

ASSESSMENT OF BIRDS DIVERSITY IN SELECTED AREAS OF JALINGO, ARDO-KOLA AND YORRO LOCAL GOVERNMENT AREAS OF TARABA STATE, NIGERIA

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ABSTRACT

Birds are powerful indicators of ecosystem health, yet their diversity in many parts of Nigeria remains under-documented. This study explored the richness and structure of bird communities across Jalingo, Ardo-Kola and Yorro Local Government Areas of Taraba State, using point counts along stratified transects during both wet and dry seasons. In total, 54 species from 32 families and 16 orders were recorded, representing 2,157 individual birds. Diversity indices revealed a high Shannon–Wiener value ($H' = 3.42$), strong evenness ($J = 0.85$) and relative diversity of 84.2%, signaling communities that are both rich in species and ecologically balanced. Seasonal analysis showed that species richness peaked during the wet season with the arrival of migratory birds, while abundance was greater in the dry season as resources became concentrated. The prominence of adaptable species such as the Northern red bishop, Speckled pigeon and Piapiac highlights the interplay between natural habitats and human-modified landscapes in sustaining birdlife. Equally, the presence of waterbirds and insectivores points to the ecological mosaic of wetlands, grasslands and woodlands that support diverse guilds. These findings position Taraba's landscapes as vital sanctuaries for both resident and migratory species and stress the urgency of weaving conservation into land-use planning to secure biodiversity and ecosystem services for the future.

1. Introduction

Taraba State, in northeastern Nigeria, is a meeting ground of landscapes. Here, the wooded hills of the Kpantisawa highlands, the broad savanna plains of Ardo Kola and the riparian mosaics of Jalingo create a patchwork of habitats where birds thrive. Jalingo the bustling state capital, is framed by rivers and urban gardens; Ardo Kola stretches out in open farmland and savanna; while Yorro rises into hill country, dotted with woodlands that serve as seasonal refuges. Together, these three local government areas (LGAs) capture the essence of Taraba's environmental variety and with it, an impressive share of Nigeria's bird diversity (Mapcarta, 2025; Wikipedia, 2025).

Birds here are more than just residents of the landscape; they are indicators of ecological change. In Ardo Kola and Yorro, for example, recent surveys showed that even small differences in habitat; whether farmland, woodland or wetland can shape which species are present and how they interact (Awai & Saviour, 2023). Similar findings from Lau and Zing LGAs underscore how local land use and vegetation cover are pivotal in maintaining avian richness (Eseyin *et al.*, 2024).

Nigeria itself is a powerhouse of birdlife, hosting nearly 900 species, one of the highest totals in West Africa (BirdLife International, 2024; Avibase, 2024). Taraba is no exception. Each year, the East Atlantic Flyway funnels migratory species through its rivers, wetlands and fields, turning local landscapes into temporary staging grounds for swallows, storks, waders and raptors (Wetlands International, 2025; NCF, 2024). In practice, this means that an urban pond in Jalingo, a farm plot in Ardo Kola, or a shaded grove at Yorro's foothills might host an entirely different suite of birds depending on the season. Importantly, our understanding of these patterns has grown. With the help of Nigerian Bird Atlas Project and other citizen science efforts, bird records from previously under-studied regions like Taraba State are being systematically documented. These efforts reveal not only resident diversity but also the timing and scale of migratory pulses (Tende *et al.*, 2024).

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Seen together, the birdlife of Jalingo, Ardo Kola and Yorro tells a story of coexistence between people, landscapes and biodiversity. These areas are not only home to farmers, herders and urban dwellers but also vital stopovers for migratory species and sanctuaries for savanna and woodland specialists. Protecting their ecological integrity; riparian buffers, wetlands and forest patches will be essential if this remarkable diversity is to persist in the face of expanding agriculture and urban growth.

