



SEASONAL AVIFAUNAL DIVERSITY IN RAMAKRISHNA ASHRAM GWALIOR, MADHYA PRADESH, INDIA

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AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Ramakrishna Ashram situated near city center in Gwalior city, its provide territory for various avifauna in different season. Present investigations were carried out on the diversity and status of avifauna in Ramakrishna Ashram from July 2019 to June 2020. Point count method and line transect method were followed for observation of bird species. Field visit were made early morning 7:00 am to 10:00 am and evening 4:00 pm to 6:00 pm. Bird species were recorded in the field area through direct sighting and listening voice. During the present study total 56 species of birds were identified belonging to 28 families and 13 orders. Among the total species 92% species were residential rest of all were residential migratory and according to IUCN threatened site all the species recorded from study area were least concern. During study period Passeriformes family was more dominant in all season, indicated that these species of family have high tolerance to fluctuating season and human anthropogenic activity in this area. Composition and species richness of bird community are influenced by abiotic factors and biotic factors.

Keywords: Avifauna; diversity; anthropogenic pressure; seasonal study; Ramakrishna Ashram; Gwalior.

1. INTRODUCTION

Birds are the most successful groups of vertebrates. The power of flight is a means of quick direct access of almost any spot on earth. They can feed on variety of food items and nest on infinite variety of sites. Most birds are useful to humans by providing meat and egg as sources of food, facilitating pollination, dispersing seed and fruits as well as biological control of insect pest like grasshopper, mosquito and others [1].

The world population continues to grow, accompanied by rapid urbanization and industrialization. In 2009, more than 50% of the

world's population was living in cities with the most rapid urban growth in low income regions. Loss of biodiversity is a worldwide phenomenon [2]. Even though cities only occupy 2.7% of the world's dry lands, urbanization leads to several environmental problems including damage to biodiversity [3]. Birds are globally seen as a flagship group for conservation, for ecological, evolutionary reasons, and they occupy a significant place in people's perception of nature. Birds are highly sensitive as well as mobile, and thus eminently suitable to study the impact of anthropogenic disturbance on biodiversity. India's bird diversity contains 13% of the world species richness, approximately 1300 species and contains several Endemic Bird Areas [4].

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Birds may shift to feeding on other food resources or migrate to other areas where their original resources are available when there is seasonal irregularity in the availability of food resources and breeding habitats [5]. Changes in the availability of food resource and climate factors can affect bird species richness and composition along with time and space [6]. Birds respond to changes in habitats because of their mobility and habitat selection [7].

Avifaunal diversity is an essential ecological tool which acts as an important indicator to evaluate different habitats both qualitatively and quantitatively [8]. Birds are also indicators of biodiversity and monitors of environmental change such as level of contaminations and environmental impact. Unfortunately global diversity of birds is decreasing incessantly primarily due to anthropogenic disturbances and climate change [9]. The major factor affecting the bird diversity is habitat destruction. Therefore, the majority of avian species are unknowingly enters to inhabit the urban area. The change in vegetation composition could impact the quantity and quality of habitat for birds in terms of food, water and cover, which can further affect diversity, abundance and distribution of birds [10].

1.1 Study Area

Ramakrishna Mission Ashrama covers an area of around 50 acres, which is located on Sachin

Tendulkar Marg, A beautiful hilly place in Gwalior, filled with a lot of greenery and a variety of flora and fauna. This park consist open area, grass land, dense forest, open forest and small aquatic area which support for different species of avifauna. This campus support large animals as well as human beings. Agriculture activities are also occurring in small part of this area. Many orphan children live in lap of nature. Hundreds of people come in this park Avery early morning for morning walk and exercise. Area is completely bounded with concrete wall in one side and another side with iron wire which provide protection (Fig. 1).

2. MATERIALS AND METHODS

Birds were studied based on direct observation method [11]. Point count and line transect methods were also followed. Five intensive study areas were selected for detailed observations. Bird population was estimated by total count method [12]. Species abundance, diversity index, seasonal fluctuation of bird community, habitat utilization of terrestrial birds was recorded and analyzed using statistical package. The observations were carried out with the aid of 8x40 binoculars and field characteristics were noted down during the study. Birds sighted during the study period were categorized according to their status as residents (R), resident migrants (RM) and winter migrants (M).

