



Birds of lower Palni Hills, Western Ghats, Tamil Nadu

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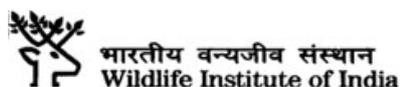
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Abstract: The current altitudinal distribution and breeding observations on birds of lower Palni Hills, Western Ghats were documented by conducting road transects, opportunistic surveys including trail walks and mist netting. A total of 196 species belonging to 63 families were recorded during the study. The Accipitridae family was foremost in species richness, followed by Cuculidae and Muscicapidae, Picidae, Timaliidae and other families. Altitudinal distribution of birds was higher between 600 and 900 m. The general patterns of the decreasing species richness with increasing altitude were observed in mid and upper Palnis. This could be probably because the lower Palnis have more deciduous and scrub forest which can support high food availability. Resident and migrant species made up to 87.76% and 12.24% of the community, respectively. We recorded a species that was threatened, three nearly threatened, and five endemic to the Western Ghats. Most of the endemics were confined to the higher altitudes due to the presence of moist evergreen and high altitude montane forests and grasslands. In total, 51 breeding bird observations were recorded. Interestingly, the variation in the breeding season of some birds was noticed with respect to earlier studies. Overall, our study illustrated useful information on bird community in this region which serves as a baseline for future monitoring programs.

Keywords: Altitudinal distribution, breeding birds, lower Palni Hills, Western Ghats.

INTRODUCTION

Birds are ideal bioindicators and useful models for studying a variety of environmental problems, hence the condition of local landscape must be investigated to identify crucial determinants of the bird community structure for avian conservation (Kattan & Franco 2004). Describing and explaining spatial patterns in species diversity are crucial steps in conserving global biodiversity (Lee et al. 2004) as the number of bird species inhabiting various altitudinal belts or 'life zones' (Ali 1949) depend on climatic changes accompanied by corresponding changes in vegetation. Studies on species distribution along elevational gradients are essential to understand principles of community organisation and species conservation. The Western Ghats, identified as one of the biodiversity hotspots in the world, is a 1600-km long chain of mountain ranges running parallel to the western coast of the Indian peninsula (Pascal 1988). Among the three distinct sections of the Western Ghats, the south-

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eastern region has one of the richest tropical forests in the country. The Western Ghats has nearly 508 bird species of which 3.5% are endemic out of more than 1200 species in India (Rajmohana & Radhakrishnan 2008). Apparently the Indian bird population has been dwindling due to direct/indirect impact from increasing human population (Balachandran et al. 2005), habitat loss, fragmentation, and severe biotic pressure, necessitating documentation of the current status of bird species for future monitoring and conservation (Islam & Rahmani 2004). Bird community evaluation has become an important tool in biodiversity conservation and for identifying conservation actions in areas of high human pressure (Kremen 1992; Shafiq et al. 1997; Chettri et al. 2001; Ramesh et al. 2011).

The avifaunal diversity of Palni Hills has been documented by various authors (Nichols 1937; Fairbank 1877; Terry 1887) and specific ecological studies were carried out in the higher altitudes (Balachandran 1998; Robin & Sukumar 2002; Balachandran et al. 2005; Somasundaram & Vijayan 2008). Apart from anecdotal observations on birds (Blanford 1867; Foulkes 1904; Navarro 1955, Fuller 1958; Surendran 1973; Ananthasubramaniam 1979; Narayana 1979; Steele 1990), few studies involve bird ringing techniques (Balachandran 1992) and a few have been monitored at low altitudes (Shahabuddin 1997). However, little is known about the avifaunal

status in the lower Palni Hills, from the foothills to an altitude of 900m above mean sea level. In order to fill up the lacunae, a short term survey was carried out to document the avifaunal altitudinal distribution and breeding observations in the lower Palni Hills.

MATERIALS AND METHODS

Study Area

Palni Hills is in the south-eastern part of the Western Ghats Hotspot in Tamil Nadu. It lies between 10.1° – 10.26° N and 77.14° – 77.52° E covering an area of c. 2400km² (Image 1). It is one of the important global biodiversity hotspots with high endemism. The Palni Hills have three well marked topographic divisions, namely the lower (300–900 m), mid (>900–1800 m) and high Palnis (>1800–2500 m) for research and administrative purposes (Balachandran et al. 2005). Perennial rivers such as Mulayar and Arungal and semiperennial rivers like Thalaiyar (Rat-tail Falls) (Balachandran et al. 2005) and Iruttar, are important water sources for the Manjalar reservoir (situated at the foothills of 300m elevation) and it is used for irrigation purposes in the lower Palnis. The minimum recorded temperature is about 8.3°C and the maximum goes up to 23°C. The annual average precipitation ranges from 800–1900 mm in the Palnis (Balachandran et al.



Image 1. Location of intensive study area in lower Palni Hills, Western Ghats.

2005). There are four seasons; Winter (December–March), Summer (April–June), southwest monsoon (June–September) and northeast monsoon (October–November). The climate is sub-tropical with major vegetation types broadly classified into scrub forest, moist and dry deciduous forest of low and mid elevations and montane evergreen forest of high elevations (Champion & Seth 1968). In addition to birds, important mammals found in Palni are Sambar *Rusa unicolor*, Muntjac *Muntiacus muntjak*, Wild Pig *Sus scrofa*, Indian Chevrotain *Tragulus meminna*, Gaur *Bos gaurus*, Four-horned Antelope *Trutragus quadricornis*, Nilgiri Tahr *Nilgiritragus hylocrius*, Tiger *Panthera tigris*, Leopard *Panthera pardus*, Dhole *Cuon alpinus*, Striped Hyena *Hyaena hyaena*, Golden Jackal *Canis aureus* and Grizzled Giant Squirrel *Ratufa macroura* (Prater 1971).

