

Birds Species Diversity of the Gudekote Sloth Bear Sanctuary, Bellary District, North Karnataka, Southern India

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Abstract: Ecological investigation of Bird species diversity of the avifauna recorded during a survey of the Gudekote sloth bear Sanctuary, Bellary District, North Karnataka. The survey was carried out between March 2015 and April 2016. Transect count and point count methods were used to investigate the abundance of birds. Observation was conducted by periodically walking along the study area early in the morning and late in the afternoon. Different diversity indices and statistical methods were used to analyze data collected during the field survey. A total of 132 bird species and 50 families were recorded. Terrestrial habitat contributed much in terms of species composition (87%) than aquatic habitat (13%). Shannon's diversity index indicate that terrestrial habitat had higher species diversity ($H' = 3.9996$) than aquatic habitat ($H' = 3.0717$). The overall bird diversity in both terrestrial and aquatic was ($H'=4.2669$). Appropriate management of bird attractant sites is very important to discourage birds from the Gudekote sloth bear Sanctuary. A complete checklist of species recorded from the area is also given along with respective relative abundance levels recorded during the survey.

Keywords: Species, diversity, birds, Gudekote sloth bear Sanctuary.

I. INTRODUCTION

Bird community evaluation has become an important tool in biodiversity conservation and for identifying conservation actions in areas of high human pressure. The Indian subcontinent is known for diverse and rich bird species whose taxonomy, distribution and their general habitat characteristics are well documented in India. Bird communities have been studied fairly well both in temperate and tropical forests. However, only a very little information is known about the bird community structure and their dynamics in India. Understanding the diversity and structure of bird communities is essential to delineate the importance of regional or local landscapes for avian conservation. Determinations of bird populations in different habitats are central to understanding the community structure and niche relationships, as well as for intelligent management of populations. Moreover, seasonal monitoring is equally important to trace the dynamic movement of birds in such habitats.

Birds are among the most easily defined and readily recognized categories of animals, due to the presence of the feather, which is unique to them. In addition to feathers, the development of forelimbs as wings, mostly in flight; feathered tail that serves for balancing, steering and lifting; toothless horny beak and skeleton exhibiting unique adaptations, mainly for flight and bipedal locomotion are characteristics of birds (Wallace et al. 1975; Padian et al. 1998).

Birds are both visually and acoustically conspicuous organisms of most ecosystems. Because they are comparatively easy to identify, birds have received considerable attention of humans (Mclay 1974; Whelan et al. 2008). Although they occupy most of the earth's surface, most species are found only in particular regions and habitats, whereas others are cosmopolitan (Van Tyne et al. 1959). Patterns of abundance and distribution of birds are strongly related to environmental factors, which determine their presence and activity. The power of flight allows them to move easily through the air and yet they are perfectly adapted to every environment that fit their requirements for successful reproduction and survival

(Welty 1985; Estrella 2007). India harbors 1200 species of birds among 13% of the 9600 bird species of the world (Ali et al. 1987). However, with the new classification coming in to force, the number of species may well be 1300 (Javed et al. 2000). Urban biodiversity has received very little attention from conservation biologist as compared to natural and protected ecosystem (Jules et al. 1997; Vandermeer 1997). The main aim of this paper is to make comprehensive based line information about the bird species for the future as well as to create awareness for their conservation.

II. STUDY AREA

The Gudekote Sloth bear Sanctuary is located in Kudligi and Sandur Talukas of Bellary District, Karnataka lies $14^{\circ} 55'$ to $14^{\circ} 47'$ N latitude and $76^{\circ} 35'$ to $76^{\circ} 43'$ E longitude covered a total geographic area of 47.54 Sq. km. Sanctuary spreads in rocky hillocks and plain forest which in surviving of the drier plains of North Karnataka. (Fig. 1)

