

## AVIAN DIVERSITY OF LAHORE ZOO SAFARI IN WINTER SEASON LAHORE, PAKISTAN

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### ABSTRACT

The study was carried out to observe the avian diversity during winter season at Lahore Zoo safari. Lahore zoo safari is located in (31° 22' 57 N, 74° 12' 47 E and elevation 208m) district Lahore, Punjab, Pakistan. The ecosystem is a composite of wetland, terrestrial and irrigated plantation. The survey was carried out from October 2014 to December 2014 to record the bird diversity. A total 2085 birds belonging to 52 species covering 30 families and 12 orders were observed. The season wise distribution was resident were 37 (71.1%), winter migratory 11(21.1%), and summer breeder 4 (7.6%). Shannon-Weiner diversity index 1.93 shown a low profile of avian diversity along with, Simpson's diversity index 0.64, species evenness 0.49, species richness 52 and census index was 1021.7birds/km<sup>2</sup>. Among the most dominant species were House crow *Corvus splendens* (n=600), House sparrow *Passer domesticus* (n=85), Common myna *Acridotheres tristis* (n=63), Jungle babbler *Turdoides striatus* (n=50) and Black crowned night heron *Nycticorax nycticorax* (n=30).

**Key words:** Diversity indices, Urbanization, Winter Diversity, Lahore Zoo Safari.

### INTRODUCTION

Pakistan holds a pantropic variety of ecosystems, which in turn captures the attention of avian fauna to manipulate their assets. More than 650 species of birds have been reported in Pakistan and their occurrence in three zoogeographical zones (Oriental, Palearctic and Ethiopian region) is unique in the world (Grimmett *et al.*, 2001; Mirza and Wasiq 2007). Protected areas in the world flourish biodiversity especially avian diversity, which creates balance in the environment and gives healthy ecosystem. Preserved areas are accredited as an important tool in preserving animal and plant species and ecosystems. These ecosystems vary substantially from country to country depending upon the preferences, national requirements and on differences in institutional, legislative and financial support (Khan, 2004). Pakistan has 235 protected areas, including 24 national parks, 99 wildlife sanctuaries, 100 game reserves and 14 unclassified areas. Distinctive color stripes and modifying behavior of birds provides us a clear visual indication attracting us towards the nature and their natural habitat among of all other species. Species richness of a particular area gives us the ecological importance regarding to their natural habitat.

### MATERIALS AND METHODS

**Study Area:** Lahore Zoo Safari (31° 22' 57 N, 74° 12' 47 E) at elevation of 208m was established at 250 acres in

1981. The ecosystem that is composite of wetland, terrestrial and irrigated plantation. Geographically, it resembles with Changa Manga plantations. A large percentage of bird species are sensitive to deforestation followed by urbanization which cause in reduction of species diversity that are highly selective for scrub habitat, (Mahboob *et al.*, 2013).

The present study was thoroughly conducted first time with the objectives to enlist and identify various bird species and to estimate their population in the area. Furthermore, the effect of urbanization on different populations of bird species in and around study area has studied.

The study was carried out from October 2014 to December 2014, covering the winter season to observe the migratory birds in addition to resident species. The survey was conducted on monthly basis to record bird diversity in the dawn (7:00 to 9:30 am) and dusk (4:00 to 6:30 pm). Birds were directly observed with naked eye and binocular of standard (10×50mm) following different field guides, literature reviews and knowledge of inhabitants.

**Point Count Method:** Three different Points were selected (Figure-1) which includes all aspects as wetland area (P: 1), irrigated plantation (P: 2), and woodland (P: 3) of study area to observe and count the birds using binocular (Haldin and Ulfvens, 1987) followed by identifying diversity indices (Shannon, 1948; Simpson, 1949).



Figure.1. Study Area (Guide Map); P; 1: Wetland Area, P; 2: Irrigated Plantation, P;3:Woodland Area

Source: Lahore Zoo Safari Information Desk

**Local Occurrence Status:** Number of individuals of a species were indicated by its local occurrence status including its frequency and the comparative abundance as reported by Bull (1974).

## RESULTS AND DISCUSSION

The study area was a composite of terrestrial ecosystem, irrigated plantation along with wetland area. Hence this complex ecosystem provides natural habitat,

food availability and suitable conditions, therefore, it favors outstandingly diverse population of birds. The avifauna was combination of both resident and migratory bird species. During visits a total 2085 birds belonging to 52 species covering 46 genera, 30 families and 12 orders were observed from the area (Table 1). The observed avifauna was representing combination of avian species found in freshwater and terrestrial habitat.