The Manjalar reservoir forms an important water body for water birds. Some parts of the river delta in lower Palnis constituted an endemic eco-region with very rare and endangered plants and animals of India but now it has been modified with cultivation of Silk Cotton *Ceiba pentandra*, Teak *Tectona grandis*, Mango *Mangifera indica*, Coffee *Coffea arabica* and Coconut *Cocos nucifera*. Expanding agricultural, urban, productive and developmental activities currently threaten to take over Palni's natural habitat and pose a threat to its preservation due to large-scale deforestation. With human disturbance, the riparian forest patch is being converted on the slopes as a complex mosaic of plantations such as mango groves, groundnut and pulses, secondary and native forests. This work is part of a long term research project "Revaluation of bird community structure of Palni Hills with special reference to endemic and threatened species" (Balachandran et al. 2005).

Field survey

We recorded sightings of birds in the lower Palnis from December 2004 to July 2005 and documented the occurrence, altitudinal distribution and breeding. The highly mountainous terrain made it impossible to lay line transects. Instead, we conducted road transects in the lower Palnis from Palni Hill Conservation Council (PHCC), Kamakapatti to Poolathur road junction (16.5km). The road was divided into six segments of 2.5km each, including a segment of 4km where each segment was sampled twice every

month in the mornings (06:00–10:00 hr) and evenings (16:00–18:30 hr). In addition, opportunistic road surveys, trail walks and mist netting were conducted to record bird species within a 3km radius from the regular road transect area. The five mist-nets were operated opportunistically at dawn from 06:00–09:00 hr and in the evenings from 15:00–18:00 hr. Mist nets were visited every hour to check the trapped birds for collection and identification. All nets were made of black nylon mesh size, 36mm with dimensions 2m high by 6m long.

RESULTS

A total of 196 species belonging to 63 families were recorded during the study (Table 1). All observations listed in Table 1 have already been published in the survey report (Balachandran et al. 2005). Accipitridae family showed highest species richness (18 species), followed by Cuculidae and Muscicapidae (10 species each), Picidae, Timaliidae, (eight species each), Phasianidae and Pycnonotidae (seven species each), Ardeidae, Cisticolidae, Columbidae, Dicruridae, Estrildidae, Motacillidae and Nectariniidae (five species each) and other families (less than five species each). Of the recorded species, 87.76% were resident and 12.24% migrants. In terms of frequency of observations, the majority of species were found to be common (74.49%), followed by uncommon (19.90%) and rare (5.61%) species. In terms of altitude, species and families were seen between >600–≤700 m and >700–900 m respectively. The number of bird species observed in each altitude zone were 128–≤400m, 122–>400 to ≤ 500, 121–>500 to ≤600, 139–>600 to ≤700, 131–>700 to ≤800 and 130–>800 to ≤900. During the study, a threatened species, three nearly threatened and 192 least concerned species were also recorded. Among all the species, five were endemic to the Western Ghats.

Breeding observations

Breeding observations of 51 bird species are given as follows:

Shikra Accipiter badius: In the lower Palnis, (c. 350m altitude) a mating pair was sighted on 3 February 2005. On 25 February, its nest was noticed with an egg on an *Ailanthus excelsa* tree and was seen with two

Table 1. List of birds observed in lower Palni Hills, Western Ghats

	Family/Species common name	Scientific name	Status	Altitude (in m)	Frequency of observation
	Accipitridae				
1	Black-shouldered Kite	<i>Elanus caeruleus</i>	R	320-900	C
2	Oriental Honey-Buzzard	<i>Pernis ptilorhynchus</i>	R	600-900	UC
3	Black Kite	<i>Milvus migrans</i>	R	300-900	C
4	Brahminy Kite	<i>Haliastur indus</i>	R	300-900	C
5	Shikra	<i>Accipiter badius</i>	R	300-900	C
6	Crested Goshawk	<i>Accipiter trivirgatus</i>	R	300-900	C
7	Besra Sparrowhawk	<i>Accipiter virgatus</i>	R	650	C
8	White-eyed Buzzard	<i>Butastur teesa</i>	R	320	C
9	Mountain Hawk-Eagle	<i>Spizaetus nipalensis</i>	R	415-900	UC
10	Changeable Hawk-Eagle	<i>Spizaetus cirrhatus</i>	R	300-900	C
11	Bonelli's Hawk-Eagle	<i>Hieraaetus fasciatus</i>	R	300-600	C
12	Booted Eagle	<i>Hieraaetus pennatus</i>	M	300-600	UC
13	Black Eagle	<i>Ictinaetus malayensis</i>	R	300-900	C
14	Pallid Harrier	<i>Circus macrourus</i>	M,NT	320	R
15	Montagu's Harrier	<i>Circus pygargus</i>	M	350	R
16	Pied Harrier	<i>Circus melanoleucos</i>	M	800-900	UC
17	Short-toed Snake-Eagle	<i>Circaetus gallicus</i>	R	300-600	UC
18	Crested Serpent Eagle	<i>Spilornis cheela</i>	R	400-900	C
	Acrocephalidae				
19	Thick-billed Warbler	<i>Acrocephalus aedon</i>	M	320-500	UC
20	Blyth's Reed-Warbler	<i>Acrocephalus dumetorum</i>	M	300-900	C
21	Paddyfield Warbler	<i>Acrocephalus agricola</i>	M	300-500	C
	Aegithinidae				
22	Common Iora	<i>Aegithina tiphia</i>	R	300-900	C
	Alaudidae				
23	Jerdon's Bush-Lark	<i>Mirafra affinis</i>	R	320	C
24	Ashy-crowned Sparrow-Lark	<i>Eremopterix grisea</i>	R	320	UC
25	Eastern Skylark	<i>Alauda gulgula</i>	R	320	UC
	Alcedinidae				
26	Small Blue Kingfisher	<i>Alcedo atthis</i>	R	320-900	C
	Anatidae				
27	Northern Pintail	<i>Anas acuta</i>	M	300	UC
28	Spot-billed Duck	<i>Anas poecilorhyncha</i>	R	300	C
	Apodidae				
29	Indian Edible-nest Swiftlet	<i>Collocalia unicolor</i>	R	600-900	C
30	White-rumped Needletail	<i>Zoonavena sylvatica</i>	R	630	UC
31	House Swift	<i>Apus affinis</i>	R	320-640	C
32	Asian Palm-Swift	<i>Cypsiurus balasensis</i>	R	300-500	UC
	Ardeidae				
33	Indian Pond-Heron	<i>Ardeola grayii</i>	R	300-900	C
34	Cattle Egret	<i>Bubulcus ibis</i>	R	300	C
35	Median Egret	<i>Mesophoyx intermedia</i>	R	300	C
36	Large Egret	<i>Casmerodius albus</i>	R	300	UC

