Indian Forester, 142 (10) : 979-988, 2016
http://www.indianforester.co.in

ISSN No. 0019-4816 (Print)
ISSN No. 2321-094X (Online)

BIRD DIVERSITY OF A RIPARIAN FOREST IN THE NILGIRI BIOSPHERE RESERVE, INDIA

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ABSTRACT

A total of 158 species of birds belonging to 56 families was recorded in a lowland riparian forest in along Bhavani river in the Nilgiri Biosphere Reserve, India from August 2012 to July 2014. Of the 158 species of birds, 110 species were residents, 33 were winter migrants and 15 summer migrants. The order Passeriformes was highest in dominance followed by Piciformes and Falconiformes. Insectivores (47%) constituted the most predominant guild followed by frugivores (20%). Highest species richness (127) was observed in February and lowest (75) in July. Maximum diversity value (4.23) was recorded in December. Avifauna of the study area comprised one threatened species, Nilgiri Woodpigeon (*Columba elphinstonii*)- Vulnerable and five near-threatened species and four endemic species. This study illustrated useful information on bird diversity of a low-land riparian forest which serves as a baseline for future research and monitoring.

Key words: Birds, Lesser Fish-eagle, Hornbills, Bhavani river.

Introduction

Birds play a useful role in the control of insect of pests, as predators of rodents, scavengers, seed dispersers and as pollinating agents and thus form an important component in natural ecosystem (Manjunath and Joshi, 2012). The Indian subcontinent has diverse avian fauna with above 1,300 bird species (Rasmussen and Anderton, 2012). Avifaunal diversity has been decreasing due to the destruction of natural habitat by human activities (Bhadja and Vaghela, 2013). Protection and maintenance of avifaunal diversity is important in maintaining species diversity of plants and animals (Simeone *et al.,* 2002). Birds inhabit a variety of ecosystems such as forest, grassland, wetland, etc. (Blair, 1999). Riparian habitats have been shown to be important in maintaining biodiversity (Naiman *et al.,* 1993) and considered as topical forest refugia (Farooqui *et al*., 2010). Although riparian forests have been known for the high bird species richness (Darveau *et al*., 1995) very little information is available from India (Johnsingh and Joshua, 1994; Balasubramanian *et al.,* 2004). Hence, with the objective of assessing avian diversity and richness of a riparian forest in the Nilgiri Biosphere Reserve, the present study was carried out in the riparian forests Bhavani river, Western Ghats.

Study area

The study was carried out in Athikadavu Valley (10°37` – 11°12` N and 76°45` – 77°50` E, Altitude 550m), along the river Bhavani in the Coimbatore Forest Division, Western Ghats, India (Fig. 1). This Valley which is contiguous to Nilgiri south-eastern slopes and part of the Nilgiri Biosphere Reserve, forms an ecologically important region owing to the presence of pristine semi-evergreen forests alongside the Bhavani River and high diversity of wild fauna. The Bhavani River originates from Silent Valley in the State of Kerala and flows into western Tamil Nadu, covering a distance of 217 km before merging with the Cauvery. The narrow strip of vegetation that occurs along the river banks is distinct in its composition comprising tall trees such as *Terminalia arjuna, Mangifera indica* and *Madhuca longifolia*. The riverine forest is bordered by the

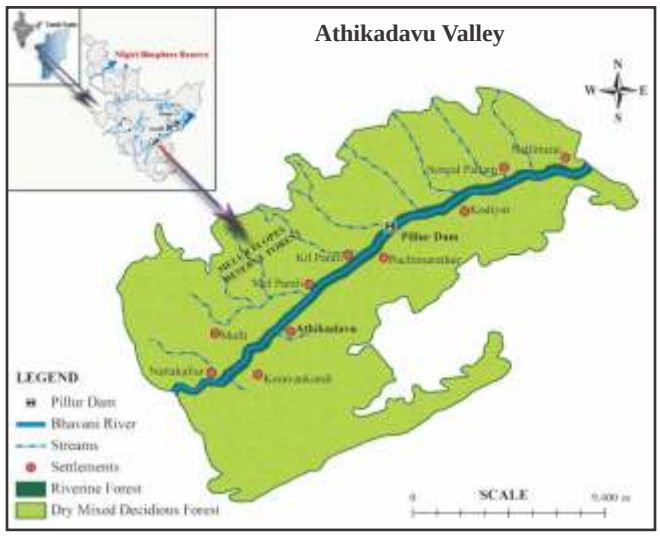

Fig. 1: Map of the study area

A total of 158 bird species belonging to 121 genera of 56 families were recorded from the lowland riparian forest in Athikadavu Valley, Nilgiri Biosphere Reserve.

mixed dry deciduous forests predominated by short trees such as *Diospyros montana, Drypetes sepiaria*, and *Strychnos potatorum*. Several "Irula" tribal settlements are situated in Athikadavu Valley who practice agriculture as well as gather forest products for their sustenance.