2. Materials and Methods

2.1 Description of the Study Areas

The research was conducted in Jalingo, Ardo-kola and Yorro Local Government Area of Taraba State, Nigeria (Figures 1). Jalingo metropolis is the State capital of Taraba State and headquarters of Jalingo Local Government Area. Jalingo having the landmass of approximately 195 km² and is located between latitudes 8° 45' N to 9° 05' N and longitudes 11° 15' E to 11° 35' E with altitude of 180m above sea level. Jalingo is bounded to the North by Lau Local Government Area, to the East by Yorro Local Government Area, to the South and West by Ardo-Kola Local Government Area (Garba *et al.*, 2016). Ardo-kola Local Government is situated between latitude 9° 00' N and 9° 30' N and longitude 11° 00' E and 12° 00' E. The Local government lies to the west of Jalingo main town it about 10 minutes drive to Sunkani, Ardo-Kola local government administrative headquarters. Yorro Local Government Area is located between latitude 8° 04' N to 9° 12' N and longitude 11° 20' E to 11° 45' E.

These three Local Government Areas (LGAs) of Taraba State, Nigeria together reflect a striking mosaic of ecological, socio-economic and cultural contexts. Jalingo, the state capital, lies within the Northern Guinea Savanna and serves as the administrative and commercial hub of Taraba State. With its mix of urban wards and peri-urban settlements, Jalingo combines the bustling vibrancy of markets, educational institutions and government services with the challenges of rapid urbanization, such as solid-waste management and infrastructure stress (Jalingo, 2025; Weatherspark, 2025). Ardo-Kola, located southwest of Jalingo, is predominantly agrarian but is gradually urbanizing, particularly around Kofai and Sunkani where institutions like Taraba State University have spurred growth. The LGA's expansive farmlands support crops such as maize, groundnut and sorghum, while pastoral Fulani communities engage in extensive cattle rearing. Its socio-linguistic diversity; hosting several indigenous languages adds to its cultural richness and creates a dynamic interface between tradition and modernity (City Population, 2025; DBpedia, 2025).

In contrast, Yorro LGA, with headquarters at Kpantisawa, offers a more rural and ecologically distinctive landscape. Covering hilly terrains and patches of forest reserves, Yorro is dominated by the Mumuye ethnic group, whose relative cultural homogeneity distinguishes it from the linguistic plurality of neighboring LGAs. Subsistence agriculture and small-scale trade remain the backbone of livelihoods, with climate and topography shaping farming practices and resource management. Average temperatures hover around 29°C, while seasonal rainfall sustains the forested environment and influences biodiversity and soil fertility (Yorro, 2025; City Population, 2025). Together the three LGAs Jalingo with its urban dynamism, Ardo-Kola with its agrarian-educational balance and Yorro with its rural, hilly ecology form a microcosm of Taraba State's diversity. This blend of urban and rural settings, cultural plurality and homogeneity and ecological variation provides a fertile ground for examining human environment interactions and their implications for conservation, sustainability and community well-being.