Table. 1: Observed Avifauna at Lahore Zoo Safari, Lahore

Order	Family	Scientific Name	Total	%
Galliformes	Phasianidae	<i>Francolinus pondicerianus</i>	1	0.05%
Anseriformes	Anatidae	<i>Anas platyrhynchos</i>	10	0.50%
Piciformes	Picidae	<i>Dinopium benghalense</i>	1	0.05%
		<i>Dendrocopos bahrattensis</i>	1	0.05%
Coraciiformes	Upupidae	<i>Upupa epops</i>	2	0.09%
	Ancinidae	<i>Halcyon gularis</i>	1	0.05%
Cuculiformes	Cuculidae	<i>Centropus sinensis</i>	1	0.05%
Psittaciformes	Psittacidae	<i>Psittacula eupatria</i>	2	0.09%
		<i>Psittacula krameri</i>	6	0.28%
Gruiformes	Rallidae	<i>Amaurornis phoenicurus</i>	19	0.91%
		<i>Gallinula chloropus</i>	7	0.33%
Columbiformes	Columbidae	<i>Columba livia</i>	3	0.14%
		<i>Streptopelia decacto</i>	11	0.54%
		<i>Streptopelia senegalensis</i>	18	0.86%
Charadiiformes	Scolopacidae	<i>Calidris temminckii</i>	6	0.28%
		<i>Actitis hypoleucos</i>	4	0.19%
	Charadriidae	<i>Vanellus indicus</i>	9	0.43%
Ciconiiformes	Ardeidae	<i>Nycticorax nycticorax</i>	75	3.50%
		<i>Ardeola grayii</i>	20	0.95%
		<i>Bubulcus ibis</i>	32	1.95%
Falconiformes	Accipitridae	<i>Milvus bigrans</i>	21	1.00%
		<i>Accipiter badius</i>	2	0.09%
		<i>Buteo rufinus</i>	1	0.05%
Passeriformes	Laniidae	<i>Lanius schach</i>	7	0.33%
	Corvidae	<i>Corvus splendens</i>	1130	54.10%
		<i>Dendrocitta vagabunda</i>	6	0.28%
	Rhipiuridae	<i>Rhipidura aureola</i>	5	0.23%

Dicruridae	<i>DicrurusBacrocercus</i>	5	0.23%
	<i>Phonicurusochruros</i>	9	0.43%
	<i>Saxicolaidesfulicata</i>	7	0.33%
	<i>Copsychussaularis</i>	9	0.43%
Muscicapidae	<i>Saxicolatorquata</i>	6	0.28%
	<i>Cercomelafusca</i>	5	0.23%
	<i>Saxicolacaprata</i>	53	2.54%
	<i>Lusciniasvecica</i>	2	0.09%
	<i>Oenanthepicata</i>	3	0.14%
Sturnidae	<i>Acridotheresginginianus</i>	5	0.23%
	<i>Acridotheres tristis</i>	165	7.90%
Hirunidinidae	<i>Hirundorustica</i>	4	0.19%
	<i>Hirundosmithii</i>	2	0.09%
Pycnonotidae	<i>Pycnonotuscafer</i>	15	0.71%
Cisticolidae	<i>Priniabuchanani</i>	9	0.43%
Zosteropidae	<i>Zosterospalpebrosus</i>	2	0.09%
Tmaliidae	<i>Turdoides striatus</i>	110	5.27%
Turdidae	<i>Monticolasolitariae</i>	2	0.09%
Sylbiidae	<i>Orthotomussutorius</i>	11	0.52%
Nectariniidae	<i>Nectariniaasiatica</i>	1	0.05%
Passeridae	<i>Passer montanus</i>	16	0.76%
	<i>Passer domesticus</i>	217	10.40%
Motacillidae	<i>Motacilla alba</i>	12	0.57%
	<i>Motacillamaderaspatensis</i>	7	0.33%
Estrildidae	<i>Lonchurapunctulata</i>	7	0.33%
		2085	100%

\* R = RESIDENT, W M = WINTER MIGRATORY, S B, SUMMER BREEDER

Passeriformes was the most dominant order represented by 29 species belonging to 17 families, followed by Charadiiformes, which was represented by 3 species belonging to 2 families. Order Coraciiformes was represented by 2 species belonging to 2 families. Order Falconiformes, Ciconiiformes, Columbiformes, Piciformes, Psittaciformes, Gruiformes were represented by 3, 3, 3, 2, 2, 2 species respectively belonging to single family. Order Galliformes, Cuculiformes and Anseriformes were represented by single species each belonging to single family each.

