RESEARCH ARTICLE

Status and diversity of Avifauna of Tukum Lake near Nagbhid, of Eastern Vidarbha (India)

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ABSTRACT

The present study was undertaken to explore species avifaunal diversity, and their residential status in and arrond the study area. Tukum pond (20º56'03.46"N and 79 º67'63.85"E) is located within newly approved Ghodazari Sanctuary by Government of Maharashtra., spreads over an area of about 50 Acres. The shallow water reservoir with surrounding deep semi-deciduous tropical forest on one and paddyfields on another, presents unique agro-forest ecosystem which provides suitable feeding ground for wetland avifauna. During study period, spaning from, May, 2014 to April. 2016, in total 5010 specimens of 119 species, belongs to 96 genus, were recorded. They belongs to 49 families and 16 orders. Maximum abundance recorded from Ord - Passeriformes with 38% (n=45) of abundance followed by ord- Anseriformes 13% (n=15). Among the observed community of waterbird, fam- Ardeidae recorded maximum abundance with 7.56% (n=9) followed by Fam-Anatidae 6.72% (n=8). The results obtained in the present investigation of bird indicates that, agro-forest ecosystem of Tukuim pond impacted the composition of bird community, as 64% of total birds are residents or residents showing local migration (R and R/LM) is in conformity with other studies on avian diversity in area having agricultural landscape. Painted stork (*Mycteria leucocephala*), Black Headed Ibis (*Threskiornis melanocephalus*) and Darter (*Anhinga melanogaster*) included in the Near Threatened (NT) category. Black headed Ibis and Darter are commonly observed in the during the study period and their population found relatively stable as against steep decline in the density pattern of Painted stork.

Keywords: Diversity, Passeriformes, Anatidae, Charadiformes, Darter

INTRODUCTION

Birds play many important functions to maintain the health of ecosystems through their actions as pollinators, seed dispersers, predators, scavengers, and as prey for other species. (Gregary, et al., 2003) Wetland birds are an important component of wetland ecosystem, as they form vital links in the food webs. (Ramsar Convention, 2016). Wetlands are under great pressure in the Asiatic region, as 20% of threatened bird species found in such habitats, including freshwater lakes, rivers, marshes, coastal lagoons and

intertidal flats. (Kumar et al., 2005). The birds inhabiting in and around water reservoir and dependent on wetland directly or indirectly for feeding, breeding, nesting or roosting are commonly called water birds or wetland birds (Kumar & Gupta 2013; Ramsar Convention, 2016;). Loss of natural wetlands is a global phenomenon that has severe consequences for waterbird populations and their ecosystem services. Waterbirds includes, waders like dabbling ducks, goose, shanks, herons, egrets, plovers, sandpipers, and waterfowls, like waterhens, watercocks cormorants etc which are water body associated birds (Boere, et, al. 2006; Ramsar Convention, 2016). Many conservation studies highlighted an importance of agro-forest ecosystem in reducing the impact of natural habitat loss, and its major role in the conservation of waterbirds. (Boere, et, al. 2006).

Birds travel to their non-breeding wintering grounds in Indian subcontinent and on their way back to their breeding areas in northern Eurasia, Russia and Arctic region. (Bamford, et al., 2008; Galbraith, et al., 2014). These journeys on predetermined flyways are repeated every year requiring precise orientation and high energy consumption, as an ecological adaptation to different environmental conditions to exploit food resources at different times of the year. (Delany, et, al., 2009; Galbraith, et al., 2014). 20% of all known species, make regular seasonal movements. (Delany et al, 2009). Many travel thousands of miles between their breeding places and their wintering grounds. But more than 40% of these migratory species are declining, and nearly 200 are now classified as globally threatened. (Delany et al, 2009. Many of these declining species were once common, and their arrivals and departures are significant cultural events throughout much of the world. (Delany, et, al. 2009).

Conservation strategies for waterbird population revolves around the flyways of individual biogeographical populations, geographical limits of breeding and non-breeding population, information about number of individuals of species, number of species, ecological processes at their wintering grounds. (Boere, et, al. 2006).

