



# Spatial Variation in Avifaunal Diversity from Various Green Spaces of Indore City, Madhya Pradesh

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## ABSTRACT

Indore city harbours a wide variety of birds. The objective of the present study was to assess the avian diversity and its spatial variation at four different locations of Indore city viz. Meghdoot Garden, Nehru Park, Lalbagh and Pipliyapala Regional Park. A yearly survey of avian fauna was carried out from January to December 2018 by adopting line transect and point count method. A total of 58 bird species belonging to 13 order and 34 families were recorded during the present study. The highest number of avian fauna was recorded in Pipliyapala Regional Park (58), followed by Lalbagh (41), then Meghdoot Garden (39) and the least number was 34 at Nehru Park. Order Passeriformes was found to be dominant in the study. Furthermore, family Columbidae was dominant having 8% contribution in Meghdoot Garden. Similarly, Muscicapidae was 12% in Nehru Park and Lalbagh each and family Muscicapidae was 10% dominant in Regional Park. This study highlights the need for conservation and importance of Green spaces in urban cities.

**Key Words:** Avian fauna, Meghdoot garden, Nehru park, Lalbagh, Pipliyapala Regional Park

## INTRODUCTION

Birds are significant element of global biodiversity [1]. There are about 1,314 species from Indian Subcontinent, out of which 450 species are reported from Central India [2]. In recent years, ornithologists have delved into various habitats and highlighted that birds are highly sensitive to obnoxious condition [3].

Estimation of avian diversity is an essential tool in assessment of ecological health (Qualitative and Quantitative) of an ecosystem [4]. Diseases, presence of predators and competition due to limited resources have led to decline in population of birds over the years [5]. Land use pattern have changed over the years; furthermore, urban cities have recreation parks and gardens which have succeeded in attracting good avifauna [6].

Availability of different food resources makes it possible for birds to preferring different guilds and to choose variety of habitats. Proper maintenance of the garden and increase in plantation certainly would increase the number of birds in the near future [7].

Indore city consists of favorable environment for avian fauna to survive in this area and this city is also becoming green and clean day by day. The central idea of the proposed study is to find out the richness of avian fauna in green spaces of the urban city. The result of the present investigation is helpful in evaluating the spatial variation among all the four sites of Indore city.

## MATERIALS AND METHODS

### Study area

The study area of Indore city was divided into following zones based on the cardinal directions:

### Site I: Meghdoot Garden

It is one of the voluminous gardens in Vijay Nagar (Periphery of Indore). Dominant trees in the place include *Polyalthia longifolia*, *Ficus benghalensis* var. *krishnae*, *Mangifera indica* and *Ficus bengalensis*.

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### Site II: Nehru Park

It is the most crowded park of Indore city and is situated near main office of BSNL Indore. *Polyalthia longifolia*, *Ficus religiosa*, *Ficus benghalensis* var. *krishnae*, *Mangifera indica*, *Sapodilla plum* and *Ficus bengalensis* are few indigenous trees are present in the park.

### Site III: Lal Bagh

It is situated in the periphery of Indore city. It is maintained by the Archeological Department of the state. Trees present are perennial in nature and are exotic and indigenous both.

### Site IV: Pipliyapala Regional Park

It is also known as Atal Bihari Vajpayee Regional Park. It is developed by Indore Development Authority (IDA) and maintained by Nagar Nigam Indore. Trees like *Callistemon citrinus*, *Annona squamosa* and *Butea monosperma* are main attraction during spring season.

### Study Period

The present study was conducted in one year (2018) and it was divided into following season.

- A. Winter season – (November to February)
- B. Summer season- (March to June)
- C. Rainy season- (July to October)

### Identifications of birds were done by the following books.

Birds of the Indian Subcontinent by Richard Grimmett, Carol Inskipp and Tim In skipp [8].

A DSLR camera was used for photography birds at different locations.

## METHODS

The following two different methods were adopted for study Avifaunal Diversity.

### Method 1: Line Transect method

While walking on a continuous pace, it is easier to locate and detect all the avian fauna around the transect line. It is possible to cover a large area in less time. This is better than adopting any other methods [9].

### Method 2: Point Count Method

This is the second method in which an observer sit or stand at a particular location of the study site and records all the birds seen around him/her by focusing on the bird call and keenly listening to every movement around him/her [9].

## RESULTS

### Spatial Variation

The result of spatial variation of birds of different study sites (Meghdoot Garden, Nehru Park, Lalbagh and Pipliyapala Regional Park) during January 2018 to December 2018 were represented in Table 1-4 and their graphical representation (family wise) is shown in Graph 1-4.

### Spatial variation of birds in Meghdoot Garden

In Meghdoot Garden total 39 species of avian fauna was recorded which belonged to 11 orders and 30 families. The observed species were represented in Table – 1.

These species belongs to order Columbiformes, Cuculiformes, Pelecaniformes, Charadriiformes, Accipitriformes, Strigiformes, Bucerotiformes, Piciformes, Coraciiformes, Psittaciformes and Passeriformes.

