

# RICHNESS OF AVIFAUNA IN GOREWADA INTERNATIONAL BIO-PARK, NAGPUR, CENTRAL INDIA

Research Article



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## Abstract

The present study comprises the biodiversity of birds in Gorewada International bio-park situated at north-west of Nagpur city with geographical location 21°11'N 79°2'E and a good habitat for avian biodiversity. Bird watching and recording were done from March 2011 to February 2014, in the morning and evening hours during Sunday and holidays. 190 species belonging to 128 genera, 51 families and 17 orders (Podicipediformes, Pelecaniformes, Ciconiiformes, Anseriformes, Falconiformes, Galliformes, Gruiformes, Charadriiformes, Columbiformes, Psittaciformes, Cuculiformes, Strigiformes, Caprimulgiformes, Apodiformes, Coraciiformes, Piciformes and Passeriformes) were recorded. The order Passeriformes is the largest order belonging to 20 families and 75 bird species. Out of total bird species, 89 (46.84%) are resident, 77 (40.53%) are resident migrant and 24 (12.63%) are migratory species.

Forest region of this bio-park provides heterogeneity in vegetation and lake is rich in aquatic fauna and other food for avian species. Therefore, this region is well suitable for feeding, resting and roosting site for aves. The report obtains information regarding resident birds, migratory birds and resident migratory birds of Gorewada bio-park.

## Key words

Avifauna, Birds, Gorewada, International bio-park, Biodiversity

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## INTRODUCTION

The Indian subcontinent is very rich in biodiversity; contains about 1,300 species or over 13% of the world's birds (Grimmett et al, 1998). The recent studies of freshwater biodiversity and wetlands are found to be the richest biodiversity sites by holding major share of the existing avifauna. Freshwater wetland support 20% of the known range of biodiversity in India. Avifauna is an important for the ecosystem as they play various roles as scavenger, pollinators and predators of insect pest (Padmavati et al. 2010). The changes in environment like urbanization and industrialization disturbs the avian habitats (Sanjay, 1993).

Gorewada is the developing international bio-park in north-west of Nagpur city and its geographical location is 21°11'N 79°2'E. It provides good habitat for avian species and some wild life. The park is basically divided into African Safari, Biopark, Energy Plaza, Trails, Indian Safari, Hight Safari, Rescue Safari and Gorewada Reservoir. Gorewada reservoir is bordered by thick forest on three sides. It was developed by the water works department, in 1912 as the primary drinking water source for Nagpur. The lake was once known as Sita Gondi, later it named after Gorewada village. Its catchment area is approx. 11 sq. mile (17,702.74 sqmt). In spite of its global significance; studies of avifauna of Gorewada International Park have not been clearly undertaken.

The present work has been carried out the checklist, occurrence and richness of bird species inhabiting the Gorewada International Park.

## MATERIAL AND METHODS

The present study has been carried out for a period of two year from March 2011 to February 2013. Bird watching and recording were done during Sunday and holidays in such a way that there should be least one visit in the study area during a month. The observations were made with the aid of a digital cameras and binoculars.

The Point Transects Method (Gregory et al. 2004) was adapted to study the bird population. The sites were visited in morning and evening hours to note maximum possible species of birds and to record its activities. Sometimes afternoon visits were made to observe the bird activities; particularly in winter season when the migratory species reported in the study area. The recorded species are identified with the help of photographs and by using standard books such as Ali (2001), Animal Life Encyclopedia and various publications. The checklist and catalogs of the avian species are prepared.

