



Seasonal Biomonitoring of bird diversity in and around Research Designs and Standards Organisation Campus (R.D.S.O.), Lucknow, Uttar Pradesh, India

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Abstract

The diversity of bird is most vital bio-indicator to analyze the frame of habitats. The present study was conducted for a period of four months starting from July 2025 to October 2025 in RDSO. During the observation time, a total 20 bird species were recorded in different transect of the observation area. RDSO campus in Lucknow has, a rich and diverse bird population, a healthy ecosystem due to its significant green cover and varied habitats. This study, is to know and improve the avifaunal biodiversity of this area with little care and concern such as providing bird feed, water and bird houses for the bird species.

Keywords: Bird diversity, Bio-indicator, Seasonal biomonitoring, Different transect.

Introduction

The diversity of the avifauna is one of the most crucial ecological markers for assessing the condition of habitats. Since ancient times, people have a close relationship with birds. Numerous birds are revered with religious overtones in Indian culture, and people are deeply concerned

about preserving them. In order to sustain a trophic level, birds are an essential component of an ecosystem. They are the most fascinating group in the animal kingdom, and are studied by both scientists and students due to their unique biological characteristics. They are also a vital component of all natural ecosystems. Diversity of avifauna is one of the most important ecological

indicators to evaluate the status of habitats. The human-bird association is since ancient times and is an intimate one. In Indian culture there are a number of birds that are worshiped with religious sentiments and people are emotionally involved in their conservation. Birds are crucial part of an ecosystem and contribute to maintain a trophic level. Activities of birds are considered as indicator of superiority of ecosystem and they also form the incurable links in many food chains, hence they imitate changes originating in several different ecosystem components (Custer and Osborne 1977). The detail study on avifauna and their ecology is important to protect them. They are one of the biological pest management tools to control pests in gardens, on farms, and other places. In RDSO water birds are also present, The term, water bird or aquatic bird is used to refer the birds that live on or around water bodies; they may be fresh water or marine. But some water birds are more terrestrial than others, and their adaptations vary depending on their environment. The present study of wetlands helps to maintain a record of water bird to restore and maintain the present condition of wetland. Wetlands play a crucial role in maintaining ecosystem and support various life forms. Man depends upon wetlands for various livelihood services but this interaction with wetlands is rapidly unlinked due to intensified industrial development and pollution by domestic and industrial sewage ((Amita Kannaujia et al. 2015). Birds are the best known group of animal taxa at the global level, with the most extended time series data available (James et al. 2017). The movement of birds from one place to another is an incredible migratory behavioural cycle driven by evolutionary trends among different species of birds and makes them one of the unique and fascinating creatures of this natural world (Lincoln & Peterson 1979). Assessment of avifaunal communities is essential because they can serve as effective indicators of ecosystem status and health, in both qualitative and quantitative terms. This is because birds perform diverse ecological roles, ranging from disease regulation and, biomass recycling to environmental sanitation, seed dispersal, and pollination (James et al. 2017; Mukhopadhyay & Mazumdar 2017; Kiros et al. 2018). Birds are also

sources of food and, spiritual inspiration, in addition to being important components of tourism industries (Kiros et al. 2018). Therefore, baseline information on birds of a particular locality, such as a species checklist, is vital for ecological monitoring, environmental assessments, conservation planning (Kandel et al. 2018; Sharma et al. 2018), and exploring eco-tourism potentials. The first exploration of avifauna in Bhutan was conducted in 1837 by a British team (Gyeltshen et al. 2020). Here in this study, We explore the avian diversity and present a comprehensive bird checklist for the bird diversity in RDSO, located at Lucknow. A number of studies on biodiversity, taxonomy and documentation of the avifauna have been reported from many parts of the Uttar Pradesh state by a number of authors; Gopi and Kittur, 2011; Yadav et al. 2020; Jha, 2013; Chaube et al. 2018; Mishra, 2020; Bhargava et al. 2016; Kumar et al. 2018; Mazumder and Khan, 2020; Verma, 2020; Kumari et al. 2020; Singh et al. 2018; Prakash & Verma 2016; Kanaujia et al. 2015; Tomar and Chouksey, 2018; Kumar et al. 2015; Mishra et al. 2016; Dwevedi et al. 2014; Kushwaha et al. 2019. The present study is the first documentation and checklist of the avifauna from RDSO, Lucknow, Uttar Pradesh, India.