Material and Methods

The study was carried out from August 2012 to July 2014. Bird census was done by using Line transect method as given in Bibby *et al.* (1992). Censuses were carried out once in a month during morning hrs (between 0700 and 0900 hrs) on the Bhavani River bank in Athikadavu valley along the riparian forest strip. Two, 1 km long transects with a width of 10 m either side of the census route were used for the census. Birds sighted were identified using binoculars (8x40). Photographs of birds were taken by a Canon (12 mp with x 20 optical zoom lenses) camera. Birds were identified by their characteristic features in accordance with the standard identification manuals and field guides by Ali and Ripley (1983); Ali (2002) and Rasmussen and Anderton (2012). Common (English) names and scientific nomenclature of bird has been adopted from (DelHoyo and Collar, 2014). The threat status of the birds given in the check list is as per IUCN list of Threatened Taxa (Birdlife International, 2001). Birds recorded in the study area were classified as residents (seen throughout the year), winter migrants (seen during September-February) and summer migrants (March-May). Birds were classified into various feeding guilds based on Ali and Ripley (1983). Species diversity was calculated by using Shannon-Wiener Index $H' = -\Sigma\ Pi \ln Pi$ where the Pi = the proportion of individuals of species *i.*

Results

The study revealed the occurrence of 158 species (51.26% Passeriformes and 48.74% Non-Passeriformes) of birds belonging to 18 orders of 56 families and 121 genera in Athikadavu Valley. White-browed Bulbul (26.45) followed by Little Cormorant (24.35) and Grey-fronted Green Pigeon (24.35) were found to be the most abundant species in the area (Table 1). Among the 18 orders, Passeriformes with 81 species formed the most

Table 1: Birds recorded in the riparian forest of Athikadavu valley

S.No.	Family/Common name	Scientific name	Status	Abund-ance	Feeding guild	IUCN status
1	Galliformes Phasianidae Indian Peafowl	*Pavo cristatus*	R	3.00	O	LC
2	Grey Junglefowl	*Gallus sonneratii*	R	4.80	O	LC
3	Common Quail	*Coturnix coturnix*	R	0.65	G	LC
4	Jungle Bush-quail	*Perdicula asiatica*	R	0.40	G	LC
5	Painted Bush-quail	*Perdicula erythrorhyncha*	R	0.85	G	LC
6	Piciformes Picidae Common Flameback	*Dinopium javanense*	R	5.05	I	LC
7	Rufous Woodpecker	*Micropternus brachyurus*	R	0.25	I	LC
8	Indian Pygmy Woodpecker	*Picoides nanus*	R	0.70	I	LC
9	Lesser Yellownape	*Picus chlorolophus*	WM	0.10	I	LC
10	Yellow-fronted Pied Woodpecker	*Dendrocopos mahrattensis*	R	0.50	I	LC
11	White-naped Woodpecker	*Chrysocolaptes festivus*	R	0.45	I	LC
12	Capitonidae White-cheeked Barbet	*Psilopogon viridis*	R	4.85	F	LC
13	Brown-headed Barbet	*Psilopogon zeylanicus*	R	5.25	F	LC
14	Malabar Barbet	*Psilopogon malabaricus*	WM, E	0.15	F	LC
15	Coppersmith Barbet	*Psilopogon haemacephalus*	R	15.75	F	LC
16	Bucerotiformes Bucerotidae Malabar Pied Hornbill	*Anthracoceros coronatus*	R	3.90	F	NT
17	Great Hornbill	*Buceros bicornis*	R	0.70	F	NT
18	Indian Grey Hornbill	*Ocyceros birostris*	WM	0.10	F	LC
19	Upupiformes Upupidae Common Hoopoe	*Upupa epops*	R	0.90	I	LC
20	Trogoniformes Trogonidae Malabar Trogon	*Harpactes fasciatus*	SM	0.35	I	LC