## OBSERVATIONS

In the present study, we recorded 190 species of birds belonging to 128 genera, 51 families and 17 orders. The order Podicipediformes, Pelecaniformes, Ciconiiformes, Anseriformes, Falconiformes, Galliformes, Gruiformes, Charadriiformes, Columbiformes, Psittaciformes, Cuculiformes, Strigiformes, Caprimulgiformes, Apodiformes, Coraciiformes, Piciformes and Passeriformes were consisted of 01 family, 02 genera and 02 species; 01 family, 02 genera and 04 species; 03 families, 15 genera and 19 species; 01 family, 07 genera and 16 species; 01 family, 08 genera and 10 species; 01 family, 03 genera and 04 species; 01 family, 04 genera and 05 species; 07 families, 12 genera and 19 species; 01 family, 03 genera and 07 species; 01 family, 01 genus and 03 species; 01 family, 07 genera and 09 species; 02 families, 02 genera and 02 species; 01 family, 01 genus and 01 species; 02 families, 02 genera and 02 species; 05 family, 07 genera and 08 species; 02 family, 04 genera and 04 species and 20 families, 48 genera and 75 species respectively (Table 1 and Table 3).

**Table 1:** Checklist of Avifauna of Gorewada International Bio-Park

S. N.	Order	Family	Scientific Name	Common Name	Status
1.	<b>Podicipediformes</b> (1 Family)	Podicipedidae (2 Genera)	<i>Podiceps cristatus</i>	Great Crested Grebe	M
			<i>Tachybaptus ruficollis</i>	Little Grebe	R
2.	<b>Pelecaniformes</b> (1 Family)	Phalacrocoracidae (2 Genera)	<i>Anhinga melanogaster</i>	Darter	RM
			<i>Phalacrocorax carbo</i>	Great Cormorant	RM
			<i>Phalacrocorax fuscicollis</i>	Indian Cormorant	R
			<i>Phalacrocorax niger</i>	Little Cormorant	RM
3.	<b>Ciconiiformes</b> (3 Families)	Ardeidae (13 Genera)	<i>Anastomus oscitans</i>	Asian Open bill	RM
			<i>Ardeacinerea</i>	Grey Heron	RM
			<i>Ardeapurpurea</i>	Purple Heron	RM
			<i>Ardeolagrayii</i>	Indian Pond Heron	R
			<i>Bubulcus ibis</i>	Cattle Egret	R
			<i>Butorides striata</i>	Little Heron	R
			<i>Casmerodius albus</i>	Large Egret	R
			<i>Ciconianigra</i>	Black Stork	M
			<i>Dupetor flavicollis</i>	Black Bittern	RM
			<i>Egretta garzetta</i>	Little Egret	R
			<i>Egretta intermedia</i>	Smaller Egret	R
			<i>Ixobrychus cinnamomeus</i>	Chesnut Bittern	RM
			<i>Ixobrychus minus</i>	Little Bittern	M
			<i>Ixobrychus sinensis</i>	Yellow Bittern	RM
			<i>Mesophoyx intermedia</i>	Median Egret	R
			<i>Mycteria leucocephala</i>	Painted Stork	RM
<i>Nycticorax nycticorax</i>	Black-crowned Night Heron	RM			
		Ciconiidae (1 Genus)	<i>Ciconia episcopus</i>	Woolly-necked Stork	RM
		Threskiornithidae (1 Genus)	<i>Pseudibis papillosa</i>	Black Ibis	RM
4.	<b>Anseriformes</b> (1 Family)	Anatidae (7 Genera)	<i>Anas acuta</i>	Northern Pintail	M
			<i>Anas clypeata</i>	Northern Shoveler	M
			<i>Anas crecca</i>	Common Teal	M
			<i>Anas penelope</i>	Eurasian Wigeon	M
			<i>Anas platyrhynchos</i>	Mallard	M
			<i>Anas poecilorhynchos</i>	Spot-billed Duck	M
			<i>Anas querquedula</i>	Garganey	M