The family wise percentage composition of these birds in Meghdoot Park was Columbidae (8%), Cuculidae (5%), Ardeidae (3%), Charadriidae (3%), Accipitridae (5%), Strigidae (3%), Bucerotidae (3%), Megalaimidae (3%), Meropidae (3%), Alcedinidae (3%), Psittaculidae (5%), Campephagidae (3%), Aegithinidae (3%), Dicuridae (3%), Rhipiduridae (3%), Corvidae (5%), Monarchidae (3%), Dicaeidae (3%), Nectariniidae (3%), Estrildidae (3%), Passeridae (3%), Paridae (3%), Cisticolidae (3%), Hirundinidae (5%), Pycnonotidae (3%), Phylloscopidae (3%), Zosteropidae (3%), Leiothrichidae (3%), Sturnidae (5%) and Muscicapidae (5%).

### Spatial variation of birds in Nehru Park

In Nehru Park total 34 species of avian fauna was recorded which belonged to 12 orders and 26 families. The observed species were represented in Table – 2.

These species belongs to order Columbiformes, Caprimulgi-formes, Cuculiformes, Pelecaniformes, Charadriiformes, Accipitriformes, Strigiformes, Bucerotiformes, Piciformes, Coraciiformes, Psittaciformes and Passeriformes.

The family wise percentage composition of these birds in Nehru Park was Columbidae (9%), Apodidae (3%), Cuculidae (3%), Ardeidae (3%), Charadriidae (3%), Accipitridae (6%), Strigidae (3%), Bucerotidae (3%), Megalaimidae (3%), Meropidae (3%), Alcedinidae (3%), Psittaculidae (3%), Oriolidae (3%), Aegithinidae (3%), Dicuridae (3%), Rhipiduridae (3%), Corvidae (9%), Dicaeidae (3%), Nectariniidae (3%), Passeridae (3%), Cisticolidae (3%), Hirundinidae (3%), Pycnonotidae (3%), Leiothrichidae (3%), Sturnidae (3%) and Muscicapidae (12%).

### Spatial variation of birds in Lalbagh

In Lalbagh, total 41 species of avian fauna was recorded which belonged to 11 orders and 27 families. The observed species were represented in Table – 3.

These species belongs to Order Columbiformes, Caprimulgiformes, Cuculiformes, Charadriiformes, Accipitriformes, Strigiformes, Bucerotiformes, Piciformes, Coraciiformes, Psittaciformes and Passeriformes.

The family wise percentage composition of these birds in Pipliyapala Regional Park was Columbidae (7%), Apodidae (2%), Cuculidae (5%), Charadriidae (2%), Accipitridae (5%), Strigidae (2%), Bucerotidae (2%), Megalaimidae (2%), Meropidae (2%), Alcedinidae (2%), Psittaculidae (2%), Campephagidae (5%), Oriolidae (2%), Aegithinidae (2%), Dicruridae (2%), Corvidae (7%), Nectariniidae (2%), Estrildidae (2%), Passeridae (2%), Motacillidae (2%), Cisticolidae (5%), Hirundinidae (5%), Pycnonotidae (2%), Zosteropidae (2%), Leiothrichidae (2%), Sturnidae (5%) and Muscicapidae (12%).

### Spatial variation of birds in Pipliyapala Regional Park

In Pipliyapala Regional Park total 58 species of avian fauna was recorded which belonged to 13 orders and 34 families. The observed species were represented in Table – 4.

These species belongs to Order Galliformes, Columbiiformes, Caprimulgiformes, Cuculiformes, Pelecaniformes, Charadriiformes, Accipitriformes, Strigiformes, Bucerotiformes, Piciformes, Coraciiformes, Psittaciformes and Passeriformes.

The family wise percentage composition of these birds in Pipliyapala Regional Park was Phasianidae (2%), Columbidae (5%), Apodidae (2%), Cuculidae (5%), Ardeidae (3%), Charadriidae (2%), Accipitridae (7%), Strigidae (2%), Bucerotidae (2%), Megalaimidae (2%), Meropidae (2%), Alcedinidae (2%), Psittaculidae (5%), Campephagidae (3%), Oriolidae (2%), Aegithinidae (2%), Dicruridae (2%), Rhipiduridae (2%), Corvidae (5%), Monarchidae (2%), Dicaeidae (2%), Nectariniidae (3%), Estrildidae (2%), Passeridae (2%), Motacillidae (3%), Paridae (2%), Cisticolidae (3%), Hirundinidae (5%), Pycnonotidae (2%), Phylloscopidae (2%), Zosteropidae (2%), Leiothrichidae (2%), Sturnidae (3%) and Muscicapidae (10%).

