



# Bird diversity of agro- forest ecosystem in and around Nagbhid, Maharashtra, India

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## ABSTRACT

The present study was undertaken to explore species diversity of birds, seasonal abundance of birds and their migratory pattern in and around the study area. The study site (20°33'N to 20°35'N and longitude 79°39'2E to 79°39'4E) spreads over an area of 20 Km<sup>2</sup> located near Nagbhid, taluka level town in Eastern part of Vidarbha of Maharashtra State. It comprises numerous ponds and lakes apart from large Ghodazari Lake. It presents unique geographical site having mountaneous dry deciduous tropical forest, dominated by teak *Tectona grandis* and bamboo *Dendrocalamus strictus*, interspersed with meadows and paddy cultivations. A total of around 120 species belonging to 50 families 17 orders were recorded during Jan, 2015 to Dec. 2017. The species recorded included 6 Breeding Migrant (BM), 32 Passage Migrant (PM) and 82 Residents (R). Among the orders, Passeriformes is the richest order in terms of avian species diversity, represented by 56 species while family Muscicapidae is found predominant. Wooly necked stork newly recorded during the present study is vulnerable (VU) species according to IUCN red data list. Present study will help in designing conservation strategy as this aquatic ecosystem adversely affected by fishing and agricultural activity which leads to bio-accumulation of pesticide in the pond posing serious threat and hence require immediate attention.

**Key Words** – *Passeriformes, Migrant, Resident, Ghodazari, Muscicapidae*

## INTRODUCTION

Birds are widespread in their occurrence, almost found everywhere in the world. Bird families and genera have broad geographical ranges, yet many individual species are specialized in their requirements and have narrow distributions. Birds are mobile and responsive to environmental changes. The variety of avian species in ecosystems reflects the well being of its habitat. Birds are likely to work better as biodiversity indicator taxa in terrestrial habitats than in either freshwater or marine habitats. Birds are the indicators of environment and are being used for conservation and

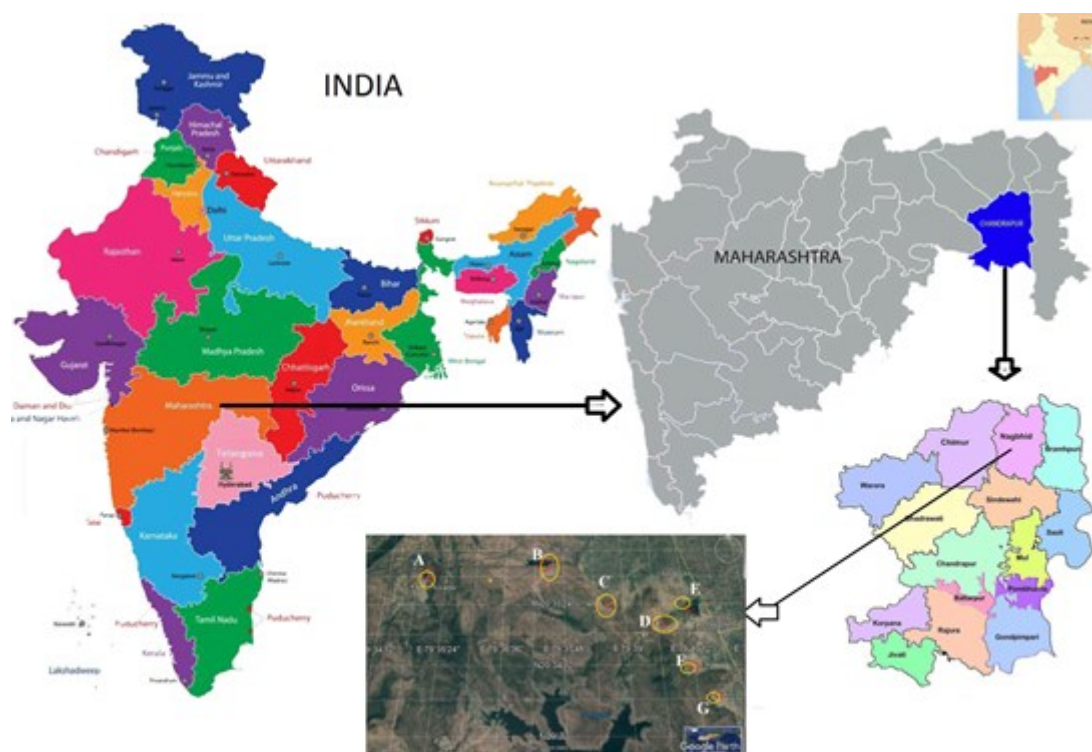
environmental impact assessment (Donald *et al.* 2001; Gregory, *et al.*, 2003). The India checklist acknowledges a total of 1263 species of birds for India, constituting about 12% of the world avifauna (Pravin *et al.*, 2016) while Bird life International projected 1212 species of avifauna, out of which 995 are landbirds. (BirdLife, 2018) Bird communities have been studied fairly well both in temperate and tropical forests (Abdulali, 1981; Islam & Rahmani, 2004; Blake 2007; Pravin and Namir, 2009, 2015; Acharya, *et al.*, 2010; Kasambe *et al.*, 2016; Pravin, *et al.*, 2016). According to the Forest Research Institute, Maharashtra State comprises, 20 IBA sites (Important Bird Areas) have been identified, in which seven are wildlife sanctuaries; four are national parks, and nine non-protected areas. The forest area of the State is 6.38 million ha, constituting 20.75% of its geographical area. Reserved forest constitutes 76%, protected forest 14% and unclassified forest 10%. There are six national parks and 36 wildlife sanctuaries in the State, covering 4.68% of the State (ENVIS, 2018). There are six tiger reserves, namely Melghat, Pench, Sahyandri, Navegaon-Nagzira, Bor and Tadoba-Andhari Tiger Reserve (ENVIS, 2018). Abdulali (1981) listed 540 species of birds from Maharashtra. Two biomes are found in Maharashtra, the Indian Peninsula Tropical Moist Forest (Biome-10) in the Western Ghat region,