The India checklist acknowledges a total of 1310 species of birds for India and for Indian subcontinent 1392 constituting about 12% of the world avifauna (Pravin *et al.*, 2016). Wetlands in India (excluding rivers), account for 18.4% of the country's geographic area, of which 70% is under paddy cultivation (Parekh & Gadhvi 2013). Waterbird communities have been studied fairly well in India (Arunkumar, et al., 2005; Bhattacharjee and Bergali, 2012; Kumar & Gupta, 2013; Quodros, G., 2016). India checklist reported 310 wetland birds, out of which 243 are waterbirds and 67 are wetland associated birds. (Arunkumar, et al., 2005). Past studies documented waterbird community of Maharashtra, mostly in Western Ghat, (Monga, et, al, 2005), in Vidarbha by Chitampally, 1993; Wagh, *et al*., 2015). 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 Karhandla Wildlife Sanctuary, Umred. There is a paucity of studies on the diversity of birds in the non-protected area of Chandrapur, Bhandara and Gadchiroli district of Maharashtra which is known for dense moist semi-deciduous forest interspersed with freshwater habitats, ponds, lakes and paddy fields. The present study site, Lawari pond, located in such non-protected area, which otherwise having rich bio-diversity acts as perfect wetland habitat for winter migratory bird species but exposed to anthropogenic activities resulted in degradation of habitat and increased disturbance to avifauna. Hence, present study has been undertaken to explore the rich diversity of waterbirds of this neglected wetland ecosystem, to assess foraging guild, residential status, conservation status, and abundance, which would be of much help to chalk out conservation strategy in future, as envisioned in the National Action Plan, 2016-2024 of Indian Government, for Conservation of Waterbirds.

MATERIAL AND METHOD

Study area

The study was conducted in Tukum pond (20º56'03.46"N and 79 º67'63.85"E) located within the Nagbhid taluka of Chandrapur district of Maharashtra, spreads over an area of about 80 Acres. (Fig.1). It is surrounded on three sides by paddy fields while on another side by forest. Study area comprises two water bodies separated from one another by only 600 meter distance. It presents unique geographical site surrounded by forest having mixed vegetations of tropical moist semi-deciduous forest, dominated by teak *Tectona grandis,Terminalia arjuna, T. tormentosa,* and *Butea monosperma* interspersed with patches of

Fig. 1. Study area showing 6 line transect points

tropical moist rainforest *Syzigium cumini, Terminalia chebula, Emblica officianalis* and bamboo *Dendrocalamus strictus*. The shallow water reservoir with surrounding deep semi-deciduous tropical forest presents unique agro-forest ecosystem which provides suitable feeding ground for wetland avifauna. Rainfall varies from 800 mm to1400 mm annually and begins from May-June and continues till the end of September. Average temperature drops to 9-15 °C in winter (Nov. to Feb.) and rises to 42-45 °C in summer (April-June).

Bird Sampling

Field observations of waders and waterfowls were recorded by random visits to the study area, during May, 2014 to April. 2016. Both distance and point count methods were used to estimate bird population (Sutherland, et al., 2004). Accordingly ten line transects having distance of 500m were randomly selected in the study area by taking into consideration suitability of location. (Fig.1). Average 9 sightings per year were carried out with 6 sighting from Oct. to Mar while 3 sightings during rest of the year. Observation of birds was done by 10x50 DPSI Wide-Angle Binocular (Olympus make) and wherever possible photographed by Canon EOS 200D digital camera. Species identification of observed birds was done with the help of standard identification keys (Ali and Ripley, 2001; Kumar, et al., 2005; Grimmett *et. al*., 2011). Qualitative data on foraging guild, migratory status, breeding biology and behavior of birds and threats to vegetation were gathered throughout the study period. Permanent sampling points were established in each transect maintaining a minimum of 100 m distance between the points. Sampling was conducted mostly during morning (06 30 to 09 30 hrs) and during afternoon (15 30 to 18.30 hrs) covering three major seasons, namely summer (March-May), monsoon (June-August). Binoculars were used to observe the behavioural activities. The species identity, foraging habitats and feeding techniques of both waders were recorded using the initial observation method (i.e., only the 1st foraging observation of each individual was considered). This method is subject to conspicuousness bias, since the most active individuals are more likely to be discovered (Holmes & Robinson 1988, Morse 1990). Sequential observations (i.e., several consecutive observations of the same individual) have been avoided since they are not independent and are subject to temporal autocorrelation, i.e., each observation is usually correlated with previous ones (Morrison 1984, Hejl, et al. 1990). Three habitat types were identified as foraging habitats for migratory waders: mud, shallow water and hydrophyte vegetation.