**Table 1: List of birds in Meghdoot Garden during January 2018-December 2018**

Common name	Scientific name	Family	Order	Local name(s)
Rock Pigeon	<i>Columba livia</i>	Columbidae	Columbiformes	Kabutar
Spotted Dove	<i>Streptopelia chinensis</i>			Chitroka fakhta
Laughing Dove	<i>Streptopelia senegalensis</i>			Chhota fakta
Indian House Swift	<i>Apus affinis</i>	Apodidae	Caprimulgiformes	Ababeel
Asian Koel	<i>Eudynamis scolopaceus</i>	Cuculidae	Cuculiformes	Koel
Cattle Egret	<i>Bubulcus ibis</i>	Ardeidae	Pelecaniformes	Surkhia bagla
Red-wattled Lapwing	<i>Vanellus indicus</i>	Charadriidae	Charadriiformes	Titeeri
Shikra	<i>Accipiter badius</i>	Accipitridae	Accipitriformes	Chipka
Black Kite	<i>Milvus migrans</i>			Cheel
Spotted Owlet	<i>Athene brama</i>	Strigidae	Strigiformes	Chughad
Indian Grey Hornbill	<i>Ocyeros birostris</i>	Bucerotidae	Bucerotiformes	Dhanesh
Coppersmith Barbet	<i>Psilopogon haemacephalus</i>	Megalaimidae	Piciformes	Chota basanta
Green Bee-eater	<i>Merops orientalis</i>	Meropidae	Coraciiformes	Harrial
White-throated Kingfisher	<i>Halcyon smyrnensis</i>	Alcedinidae		Chota killila
Rose-ringed Parakeet	<i>Psittacula krameri</i>	Psittaculidae	Psittaciformes	Tota
Indian Golden Oriole	<i>Oriolus kundoo</i>	Oriolidae	Passeriformes	Peelak
Common Iora	<i>Aegithina tiphia</i>	Aegithinidae		Shaubeegi
Black Drongo	<i>Dicrurus macrocercus</i>	Dicruridae		Bhujanga
White-throated Fantail	<i>Rhipidura albicollis</i>	Rhipiduridae		Chakdil
Rufous Treepie	<i>Dendrocitta vagabunda</i>	Corvidae		Mahalat
House Crow	<i>Corvus splendens</i>			Kowwa
Large-billed Crow	<i>Corvus macrorhynchos</i>			Kala kowwa
Thick-billed Flowerpecker	<i>Dicaeum agile</i>	Dicaeidae		Phul soohgi
Purple-rumped Sunbird	<i>Leptocoma zeylonica</i>	Nectariniidae		Shakar Khora

Table 1: (Continued)

Common name	Scientific name	Family	Order	Local name(s)
House Sparrow	<i>Passer domesticus</i>	Passeridae		Gauriya
Common Tailorbird	<i>Orthotomus sutorius</i>	Cisticolidae		Darzee
Dusky Crag Martin	<i>Ptyonoprogne concolor</i>	Hirundinidae		Chatan ababil
Red-vented Bulbul	<i>Pycnonotus cafer</i>	Pycnonotidae		Bulbul
Jungle Babbler	<i>Turdoides striata</i>	Leiothrichidae		Sat bhai
Common Myna	<i>Acridotheres tristis</i>	Sturnidae		Desi myna
Indian Robin	<i>Saxicoloides fulicatus</i>	Muscicapidae		Kalchuri
Oriental Magpie Robin	<i>Copsychus saularis</i>			Dhaiyar
Red-breasted Flycatcher	<i>Ficedula parva</i>			Turra
Siberian Stonechat	<i>Saxicola maurus</i>			Khar pidda
Total = 39 Species		Total = 30 Families Total = 11 Order		