S. N.	Order	Family	Scientific Name	Common Name	Status
			<i>Anas strepera</i>	Gadwall	M
			<i>Aythya ferina</i>	Common Pochard	M
			<i>Aythya fuligula</i>	Tufted Duck	M
			<i>Aythya nyrocha</i>	Ferruginous Pochard	M
			<i>Dendrocygna javanica</i>	Lesser Whistling-duck	RM
			<i>Falcated Duck</i>	Anasfalcata	M
			<i>Nettapus coromandelianus</i>	Cotton Teal	R
			<i>Rhodonessarufina</i>	Red-crested Pochard	M
			<i>Tadorna ferruginea</i>	Ruddy Shelduck	M
5.	<b>Falconiformes</b> (1 Family)	Accipitridae (8 Genera)	<i>Accipiter badius</i>	Shikra	RM
			<i>Accipiter nisus</i>	Eurasian Sparrowhawk	RM
			<i>Aquila rapax</i>	Tawny Eagle	RM
			<i>Butastur teesa</i>	White-eyed Buzzard	RM
			<i>Circus aeruginosus</i>	Western Marsh Harrier	RM
			<i>Circus macrorous</i>	Pallid Harrier	RM
			<i>Elanus caeruleus</i>	Black-shouldered Kite	RM
			<i>Milvus migrans</i>	Black kite	RM
			<i>Pernis ptilorhynchus</i>	Oriental Honey-buzzard	RM
			<i>Spilornis cheela</i>	Crested Serpent Eagle	RM
6.	<b>Galliformes</b> (1 Family)	Phasianidae (3 Genera)	<i>Coturnix coturnix</i>	Common Quail	R
			<i>Fracolinus pictus</i>	Painted Francolin	RM
			<i>Fracolinus pondicerianus</i>	Grey Francolin	RM
			<i>Pavocristatus</i>	Indian Peafowl	RM
7.	<b>Gruiformes</b> (1 Family)	Rallidae (4 Genera)	<i>Amaurornis akool</i>	Brown Crake	R
			<i>Amaurornis phoenicurus</i>	White-breasted Waterhen	R
			<i>Fulica atra</i>	Common Coot	R
			<i>Gallinula chloropus</i>	Common Moorhen	R
			<i>Porphyrio porphyrio</i>	Purple Moorhen	RM
8.	<b>Charadriiformes</b> (7 Families)	Jacaniidae (2 Genera)	<i>Hydrophasianus chirurgus</i>	Pheasant tailed Jacana	R
			<i>Metopidius indicus</i>	Bronze winged Jacana	R
		Charadriidae (2 Genera)	<i>Charadrius alexandrinus</i>	Kentish Plover	M
			<i>Charadrius dubius</i>	Little Ringed Plover	RM
			<i>Charadrius mongolus</i>	Lesser Sand Plover	M
			<i>Vanellus indicus</i>	Red-wattled Lapwing	R
			<i>Vanellus malarbaricus</i>	Yellow-wattled Lapwing	RM
		Scopacidae (3 Genera)	<i>Actitis hypoleucos</i>	Common Sandpiper	M
			<i>Limosa limosa</i>	Black-tailed Godwit	RM
			<i>Tringa glareola</i>	Wood Sandpiper	RM
			<i>Tringa nebularia</i>	Common Greenshank	M
			<i>Tringa acrocephalus</i>	Green Sandpiper	R
			<i>Tringa totanus</i>	Common Redshank	M
		Glareolidae (1 Genus)	<i>Glareola lactea</i>	Small Pratincole	RM
		Scolopacidae (1 Genus)	<i>Gallinago gallinago</i>	Common Snipe	M
		Recurvirostridae (1 Genus)	<i>Himantopus himantopus</i>	Black-winged Stilt	RM
		Laridae (2 Genera)	<i>Chlidonias hybrida</i>	Whiskered Tern	RM
			<i>Sterna acuticauda</i>	Black-bellied Tern	RM
			<i>Sterna aurantia</i>	River Tern	R
9.	<b>Columbiformes</b> (1 Family)	Columbidae (3 Genera)	<i>Columba livia</i>	Blue rock Pigeon	R
			<i>Streptopelia chinensis</i>	Spotted Dove	R
			<i>Streptopelia decaocto</i>	Eurasian Collared Dove	R
			<i>Streptopelia orientalis</i>	Oriental Turtle Dove	RM
			<i>Streptopelia senegalensis</i>	Little Brown Dove	R
			<i>Streptopelia tranquebarica</i>	Red Collared Dove	RM
			<i>Treron phoenicoptera</i>	Yellow-footed Green Pigeon	RM
10.	<b>Psittaciformes</b> (1 Family)	Psittacidae (1 Genus)	<i>Psittacula cyanocephala</i>	Plum-headed Parakeet	RM
			<i>Psittacula eupatria</i>	Alexandrine Parakeet	RM
			<i>Psittacula krameri</i>	Rose ringed Parakeet	RM
11.	<b>Cuculiformes</b> (1 Family)	Cuculidae (7 Genera)	<i>Cacomantis passerinus</i>	Indian palaintive Cuckoo	RM
			<i>Centropus sinensis</i>	Greater Coucal	R