Data Analysis

The information on order, family and species composition, residential status, foraging guild, and IUCN status of observed birds were tabulated. Waterbirds observed were categorized into groups based on their relative numbers of sightings as, Very Common (Vcom) 16 - 18, Common (Com) 12- 15, Uncommon (UnCom) 8 - 11, Rare (Ra) 5 – 7, Very Rare (VRa) 1-4. The density pattern was calculated by the formula:

$$D = \frac{1}{L} \times 100$$

Where, D is the density, I is number of specimens of each species, L is the number of all specimens.

Checklist of bird community in the study area is prepared on the basis bird field guides of Ali & Ripley, 2001; Grewal, *et al*., (2002); Arunkumar, et al., 2005; Grimmett, *et al*., (2011) and India check list by Pravin, *et al.*, (2016) (Table.1).

RESULTS

During two year study period, spanning from, May, 2014 to April. 2016, in total 5010 specimens of 119 bird species, belongs to 96 genus, were recorded. They belong to 49 families and 16 orders. (Appendix Table.1). Maximum abundance recorded from Order - Passeriformes with 37.81% (n=45) of abundance followed by ord-Charadiformes 12.60% (n=15) and

Peliconiformes 9.24% (n=11). (Fig.2) Among the observed bird community, fam- Ardeidae recorded maximum abundance with 7.56 % (n=9) followed by fam- Anatidae 6.72 % (n=8) and Fam – Scolopacidae 5.88% (n=7).

Avian community of Tukum pond, categorized on the basis of overall sightings throughout study period of two years. (Fig.4). It reveals that, maximum abundance 36% (n=43) recorded from uncommon (UCom) bird species followed by 31% (n=37) from Very common (VCom) birds. Residential status of bird species observed during study period includes, 36% (n=46) residents (R), followed by 25% (n=30) residents with local migration (R/LM) and 14% (n=17) Winter Migrants (WM). (Fig. 5), while birds showing summer influx (R/LM/SM) and winter influx as well as summer movements (R/WM/SM) show least abundance. Foraging guild of bird community of study area reveals that, maximum abundance 26% (n=22) recorded from birds showing omnivorous (O) and Insectivorous (I) feeding habit followed by carnivorous (C) 22.61% (n=19) and piscivorous 17.85% (n=15) birds.

Conservation status according to IUCN list of birds for recorded species in the study area indicates that, only three species of birds, Painted stork (*Mycteria leucocephala*), Black Headed Ibis (*Threskiornis melanocephalus*) and Darter (*Anhinga melanogaster*) included in the Near Threatened (NT) category while all other species are from least concern (LC) catagory. (Table. 1).

Table.1. Checklist of birds observed at Tukum Pond showing Total count, Density, total sightings, Residential status, foraging guild, IUCN conservation status, and Abundance.

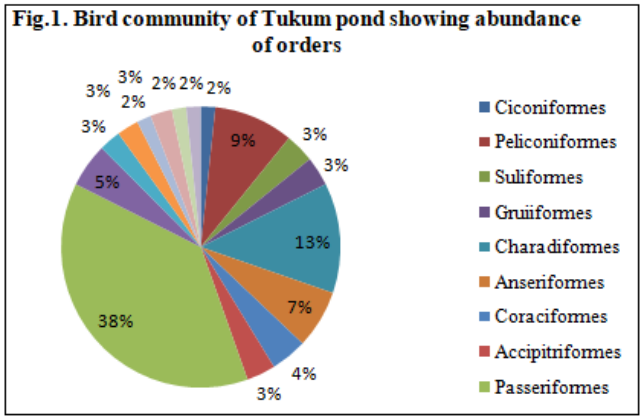
Sr. N.	Common Name	Zoological Name	Tot. Count	Tot Sig.	Density Pattern (%)	Res. Status	For. Guild	IUCN	Abund
Ord –Ciconiformes									
Fam -Ciconidae									
1	Painted stork	*Mycteria leucocephala*	104	8	2.075	R/LM/SM	P	NT	UnCom
2	Asian Openbill Stork	*Anastomus oscitans*	67	14	1.337	R/LM/SM	P,C	LC	Com
Ord - Peliconiformes									
Fam- Ardeidae									
3	Purple Heron	*Ardea pupurea*	22	13	0.439	R/LM/WM	P,I	LC	UnCom
4	Indian Pond Heron	*Ardea grayii*	60	18	1.197	R	P	LC	VCom
5	Grey Heron	*Ardea cinerea*	16	10	0.319	R/LM	P,C,I	LC	UnCom
6	Intermediate Egret	*Ardea intermedia*	41	11	0.818	R/LM/SM	P	LC	Com
7	Little Green Heron	*Butorides striatus*	13	8	0.259	R	P,C,I	LC	UCom
8	Black-crowned Night-Heron	*Nycticorax nycticorax*	66	8	1.317	R/LM/WM	P	LC	UCom
9	Catle Egret	*Bubulcus ibis*	319	18	6.367	R	I	LC	VCom
10	Little Egret	*Egretta garxetta*	175	18	3.493	R/LM	P	LC	VCom
11	Large Egret	*Casmerodius albus*	55	14	1.097	R/LM/SM	P,C	LC	Com
Fam - Threskiornithidae									
12	Black Headed Ibis	*Threskiornis melanocephalus*	53	10	1.057	R/WM/SM	P	NT	UnCom
13	Red Naped Ibis	*Pseudibis papilosa*	76	16	1.516	R/LM	P	LC	VCom
Ord - Sulliformes									
Fam - Phalacocrocoracidae									
14	Little Cormorant	*Phalacrocorax niger*	171	16	3.413	R/LM	P	LC	VCom
15	Indian Cormorant	*Phalacrocorax fuscicollis*	145	16	2.894	R/LM	P	LC	VCom
16	Great Cormorant	*Phalacrocorax corbo*	11	7	0.219	R/LM/WM	P	LC	Ra
Fam - Anhingidae									
17	Darter	*Anhinga melanogaster*	21	14	0.419	R/WM/SM	P	**NT**	Com
18	White breasted Waterhen	*Amaurornis phoenicurus*	22	8	0.439	R	O	LC	UnCom
19	Eurasian Coot	*Fulica atra*	63	10	1.257	WM	O	LC	UnCom