Table 2: List of birds in Nehru Park during January 2018-December 2018

Common Name	Scientific Name	Family	Order	Local name(s)
Rock Pigeon	<i>Columba livia</i>			Kabutar
Spotted Dove	<i>Streptopelia chinensis</i>	Columbidae	Columbiformes	Chitroka fakhta
Laughing Dove	<i>Streptopelia senegalensis</i>			Chhota fakta
Indian House Swift	<i>Apus affinis</i>	Apodidae	Caprimulgiformes	Ababeel
Asian Koel	<i>Eudynamis scolopaceus</i>	Cuculidae	Cuculiformes	Koel
Cattle Egret	<i>Bubulcus ibis</i>	Ardeidae	Pelecaniformes	Surkhia bagla
Red-wattled Lapwing	<i>Vanellus indicus</i>	Charadriidae	Charadriiformes	Titeeri
Shikra	<i>Accipiter badius</i>			Chipka
Black Kite	<i>Milvus migrans</i>	Accipitridae	Accipitriformes	Cheel
Spotted Owllet	<i>Athene brama</i>	Strigidae	Strigiformes	Chughad
Indian Grey Hornbill	<i>Ocyrceros birostris</i>	Bucerotidae	Bucerotiformes	Dhanesh
Coppersmith Barbet	<i>Psilopogon haemacephalus</i>	Megalaimidae	Piciformes	Chota basanta
Green Bee-eater	<i>Merops orientalis</i>	Meropidae		Harrial
White-throated Kingfisher	<i>Halcyon smyrnensis</i>	Alcedinidae	Coraciiformes	Chota kilbila
Rose-ringed Parakeet	<i>Psittacula krameri</i>	Psittaculidae	Psittaciformes	Tota
Indian Golden Oriole	<i>Oriolus kundoo</i>	Oriolidae		Peelak
Common Iora	<i>Aegithina tiphia</i>	Aegithinidae		Shaubeeegi
Black Drongo	<i>Dicrurus macrocercus</i>	Dicruridae		Bhujanga
White-throated Fantail	<i>Rhipidura albicollis</i>	Rhipiduridae		Chakdil
Rufous Treepie	<i>Dendrocitta vagabunda</i>			Mahalat
House Crow	<i>Corvus splendens</i>	Corvidae		Kowwa
Large-billed Crow	<i>Corvus macrorhynchos</i>			Kala kowwa
Thick-billed Flowerpecker	<i>Dicaeum agile</i>	Dicaeidae		Phul soohgi
Purple-rumped Sunbird	<i>Leptocoma zeylonica</i>	Nectariniidae		Shakar Khora
House Sparrow	<i>Passer domesticus</i>	Passeridae	Passeriformes	Gauriya
Common Tailorbird	<i>Orthotomus sutorius</i>	Cisticolidae		Darzee
Dusky Crag Martin	<i>Ptyonoprogne concolor</i>	Hirundinidae		Chatan ababil
Red-vented Bulbul	<i>Pycnonotus cafer</i>	Pycnonotidae		Bulbul
Jungle Babbler	<i>Turdoides striata</i>	Leiothrichidae		Sat bhai
Common Myna	<i>Acridotheres tristis</i>	Sturnidae		Desi myna
Indian Robin	<i>Saxicoloides fulicatus</i>			Kalchuri
Oriental Magpie Robin	<i>Copsychus saularis</i>			Dhaiyar
Red-breasted Flycatcher	<i>Ficedula parva</i>	Muscicapidae		Turra
Siberian Stonechat	<i>Saxicola maurus</i>			Khar pidda
<b>Total = 34 Species</b>		<b>Total = 26 Families Total = 12 order</b>		

**Table 3: List of birds in Lalbagh during January 2018-December 2018**

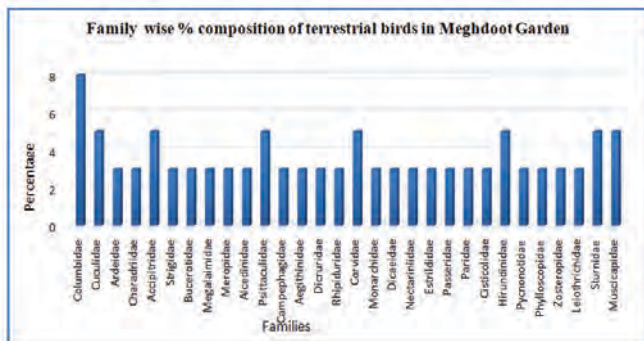
Common Name	Scientific Name	Family	Order	Local name(s)
Rock Pigeon	<i>Columba livia</i>	Columbidae	Columbiformes	Kabutar
Spotted Dove	<i>Streptopelia chinensis</i>			Chitroka fakhta
Laughing Dove	<i>Streptopelia senegalensis</i>			Chhota fakta
Indian House Swift	<i>Apus affinis</i>	Apodidae	Caprimulgiformes	Ababeel
Greater Coucal	<i>Centropus sinensis</i>	Cuculidae	Cuculiformes	Mahoka
Asian Koel	<i>Eudynamis scolopaceus</i>			Koel
Red-wattled Lapwing	<i>Vanellus indicus</i>	Charadriidae	Charadriiformes	Titeeri
Black-winged Kite	<i>Elanus caeruleus</i>	Accipitridae	Accipitriformes	Kapassi
Black Kite	<i>Milvus migrans</i>			Cheel
Spotted Owlet	<i>Athene brama</i>	Strigidae	Strigiformes	Chughad
Indian Grey Hornbill	<i>Ocyrceros birostris</i>	Bucerotidae	Bucerotiformes	Dhanesh
Coppersmith Barbet	<i>Psilopogon haemacephalus</i>	Megalaimidae	Piciformes	Chota basanta
Green Bee-eater	<i>Merops orientalis</i>	Meropidae	Coraciiformes	Harrial
White-throated Kingfisher	<i>Halcyon smyrnensis</i>	Alcedinidae		Chota kilbila
Rose-ringed Parakeet	<i>Psittacula krameri</i>	Psittaculidae	Psittaciformes	Tota
Small Minivet	<i>Pericrocotus cinnamomeus</i>	Campephagidae	Passeriformes	Saheli
Large Cuckooshrike	<i>Coracina javensis</i>			Kasya
Indian Golden Oriole	<i>Oriolus kundoo</i>	Oriolidae		Peelak
Common Iora	<i>Aegithina tiphia</i>	Aegithinidae		Shaubeegi
Black Drongo	<i>Dicrurus macrocercus</i>	Dicruridae		Bhujanga
Rufous Treepie	<i>Dendrocitta vagabunda</i>	Corvidae		Mahalat
House Crow	<i>Corvus splendens</i>			Kowwa
Large-billed Crow	<i>Corvus macrorhynchos</i>			Kala kowwa
Purple Sunbird	<i>Cinnyris asiaticus</i>	Nectariniidae		Phul soohgi
Indian Silverbill	<i>Euodice malabarica</i>	Estrildidae		Pidda
House Sparrow	<i>Passer domesticus</i>	Passeridae		Gauriya
White-browed Wagtail	<i>Motacilla maderaspatensis</i>	Motacillidae		Khanjan
Ashy Prinia	<i>Prinia socialis</i>	Cisticolidae		Phutki
Common Tailorbird	<i>Orthotomus sutorius</i>			Darzee
Wire-tailed Swallow	<i>Hirundo smithii</i>	Hirundinidae		Leishra
Barn Swallow	<i>Hirundo rustica</i>			Ababil
Red-vented Bulbul	<i>Pycnonotus cafer</i>	Pycnonotidae		Bulbul
Oriental White-eye	<i>Zosterops palpebrosus</i>	Zosteropidae		Baboona
Jungle Babbler	<i>Turdoides striata</i>	Leiotherichidae		Sat bhai
Asian Pied Starling	<i>Gracupica contra</i>	Sturnidae		Ablak myna
Common Myna	<i>Acridotheres tristis</i>			Desi myna
Indian Robin	<i>Saxicoloides fulicatus</i>	Muscicapidae		Kalchuri
Oriental Magpie Robin	<i>Copsychus saularis</i>			Dhaiyar
Tickell's Blue Flycatcher	<i>Cyornis tickelliae</i>			Adharanga
Red-breasted Flycatcher	<i>Ficedula parva</i>			Turra
Brown Rock Chat	<i>Oenanthe fusca</i>			Dauma
<b>Total = 41 Species</b>		<b>Total = 27 Families</b>	<b>Total = 11 Orders</b>	