and Indo-Malayan Tropical Dry Zone (Biome-11) in the remainder of the State. Past studies documented bird community of Maharashtra, mostly in Western Ghat, (Gole, 2000; Kumbhar and Ghatge, 2014; Kasambe, *et al.*, 2015), Marathwada, (Balkhande, *et al.*, 2012) and in Vidarbha by Chittampalli, 1993; Wagh, *et al.*, 2015; Bayani & Dandekar, 2017). Most of the study pertaining to diversity of avifauna in this eastern part of the Vidarbha (Maharashtra) carried out in protected forests like Tadoba-Andhari Tiger Reserve, Nagzira Wildlife Sanctuary and Umred Karhandla. The study area had been in media during last decade due to man-wild conflict which resulted in the casualties inflicted by wild animals like tiger, leopard and wild boar on human life. Hence this study has been undertaken to explore rich avifauna of this unexplored habitat.

## METHODOLOGY

### Study area:

The study site (20°33'N to 20°35'N and longitude 79°39'2E to 79°39'4E) spreads over an area of 20 Km<sup>2</sup> located near Nagbhid, taluka level town in Eastern part of Vidarbha of Maharashtra State. It is situated in the newly approved Ghodazari Sanctuary.



**Fig. 1.** Study site showing A.Korambi lake B. Kasarla Lake C. Dongargaon pond D. Pandav Lake E. Navkhala Pond , F. Dev Talav (Pond) and G. Tukum Pond

Study area comprises seven water reservoirs, Dev Talav (Lake), Pandav Lake, Navkhala Pond, Tukum Pond, Dongargaon Pond, Kasarla lake and Korambi Lake. It presents unique geographical site having mixed vegetations of tropical dry deciduous forest, dominated by teak *Tectona grandis*, *Terminalia arjuna*, *T. tormentosa*, and *Butea monosperma* interspersed with patches of tropical moist rainforest *Syzigium cumini*, *Terminalia chebula*, *Embllica officianalis* and bamboo *Dendrocalamus strictus*. Foothills have meadows with shrubs like *Lantana camara* and paddy cultivations interspersed with thorny shrub, *Acacia nilotica*, *Zizyphus jujuba* and *Azadiracta indica* as a predominant flora. This unique climatic condition of agro-forest ecosystem provides suitable feeding ground for avifauna.