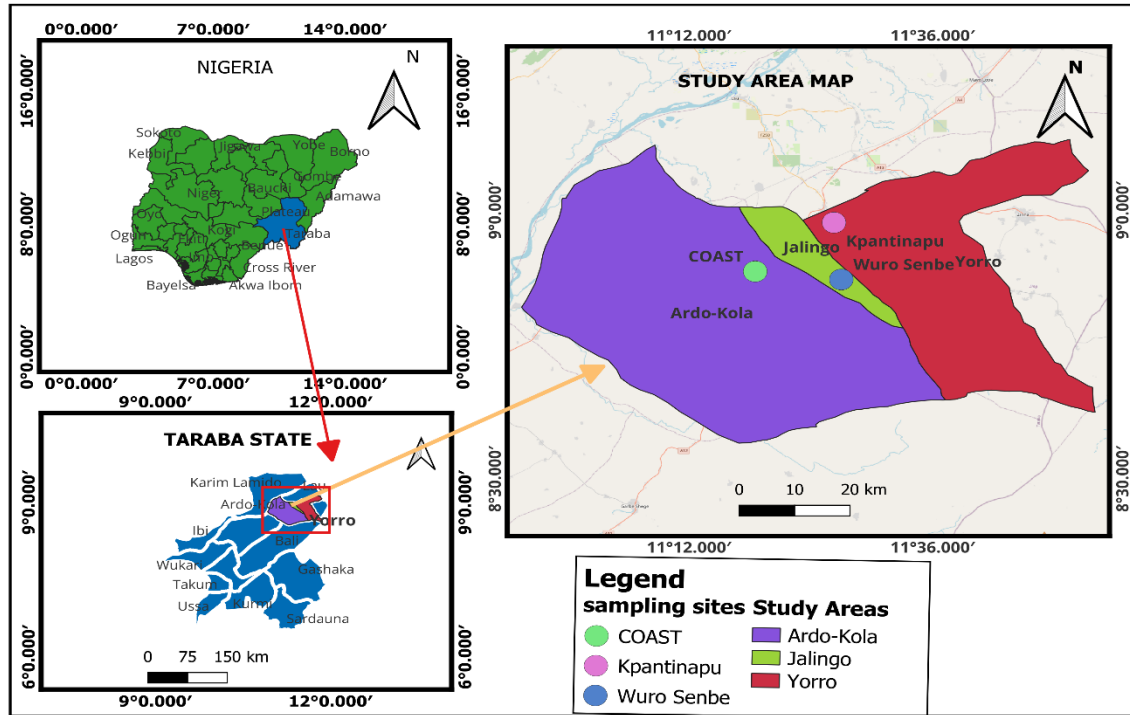


Figure 1: Map of Taraba State Showing Jalingo Local Government Area
Source: Ministry of Land and Survey

2.2 Experimental Design

The study was conducted in Jalingo, Ardo-kola and Yorro Local Government Area of Taraba. Data was collected during the wet season (June and July, 2025) and dry season (January and February, 2025) for four (4) months. The area was stratified into three (3); Pantivoh, Wuro Sembe and College of Agricultural Science and Technology. The sampling areas were selected using stratified random sampling techniques. Point Count Method as outlined by Bibby *et al.* (1992), Ralph *et al.* (1993) and Sutherland (1997) was adopted for the census of birds on each study site for the collection of data. Proper data sheet was used for recording of species encounter. Nine (9) transects was laid in the morning and evening hours to estimate, diversity abundance and distribution of birds in the study area. Sampling was carried out between 7:00 am - 9:00 am and between 3:30 pm -6:30 pm for four (4) months in each of the study areas during the dry and rainy season; the data was collected once in a month for two (2) months in each location, for dry season and was equally collected during rainy season. The survey took place in January and February, 2025 for dry season; and then June and July, 2025 for wet/rainy season data collection. A total of nine (9) transects points ranging from 100m in length and covering a distance of 1km were surveyed at different location. During each observation, the researcher stayed at a vantage position recording birds seen at least 50m on either side of the point. Whenever a bird is sighted, the total distance away from the point of origin and approximate coordinates was recorded using a Garmin GPS device. A pair of binoculars was used to confirm the identification of birds located by eye. Birds guide book was used to identify bird species and a birds call or song was identified and recorded.

2.3 Data Analysis

Species diversity in each habitat was quantified using the Shannon–Wiener index (H'), calculated as:

$$H' = \sum_{i=1}^s P_i \ln P_i \quad (1)$$

where P_i represents the proportion of individuals in species i and s is the total number of species in the community. This index captures both the richness (number of species) and the evenness (relative abundance) of species distribution (LibreTexts, 2025).