	Family/Species common name	Scientific name	Status	Altitude (in m)	Frequency of observation
37	Little Egret	<i>Egretta garzetta</i>	R	300	C
	Bucerotidae				
38	Malabar Grey Hornbill	<i>Ocyrceros griseus</i>	R,E	800-900	C
	Campephagidae				
39	Pied Flycatcher-Shrike	<i>Hemipus picatus</i>	R	600-900	C
40	Black-headed Cuckoo-Shrike	<i>Coracina melanoptera</i>	R	300-900	UC
41	Scarlet Minivet	<i>Pericrocotus flammeus</i>	R	500-900	C
42	Small Minivet	<i>Pericrocotus cinnamomeus</i>	R	320-680	C
	Caprimulgidae				
43	Jerdon's Nightjar	<i>Caprimulgus atripennis</i>	R	450-850	UC
44	Common Indian Nightjar	<i>Caprimulgus asiaticus</i>	R	320-900	C
	Cerylidae				
45	Lesser Pied Kingfisher	<i>Ceryle rudis</i>	R	300-900	C
	Charadriidae				
46	Red-wattled Lapwing	<i>Vanellus indicus</i>	R	300-900	C
47	Little Ringed Plover	<i>Charadrius dubius</i>	R	300	C
	Chloropseidae				
48	Gold-fronted Chloropsis	<i>Chloropsis aurifrons</i>	R	450-900	C
49	Jerdon's Chloropsis	<i>Chloropsis cochinchinensis</i>	R	500-640	UC
	Ciconiidae				
50	Painted Stork	<i>Mycteria leucocephala</i>	R,NT	300	UC
	Cinclosomatidae				
51	Spotted Babbler	<i>Pellorneum ruficeps</i>	R	415-900	C
	Cisticolidae				
52	Franklin's Prinia	<i>Prinia hodgsonii</i>	R	550-720	UC
53	Plain Prinia	<i>Prinia inornata</i>	R	320-900	C
54	Ashy Prinia	<i>Prinia socialis</i>	R	500-900	C
55	Jungle Prinia	<i>Prinia sylvatica</i>	R	300-900	C
56	Common Tailor Bird	<i>Orthotomus sutorius</i>	R	300-900	C
	Columbidae				
57	Blue Rock Pigeon	<i>Columba livia</i>	R	300-900	C
58	Eurasian Collared Dove	<i>Streptopelia decaocto</i>	R	320-400	UC
59	Spotted Dove	<i>Streptopelia chinensis</i>	R	300-900	C
60	Little Brown Dove	<i>Streptopelia senegalensis</i>	R	300-400	C
61	Emerald Dove	<i>Chalcophaps indica</i>	R	500-900	C
	Coraciidae				
62	Indian Roller	<i>Coracias benghalensis</i>	R	300-350	C
	Corvidae				
63	Indian Treepie	<i>Dendrocitta vagabunda</i>	R	300-900	C
64	House Crow	<i>Corvus splendens</i>	R	300-900	C
65	Jungle Crow	<i>Corvus macrorhynchos</i>	R	300-900	C
	Cuculidae				
66	Pied Crested Cuckoo	<i>Clamator jacobinus</i>	R	300-450	C
67	Brainfever Bird	<i>Hierococcyx varius</i>	R	300-900	C

	Family/Species common name	Scientific name	Status	Altitude (in m)	Frequency of observation
68	Indian Cuckoo	<i>Cuculus micropterus</i>	R	640	C
69	Indian Plaintive Cuckoo	<i>Coccyzus passerinoides</i>	R	320	C
70	Drongo Cuckoo	<i>Surniculus lugubris</i>	R	300-900	UC
71	Asian Koel	<i>Eudynamis scolopacea</i>	R	300-900	C
72	Small Green-billed Malkoha	<i>Phaenicophaeus viridirostris</i>	R	300-900	C
73	Sirkeer Malkoha	<i>Phaenicophaeus leschenaultii</i>	R	300-900	C
74	Greater Coucal	<i>Centropus sinensis</i>	R	300-900	C
75	Lesser Coucal	<i>Centropus bengalensis</i>	R	300-900	C
	Dicaeidae				
76	Thick-billed Flowerpecker	<i>Dicaeum agile</i>	R	400-600	C
77	Tickell's Flowerpecker	<i>Dicaeum erythrorhynchos</i>	R	300-600	C
78	Plain Flowerpecker	<i>Dicaeum concolor</i>	R	800-900	C
	Dicruridae				
79	Black Drongo	<i>Dicrurus macrocercus</i>	R	300-500	C
80	Ashy Drongo	<i>Dicrurus leucophaeus</i>	M	450-500	C
81	White-bellied Drongo	<i>Dicrurus caerulescens</i>	R	320-700	C
82	Bronzed Drongo	<i>Dicrurus aeneus</i>	R	900-1300	UC
83	Greater Racket-tailed Drongo	<i>Dicrurus paradiseus</i>	R	750-1100	C
	Estrildidae				
84	White-throated Munia	<i>Lonchura malabarica</i>	R	300-600	C
85	White-rumped Munia	<i>Lonchura striata</i>	R	300-900	C
86	Black-throated Munia	<i>Lonchura kelaarti</i>	R	650-900	UC
87	Spotted Munia	<i>Lonchura punctulata</i>	R	300-900	C
88	Black-headed Munia	<i>Lonchura malacca</i>	R	300-600	C
	Falconidae				
89	Common Kestrel	<i>Falco tinnunculus</i>	R	300-900	C
	Halcyonidae				
90	Stork-billed Kingfisher	<i>Halcyon capensis</i>	R	300	UC
91	White-breasted Kingfisher	<i>Halcyon smyrnensis</i>	R	300-900	C
	Hemiprocniidae				
92	Crested Tree-Swift	<i>Hemiprocne coronata</i>	R	300-900	C
	Hirundinidae				
93	Dusky Crag Martin	<i>Hirundo concolor</i>	R	800-900	C
94	Common Swallow	<i>Hirundo rustica</i>	M	300-600	C
95	Red-rumped Swallow	<i>Hirundo daurica</i>	R	320-900	C
	Irenidae				
96	Asian Fairy Bluebird	<i>Irena puella</i>	R	600-900	C
	Laniidae				
97	Bay-backed Shrike	<i>Lanius vittatus</i>	R	320	C
98	Rufous-backed Shrike	<i>Lanius schach</i>	R	300-900	C
99	Brown Shrike	<i>Lanius cristatus</i>	M	300-900	C
	Megalaimidae				
100	Brown-headed Barbet	<i>Megalaima zeylanica</i>	R	400-850	C
101	White-cheeked Barbet	<i>Megalaima viridis</i>	R	700-900	C