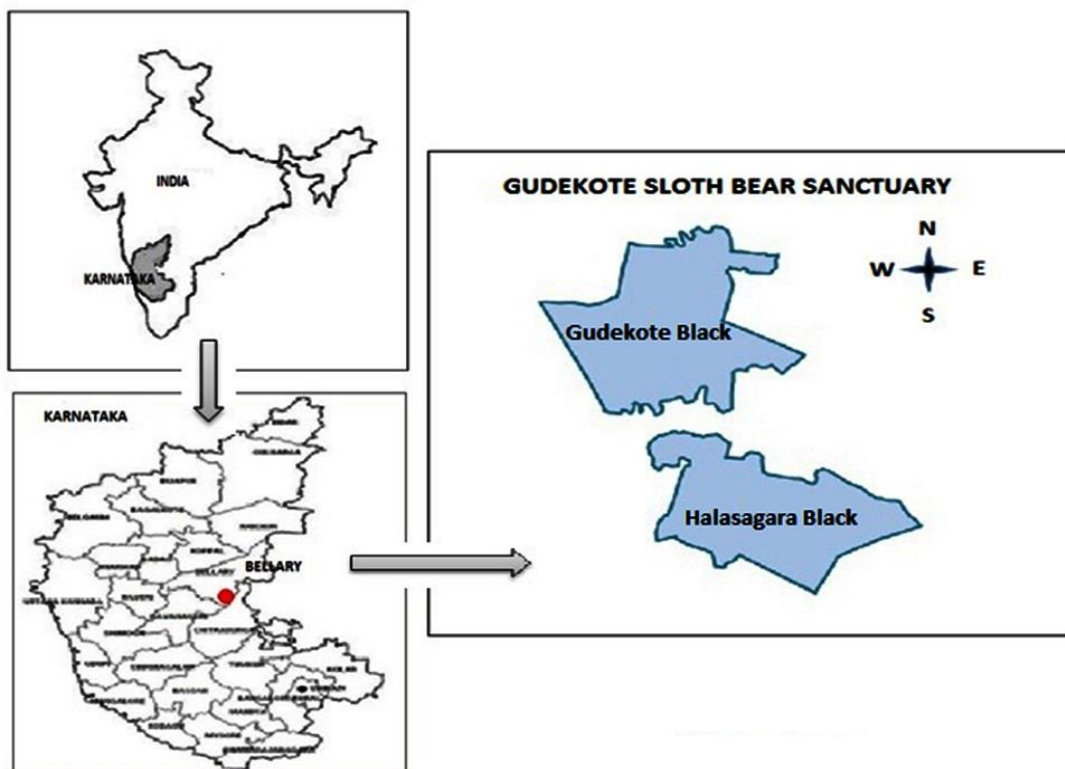


Fig 1: Study area

III. METERIALS AND METHODS

Data were collected using three methods: transect walk, point transects and direct observations during March 2015 to April 2016. Line Transect method was used for the bird survey. This method proved most efficient in terms of data collection per unit effort (Yallop et al. 2003). This survey involves an observer moving slowly along the routes and recording all birds detected on either side of the route. The length of transects depends on the type of survey but is usually constrained by accessibility and thus fixed. Line transects are often used to collect data in large, open areas and is more efficient than point count as one tends to record more birds per unit time.

The most of the surveys of the aquatic birds were conducted between November 2015 and February 2016 using a transect line approach (Bibby et al.1992). The line transect method proved most efficient in terms of data collection per unit effort (Yallop et al. 2003). A total of three transects was established along the various flat terrains available within the field areas. Each transect had a total length of 2000 m, with 100 m of transects. For each transect, an observer recorded any bird species and numbers in the area with the aid of binoculars. At each site, birds' observations were carried out twice monthly; morning between 0630 to 9000 h and evening, between 1600 and 1800 h by walking slowly along transects. Birds were counted as the bird seen and heard and birds in flight were also recorded. The birds were identified using Bushnell binoculars (10x42) and field guides (Richard Grimmatt 2015; Samad Kottur 2014).

Data analysis Bird:**Species diversity:**

The relative abundance of a species was obtained by dividing the abundance of a species by the total abundance of all species combined based on the assumption that the frequently seen the species the more abundant it is (Welty 1975). Birds' diversity was calculated using Shannon-Weiner diversity indices.

Shannon-Weiner diversity Index 'H' was calculated using the formula:

$$H' = - \sum_{i=1}^R pi \ln pi$$

Where, Pi = Proportion of individual species and R = total number of species of the community (number seen and heard).