S.No.	Family/Common name	Scientific name	Status	Abund-ance	Feeding guild	IUCN status
21	Coraciiformes Coraciidae Indian Roller	*Coracias benghalensis*	R	0.90	I	LC
22	Alcedinidae Common Kingfisher	*Alcedo atthis*	R	3.05	P	LC
23	Cerylidae Pied Kingfisher	*Ceryle rudis*	SM	0.20	P	LC
24	Halcyonidae Black-capped Kingfisher	*Halcyon pileata*	SM	0.10	P	LC
25	Stork-billed Kingfisher	*Pelargopsis capensis*	R	3.90	P	LC
26	White-throated Kingfisher	*Halcyon smyrnensis*	R	4.40	I	LC
27	Meropidae Little Green Bee-eater	*Merops orientalis*	R	6.00	I	LC
28	Chestnut-headed Bee-eater	*Merops leschenaultia*	WM	3.70	I	LC
29	Blue-bearded Bee-eater	*Nyctyornis athertoni*	SM	0.45	I	LC
30	Cuculiformes Cuculidae Chestnut-winged Cuckoo	*Clamator coromandus*	WM	0.25	I	LC
31	Jacobin Cuckoo	*Clamator jacobinus*	R	0.40	I	LC
32	Common Hawk-cuckoo	*Hierococcyx varius*	SM	0.25	I	LC
33	Grey-bellied Cuckoo	*Cacomantis passerines*	R	0.40	I	LC
34	Asian Koel	*Eudynamys scolopaceus*	R		F	LC
35	Blue-faced Malkoha	*Phaenicophaeus viridirostris*	R	3.80	I	LC
36	Sirkeer Malkoha	*Taccocua leschenaultia*	R	0.15	I	LC
37	Centropodidae Greater Coucal	*Centropus sinensis*	R	1.60	I	LC
38	Psittaciformes Psittacidae Vernal Hanging-parrot	*Loriculus vernalis*	R	1.25	F	LC
39	Rose-ringed Parakeet	*Psittacula krameri*	R	4.80	F	LC
40	Malabar Parakeet	*Psittacula columboides*	R, E	11.65	F	LC
41	Plum-headed Parakeet	*Psittacula cyanocephala*	R	1.20	F	LC
42	Apodiformes Apodidae Little Swift	*Apus affinis*	R	2.35	I	LC
43	Strigiformes Strigidae Collared Scops-owl	*Otus lettia*	R	0.40	Cr	LC
44	Brown Fish-owl	*Ketupa zeylonensis*	SM	0.15	Cr	LC
45	Rock Eagle-owl	*Bubo bengalensis*	R	0.20	Cr	LC
46	Jungle Owlet	*Glaucidium radiatum*	R	0.85	Cr	LC
47	Brown Hawk-owl	*Ninox scutulata*	WM	0.25	Cr	LC
48	Spotted Owlet	*Athene brama*	R	0.25	Cr	LC
49	Columbiformes Columbidae Grey-fronted Green Pigeon	*Treron affinis*	R	23.45	F	LC
50	Nilgiri Woodpigeon	*Columba elphinstonii*	WM, E	0.15	F	V
51	Rock Pigeon	*Columba livia*	R	4.00	G	LC
52	Emerald Dove	*Chalcophaps indica*	R	1.85	G	LC
53	Spotted Dove	*Streptopelia chinensis*	R	9.20	G	LC
54	Red Collared-dove	*Streptopelia tranquebarica*	R	0.45	G	LC
55	Gruiformes Rallidae White-breasted Waterhen	*Amaurornis phoenicurus*	R	0.20	I	LC
56	Charadriiformes Charadriidae Red-wattled Lapwing	*Vanellus indicus*	R	2.40	I	LC

S.No.	Family/Common name	Scientific name	Status	Abund-ance	Feeding guild	IUCN status
57	Ardeidae Little Egret	*Egretta garzetta*	R	0.95	P	LC
58	Intermediate Egret	*Egretta intermedia*	WM	3.00	P	LC
59	Cattle Egret	*Bubulcus ibis*	R	0.75	I	LC
60	Indian Pond Heron	*Ardeola grayii*	R	2.50	P	LC
61	Grey Heron	*Ardea cinerea*	WM	0.40	P	LC
62	Green-backed Heron	*Butorides striata*	R	0.35	P	LC
63	Ciconiiformes Scolopacidae Common Sandpiper	*Actitis hypoleucos*	WM	0.65	I	LC
64	Ciconiidae Asian Openbill	*Anastomus oscitans*	WM	0.85	P	LC
65	Falconiformes Accipitridae Jerdon's Baza	*Aviceda jerdoni*	WM	0.20	Cr	LC
66	Black Kite	*Milvus migrans*	R	0.55	Cr	LC
67	Lesser Fish-eagle	*Ichthyophaga humilis*	R	3.30	P	NT
68	Crested Serpent-Eagle	*Spilornis cheela*	R	0.70	Cr	LC
69	Changeable Hawk-eagle	*Nisaetus cirrhatus*	R	0.50	Cr	LC
70	Bonelli's Eagle	*Aquila fasciata*	R	0.35	Cr	LC
71	Brahminy Kite	*Haliastur indus*	R	0.95	Cr	LC
72	Black Eagle	*Ictinaetus malayensis*	R	0.40	Cr	LC
73	Shikra	*Accipiter badius*	R	1.25	Cr	LC
74	Podicipediformes Podicipedidae Little Grebe	*Tachybaptus ruficollis*	R	0.20	I	LC
75	Anhingidae Oriental Darter	*Anhinga melanogaster*	R	0.30	P	NT
76	Suliformes Phalacrocoracidae Little Cormorant	*Microcarbo niger*	R	24.35	P	LC
77	Great Cormorant	*Phalacrocorax carbo*	R	0.15	P	LC
78	Passeriformes Pittidae Indian Pitta	*Pitta brachyuran*	WM	0.15	I	LC
79	Irenidae Asian Fairy-bluebird	*Irena puella*	R	6.40	F	LC
80	Chloropseidae Golden-fronted Leafbird	*Chloropsis aurifrons*	R	7.60	I	LC
81	Laniidae Bay-backed Shrike	*Lanius vittatus*	R	0.65	I	LC
82	Corvidae Rufous Treepie	*Dendrocitta vagabunda*	R	4.30	F	LC
83	House Crow	*Corvus splendens*	R	2.30	O	LC
84	Indian Jungle Crow	*Corvus culminates*	R	3.35	O	LC
85	Artamidae Ashy Woodswallow	*Artamus fuscus*	R	1.00	I	LC
86	Oriolidae Black-hooded Oriole	*Oriolus xanthornus*	R	4.45	F	LC
87	Indian Golden Oriole	*Oriolus kundoo*	WM	1.40	F	LC
88	Black-naped Oriole	*Oriolus chinensis*	WM	0.35	F	LC
89	Campephagidae Large Cuckooshrike	*Coracina macei*	SM	0.30	I	LC
90	Black-headed Cuckooshrike	*Coracina melanoptera*	SM	0.40	I	LC
91	Orange Minivet	*Pericrocotus flammeus*	R	6.85	I	LC
92	Small Minivet	*Pericrocotus cinnamomeus*	R	8.20	I	LC
93	Dicruridae Black Drongo	*Edolius macrocercus*	R	10.40	I	LC