	Family/Species common name	Scientific name	Status	Altitude (in m)	Frequency of observation
102	Crimson-throated Barbet	<i>Megalaima rubricapilla</i>	R	700-900	C
103	Coppersmith Barbet	<i>Megalaima haemacephala</i>	R	400-900	C
	Meropidae				
104	Chestnut-headed Bee-eater	<i>Merops leschenaulti</i>	R	400-900	C
105	Small Bee-eater	<i>Merops orientalis</i>	R	300-450	C
106	Blue-bearded Bee-eater	<i>Nyctornis athertoni</i>	R(AM)	750-900	UC
	Monarchidae				
107	Asian Paradise-Flycatcher	<i>Terpsiphone paradisi</i>	R	300-900	C
108	Black-naped Monarch-Flycatcher	<i>Hypothymis azurea</i>	R	600-900	C
	Motacillidae				
109	Paddy field Pipit	<i>Anthus rufulus</i>	R	300-900	C
110	Forest Wagtail	<i>Dendronanthus indicus</i>	M	320-900	C
111	Yellow Wagtail	<i>Motacilla flava</i>	M	300-600	C
112	Grey Wagtail	<i>Moticella cinerea</i>	M	500-900	UC
113	Large Pied Wagtail	<i>Moticella maderaspatensis</i>	R	300-900	UC
	Muscicapidae				
114	Asian Brown Flycatcher	<i>Muscicapa dauurica</i>	M	450-700	C
115	Brown-breasted Flycatcher	<i>Muscicapa muttui</i>	M	500-900	UC
116	Blue-throated Flycatcher	<i>Cyornis rubeculoides</i>	R(AM)	650	R
117	Tickell's Blue-Flycatcher	<i>Cyornis tickelliae</i>	R	300-900	C
118	White-rumped Shama	<i>Copsycus malabaricus</i>	R	700-900	C
119	Pied Bushchat	<i>Saxicola caprata</i>	R	300-900	C
120	Indian Robin	<i>Saxicoloides fulicata</i>	R	300-640	C
121	Blue-headed Rock-Thrush	<i>Monticola cinclorhynchus</i>	M	680	R
122	Indian Blue Robin	<i>Luscinia brunnea</i>	R	300-900	C
123	Oriental Magpie-Robin	<i>Copsycus saularis</i>	R	300-900	C
	Nectariniidae				
124	Purple-rumped Sunbird	<i>Nectarinia zeylonica</i>	R	300-900	C
125	Small Sunbird	<i>Nectarinia minima</i>	R,E	900	R
126	Loten's Sunbird	<i>Nectarinia lotenia</i>	R	500-900	UC
127	Purple Sunbird	<i>Nectarinia asiatica</i>	R	300-900	C
128	Little Spiderhunter	<i>Arachnothera longirostra</i>	R	650-900	R
	Oriolidae				
129	Eurasian Golden Oriole	<i>Oriolus oriolus</i>	M	300-350	C
130	Black-naped Oriole	<i>Oriolus chinensis</i>	M	640-900	C
131	Black-headed Oriole	<i>Oriolus xanthomus</i>	R	370-900	C
	Paridae				
132	Great Tit	<i>Parus major</i>	R	600-900	C
133	Black-lored Yellow Tit	<i>Parus xanthogenys</i>	R	700-900	UC
	Paroidea				
134	Grey-headed Flycatcher	<i>Culicicapa ceylonensis</i>	R	800-900	UC
	Passeridae				
135	House Sparrow	<i>Passer domesticus</i>	R	300-900	C
	Phalacrocoracidae				
136	Little Cormorant	<i>Phalacrocorax niger</i>	R	300-900	C