IV. RESULTS AND DISCUSSION

A total of 5176 individual birds representing 132 species, 50 families were observed in Gudekote Sloth bear Sanctuary (Table 1). The maximum (8.19%) of species were recorded Columbidae family, followed by Muscicapidae (7.65%), Charadriidae (6.91%), Ardeidae (6.04%), Nectariniidae (5.96%), Phasianidae (5.58%), Corvidae (5.19%), Sturnidae (4.52%), Pycnonotidae (4.38%), Cisticolidae (4.09), Leiothrichidae (4.01), Ploceidae (3.65%), Cuculidae (3.63%), Apodidae (3.18%), Meropidae (3.05%), Coraciidae (2.68%), Alcedinidae (1.89%), Upupidae (1.50%), Campephagidae (1.15%), Megalaimidae (1.13%), Podicipedidae (1.13%), Accipitridae, Rallidae (1.00%), Aegithinidae (0.92%), Motacillidae (0.85%), Dicaeidae, Dicruridae, Phalacrocoracidae (0.81%), Psittacidae (0.75%), Alaudidae (0.73%), Caprimulgidae (0.71%), Laridae (0.71%), Anatidae (0.57%), Zosteropidae (0.50%), Bucerotidae (0.48%), Strigidae (0.48%), Scolopacidae (0.38%), Turdidae (0.28%), Ciconiidae (0.25%), Acrocephalidae (0.21%), Threskiornithidae (0.19%), Laniidae (0.15%), Picidae (0.13%), Tephrodornithidae (0.11%), Falconidae (0.09%), Anhingidae (0.057%), Oriolidae (0.05%), Monarchidae (0.03%) and Pteroclididae (0.01%), families were recorded during the study periods (Fig.2).

Terrestrial habitat contributed much in terms of family composition (78%) than aquatic habitat (22%). (Fig.3). Terrestrial habitat contributed much in terms of species composition (73%) than aquatic habitat (27%). We observed that terrestrial habitat had a higher number of birds (4495 individuals, 87%) than water birds (681 individuals, 13%) (Fig.4). However, in overall abundance, Red-vented Bulbul (Pycnonotusgoiavier) had the highest relative frequency followed by Red-wattled lapwing, Purple Sunbird, Yellow-wattled lapwing, Green Bee-eater, and Jungle Babbler. Higher relative frequency of birds could be contributed by the high frequency of occurrences to some of the birds.

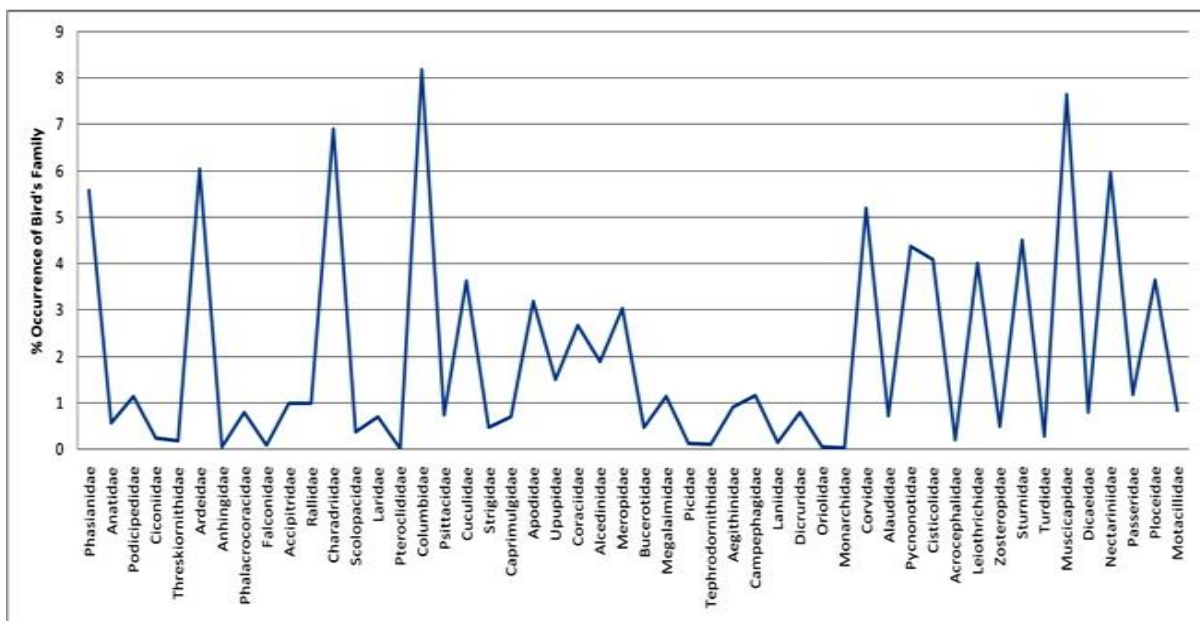


Fig 2: Percentage representation of bird species in Gudekote Sloth bear Sanctuary.