S. N.	Order	Family	Scientific Name	Common Name	Status	
			<i>Clamatorjacobinus</i>	Pied Crested Cuckoo	RM	
			<i>Cuculuscanorus</i>	Common Cuckoo	R	
			<i>Cuculusmicropterus</i>	Indian Cuckoo	RM	
			<i>Cuculusvarius</i>	Common Hawk Cuckoo	RM	
			<i>Eudynamysscolopacea</i>	Asian Koel	RM	
			<i>Phaenicophaeusleschenaultii</i>	SirkeerMalkoha	RM	
			<i>Surniculustlugubris</i>	Asian Drongo Cuckoo	RM	
12.	<b>Strigiformes</b> (2 Families)	Tytonidae (1 Genus)	<i>Tyto alba</i>	Barn Owl	R	
		Strigidae (1 Genus)	<i>Athenebrama</i>	Spotted Owlet	R	
13.	<b>Caprimulgiformes</b> (1 Family)	Caprimulgidae (1 Genus)	<i>Caprimulgusasiaticus</i>	Indian Nightjar	R	
14.	<b>Apodiformes</b> (2 Families)	Apodidae (1 Genus)	<i>Cypsiurusbalasiensis</i>	Asian Palm Swift	R	
		Hemiprocnidae (1 Genus)	<i>Hemiprocnecoronata</i>	Crested Treeswift	R	
15.	<b>Coraciiformes</b> (5 Families)	Alcedinidae (3 Genera)	<i>Alcedoatthis</i>	Small Blue Kingfisher	R	
			<i>Cerylerudis</i>	Pied Kingfisher	R	
			<i>Halcyon smyrnensis</i>	White-breasted Kingfisher	R	
		Meropidae (1 Genus)	<i>Meropsorientalis</i>	Small Bee-eater	R	
			<i>Meropsphilippinus</i>	Blue-tailed Bee-eater	R	
		Upupidae (1 Genus)	<i>Upupaepops</i>	Common Hoopoe	R	
		Coraciidae (1 Genus)	<i>Coraciabenghalensis</i>	Indian Roller	R	
	Bucerotidae (1 Genus)	<i>Ocyerosbirostris</i>	Grey Hornbill	R		
16.	<b>Piciformes</b> (2 Families)	Capitonidae (1 Genus)	<i>Megalainahaemacephala</i>	Crimson-breasted Barbet	R	
		Picidae (3 Genera)	<i>Dendrocoposmahrattensis</i>	Yellow-crowned Woodpecker	R	
			<i>Dinopiumbenghalense</i>	Black-rumpedFlameback Woodpecker	R	
			<i>Jynxtorquilla</i>	Eurasian Wryneck	M	
17.	<b>Passeriformes</b> (20 Families)	Alaudidae (6 Genera)	<i>Alaudagulgula</i>	Oriental Skylark	RM	
			<i>Ammomanesphoenicura</i>	Rufous-tailed Finch Lark	R	
			<i>Calandrellabrachydactyla</i>	Greater Short-toed Lark	RM	
			<i>Eremopterixgriseus</i>	Ashy-crowned Sparrow Lark	R	
			<i>Galerida deva</i>	Syke's Crested Lark	R	
			<i>Mirafraassamica</i>	Bengal Bushlark	R	
			<i>Mirafra cantillans</i>	Singing Bushlark	R	
			<i>Mirafraerythroptera</i>	Red-winged Bushlark	R	
			Hirundinidae (2 Genera)	<i>Hirundoconcolor</i>	Dusky Crag Martin	R
				<i>Hirundodaurica</i>	Red-rumped Swallow	RM
		<i>Hirundo fluvicola</i>		Streak-throated Swallow	R	
		<i>Hirundo rustica</i>		Common Swallow	RM	
		<i>Hirundo smithii</i>		Wire-tailed Swallow	R	
		Dicruridae (1 Genus)	<i>Ripariapaludicola</i>	Plain Sand Martin	RM	
			<i>Dicrurusleucophaeus</i>	Ashy Drongo	RM	
			<i>Dicrurus macrocercus</i>	Black Drongo	R	
		Laniidae (1 Genus)	<i>Dicrurusparadiseus</i>	Greater Racket-tailed Drongo	RM	
			<i>Laniuscristatus</i>	Brown Shrike	RM	
			<i>Lanius schach</i>	Rufous Backed Shrike	R	
		Oriolidae (1 Genus)	<i>Lanius vittatus</i>	Bay-backed Shrike	RM	
	<i>Oriolus oriolus</i>		Eurasian Golden Oriole	R		
	Sturnidae (2 Genera)	<i>Acridotherestrictis</i>	Common Myna	R		
		<i>Sturnus contra</i>	Asian Pied Starling	R		
		<i>Sturnus pagodarum</i>	Brahminy Starling	R		
		<i>Sturnus roseus</i>	Rosy Starling	RM		
	Corvidae (2 Genera)	<i>Corvus macrorhynchos</i>	Jungle Crow	R		
		<i>Corvus splendens</i>	House Crow	R		
		<i>Dendrocitta vagabunda</i>	Rufous Treepie	R		
	Campephagidae (2 Genera)	<i>Coracinamelanoptera</i>	Black-headed Cuckooshrike	R		
		<i>Pericrocotus cinnamomeus</i>	Small Minivet	R		
	Irenidae (2 Genera)	<i>Aegithinatifolia</i>	Common Iora	R		
		<i>Pycnonotus cafer</i>	Red-vented Bulbul	R		
		<i>Pycnonotus luteolus</i>	White-browed Bulbul	RM		