Materials and Methods

Study Area

The Research Designs and Standards Organization in Lucknow located on a sprawling campus spread over 159 hectares (approximately 17.1 million square feet) in Manak Nagar, Lucknow. It is situated near Manak Nagar Station of Lucknow. The area (RDSO) for the study was chosen for the easy to regular and periodic observation as required for the study. The Geographical status of R.D.S.O. at 26.83° North latitude and 80.91° East longitudinal in Lucknow district of Uttar Pradesh, India. The climate condition of that area has a humid subtropical climate with cool, dry winters with daytime temperatures around 25°C and nighttime lows ranging from 3°C to 7°C, extremely hot and dry



Figure:- 1 The map of study area and R.D.S.O. main campus

summers with temperatures often ranging between 40° and 45°C. The normal annual rainfall is approximately 953mm, with the wettest month being July. Common trees found in the Research Designs and Standards Organization (RDSO) and surrounding areas, include native species like neem (*Azadirachta indica*), mahua (*Madhuca longifolia*), banyan (*Ficus benghalensis*), peepal (*Ficus religiosa*), ashoka (*Saraca asoca*), sheesham (*Dalbergia sissoo*), amaltas (*Cassia fistula*), gulmohar (*Delonix regia*), babul (*Vachellia nilotica*) trees. Other fruit trees planted in the region include Mango, Guava, Litchi, Amla, Peach, Pomegranate, Lemon. RDSO greenery initiatives includes planting thousands of trees, with a focus on fruit trees, within its Lucknow campus and converting leaf waste into compost.

Methodology

The present study was conducted for a period of four months starting from July, 2025 to October, 2025 in RDSO and their surrounding areas of Lucknow, covering one season remarkable (Rainy

season). The bird survey was conducted every after two days. In the study area, four different transects varying in length and comprising different habitats, were selected for data collection. The data collection carried out twice in a day in the morning (6:00 am to 9:00 am) and in evening (3:00 pm to 6:00 pm). The birds are identified using standard field guide books of Ali & Ripley, 1995, Grimmett et al., 1998, Salim Ali, 2002. Birds were counted by using direct count method from walking within the selected study area of Lucknow. Photographs were taken with the help of camera (74 megapixel) of phone. The birds were observed most active during the period of day.

Transects selection

In the survey of study area there are four different transect, varying in lengths were selected for the collection of data during study time. Location of all four transects areas (T1, T2, T3, T4) with their length and habitat demonstrated in the table form.

Table 1. Length and habitat of transects in the study area

S.NO	Transects	Transect Length	Habitat at Transect	Transect method
1	T1	2Km	Urban Area	Line TM
2	T2	1.5Km	Wetland	Point TM
3	T3	3Km	Semi Urban Area	Line TM
4	T4	2Km	Forest Area	Point TM

Relative Diversity (RD_i) denotes percentage occurrence of various families concerning the whole bird community and is a powerful tool for the population study related to family diversity and dominance. It was calculated following Koli (2014).

$$RD_i = \frac{\text{Number of species in a family}}{\text{Total number of species}} \times 100$$

Results

During the observation time, a total 20 bird species were recorded in different transect of the

observation area. These 20 avian species belong to 9 orders, 13 families. Out of the observed 9 orders, the avian species richness was highest for the Order Passeriformes (8 species) followed by Columbiformes (4 species), Cuculiformes (2 species), Psittaciformes (1 species), Gruiformes (1 species), Galliformes (1 species), Bucerotiformes (1 species), Pelecaniformes (1 species), Ciconiiformes (1 species). Passeriformes alone accounted 40 % of total observed avian species. The second largest order was Columbiformes which have total 4 species which belonging to the family Columbidae and Cuculidae respectively

which constitute the 20 % of the total avifaunal biodiversity. The Orders Psittaciformes, Bucerotiformes, Galliformes , Ciconiiformes ,& Gruiformes were constitute the 5 % of the total avifaunal biodiversity.