**Table 4: List of birds in Pipliyapala Regional Park during January 2018-December 2018**

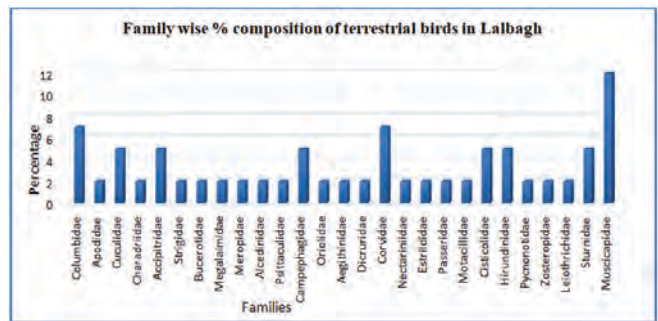
Common Name	Scientific Name	Family	Order	Local name(s)
Indian Peafowl	<i>Pavo cristatus</i>	Phasianidae	Galliformes	Mor
Rock Pigeon	<i>Columba livia</i>	Columbidae	Columbiformes	Kabutar
Spotted Dove	<i>Streptopelia chinensis</i>			Chitraloka fakhta
Laughing Dove	<i>Streptopelia senegalensis</i>			Chhota fakta
Indian House Swift	<i>Apus affinis</i>	Apodidae	Caprimulgi-formes	Ababeel
Greater Coucal	<i>Centropus sinensis</i>	Cuculidae	Cuculiformes	Mahoka
Pied Cuckoo	<i>Clamator jacobinus</i>			Kala Papiya
Asian Koel	<i>Eudynamys scolopaceus</i>			Koel
Indian Pond Heron	<i>Ardeola grayii</i>	Ardeidae	Pelecaniformes	Andha bagla
Cattle Egret	<i>Bubulcus ibis</i>			Surkhia bagla
Red-wattled Lapwing	<i>Vanellus indicus</i>	Charadriidae	Charadriiformes	Titeeri
Black-winged Kite	<i>Elanus caeruleus</i>	Accipitridae	Accipitriformes	Kapassi
Oriental Honey Buzzard	<i>Pernis ptilorhynchus</i>			Madkare
Shikra	<i>Accipiter badius</i>			Chipka
Black Kite	<i>Milvus migrans</i>			Cheel
Spotted Owlet	<i>Athene brama</i>	Strigidae	Strigiformes	Chughad
Indian Grey Hornbill	<i>Ocyrceros birostris</i>	Bucerotidae	Bucerotiformes	Dhanesh
Coppersmith Barbet	<i>Psilopogon haemacephalus</i>	Megalaimidae	Piciformes	Chota basanta
Green Bee-eater	<i>Merops orientalis</i>	Meropidae	Coraciiformes	Harrial
White-throated Kingfisher	<i>Halcyon smyrnensis</i>	Alcedinidae		Chota kilkila
Plum-headed Parakeet	<i>Psittacula cyanocephala</i>	Psittaculidae	Psittaciformes	Tuiya tota
Alexandrine Parakeet	<i>Psittacula eupatria</i>			Hiraman tota
Rose-ringed Parakeet	<i>Psittacula krameri</i>			Tota
Small Minivet	<i>Pericrocotus cinnamomeus</i>	Campephagidae	Passeriformes	Saheli
Large Cuckooshrike	<i>Coracina javensis</i>			Kasya
Indian Golden Oriole	<i>Oriolus kundoo</i>	Oriolidae		Peelak
Common Iora	<i>Aegithina tiphia</i>	Aegithinidae		Shaubeegi
Black Drongo	<i>Dicrurus macrocercus</i>	Dicruridae		Bhujanga
White-throated Fantail	<i>Rhipidura albicollis</i>	Rhipiduridae		Chakdil
Rufous Treepie	<i>Dendrocitta vagabunda</i>	Corvidae		Mahalat
House Crow	<i>Corvus splendens</i>			Kowwa
Large-billed Crow	<i>Corvus macrorhynchos</i>			Kala kowwa
Indian Paradise-flycatcher	<i>Terpsiphone paradisi</i>	Monarchidae		Dudhraj
Thick-billed Flowerpecker	<i>Dicaeum agile</i>	Dicaeidae		Phul soohgi
Purple-rumped Sunbird	<i>Leptocoma zeylonica</i>	Nectariniidae		Shakar Khora
Purple Sunbird	<i>Cinnyris asiaticus</i>			Phul soohgi
Indian Silverbill	<i>Euodice malabarica</i>	Estrildidae		Pidda
House Sparrow	<i>Passer domesticus</i>	Passeridae		Gauriya
White-browed Wagtail	<i>Motacilla maderaspatensis</i>	Motacillidae		Khanjan
White Wagtail	<i>Motacilla alba</i>			Dhoban
Black-lored Tit	<i>Machlolophus xanthogenys</i>	Paridae		peeli ramchakli