S.No.	Family/Common name	Scientific name	Status	Abund-ance	Feeding guild	IUCN status
94	White-bellied Drongo	*Edolius caerulescens*	R	3.05	I	LC
95	Ashy Drongo	*Edolius leucophaeus*	SM	0.65	I	LC
96	Bronzed Drongo	*Chaptia aeneus*	WM	0.50	I	LC
97	Spangled Drongo	*Dicrurus hottentottus*	WM	0.40	I	LC
98	Greater Racket-tailed Drongo	*Dicrurus paradiseus*	R	5.60	I	LC
99	Monarchidae Asian Paradise-flycatcher	*Terpsiphone paradise*	WM	1.95	I	LC
100	Aegithinidae Common Iora	*Aegithina tiphia*	R	6.30	I	LC
101	Malconotinae Common Woodshrike	*Tephrodornis pondicerianus*	R	1.40	I	LC
102	Malabar Woodshrike	*Tephrodornis sylvicola*	R	0.30	I	LC
103	Muscicapidae Turdinae Malabar Whistling-thrush	*Myophonus horsfieldii*	SM	0.20	I	LC
104	Eurasian Blackbird	*Turdus simillimus*	WM	1.50	I	LC
105	Indian Robin	*Saxicoloides fulicatus*	R	3.90	I	LC
106	Oriental Magpie-robin	*Copsychus saularis*	R	7.75	I	LC
107	White-rumped Shama	*Copsychus malabaricus*	R	1.70	I	LC
108	Pied Bushchat	*Saxicola caprata*	R	1.40	I	LC
109	Muscicapinae Tickell's Blue-flycatcher	*Cyornis tickelliae*	R	8.20	I	LC
110	Asian Brown Flycatcher	*Muscicapa latirostris*	WM	0.25	I	LC
111	Verditer Flycatcher	*Eumyias thalassinus*	WM	0.60	I	LC
112	Brown-breasted Flycatcher	*Muscicapa dauurica*	WM	0.45	I	LC
113	Nilgiri Flycatcher	*Eumyias albicaudatus*	WM, E	0.25	I	NT
114	Sturnidae Common Myna	*Acridotheres tristis*	R	16.10	O	LC
115	Jungle Myna	*Acridotheres fuscus*	R	9.05	O	LC
116	Hill Myna	*Gracula religiosa*	WM	1.65	F	LC
117	Brahminy Starling	*Sturnia pagodarum*	R	0.85	F	LC
118	Chestnut-tailed Starling	*Sturnia malabaricus*	WM	3.65	F	LC
119	Rosy Starling	*Pastor roseus*	SM	0.30	F	LC
120	Sittidae Velvet-fronted Nuthatch	*Sitta frontalis*	R	0.25	I	LC
121	Paridae Cinereous Tit	*Parus nuchalis*	R	3.60	I	LC
122	Hirundinidae Pacific Swallow	*Hirundo tahitica*	R	7.30	I	LC
123	Pycnonotidae Red-vented Bulbul	*Pycnonotus cafer*	R	20.65	F	LC
124	Red-whiskered Bulbul	*Pycnonotus jocosus*	R	17.30	F	LC
125	White-browed Bulbul	*Pycnonotus luteolus*	R	26.45	F	LC
126	Asian Black Bulbul	*Hypsipetes leucocephalus*	WM	0.75	F	LC
127	Yellow-browed Bulbul	*Acritillas indica*	R	4.25	F	LC
128	Cisticolidae Ashy Prinia	*Prinia socialis*	R	1.50	I	LC
129	Plain Prinia	*Prinia inornata*	R	0.45	I	LC
130	Grey-breasted Prinia	*Prinia hodgsonii*	R	0.25	I	LC
131	Zosteropidae Oriental White-eye	*Zosterops palpebrosus*	SM	0.45	F	LC
132	Sylviidae Greenish Warbler	*Phylloscopus trochiloides*	WM	0.45	I	LC
133	Paddyfield Warbler	*Acrocephalus Agricola*	R	1.30	I	LC
134	Blyth's Reed-Warbler	*Acrocephalus dumetorum*	SM	1.10	I	LC
135	Booted Warbler	*Hippolais caligata*	WM	1.30	I	LC
136	Common Tailorbird	*Orthotomus sutorius*	R	4.35	I	LC