3. Results and Discussion

The survey carried across all study areas and seasons yielded substantial data on avian species diversity and community structure is presented in Tables 1, 2 and 3. The overall findings reveal the ecological richness of the study areas and provide baseline data for understanding bird community dynamics in the areas. The study recorded a total of 54 bird species, 32 families belonging to 16 orders across all study areas, with a combined abundance of 2,157 individuals. The species composition showed remarkable diversity, ranging from highly abundant species to rare occasional visitors, indicating a complex and well-structured avian community.

Table 1: Checklist of Bird Species in the Study Areas

S/N	Species Name	Scientific Names	Family	Order
1	Fulvous whistling duck	<i>Dendrocygna bicolor</i>	Anatidae	Anseriformes
2	Abdim's stork	<i>Ciconia abdimii</i>	Ciconiidae	Ciconiiformes
3	Black headed heron	<i>Ardea melanocephala</i>	Ardeidae	pelecaniformes
4	Cattle egret	<i>Bubulcus ibis</i>	Ardeidae	pelecaniformes
5	little bittern	<i>Ixobrychus minutus</i>	Ardeidae	pelecaniformes
6	Hammerkop	<i>Scopus umbretta</i>	Scopidae	pelecaniformes
7	Shikra	<i>Accipiter badius</i>	Accipitridae	accipitiriformes
8	Black shoulder kite	<i>Elanus axillaris</i>	Accipitridae	pelecaniformes
9	Common kestrel	<i>Falcon tinnunculus</i>	Falconidae	Falconiformes
10	Spur-winged lapwing	<i>Vanellus spinosus</i>	Recurvirostridae	charadriiforme
11	Sand piper	<i>Scolopacidae</i>	Scolopacidae	charadriiforme
12	Plover	<i>Charadrius spp</i>	Charadriidae	charadriiforme
13	African crane	<i>Creopis egregia</i>	Rallidae	Gruiformes
14	Laughing dove	<i>Spilopelia senegalensis</i>	Columbidae	Culumbiformes
15	Speckle pigeon	<i>Columba guinea</i>	Columbidae	Culumbiformes
16	Adamawa turtle dove	<i>Streptopelia hypopyrrha</i>	Columbidae	Culumbiformes
17	Bruce's green pigeon	<i>Treron waalia</i>	Columbidae	Culumbiformes
18	Mourning dove	<i>Zenaid macroura</i>	Columbidae	Culumbiformes
19	Rin-neck dove	<i>Streptopelia capicola</i>	Columbidae	Culumbiformes
20	Western plantain-eater	<i>Crinifer piscator</i>	Musophagidae	Musophagiformes
21	Senegal coucal	<i>Centropus senegalensis</i>	Cucullidae	Cuculiforme
22	Yellow bill	<i>Melanitta nigra</i>	Cucullidae	Cuculiforme
23	Black cuckoo	<i>Cuculus clamosus</i>	Cucullidae	Cuculiforme
24	Levaillants cuckoo	<i>Clamator levaillantii</i>	Cucullidae	Cuculiforme
25	Large-tailed Nighttiger	<i>Caprimulgus macrurus</i>	Caprimulgidae	Caprimulgiformes
26	Palm swift	<i>Cypsiurus balasiensis</i>	Apodidae	Apodiformes
27	Green Wood hoopoe	<i>Phoeniculus purpureus</i>	Phoeniculidae	Bucerotiformes
28	Redbilled hornbill	<i>Tockus erythrorhynchus</i>	Bucerotidae	Bucerotiformes
29	African grey hornbill	<i>Tockus nasutus</i>	Bucerotidae	Bucerotiformes
30	Abyssinian roller	<i>Coracias abyssinicus</i>	Coraciidae	Coraciiforme
31	Broad billed roller	<i>Eurystomus glaucurus</i>	Coraciidae	Coraciiforme
32	Pied kingfisher	<i>Ceryle rudis</i>	Alcedinidae	Coraciiforme
33	Woodland king fisher	<i>Halcyon senegalensis</i>	Alcedinidae	Coraciiforme
34	Rosy bee-eater	<i>Merops malimbicus</i>	Meropidae	Coraciiforme
35	Bearded barbet	<i>Lybius dubius</i>	Lybiidae	Piciformes
36	Piapiac	<i>Ptilostomus afer</i>	Corvidae	Passeriformes
37	Pied crow	<i>Corvus albus</i>	Corvidae	Passeriformes
38	Long tailed glossy starling	<i>Lamprotornis caudatus</i>	Stunidae	Passeriformes
39	Cape glossy starling	<i>Lamprotornis nitens</i>	Stunidae	Passeriformes
40	Splendid glossy starling	<i>Lamprotornis splendidus</i>	Stunidae	Passeriformes
41	Yellow billed shrike	<i>Corvinella corvine</i>	Mallaconotidae	Passeriformes
42	Common bulbul	<i>Pycnonotus barbatus</i>	Pycnotidae	Passeriformes
43	Southern cordon blue	<i>Uraeginthus angolensis</i>	Estrildidae	Passeriformes
44	Red checked cordon blue	<i>Uraeginthus bengalus</i>	Estrildidae	Passeriformes