	Family/Species common name	Scientific name	Status	Altitude (in m)	Frequency of observation
137	Darter	<i>Anhinga melanogaster</i>	R,NT	300-900	C
	Phasianidae				
138	Grey Francolin	<i>Francolinus pondicerianus</i>	R	300- 400	C
139	Rain Quail	<i>Coturnix coromandelica</i>	R	300-900	C
140	Painted Bush-Quail	<i>Perdica erythrorhyncha</i>	R	300-900	C
141	Red Spurfowl	<i>Galloperdix spadicea</i>	R	500-900	C
142	Painted Spurfowl	<i>Galloperdix lunulata</i>	R	320-650	C
143	Grey Junglefowl	<i>Gallus sonneratii</i>	R	300-900	C
144	Indian Peafowl	<i>Pavo cristatus</i>	R	300-500	C
	Phylloscopidae				
145	Large-billed Leaf-Warbler	<i>Phylloscopus magnirostris</i>	M	500-900	UC
146	Greenish Leaf-Warbler	<i>Phylloscopus trochiloides</i>	M	320-900	C
	Picidae				
147	Rufous Woodpecker	<i>Celeus brachyurus</i>	R	600-640	R
148	Little Scaly-bellied Green Woodpecker	<i>Picus xanthopygaeus</i>	R	350-900	UC
149	Small Yellow-naped Woodpecker	<i>Picus chlorolophus</i>	R	665	C
150	Lesser Golden-backed Woodpecker	<i>Dinopium benghalense</i>	R	300-900	C
151	Common Golden-backed Woodpecker	<i>Dinopium javanense</i>	R	300-900	C
152	Yellow-fronted Pied Woodpecker	<i>Dendrocopos mahrattensis</i>	R	642-900	UC
153	Brown-capped Pygmy Woodpecker	<i>Dendrocopos nanus</i>	R	780-900	UC
154	Greater Golden-backed Woodpecker	<i>Chrysocolaptes lucidus</i>	R	700-900	C
	Pittidae				
155	Indian Pitta	<i>Pitta brachyura</i>	M	300-900	C
	Ploceidae				
156	Baya Weaver	<i>Ploceus philippinus</i>	R	300-350	C
	Podicipedidae				
157	Little Grebe	<i>Tachybaptus ruficollis</i>	R	300-900	C
	Prionopidae				
158	Large Woodshrike	<i>Tephrodornis gularis</i>	R	550-900	C
159	Common Woodshrike	<i>Tephrodornis pondicerianus</i>	R	320-700	C
160	Large Cuckoo-Shrike	<i>Coracina macei</i>	R	550-700	C
	Psittacidae				
161	Rose-ringed Parakeet	<i>Psittacula krameri</i>	R	300-450	C
162	Plum-headed Parakeet	<i>Psittacula cyanocephala</i>	R	400-900	C
163	Blue-winged Parakeet	<i>Psittacula colomboides</i>	R,E	500-900	C
164	Indian Hanging-Parrot	<i>Loriculus vernalis</i>	R	500-900	C
	Pycnonotidae				
165	Grey-headed Bulbul	<i>Pycnonotus priocephalus</i>	R,E	700-900	C
166	Ruby-throated Yellow Bulbul*	<i>Pycnonotus melanicterus gularis</i>	R	700-900	UC
167	Red-whiskered Bulbul	<i>Pycnonotus jocosus</i>	R	320-900	C

	Family/Species common name	Scientific name	Status	Altitude (in m)	Frequency of observation
168	Red-vented Bulbul	<i>Pycnonotus cafer</i>	R	300-900	C
169	Yellow-throated Bulbul	<i>Pycnonotus xantholaemus</i>	R,T	450-715	R
170	White-browed Bulbul	<i>Pycnonotus luteolus</i>	R	300-700	C
171	Yellow-browed Bulbul	<i>Iole indica</i>	R	700-900	UC
	Rallidae				
172	White-breasted Waterhen	<i>Amaurornis phoenicurus</i>	R	300-900	C
	Rhipiduridae				
173	White-browed Fantail-Flycatcher	<i>Rhipidura aureola</i>	R	640	C
	Scolopacidae				
174	Common Sandpiper	<i>Actitis hypoleucos</i>	M	300-900	C
	Sittidae				
175	Velvet-fronted Nuthatch	<i>Sitta frontalis</i>	R	700-900	UC
	Strigidae				
176	Eurasian Eagle-Owl	<i>Bubo bubo</i>	R	350	R
177	Spotted Owlet	<i>Athene brama</i>	R	300-900	C
	Sturnidae				
178	Rosy Starling	<i>Sturnus roseus</i>	M	320-400	UC
179	Common Myna	<i>Acridotheres tristis</i>	R	300-500	C
180	Jungle Myna	<i>Acridotheres fuscus</i>	R	450-900	UC
181	Southern Hill-Myna	<i>Gracula indica</i>	R	750-900	C
	Sylviidae				
182	Yellow-eyed Babbler	<i>Chrysomma sinense</i>	R	300-500	C
	Timaliidae				
183	Indian Scimitar-Babbler	<i>Pomatorhinus horsfieldii</i>	R	500-900	C
184	Rufous-bellied Babbler	<i>Dumetia hyperythra</i>	R	300-900	C
185	Black-headed Babbler	<i>Rhopocichla atriceps</i>	R	700-900	UC
186	Common Babbler	<i>Turdoides caudatus</i>	R	320-400	C
187	Indian Rufous Babbler	<i>Turdoides subrufus</i>	R,E	540-900	R
188	Jungle Babbler	<i>Turdoides striatus</i>	R	450-900	C
189	White-headed Babbler	<i>Turdoides affinis</i>	R	300-400	C
190	Quaker Tit-Babbler	<i>Alcippe poiocephala</i>	R	450-900	R
	Trogonidae				
191	Malabar Trogon	<i>Harpactes fasciatus</i>	R	740-900	C
	Turdidae				
192	Malabar Whistling-Thrush	<i>Myiophonus horsfieldii</i>	R	500-900	C
	Turnicidae				
193	Common Buttonquail	<i>Turnix suscitator</i>	R	300-320	C
194	Small Buttonquail	<i>Turnix sylvatica</i>	R	320	C
	Upupidae				
195	Common Hoopoe	<i>Upupa epops</i>	R	300-900	C
	Zosteropidae				
196	Oriental White-eye	<i>Zosterops palpebrosus</i>	R	550-900	C

R - Resident; C - Common; T - Threatened; M - Migrant; UC - Uncommon; NT - Near Threatened; AM - Altitudinal Migrant; X - Rare; E - Endemic

additional eggs on 8 March. On 25 March the hatched eggshells were seen under the tree but the hatchlings were taken away by graziers for consumption. The nest was noticed again with a single egg on 5 April 2005, which was predated later. The other nest was located in early March on *Acacia catechu* near the arboretum of PHCC. It had two eggs and both fledged successfully on 2nd May 2005.