Table 4: (Continued)

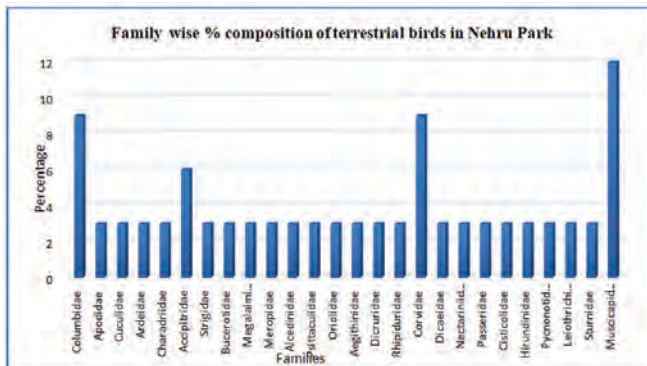
Common Name	Scientific Name	Family	Order	Local name(s)
Ashy Prinia	<i>Prinia socialis</i>	Cisticolidae		Phutki
Common Tailorbird	<i>Orthotomus sutorius</i>			Darzee
Wire-tailed Swallow	<i>Hirundo smithii</i>	Hirundinidae		Leishra
Barn Swallow	<i>Hirundo rustica</i>			Ababil
Dusky Crag Martin	<i>Ptyonoprogne concolor</i>			Chatan ababil
Red-vented Bulbul	<i>Pycnonotus cafer</i>	Pycnonotidae		Bulbul
Greenish Leaf Warbler	<i>Phylloscopus trochiloides</i>	Phylloscopidae		Hari piddi
Oriental White-eye	<i>Zosterops palpebrosus</i>	Zosteropidae		Baboona
Jungle Babbler	<i>Turdoides striata</i>	Leiothrichidae		Sat bhai
Asian Pied Starling	<i>Gracupica contra</i>	Sturnidae		Ablak myna
Common Myna	<i>Acridotheres tristis</i>			Desi myna
Indian Robin	<i>Saxicoloides fulicatus</i>	Muscicapidae		Kalchuri
Oriental Magpie Robin	<i>Copsychus saularis</i>			Dhaiyar
Tickell's Blue Flycatcher	<i>Cyornis tickelliae</i>			Adharanga
Red-breasted Flycatcher	<i>Ficedula parva</i>			Turra
Siberian Stonechat	<i>Saxicola maurus</i>			Khar pidda
Brown Rock Chat	<i>Oenanthe fusca</i>			Dauma
Total = 58 species		Total = 34 families	Total = 13 orders	



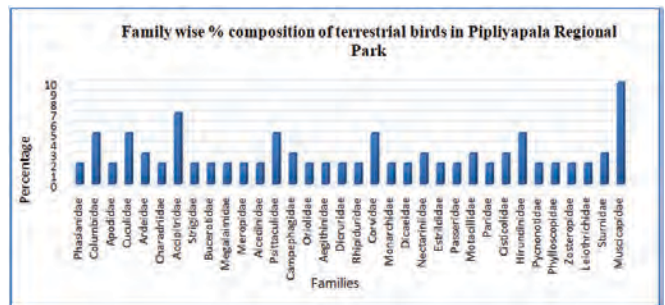
Graph 1: Graphical representation of birds (Family wise) in Meghdoot Garden during January 2018-December 2018.