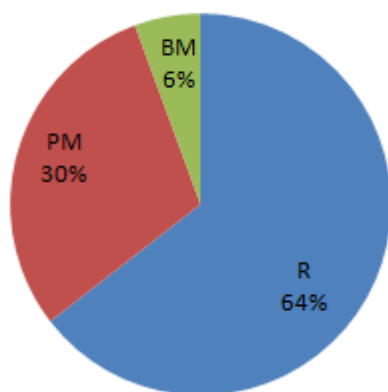
**Bird Sampling:**

Preliminary bird survey of bird community was carried out during Jan, 2014 to Dec. 2016. The avian survey was conducted in 10 sq. km perimeter by monthly visit to the study area. Four sampling sites with radius of 500m had been randomly selected in the study area. (Table.1) according to point transect method for sampling of birds. (Bibby *et al.* 2000) According four point clusters Observation of birds was done by Olympus 118760 10x50 DPSI Wide-Angle Binocular and wherever possible photographed by digital camera Canon EOS 750D. The identification of birds was done as per the photographic guides to the birds of India (Ali and Ripley, 2001; Grimmett *et al.*, 2011). Qualitative data on threats to vegetation and birds were also gathered throughout the study period.

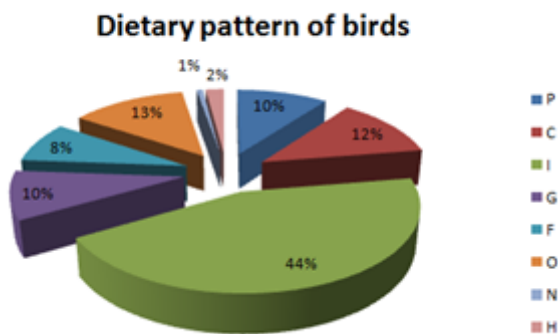
**RESULT**

In the present survey, total 120 species of avifauna, representing 17 orders and 50 families are recorded during the study period. Migratory status shows that 82 are residents (R), 32 Passage Migrants (PM) and 6 are Breeding Migrants (BM) (Fig. 2). Foraging guild of birds in the study area indicates dominance of insectivorous birds, followed by omnivorous, grainivorous, frugivorous, piscivorous and carnivorous birds while herbivorous and nectarivorous birds are very few. (Fig.3). Maximum abundance recorded from Order - Passeriformes with 47% of total avian species represented by 56 species belonging 25 families.

Maximum abundance noted from Fam-Muscicapidae respresented by 11 species followed by Fam-Accipitridae, Anatidae and Sturniidae represented by 6 species each. Conservation status of bird community of study area indicates that three birds, Black Headed Ibis (*Threskiornis melanocephalus*), Black Stork (*Ciconia nigra*) and Lesser Adjutant (*Leptoptilos javanicus*) are placed threatened catagory, while all other birds are Least Concern (LC) category as per IUCN list. Checklist of bird community in the study area is prepared on the basis bird field guides of Ali & Ripley, 2001; Grimmett, *et al.*, (2011) and India check list by Pravin, *et al.*, (2016), eBird (2017) and Bird Life International (2018). (Appendix Table.1 & 2).