S. N.	Order	Family	Scientific Name	Common Name	Status
		Timaliidae (3 Genera)	<i>Chrysommasinense</i> <i>Dumetiahyperythra</i> <i>Turdoidescaudata</i> <i>Turdoidesmalcolmi</i> <i>Turdoidesstriata</i>	Yellow-eyed Babbler Tawny-bellied Babbler Common Babbler Large Grey Babbler Jungle Babbler	R RM R R R
		Monarchidae (3 Genera)	<i>Hypothymisazurea</i> <i>Rhipiduraalbicollis</i> <i>Rhipiduraaureola</i> <i>Terpsiphonparadisi</i>	Black-naped Monarch White-throated Fantail White-browed Fantail Asian Paradise-flycatcher	RM R R RM
		Muscicapidae (2 Genera)	<i>Cyornistickelliae</i> <i>Muscicapadaurica</i>	Tickell's Blue Flycatcher Asian Brown Flycatcher	R RM
		Sylviidae (5 Genera)	<i>Acrocephalusdumetorum</i> <i>Hippolaiscaligata</i> <i>Orthotomussutorius</i> <i>Phylloscopustrochiloides</i> <i>Priniainornata</i> <i>Priniasocialis</i> <i>Priniasylvatica</i>	Blyth's Reed Warbler Booted Warbler Common Tailorbird Greenish Warbler Plain Prinia Ashy Prinia Jungle Prinia	RM RM R RM R R RM
		Turdidae (7 Genera)	<i>Cercomelafusca</i> <i>Copsychussaularis</i> <i>Lusciniasvecica</i> <i>Phoenicurusochruros</i> <i>Saxicolacaprata</i> <i>Saxicoloidesfulicata</i> <i>Zootheracitrina</i>	Brown Rock-Chat Oriental Magpie Robin Bluethroat Black Redstart Pied Bushchat Indian Robin Orange-headed Thrush	R R RM RM R R R
		Motacillidae (2 Genera)	<i>Anthusrufulus</i> <i>Anthussimilis</i> <i>Motacilla alba</i> <i>Motacillacineara</i> <i>Motacillacitreola</i> <i>Motacillaflava</i> <i>Motacillamaderaspatensis</i>	Paddy field Pipit Long-billed Pipit White Wagtail Grey Wagtail Citrine Wagtail Yellow Wagtail Large Pied Wagtail	R RM RM RM RM RM R
		Zosteropidae (1 Genus)	<i>Zosteropsalpebrosus</i>	Oriental White-Eye	R
		Dicaeidae (1 Genus)	<i>Dicaeumerythrorhynchos</i>	Pale-billed Flowerpecker	R
		Nectarinidae (1 Genus)	<i>Nectariniaasiatica</i> <i>Nectariniazeylonica</i>	Purple Sunbird Purple-rumped Sunbird	R R
		Ploceidae (2 Genera)	<i>Passer domesticus</i> <i>Ploceusphilippinus</i>	House Sparrow Baya Weaver	R RM
		Estrildidae (2 Genera)	<i>Amandavaamandava</i> <i>Lonchuramalabarica</i> <i>Lonchuramalacca</i> <i>Lonchurrapunctulata</i>	Red Munia Indian Silverbill Black-headed Munia Scaly-breasted Munia	RM R R R
	<b>Orders- 17</b>	<b>Families- 51</b>	<b>No. of Bird Genera- 128</b>	<b>No. of Bird species- 190</b>	