Monthly Variations

For the evaluation of monthly variations in avian diversity, the data recorded during periodic visits was computed month wise for the four months of the study. The maximum species richness was recorded in the month of August-October, 2025

(15 species) and minimum in the month of July, 2025 (7 species).

Diurnal Variations in Avian Diversity of The Study Area

The evaluation of diurnal variations in avian diversity was done by observing the birds during whole day in two diurnal phases viz. Morning and Evening Phase. Maximum numbers of birds were observed during the Morning Phase whereas the Evening Phase accounted for minimum numbers of birds were observed.

Table 1: Checklist of birds recorded in RDSO

S.No.	Common name	Zoological name	Feeding habit
Order: Columbiformes			
Family: Columbidae			
1	Spotted Dove	<i>Spilopelia chinensis</i>	OV
2	Pigeon	<i>Patagioenas leucocephala</i>	OV
3	Feral pigeon	<i>Columdia livia domestica</i>	OV
4	Laughing dove	<i>Spilopelia senegalensis</i>	OV
Order: Passeriformes			
Family: Leiothrichidae			
5	Jungal babbler	<i>Turdodies striata</i>	OV
Family: Sturnidae			
6	Common Myna	<i>Acridotheres tristis</i>	OV
Family: Corvidae			
7	House Crow	<i>Corvus splendor</i>	OV
8	Jungle Crow	<i>Corvus macrorhynchos</i>	OV
9	Rufous treepie	<i>Dendrocitta vagabunda</i>	OV
Family: Muscicapidae			
10	Oriental magpie robin	<i>Copsychus saularis</i>	OV
Family: Nectariniidae			
11	Olive backed sunbird	<i>Cinnyris jugularis</i>	OV
Family: Passeridae			
12	House sparrow	<i>Passer domesticus</i>	GV

Order: Psittaciformes Family: Psittaculidea			
13	Rose ringed parakeet	<i>Psittacula krameri</i>	FV
Order: Gruiformes Family: Rallidae			
14	White breasted waterhen	<i>Amaurarnis phoenicurus</i>	OV
Order: Galliformes Family: Pharianidae			
15	Indian Peafowl	<i>Pava cristatus</i>	OV
Order: Bucerotiformes Family: Bucerotidae			
16	Indian grey hornbill	<i>Ocyceros birostis</i>	OV
Order: Pelecaniformes Family: Ardeidae			
17	Indian pond Heron	<i>Ardeola grayii</i>	OV
18	Cattle egret	<i>Bubulcus ibis</i>	CV
Order: Cuculiforms Family: Cuculidae			
19	Greater coucal	<i>Centropus sinensis</i>	OV
20	Asian koel	<i>Eudynamys scolopaceus</i>	OV

CV- Carnivorous| OV- Omnivorous| GV- Granivorous

Table 2: Observation table showing % composition of order

S.No.	Name of Order	No. of species in order	% composition of order
1	Passeriforms	8	40%
2	Cuculiforms	2	10%
3	Gruiforms	1	5%
4	Galliforms	1	5%
5	Psittaciforms	4	20%
6	Ciconiiforms	1	5%
7	Columbiforms	1	5%
8	Bucerotiforms	1	5%
9	Pelecaniforms	1	5%

