

Species Abundance and Distributions of Bird Communities In Agroecosystems, South Andaman

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ABSTRACT

This study was carried out in the Central Island Agricultural Research Institute campus during November 2014 to October 2015 to assess the avifaunal diversity and species distribution in different agroecosystem. A total of 108 species observed, these belongs to 15 Orders, and 38 families. Of the recorded species, 69 were resident, 16 were resident with local movements, 18 winter migrant, 1 resident with winter influx, 1 passage migrant, 3 summer migrant and 1 vagrant. The overall diversity Index (H') was 3.19 and (λ) 0.02. The Andaman Red-whiskered Bulbul (325.03 / km²) showed highest in density followed by Andaman Red-breasted Parakeet (309.13 / km²), House Sparrow (297.88 / km²), Andaman Koel (243.11 / km²) and Common Myna (222.88 / km²). The local ecological factors may contribute to the avian species abundance and diversity in this region particularly the different agro-ecosystem and abundance of foraging habitat. The result shows that area support unique avian assemblages, comprising of many rare and endemic species in this archipelago.

Keywords: Avifauna; Species diversity; Species abundance; Agroecosystem, South Andaman

INTRODUCTION

Andaman and Nicobar Islands constitute a globally important biodiversity hotspot. Due to isolation from the mainland, the endemism is very high in all taxa including avifauna (Rao *et al.*, 1980; Das, 1999a, 1999b and Andrews, 2001). This archipelago is one of the Endemic Bird Areas and nineteen sites are identified as Important Bird Areas and twenty eight species are considered as endemic to Andaman and Nicobar Islands (Stattersfield *et al.*, 1998). A total of two hundred and eighty four taxa of birds were reported from Andaman and Nicobar Islands, belonging 56 Families under 17 Orders (Sivaperuman *et al.*, 2010).

Avifaunal explorations in Andaman and Nicobar Islands initiated by many British researchers during the middle of 19th century (Blyth, 1845, 1846, 1863 and 1866) followed by Beavan (1867), Hume (1873, 1874a, 1874b, 1876), Butler (1899a, 1899b, 1899c, 1900). Later,

several researchers conducted surveys on the avifauna of Andaman and Nicobar Islands (Abduali, 1964, 1965, 1967, 1971, 1976, 1979, and 1981; Das, 1971; Mukherjee and Dasgupta, 1975; Dasgupta, 1976; Saha and Dasgupta, 1980; Mukherjee, 1981; Tikader, 1984; Chandra and Rajan, 1996; Davidar *et al.*, 1996, 2001, 2002, and 2010; Pandey *et al.*, 2007; Sivaperuman *et al.*, 2010; Sivaperuman, 2011a,b,c; 2012; Sivaperuman and Venkataraman, 2012). Though, various studies carried out on the general aspects of avifauna of this archipelago, no studies are available from the agro-ecosystem. Hence, the present study has been carried out to document the avifauna of different agro-ecosystem in ICAR-Central Island Agricultural Research Institute campus, South Andaman.

METHODS

The survey was carried during November 2014 to October 2015 and census was conducted using Point

count method (Burnham *et al.*, 1980) during morning (0500 hrs to 1000 hrs) and evening (1600 hrs to 1800 hrs). Night surveys also carried out to find out the nocturnal bird species especially owls. Call count surveys were adapted to identify the nocturnal bird species (Gibbons and Gregory, 2006). Birds species were identified using Nikon Spotting Scope (15-45x X 60mm) based on physical features using standard field guides (Ali and Ripley, 1983; Grimmett *et al.*, 2011).

Species richness and abundance: Species richness and abundance of birds were calculated from the census data and field observations. Species richness indices like Margalef Index (R1) and Menhinick Index (R2) were calculated using the formula (Ludwig and Reynolds, 1988).