45	Magpie mannaki	<i>Copsychus saularis</i>	Estrildidae	Passeriformes
46	Northern red bishop	<i>Euplectes franciscanus</i>	Ploceidae	Passeriformes
47	Village weaver	<i>Ploceus cucullatus</i>	Ploceidae	Passeriformes
48	Northern grey headed sparrow	<i>Passer griseus</i>	Passeridae	Passeriformes
49	Pin-tailed whydah	<i>Vidua macroura</i>	Vidauidae	Passeriformes
50	Beautiful sunbird	<i>Cinnyris pulchellus</i>	Nectriniidae	Passeriformes
51	Variable sunbird	<i>Cinnyris venustus</i>	Nectriniidae	Passeriformes
52	Fork-tailed drongo	<i>Dicrurus adsimilis</i>	Dicrouridae	Passeriformes
53	Croacking cisticola	<i>Cisticola natalensis</i>	Cisticolidae	Passeriformes
54	River prinia	<i>Prinia fluviatilis</i>	Cisticolidae	Passeriformes

Table 2: Shannon-Weiner Diversity Index Analysis across the habitats in Jalingo, Ardo-kola and Yorro Local Government Area of Taraba.

Parameter	Value	Interpretation
Shannon- Weiner Index (H')	3.42	High species diversity
Species Evenness (J)	0.85	Well-distributed abundances
Species Richness (S)	54	High number of species
Maximum Possible H'	4.06	Theoretical maximum for 53 species
Relative Diversity	84.2%	Percentage of maximum possible diversity

Table 3: Seasonal Diversity Comparison across the habitats in Jalingo, Ardo-kola and Yorro Local Government Areas of Taraba.

Parameter	Dry Season	Wet Season	Difference	Percentage Change
Total Species	45	52	+7	+15.6%
Total Abundance	1,241	916	-241	-15.6%
Shannon-Weaver Index (H')	3.18	3.35	+0.17	+5.3%
Species Evenness (J)	0.83	0.87	+0.04	+4.8%
Unique Species	6	13	+7	+116.7%