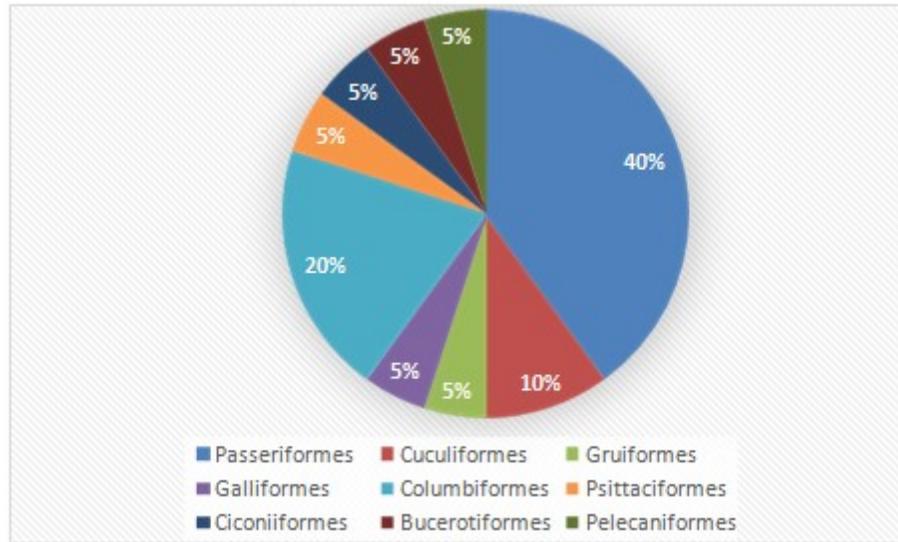


Fig 2. Avian Species richness per order recorded in Study area

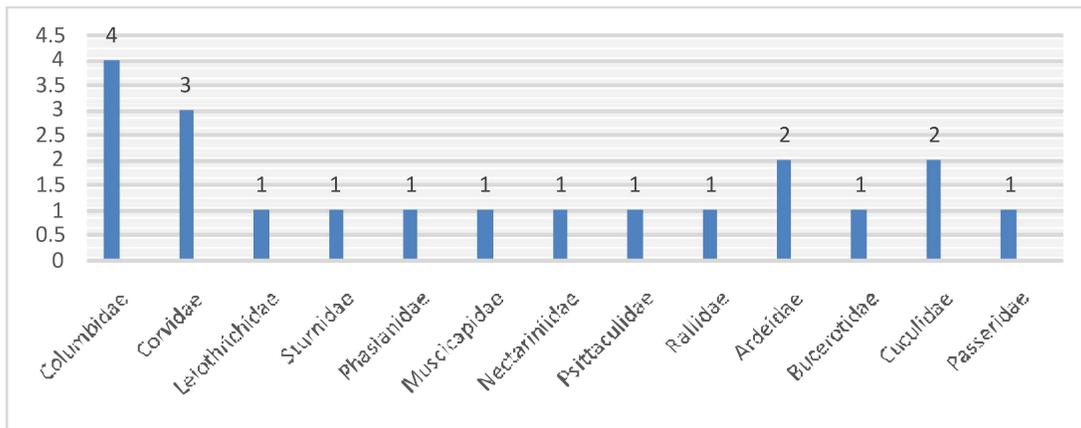


Fig 3. Family wise species richness observed in Study areas

Table 3- Observation Table showing % Composition of family

S.No.	Name of Family	No. of species in a family	% Composition of species in a family
1	Columbidae	4	20%
2	Corvidae	3	15%
3	Leiothrichidae	1	5%
4	Sturnidae	1	5%
5	Phasianidae	1	5%
6	Muscicapidae	1	5%
7	Nectariniidae	1	5%
8	Psittaculidae	1	5%
9	Rallidae	1	5%
10	Ardeidae	2	10%
11	Bucerotidae	1	5%
12	Cuculidae	2	10%
13	Passeridae	1	5%