S.No.	Family/Common name	Scientific name	Status	Abund-ance	Feeding guild	IUCN status
137	Timaliinae Tawny-bellied Babbler	*Dumetia hyperythra*	R	2.60	I	LC
138	Jungle Babbler	*Turdoides striata*	R	9.60	I	LC
139	Yellow-eyed Babbler	*Chrysomma sinense*	R	0.70	I	LC
140	Common Babbler	*Turdoides caudata*	R	21.00	I	LC
141	Alaudidae Indian Bushlark	*Mirafra erythroptera*	WM	0.40	G	LC
142	Singing Bushlark	*Mirafra cantillans*	R	0.65	G	LC
143	Dicaeidae Pale-billed Flowerpecker	*Dicaeum erythrorhynchos*	R	4.55	F	LC
144	Thick-billed Flowerpecker	*Pachyglossa agile*	R	0.75	F	LC
145	Nectarinidae Purple Sunbird	*Cinnyris asiatica*	R	4.60	N	LC
146	Purple-rumped Sunbird	*Leptocoma zeylonica*	R	11.60	N	LC
147	Loten's Sunbird	*Cinnyris lotenia*	R	1.10	N	LC
148	Passeridae House Sparrow	*Passer domesticus*	R	1.65	G	LC
149	Motacillidae White Wagtail	*Motacilla alba*	WM	0.30	I	LC
150	White-browed Wagtail	*Motacilla maderaspatensis*	R	8.75	I	LC
151	Yellow Wagtail	*Motacilla flava*	WM	1.55	I	LC
152	Grey Wagtail	*Motacilla cinerea*	WM	0.55	I	LC
153	Forest Wagtail	*Dendronanthus indicus*	R	1.50	I	LC
154	Estrididae Tricoloured Munia	*Lonchura malacca*	R	2.35	G	LC
155	Scaly-breasted Munia	*Lonchura punctulata*	R	0.80	G	LC
156	White-rumped Munia	*Lonchura striata*	R	0.65	G	LC
157	Indian Silverbill	*Lonchura malabarica*	R	0.55	G	LC
158	Fringillidae Common Rosefinch	*Carpodacus erythrinus*	WM	0.55	G	LC

Abbreviations used
Threat category : NT = Near Threatened; VU = Vulnerable; EN = Endemic
Status : R = Resident; SM = Summer Migrant; WM = Winter Migrant
Feeding guild : I=Insectivore; F=Frugivore; P=Piscivore; G=Granivore; Cr=Carnivore; O=Omnivore; N=Nectarivore

predominant followed by Piciformes with 10 species and each nine species Coraciformes and Falconiformes. Of the 3 orders contained one species which are Upupiformes, Trogoniformes and Gruciformes Majority of the families are represented by a fewer species. Accipitridae with nine species followed by Cuculidae (seven species) constituted the most prominent avian families. Most of the families contained 1-2 species. Maximum percent occurrence was found in the families: Accipitridae (5.70%) and Cuculidae (4.43%) (Table 2). Of the 158 species, 70% were residents and 30% migrants.

Species richness and diversity: Species richness showed highest values in February (127 species) and lowest (75) in July. Highest diversity was value (4.23) was observed in December and lowest (3.69) in July (Table 3). In general, bird species richness and diversity was found to be high during north-east monsoon and winter and low in summer and southwest monsoon. Most abundant species of the riparian forests included Grey-fronted Green Pigeon (31.27) followed by White-browed Bulbul (26.45) and Little Cormorant (24.35).

Feeding guild: Among the different avian feeding guilds, insectivores (47%; 74 species) comprised the highest proportion followed by frugivores (20%; 31 species), piscivores (9.5%; 15 species), etc (Fig.2).

The avifauna of this locality included a Vulnerable species, Nilgiri Woodpigeon (*Columba elphinstonii*) (IUCN, 2012) and five Near Threatened species namely, Oriental Darter (*Anhinga melanogaster*) (IUCN, 2012), Great Hornbill (*Buceros bicornis*) (IUCN, 2013), Malabar Pied Hornbill (*Anthracoceros coronatus*) (IUCN, 2012), Nilgiri Flycatcher (*Eumyias albicaudata*) and Lesser Fish-eagle (*Ichthyophaga humilis*) (IUCN, 2012). Nilgiri Flycatcher (*Eumyias albicaudata*), Nilgiri Woodpigeon (*Columba elphinstonii*), Malabar Parakeet (*Psittacula columboides*) and Malabar Barbet (*Psilopogon malabaricus*) Endemic to

Table 2: Per cent occurrence of bird family in the study area.