The diversity analysis reveals exceptionally high levels of species diversity and community balance across the study areas; these reflect the ecological richness of the region which likely supports diverse habitat types suitable for various bird species. The Shannon-Weiner index value of 3.42 indicates remarkable species diversity that compares favorably with other tropical and subtropical bird communities, suggesting that the study area maintains healthy ecosystem functioning with minimal ecological stress and this call for serious conservation efforts in the area. The species evenness value of 0.85 demonstrates well-distributed abundances across the community, indicating that no single species or small group of species dominates the ecosystem to the exclusion of others. This high evenness might be attributed to optimal resource partitioning and niche availability. The relative diversity of 84.2% suggests that the community is approaching its theoretical maximum diversity potential, indicating minimal ecological stress and optimal resource utilization which draw attention of many species so as to avoid competing for food resources. The dominance of Northern red bishop, Speckled pigeon and Piapiac suggesting that these species are particularly well-adapted to the local environmental conditions and availability food resources, abundant grasses, presence of insects and others ecological requirements. The Northern red bishop's prominence (10.57% relative abundance) indicates extensive grassland habitats suitable for this granivorous species, while the high abundance of Speckled pigeon suggests adequate nesting sites, good breeding ground and food resources in the urban and semi-urban environments. This observation agrees with Soh *et al.*, (2024) who find out that urban area have become significant habitats for

various bird species, such as pigeons, sparrows and crows which are highly adaptable, often utilizing human structures for nesting and finding food in human refuse. The presence of water-associated species like Cattle egret and the diversity of insectivorous species indicate the proximity of aquatic habitats in some selected sites and the presence abundant invertebrate such as insects, maggot, butterflies, caterpillar while the abundance of seed-eating species like various doves suggests adequate food resources in the form of seeds and fruits throughout the study areas as it observed in the field. This findings concurs with Nubuya *et al.* (2023) who reported that high productive environment, suitable ecosystem, wide variety of food resources, presence of fresh grasses, availability of water, good vegetation cover, good breeding and nesting sites, moderate level of disturbance, moderate level of predation, presence of insects, their caterpillar/maggot, seeds, fruits, grasses, leaves, availability of fish and invertebrates which influenced high diversity for some families of birds like, *Columbidae* (Speckled pigeon), *Ploceidae* (Black-winged red bishop) and *Accipitridae* (Hen harrier).

The seasonal analysis reveals significant temporal changes in bird community structure that reflect resource availability and migration patterns. During the wet season, the Shannon-Weiner index reaches 3.35 compared to 3.18 in the dry season, indicating that resource abundance and distribution during the rainy period create more balanced species assemblages. This is because the unlimited food resources in an area might cause species to migrate from one place to another in search of food especially water and breeding site. This aligned with Nubuya *et al.* (2023) who reported that seasonal changes in breeding, foraging behavior of birds attracted more family *Nectarinidae* to the Forest zone and weather condition change and the intra African and Palearctic migrants that returned from their residential habitat for roost and breed.

Species evenness shows a similar pattern, with the wet season achieving 0.87 compared to 0.83 in the dry season, suggesting that the arrival of migratory species and dispersal of resident populations create more equitable abundance distributions. Contrary to diversity patterns, total abundance shows higher values during the dry season compared to the wet season, reflecting resource concentration effects where birds aggregate around limited water, shelter and food sources during dry periods, moreover the presence nesting site, good breeding and absent predators due to the openness in vegetation during dry season might contribute to this seasonal changes in species diversity and abundance. The wet season supports 52 species compared to 45 in the dry season, confirming the arrival of migratory species that contribute to increased species richness during the rainy seasons. This aligned with Ma *et al.* (2024) who pointed out that seasonal availability of food resources, such as insects in the summer and seeds in the winter, drives these migrations.

Conclusion

The study reveals that bird communities in Jalingo, Ardo-Kola and Yorro are not only species-rich but also remarkably balanced, reflecting ecosystems that are healthy and resilient. Seasonal shifts show how rainfall, food availability and migration weave together to create dynamic but stable assemblages, with wet seasons boosting richness and dry seasons concentrating abundances around vital resources. The adaptability of species like the Northern red bishop and Speckled pigeon illustrates how both natural and human-modified habitats can sustain thriving bird populations. Protecting these landscapes is therefore urgent; not just for birds, but for the ecological services and cultural values that healthy savannah ecosystems provide.

Ethics Statement

The authors declare that there are no conflicts of interest.

This article does not contain any studies involving human or animal subjects.

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