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Cover: Mixed media with fine liners, colour pencils, and watercolour background of an Indian funnel web spider. © Elakshi Mahika Molur.



Endemicity and diversity of birds of the Kuvempu University Campus, Shivamogga District, Karnataka: an updated checklist

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Abstract: The updated checklist of birds at Kuvempu University Campus including present and past records, now contains 229 species, belonging to 16 orders and 62 families. A family-wise analysis showed that Accipitridae dominated the avifauna of the region (16 species), followed by Muscipidae (14 species), Picidae (11 species), Columbidae (9 species), Strigidae (8 species), and Cuculidae, Alaudidae, Sturnidae, & Motacillidae (7 species each). The community consists of 83% (190 species) resident and 17% (39 species) winter migrant species. The study also documented four species of birds that are classified as 'Near Threatened' (Black-headed Ibis *Threskiornis melanocephalus*, Pallid Harrier *Circus macrourus*, Malabar Pied Hornbill *Anthracoceros coronatus*, and Grey-headed Bulbul *Microtarsus priocephalus*), one 'Endangered' Egyptian Vulture *Neophron percnopterus*, and one 'Vulnerable' Woolly-necked Stork *Ciconia episcopus* as per the IUCN Red List of Threatened Species. The campus harbours 69 species, of which 14 are endemic to both the Indian Subcontinent and the Western Ghats. The study highlights the impact of anthropogenic activities as the main cause for the loss of diversity of birds and their habitats and emphasizes the urgent need to conserve this biodiversity-rich area with long-term monitoring programs.

Keywords: Bird conservation, Bhadra Wildlife Sanctuary, campus birds, endangered, endemic, threatened, vulnerable species, winter migrants, Western Ghats.

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Author contributions: MNH involved in the design of the research, survey, data collection, analysis and write up of the manuscript. BBH contributed in supervision of data collection and manuscript preparation.

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INTRODUCTION

Birds are the best monitors of environmental changes and serve as ecological indicators to assess habitat quality (Bibby 1999; Morelli et al. 2014). The changes in their composition, population behavior patterns, and reproductive ability have most often been used to assess the long-term effects of habitat fragmentation. Hence, they are good indicators of the ecological status of any given ecosystem (Harisha & Hosetti 2009; Byju et al. 2023).

Bird species composition is highly related to the forest vegetation types and depends on stratification, canopy density, altitude, season, and disturbance (Bilgrami 1995; Das 2008; Jayson & Mathew 2003) and their assemblage structure is affected by changes in habitat either due to natural or anthropogenic disturbances (Duguay et al. 2000; Weakland et al. 2002; Rahayuningsih et al. 2007). Also, a seasonal change in the species diversity of birds occurs in forests due to their foraging behaviour (Robertson & Hackwell 1995). The diversity, abundance, and distribution of birds, particularly of native species, positively correlate with the increasing structural complexity of the vegetation and have an impact on birds in terms of their food, water, and cover (Gregory et al. 2003; Clawges et al. 2008; Rajpar & Zakaria 2011).

Bhadra Wildlife Sanctuary has more than 253 species of birds (Referred to as eBird Field Checklist Bhadra Wildlife Sanctuary - Lakkavalli, Chikkamagaluru, Karnataka, IN; ebird.org/india/hotspot/L3134967). The birds of Kuvempu University (KU) Campus have been documented since 1997. The first published systematic bird list from the KU campus reported 94 species (Nazneen et al. 2000). Later, it was updated with the addition of 41 species (Dinesh et al. 2007). Except for these reports, no detailed long-term studies have been done on the diversity of birds in the Campus. In this context, the present study was undertaken to record the status, composition, and endemism of birds of the KU Campus, Shivamogga.

MATERIAL AND METHODS

Study area

Kuvempu University Campus (13.7359 °N & 75.6324 °E) in the tropical climatic zone is hilly and the elevation gradually varies 680–720 m (Image 1). The campus is located 24 km south-east of Shivamogga City and 4 km north of Bhadra Reservoir, amidst the dry deciduous forest, and is on the edge of Bhadra Tiger Reserve

and Bhadra Wildlife Sanctuary. The University campus sprawls over an area of 132.012 ha in that around 56.48% (74.56 ha) of land is forest area (undisturbed area) and the remaining 43.51% (57.45 ha) of land is used for construction & vegetation cover of the university buildings blending naturally with the varied landscape types. Annual rainfall is around 1,000 mm; the average temperature varies 18–36 °C and the average humidity ranges 60–75 %.

Vegetation structure

The predominating vegetation of the campus is typically of southern tropical dry deciduous type with considerable similarities with the Bhadra Wildlife Sanctuary. The campus has a diverse range of habitats including:

1. Evergreen forests with species like bamboo, *Santalum album*, *Ficus religiosa*, *F. benghalensis*, *F. racemosa*, *F. arnottiana*, *Syzygium cumini*, and *Artocarpus* spp.;
2. Deciduous forests dominated by trees like *Terminalia paniculata*, *Trema micrantha*, *Xylia xylocarpa*, *Anogeissus latifolia*, *Diospyros montana*, *Acacia* spp., *Lagerstroemia* spp., *Radermachera xylocarpa*, *Careya arborea*, *Lannea coromandelica*, and *Bombax ceiba*;
3. Scrublands represented by dense thickets of shrubs like *Lantana camara*, *Carissa carandas*, *Ziziphium oenoplia*, *Catunaregam spinosa* and *Erythrina stricta*;
4. Grasslands with species like *Oplismenus burmannii*, *Arthraxon lanceolatus*, *A. hispida*, *Heteropogon contortus*, *H. ritchiei*, *Apluda mutica*, *Fimbristylis lawiana*, *Ischaemum polytrias*, and *Themeda triandra* are common. While *Parthenium* spp., *Ipomoea* spp., *Amaranthus spinosus*, *Achyranthes aspera*, *Malvastrum tricuspidatum*, *Stachytarpheta indica*, *Cassia tora*, and *Senna tora* are the prominent weeds in the study area;
5. Wetlands include a man-made pond;
6. Rocky outcrops are granite rocky hills and boulders, home to specialized flora and fauna;
7. Riparian zones are areas along water body, supporting plant and animal life; and
8. Urbanized areas with buildings, roads, and other infrastructure.