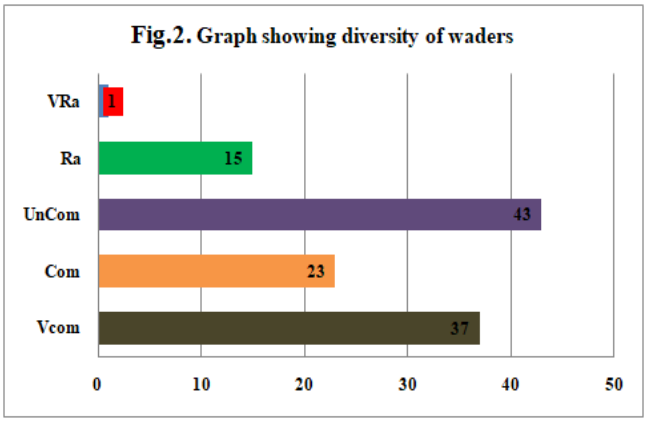
20	Common Moorhen	*Gallinula chloropus*	44	12	0.878	R	O	LC	Com
21	Grey Headed Swamphen	*Porphyrio poliocephalus*	66	14	1.317	R/LM	O	LC	Com
Ord - Gruiiformes									
Fam - Raliidae									
22	Little Ringed Plover	*Charadrius dubios*	82	14	1.636	R/LM	I	LC	Com
23	Red Wattled Lapwing	*Vanellius indicus*	150	18	2.994	R	C	LC	Vcom
24	Yellow Wattled Lapwing	*Vanellius malabaricus*	21	10	0.419	R/LM/WM	C	LC	UCom
Fam - Scolopacidae									
25	Temminck's Stint	*Calidris temminckii*	17	10	0.339	WM	I	LC	UCom
26	Common Snipe	*Gallinago gallinago*	9	6	0.179	R/WM/SM	I	LC	Ra
27	Spotted Redshank	*Tringa erythropus*	22	7	0.439	WM	C,I	LC	Ra
28	Common Greenshank	*Tringa nebularia*	27	7	0.538	WM	C,I	LC	Ra
29	Green Sandpiper	*Tringa ochropus*	15	7	0.299	WM	C,I	LC	Ra
30	Wood Sandpiper	*Tringa glareola*	39	10	0.778	R/LM/WM	C	LC	Com
31	Common Sandpiper	*Actius hypoleucos*	25	8	0.499	WM	C	LC	UCom
Fam - Jacanidae									
32	Bronze Winged Jacana	*Metopodius indicus*	21	14	0.419	R/LM	O	LC	Com
33	Pheasant Tailed Jacana	*Hydrophasianus chirugus*	24	12	0.479	R/LM	H	LC	Com
Fam - Rostratulidae									
34	Greater Painted Snipe	*Rostratula benghalensis*	11	8	0.219	R/WM/SM	C	LC	UnCom
Fam - Laridae									
35	River Tern	*Sterna aurantia*	45	12	0.898	R/LM	P,C	LC	Com
Fam - Recurvirostridae									
36	Black Winged Stilt	*Himantopus himantopus*	36	10	0.718	WM	C	LC	UCom
Ord – Anseriformes									
Fam - Anatidae									
37	Lesser Whissling duck	*Dedrocigna javanica*	73	14	1.457	R/LM/WM	H	LC	Com
38	Eurasian Wigeon	*Mareca penelope*	95	8	1.896	WM	H	LC	UnCom
39	Gadwall	*Mareca strepera*	81	8	1.616	WM	H	LC	UnCom
40	Bar-headed goose	*Anser indicus*	25	5	0.499	WM	H	LC	Ra
41	Indian spot billed	*Anas poecillorhyncha*	60	14	1.197	R/LM/WM	H	LC	Com
42	Northern pintail	*Anas acuta*	103	8	2.055	WM	H	LC	UCom
43	Common Teal	*Anas crecca*	29	6	0.578	WM	H	LC	Ra
44	Cotton Pygmy Goose	*Nettapus coromandlianus*	84	14	1.676	R/LM/WM	H	LC	Com
Ord –Coraciformes									
Fam - Coracidae									
45	Indian Roller	*Coracius bengalensis*	26	16	0.518	R	C,I	LC	Vcom
Fam - Meropidae									
46	Green bee-eater	*Merops orientalis*	57	18	1.137	R	I	LC	Vcom
Fam - Alcedinidae									
47	White Throated Kingfisher	*Halcyon smyrnensis*	31	18	0.618	R	P	LC	Vcom
48	Common Kingfisher	*Alcedo atthis*	40	18	0.798	R	P	LC	Vcom
49	Pied Kingfisher	*Cerule rudis*	29	18	0.578	R	P	LC	Vcom
Ord –Accipitriformes									
Fam - Accipitridae									
50	Oriental Honey	*Pernis ptilorhynchus*	7	7	0.139	R/LM	C	LC	Ra