R- Resident; RM- Resident Migrant; M- Migrant.

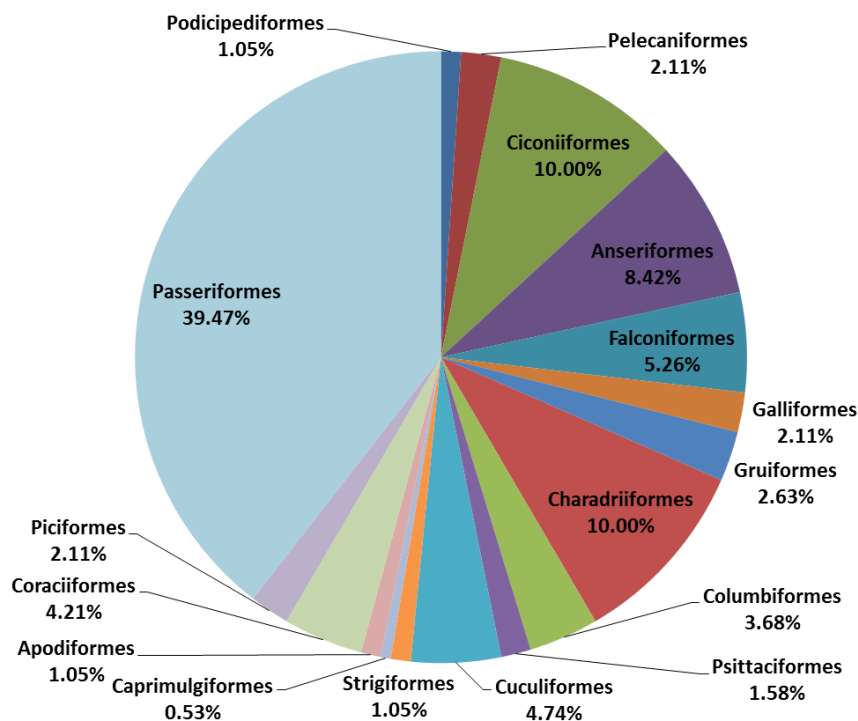
**Table 3:** Distribution of avifauna in respective orders and families