Changeable Hawk-eagle *Spizaetus cirrhatus*: During the transect count on 24 March 2005 a nest was located containing a newly hatched chick with fluffy white down feathers and black beak on a tree located in a ravine of the riparian forest at an altitude of 732m. The nestling, being a singleton, was monitored continuously until fully grown and fledged. The nest was a large platform of sticks and twigs with a central depression lined with fresh green leaves constantly renovated to protect the nestling from direct sunlight. The nest was located at a height of about 15m from the ground on a 30m tall tree having a dbh (diameter at breast height) of 132cm.

Painted Spurfowl *Galloperdix lunulata*: A male with a single chick with dark brown down feathers was seen foraging on a rocky slope interspersed with grass and bush, near the road at 410m altitude on 14 June 2005. It was speculated that both parents were involved in parental care.

Grey Junglefowl *Gallus sonneratii*: Noticed with three chicks on 25 March 2005, at 781m altitude.

Indian Peafowl *Pavo cristatus*: Three juveniles were recorded on 11 December 2004 at 350m altitude and may have possibly hatched in early November.

Little Brown Dove *Streptopelia senegalensis*: Three nests were observed in the Lower Palnis. At 320m altitude the nest was made up of short grasses laid on the ground under *Dodonaea viscosa* bush. Another nest was located on an *Acacia planifrons* tree on 07 April 2005. A pair of eggshells from another nest was collected near *Carissa* sp. shrub on 14 June 2005.

Spotted Dove *Streptopelia chinensis*: On 2 July 2005, a nest with two eggs was located on the lower fork of a Teak *Tectona grandis* tree at about 3m from the ground at 320m altitude.

Plum-headed Parakeet *Psittacula cyanocephala*: Two juveniles with an adult were seen at 600m altitude on 7 April 2005.

Sirkeer Malkoha *Phaenicophaeus leschenaultii*:

A juvenile was seen perched on a *Diospyros montana* tree at 350m altitude in mid April and another juvenile accompanying an adult was noticed in early June 2005.

Greater Coucal *Centropus sinensis*: This species was seen carrying food material in mid June at 320m altitude.

Spotted Owlet *Athene brama*: The nest was seen on a rooftop of a house at 300m altitude. Two broods were noticed in the same nest, one during February and another in late April. Both the broods were observed with eggs, but on the next day, all eggs rolled out of the nest to the ground.

Common Indian Nightjar *Caprimulgus asiaticus*: Two juveniles accompanying an adult were seen along the mud path at 320m altitude on 5 May 2005. A juvenile was caught in a mist net in early December.

White-breasted Kingfisher *Halcyon smyrnensis*: A nest was located on the roadside bank at 630m altitude, during May 2005.

Blue-bearded Bee-eater *Nyctornis athertoni*: On 29 April 2005, a nest was located along the roadside along a gentle downward slope at a height of 850m altitude. The nest was about 3–4 cm in diameter and more than 1.5m deep.

Small Bee-eater *Merops orientalis*: On 24 April 2005, at 320m altitude a nest was observed in a small earthen structure constructed for rainwater harvesting. The nest hole was about two inches in diameter and both adults were seen hunting insects and feeding their nestlings. Many insect heads were seen scattered at the entrance of the nest.

Chestnut-headed Bee-eater *Merops leschenaulti*: In Lower Palnis, more than five nests were seen on a roadside sand bank on 17 April 2005 at 650m altitude. These nests were horizontal tunnels drilled into the sand bank. An active nest was located and two eggshells were seen near the nest hole.

Malabar Grey Hornbill *Ocyceros griseus*: Two nests were noticed during March 2005 at an altitude of c. 800m. A nest-hole was found on a horizontal branch of a large *Buchanania axillaris* tree at a height of about 20m from the ground and the other was on the trunk of a large tree with 10 nesting holes. In both the nests, the adult male was seen feeding the incarcerated inmates with black berries and insects. On 23 June 2005, two fledglings flew across the road.

Red-rumped Swallow *Hirundo daurica*: In the

lower Palnis, three nests were located. Of them, two were constructed under road culverts, one at 415m altitude and the other at 552m altitude. The third nest was seen on the ceiling of an abandoned building at 320m with shells of two eggs found on the ground. Only a single nest was seen with two nestlings.

Large cuckoo-shrike *Coracina macei*: A nest was noticed in the lower Palnis during early May 2005 at 604m altitude. The nest was seen on the fork of a *Tectona grandis* tree at a height of about 20m. The nest was built by peeling the fibres from a *Commiphora caudata* tree. The nest was not found after the rains.

Small Minivet *Pericrocotus cinnamomeus*: Although the nest was not seen, both male and female were seen carrying food in mid April 2005 in the scrub forests at 320m altitude.

Scarlet Minivet *Pericrocotus flammeus*: On 24 March 2005, a well-camouflaged nest lined with lichen was observed on *Tectona grandis* and the female was seen incubating the eggs. The male fed the incubating female a moth.

Black-crested Bulbul *Pycnonotus melanicterus gularis*: On 20 January 2005, a nest was located at 789m altitude. The bird was seen plucking leaves for nest construction and taking them onto a tree.

Red-whiskered Bulbul *Pycnonotus jocosus*: Although no nests were located, two juveniles were caught in a mist net, at an altitude of 320m on 1st November 2004. As this species is very rare in the lower altitudes (up to 400m), the juveniles caught might be undergoing a 'juvenile dispersal period'.