Species diversity indices: Diversity measures the variation in richness and abundance. Diversity Index combines the information on multiple species into a single number. These indices provide easily understandable measures of diversity. Shannon-Weiner (H'), Simpson's (λ), and Hill's diversity number N1 and N2 were calculated using the computer program SPDIVERS.BAS (Ludwig and Reynolds, 1988).

Density: The density was estimated from the daily census of birds using Distance 6.0 statistical package (Thomas, 2009).

Study area

The study was conducted in the ICAR-Central Island Agricultural Research Institute campus. It is situated at Garacharma, Port Blair with extent of 62 ha (11° 36' 50.64" N Latitudes; 092° 42' 59.40" E Longitudes). This campus has human settlements *i.e.* administrative campus, residential quarters, Semi-Evergreen forests, Wetlands, Grasslands, Coconut, Arecanut, Oil palm, Banana and Fruit orchard plantations.

RESULTS AND DISCUSSION

Occurrence of species

During the period of study, a total of 108 species of birds belong to 15 orders and 38 families were recorded. Of the recorded species 69 were resident, 16 resident with local movements, 18 winter migrant, 1 resident with winter influx, 1 passage migrant, 3 summer migrant, and 1 vagrant (Table 1; Fig. 1). The avifaunal records of ICAR-CIARI campus includes eighteen endemic, 8 near threatened and 1 introduced species. Highest number of species recorded from the Order Passeriformes, followed by Coraciiformes, Ciconiiformes and Gruiformes.

Table 1. List of birds observed during the study period

Sl. No.	Common Name	Scientific Name	Migratory Status	Conservation status	Abundance Status	Food	Straum	Behaviour
Ciconiiformes								
Ardeidae								
1.	Little Egret	<i>Egretta garzetta</i> (Linnaeus, 1766)	R/LM	LC	F	C	W	G
2.	Large Egret	<i>Casmerodius albus</i> (Linnaeus, 1758)	R/LM	LC	R	C	W	G
3.	Median Egret	<i>Mesophoyx intermedia</i> (Wagler, 1829)	R/LM	LC	F	C	W	G
4.	Eastern Cattle Egret	<i>Bubulcus coromandus</i> (Boddaert, 1783)	R/LM	LC	F	C	W	G
5.	Indian Pond-Heron	<i>Ardeola grayii</i> (Sykes, 1832)	R/LM	LC	R	C	W	G
6.	Chinese Pond-Heron	<i>Ardeola bacchus</i> (Bonaparte, 1855)	R/LM	LC	F	C	W	G
7.	Andaman Little green Heron	<i>Butorides striatus spodiogaster</i> Sharpe, 1894	R	NR	F	C	W	G
8.	Yellow Bittern	<i>Ixobrychus sinensis</i> (Gmelin, 1789)	R/LM	LC	R	C	W	G
9.	Chestnut Bittern	<i>Ixobrychus cinnamomeus</i> (Gmelin, 1789)	R/LM	LC	R	C	W	G
Anseriformes								
Anatidae								

