
25	Little Bea eater	*Meropspusillus*	Meropidae	LC	6	0.34
26	Black and White Casqued Hornbill	*Bycanistessubcylindricus*	Bucerotidae	LC	8	0.45
27	Grey-headed wood pecker	*Picuscanus*	Picidae	LC	2	0.11
28	Barn Swallow	*Hirundorustica*	Hirundinidae	LC	13	0.73
29	Mosque Swallow	*Cecropissenegalensis*	Hirundinidae	LC	15	0.85
30	House martin	*Delichonurbicum*	Hirundinidae	LC	32	1.81
31	African Pied wagtail	*Motacillaaguimp*	Motacillidae.	LC	25	1.41
32	Common bulbul	*Pycnonotusbarbatus tricolor*	Pycnonotidae	LC	44	2.49
33	Heuglins Robin Chat	*Cossyphaheuglini*	Muscicapidae	LC	16	0.9
34	White-browed Robin chat	*Cossyphaheuglini*	Muscicapidae	LC	12	0.68
35	African Thrush	*Turduspelios*	Turdidae	LC	24	1.36
36	Garden Warbler	*Sylvia borin*	Sylviidae	LC	7	0.4
37	Winding Cisiticola	*Cisticolamarginatus*	Cisticolidae	LC	12	0.68
38	Tawny-flanked Prinia	*Prinia* subflava	Cisticolidae	LC	14	0.79
39	Grey-backed Cameroptera	*Camaroptera* brevicaudata	Cisticolidae	LC	10	0.56
40	African Dusky Fly catcher	*Muscicapa adusta*	Muscicapidae	LC	14	0.79
41	African Paradise flycatcher	*Terpsiphone viridis*	Muscicapidae	LC	6	0.34
42	African Blue Flycatcher	*Elminialongicauda*	Muscicapidae	LC	4	0.23

43	Bronze Sunbird	*Nectariniakilimensis*	Nectariniidae	LC	30	1.69
44	Red-chested Sunbird	*Cinnyriserythrocercu*	Nectariniidae	LC	22	1.24
45	Collared Sunbird	*Hedydipnacollaris*	Nectariniidae	LC	4	0.23
46	Black-headed Bushshrike	*Laniariuserythrogaster*	Malaconotidae	LC	12	0.68
47	Tropical Boubou	*Laniarius major*	Malaconotidae	LC	4	0.23
48	Common Fiscal	*Laniuscollaris*	Laniidae	LC	10	0.56
49	Pied Crow	*Corvusalbus*	Corvidae	LC	60	3.39
50	Black Kite	*Milvusmigrans*	Accipitridae	LC	10	0.56
51	African Drongo	*Dicrurusadsimilis*	Dicruridae	LC	2	0.11
52	Long-tailed glossy Starling	*Lamprotorniscaudatus*	Sturnidae	LC	23	1.3
53	Grey-headed Sparrow	*Passer griseus*	Passeridae	LC	32	1.81
54	Black-headed Weaver	*Ploceusmelanocephalus*	Ploceidae	LC	22	1.24
55	Fan-tailed widowbird	*Euplectesaxillaris*	Ploceidae	LC	6	0.34
56	Cardinal Quelea	*Quelea* cardinalis	Ploceidae	LC	3	0.17
57	Red-billed Quelea	*Queleaquelea*	Ploceidae	LC	100	5.65
58	Red-billed Firefinch	*Lagonostictasenegala*	Estrildidae	LC	2	0.11
59	African Firefinch	*Lagonostictarubricata*	Estrildidae	LC	200	11.3
60	Red-cheeked Cordonbleu	*Uraeginthusbengalus*	Estrildidae	LC	60	3.39
61	Common Waxbill	*Estrildaastrild*	Estrildidae	LC	150	8.47
62	Pin-Tailed Whydah	*Viduamacroura*	Viduidae	LC	4	0.23
63	Bronze Mannikin	*Spermestes cucullata*	Estrildidae	LC	300	16.9
64	Yellow-fronted Canary	*Crithagramozambica*	Fringillidae	LC	4	0.23
65	Grey-green Bush Shrike	*Chlorophoneusbocagei*	Malaconotidae	LC	8	0.45
66	Augur Buzzard	*Buteo augur*	Accipitridae	LC	2	0.11

67	Grey-backed Fiscal	*Laniusexcubitoroides*	Laniidae	LC	15	0.85

Plate 1. Closer view of the Nesting tree*Cassia sp*

Plate 2. Full view of the nesting tree*Cassia sp*

Discussion

An overall species diversity of 3.41 was recorded for Kabale Municipality. This is regarded as high given that typical values are generally between 1.5 and 3.5 in most ecological studies [10].The abundance of many bird species are determined by the composition and characteristics of the vegetation that forms a major element of their habitats [3]. The high species diversity recorded in Kabale municipality is probably as a result of the presence of a relatively high number of trees and farmlands. Generally, wooded plant cover and farmlands offer many niches that are exploited by a variety of birds[11]. Trees provides various food sources or nesting or perching grounds for the survival of birds [11, 12].

Birds such as African Paradise flycatcher(*Terpsiphone viridis)*, African Dusky Flycatcher*(Muscicapa adusta)*, and Yellow-fronted Canary(*Crithagramozambica)* that have been recorded in Bwindi forest were also recorded within the municipality. This is probably because they areforest edge species, well adapted to riverine and open forests, woodlands or savannah habitats, and are regularly found in cultivated gardens in highly populated areas. Although the Black-headed Heron (*Ardeamelanocephala)*was recorded breeding in town, it appears to be foraging in habitats outside of the municipality based on the low abundance recorded.

The Woolly-necked Stork is a widespread tropical species which breeds in Asia, India, Indonesia and throughout Africa [13]. It has been found to use agricultural fields as foraging grounds in addition to wetlands and grasslands, making it Vulnerable [14]. Fairly larger flocks of Woolly-necked Stork have been recorded in other parts of the world for example [15] in India, [16] in Nepal. However, very small flocks of 1-2 individuals were recorded during this study.

The Grey Crowned-cranes (*Balearica regulorum*), are found scattered across their range in Africa, which extends from South Africa in the south, to Uganda and Kenya in the north. The Grey Crowned-crane is listed as Endangered in the 2012 IUCN Red Data List because threats such as habitat loss and the illegal removal of birds and eggs from the wild have resulted in the species decline [17]. Similar to the Woolly-necked Stork, the Grey Crowned-cranes has been found to use agricultural fields as foraging grounds

[18]. This bird species has also adapted to changing environment [18], and it has been recorded foraging and roosting in urban areas [19]. Although widespread across south-western, southern and south-eastern parts of the country, they are concentrated in the Mbarara / Bushenyi, Masaka and Kabale Regions in the south-western parts of the country [20]. The presence of Woolly-necked Stork and Grey Crowned-cranes within Kabale municipality is not surprising given that small scale farms are a widespread land use.

Conclusion

The study established that Kabale Municipality has a sizable number of bird species which is probably attributed to the presence of trees on farmland areas within the municipality. However, given the rapid urbanisation of many towns that have now been upgraded to city status Kabale inclusive, the presence of these birds is threatened. It is therefore imperative to conduct regular avifaunal surveys to guide conservation planning. Extending the survey to the bigger part of the municipality to include all habitat types is highly recommended.

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