S. No.	Family	Per cent occurrence
1	Phasianidae	3.16%
2	Picidae	3.80%
3	Capitonidae	2.53%
4	Bucerotidae	1.90%
5	Upupidae	0.63%
6	Trogonidae	0.63%
7	Coraciidae	0.63%
8	Alcedinidae	0.63%
9	Cerylidae	0.63%
10	Halcyonidae	1.90%
11	Meropidae	1.90%
12	Cuculidae	4.43%
13	Centropodidae	0.63%
14	Psittacidae	2.53%
15	Apodidae	0.63%
16	Strigidae	3.80%
17	Columbidae	3.80%
18	Rallidae	0.63%
19	Scolopacidae	0.63%
20	Charadriidae	0.63%
21	Ardeidae	3.80%
22	Ciconiidae	0.63%
23	Accipitridae	5.70%
24	Podicipedidae	0.63%
25	Anhingidae	0.63%
26	Phalacrocoracidae	1.27%
27	Pittidae	0.63%
28	Irenidae	0.63%
29	Chloropsidae	0.63%
30	Laniidae	0.63%
31	Corvidae	1.90%
32	Artamidae	0.63%
33	Oriolidae	1.90%
34	Campephagidae	2.53%
35	Dicruridae	3.80%
36	Monarchidae	0.63%
37	Aegithinidae	0.63%
38	Malconotinae	1.27%
39	Turdinae	3.80%
40	Muscicapinae	3.16%
41	Sturnidae	3.80%
42	Sittidae	0.63%
43	Paridae	0.63%
44	Hirundinidae	0.63%
45	Pycnonotidae	3.16%
46	Cisticolidae	1.90%
47	Zosteropidae	0.63%
48	Sylviidae	3.16%
49	Timaliinae	2.53%
50	Alaudidae	1.27%
51	Dicaeidae	1.27%
52	Nectarinidae	1.90%
53	Passeridae	0.63%
54	Motacillidae	3.16%
55	Estrididae	2.53%
56	Fringillidae	0.63%

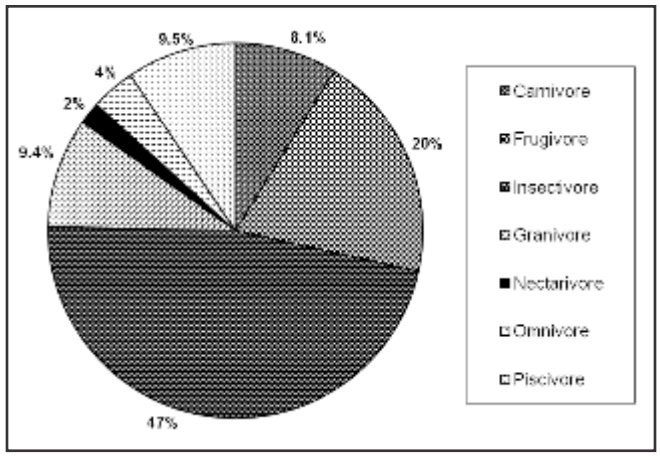

Fig. 2: Distribution of birds feeding habits in the study area

the Western Ghats (Rasmussen and Anderton, 2012) were also reported here.

Notes on selected species

LESSER FISH EAGLE *Icthyophaga humilis* (Near Threatened)

Breeding resident. Historically known to occur in the Himalayan foothills and north-eastern India (Naoroji, 2006). Praveen (2011) reported its distribution in certain locations of south Indian states of Karnataka, Kerala and Tamil Nadu. During the present study, it was found in the riparian habitat of Bhavani river, Tamil Nadu. Twenty individuals were found. Three nests were located at Pillur and Athikadavu. Lesser Fish Eagle nested in two riparian tree species namely *Terminalia bellirica* and *Mangifera indica*.

CHANGEABLE HAWK EAGLE *Nisaetus cirrhatus*

Breeding resident. Commonly found in throughout the area both in riverine and the adjoining dry mixed deciduous forests. Two nests were located at Athikadvu. Changeable Hawk Eagle nests were observed little away from river bank in dry forest patches closer to human settlements. *Albizia lebbeck* and *Hardwickia binata* trees were chosen for nesting and old nests were reused.

BONELLI'S EAGLE *Hieraaetus fasciatus*

Breeding resident. One nest was located in *Terminalia arjuna* at Athikadavu.

JERDON'S BAZA *Aviceda leuphotes*

Breeding resident. One nest was located on *Hardwickia binata* tree at Athikadavu.