**Fig. 2: Showing migratory status**



**Fig. 3: Dietary pattern of Birds community**

Table 1: List of Birds

SN	Common Name	Zoological Name	S	A	IUCN	FG	M
<b>Ord - Ciconiformes</b>							
<b>Fam - Ciconidae</b>							
1	Asian Openbill Stork	<i>Anastomus oscitans</i>	MN	++	LC	P,C	BM
2	Painted stork	<i>Mycteria leucocephalia</i>	MN	+	LC	P,C	BM
3	Wooly necked stork	<i>Ciconia episcopus</i>	MN	+	VU	C,I	PM
4	Black Stork	<i>Ciconia nigra</i>	WN	+	LC	P,I	PM
5	Lesser adjutant	<i>Leptoptilos javanicus</i>	WN	+	VU	P,I	PM
<b>Ord - Peliconiformes</b>							
<b>Fam - Ardeidae</b>							
6	Purple Heron	<i>Ardea pupurea</i>	WN	+	LC	P,I	PM
7	Indian Pond Heron	<i>Ardea grayii</i>	AL	+++	LC	P	R
8	Cattle Egret	<i>Bubulcus ibis</i>	AL	++++	LC	I	R
9	Little Egret	<i>Egretta garxetta</i>	MN	+++	LC	P	R
10	Intermediate Egret	<i>Ardea intermedia</i>	MN	++	LC	P,I	PM
<b>Fam - Threskiornidae</b>							
11	Black Headed Ibis	<i>Threskiornis melanocephalus</i>	MN	++	NT	P,C,I	BM
12	Glossy Ibis	<i>Plegadis falcinellus</i>	AL	+++	LC	P,C,I	BM
13	Little Cormorant	<i>Phalacrocorax niger</i>	AL	+++	LC	P	R
<b>Ord - Accipitriformes</b>							
<b>Fam - Accipitridae</b>							
14	Oriental Honey Buzzard	<i>Pernis ptilorhynchus</i>	WN	++	LC	I	BM
15	Shikra	<i>Accipiter badius</i>	AL	+++	LC	C	R
16	Black winged Kite	<i>Elanus caeruleus</i>	WN	+++	LC	C	R
17	Black Kite	<i>Milvus migrans</i>	AL	++	LC	C	R
18	Bramhiny Kite	<i>Haliastur indus</i>	AL	++	LC	C	R
19	White Eyed Buzzard	<i>Butastur teesa</i>	AL	+	LC	C	R
<b>Ord - Gruiformes</b>							
<b>Fam - Raliidae</b>							
20	Waterhen	<i>Amaurornis phoenicurus</i>	AL	++	LC	O	R
21	Eurasian Coot	<i>Fulica atra</i>	WN	++	LC	O	PM
22	Common Moorhen	<i>Gallinula chloropus</i>	AL	++	LC	O	R
<b>Ord - Gulliformes</b>							
<b>Fam - Phasianidae</b>							
23	Peafowl	<i>Pavo cristatus</i>	AL	+++	LC	G	R
24	Grey Francolin	<i>Francolin pondicerianus</i>	AL	++	LC	G	R
25	Lesser Whistling duck	<i>Dedrocygna javanica</i>	WN	+++	LC	O	R
26	Indian spot billed duck	<i>Anas poecillorhyncha</i>	AL	++++	LC	O	R
<b>Ord - Apodiformes</b>							
<b>Fam - Apodidae</b>							
27	House Swift	<i>Apus nipalensis</i>	AL	++	LC	I	R
28	Asian Palm Swift	<i>Cypsiurus balasiensis</i>	AL	++	LC	I	R
<b>Ord - Charadriiformes</b>							
<b>Fam - Charadriidae</b>							
29	Yellow Wattled Lapwing	<i>Vanelius malabaricus</i>	WN	++	LC	I	R
30	Little Ringed Plover	<i>Charadrius dubios</i>	WN	++	LC	I	PM
<b>Fam - Turnicidae</b>							
31	Jungle Bush Quill	<i>Purdicula asiatica</i>	AL	+++	LC	I,G	R