Sampling methods

The avian checklist was prepared from the intensive survey and opportunistic recordings between January 2007 to February 2015. Bimonthly field surveys were carried out by walking on fixed transects (five transects were 200 m in length with a maximum of 25 m view on with side) in the morning (0600–1000 h) and in the evening

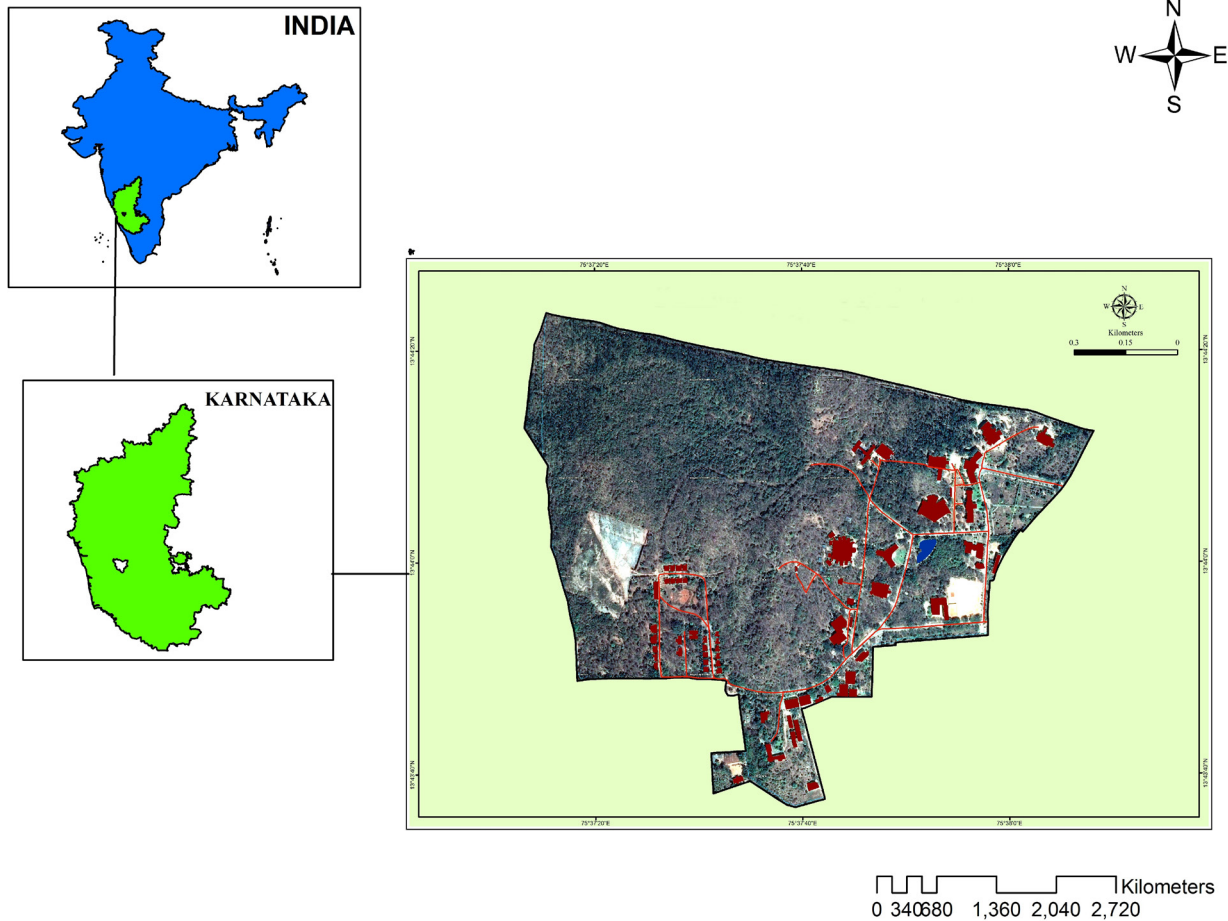


Image 1. Kuvempu University Campus.

(1600–1800 h) when birds were found to be most active (Gupta et al. 2009). A minimum of 30 minutes (speed: 8m/minute) was spent for each transect (Nazneen et al. 2001). The trails were selected and different habitats were covered (i.e., moist, dry deciduous, bamboo forest, and scrub forest). Birds were observed with a field binocular (Olympus) and photographs were taken with a Canon 400D with 75–300 mm lens for further identification. Calls of species were used to confirm the presence of species; however, species were recorded only after their sighting. Birds were identified by using field guides (Ali & Ripley 1983; Grimmett et al. 2011). Standardized common, and scientific nomenclature are following Praveen et al. (2021b & 2024). The residential status of birds was categorized as resident and winter visitors were assigned strictly regarding the study area based on the presence or absence method (Ali & Ripley 1987). The status of threatened categories was adopted from the IUCN Red List (IUCN 2019). Species richness was calculated as the total number of bird species observed in the study area.

RESULT AND DISCUSSION

Diversity and composition of avifauna

The updated checklist of birds at Kuvempu University Campus including present and past records, now contains 229 species, belonging to 16 orders and 62 families, which accounts for 42.17% of the 543 bird species of Karnataka (Praveen et al. 2021a) (Table 1). The present study alone reported 107 species new to the earlier reports. The past surveys in 1997–2000 (Nazneen et al. 2001) reported 94 species (of which 88 were new and six were not reported in the current study), and later in 2000–2001 (Dinesh et al. 2007) which was then updated by addition of 41 species, (of which 34 were new, three species such as Indian House Swift *Apus affinis*), Black-hooded Oriole *Oriolus xanthornus* and Ashy Woodswallow *Artamus fuscus* which were retaken from Nazneen et al. (2007) and four were not reported in the current survey to that of the earlier survey. Since then, more species have been added to the campus avifauna, and more information is available on species

and their status. Highlights of the present survey include 107 new records of species to the area, 122 common species (88 reported by Nazneen et al. (2001), and 34 by Dinesh et al. (2007)) to that of the earlier surveys, while 11 species from the past were not reported.

Accipitridae exhibited the highest species richness (16 species), followed by Muscicapidae (14 species), Picidae (11 species), Columbidae (9 species), Strigidae (8 species), Cuculidae, Alaudidae, Sturnidae, & Motacillidae (7 species each), and Phasianidae, Estrildidae, Nectariniidae, Cisticolidae, and Dicruridae (6 species) (Table 1). Several other studies have also found a similar pattern of dominance of Accipitridae from different protected areas in India, i.e., from Lakkavalli Range Forest, Bhadra Wildlife Sanctuary, Chikkamagaluru (Harisha & Hosetti 2009), Sharavathy landscape, Shivamogga (Barve & Warriar 2013), Daroji Sloth Bear Sanctuary, Ballari, Karnataka (Harisha et al. 2021).

Residential status

The analysis of data on the residential status of avifauna revealed that 39 species were winter visitors, whereas, the remaining 190 species were residents, accounting for 17% and 83%, respectively.