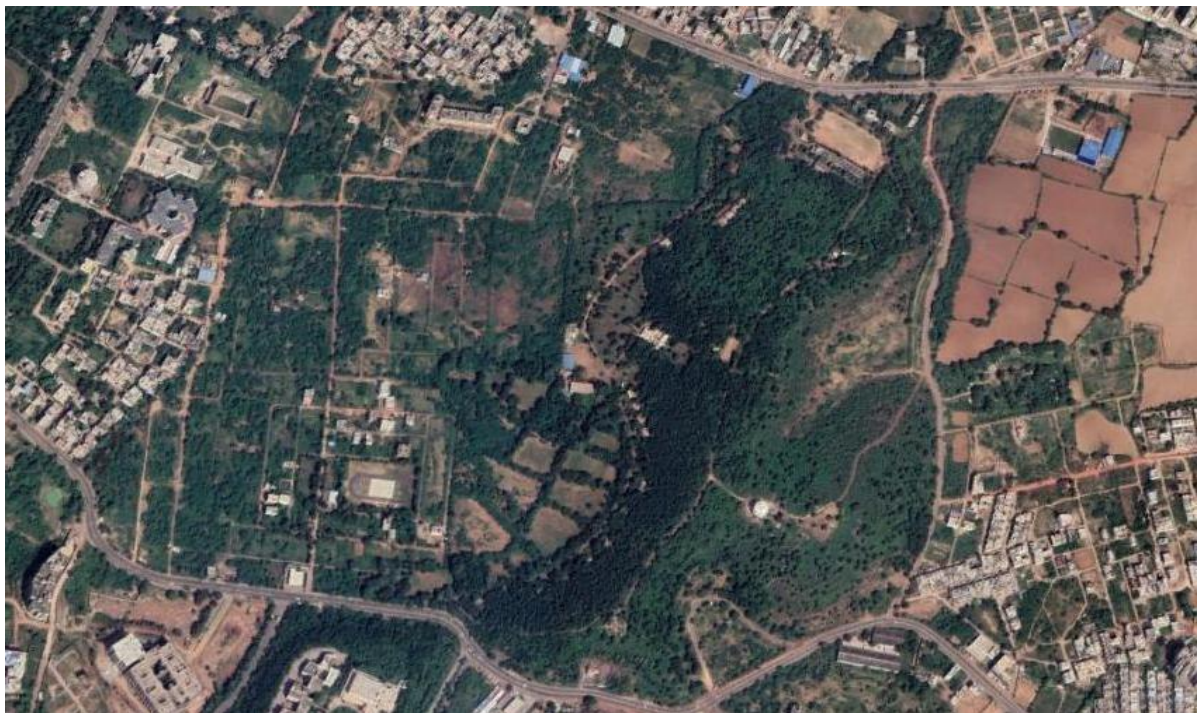


Fig. 1. Map shows study area

3. RESULTS AND DISCUSSION

The study revealed presence of total 53 Species of birds belonging to 33 families and 08 orders. The check list of recorded bird species along with their order, family, scientific name, common name, IUCN (International Union Conservation of Nature) status and residential status have been given in Table 1. According to IUCN red data book all the recorded species from study area was least concern. Birds species observed from total of recorded species 49 with 92% were residential, 4 species with 8% were residential migratory.

Family wise proportion of species richness of bird varied from 1% to 18%. There was Columbidae family represent 5 species (9%) followed by Sturnidae and Cuculidae 4 species each (8%), Motacillidae and Corvidae 3 species each (6%), Muscicapidae, Leiothrichidae, Megalaimidae, Rallidae, Ardeidae 2 species each (4%) rest of all family represent to 1 species each (2%) of each. Columbidae, Sturnidae, Cuculidae, Motacillidae and Corvidae were observed most dominant throughout the all season (Table 2 and Fig. 2).