ORIENTAL DARTER *Anhinga melanogaster* (Near Threatened)

Common Resident. No nests were recorded.

Table 3: Mean monthly diversity and richness of bird species in the riparian forest of Athikadavu valley (2012-2014)

	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.
Species richness	84	109	111	101	112	113	127	98	92	95	78	75
Shannon's diversity index	3.97	4.05	4.18	4.15	4.23	4.13	4.18	4.12	4.07	3.97	3.98	3.69

GREAT HORNBILL *Buceros bicornis* (Near Threatened)

Common Resident. Two nests were located at Athikadavu. *Terminalia arjuna* trees were used for nesting.

MALABAR PIED HORNBILL *Ocyceros birostris* (Near Threatened)

This species was common resident and widespread in the riverine habitat. Thirty individuals are found here. During the survey it was found commonly throughout the area. Breeding recorded here (Balasubramanian *et al*., 2004). Nests were located on *Madhuca longifolia*, *Terminalia arjuna* and *Mangifera indica.*

NILGIRI FLYCATCHER *Eumyias albicaudatus* (Near Threatened)

Winter migrant and Altitudinal migrant. This species is endemic to the Western Ghats commonly found in the shola and evergreen forests. Two individuals were sighted on 02 January 2013 at 0800 hrs in Pillur and one individual on 04 February 2013 at 0820 hrs in Athikadavu. It is an altitudinal migrant appears to come from the upper Nilgiri hills.

NILGIRI WOODPIGEON *Columba elphinstonii* (Vulnerable)

Winter visitor and Altitudinal migrant. This species is endemic to the Western Ghats commonly found in the shola forests (montane temperate forest). An individual of Nilgiri Woodpigeon was sighted on 03 September 2012 at 0845 hrs and on 10 September 2013 at 0845 hrs in Athikadavu.

MALABAR TROGON *Harpactes fasciatus*

Winter visitor and Altitudinal migrant. This species is a denizen of the tropical evergreen forests of the Western Ghats. Two individuals of Malabar Trogon were sighted on 05 September 2012 at 1045 hrs in Athikadavu, on 12 October 2013 at 1030hrs in Pillur and 30 September 2014 at 0930 hrs in Pillur.

MALABR BARBET *Psilopogon malabaricus* (Endemic)

Winter visitor and Altitudinal Migrant. This species mainly inhabits the high altitude evergreen forest of the Western Ghats. One bird was seen on 05 December 2012 at 0730 hrs in Pillur and two individuals of Malabar Barbet were sighted on 04 April 2013 at 0830 hrs at Athikadavu.

MALABAR WHISTLING THRUSH *Myophonus horsfieldii*

Summer visitor and Altitudinal migrant. Two individuals of Malabar Whistling Thrush were sighted on 08 April 2013 at 0720 hrs in Pillur and on 06 April 2014 at 0730 hrs in Athikadavu.

MALABAR PARAKEET *Psittacula columboides* (Endemic)

During the survey it was found commonly throughout the area. The riverine forests are extensively used for foraging. Nests were located both in the riverine and the adjoining dry deciduous forests.

HILL MYNA *Gracula religiosa*

Winter visitor and Altitudinal migrant. This species mainly inhabits the high altitude evergreen forest of the Western Ghats. Five individuals of Hill Myna were sighted on 05 December 2012 at 0820 hrs and seven individuals were seen on 03 January 2013 at 0830 hrs in Pillur. Next year seven species of Hill Myna were seen on 02 December 2013 at 0900 hrs and nine individuals were seen on 04 January 2014 at 0830 hrs in Pillur.

EURASIAN BLACKBIRD *Turdus merula*

Winter visitor and Altitudinal migrant. Generally inhabits the shola forests (Montane temperate forest) and Tropical Evergreen forests of the Western Ghats. A flock of Indian Blackbirds was sighted in Pillur from 30 January 2014 to 05 February 2014 and the flock size varied from 12 to 20.

ASIAN OPENBILL *Anastomus oscitans*

An important wetland species was recorded during winter in small numbers (5-12 birds). A flock of birds were sighted on 4 February 2014 at 1745 hrs in Pillur which were spotted for a week and they were roosting on *Hardwickia binata* tree at Neeradi.

BLACK-CAPED KINGFISHER *Halcyon pileata*

Winter visitor. This species has been reported in Coimbatore region way back in 1956 (Anon. 1956) and no further sightings reported. During the present study, a single bird was spotted in the riverine forests of Pillur at 1730hrs on 30 March 2013 and a single bird seen on 02 February 2014 at 0900 hrs in Athikadavu and the bird was photographed.

BROWN FISH OWL *Ketupa zeylonensis*

Summer visitor. Brown Fish Owl was sighted on 15 May 2013 at 0720 hrs in Athikadavu and 03 April 2014 at 0800 hrs in Pillur.