S.N.	Order	No. of Families	No. of Genera	No. of Species
1.	Podicipediformes	01	02	02
2.	Pelecaniformes	01	02	04
3.	Ciconiiformes	03	15	19
4.	Anseriformes	01	07	16
5.	Falconiformes	01	08	10
6.	Galliformes	01	03	04
7.	Gruiformes	01	04	05
8.	Charadriiformes	07	12	19
9.	Columbiformes	01	03	07
10.	Psittaciformes	01	01	03
11.	Cuculiformes	01	07	09
12.	Strigiformes	02	02	02
13.	Caprimulgiformes	01	01	01
14.	Apodiformes	02	02	02
15.	Coraciiformes	05	07	08
16.	Piciformes	02	04	04
17.	Passeriformes	20	48	75
	<b>17</b>	<b>51</b>	<b>128</b>	<b>190</b>

The maximum bird species are belonging to the order Passeriformes (39.47%) followed by Ciconiiformes and Charadriiformes (10.00%); Anseriformes (8.42%); Falconiformes (5.26%); Coraciiformes (4.21%); Cuculiformes (4.74%); Columbiformes (3.68%); Gruiformes (2.63%); Pelecaniformes, Galliformes and Piciformes (2.11%), Psittaciformes (1.58%); Podicipediformes, Strigiformes and Apodiformes (1.05%) and minimum species reported in order Caprimulgiformes (0.53%) (Figure 1).

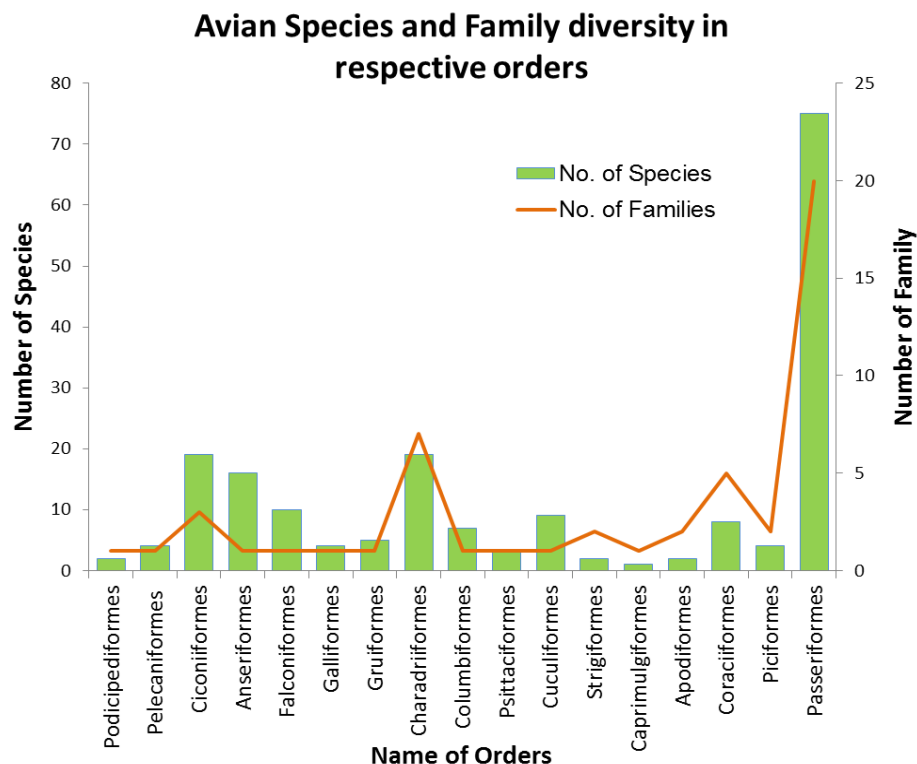
**Figure 1:** To show avian species percentage in respective orders

### Avian species % in respective orders



These 17 orders are divided in 51 families. The largest number of families were reported in order Passeriformes (20) followed by Charadriiformes (07); Coraciiformes (05); Ciconiiformes (03); Strigiformes, Apodiformes and Piciformes (02); and only single family reported in order Podicipediformes, Pelecaniformes, Anseriformes, Falconiformes, Galliformes, Gruiformes, Columbiformes, Psittaciformes, Cuculiformes and Caprimulgiformes (Figure 2, Table 3).