Yellow-throated Bulbul *Pycnonotus xantholaemus*: Collection of nest materials by this bird was noticed on 10 April 2005 and 9 June 2005.

White-browed Bulbul *Pycnonotus luteolus*: A nest was located on 18 April 2005 on *Celtis* sp. tree at about 4m from the ground at 630m altitude.

Oriental Magpie-robin *Copsychus saularis*: On 7 May 2005, a bird was observed in the thick undergrowth with an insect in its mouth at 591m altitude.

White-rumped Shama *Copsychus malabaricus*: A nest was located on a short dead stump of a tree on an inaccessible slope at 410m altitude. Both the birds were seen frequenting the site as if they were feeding young ones.

Indian Robin *Saxicoloides fulicata*: The bird was seen carrying food to an inaccessible bush. Such sightings were made at various altitudes from 320–600

m altitude from mid May till late June.

Rufous-bellied Babbler *Dumetia hyperythra*: A nest with four nestlings was located at about 350m on 30 April 2005 and all the nestlings fledged on 2 May 2005.

Yellow-eyed Babbler *Chrysomma sinense*: A nest with two nestlings was located on 17 November 2004.

White-headed Babbler *Turdoides affinis*: A nest with three eggs was located on a fork of *Carissa* sp. bush at about 1.5m from the ground on 19 February 2005 at 320m altitude. The eggs were predated and the nest was abandoned.

Jungle Prinia *Prinia sylvatica*: Three nests were located in the scrub jungle between altitudes 300 and 400 m from late February to May. Out of the three nests, two had nestlings (two and three) and the other nests with three eggs were abandoned later. The breeding season does not correspond with the months (April to September) as indicated by Ali & Ripley (1983).

Plain Prinia *Prinia inornata*: A nest with two nestlings was located during the first week of December 2004 at 320m altitude. Both the chicks fledged successfully.

Common Tailorbird *Orthotomus sutorius*: A total of 23 juveniles were ringed from September to June at 320m altitude.

Asian Brown Flycatcher *Muscicapa dauurica*: A juvenile was noticed in a mixed foraging flock at 665m altitude on 7 June 2005. An adult was noticed feeding a juvenile at 640m altitude on 17 June 2005.

Tickell's Blue-flycatcher *Cyornis tickelliae*: In the Lower Palnis, two nests with nestlings each, were located between 564 and 648 m altitudes respectively. Both the nests were placed in rocky clefts along the roadside. The first nest was located in late April 2005 which was well camouflaged with fern leaves and placed at about 5m from the ground and the next was located in late June at about 4m from the ground.

Tickell's Flowerpecker *Dicaeum erythrorhynchos*: A male and female were observed collecting nest materials on 22 and 29 January 2005 at 550m altitude in the dry deciduous forests of Lower Palni Hills.

Thick-billed Flowerpecker *Dicaeum agile*: Two nests were observed. A nest with two nestlings was being fed by both adults on an *Acacia planifrons* tree at c.3m from the ground on 29 January 2005 at 420m

altitude. The other was located on an *Albizia lebbbeck* tree at c.5m from the ground on 12 February 2005 at 580m altitude.

Purple-rumped Sunbird *Nectarinia zeylonica*: Four nests were recorded, one each in January and February and two in March. All nests were abandoned.

Purple Sunbird *Nectarinia asiatica*: Ten nests were seen with two eggs each in lower Palnis. Nestlings in four nests fledged successfully, two nests were abandoned and the other two nests could not be monitored. A nest was located with two eggs on 28 April at 320m altitude in *Acacia leucophloea* tree, but both the hatchlings succumbed to rain on 3 May 2005.

Loten's Sunbird *Nectarinia lotenia*: At 462m altitude a nest was located on 11 April 2005 at c. 6m from the ground on a tree. Both the adults were seen frequenting the nest.

Oriental White-eye *Zosterops palpebrosus*: In lower Palnis, construction of two nests was observed on 24 March at altitudes 738 and 744 m. One was at about 3m from the ground on a *Celtis* sp. tree but was later damaged by a vehicle passing over. The other was at a height of about 8m from the ground on a tree.

White-rumped Munia *Lonchura striata*: Two nests were recorded on 2 December 2004. One was located with seven nestlings on a tree about 3m from the ground. One had an egg but no eggs were found in the other. Both the nests were abandoned.

White-throated Munia *Lonchura malabarica*: A nest with three eggs was located on an *Acacia planifrons* tree in late November 2005.

Common Myna *Acridotheres tristis*: A nest was constructed on the roof of a building at 320m altitude during mid June and the the incubating eggs were seen till early July 2005.

Southern Hill-myna *Gracula religiosa indica*: A nest was observed at 800m altitude in Lower Palnis on *Chukrasia tubularis* tree at c. 5m from the ground during late March 2005. Reuse of the nest by the pair was observed in March and the second brood was seen in July 2005.

Black-headed Oriole *Oriolus xanthornus*: Collection of nest material was seen in late April and a juvenile was observed being fed by its parents in mid June 2005 at 619m altitude.

Black Drongo *Dicrurus macrocercus*: On 24 March 2005, a nest with two eggs was located on *Acacia*

leucophloea tree and both the eggs hatched on 5 April 2005.

Greater Racket-tailed Drongo *Dicrurus paradiseus*: In the lower Palnis, a nest with an incubating female was seen during mid April at 762m altitude on a tall tree c. 20m from the ground.

Indian Treepie *Dendrocitta vagabunda*: A mating pair was sighted in mid June 2005 at 360m altitude. A juvenile was seen begging for food from an adult at 630m altitude on 6 July 2005.

Jungle Crow *Corvus macrorhynchos*: A nest was located during mid-June on *Azadirachta indica* tree at a height of 7m from the ground.