Endemism

Alterations in the land use pattern of the forest patches throughout the Western Ghats have triggered the decline in the diversity of endemic bird species (Nihara et al. 2007). The campus also helps in the conservation of endemic species; in the present study 69 species endemic to the Indian Subcontinent were recorded, of which 14 species (Image 6–17) such as Grey-fronted Green Pigeon *Treron affinis*, Malabar Grey Hornbill *Ocyrceros griseus*, Malabar Barbet *Psilopogon malabaricus*, White-cheeked Barbet *Psilopogon viridis*, Malabar Parakeet *Psittacula columboides*, Malabar Woodshrike *Tephrodornis sylvicola*, Malabar Lark *Galerida malabarica*, Grey-headed Bulbul *Brachypodius priocephalus*, Rufous Babbler *Argya subrufa*, Malabar Starling *Sturnia blythii*, Nilgiri Flowerpecker *Dicaeum concolor*, Crimson-backed Sunbird *Leptocoma minima*, Malabar Flameback *Chrysocolaptes socialis*, and Vigors's Sunbird *Aethopyga vigorsii* are endemic to the Western Ghats and the Indian subcontinent (Jathar & Rahmani 2006; Rasmussen & Anderton 2012; Praveen et al. 2021b, 2024) (Table 1).

IUCN Red List status

The study also revealed that the campus also supports a few threatened species such as the 'Endangered' Egyptian Vulture *Neophron percnopterus*, 'Vulnerable' Woolly-necked Stork *Ciconia episcopus*, and 'Near Threatened' species such as Black-headed Ibis *Threskiornis melanocephalus*, Pallid Harrier *Circus macrourus*, Malabar Pied Hornbill *Anthracoeros coronatus*, & Grey-headed Bulbul *Microtarsus priocephalus* were recorded from deciduous forest patch in the campus indicating their conservation significance. All the remaining species (223) are of 'Least Concern' (IUCN 2019) (Table 1).

Interesting absences

The current list of birds observed does not include 11 species of birds which were previously reported (Nazneen et al. 2001; Dinesh 2007), of which eight were wetland birds such as Little Grebe *Tachybaptus ruficollis*, Intermediate Egret *Ardea intermedia*, Great Egret *Ardea alba*, Wood Sandpiper *Tringa glareola*, Fantail Snipe *Gallinago gallinago*, Common Tern *Sterna hirundo*, Cotton Teal *Nettapus coromandelianus*, and Common Coot *Fulica atra*. The absence of these wetland birds could be due to increased anthropogenic pressure like habitat alternations, and improper, unscientific trenching and drainage systems around the water body. The area of the man-made pond is about 0.30 ha (Image 2). Earlier it was an undisturbed earthen pond and the only source of water was rainwater that came from the surrounding forest. In 2004, it was converted into a stagnant concrete pond, even though the study area is in a dry deciduous forest. Due to an unscientific trenching and drainage system, the inflow of water to the pond from the surrounding catchment area in the forest decreased, and rainwater instead of percolating into the pond flowed out of the area. Consequently, there was low retention of water in the pond and it dried at the end of winter and during summer, leading to a harsh habitat for the animals to survive (Harisha & Hosetti 2021) (Image 3).

The water birds, generally at or near the top of most wetland food chains, are highly susceptible to habitat disturbances and are therefore good indicators of the general condition of wetland habitats (Kushlan 1992; Jayson & Mathew 2002). The study also revealed that the pond has a pathway that the university staff and students use for regular walking, jogging, or exercising in the morning (0600–0800 h) and evening (1600–1900 h), posing threats to the assemblage of wetland birds.

The other three bird species not observed in the

Table 1. Updated checklist of birds of Kuvempu University Campus, Shivamogga, Karnataka.

	Common name/ Order/ Family	Scientific name	Nazneen et al. 2000	Dinesh et al. 2007	Harisha & Hosetti	IUCN Red List status	Residential status	Endemicity
	1. Order: Galliformes							
	1. Family: Phasianidae							
1	Jungle Bush Quail	<i>Perdica asiatica</i> Latham, 1790			+	LC	R	IS
2	Rock Bush Quail	<i>Perdica argoondah</i> Sykes, 1832			+	LC	R	IS
3	Grey Francolin	<i>Ortygornis pondicerianus</i> J.F. Gmelin, 1789			+	LC	R	
4	Red Spurfowl	<i>Galloperdix spadicea</i> J.F. Gmelin, 1789			+	LC	R	IS
5	Grey Junglefowl	<i>Gallus sonneratii</i> Temminck, 1813	+			LC	R	IS
6	Indian Peafowl	<i>Pavo cristatus</i> Linnaeus, 1758	+			LC	R	IS
	2. Order: Columbiformes							
	1. Family: Columbidae							
7	Rock Pigeon	<i>Columba livia</i> J.F. Gmelin, 1789	+			LC	R	
8	Spotted Dove	<i>Spilopelia chinensis</i> Scopoli, 1786	+			LC	R	
9	Oriental Turtle Dove	<i>Streptopelia orientalis</i>	+			LC	R	
10	Eurasian Collared Dove	<i>Streptopelia decaocto</i> Frivaldszky, 1838	+			LC	R	
11	Asian Emerald Dove	<i>Chalcophaps indica</i> Linnaeus, 1758			+	LC	R	
12	Laughing Dove	<i>Spilopelia senegalensis</i> Linnaeus, 1766			+	LC	R	
13	Grey-fronted Green Pigeon	<i>Treron affinis</i> Jerdon, 1840			+	LC	R	IS/WG
14	Yellow-footed Green Pigeon	<i>Treron phoenicopterus</i> Latham, 1790			+	LC	R	
15	Green Imperial Pigeon	<i>Ducula aenea</i> Linnaeus, 1766			+	LC	R	
	3. Order: Caprimulgiformes							
	1. Family: Caprimulgidae							
16	Jerdon's Nightjar	<i>Caprimulgus atripennis</i> Jerdon, 1845			+	LC	R	IS
17	Indian Nightjar	<i>Caprimulgus asiaticus</i> Latham, 1790			+	LC	R	
18	Jungle Nightjar	<i>Caprimulgus indicus</i> Latham, 1790			+	LC	R	IS
19	Savanna Nightjar	<i>Caprimulgus affinis</i> Horsfield, 1821			+	LC	R	
	2. Family: Apodidae							
20	Little Swift	<i>Apus affinis</i> J.E. Gray, 1830	+	+		LC	R	
21	Asian Palm Swift	<i>Cypsiurus balasiensis</i> J. E. Gray, 1829	+			LC	R	
	3. Family: Hemiprocidae							
22	Crested Treeswift	<i>Hemiprocne coronata</i> Tickell, 1833			+	LC	R	
	4. Order: Cuculiformes							
	1. Family: Cuculidae							
23	Asian Koel	<i>Eudynamys scolopaceus</i> Linnaeus, 1758	+			LC	R	
24	Greater Coucal	<i>Centropus sinensis</i> Stephens, 1815	+			LC	R	
25	Blue-faced Malkoha	<i>Phaenicophaeus viridirostris</i> Jerdon, 1840	+			LC	R	IS
26	Common Hawk Cuckoo	<i>Hierococcyx varius</i> Vahl, 1797			+	LC	R	IS
27	Square-tailed Drongo Cuckoo	<i>Surniculus lugubris</i> Horsfield, 1821			+	LC	R	
28	Pied Cuckoo	<i>Clamator jacobinus</i> Boddaert, 1783			+	LC	R	
29	Grey-bellied Cuckoo	<i>Cacomantis passerines</i> Vahl, 1797			+	LC	R	IS
	5. Order: Gruiformes							
	1. Family: Rallidae							
30	White-breasted Waterhen	<i>Amaurornis phoenicurus</i> Pennant, 1769	+			LC	R	