The study area provides plenty of food resources especially insects, crustaceans, small invertebrates, arachnids, grains, seeds, fruits and wasteful material of human beings, which supports most of the Passeriformes species like common myna, barn swallow and house sparrow etc. For example common myna which scrounge on the ground among grass for insects, and particularly for grasshopper, that's why it gets the generic name *Acridotheres*, "grasshopper hunter" (Ali *et al.*, 2001). The important flora of study area includes Safaida *Eucalyptuscamaldulensis*, Mulberry *Morus alba*, Sukh Chain *Pongamia glabra*, Date Palm *Phoenix dactylifera* and Kikar *Acacia nilotica* provides the plenty of food along with shelter and also host nests of different species including House Sparrow, Common Myna and Jungle Babbler etc. This dominantly supports Passeriformes order. Diversified plant species have a direct or indirect relation with the availability of shelter including their nesting space, food as well as little concern with water, parching and roosting facilities (Mahboob *et al.*, 2013).

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Different birds shows less or low profile of diversity for a particular kind of food. *Ziziphus* species fruit provides rich supply of food that attracts Mynas, Babblers, Bulbuls and Parakeets. Among five dominant species four were of Passeriformes order and their abundance is due to availability of their specific food in abundance (Table: 2).

Bird's relative abundance was also observed and has shown in table that predicts about five dominant bird species in study area. Breeding season, habitat conditions and food enrichment might have close relationship with bird's relative abundance (Bibi and Ali, 2013) (Table: 2).

**Table. 2. Relative Abundance of Five Dominant Species Observed at Lahore Zoo Safari**

Sr. no	Scientific name & common name	Relative abundance
1	<i>Corvus splendens</i> ( House crow)	0.5419
2	<i>Passer domesticus</i> (House sparrow)	0.104
3	<i>Acridotheres tristis</i> (Common myna)	0.0791
4	<i>Turdoides striatus</i> ( Jungle babbler)	0.0527
5	<i>Nycticoraxnycticorax</i> (Night heron)	0.0359

Out of 52 bird species observed during our survey, 11 were winter visitors, 4 were summer breeder and 37 were residents. The winter visitors were Mallard (0.5%), Temminck's Stint (0.28%), Common sandpiper (0.19%), Long-Legged Buzzard (0.05%), Black Redstart (0.43%), Blue-Throat ( 0.09%), Variable Wheatear (0.14%), Barn Swallow (0.19%), Blue Rock Thrush (0.09%), Eurasian tree sparrow (0.76%) and White

Wagtail (0.57%). Severe temperature changes, low food availability, day night length variations, high risk of predation and unfavorable breeding places might be the reasons for their migration to Pakistan in winter season.

The summer breeders were Common Stonechat (0.28%), Wire-Tailed Swallow (0.09%), Purple Sunbird (0.05%) and Black Crowned Night Heron (3.50).

The value of Shannon Weiner index ranges from 1.5 to 4.5. The value 1.93 reveals low profile of avian diversity in study area. Simpson index ranges from 0 to 1. 0 shows infinite diversity and 1 means no diversity at all; 0.64 shows moderate diversity in study area. 0.49 value of species evenness depicts almost homogenized species distribution in the study area (Table-3).

**Table 3. Diversity Indices Current Study**

DIVERSITY INDEX	RESULTS
Shannon Weiner Index $H'$	1.93
Simpson Index $D$	0.64
Species Evenness $E$	0.49
Census Index $C.I$	1021.7 birds/km <sup>2</sup>
Species Richness $r$	52

Eurasian tree sparrow is identified during our observations as tree sparrow has not well explained clearly by Robert (1991, 92), Mirza and Wasiaq (2007) and by Grimmett (2008). They have reported its presence but in a very minor range along Lahore surrounding areas but specifically they have reported it summer breeder but unexpectedly its presence has been notified in winter season as a winter visitor during our survey durations.

**Threats:** Some common threats were identified were deforestation, urbanization, lack of public awareness to care avian diversity and grazing of domestic animals in the bird's habitat (Table-4).

**Table 4: Threats observed at Study Area**

Threats	high	medium	low
Deforestation	✓		
Urbanization	✓		
Unawareness		✓	
Grazing			✓

**Deforestation:** Deforestation has been done for renovation of the park, which clears some shelters for birds and thereby reducing their number.

**Urbanization:** Deforestation alone has less adverse effects until it is not followed by rapid and haphazard urbanization. Urbanization around biodiversity rich areas is the lethal cause of diversity decline because it increases illegal hunting and netting along with its premier factor shelter decline etc.

**Unawareness:** Unawareness about importance of wildlife in developing countries like Pakistan is the emerging cause of wildlife decline.

**Grazing:** Grazing has very little effect on Safari's diversity as it happens in very low ratio. Mainly grazing has been done by the domestic animals which have been kept around Lahore Zoo Safari settlement areas.

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