Among total 53 species maximum species were recorded in winter season 49 with total numbers of individual of species 534 while 43 species with 419 individual of species were recorded in summer season

while less number 35 species with individual of species 273 were recorded in rainy season (Table 3). Dapke et al. [13] recorded total of 49 species were observed in winter season. In monsoon 44 species and in summer season 42 species were seen in and around Laxminarayan Institute of Technology campus, Nagpur. The common urban birds those were abundant in number were Red wattled Lapwing, Common Tailorbird, Rock Pigeon, Common Myna, House Crow, Asian Koel, Black Drongo, Oriental Magpie Robin, Red vented Bulbul, Jungle Babbler and Peacock. These birds are considered as urban adapters as they dwell around human habitation [14].

The present study recorded 1226 individuals of 53 species. The Shannon-wiener index, Evenness and Simpson diversity of different season were shown in Table 4. Out of three different seasons, winter season had the highest value of Shannon diversity index ($H' = 2.129$) while lowest value ($H' = 0.988$) in monsoon season during study period. Similarly Evenness were higher in winter season with value of 0.985 and lower in monsoon season with value of 0.362, Simpson index were higher recorded in winter season with value of 0.097 while lowest value of Simpson diversity recorded in monsoon season with value of 0.062 (Table 4). Similarly observations were made by Gatesire et al. [15] in relation to Urban Landscape types in Northern Rwanda.

Table 1. Checklist of bird species recorded in Ramakrishna Ashram

S. No.	Order	Family	Scientific Name	Species Name	IUCN Status	Res. Status
1	Passeriformes	Sturnidae	<i>Sturnia pagodarum</i>	Brahminy Starling	LC	R
2			<i>Acridotheres ginginianus</i>	Bank Myna	LC	R
3			<i>Acridotheres tristis</i>	Common Myna	LC	R
4			<i>Gracupica contra</i>	Asian Pied Starling	LC	R
5		Hirudinidae	<i>Hirundo rustica</i>	Barn Swallow	LC	RM
6		Muscicapidae	<i>Saxicoloides fulicatus</i>	Indian Robin	LC	R
7			<i>Copsychus saularis</i>	Oriental Magpie-robin	LC	R
8			Leiothrichidae	<i>Turdoides striata</i>	Jungle Babbler	LC
9		<i>Argya caudata</i>		Common Babbler	LC	R
10		Motacillidae	<i>Motacilla cinerea</i>	Grey Wagtail	LC	RM
11			<i>Motacilla maderaspatensis</i>	White-browed Wagtail	LC	R
12			<i>Anthus trivialis</i>	Tree Pipit	LC	RM
13			Corvidae	<i>Dendrocitta vagabunda</i>	Rufous Treepie	LC
14		<i>Corvus macrorhynchos</i>		Large-billed Crow	LC	R