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	6. Order: Pelecaniformes							
	1. Family: Ciconiidae							
31	Woolly-necked Stork	<i>Ciconia episcopus</i> Boddaert, 1783		+		VU	R	
	2. Family: Ardeidae							
32	Little Egret	<i>Egretta garzetta</i> Linnaeus, 1766	+			LC	R	
33	Western Cattle Egret	<i>Bubulcus ibis</i> Linnaeus, 1758	+			LC	R	
34	Indian Pond Heron	<i>Ardeola grayii</i> Sykes, 1832	+			LC	R	
35	Black crowned Night Heron	<i>Nycticorax nycticorax</i> Linnaeus, 1758			+	LC	R	
	3. Family: Threskiornithidae							
36	Red-naped Ibis	<i>Pseudibis papillosa</i> Temminck, 1824			+	LC	R	IS
37	Black-headed Ibis	<i>Threskiornis melanocephalus</i> Latham, 1790		+		NT	R	
	4. Family: Phalacrocoracidae							
38	Little Cormorant	<i>Microcarbo niger</i> Vieillot, 1817	+			LC	R	
	7. Order: Charadriiformes							
	1. Family: Charadriidae							
39	Yellow-wattled Lapwing	<i>Vanellus malabaricus</i> Boddaert, 1783	+			LC	R	IS
40	Red-wattled Lapwing	<i>Vanellus indicus</i> Boddaert, 1783	+			LC	R	
41	Little Ringed Plover	<i>Charadrius dubius</i> Scopoli, 1786	+			LC	W	
	2. Family: Scolopacidae							
42	Common Sandpiper	<i>Actitis hypoleucos</i> Linnaeus, 1758	+			LC	W	
	3. Family: Turnicidae							
43	Barred Buttonquail	<i>Turnix suscitator</i> J.F. Gmelin, 1789			+	LC	R	
	8. Order: Accipitriformes							
	1. Family: Accipitridae							
44	Oriental Honey Buzzard	<i>Pernis ptilorhynchus</i> Temminck, 1821			+	LC	R	
45	White-eyed Buzzard	<i>Butastur teesa</i> Franklin, 1831			+	LC	R	
46	Black-winged Kite	<i>Elanus caeruleus</i> Desfontaines, 1789		+		LC	R	
47	Short-toed Snake Eagle	<i>Circaetus gallicus</i> J.F. Gmelin, 1788			+	LC	R	
48	Black Eagle	<i>Ictinaetus malaiensis</i> Temminck, 1822			+	LC	R	
49	Booted Eagle	<i>Hieraetus pennatus</i> J.F. Gmelin, 1788			+	LC	W	
50	Changeable Hawk Eagle	<i>Nisaetus cirrhatus</i> J.F. Gmelin, 1788		+		LC	R	
51	Crested Serpent Eagle	<i>Spilornis cheela</i> Latham, 1790			+	LC	R	
52	Black Kite	<i>Milvus migrans</i> Boddaert, 1783	+			LC	R	
53	Brahminy Kite	<i>Haliastur Indus</i> Boddaert, 1783	+			LC	R	
54	Shikra	<i>Accipiter badius</i> J.F. Gmelin, 1788	+			LC	R	
55	Besra	<i>Accipiter virgatus</i> Temminck, 1822			+	LC	R	
56	Egyptian Vulture	<i>Neophron percnopterus</i> Linnaeus, 1758	+			EN	R	
57	Pallid Harrier	<i>Circus macrourus</i> S.G. Gmelin, 1770			+	NT	W	
58	Western Marsh Harrier	<i>Circus aeruginosus</i> Linnaeus, 1758			+	LC	W	
59	Montagu's Harrier	<i>Circus pygargus</i> Linnaeus, 1758			+	LC	W	
	9. Order: Strigiformes							
	1. Family: Tytonidae							
60	Common Barn Owl	<i>Tyto alba</i> Scopoli, 1769			+	LC	R	

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	2. Family: Strigidae							
61	Indian Eagle Owl	<i>Bubo bengalensis</i> Franklin, 1831			+	LC	R	IS
62	Indian Scops Owl	<i>Otus bakkamoena</i> Pennant, 1769			+	LC	R	IS
63	Brown Wood Owl	<i>Strix leptogrammica</i> Temminck, 1832			+	LC	R	
64	Mottled Wood Owl	<i>Strix ocellata</i> Lesson, 1839			+	LC	R	IS
65	Brown Boobook	<i>Ninox scutulata</i> Raffles, 1822			+	LC	R	
66	Brown Fish Owl	<i>Ketupa zeylonensis</i> J.F. Gmelin, 1788			+	LC	R	
67	Jungle Owlet	<i>Glaucidium radiatum</i> Tickell, 1833			+	LC	R	IS
68	Spotted Owlet	<i>Athene brama</i> Temminck, 1821	+			LC	R	
	10. Order: Trogoniformes							
	1. Family: Trogonidae							
69	Malabar Trogon	<i>Harpactes fasciatus</i> Pennant, 1769			+	LC	R	IS
	11. Order: Bucerotiformes							
	1. Family: Bucerotidae							
70	Indian Grey Hornbill	<i>Ocyrceros birostris</i> Scopoli, 1786	+			LC	R	IS
71	Malabar Grey Hornbill	<i>Ocyrceros griseus</i> Latham, 1790		+		LC	R	IS/WG
72	Malabar Pied Hornbill	<i>Anthracoceros coronatus</i> Boddaert, 1783	+			NT	R	IS
	2. Family: Upupidae							
73	Common Hoopoe	<i>Upupa epops</i> Linnaeus, 1758	+			LC	R	
	12. Order: Piciformes							
	1. Family: Picidae							
74	Heart-spotted Woodpecker	<i>Hemicircus canente</i> Lesson, 1832			+	LC	R	
75	Brown-capped pygmy Woodpecker	<i>Yungipicus nanus</i> Vigors, 1832			+	LC	R	IS
76	Yellow-crowned Woodpecker	<i>Leiopicus mahrattensis</i> Latham, 1801			+	LC	R	
77	Common Flameback	<i>Dinopium javanense</i> Ljungh, 1797			+	LC	R	
78	Black-rumped Flameback	<i>Dinopium benghalense</i> Linnaeus, 1758	+			LC	R	IS
79	Greater Flameback	<i>Chrysocolaptes guttacrastatus</i> Tickell, 1833			+	LC	R	
80	Malabar Flameback	<i>Chrysocolaptes socialis</i> Koelz, 1939			+	LC	R	IS/ WG
81	White-naped Woodpecker	<i>Chrysocolaptes festivus</i> Boddaert, 1783			+	LC	R	IS
82	White-bellied Woodpecker	<i>Dryocopus javensis</i> Horsfield, 1821			+	LC	R	
83	Lesser Yellownape	<i>Picus chlorolophus</i> Vieillot, 1818			+	LC	R	
84	Rufous Woodpecker	<i>Micropternus brachyurus</i> Vieillot, 1818			+	LC	R	
	2. Family: Ramphastidae							
85	White-cheeked Barbet	<i>Psilopogon viridis</i> Boddaert, 1783	+			LC	R	IS/WG
86	Brown-headed Barbet	<i>Psilopogon zeylanicus</i> J.F. Gmelin, 1788	+			LC	R	IS
87	Coppersmith Barbet	<i>Psilopogon haemacephalus</i> Statius Muller, 1776	+			LC	R	
88	Malabar Barbet	<i>Psilopogon malabaricus</i> Blyth, 1847			+	LC	R	IS/ WG
	13. Order: Coraciiformes							
	1. Family: Meropidae							
89	Blue-bearded Bee-eater	<i>Nyctyornis athertoni</i> Jardine & Selby, 1828			+	LC	R	
90	Green Bee-eater	<i>Merops orientalis</i> Latham, 1801	+			LC	R	
91	Chestnut-headed Bee-eater	<i>Merops leschenaultia</i> Vieillot, 1817	+			LC	R	

