



## SHORT COMMUNICATION

# Additions to the Birds of Bangalore University Campus (BUC), India

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**Abstract** The present study was designed to note the birds occurring in the microhabitats of Bangalore University Campus, India. Birds were monitored and surveyed using line transect methods that were laid in different spots of the campus. Twenty-eight species were newly added to this campus premises, out of which 20 are waterbirds. Conservation methods needed for habitat improvement through restoration of ponds and water check-dams including vegetation.

**Keywords** Avifauna · Conservation · Microhabitats

## Introduction

Birds inhabit various ecological niches from sub-zero alpine zones to seething deserts, high mountains to open grassland and evergreen forests. They may reside in the same area (resident) or fly away in search of food and better climate (migrants) (Ali 2012). They play a vital role from ecological point of view such as arachnivorous (Ali 2012), carnivorous (Brown et al. 2015), frugivorous (Mueller et al. 2014), granivorous (Connolly et al. 2014), herbivorous (Amo et al. 2013), insectivorous (Powell et al. 2015; Rajashekara and Venkatesha 2015), nectarivorous (Bennett et al. 2014) and omnivorous (Burin

et al. 2015) nature of diet types. They are the good pollinators and has profound effects on plant mating systems (Krauss et al. 2017). They disperse the seeds and keep check on proliferation of pests, etc., thereby contributing to maintain a healthy and sustainable ecosystem (Rajashekara and Venkatesha 2014a). This means that the birds are best specialized creatures that provide a lot of ecosystem functioning services with mode of ornithophily to mankind.

Bengaluru city is famous as “Udhyana Nagara” (means city full of parks) for its residential and/urban parks and roads lined with large canopied flowering trees (Ramaswamy and Razi 1973). This city has also several adversative factors such as the devastating human presence, disturbances of various kinds and pollution. This city landscapes serves as urban hotspot for urban wildlife and balancing reservoir for several wildlife (of native flora and fauna) including many invertebrates (major arthropods) and vertebrates (amphibians, reptiles, aves and mammals). This type of urban green areas including residential parks, educational and defense premises are recognized as hotspots for urban biodiversity by Patvarthan et al. (2000).

While educational habitats lodge <5% of the total urban area, such areas may dock up to half the biodiversity of the urban biota in different locations of India (Shyamal 1994; Nameer et al. 2000; Palot and Pramod 2000; Nazneen et al. 2001; Ramitha and Vijayalaxmi 2001; Wadatkar 2001; Dookia 2002; Jose and Zacharias 2003; Subramanean and Davidar 2004; Jain et al. 2005; Praveen and Joseph 2006; Dinesh et al. 2007; Upadhye et al. 2008; Gupta et al. 2009; Das et al. 2010; Palita et al. 2011; Devi et al. 2012; Ali et al. 2013; Dapke et al. 2015; Joshi 2015; Sethy et al. 2015; Tandan et al. 2015; Aggarwal et al. 2016; Chakdar et al. 2016; Edison et al. 2016; Rajashekara and Venkatesha 2016; Singh 2016).

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The aim of our study was to ascertain the complete bird assemblages in and around the Bangalore University Campus (BUC), India. Therefore this unique extension of bird fauna constitutes a complete checklist for the premises of BUC.

## Materials and Methods

### Study Area

Bangalore University Campus (BUC) (12°55′–12°58′N and 77°30′–77°31′E with an elevation of 875–900 m asl) is located 14 km from Bengaluru city railway station, 3 km from off Mysuru Road, Kengeri adjoining the stretches of the Turahalli Forest from about 08 km from off Kanakapura road, Bengaluru region. This campus is spread over an area of about 445.15 ha. (please see map in [10.1007/s12595-016-0175-x](https://doi.org/10.1007/s12595-016-0175-x)) comprising undulating terrain and barren land with several vegetation patches with non-deciduous trees, weeds, shrubs, scrubs, herbs, bamboo thickets, and ornamental plants. This campus also has several water bodies most of which are seasonal such as check dams, ponds of many departments and the streams of Vrishbhavathi River valley that are good spots for bird watching.

Dhanavantari Vana forms one of the biodiversity hotspots of Bengaluru Metropolitan Region (BMR), a part of BUC, India and consisted of an area of 37 acres of forest land is planted with rare medicinal and other plants which is under the control of Karnataka State Forest Department (KSFD). This plot is planted with 414 medicinal plants consisting of 173 species of trees, 82 species of shrubs, 92 species of herbs and 42 species of climbers (Ramaswamy and Razi 1973; International Year of Planet Earth 2008).

Another urban hotspot is a Biodiversity Park (Bio-Park) under the control of Bangalore University Campus, Bengaluru city. A patch of about 400 acres (242.80 ha of land) is planted saplings collected from various parts of the Western Ghats, India with the assistance of KSFD spread over different plots in BUC. This bio-park would be one of the unique biodiversity hotspots when those trees attain maturity after the decade. BUC has a total area of 445.15 ha with pockets of wilderness spread over (International Year of Planet Earth 2008).