15			<i>Corvus splendens</i>	House Crow	LC	R
16		Oriolidae	<i>Oriolus oriolus</i>	Eurasian Golden Oriole	LC	R
17		Estrilidae	<i>Lonchura punctulata</i>	Scaly-breasted Munia	LC	R
18		Passeridae	<i>Passer domesticus</i>	House Sparrow	LC	R
19		Cisticolidae	<i>Orthotomus sutorius</i>	Common Tailorbird	LC	R
20		Compephagidae	<i>Coracina macei</i>	Indian Cuckooshrike	LC	R
21		Nectariniidae	<i>Cinnyris asiaticus</i>	Purple Sunbird	LC	R
22		Dicruridae	<i>Dicrurus macrocercus</i>	Black Drongo	LC	R
23		Pycnonotidae	<i>Pycnonotus cafer</i>	Red-vented Bulbul	LC	R
24		Laniidae	<i>Lanius vittatus</i>	Bay-backed Shrike	LC	R
25		Monarchidae	<i>Terpsiphone paradise</i>	Indian Paradise-flycatcher	LC	R
26	Columbiformes	Columbidae	<i>Treron phoenicopterus</i>	Yellow-footed Green-pigeon	LC	R
27			<i>Columba livia</i>	Rock Dove	LC	R
28			<i>Spilopelia senegalensis</i>	Laughing Dove	LC	R
29			<i>Streptopelia tranquebarica</i>	Red Turtle-dove	LC	R
30			<i>Spilopelia chinensis</i>	Eastern Spotted Dove	LC	R
31		Cuculidae	<i>Centropus sinensis</i>	Greater Coucal	LC	R
32			<i>Cuculus micropterus</i>	Indian Cuckoo	LC	R
33			<i>Hierococcyx varius</i>	Common Hawk-cuckoo	LC	R
34			<i>Eudynamis scolopaceus</i>	Western Koel	LC	R
35		Alcedinidae	<i>Halcyon smyrnensis</i>	White-breasted Kingfisher	LC	R
36		Coraciidae	<i>Coracias benghalensis</i>	Indian Roller	LC	R
37		Meropidae	<i>Meropus orientalis</i>	Asian Green Bee-eater	LC	R
38	Galliformes	Phasianidae	<i>Pavo cristatus</i>	Indian Peafowl	LC	R
39			<i>Francolinus pondicerianus</i>	Grey Francolin	LC	R
40	Bucerotiformes	Bucerotidae	<i>Ocyeros birostris</i>	Indian Grey Hornbill	LC	RM
41		Upupidae	<i>Upupa epops</i>	Common Hoopoe	LC	R
42	Piciformes	Megalaimidae	<i>Psilopogon zeylanicus</i>	Brown-headed Barbet	LC	R
43			<i>Psilopogon haemacephalus</i>	Coppersmith Barbet	LC	R
44	Gruiformes	Rallidae	<i>Amaurornis phoenicurus</i>	White-breasted Waterhen	LC	R
45			<i>Gallinula chloropus</i>	Common Moorhen	LC	R

46	Charadriiformes	Charadriidae	<i>Vanellus indicus</i>	Red-wattled Lapwing	LC	R
47		Recurvirostridae	<i>Himantopus himantopus</i>	Black-winged Stilt	LC	R
48	Palecaniformes	Ardeidae	<i>Bubulcus ibis</i>	Cattle Egret	LC	R
49			<i>Ardeola grayii</i>	Indian Pondheron	LC	R
50	Caprimulgiformes	Apodidae	<i>Apus affinis</i>	Little Swift	LC	R
51	Strigiformes	Strigidae	<i>Athene brama</i>	Spotted Owlet	LC	R
52	Psittaciformes	Psittaculidae	<i>Psittacula krameri</i>	Rose-ringed Parakeet	LC	R
53	Accipitriformes	Accipitridae	<i>Accipiter badius</i>	Shikra	LC	R