Graph 3: Graphical representation of birds (Family wise) in Laibagh during January 2018-December 2018.



Graph 2: Graphical representation of birds (Family wise) in Nehru Park during January 2018-December 2018.



Graph 4: Graphical representation of birds (Family wise) in Pipliyapala Regional Park during January 2018-December 2018.

## DISCUSSION

A total of 58 bird species belonging to 13 order and 34 families were recorded during the present study. The highest number of avian fauna was recorded in Pipliyapala Regional Park with 58 bird species (Table – 4) followed by Lalbagh having 41 species (Table - 3), then at Meghdoot Garden (Table -1) having 39 bird species and least number of avian fauna recorded was 34 at Nehru Park (Table- 2). Species richness of 76 species of 13 order and 39 families were recorded in Ralamandal Wildlife Sanctuary [10] and 517 species were recorded in Madhya Pradesh and Chhattisgarh [11].

Family Columbidae was dominant having 8% contribution in Meghdoot Garden; Similarly, Muscicapidae was 12% in Nehru Park and Lalbagh which is also reported by several researchers [7, 12] and Muscicapidae was 10% in Regional Park [13]. Order Passeriformes was found dominant in our study with 23 species (58.9%) of the total richness in Meghdoot Park; 19 species having 55.8% contribution to the total fauna at Nehru Park; similarly, 26 species having 63.4% contribution in total avifaunal species in Lalbagh and 35 species which is 60.3% of the total birds found in Pipliyapala Regional Park (Table 1-4). Workers published a list of 32 species of Passeriformes [12]. Interestingly, Passeriformes dominance was concluded with 45 species [14] and 68 species [15] in various study areas of the state. Thus, the results of present study corroborate with above mentioned researchers.

## CONCLUSION

The present study highlights the importance of green spaces in cities. These areas are species rich and require regular monitoring and development to increase its existing biodiversity. A total of 58 species belonging to 13 orders and 34 families were reported in all our study sites collectively and its spatial variation was estimated. This investigation was first ever study conducted at Meghdoot and Nehru Park. The present study will provide the baseline information in near future in terms of conservation, awareness and sustenance of avian diversity in Indore city.

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## Conflict of Interest

There are no conflicts of interest to declare.

## REFERENCES

1. Bamford A, Moore JL, Brooks T, Burgess N, Hansen LA: Conservation conflicts across Africa. *Science* 2001;291:2616-2619.
2. Raju D, Ramachandran S: Photographic field guide Wildlife of Central India. Chennai: Notion Press; 2016. p. 1-300.
3. Kushwaha S, Kanaujia A, Kumar A, Kumar A, Maheshwari SK: Avifauna diversity of Tikamgarh District, Madhya Pradesh, India. *Discovery Nature* 2015; 9(20):20-32.
4. James AO, Emmanuel D, Bright AY: Diversity and abundance of bird species in Mole National Park, Damongo, Ghana. *Journal of Natural Science Research* 2017; 7(12): 20-33.
5. Jain A, Mudgal LK, Sharma GD: Spatial Relations of Migratory Birds and Water Quality Management of Sirpur Lake, Indore, Madhya Pradesh. *International Journal of Scientific Research and Education* 2015; 3(7): 4091-4096.
6. Luck GW, Daily GC, Ehrlich PR: Population diversity and ecosystem services. *Trends in Ecology and Evolution* 2003; 18:331-336.
7. Prakash MM, Panwar K, Malhotra M, Sharma VK, Kaskhedikar P, Sharma A, Dhakad NK: Birds of Holkar Science College Campus, Indore. *Trojectory* 2004; 2(1):59-63.
8. Grimmett R, Inskipp C, Inskipp T. *Birds of the Indian Subcontinent*. London: Christopher Helm; 2014. p. 1-556.
9. Bibby C, Burgess ND, Hill DA, Mustoe S: *Bird Census Techniques*. Academic Press; 2000. p. 200-331.
10. Bhonsle O, Gaherwal S: A Study of Avian Fauna at Ralamandal Wildlife Sanctuary, Ralamandal, Dist. Indore (M.P.). *International Journal of Current Trends in Science and Technology* 2018; 8(2): 20498-20504.
11. Chandra K, Singh RK: Avifauna of Madhya Pradesh and Chhattisgarh. *Zoo's Print Journal* 2004; 19(7): 1534-1539.
12. Bhonsle O, Shrivastava CS, Jain R, Gaherwal S: A Preliminary Study on Avian Fauna at Govt. (Model, Autonomous) Holkar Science College, Indore (M.P.). *International Journal of Scientific Research in Biological Sciences* 2018; 5(1):18-27.
13. Mewada MS: Ecological study and avifaunal diversity of Narmada River and its surrounding areas of Dindori district (M.P.). *International Journal of Scientific Research in Biological Sciences* 2017; 4(1): 4-9.
14. Sharma S, Shukla A: Preliminary study of avian faunal diversity of Polipathar area in Jabalpur (M.P.). *International Journal of Current Advanced Research* 2015; 4(9):364-367.
15. Talmale SS, Limje ME, Sambath S: Avian Diversity of Singhori Wildlife Sanctuary, Raisen District, Madhya Pradesh. *Biological Forum- An International Journal* 2012; 4(2): 52-61.