10.	Lesser Whistling-Duck	<i>Dendrocygna javanica</i> (Horsfield,1821)	R/LM	LC	F	C	W	G
11.	Andaman Teal	<i>Anas gibberifrons</i> (Muller,1842)	R	LC	R	C	W	G
Falconiformes								
Accipitridae								
12.	Andaman Black-crested Baza	<i>Aviceda leuphotes andamanica</i> Abdulali, 1817	R	LC	R	C	M	S
13.	Brahminy kite	<i>Haliastur indus</i> (Boddaert,1783)	R	LC	F	C	A	A
14.	White-bellied Sea-Eagle	<i>Haliaeetus leucogaster</i> (Gmelin,1788)	R	LC	C	C	A	A
15.	Andaman Crested Serpent-Eagle	<i>Spilornis cheela davisoni</i> Hume, 1873	R	LC	R	C	M	S
16.	Andaman Serpent-Eagle	<i>Spilornis elgini</i> (Blyth, 1863)	R	NT	F	C	M	S
17.	Besra Sparrowhawk	<i>Accipiter virgatus</i> (Temminck, 1822)	R/LM	LC	R	C	L	S
18.	Changeable Hawk-Eagle	<i>Spizaetus cirrhatus andamanensis</i> Tytler, 1865	R	LC	F	C	L	S
Galliformes								
Phasianidae								
19.	Grey Francolin	<i>Francolinus pondicerianus</i> (Gmelin,1789)	R	LC	C	G	G	G
Gruiformes								
Rallidae								
20.	Andaman Crane	<i>Rallina canningi</i> (Blyth, 1863)	R	NT	F	I	G	G
21.	Andaman Blue-breasted Rail	<i>Gallirallus striatus obscurior</i> (Hume, 1874)	R	LC	F	I	W	G
22.	Andaman White-breasted Waterhen	<i>Amauornis phoenicurus insularis</i> Sharpe, 1894	R	LC	C	I	W	G
23.	Baillon's Crane	<i>Porzana pusilla</i> (Pallas, 1776)	WM	LC	R	I	W	G
24.	Ruddy-breasted Crane	<i>Porzana fusca</i> (Linnaeus, 1766)	WM	LC	R	I	W	G
25.	Watercock	<i>Gallix rex cinerea</i> (Gmelin,1789)	R/LM	LC	F	I	W	G
26.	Purple Moorhen	<i>Porphyrio porphyrio</i> (Linnaeus,1758)	R/LM	LC	F	I	W	G
27.	Common Moorhen	<i>Gallinula chloropus</i> (Linnaeus,1758)	R/LM	LC	F	I	W	G
Charadriiformes								
Charadriidae								
28.	Pacific Golden-Plover	<i>Pluvialis fulva</i> (Gmelin,1789)	WM	LC	F	I	W	G
Scolopacidae								
29.	Pintail Snipe	<i>Gallinago stenura</i> (Bonaparte,1830)	WM	LC	F	I	W	G
30.	Common Snipe	<i>Gallinago gallinago</i> (Linnaeus, 1758)	WM	LC	R	I	W	G
31.	Whimbrel	<i>Numenius phaeopus</i> (Linnaeus,1758)	WM	LC	F	I	W	G
32.	Wood Sandpiper	<i>Tringa glareola</i> Linnaeus,1758	WM	LC	F	I	W	G
33.	Common Sandpiper	<i>Actitis hypoleucos</i> Linnaeus,1758	WM	LC	F	I	W	G
Glareolidae								
34.	Oriental Pratincole	<i>Glareola maldivarum</i> J.R. Forster, 1795	SM	LC	F	I	G	G
Columbiformes								
Columbidae								
35.	Blue Rock Pigeon	<i>Columba livia</i> Gmelin,1789	R	LC	C	G	O	F
36.	Red Collared-Dove	<i>Streptopelia tranquebarica</i> (Hermann,1804)	R	LC	C	G	L	F
37.	Andaman Cuckoo-Dove	<i>Macropygia rufipennis</i> Blyth,1846	R	NT	F	F	M	F