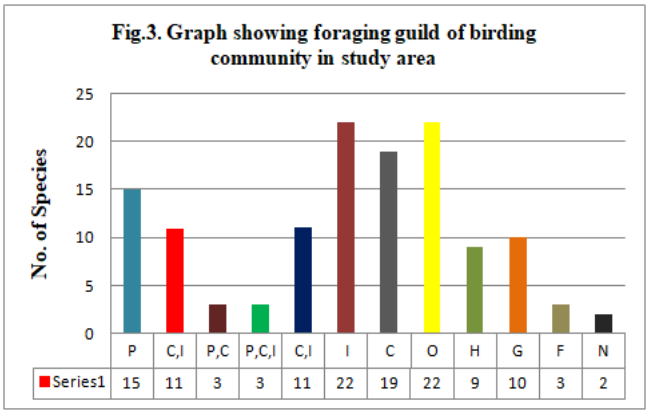
	Buzzard								
51	White Eyed Buzzard	*Butastur teesa*	13	8	0.259	R/LM	C	LC	UnCom
52	Osprey	*Pandian haliaetus*	7	6	0.139	WM	P	LC	Ra
53	Black winged Kite	*Elanus caeruleus*	23	13	0.459	R	C	LC	Com
Ord - Passeriformes									
Fam - Muscicapidae									
54	Indian robin	*Copsychus fulicatus*	45	14	0.898	R	O	LC	Com
55	Magpie Robin	*Copsychus saularis*	67	15	1.337	R	O	LC	Com
56	Common Stone chat	*Saxicola mourus*	19	7	0.379	R/LM/WM	I	LC	Ra
57	Brown Rock Chat	*Oenanthe fusca*	43	16	0.858	R	I	LC	Vcom
58	Pied Bush Chat	*Saxicola caprata*	29	13	0.578	R	I	LC	Com
59	Black Redstart	*Phoenicurus ochruros*	13	4	0.259	WM	I	LC	UnCom
60	Asian Brown Flycatcher	*Muscicapa dauurica*	10	6	0.199	R/LM/SM	I	LC	Ra
Fam - Oriolidae									
61	Indian Golden Oriole	*Oriolus kundoo*	16	7	0.319	R/LM	O	LC	Com
Fam - Ploceidae									
62	Baya Weaver Bird	*Ploceus phillipinus*	59	16	1.177	R	G	LC	Vcom
Fam - Corvidae									
63	Indian Jungle crow	*Corvus culminatus*	5	4	0.099	R/LM	O	LC	VRa
64	House Crow	*Corvus splendens*	23	18	0.459	R	O	LC	Vcom
65	Rufous tree pie	*Dendrocita vagabanda*	14	8	0.279	R	O	LC	UnCom
Fam - Timalidae									
66	Jungle Babbler	*Turdoides striata*	81	18	1.616	R	O	LC	Vcom
67	Common Babbler	*Turdoides caudata*	24	15	0.479	R	O	LC	UnCom
68	Yellow Eyed Babbler	*Chrysoma sinense*	10	8	0.199	R/LM	I	LC	UnCom
Fam - Rhipiduridae									
69	White Browed Fantail	*Phipidura auriola*	39	14	0.778	R/LM	I	LC	Com
Fam - Monarchidae									
70	Asian Paradise flycatcher	*Terpsiphone paradisi*	19	10	0.379	R/LM/SM	I	LC	UnCom
Fam - Laniidae									
71	Bay backed shrike	*Lanius vitatus*	11	10	0.219	R/LM	C,I	LC	UnCom
72	Long Tailed Shrike	*Lanius schach*	25	14	0.499	R/LM	C,I	LC	Com
Fam - Vangidae									
73	Common Woodshrike	*Tephrodornis pondicerianus*	17	11	0.339	R/LM	C,I	LC	UnCom
Fam - Phyloscopidae									
74	Tickels Warbler	*Phyloscopus affinis*	11	8	0.219	R/LM/WM	I	LC	UnCom
Fam - Zosteropidae									
75	Oriental White Eye	*Zosterops palpebrosus*	23	8	0.459	R/LM	N	LC	UnCom
Fam - Estriididae									
76	Red munia	*Amandava amandava*	16	8	0.319	R/LM/WM	G	LC	UnCom
77	Scaly breasted Munia	*Lonchura punctulata*	36	16	0.718	R	G	LC	Vcom
78	Indian Silverbill	*Euodice malabarica*	64	18	1.277	R	G	LC	Vcom
Fam - Passeridae									
79	House Sparrow	*Passer domesticus*	74	18	1.477	R	G	LC	Vcom
80	Chestnut Shouldered Petronia	*Gymnoris xanthocolis*	81	17	1.616	R	G	LC	Vcom
Fam - Aegithinidae									