Mg= Migratory Status, RM= Residential Migratory, R= Residential

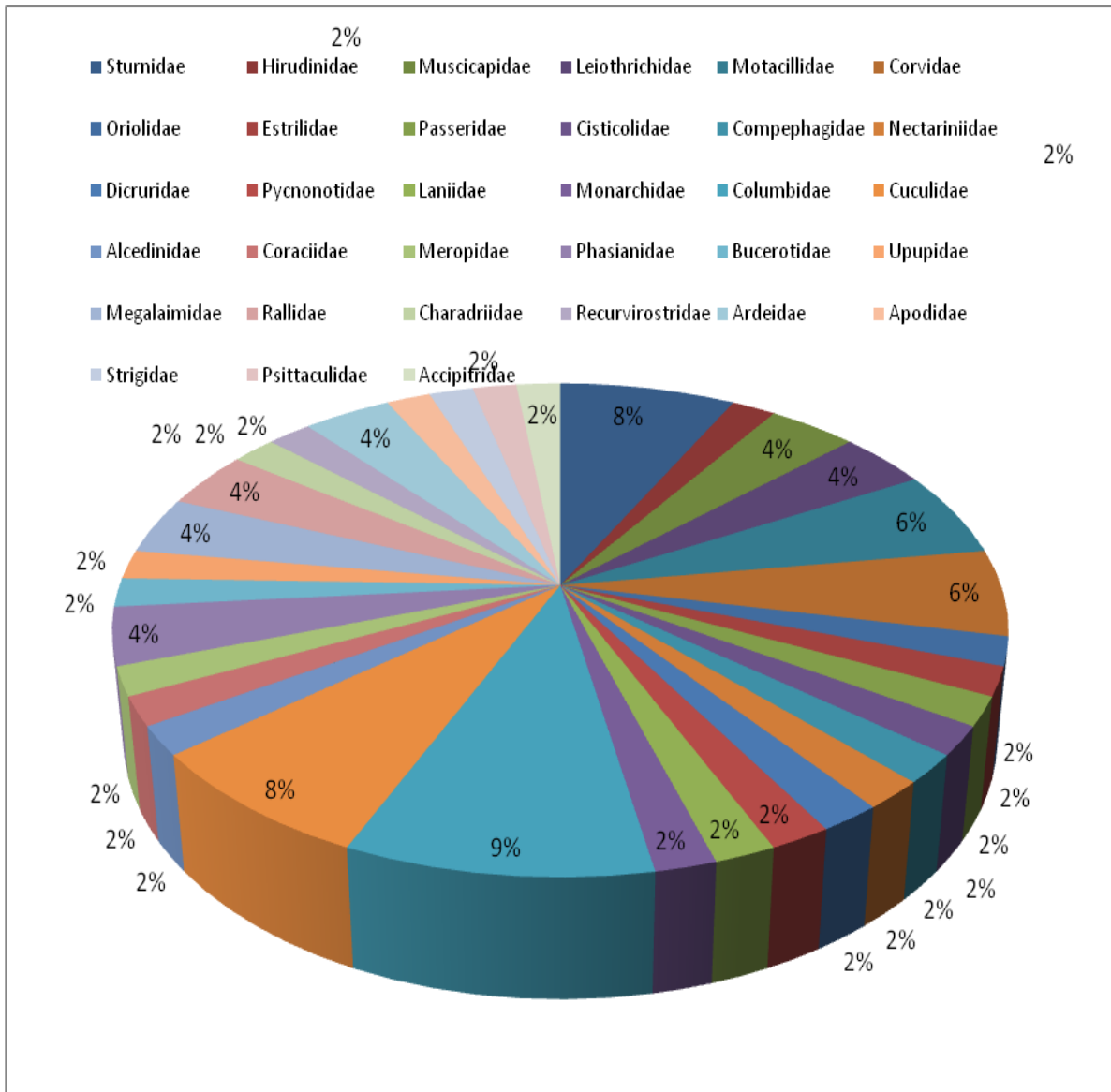


Fig. 2. Family wise percentage of recorded species in study area

Table 2. Family wise distribution of bird species in Ramakrishna Ashram

S. No.	Family	Recorded Species	S. No.	Family	Recorded Species
1	Sturnidae	4	18	Cuculidae	4
2	Hirudinidae	1	19	Alcedinidae	1
3	Muscicapidae	2	20	Coraciidae	1
4	Leiothrichidae	2	21	Meropidae	1
5	Motacillidae	3	22	Phasianidae	2
6	Corvidae	3	23	Bucerotidae	1
7	Oriolidae	1	24	Upupidae	1
8	Estrilidae	1	25	Megalaimidae	2
9	Passeridae	1	26	Rallidae	2
10	Cisticolidae	1	27	Charadriidae	1
11	Compephagidae	1	28	<u>Recurvirostridae</u>	1
12	Nectariniidae	1	29	Ardeidae	2
13	Dicruridae	1	30	Apodidae	1
14	Pycnonotidae	1	31	Strigidae	1
15	Laniidae	1	32	Psittaculidae	1
16	Monarchidae	1	33	Accipitridae	1
17	Columbidae	5	Total	53	

Table 3. Seasonally presence and number of individuals of species recorded in Ramakrishna Ashram