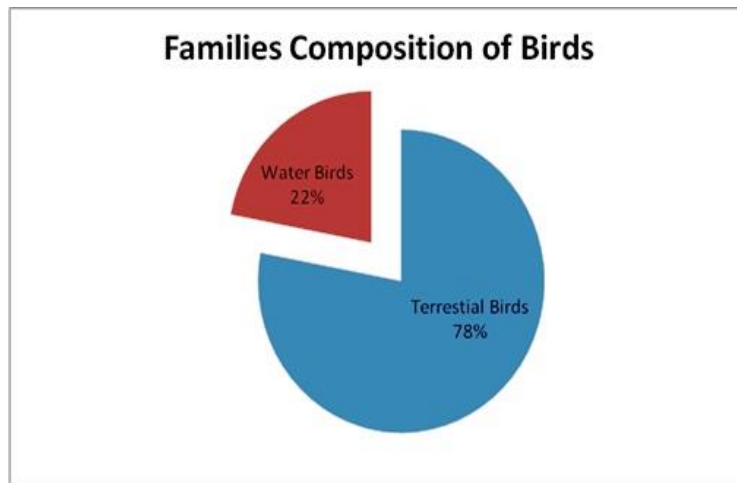


Fig 3: Families Composition of Birds in Gudekote Sloth bear Sanctuary.

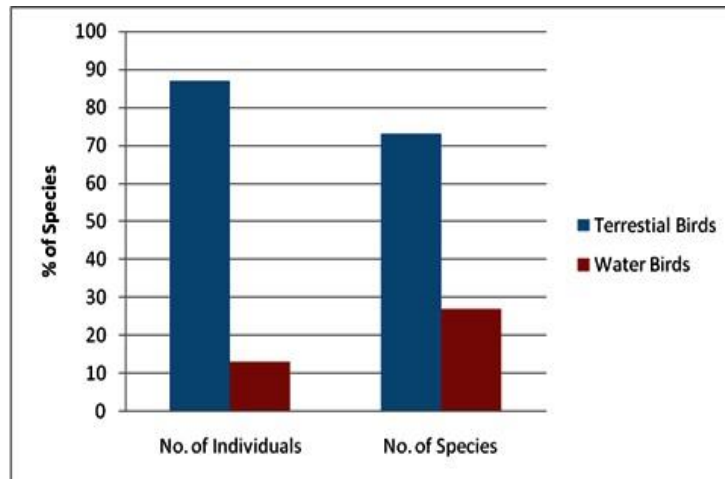


Fig 4: Species Composition of Birds in Gudekote Sloth bear Sanctuary.

Shannon's diversity index indicate that Gudekote black had higher species diversity ($H' = 4.3709$) than Halasagara black ($H' = 3.7855$). The overall birds' diversity for both Gudekote black and Halasagara black was ($H' = 4.2667$) (Fig.5). Gudekote black habitat contributed much in terms of family composition (58%) than Halasagara black habitat (42%). Gudekote black habitat contributed much in terms of species composition (62%) than Halasagara black habitat (38%). We observed that Gudekote habitat had higher number of birds (3522 individuals, 68%) than Halasagara (1654 individuals, 32%) (Fig.6).

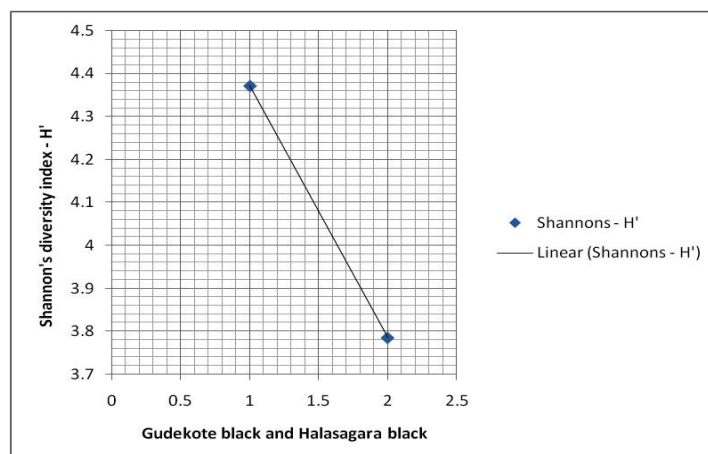


Fig 5: diversity indices in Gudekote black and Halasagara Black at Gudekote Sloth bear Sanctuary