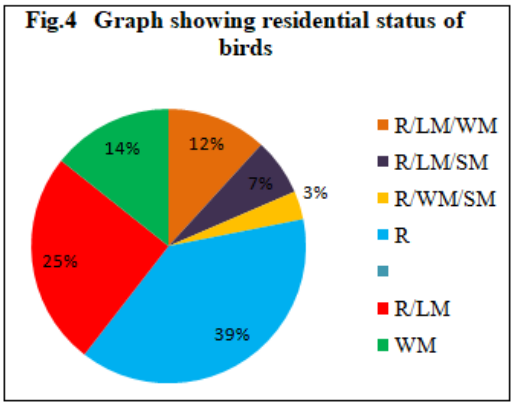
81	Common Iora	*Aegithina tiphia*	32	8	0.638	R/LM	I	LC	UnCom
Fam - Pycnonotidae									
82	Red Vented Bulbul	*Pycnonotus cafer*	51	18	1.017	R	I	LC	VCom
Fam - Sturnidae									
83	Common Myna	*Acridotherus tristis*	47	18	0.938	R	O	LC	VCom
84	Pied Myna	*Gracupica contra*	36	18	0.718	R	O	LC	VCom
85	Bramhany Myna	*Sturna pagodarum*	54	18	1.077	R	O	LC	VCom
Fam - Nectarinidae									
86	Purple Sunbird	*Cinnyris asiaticus*	34	18	0.678	R	N	LC	VCom
Fam - Dicruridae									
87	Black Drongo	*Dicrurus macrocerces*	26	18	0.518	R	I	LC	Vcom
Fam - Hirudinidae									
88	Barn Swallow	*Hirundo rustica*	44	10	0.878	R/LM/WM	I	LC	UnCom
Fam - Alaudidae									
89	Bengal Bush Lark	*Mirafra assamica*	17	8	0.339	R/LM	G	LC	UnCom
90	Indian Bush Lark	*Mirafra erythroptera*	14	8	0.279	R/LM	G	LC	UnCom
91	Ashy C. Sparrow Lark	*Erimopteryx griseus*	27	18	0.538	R	G	LC	Vcom
92	Rufous Tailed Lark	*Ammomanes phoenicura*	43	18	0.858	R	G	LC	Vcom
Fam - Cisticolidae									
93	Plain Prinia	*Prinia inornata*	20	18	0.399	R	I	LC	Vcom
94	Ashy Prinia	*Prinia socialis*	35	15	0.698	R	I	LC	Com
Fam - Motaciliidae									
95	White Wagtail	*Motacila alba*	27	8	0.538	WM	C,I	LC	UnCom
96	YellowWagtail	*Motacila flava*	31	8	0.618	WM	C,I	LC	UnCom
97	White browed Wagtail	*Motacila maderaspatensis*	48	16	0.958	R	C,I	LC	Vcom
98	Paddyfield Pipit	*Anthus rufulus*	23	18	0.459	R	C,I	LC	Vcom
Ord - Columbiformes									
Fam - Columbidae									
99	Spotted dove	*Spilopelia senegalensis*	36	18	0.718	R	O	LC	**Vcom**
100	Common pigeon	*Columba livia*	30	18	0.598	R	O	LC	**Vcom**
101	Green pigeon	*Treron phoenicopterus*	29	10	0.578	R/LM	O	LC	**UnCom**
102	Laughing Dove	*Spilopelia senegalensis*	42	18	0.838	R	O	LC	**Vcom**
103	Red Collored Dove	*Streptopelia tranquebarica*	13	8	0.259	WM	O	LC	**UnCom**
104	Euracian Collored Dove	*Streptopelia decaocto*	38	8	0.758	R/LM/WM	O	LC	**UnCom**
Ord - Cuculiformes									
Fam - Cuculidae									
105	Greater coucal	*Centropus sinensis*	19	16	0.379	R	C	LC	**Vcom**
106	Common Hawk Cuckoo	*Hierococcyx varius*	15	9	0.299	R/LM/SM	C	LC	**UnCom**
107	Pied Cuckoo	*Clamator jacobinous*	13	6	0.259	R/LM/SM	C	LC	**Ra**
Ord - Strigiformes									
Fam - Strigidae									
108	Indian eagle owl	*Bubo bengalensis*	9	6	0.179	R/LM	C	LC	Ra
109	Spotted Owlet	*Athene brama*	17	10	0.339	R	C	LC	UnCom
Fam - Tytonidae									
110	Barn owl	*Tyto alba*	6	6	0.119	R	C	LC	Ra
Ord - Bucerotiformes									
Fam - Upupidae									
111	Common hoopee	*Upupa epops*	25	10	0.499	R/LM/WM	C	LC	UnCom
Fam - Bucerotidae									
112	Indian Grey hornbill	*Ocyceros birostris*	16	8	0.319	R/LM	C	LC	UnCom
Ord - Piciformes									
Fam - Picidae									
113	Pygmy brown capped	*Dendrocopus nanus*	16	8	0.319	R/LM	C	LC	UnCom