*Albizia* spp., *Emblica officinalis*, *Santalum album*, *Shorea talura*, *Terminalia arjuna*, *Wrightia tinctoria*, and bamboos are the common tree species found in the BUC. Also, *Bougainvilleae*, *Carica papaya*, *Codiaeum variegatum*, *Hibiscus rosesinensis*, *Ixora* spp., *Lantana camara*, *Morus alba*, and *Psidium gurajava*, etc. are common shrubs/plants in the premises. A lesser area of the BUC consists of the plantations of *Eucalyptus*, *Bauhinia*

*purpurea*, *Peltophorum pterocarpum* and *Samanea saman* (Ramaswamy and Razi 1973; International Year of Planet Earth 2008).

### Bird Sampling

Birds were examined and surveyed during the study period February 2010 to January 2014 using line transect methods that were laid in different spots of Bangalore University Campus (BUC) as methodology followed by Rajashekara and Venkatesha (2016). Line transect methods was used to detect and to conduct the bird surveys. These transects were placed in the BUC and each transect was a half kilometer long, and 20 m wide, on either side (Verner 1985). Prefixed transects were walked down at a uniform pace of about 1–1.5 km h<sup>-1</sup> in the morning (08.00–11.00 h) and in the afternoon (15.00–18.00 h) to record the various bird species (Verner 1985; Praveen and Nameer 2009). These survey methods used fixed time-spans for all surveys (40 min per transect count), thereby using ‘standardized search’ sampling effort across all sampling stations (Watson 2003). Apart from this, accidental encounters were also recorded, along with the habitat in which they were observed. All identifications of bird species was based on Grewal (1995), Grimmett and Inskipp (2007) and Ali (2012). Nomenclature and taxonomy of birds was assigned according to BirdLife International (2016). Call notes of bird species was also used to locate them (Ali 2012).

## Results and Discussion

We are hereby updating the checklist by an addition of 28 species of birds belonging to 19 families under 26 genera from February 2010 to January 2014 in the check dams, ponds of many departments and the streams of Vrishbhavathi River valley running in the Bangalore University Campus (BUC), Bio-Park region and adjacent to the building areas of the University administrative and also near Department of Zoology (Table 1). Among the presently recorded 28 species, eight are terrestrial and 20 species are aquatic. All of them are least concerned in conservation status. Highest number of bird species was carnivorous/insectivorous and omnivorous (seven spp. each) compared to the other diet types (Table 1). Highest number of resident bird species (18 spp.) was compared to the remaining residential status. Highest number (three) of genera was recorded from Anatidae. Anatidae, Ardeidae and Rallidae families (four spp. each) consisted of the highest number of bird species in the present study (Table 1). Rajashekara and Venkatesha (2016) prepared a preliminary checklist of 106 species of birds based on the

**Table 1** Occurrence, residential status and the diet type of bird communities in the Bangalore University Campus, Bengaluru, India (2010–2014)