**Figure2:** To show avian species and family diversity in respective orders



In the present study out of total 190 bird species, 89 (46.84%) are resident, 77 (40.53%) are resident migrant and 24 (12.63%) are migratory species (Table 2).

**Table 2:** Status of Avifauna of Gorewada International Bio-Park.

S.N.	Avian species	No. of Avian species	% of Avian species
1.	Resident	89	46.84
2.	Resident Migrant	77	40.53
3.	Migrant	24	12.63
		<b>190</b>	<b>100.00</b>

**DISCUSSION**

In Gorewada International Park, Nagpur we have recorded 190 species belonging to 128 genera, 51 families and 17 orders. Out of 190 bird species, 89(46.84%) species are resident, 77 (40.53%) are resident migrant and 24 (12.63%) were migratory species. The order Passeriformes is the largest order which covered 20 families out of 51. Patil and Tijare (2012) were recorded 82 bird species from 11 orders and 36 families in the vicinity of Gorewadalake, Nagpur (Maharashtra). Maximum species were observed during monsoon and winter months in compare to summer months probably due to scarcity of food. They also reported 72 species belonging to 12 orders and 35 families from Borgaon near Gorewada (Patil and Tijare 2013).

Chinchkhede and Kedar (2012b) were counted 59 species of birds of which 45 were resident, 08 were winter migrants, 04 were local migrants and 02 were found to be summer migrants in Sringarlake, near Navegaon national park. In and around Koradilake of Nagpur, they were reported 76 species belonging to 15 orders among which 54 species were resident; 09 species were seasonal local migrant and 13 species were winter migrant. There was a gradual decline in species richness as the weather condition changes from colder to warmer. Order Passeriformes (26 species) dominated the avifauna of the Koradilake which was followed by order Ciconiiformes (10species).The minimum diversity was recorded in the months of monsoon due to heavy rain, increased flow of water, non-availability of food and return of migratory birds (Chinchkhede and Kedar, 2012a).

While, in and around Ambazarilake, Kedar (2012) was observed 135 species of birds out of which 105 species were recorded as resident, 17 species were resident migrant and 13 were winter migrant. In Bamanwada Lake of Rajura, Chilke (2012) was recorded 58 species of birds belonging to 9 orders and 29 families. Among 9 orders Passeriformes consists of 34.48% of total families out of 29.

The above observations are similar to the present study where, residents birds are predominant than that of resident migrant and migratory birds; the number of birds are more during winter and Least number of birds are reported during summer and Passeriformes is the dominating order of birds.

## CONCLUSION

Gorewada International bio-park is covered by dense forest on three sides of the lake and provides heterogeneity in vegetation for avian species. The importance of the lake is as a major water source and the forest around it have prevented the lake's decline. This lake is rich in aquatic fauna which includes micro and macro-organisms, shrimps, fishes and protein-rich invertebrates and other food. This region is suitable for feeding, resting and roosting due to the abundance of food, accessibility to food resources, availability of exposed mudflats and shorelines. Gorewada Bio-park is an important site for many resident and migratory species of birds which are excellent indicators of ecological health. Therefore, the conservation of this bio-park is very essential to sustain resident and migratory bird populations along with the threatened and vulnerable birds of this area.

This study will be helpful to obtain comprehensive information regarding staging areas of migratory birds, feeding areas of resident migratory birds and breeding areas of resident birds. This study will also be helpful for protection and conservation of birds.

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