	woodpecker								
114	Lesser Goldenback	*Dinopium benghalense*	23	10	0.459	R/LM	C	LC	UnCom
Fam - Megalamidae									
115	Coppersmith Barbet	*Psilopogon haemocephala*	33	12	0.658	R/LM	F	LC	Com
Ord - Psitaciformes									
Fam - Psittacidae									
116	Rose Ringed Parakeet	*Psitacula krameri*	58	16	1.157	R	F	LC	Vcom
117	Plum Headed Parakeet	*Psitacula cyanocephala*	86	18	1.716	R/LM	F	LC	Vcom
Ord - Caprimulgiformes									
Fam - Caprimulgidae									
118	Indian Nightjar	*Caprimulgus asiaticus*	30	14	0.598	R	I	LC	Com
119	Jungle Nightjar	*Caprimulgus indicus*	36	15	0.718	R	I	LC	Com









DISCUSSION

In the present study, bird diversity of Tukum pond was analyzed to assess status and abundance and richness, diet guild, residential status, and IUCN status of bird species in relation to trend in Indian subcontinent as well as global trend, during past 2 years study period. Many studies in the past few decades reveals that, anthropogenic land use, climate change and increased human population resulted in decline of population of many migratory waterbird species seeking Central Asian flyaway (Boere, et,al.,2006, Kirby, et al, 2008; Delany, et, al., 2009; Galbraith, et al., 2014). Therefore, studies on the composition of local avifauna especially for the vulnerable group like water birds immensely helpful in assessing changes in environmental condition of habitat. (Gregory, *et al.,* 2003).