Discussion

The riparian ecosystem harbours both aquatic and land birds including several important species (Farooqui *et al.,* 2010). Joshua and Johnsingh (1988) assessed the bird community of the Mundanthurai plateau in the Western Ghats and recorded 159 species in three vegetation types including the riverine forests. The present study recorded 158 species in the riverine forests exclusively, thus highlighting the significance of riverine forests as an important bird habitat in the Western Ghats. A variety of birds including endemic and threatened species occur here. Notable water birds include Oriental Darter, Asian Openbill Stork, cormorants, egrets, herons and kingfishers. The occurrence of near threatened species such as Great Hornbill, Malabar Pied Hornbill, Lesser Fish-eagle, Nilgiri Flycatcher, Oriental Darter and the Vulnerable Nilgiri Woodpigeon (Birdlife International, 2001) is interesting. Of these five species, both the hornbill species and Lesser Fish-eagle breed in the riparian forests (personal observations). The Lesser Fish-eagle and Malabar Pied Hornbill are habitat specialists mainly inhabiting the lowland riparian forests (Ali and Ripley, 1983; Balasubramanian *et al.,* 2004). Presence of tall trees with large canopy makes it an ideal nesting site of these large birds. The sighting of altitudinal migrants such as Malabar Whistling Thrush, Malabar Trogon, Malabar Barbet, Nilgiri Flycatcher, Eurasian Blackbird, Hill Myna and Nilgiri Woodpigeon indicates that these species use the riparian forests during their migration from high altitude evergreen forests to foothill forests for foraging. The occurrence of nine species of raptors further signifies the importance of this bird-habitat. Notable among the raptors include Bonelli's Eagle and Jerdon's Baza. Jerdon's Baza is disjunctly distributed and only rarely sighted in Peninsular India (Ali and Ripley 1983). The occurrence of six species of owls indicates that the lowland riparian forests are favoured home for these nocturnal species.

In the study area, bird species richness and diversity were found higher during December, January and February. Similar findings were reported in a foot hill forest of the Nilgiris, Western Ghats (Peter *et al.,* 2015) and in a tropical evergreen forest in the Silent Valley National Park, Nilgiri Biosphere Reserve (Jayson and Mathew, 2000; Sanalkumar *et al.,* 2012). Johnsingh and Joshu (1994) reported maximum species richness in November-December in three different vegetation types of the Mundanthurai Plateau, Western Ghats.

Conclusion

To conclude it may be noted that this low-land riparian forest site that harbour diverse avian fauna, constitutes an important bird habitat in the Nilgiri Biosphere Reserve. The impact of anthropogenic pressures on the alteration of this habitat might affect the survival of habitat specialists such as Malabar Pied Hornbill and Lesser Fish-eagle and hence conservation measures needs to be stepped up.

Acknowledgements

Authors thank the Ministry of Environment, Forests and Climate Change, Government of India for funding assistance. Thanks to Principal Chief Conservator of Forests, Tamil Nadu Forest Department for granting the field work permission. They are thankful to Dr. P. A. Azeez, Director and Dr Rajah Jayapal, Principal Scientist, Salim Ali Centre for Ornithology and Natural History for the useful suggestions.

निलगिरि जीव-मण्डल रिजर्व, भारत में तटवर्ती वन की पक्षी विविधता

पी. मणिकन्दन और पी. बालासुब्रमण्यन

सारांश

निलगिरि जीव-मण्डल रिजर्व, भारत में अगस्त 2012 से जुलाई, 2014 तक भवानी नदी के साथ-साथ निम्नभूमि तटवर्ती वन में 56 कुलों से संबंधित पक्षियों की कुल 158 प्रजातियों को अभिलिखित किया गया। पक्षियों की 158 प्रजातियों में से 110 प्रजातियां स्थानिक थी, 33 सर्दी की प्रवासी थी और 15 गरमी की प्रवासी थी। गण पासीरिफॉर्मीस प्रधानता में उच्चतम थी इसके बाद पिसिफॉर्मीस एवं फाल्कोनिफॉर्मीस थी। कीटभक्षियों (47 प्रतिशत)का सबसे प्रधान संघ था इसके बाद फलभक्षियों (20 प्रतिशत) का रहा। उच्चतम प्रजाति समृद्धता (127) फरवरी में और न्यूनतम (75) जुलाई में प्रेक्षित की गई। अधिकतम विविधता मान (4.23) दिसम्बर में अभिलिखित किया गया। अध्ययन क्षेत्र के पक्षी प्राणिजात एक संकटस्थ प्रजाति, निलगिरि वुडपिजीयन (*कॉलूम्बा इलफिन्स्टोनाइ*) अति संवेदनशील और पांच लगभग संकटस्थ प्रजाति एंव चार स्थानिक प्रजाति को मिलाकर हैं। इस अध्ययन में निम्नभूमि तटवर्ती वन की पक्षी विविधता पर उपयोगी सूचना दी गई है, जो भावी शोध और अनुवीक्षण के लिए एक आधार रेखा के रूप में कार्य करेगी।

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