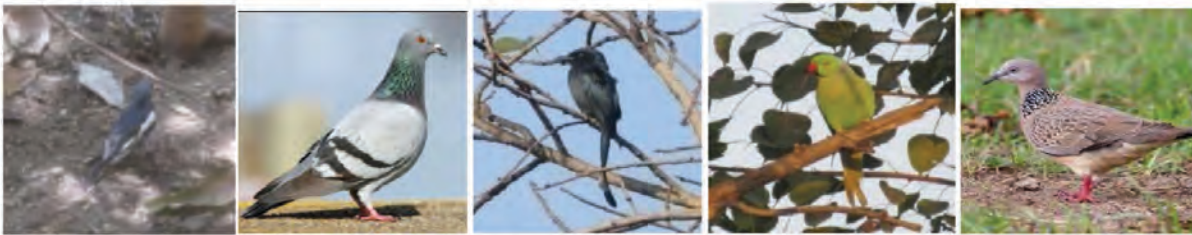
## FEW SNAPSHOTS OF AVIAN FAUNA OF THE PRESENT STUDY



*Turdoides striata*      *Ardeola grayii*      *Cinnyris asiaticus*      *Pycnonotus cafer*      *Eudynamys scolopaceus*



*Orthotomus sutorius*      *Centropus sinensis*      *Vanellus indicus*      *Dendrocitta vagabunda*      *Streptopelia senegalensis*



*Copsychus saularis*      *Columba livia*      *Dicrurus macrocercus*      *Psittacula krameri*      *Strptopelia chinesis*



*Ocyrceros birostris*      *Pavo cristatus*      *Apus affinis*      *Elanus caeruleus*      *Athene brama*



*Motacilla maderaspatensis*      *Accipiterbadius*      *Psilopogon haemacephalus*      *Passer domesticus*      *Merops orientalis*



*Halcyon symrnensis*      *Prinia socialis*      *Clamator jacobinus*      *Psittacula cyanocephala*      *Aegithina tiphia*



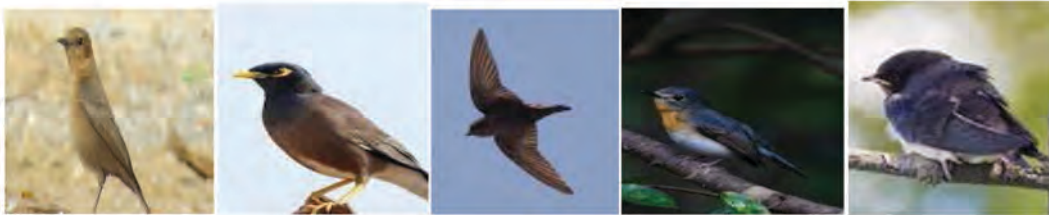
*Bulbulcus ibis*      *Psittacula eupatria*      *Terpsiphone paradise*      *Milvus migrans*      *Pericrocotus cinnamomeus*



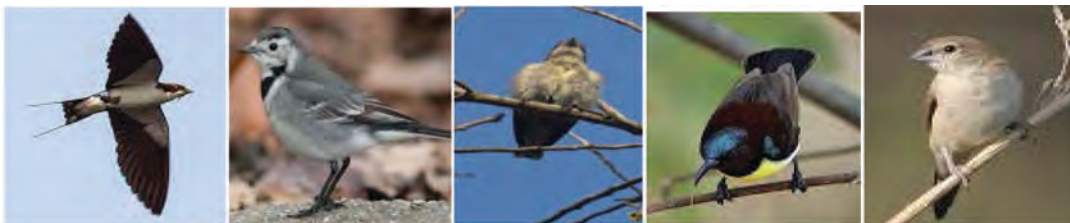
*Corvus splendens*      *Rhipidura albicollis*      *Ficedula parva*      *Gracupica contra*      *Oriolus kundoo*



*Saxicoloides fulicatus*      *Zosterops palpebrosus*      *Corana javensis*      *Saxiolus maurus*      *Phylloscopus trochiloides*



*Oenanthe fusca*      *Acridotheres tristis*      *Ptyonoprogene concolor*      *Cyornis tickelliae*      *Hirundo rustica*



*Hirundo smithii*      *Motacilla alba*      *Dicaeum agile*      *Leptocoma zeylonica*      *Euodice malabarica*