Ecosystem of local area impacted composition of bird community and their foraging guild (Gregory, *et al.,* 2003; Bhagvat, *et al*., 2008; Karanth, et al., 2016). The results obtained in the present investigation of bird indicates that, agro-forest ecosystem of Tukum pond impacted the composition of bird community, as 64% of total birds are residents or residents showing local

migration (R and R/LM) is in conformity with other studies on avian diversity in area having agricultural landscape.(Blake, 2007). It is in contrast with the fact that, composition of avifauna in any wetland shows predominance of winter migratory birds. (Kumar & Gupta 2013). Global trend is towards sharp decline in the diversity of water birds. (UNEP/CMS, 2014; Sackl and Ferger, 2016). Moreover, winter migratory (WM) water birds having breeding grounds in Northern Eurasia, Balkan region and Arctic region make absolute abundance (38%) among the total recorded water bird species, witnesses steep decline with few exceptions of Northern Pintail, Gadwall, Cotton Pygmy Goose and Spotted Redshank (Bamford, et al., 2008; Galbraith, et al., 2014)

During present study, among the recorded bird species, Fam-Anatidae shows maximum abundance. Individuals of these populations depend upon optimum utilization of network of wetland habitat sites to complete their annual life cycle. (Delany, et al., 2009) These winter migratory water birds migrates from breeding grounds in Europe, North Asia and Arctic region. They follows, East Asia-Australasia Flyway which connects North-East Asian breeding grounds with winter feeding grounds in South-East Asia and Australia (Boere, et, al., 2006, Delany, et, al., 2009).

Most of the winter migratory birds in the present study belong to the family-Anatidae, shows drastic decline in their density pattern during past four years with few exceptions of Northern Pintail, Gadwall, and Eurasian Wigeon. Drastic decline in the density pattern of dabbling ducks of Anatidae family during present investigation is in coherence global trend as witnessed in their breeding ground in Europe and North Asia. Abundance of winter migratory water birds having either herbivorous or omnivorous as compared to piscivorous and cornivorous diet guild in the study area clearly underlies an importance of surrounding agro-forest ecosystem with flooded paddy fields having stubbles from 'monsoon' harvest. Relatively stable population of Northern Pintail (*Anas acuta*) in the study area during four year study period as against trend of steep decline in abundance in case of other Winter Migrants (WM) from their breeding ground may be due to specialized nocturnal foraging habit of these dabbling ducks on standing stubbles in flooded paddy field with soft bottoms. (Fox, et al., 2016).

An occurrence of Very common (VCom) and Common (Com) birds which make up about 50% of total avifaunal community indicates that, Tukum pond already under tremendous pressure of anthropogenic activities due to which losing ground for rare birds (Ra) while uncommon waterbirds also shows substantial abundance of about 36%, most of which are winter migratory birds having their breeding ground in Eastern Europe and ranges to Mongolia, add to the rich avifaunal diversity of Tukum pond. In the present investigation of avifaunal diversity of Tukum lake, only three species recorded so far are Painted stork (*Mycteria leucocephala*), Black Headed Ibis (*Threskiornis melanocephalus*) and Darter (*Anhinga melanogaster*) included in the Near Threatened (NT), all having piscivorous (P) diet guild, decline in abundance may be attributed to intensified fishing activityin the local area, previously fishing was not carried out there. Overall assessment of data on the diet guild of waterbird community in the study area indicates abundance of insectivorous (I) and Omnivorous (O) indicates impact of surrounding agro-forest ecosystem (Fox, et al., 2016). All the waterbird species having herbivorous diet guild belongs to Order-Anseriformes and most of which are Anatidae family, while most of the waterbird species having carnivorous and insectivorous diet guild are waders of order-Charadiformes, like sandpipers, redshanks, greenshanks, plovers, lapwings and stints. The present study suggested that, as study site has been visited by the numerous migratory during winter season, due to anthropogenic disturbances like intensification of agricultural activities, poaching and intensified fishing activity, there is urgent need to chalk out conservation measures in near future.

CONCLUSIONS

During the present investigations on the fluctuations in the status and diversity of avifauna throughout two year study period of neglected Tukum Pond of Eastern Vidarbha, for which, information on foraging guild, residential status is explored. Most important findings were assessment of phenomenal decline in the diversity of winter migratory birds of Fam-Anatidae with few exceptions of Nothern Pintail and Cotton Pygmy Goose. Relatively stable population of these few winter migratory birds, attributed to the ample tropic niche in the form of standing stubbles in flooded

paddyfields, which highlights importance of agro-forest ecosystem in an adjoining area of this wetland.

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