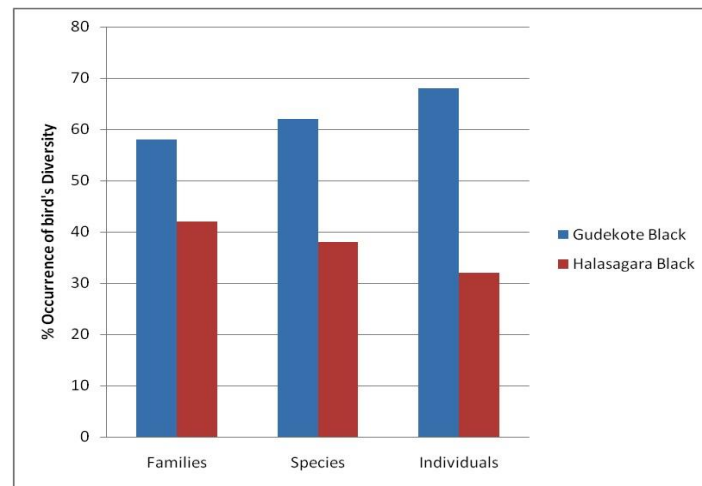


Fig 6: Percentage of bird diversity in Gudekote black and Halasagara black for Gudekote Sloth bear Sanctuary.

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Table 1: Check list of birds in Gudekote Sloth bear Sanctuary

S.No	Common Name	Scientific Name	Family
1	Grey Francoline	<i>Francolinus pondicerianus</i>	Phasianidae
2	Common Quail	<i>Coturnix coturnix</i>	Phasianidae
3	Rain Quail	<i>Coturnix coromandelica</i>	Phasianidae
4	Jungle Bush Quail	<i>Perdica asiatica</i>	Phasianidae
5	Rock Bush Quail	<i>Perdica argoondah</i>	Phasianidae
6	Painted Spurfiowl	<i>Galloperdix lunulata</i>	Phasianidae
7	Indian Peafowl	<i>Pavo cristatus</i>	Phasianidae
8	Lesser Whistling-duck	<i>Dendrocygna javanica</i>	Anatidae
9	Bar-headed Goose	<i>Anser indicus</i>	Anatidae
10	Cotton Pygmy-goose	<i>Nettapus coromandelinus</i>	Anatidae
11	Indian Spot-billed Duck	<i>Anas poecilorhyncha</i>	Anatidae
12	Northern Pintail	<i>Anas acuta</i>	Anatidae
13	Common Teal	<i>Anas crecca</i>	Anatidae
14	Little Grebe	<i>Tachybaptus ruficollis</i>	Podicipedidae
15	Painted Stork	<i>Mycteria leucocephala</i>	Ciconiidae
16	Asian Openbill Stork	<i>Anastomus oscitans</i>	Ciconiidae
17	Woolly-necked Stork	<i>Ciconia episcopus</i>	Ciconiidae
18	Black-headed Ibis	<i>Threskiornis melanocephalus</i>	Threskiornithidae
19	Eurasian Spoonbill	<i>Platalea leucorodia</i>	Threskiornithidae
20	Striated Heron	<i>Butorides striata</i>	Ardeidae
21	Black-crowned Night Heron	<i>Nycticorax nycticorax</i>	Ardeidae
22	Indian Pond Heron	<i>Ardeola grayii</i>	Ardeidae
23	Grey Heron	<i>Ardea cinerea</i>	Ardeidae
24	Purple Heron	<i>Ardea purpurea</i>	Ardeidae
25	Cattle Egret	<i>Bubulcus albus</i>	Ardeidae
26	Great Egret	<i>Casmerodius albus</i>	Ardeidae
27	Intermediate Egret	<i>Mesophoyx intermedia</i>	Ardeidae
28	Little Egret	<i>Egretta garzetta</i>	Ardeidae
29	Darter	<i>Anhinga melanogaster</i>	Anhingidae
30	Little Cormorant	<i>Phalacrocorax niger</i>	Phalacrocoracidae
31	Indian Cormorant	<i>Phalacrocorax fuscicollis</i>	Phalacrocoracidae
32	Common Kestrel	<i>Falco tinnunculus</i>	Falconidae
33	Peregrine Falcon	<i>Falco peregrines</i>	Falconidae
34	Black-winged Kite	<i>Elanus caeruleus</i>	Accipitridae
35	Black Kite	<i>Milvus migrans</i>	Accipitridae
36	Brahminy Kite	<i>Haliastur indus</i>	Accipitridae
37	Pallid Harrier	<i>Circus macrourus</i>	Accipitridae
38	Shikra	<i>Accipiter badius</i>	Accipitridae
39	White-breasted Waterhen	<i>Amaurornis phoenicurus</i>	Rallidae
40	Common Moorhen	<i>Gallinula chloropus</i>	Rallidae
41	Yellow-wattled Lapwing	<i>Vanellus malabaricus</i>	Charadriidae
42	Red-wattled Lapwing	<i>Vanellus indicus</i>	Charadriidae
43	Little Ringed Plover	<i>Charadrius dubius</i>	Charadriidae
44	Common Snipe	<i>Gallinago gallinago</i>	Scolopacidae
45	Common Greenshank	<i>Tringa nebularia</i>	Scolopacidae
46	Green Sandpiper	<i>Tringa ochropus</i>	Scolopacidae