32	Rain Quill	<i>Cotunix coromandelica</i>	AL	++++	LC	I,G	R
<b>Fam - Recurvirostridae</b>							
33	Black Winged Stilt	<i>Himantopus himantopus</i>	WN	++	LC	P,C,I	PM
<b>Ord - Anseriformes</b>							
<b>Fam - Anatidae</b>							
34	Indian Runner Duck	<i>Anas platyrhynchos domesticus</i>	AL	+++	LC	O	R
35	Gadwall	<i>Mareca strepera</i>	WN	+++	LC	O	PM
36	Indian spot billed duck	<i>Anas poecillorhyncha</i>	AL	+++	LC	O	R
37	Mallard	<i>Anas platyrhynchos</i>	WN	++	LC	H	R
38	Lesser Whistling duck	<i>Dedrocigna javanica</i>	WN	+++	LC	H	R
39	Northern pintail	<i>Anas acuta</i>	WN	++	LC	H	PM
<b>Ord - Columbiformes</b>							
<b>Fam - Columbidae</b>							
40	Laughing Dove	<i>Spilopelia senegalensis</i>	WN	+++	LC	G,F	R
41	Blue Rock Pigeon	<i>Columba livia</i>	AL	++++	LC	G,	R
42	Green Pigeon	<i>Treron phoenicopterus</i>	WN	++	LC	G,F	PM
<b>Ord - Cuculiformes</b>							
<b>Fam - Cuculidae</b>							
43	Asian Koel	<i>Eudynamis scolopaceous</i>	AL	+++	LC	F	R
44	Greater Coucal	<i>Centropus sinensis</i>	AL	+++	LC	C	R
<b>Ord - Strigiformes</b>							
<b>Fam - Tytonidae</b>							
45	Barn owl	<i>Tyto alba</i>	AL	+++	LC	C	R
<b>Fam - Strigidae</b>							
46	Mottled Wood Owl	<i>Stryx ocellata</i>	SM	+	LC	C	R
47	Spotted Owlet	<i>Athene brama</i>	AL	++	LC	C,I	R
48	Great Horned Owl	<i>Bubo bengalensis</i>	SM	+	LC	C,I	R
<b>Ord - Caprimulgiformes</b>							
<b>Fam - Caprimulgidae</b>							
49	Indian Nightjar	<i>Caprimulgus asiaticus</i>	AL	+++	LC	I	R
50	Jungle Nightjar	<i>Caprimulgus indicus</i>	AL	++	LC	I	R
<b>Ord - Bucerotiformes</b>							
<b>Fam - Upupidae</b>							
51	Common Hoopee	<i>Upupa epops</i>	AL	+++	LC	I	R
<b>Fam - Bucerotidae</b>							
52	Indian Grey Hornbill	<i>Ocyrceros birostris</i>	SM	++	LC	C,F	PM
<b>Ord - Coraciiformes</b>							
<b>Fam - Coraciidae</b>							
53	Indian Roller	<i>Coracias bengalensis</i>	AL	+++	LC	I	R
<b>Fam - Halcyonidae</b>							
54	White Throated Kingfisher	<i>Halcyon smyrnensis</i>	AL	++	LC	C,I	R
<b>Fam - Alcedonidae</b>							
55	Common Kingfisher	<i>Alcedo atthis</i>	AL	+++	LC	P	R
56	Blue Eared Kingfisher	<i>Alcedo menintings</i>	AL	++	LC	P,I	R
57	Pied Kingfisher	<i>Cerule rudis</i>	AL	++	LC	P,I	R
<b>Fam - Meropidae</b>							
58	Green bee-eater	<i>Merops orientalis</i>	AL	++++	LC	I	PM
<b>Ord - Psittaciformes</b>							