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92	Blue-tailed Bee-eater	<i>Merops philippinus</i> Linnaeus, 1767	+			LC	W	
	2. Family: Coraciidae							
93	Indian Roller	<i>Coracias benghalensis</i> Linnaeus, 1758	+			LC	R	
	3. Family: Alcedinidae							
94	Common Kingfisher	<i>Alcedo atthis</i> Linnaeus, 1758	+			LC	R	
95	White-throated Kingfisher	<i>Halcyon smyrnensis</i> Linnaeus, 1758	+			LC	R	
96	Pied Kingfisher	<i>Ceryle rudis</i> Linnaeus, 1758	+			LC	R	
	14. Order: Falconiformes							
	1. Family: Falconidae							
97	Common Kestrel	<i>Falco tinnunculus</i> Linnaeus, 1758		+		LC	W	
	15. Order: Psittaciformes							
	1. Family: Psittaculidae							
98	Vernal Hanging Parrot	<i>Loriculus vernalis</i> Sparrman, 1787	+			LC	R	
99	Rose-ringed Parakeet	<i>Psittacula krameri</i> Scopoli, 1769	+			LC	R	
100	Plum-headed Parakeet	<i>Psittacula cyanocephala</i> Linnaeus, 1766	+			LC	R	IS
101	Malabar Parakeet	<i>Psittacula columboides</i> Vigors, 1830			+	LC	R	IS/ WG
	16. Order: Passeriformes							
	1. Family: Pittidae							
102	Indian Pitta	<i>Pitta brachyura</i> Linnaeus, 1766		+		LC	W	IS
	2. Family: Campephagidae							
103	Black-headed Cuckooshrike	<i>Lalage melanoptera</i> Ruppell, 1839		+		LC	R	
104	Large Cuckooshrike	<i>Coracina macei</i> R. Lesson, 1831	+			LC	R	
105	Orange Minivet	<i>Pericrocotus flammeus</i> J.R. Forster, 1781	+			LC	R	IS
106	Small Minivet	<i>Pericrocotus cinnamomeus</i> Linnaeus, 1766	+			LC	R	
	3. Family: Oriolidae							
107	Indian Golden Oriole	<i>Oriolus kundoo</i> Sykes, 1832	+			LC	W	
108	Black-hooded Oriole	<i>Oriolus xanthornus</i> Linnaeus, 1758	+	+		LC	R	
109	Black-naped Oriole	<i>Oriolus chinensis</i> Linnaeus, 1766		+		LC	W	
	4. Family: Artamidae							
110	Ashy Woodswallow	<i>Artamus fuscus</i> Vieillot, 1817	+	+		LC	R	
	5. Family: Vangidae							
111	Common Woodshrike	<i>Tephrodornis pondicerianus</i> J.F. Gmelin, 1789			+	LC	R	
112	Large Woodshrike	<i>Tephrodornis virgatus</i> Timminck, 1824		+		LC	R	
113	Malabar Woodshrike	<i>Tephrodornis sylvicola</i> Jerdon, 1839			+	LC	R	IS/WG
114	Bar-winged Flycatcher-shrike	<i>Hemipus picatus</i> Sykes, 1832		+		LC	R	
	6. Family: Aegithinidae							
115	Common Iora	<i>Aegithina tiphia</i> Linnaeus, 1758	+			LC	R	
	7. Family: Dicruridae							
116	Black Drongo	<i>Dicrurus macrocercus</i> Vieillot, 1817	+			LC	R	
117	Ashy Drongo	<i>Dicrurus leucophaeus</i> Vieillot, 1817	+			LC	W	
118	Bronzed Drongo	<i>Dicrurus aeneus</i> Vieillot, 1817			+	LC	R	
119	White-bellied Drongo	<i>Dicrurus caerulescens</i> Linnaeus, 1758	+			LC	R	IS
120	Greater Racket-tailed Drongo	<i>Dicrurus paradiseus</i> Linnaeus, 1766		+		LC	R	