S. No.	Species name	Monsoon Season		Winter Season		Summer Season	
		Presence	Numbers	Presence	Numbers	Presence	Numbers
1	Brahminy Starling	✓	12	✓	28	✓	18
2	Bank Myna	✓	08	✓	14	✓	11
3	Common Myna	✓	17	✓	49	✓	35
4	Asian Pied Starling	✓	14	✓	19	✓	24
5	Barn Swallow			✓	6	✓	2
6	Indian Robin	✓	7	✓	12	✓	9
7	Oriental Magpie-robin	✓	8	✓	12	✓	5
8	Jungle Babbler	✓	11	✓	28	✓	22
9	Common Babbler	✓	35	✓	67	✓	46
10	Grey Wagtail	✓	2				
11	White-browed Wagtail	✓	2	✓	1		
12	Tree Pipit			✓	3	✓	2
13	Rufous Treepie			✓	4	✓	2
14	Large-billed Crow			✓	2	✓	8
15	House Crow	✓	14	✓	26	✓	21
16	Eurasian Golden Oriole			✓	1	✓	2
17	Scaly-breasted Munia					✓	4
18	House Sparrow	✓	19	✓	35	✓	24
19	Common Tailorbird	✓	2	✓	6	✓	9
20	Indian Cuckooshrike	✓	1				
21	Purple Sunbird	✓	8	✓	4	✓	6
22	Black Drongo	✓	7	✓	5	✓	9
23	Red-vented Bulbul	✓	12	✓	18	✓	15
24	Bay-backed Shrike			✓	3	✓	1
25	Indian Paradise-flycatcher			✓	2		
26	Yellow-footed Green-pigeon			✓	8	✓	16
27	Rock Dove	✓	3	✓	4	✓	8
28	Laughing Dove	✓	6	✓	16	✓	10
29	Red Turtle-dove	✓	2	✓	5	✓	7
30	Eastern Spotted Dove	✓	2	✓	7	✓	4
31	Greater Coucal	✓	1	✓	2	✓	2
32	Indian Cuckoo			✓	1		

33	Common Hawk-cuckoo			✓	2	✓	1
34	Western Koel			✓	1	✓	1
35	White-breasted Kingfisher	✓	2	✓	3		
36	Indian Roller			✓	4	✓	3
37	Asian Green Bee-eater			✓	9	✓	5
38	Indian Peafowl	✓	18	✓	27	✓	24
39	Grey Francolin	✓	6	✓	23	✓	14
40	Indian Grey Hornbill	✓	2			✓	4
41	Common Hoopoe	✓	1	✓	2	✓	2
42	Brown-headed Barbet			✓	3	✓	1
43	Coppersmith Barbet			✓	1	✓	1
44	White-breasted Waterhen	✓	3	✓	1		
45	Common Moorhen	✓	2	✓	2		
46	Red-wattled Lapwing	✓	7	✓	14	✓	9
47	Black-winged Stilt	✓	11			✓	
				S			
48	Cattle Egret	✓	14	✓	8		
49	Indian Pond-heron	✓	3	✓	4	✓	1
50	Little Swift			✓	12	✓	9
51	Spotted Owlet	✓	2	✓	1	✓	1
52	Rose-ringed Parakeet	✓	9	✓	28	✓	19
53	Shikra			✓	1	✓	2
Total		35	273	49	534	43	419

Table 4. Bird species Diversity index

S.No.	Species Diversity	Monsoon Season	Winter Season	Sumer Season
1	Shannon_H	0.988	2.129	1.167
2	Evenness_e^H/S	0.362	0.985	0.654
3	Simpson_1-D	0.062	0.097	0.081

4. CONCLUSION

Above investigation suggested that Ramkrishan Ashram possessed the rich avian diversity. It is a good place for avian diversity especially to residential bird species in Gwalior city. Further research should give attention on systematic inventory on biodiversity related with bird species, microclimatic variables and more bird watching. This study highlights importance of green space of Gwalior city for maintenance of the ecological balance for sustainable urban development.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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