<b>Fam - Psittacidae</b>							
59	Rose Ringed Parakeet	<i>Psitacula krameri</i>	AL	+++	LC	F	R
60	Plum Headed Parakeet	<i>Psitacula cyanocephala</i>	WN	+	LC	F	PM
<b>Ord - Piciformes</b>							
<b>Fam - Megalamidae</b>							
61	Coppersmith Barbet	<i>Psilopogon hematocephala</i>	AL	+	LC	F,I	R
<b>Fam - Picidae</b>							
62	Pygmy Brown Capped Woodpecker	<i>Dendrocopus nanus</i>	WN	+	LC	F,I	R
63	Lesser Goldenback	<i>Dinopium benghalense</i>	WN	+	LC	F,I	R
<b>Ord - Passeriiformes</b>							
<b>Fam - Pittidae</b>							
64	Indian Pitta	<i>Pitta brachyura</i>	WN	+	LC	I	PM
<b>Fam - Ploceidae</b>							
65	Baya Weaver Bird	<i>Ploceus phillipinus</i>	AL	++	LC	G	R
<b>Fam - Dicruridae</b>							
66	Black Drongo	<i>Dicrurus macroceres</i>	AL	++++	LC	I	R
<b>Fam - Oriolidae</b>							
67	Indian Golden Oriole	<i>Oriolus kundoo</i>	MN	++	LC	F	PM
<b>Fam - Monarchidae</b>							
68	Asian Paradise Flycatcher	<i>Terpsiphone paradisi</i>	SM	+	LC	I	PM
69	Black Naped Monarch	<i>Hypothymis azurea</i>	SM	+	LC	I	BM
<b>Fam - Corvidae</b>							
70	Indian Jungle crow	<i>Corvus culminatus</i>	AL	++	LC	O	R
71	House Crow	<i>Corvus splendens</i>	AL	+++	LC	O	R
72	Rufous Treepie	<i>Dendrocitta vagabunda</i>	WN	++	LC	I	R
<b>Fam - Hirudinidae</b>							
73	Red Rumped Swallow	<i>Cercopis daurica</i>	SM	++	LC	I	R
<b>Fam - Paridae</b>							
74	Great Tit	<i>Parus major</i>	AL	++	LC	O	R
<b>Fam - Alaudidae</b>							
75	Oriental SkyLark	<i>Alauda gulgula</i>	AL	+++	LC	O	R
76	Ashy Crowned Sparrow Lark	<i>Erimopteryx griseus</i>	WN	++	LC	O	PM
<b>Fam - Timalidae</b>							
77	Jungle Babbler	<i>Turdoides striata</i>	AL	++	LC	I	R
78	Common Babbler	<i>Turdoides caudata</i>	AL	+++	LC	I	R
<b>Fam - Pycnonotidae</b>							
79	Red Vented Bulbul	<i>Pycnonotus cafer</i>	AL	+++	LC	O	R
<b>Fam - Cisticolidae</b>							
80	Plain Prinia	<i>Prinia inornata</i>	WN	+++	LC	I	PM
81	Jungle Prinia	<i>Prinia sylvatica</i>	MN	+	LC	I	PM
82	Common Tailor Bird	<i>Orthrotomus sutorius</i>	AL	+++	LC	I,F	R
<b>Fam - Aegithinidae</b>							
83	Common Iora	<i>Aegithina tiphia</i>	AL	++	LC	I	R
<b>Fam - Zosteropidae</b>							
84	Oriental White Eye	<i>Zosterops palpebrosus</i>	SM	++	LC	O,N	PM
<b>Fam - Phylloscopidae</b>							
85	Paddyfield Warbler	<i>Acrocephalus agricola</i>	SM	++++	LC	I	PM
86	Clamorous Reed Warbler	<i>Acrocephalus stentoreus</i>	SM	++	LC	I	PM