DISCUSSION

Species richness generally decreases with increasing elevation (Begon et al. 1996). Bird distribution and abundance varies with habitat (Jayapal et al. 2007; Ramesh et al. 2011), climatic condition, food resource and evolutionary history of the area (Jayson 1994). The species richness recorded was lowest in the upper Palnis (n=99) and mid Palnis (n=130) (Balachandran et al. 2005) in comparison to lower Palnis. This was probably because lower Palnis has more deciduous and scrub jungle which may support high food availability. Thus, in this heterogeneous matrix of habitat it is essential to maintain and conserve intact forests. In Kalakad-Mundanthurai Tiger Reserve, Raman et al. (2005) revealed that bird community composition significantly correlated with elevation and tree species composition of sites, indicating the influence of deterministic factors on bird community structure. Resource abundance and availability are described as the most important factor in determining the community structure (Recher & Davis 2002). The bird families Accipitridae, Cuculidae, Muscicapidae, Picidae, Timaliidae, Phasianidae, Pycnonotidae, Ardeidae, Cisticolidae, Columbidae, Dicruridae, Estrildidae, Motacillidae and Nectariniidae are sufficiently abundant and thus considered to be characteristic of resource availability in this region (Balachandran et al. 2005). Endemic bird species were less in the lower Palnis than mid and upper Palnis. Most of the endemics were confined to the higher altitudes due to the presence of moist evergreen and high altitude montane forests and grasslands

(Pramod et al. 1997; Vijayan & Gokula 2006). The extensive deciduous and scrub forests were not used much by the endemics though the habitats are generally richer in bird species than humid evergreen and montane forests, when equal areas are compared (Daniels et al. 1991, 1992). Similarly, the common and resident birds are abundant in lower Palnis. More bird species and families were found between 600 and 900 m altitude. This is probably related to the presence of mixed vegetation types at these altitudes. By comparing the number of species present in lower Palnis with earlier studies by Balachandran et al. (2005), and Somasundaram & Vijayan (2008) in mid and upper Palnis the species richness was higher in the lower altitude than the higher altitude. Similarly, most studies have shown a general pattern of decreasing species richness with increasing altitude believed to mirror the well-recognised latitudinal gradient in species richness (MacArthur 1972; Bachman et al. 2004, Raman et al. 2005).

Palni Hills is located in the southeastern Western Ghats and is well known for its high endemism (Rajmohana & Radhakrishnan 2008). Though these hills are highly significant for the seven high altitude endemic species namely Nilgiri Wood-Pigeon, Grey-breasted Laughing Thrush, Black-and-Orange Flycatcher, Nilgiri Flycatcher, Broad-tailed Grass-Warbler, White-bellied Shortwing and Nilgiri Pipit, they are found above 1500m (Balachandran et al. 2005; Somasundaram & Vijayan 2008) despite the lower Palnis having a threatened species, three nearly threatened and five endemic species. In total, 9 and 11 endemics, 3 and 2 Vulnerable and 5 and 4 Near Threatened birds were recorded in mid and upper Palnis, respectively. The Indian Rufous Babbler *Turdoides subrufus* and the Small Sunbird *Nectarinia minima* are the two endemics seen in all the three divisions of Palnis. It is evident that Palni hills is a significant site due to the high congregation of threatened and endemic bird species as referred by the Important Bird Area (IBA) (Islam & Rahmani 2004). This site has been selected as an IBA site on the basis of the presence of globally threatened species with a significant percentage of restricted range species, and some biome-restricted species (Islam & Rahmani 2004). The presence of endemic and threatened species indicates the conservation importance of the study site. All the endemic species observed have

already been recorded in the hill ranges of Palni Hills (Fairbank 1877; Terry 1887; Nichols 1937) while some that appeared to be rare like the Indian Rufous Babbler, Blue-winged Parakeet *Psittacula columboides* and Malabar Grey Hornbill *Ocyrceros griseus* in Lower Palnis may be due to habitat fragmentation and degradation. Habitat loss due to anthropogenic pressure is the greatest threat to most of the Indian birds (Rahmani 2008). Anthropogenic pressures like illegal encroachment into forest land, livestock-grazing, and harvesting of fuel wood with huge quantities of minor forest products must be put under control in this region (Balachandran et al. 2005). Interestingly, variations in the observation of breeding season compared to Ali & Ripley (1983) was noticed in plain *Prinia Prinia inornata*, known to breed from March to July, was found breeding in the first week of December. Its nest was located with two nestlings. Both nestlings fledged successfully. Shikra *Accipiter badius* breeds from March to June but it also bred earlier in February. Spotted Owlet *Athene brama* breeds in November and March but the second brood was observed in April. Common Iora *Aegithina tiphia* usually breeds from January to August, but it was noticed breeding in November along with the observation of a nest with juveniles. Baya Weaver *Ploceus philippinus* usually breeds from June to September but it was seen breeding in October.

Our study illustrated useful breeding observations of birds in the Palni Hills. The protection of Important Bird Areas contributes not only to bird conservation but even the biodiversity of this highly endangered ecosystem as a whole (Islam & Rahmani 2004). Since we documented the occurrence, altitudinal distribution and breeding observations, we felt that eight months were sufficient to bring out useful information on the aforementioned aspects. However, we agree that the short term field study was a limitation and definitely a long term study would bring out robust ornithological information on Palni Hills. This study generated baseline data on bird species occurrence along an altitudinal gradient in the lower Palni Hills. Large scale habitat changes occurring globally fulfil endless human needs, habitat destruction, fragmentation and degradation necessitates further assessment on the impact of anthropogenic changes on birds (Brash 1987; Whitten et al. 1987; Khan et al. 1993). To maintain the bird community structure, further habitat exploitation

must be minimised by regulating human activities (Johnsingh & Joshua 1994). The data gathered from this study serves to be important in developing future conservation and management programs, which will identify priority areas for long-term persistence of bird communities.

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