47	Little Stint	<i>Calidris minuta</i>	Scolopacidae
48	River Tern	<i>Sterna aurantia</i>	Laridae
49	Whiskered Tern	<i>Chlidonias hybrid</i>	Laridae
50	Painted Sandgrouse	<i>Pterocles indicus</i>	Pteroclididae
51	Common Pigeon	<i>Columba livia</i>	Columbidae
52	Eurasian Collared Dove	<i>Streptopelia decaocto</i>	Columbidae
53	Red Collared Dove	<i>Streptopelia tranquebarica</i>	Columbidae
54	Spotted Dove	<i>Stigmatopelia chinensis</i>	Columbidae
55	Laughing Dove	<i>Stigmatopelia senegalensis</i>	Columbidae
56	Rose-ringed Parakeet	<i>Psittacula krameri</i>	Psittacidae
57	Jacobin Cuckoo	<i>Clamator jacobinus</i>	Cuculidae
58	Common Hawk Cuckoo	<i>Hierococcyx varius</i>	Cuculidae
59	Grey-bellied Cuckoo	<i>Cacomantis passerines</i>	Cuculidae
60	Asian Koel	<i>Eudynamys scolopaceus</i>	Cuculidae
61	Blue-faced Malkoha	<i>Rhopodytes viridirostris</i>	Cuculidae
62	Southern Coucal	<i>Centropus (sinensis) parroti</i>	Cuculidae
63	Barn Owl	<i>Tyto alba</i>	Strigidae
64	Spotted Owlet	<i>Athene brama</i>	Strigidae
65	Eurasian Eagle Owl	<i>Bubo bubo</i>	Strigidae
66	Indian Nightjar	<i>Caprimulgus asiaticus</i>	Caprimulgidae
67	Asian Palm Swift	<i>Cypsiurus balasiensis</i>	Apodidae
68	Little Swift	<i>Apus affinis</i>	Apodidae
69	Common Hoopoe	<i>Upupa epops</i>	Upupidae
70	Indian Roller	<i>Coracias benghalensis</i>	Coraciidae
71	White-throated Kingfisher	<i>Halcyon smyrnensis</i>	Alcedinidae
72	Common Kingfisher	<i>Alcedo atthis</i>	Alcedinidae
73	Pied Kingfisher	<i>Ceryle rudis</i>	Alcedinidae
74	Green Bee-eater	<i>Merops orientalis</i>	Meropidae
75	Blue-tailed Bee-eater	<i>Merops philippinus</i>	Meropidae
76	Indian Grey Hornbill	<i>Ocyeros birostris</i>	Bucerotidae
77	Coppersmith Barbet	<i>Megalaima haemacephala</i>	Megalaimidae
78	Yellow-crowned Woodpecker	<i>Dendrocopos mahrattensis</i>	Picidae
79	Lesser Goldenback	<i>Dinopium benghalense</i>	Picidae
80	Common Woodshrike	<i>Tephrodornis pondicerianus</i>	Tephrodornithidae
81	Common Iora	<i>Aegithina tiphia</i>	Aegithinidae
82	Small Minivet	<i>Pericrocotus cinnamomeus</i>	Campephagidae
83	Bay-backed Shrike	<i>Lanius vittatus</i>	Laniidae
84	Long-tailed Shrike	<i>Lanius schach</i>	Laniidae
85	Black Drongo	<i>Dicrurus macrocercus</i>	Dicruridae
86	Indian Golden Oriolus	<i>Oriolus (oriolus) kundoo</i>	Oriolidae
87	Asian Paradise-flycatcher	<i>Terpsiphone papadisi</i>	Monarchidae
88	Rufous Treepie	<i>Dendrocitta vagabunda</i>	Corvidae
89	Indian Jungle Crow	<i>Corvus (macrorhynchos) culminates</i>	Corvidae
90	House Crow	<i>Corvus splendens</i>	Corvidae
91	Rufous-tailed Lark	<i>Ammomanes phoenicura</i>	Alaudidae
92	Oriental Skylark	<i>Alauda gulgula</i>	Alaudidae
93	Red-vented Bulbul	<i>Pycnonotus cafer</i>	Pycnonotidae
94	White-browed Bulbul	<i>Pycnonotus luteolus</i>	Pycnonotidae
95	Yellow-browed Bulbul	<i>Acritillas indica</i>	Pycnonotidae