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121	Hair-crested Drongo	<i>Dicrurus hottentottus</i> Linnaeus, 1766			+	LC	R	
	8. Family: Rhipiduridae							
122	White-browed Fantail	<i>Rhipidura aureola</i> Lesson, 1831			+	LC	R	
123	Spot-breasted Fantail	<i>Rhipidura albogularis</i> Lesson, 1832			+	LC	R	IS
	9. Family: Laniidae							
124	Brown Shrike	<i>Lanius cristatus</i> Linnaeus, 1758	+			LC	W	
125	Long-tailed Shrike	<i>Lanius schach</i> Linnaeus, 1758	+			LC	R	
126	Bay-backed Shrike	<i>Lanius vittatus</i> Valenciennes, 1826			+	LC	R	
127	Great Grey Shrike	<i>Lanius excubitor</i> Linnaeus, 1758			+	LC	R	
	10. Family: Corvidae							
128	Rufous Treepie	<i>Dendrocitta vagabunda</i> Latham, 1790	+			LC	R	
129	House Crow	<i>Corvus splendens</i> Vieillot, 1817	+			LC	R	
130	Large-billed Crow	<i>Corvus macrorhynchos</i> Wagler, 1827	+			LC	R	
	11. Family: Monarchidae							
131	Black-naped Monarch	<i>Hypothymis azurea</i> Boddaert, 1783			+	LC	R	
132	Indian Paradise-flycatcher	<i>Terpsiphone paradise</i> Linnaeus, 1758	+			LC	R	
	12. Family: Dicaeidae							
133	Thick-billed Flowerpecker	<i>Dicaeum agile</i> Tickell, 1833			+	LC	R	
134	Pale-billed Flowerpecker	<i>Dicaeum erythrorhynchos</i> Latham, 1790	+			LC	R	
135	Nilgiri Flowerpecker	<i>Dicaeum concolor</i> Jerdon, 1840			+	LC	R	IS/WG
	13. Family: Nectariniidae							
136	Purple-rumped Sunbird	<i>Leptocoma zeylonica</i> Linnaeus, 1766	+			LC	R	IS
137	Crimson-backed Sunbird	<i>Leptocoma minima</i> Sykes, 1832		+		LC	R	IS/ WG
138	Purple Sunbird	<i>Cinnyris asiaticus</i> Latham, 1790	+			LC	R	
139	Loten's Sunbird	<i>Cinnyris lotenius</i> Linnaeus, 1766		+		LC	R	IS
140	Vigors's Sunbird	<i>Aethopyga vigorsii</i> Sykes, 1832			+	LC	R	IS/ WG
141	Little Spiderhunter	<i>Arachnothera longirostra</i> Latham, 1790			+	LC	R	
	14. Family: Irenidae							
142	Golden-fronted Leafbird	<i>Chloropsis aurifrons</i> Temminck, 1829	+			LC	R	
143	Jerdon's Leafbird	<i>Chloropsis jerdoni</i> Blyth, 1844			+	LC	R	IS
	15. Family: Ploceidae							
144	Baya Weaver	<i>Ploceus philippinus</i> Linnaeus, 1766		+		LC	R	
145	Streaked Weaver	<i>Ploceus manyar</i> Horsfield, 1821		+		LC	R	
	16. Family: Estrildidae							
146	Red Munia	<i>Amandava amandava</i> Linnaeus, 1758			+	LC	R	
147	Tricoloured Munia	<i>Lonchura malacca</i> Linnaeus, 1766		+		LC	R	IS
148	Indian Silverbill	<i>Euodice malabarica</i> Linnaeus, 1758	+			LC	R	
149	Scaly-breasted Munia	<i>Lonchura punctulata</i> Linnaeus, 1758	+			LC	R	
150	White-rumped Munia	<i>Lonchura striata</i> Linnaeus, 1766	+			LC	R	
151	Black-throated Munia	<i>Lonchura kelaarti</i> Jerdon, 1863		+		LC	R	IS
	17. Family: Passeridae							
152	House Sparrow	<i>Passer domesticus</i> Linnaeus, 1758	+			LC	R	
153	Yellow-throated Sparrow	<i>Gymnoris xanthocollis</i> E. Burton, 1838			+	LC	R	

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	18. Family: Motacillidae							
154	Paddyfield Pipit	<i>Anthus rufulus</i> Vieillot, 1818	+			LC	R	
155	Tree Pipit	<i>Anthus trivialis</i> Linnaeus, 1758			+	LC	W	
156	Olive-backed Pipit	<i>Anthus hodgsoni</i> Richmond, 1907			+	LC	W	
157	White-browed Wagtail	<i>Motacilla maderaspatensis</i> J.F. Gmelin, 1789	+			LC	R	IS
158	Western Yellow Wagtail	<i>Motacilla flava</i> Linnaeus, 1758			+	LC	W	
159	Grey Wagtail	<i>Motacilla cinerea</i> Tunstall, 1771	+			LC	W	
160	Forest Wagtail	<i>Dendronanthus indicus</i> J.F. Gmelin, 1789			+	LC	W	
	19. Family: Fringillidae							
161	Common Rosefinch	<i>Carpodacus erythrinus</i> Pallas, 1770		+		LC	W	
	20. Family: Paridae							
162	Indian Black-lored Tit	<i>Machlolophus aplonotus</i> Blyth, 1847		+		LC	R	IS
163	Cinereous Tit	<i>Parus cinereus</i> Vieillot, 1818	+			LC	R	
	21. Family: Alaudidae							
164	Ashy-crowned Sparrow Lark	<i>Eremopterix griseus</i> Scopoli, 1786	+			LC	R	IS
165	Singing Bushlark	<i>Mirafra javanica</i> Horsfield, 1821		+		LC	R	
166	Indian Bushlark	<i>Mirafra erythroptera</i> Blyth, 1845			+	LC	R	IS
167	Jerdon's Bushlark	<i>Mirafra affinis</i> Blyth, 1845			+	LC	R	IS
168	Sykes's Lark	<i>Galerida deva</i> Sykes, 1832		+		LC	R	IS
169	Malabar Lark	<i>Galerida malabarica</i> Scopoli, 1786		+		LC	R	IS/ WG
170	Rufous-tailed Lark	<i>Ammomanes phoenicura</i> Franklin, 1831			+	LC	R	IS
	22. Family: Cisticolidae							
171	Grey-breasted Prinia	<i>Prinia hodgsonii</i> Blyth, 1844		+		LC	R	
172	Zitting Cisticola	<i>Cisticola juncidis</i> Rafinesque, 1810			+	LC	R	
173	Ashy Prinia	<i>Prinia socialis</i> Sykes, 1832	+			LC	R	IS
174	Plain Prinia	<i>Prinia inornata</i> Sykes, 1832	+			LC	R	
175	Jungle Prinia	<i>Prinia sylvatica</i> Jerdon, 1840			+	LC	R	IS
176	Common Tailorbird	<i>Orthotomus sutorius</i> Pennant, 1769	+			LC	R	
	23. Family: Acrocephalidae							
177	Blyth's Reed Warbler	<i>Acrocephalus dumetorum</i> Blyth, 1849		+		LC	W	
178	Clamorous Reed Warbler	<i>Acrocephalus stentoreus</i> Hemprich & Ehrenberg, 1833			+	LC	W	
179	Booted Warbler	<i>Iduna caligata</i> Lichtenstein, 1823		+		LC	W	
	24. Family: Hirundinidae							
180	Dusky Crag Martin	<i>Ptyonoprogne concolor</i> Sykes, 1832			+	LC	R	
181	Barn Swallow	<i>Hirundo rustica</i> Linnaeus, 1758	+			LC	W	
182	Wire-tailed Swallow	<i>Hirundo smithii</i> Leach, 1818	+			LC	R	
183	Red-rumped Swallow	<i>Cecropis daurica</i> Laxmann, 1769		+		LC	W	
184	Streak-throated Swallow	<i>Petrochelidon fluvicola</i> Blyth, 1855			+	LC	R	
	25. Family: Pycnonotidae							
185	Red-whiskered Bulbul	<i>Pycnonotus jocosus</i> Linnaeus, 1758	+			LC	R	
186	Red-vented Bulbul	<i>Pycnonotus cafer</i> Linnaeus, 1766	+			LC	R	
187	White-browed Bulbul	<i>Pycnonotus luteolus</i> Lesson, 1841		+		LC	R	IS
188	Yellow-browed Bulbul	<i>Acritillas indica</i> Jerdon, 1839			+	LC	R	IS