87	Common chiffchaff	<i>Phylloscopus collybita</i>	WN	++	LC	I	PM
<b>Fam - Turdidae</b>							
88	Pied Thrush	<i>Geokichia citrina</i>	WN	+	LC	I,F	PM
<b>Fam - Laniidae</b>							
89	Long Tailed Shrike	<i>Lanius schach</i>	SM	++	LC	I	PM
<b>Fam - Sturnidae</b>							
90	Common Maina	<i>Acridotherus tristis</i>	AL	++++	LC	O	R
91	Pied Myna	<i>Gracupica contra</i>	AL	++	LC	O	R
92	Bramhany Myna	<i>SturnUS pagodarum</i>	SM	+++	LC	O	PM
93	Asian Glossy Sterling	<i>Aplonis panayensis</i>	WM	++	LC	O	PM
94	Common Sterling	<i>Sturnus vulgaris</i>	SM	++	LC	O	R
95	Rosy sterling	<i>Paster roseus</i>	WN	+	LC	I,F	PM
<b>Fam - Campephagidae</b>							
96	Small Minivet	<i>Pericrocotus cinammomeus</i>	AL	+	LC	I	PM
<b>Fam - Motaciliidae</b>							
97	Paddyfield Pipit	<i>Anthus rufulus</i>	WN	++++	LC	I	R
98	White browed Wagtail	<i>Motacila maderaspatensis</i>	AL	++	LC	I	R
99	Grey Wagtail	<i>Motacila cinerea</i>	AL	+++	LC	I	R
<b>Fam - Muscicapidae</b>							
100	Indian Robin	<i>Copsychus fulicatus</i>	AL	+++	LC	I	R
101	Magpie Robin	<i>Copsychus saularis</i>	AL	++	LC	I	R
102	White Rumped Shama	<i>Copsychus malbaricus</i>	WN	+	LC	I	R
103	Red Breasted Flycatcher	<i>Ficedula parva</i>	SM	+	LC	I	PM
104	Taiga Flycatcher	<i>Ficedula albicilla</i>	WN	++	LC	I	PM
105	Tickell's Blue Flycatcher	<i>Cyornis tickellae</i>	WN				
106	Hodgson's Redstart	<i>Phoenicurus hodgsoni</i>	WN	+	LC	I	PM
107	Black Redstart	<i>Phoenicurus ochurus</i>					
108	Common Stone chat	<i>Saxicola torquatus</i>	WN	+++	LC	I	PM
109	Bush Chat	<i>Saxicola caprata</i>	WN	+++	LC	I	PM
110	Brown Rock Chat	<i>Oenanthe fusca</i>	AL	++++	LC	I	R
<b>Fam - Rhipiduridae</b>							
111	White Browed Fantail Flycatcher	<i>Phipidura auriola</i>	WN	++	LC	I	PM
112	Asian Brown Flycatcher	<i>Muscicappa dauurica</i>	WN	++	LC	I	PM
<b>Fam - Estridiidae</b>							
113	Chestnut Munia	<i>Lonchura atricapila</i>	AL	+++	LC	G	R
114	Scaly Breasted Munia	<i>Lonchura punctulata</i>	AL	+++	LC	G,I	R
115	Straberry Finch/Red Munia	<i>Amandava amandava</i>	WN	+	LC	G,I	R
116	White Rumped Munia	<i>Lonchura striata</i>	WN	+	LC	G,I	R
117	Indian Silverbill	<i>Euodice malabarica</i>	WN	+	LC	G,I	R
<b>Fam - Passeridae</b>							
118	House Sparrow	<i>Passer domesticus</i>	AL	++++	LC	G	R
119	Chestnut Shouldered Petronia	<i>Gymnoris xanthocolis</i>	WN	++	LC	G	R
<b>Fam - Nectarinidae</b>							
120	Purple Sunbird	<i>Cinnyris asiaticus</i>	AL	+++	LC	N	R

**Appendix Table 1.** Bird species recorded in and around DevTalav (Pond), Maharashtra, India Jan, 2014 to Dec. 2016. A = Abundance, FG = Foraging Guild, IUCN=International Union for Conservation of Nature, M = Migratory status, MN = Monsoon, AL = All Seasons, WN = Winter, LC = Least Concern, NT = Near Threatened, P = Piscivorous, C = Carnivorous, I = Insectivorous, O = Omnivorous, F = Frugivorous, N = Nectarivorous, G = Grainivorous, BM=Breeding Migrant, PM=Passage Migrant, R=Resident