96	Grey-breasted Prinia	<i>Prinia hodgsonii</i>	Cisticolidae
97	Jungle Prinia	<i>Prinia sylvatica</i>	Cisticolidae
98	Plain Prinia	<i>Prinia inornata</i>	Cisticolidae
99	Zitting Cisticola	<i>Cisticola juncidis</i>	Cisticolidae
100	Common Tailorbird	<i>Orthotomus sutorius</i>	Cisticolidae
101	Clamorous Reed Warbler	<i>Acrocephalus stentoreus</i>	Acrocephalidae
102	Blyth's Reed Warbler	<i>Acrocephalus dumetorum</i>	Acrocephalidae
103	Greenish Warbler	<i>Phalloscopus trochiloides</i>	Acrocephalidae
104	Common Babbler	<i>Turdoides caudate</i>	Leiothrichidae
105	Jungle Babbler	<i>Turdoides striata</i>	Leiothrichidae
106	Large Grey Babbler	<i>Turdoides malcolmi</i>	Leiothrichidae
107	Oriental White-eye	<i>Zosterops palpebrosus</i>	Zosteropidae
108	Common Myna	<i>Acridotheres tristis</i>	Sturnidae
109	Brahminy Starling	<i>Sturnia pagodarum</i>	Sturnidae
110	Orange-headed Thrush	<i>Zoothera citrine</i>	Turdidae
111	Oriental Magpie Robin	<i>Copsychus saularis</i>	Muscicapidae
112	Pied Bushchat	<i>Saxicola caprata</i>	Muscicapidae
113	Indian Robin	<i>Saxicoloides fulicatus</i>	Muscicapidae
114	Black Redstart	<i>Phoenicurus ochruros</i>	Muscicapidae
115	Asian Brown Flycatcher	<i>Muscicapa dauurica</i>	Muscicapidae
116	Tickell's Blue Flycatcher	<i>Cyornis tickelliae</i>	Muscicapidae
117	Pale-billed Flowerpecker	<i>Dicaeum erythrorhynchos</i>	Dicaeidae
118	Purple-rumped Sunbird	<i>Leptocoma zeylonica</i>	Nectariniidae
119	Purple Sunbird	<i>Cinnyris asiaticus</i>	Nectariniidae
120	House Sparrow	<i>Passer domesticus</i>	Passeridae
121	Chestnut-shouldered Petronia	<i>Gymnoris xanthocollis</i>	Passeridae
122	Streaked Weaver	<i>Ploceus manyar</i>	Ploceidae
123	Baya Weaver	<i>Ploceus philippinus</i>	Ploceidae
124	Indian Silverbill	<i>Euodice malabarica</i>	Ploceidae
125	Red Avadavat	<i>Amandava amandava</i>	Ploceidae
126	Scaly-breasted Munia	<i>Lonchura punctulata</i>	Ploceidae
127	Black-headed Munia	<i>Lonchura Malacca</i>	Ploceidae
128	Yellow Wagtail	<i>Motacilla flava</i>	Motacillidae
129	Grey Wagtail	<i>Motacilla cinerea</i>	Motacillidae
130	White Wagtail	<i>Montacilla alba</i>	Motacillidae
131	White-browed Wagtail	<i>Motacilla maderaspatensis</i>	Motacillidae
132	Paddyfield Pipit	<i>Anthus rufulus</i>	Motacillidae