Bird family	Bird species	Scientific names	Residential status <sup>a</sup>	Diet types <sup>a</sup>
Alaudidae	Indian Lark	<i>Mirafra erythroptera</i> Blyth, 1845	R <sup>b</sup>	G
Alcedinidae	Pied Kingfisher	<i>Ceryle rudis</i> (Linnaeus, 1758)	R <sup>c</sup>	P/I
Anatidae	Northern Shoveler	<i>Anas clypeata</i> Linnaeus, 1758	M <sup>c</sup>	AM
	Spot-billed Duck	<i>Anas poecilorhyncha</i> Forster, 1781	RM <sup>c</sup>	H
	Garganey	<i>Anas querquedula</i> Linnaeus, 1758	M <sup>c</sup>	H
	Comb Duck	<i>Sarkidiornis melanotos</i> (Pennant, 1769)	R <sup>c</sup>	O
	Grey Heron	<i>Ardea cinerea</i> Linnaeus, 1758	RM <sup>c</sup>	C
Ardeidae	Indian Pond-heron	<i>Ardeola grayii</i> (Sykes, 1832)	R <sup>c</sup>	C/I
	Little Egret	<i>Egretta garzetta</i> (Linnaeus, 1766)	R <sup>c</sup>	C
	Black-crowned Night-heron	<i>Nycticorax nycticorax</i> (Linnaeus, 1758)	R <sup>c</sup>	C/I
Bucerotidae	Indian Grey Hornbill	<i>Ocyrceros birostris</i> (Scopoli, 1786)	R <sup>b</sup>	F/C
Campephagidae	Large Cuckooshrike	<i>Coracina macei</i> (Lesson, 1831)	R <sup>b</sup>	F/I
Charadriidae	Red-wattled Lapwing	<i>Vanellus indicus</i> (Boddaert, 1783)	R <sup>c</sup>	C/I
Cuculidae	Blue-faced Malkoha	<i>Phaenicophaeus viridirostris</i> (Jerdon, 1840)	R <sup>b</sup>	C/I
Jacaniidae	Pheasant-tailed Jacana	<i>Hydrophasianus chirurgus</i> (Scopoli, 1786)	R <sup>c</sup>	O
Phalacrocoracidae	Little Cormorant	<i>Microcarba niger</i> (Vieillot, 1817)	RM <sup>c</sup>	P
Picidae	Streak-throated Woodpecker	<i>Picus xanthopygaeus</i> (Gray and Gray, 1846)	R <sup>b</sup>	I/N
Pittidae	Indian Pitta	<i>Pitta brachyura</i> (Linnaeus, 1766)	R <sup>b</sup>	I/H
Podicipedidae	Little Grebe	<i>Tachybaptus ruficollis</i> (Pallas, 1764)	R <sup>c</sup>	C/I
Pycnonotidae	White-browed Bulbul	<i>Pycnonotus luteolus</i> (Lesson, 1841)	R <sup>b</sup>	O
Rallidae	White-breasted Waterhen	<i>Amaurornis phoenicurus</i> (Pennant, 1769)	R <sup>c</sup>	O
	Common Coot	<i>Fulica atra</i> Linnaeus, 1758	RM <sup>c</sup>	O
	Common Moorhen	<i>Gallinula chloropus</i> (Linnaeus, 1758)	RM <sup>c</sup>	O
	Purple Swampphen	<i>Porphyrio porphyrio</i> (Linnaeus, 1758)	R <sup>c</sup>	O
Recurvirostridae	Black-winged Stilt	<i>Himantopus himantopus</i> (Linnaeus, 1758)	R <sup>c</sup>	C
Scolopacidae	Common Sandpiper	<i>Actitis hypoleucos</i> Linnaeus, 1758	RM <sup>c</sup>	C/I
	Common Greenshank	<i>Tringa nebularia</i> (Gunnerus, 1767)	M <sup>c</sup>	C/I
Sylviidae	Orphean Warbler	<i>Sylvia hortensis</i> (Gmelin, 1789)	M <sup>b</sup>	I/N

<sup>a</sup> Ali (2012); M- Migrant, R- Resident, RM- Resident Migrant; AM- Animal matter, C-Carnivores, C/I-Carnivores/Insectivores, F-Frugivores, G-Granivores, H-Herbivores, I-Insectivores, I/N-Insectivores/Nectivores, O-Omnivores, P/I- Piscivore/Insectivore; <sup>b</sup>Terrestrial and <sup>c</sup>Aquatic in habitats

observations from February 2008 to January 2010. During the course of observation by addition of 28 to 106 species, a sum total of 134 bird species along with both aquatic and terrestrial birds sighted in the period 2008–2014. This list further provides additional confirmation of the continual occurrence of the bird species recorded.

The checklist of Bengaluru birds presented 341 species with 186 regularly occurring species (George et al. 1994; Rajashekar 2011; Rajashekar and Venkatesha 2014b, 2015, 2016, 2017), which included the presently recorded 134 species of both aquatic and terrestrial birds in the BUC, India. A strong association between habitat quality is present between the biotic and abiotic factors with the involvement of safe roosting site, availability of food and water resources, habitat size and habitat complexities, human disturbances and recreational activities,

that influences the bird populations as reported by Mukherjee et al. (2002), Patankar et al. (2007), Narang et al. (2008) and, Rajashekar and Venkatesha (2010, 2014b). Twenty species of waterbirds in the BUC are also recorded in different lakes of the Bengaluru region earlier by Rajashekar (2011) and, Rajashekar and Venkatesha (2010, 2014b, 2017).

## Recommendations

Conservation of the natural habitats is very essential for the existence of many species of avian fauna. Regardless of being human-inhabited, BUC premises are fairly benign from threats and afford enough food sources for the numerous feeding guilds of bird communities as reported by Rajashekar (2011) and, Rajashekar and Venkatesha

(2016). Depending upon the availability of food and suitable conditions for foraging, different bird groups can be perceived occupying different locations of the campus. Campus survey for the bird communities should be made periodically; encroachment for developing infrastructure should be improved by adopting vertical multistoried instead of several horizontal buildings; ancient trees standing in these green patches should be identified and listed; should be afforested with nectar-yielding flower plants and fruit-yielding local tree species, wherever older trees have died or fallen. Filling up of the constructed small ponds or check-dams by stocking the water resources that will also attract many migratory birds.

**Acknowledgements** This work was able to complete with the help of Post graduate students during their biodiversity visits in the campus, and many friends and research colleagues of the Department of Zoology, Bangalore University, Bengaluru 560 056.

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