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189	Grey-headed Bulbul	<i>Microtarsus priocephalus</i> Jerdon, 1839			+	NT	R	IS/WG
	26. Family: Phylloscopidae							
190	Green Warbler	<i>Phylloscopus nitidus</i> Blyth, 1843			+	LC	W	
191	Greenish Warbler	<i>Phylloscopus trochiloides</i> Sundevall, 1837		+		LC	W	
192	Tickell's Leaf Warbler	<i>Phylloscopus affinis</i> Tickell, 1833			+	LC	W	
193	Large-billed Leaf Warbler	<i>Phylloscopus magnirostris</i> Blyth, 1843		+		LC	W	
	27. Family: Sylviidae							
194	Yellow-eyed Babbler	<i>Chrysomma sinense</i> J.F. Gmelin, 1789			+	LC	R	
	28. Family: Zosteropidae							
195	Indian White-eye	<i>Zosterops palpebrosus</i> Temminck, 1824		+		LC	R	
	29. Family: Timaliidae							
196	Indian Scimitar Babbler	<i>Pomatorhinus horsfieldii</i> Sykes, 1832		+		LC	R	IS
197	Tawny-bellied Babbler	<i>Dumetia hyperythra</i> Franklin, 1831			+	LC	R	IS
198	Dark-fronted Babbler	<i>Dumetia atriceps</i> Jerdon, 1839		+		LC	R	IS
	30. Family: Pellorneidae							
199	Puff-throated Babbler	<i>Pellorneum ruficeps</i> Swainson, 1832		+		LC	R	
	31. Family: Leiotherichidae							
200	Common Babbler	<i>Argya caudata</i> Dumont, 1823			+	LC	R	IS
201	Rufous Babbler	<i>Argya subrufa</i> Jerdon, 1839	+			LC	R	IS/ WG
202	Jungle Babbler	<i>Argya striata</i> Dumont, 1823	+			LC	R	IS
203	Large Grey Babbler	<i>Argya malcolmi</i> Sykes, 1832	+			LC	R	IS
204	Yellow-billed Babbler	<i>Argya affinis</i> Jerdon, 1845			+	LC	R	IS
	32. Family: Sittidae							
205	Velvet-fronted Nuthatch	<i>Sitta frontalis</i> Swainson, 1820			+	LC	R	
206	Indian Nuthatch	<i>Sitta castanea</i> Lesson, 1830			+	LC	R	IS
	33. Family: Sturnidae							
207	Chestnut-tailed Starling	<i>Sturnia malabarica</i> J.F. Gmelin, 1789	+			LC	W	
208	Malabar Starling	<i>Sturnia blythii</i> Jerdon, 1845			+	LC	R	IS/ WG
209	Brahminy Starling	<i>Sturnia pagodarum</i> J.F. Gmelin, 1789	+			LC	R	
210	Rosy Starling	<i>Pastor roseus</i> Linnaeus, 1758			+	LC	W	
211	Common Myna	<i>Acridotheres tristis</i> Linnaeus, 1766	+			LC	R	
212	Jungle Myna	<i>Acridotheres fuscus</i> Wagler, 1827	+			LC	R	
213	Southern Hill Myna	<i>Gracula indica</i> Cuvier, 1829			+	LC	R	IS
	34. Family: Muscipidae							
214	Indian Robin	<i>Copsychus fulicatus</i> Linnaeus, 1766	+			LC	R	IS
215	Oriental Magpie Robin	<i>Copsychus saularis</i> Linnaeus, 1758	+			LC	R	
216	Bluethroat	<i>Luscinia svecica</i> Linnaeus, 1758			+	LC	W	
217	White-rumped Shama	<i>Copsychus malabaricus</i> Scopoli, 1786			+	LC	R	
218	Asian Brown Flycatcher	<i>Muscicapa dauurica</i> Pallas, 1811			+	LC	W	
219	Brown-breasted Flycatcher	<i>Muscicapa muttui</i> E.L. Layard, 1854			+	LC	W	
220	Tickell's Blue Flycatcher	<i>Cyornis tickelliae</i> Blyth, 1843			+	LC	R	
221	Verditer Flycatcher	<i>Eumyias thalassinus</i> Swainson, 1838			+	LC	W	
222	Red-breasted Flycatcher	<i>Ficedula parva</i> Bechstein, 1792			+	LC	W	
223	Blue-capped Rock Thrush	<i>Monticola cinclorhyncha</i> Vigors, 1831			+	LC	W	

	Common name/ Order/ Family	Scientific name	Nazneen et al. 2000	Dinesh et al. 2007	Harisha & Hosetti	IUCN Red List status	Residential status	Endemicity
224	Blue Rock Thrush	<i>Monticola solitarius</i> Linnaeus, 1758			+	LC	W	
225	Black Redstart	<i>Phoenicurus ochruros</i> S.G. Gmelin, 1774			+	LC	W	
226	Pied Bushchat	<i>Saxicola caprata</i> Linnaeus, 1766	+			LC	R	
227	Siberian Stonechat	<i>Saxicola maurus</i> Pallas, 1773			+	LC	W	
	35. Family: Turdidae							
228	Indian Blackbird	<i>Turdus simillimus</i> Jerdon, 1839			+	LC	R	IS
229	Orange-headed Thrush	<i>Geokichla citrina</i> Latham, 1790			+	LC	R	

LC—Least Concern | NT—Near Threatened | VU—Vulnerable | R—Resident | W—Winter Migrant | IS—Endemic to Indian Subcontinent | WG—Endemic to Western Ghats.