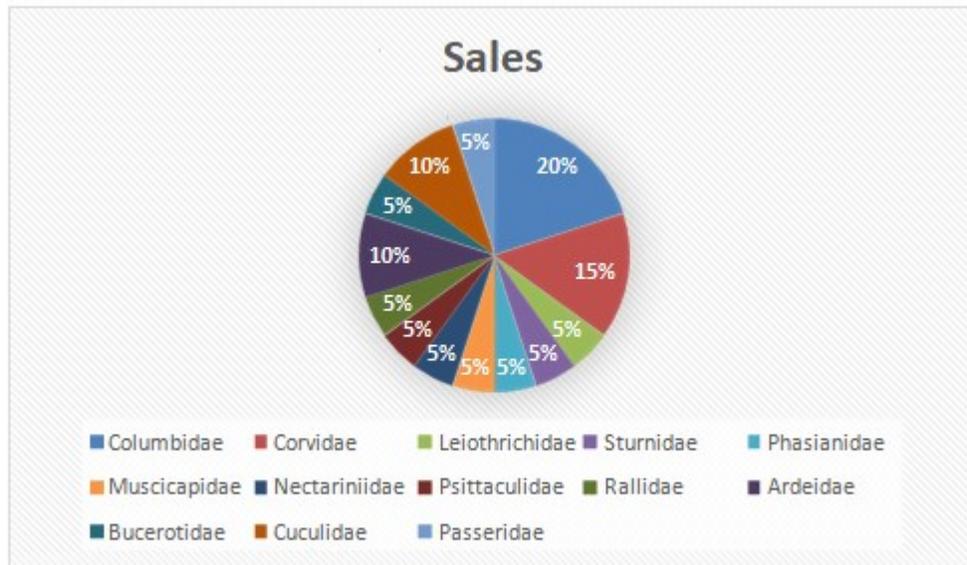


Fig 4. Avian species richness per family recorded in Study Area

Picture 1 – Photographs of some bird species, observed during study



Acridotheres tristis (Myna)



Centropus sinensis
(Greater coucal)



Patagioenas leucocephala
(Pigeon)



Pava cristatus
(Indian peafowl)



Bubulcus ibis(Cattle Egret)



Passer domesticus (House sparrow)



Spilopelia chinensis
(Spotted dove)



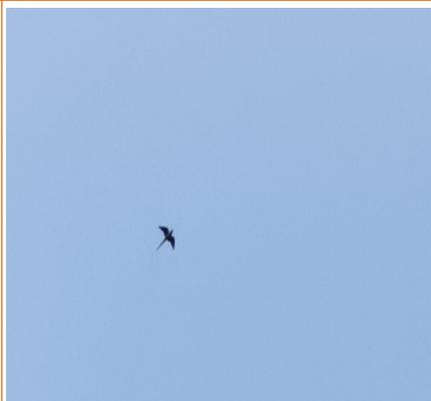
Amaurornis phoenicurus
(White breasted waterhen)



Spilopelia senegalensis
(Laughing dove)



Turdodius striata
(Jungle babbler)



Psittacula krameri
(Rose-ringed parakeet)



Ardeola grayii
(Indian pond heron)



Corvus splendens
(House crow)



Corvus macrorhynchos
(Jungle crow)



Copsychus saularis
(Oriental magpie robin)



Dendrocitta vagabunda
(Rufous Treepie)



Ocyrceros birostitis
(Indian grey hornbill)



Cinnyris jugularis
(Olive-backed sunbird)

Conclusion

It can conclude that the total number of 20 bird species were observed during the study time. The Research Designs and Standards Organisation (RDSO) campus in Lucknow has a rich and diverse bird population, a healthy ecosystem due to its significant green cover and varied habitats. This area showed a rich & diverse present of nearly 20 species of birds in its varied habitat, belonging to the 9 orders and 13 families. In this area there are some common birds were observed belonging to the order Passeriformes which showed a maximum number of birds diversity. The purpose of this study, is to know and improve the avifaunal bio-diversity of this area with little care and concern such as providing bird feed, water and bird houses for the bird species.

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Quick Response Code	
DOI: 10.22192/ijarbs.2026.13.02.005	

How to cite this article:

Sakshi Kannaujia, Princess Tiwari & Amrita Singh. (2026). Seasonal Biomonitoring of bird diversity in and around Research Designs and Standards Organisation Campus (R.D.S.O.), Lucknow, Uttar Pradesh, India. *Int. J. Adv. Res. Biol. Sci.* 13(2): 39-50.

DOI: <http://dx.doi.org/10.22192/ijarbs.2026.13.02.005>