**Table 2. Percentage occurrence of families of bird community in study area**

Sr. No.	Families	% Occurrence
1.	Ciconidae	4.1
2.	Ardeidae	4.1
3.	Threskiornidae	2.5
4.	Accipitridae	5.0
5.	Raliidae	2.5
6.	Phasianidae	3.3
7.	Apodidae	1.6
8.	Charadriidae	1.6
9.	Turnicidae	1.6
10.	Recurvirostridae	0.8
11.	Columbidae	2.5
12.	Anatidae	5.0
13.	Cuculidae	1.6
14.	Tytonidae	0.8
15.	Strigidae	2.5
16.	Caprimulgidae	1.6
17.	Upupidae	0.8
18.	Bucerotidae	0.8
19.	Coraciidae	0.8
20.	Halcyonidae	0.8
21.	Alcedonidae	2.5
22.	Meropidae	0.8
23.	Psittacidae	1.6
24.	Megalamidae	0.8
25.	Picidae	1.6
26.	Pittidae	0.8
27.	Ploceidae	0.8
28.	Dicruridae	0.8
29.	Oriolidae	0.8
30.	Monarchidae	1.6
31.	Corvidae	2.5
32.	Hirudinidae	0.8
33.	Paridae	0.8
34.	Alaudidae	1.6
35.	Timalidae	1.6
36.	Pycnonotidae	0.8
37.	Cisticolidae	2.5
38.	Aegithinidae	0.8
39.	Zosteropidae	0.8
40.	Phyloscopidae	1.6
41.	Turdidae	0.8
42.	Laniidae	0.8
43.	Sturnidae	5.0
44.	Campephagidae	0.8
45.	Motaciliidae	2.8
46.	Muscicapidae	9.1
47.	Rhipiduridae	1.6
48.	Estrinidae	4.1
49.	Passeridae	1.6
50.	Nectarinidae	0.8

## DISCUSSION

Avifauna of study area in and around Nagbhid, within the proposed Ghodazari Wildlife Sanctuary in Bramhapuri Forest Division range of Maharashtra, remained unexplored till date. During present survey of study site, total 120 species of avifauna, representing 17 orders and 50 families are recorded during Jan, 2014 to Dec. 2016. Bayani and Dandekar (2017) recorded 255 species of avifauna from Tadoba-Andhari Tiger Reserve (TATR) forest in Maharashtra, which is located in the vicinity of study area.

Foraging guild of birds in the study area indicates dominance of insectivorous birds, followed by omnivorous, grainivorous, frugivorous, piscivorous and carnivorous birds while herbivorous and nectarivorous birds are very few which indicates that agro-forest ecosystem in the study area provide food for their sustenance. Ecosystem of local area impacted composition of bird community and their foraging guild (Gregory, *et al.*, 2003; Bhagwat, *et al.*, 2008; Beaudrot, *et al.*, 2016; Karanth, *et al.*, 2016). Substantial number of rare bird species like Purple Heron, White-Eyed Buzzard, Mottled Wood Owl, Indian Pitta, Plum-Headed Parakeet, Black Stork, Woolly Necked Stork, Bar Headed Goose, Great Horned Owl, Black Naped Monarch and Asian Paradise Flycatcher, adds to the richness of avifauna. As such rare species are indicative of rich diversity of birds in this habitat hence need special conservation measures. (Prendergast, *et al.*, 1993).

Birds like Rosy Sterling are winter visitors from their breeding ground in European countries (Nyagolov, *et al.*, 2003) found to perched on *Butea monosperma* tree during flowering in the month of March. *Anastomus oscitans*, *Threskiornis melanocephalus*, *Plegadis falcinellus*, *Pernis ptilorhynchus* and *Hypothymis azurea* are breeding migrants, migrated from their faraway nesting places. *Anastomus oscitans* and *Threskiornis melanocephalus* are monsoon breeding migrants arrive from their faraway nesting places in North-East India, Burma and Bangladesh to breeding places in the month of June-July and departs from breeding place in the month of December. (Wells *et al.*, 1999; Ali and Ripley, 2001; Das, *et al.*, 2014; Pramanik, *et al.*, 2016). Black Stork, Woolly Necked Stork and Bar Headed Goose are newly recorded in study area within Ghodazari Sanctuary.



## CONCLUSION

In the present study of avifauna, migratory birds are observed in few numbers as compared to resident birds. The substantial number of insectivorous and granivorous birds in the study area underline the significance of agroforest ecosystem. Anthropogenic activities like livestock grazing, fishing, uses of pesticides in agriculture and deforestation are posing threat to the bird diversity in the study area hence need conservation measures.

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