current survey include Crimson Sunbird *Aethopyga siparaja*, White-throated Fantail *Rhipidura albicollis*, and Eurasian Golden Oriole *Oriolus oriolus*. However, subspecies, such as Vigors's Sunbird *Aethopyga vigorsii*, and Spot-breasted Fantail *Rhipidura albogularis* have been regularly observed in the campus. The Crimson Sunbird is monotypic, its absence from the study area could be due to a true absence or due to a lack of favorable habitats for the species and because of its restricted home range (distribution range: Himalayan foothills in India, from the west in Himachal Pradesh (Kangra) to the east in Sikkim and Bhutan, south to northern West Bengal, eastern Bihar, eastern Madhya Pradesh, and Odisha (possibly northern Andhra Pradesh), and western Bangladesh (Cheke et al. 2020). The reasons for the absence of the polytypic White-throated Fantail could also be due to its restricted home range, i.e., central Himalaya (Nepal and Sikkim), and from plains of Bangladesh to eastern India (lower West Bengal) (Boles 2020). However, the Eurasian Golden Oriole *Oriolus oriolus* is a monotypic species and was formerly considered to be a subspecies of the Indian Golden Oriole *Oriolus kundoo* (Rasmussen & Anderton 2005), absence from the study area could be due to its limited distribution, which includes western, central, and southern Europe (south from southern Finland), and northern Africa (Morocco to Tunisia), east to Altai Mountains (Southern Siberia, western Mongolia, and extreme northwestern China), and south to northern Iran and locally to northern Arabian Peninsula; non-breeding in Sub-Saharan Africa (Walther & Jones 2020).

Birds with breeding activity

The campus supported breeding activities of a few species of birds such as the House Crow *Corvus splendens*, followed by the Scaly-breasted Munia *Lonchura*

punctulata and White-rumped Munia *L. striata*, Blue-faced Malkoha *Phaenicophaeus viridirostris*, Greater Coucal *Centropus sinensis*, Changeable Hawk Eagle *Nisaetus cirrhatus*, Red-whiskered Bulbul *Pycnonotus jocosus*, Red-vented Bulbuls *P. cafer*, Purple Sunbird *Cinnyris asiaticus*, Purple-rumped Sunbirds *Leptocoma zeylonica*, Barn Owl *Tyto alba*, Spotted Owlet *Athene brama*, and Indian Paradise Flycatcher *Terpsiphone paradisi*. The presence of an old nest of White-rumped Munia *Lonchura striata*, besides the active nest on the same *Artocarpus* sp., indicates that the bird used the site for nesting year after year. Earlier reports (Nazneen et al. 2001; Dinesh et al. 2007) corroborating with the present findings indicate that the flat terrain with open sun-baked areas behind the employee quarters might be a traditional breeding ground for many bird species such as Indian Peafowl *Pavo cristatus*, Indian Nightjars *Caprimulgus asiaticus*, Red-wattled Lapwing *Vanellus indicus*, and Yellow-wattled Lapwing *V. malabaricus*.

The landscape with diverse habitat types provides additional opportunities for diverse avian assemblages (Karr & Roth 1971). The present study shows that the KU campus represents a sound avifaunal diversity as it lies in an important ecological zone, i.e., Bhadra Wildlife Sanctuary of the Western Ghats Mountain ranges. Therefore, a variety of habitats and environments of the campus attract and support a variety of bird species. The diversity and distribution of species within a habitat are influenced by the variation in vegetation (MacArthur et al. 1962; Karr & Roth 1971; Pearman 2002). During the flowering and fruiting seasons, the plants like *Ficus arnottiana* (December–April), *F. racemosa* (December–March), *F. benghalensis* (November–January), *F. religiosa* (November–January), *Trema orientalis* (August–January), *Lannea coromandelica* (January–July), *Ziziphus oenoplia* (July–January), *Z. mauritiana*



Image 2. Manmade wetland in the Kuvempu University campus estate. © M.N. Harisha.



Image 3. Drainage trench in the forest patch of Kuvempu University Campus. © M.N. Harisha.



Image 4. Forest patch with weeds cleared or uprooted. © M.N. Harisha.



Image 5. Anthropogenic activities in the forest area of Kuvempu University campus. © M.N. Harisha.

(May–June), *Muntingia calabura* (May–June), and *Securinea virosa* (December–March) were in extensive bloom with flowers and fleshy fruits. On the other hand, trees like *Bombax ceiba* (February–May), *Careya arborea* (February–July), *Butea monosperma* (February–April), *Spathodea campanulata* (December–March), and *Peltophorum pterocarpum* (September–November; March–May), though with dry non-edible fruits, were blooming with flowers of bright coloured and fine good quantity of nectar. These plant resources might also attract insects and consequently provide prey resources for insectivorous birds.

Anthropogenic disturbances on forest structure and function are well-established (Bhat & Murali 2001; Chandrashekara et al. 2006) and their impact on overall avifaunal diversity. The present study also revealed the threats to avifaunal habitats due to anthropogenic activities such as habitat alternations, improper drainage systems and land use patterns for new building constructions, road widening, frequent weed clearing,

garbage dumping, and pollution (Images 4 & 5). Such disturbances adversely affect habitats and might threaten both resident and migratory bird species.

CONCLUSION

The present study revealed that varied habitats and vegetation structures on the campus attract and support a variety of resident, migrant, endemic, and threatened bird species. This reiterates the significance of academic campuses in conserving biological diversity at a regional level. The avifauna and their habitat are adversely impacted due to intensive anthropogenic activities. And more scientific studies are required to understand the season-wise population dynamics of birds in this area



Image 6. Grey-fronted Green Pigeon *Treron affinis* © M.N. Harisha.



Image 7. Malabar Barbet *Psilopogon malabaricus* © N.J. Karthik.



Image 8. White-cheeked Barbet *Psilopogon viridis* © M.N. Harisha.



Image 9. Malabar Parakeet *Psittacula columboides* © M.N. Harisha.



Image 10. Malabar Woodshrike *Tephrodornis sylvicola* © N.J. Karthik.



Image 11. Malabar Lark *Galerida malabarica* © M.N. Harisha.



Image 12. Grey-headed Bulbul *Brachypodius priocephalus* © M.N. Harisha.



Image 13. Rufous Babbler *Argya subrufa* © M.N. Harisha.



Image 14. Malabar Starling *Sturnia blythii* © V.S. Dhanyashree.



Image 15. Crimson-backed Sunbird *Leptocoma minima* © M.N. Harisha.

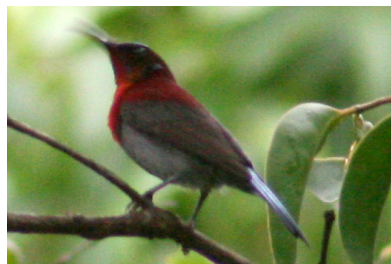


Image 16. Vigors's Sunbird *Aethopyga vigorsii* © M.N. Harisha.



Image 17. Malabar Pied Hornbill *Anthracoceros coronatus* © M.N. Harisha.



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