38.	Andaman Emerald Dove	<i>Chalcophaps indica maxima</i> Hartert, 1931	R	LC	C	G	L	F
39.	Andaman Green-Pigeon	<i>Treron chloropterus</i> (Blyth, 1840)	R	NR	F	F	M	F
40.	Andaman Green-imperial Pigeon	<i>Ducula aenea andamanica</i> (Abdualali, 19 64)	R	LC	F	F	M	F
Psittaciformes								
Psittacidae								
41.	Indian Hanging-Parrot	<i>Loriculus vernalis</i> (Sparman,1787)	R	LC	F	F	L	F
42.	Alexandrine Parakeet	<i>Psittacula eupatria magnirostris</i> (Ball, 1872)	R	LC	F	F	M	F
43.	Andaman Red-breasted Parakeet	<i>Psittacula alexandri abbotti</i> (Oberholser, 1919)	R	LC	C	F	L	F
44.	Andaman Red-cheeked Parakeet	<i>Psittacula longicauda tytleri</i> (Hume, 1874)	R	NT	C	F	L	F
Cuculiformes								
Cuculidae								
45.	Indian Cuckoo	<i>Cuculus micropterus</i> Gould, 1838	R	LC	F	I	M	F
46.	Violet Cuckoo	<i>Chrysococcyx xanthorhynchus</i> (Horsfield,1821)	V	LC	R	I	L	F
47.	Andaman Koel	<i>Eudynamis scolopacea dolosa</i> Ripley, 1946	R	LC	F	F	L	F
48.	Andaman Coucal	<i>Centropus andamanensis</i> (Beavan,1867)	R	LC	C	C	L	S
Strigiformes								
Tytonidae								
49.	Andaman Barn Owl	<i>Tyto deroepstorffi</i> (Hume, 1875)	R	LC	R	C	O	S
Strigidae								
50.	Andaman Scops-Owl	<i>Otus balli</i> (Hume, 1873)	R	NT	R	I	H	F
51.	Oriental Scops-Owl	<i>Otus sunia</i> (Hodgson, 1836)	R	LC	F	I	L	F
52.	Andaman Hume's Hawk Owl	<i>Ninox obscura</i> Hume, 1872	R	LC	F	I	L	F
53.	Andaman Hawk-Owl	<i>Ninox affinis</i> Beavan, 1867	R	NT	F	I	M	F
Caprimulgiformes								
Caprimulgidae								
54.	Andaman Nightjar	<i>Caprimulgus andamanicus</i> Hume, 1873	R	UR	R	I	L	F
Apodiformes								
Apodidae								
55.	White bellied Swiftlet	<i>Collocalia esculenta</i> (Linnaeus,1758)	R	LC	C	I	A	A
56.	Brown-backed Needletail-Swift	<i>Hirundapus giganteus</i> (Temminck,1846)	R	LC	F	I	A	A
Coraciformes								
Alcedinidae								
57.	Small Blue Kingfisher	<i>Alcedo atthis</i> (Linnaeus, 1758)	WM	LC	F	C	W	F
58.	Andaman Blue-eared Kingfisher	<i>Alcedo meninting rufigaster</i> Walden, 1873	R	LC	F	C	L	F
59.	Andaman Oriental Dwarf Kingfisher	<i>Ceyx tridactylus macrocarus</i> Oberholser, 1917	R/LM	LC	F	C	L	F
60.	Andaman Stork-billed Kingfisher	<i>Halcyon capensis osmastoni</i> (Baker, 1934)	R	LC	C	C	W	F
61.	Andaman White-breasted Kingfisher	<i>Halcyon smyrnensis saturatior</i> Hume, 1874	R	LC	C	C	W	F
62.	Andaman Collared Kingfisher	<i>Halcyon chloris davisoni</i> Sharpe, 1892	R	LC	C	C	W	F

Meropidae								
63.	Blue-tailed Bee-eater	<i>Merops philippinus</i> Linnaeus, 1766	SM	LC	F	I	W	S
64.	Andaman Chestnut-headed Bee Eater	<i>Merops leschenaulti andamanensis</i> Marien, 1950	R	LC	F	I	L	F
Coraciidae								
65.	Andaman Broad-billed Roller	<i>Eurystomus orientalis gigas</i> Stesemann, 1913	R	LC	F	I	M	F
Piciformes								
Picidae								
66.	Andaman Fulvous-breasted Pied Woodpecker	<i>Dendrocopos macei andamanensis</i> (Blyth, 1859)	R	LC	F	I	B	F
67.	Andaman Woodpecker	<i>Dryocopus hodgei</i> (Blyth, 1860)	R	NT	F	I	B	F
Passeriformes								
Hirundinidae								
68.	Common Swallow	<i>Hirundo rustica</i> Linnaeus, 1758	WM	LC	F	I	A	A
69.	Red-rumped Swallow	<i>Hirundo daurica</i> Linnaeus, 1771	SM	LC	R	I	A	A
Motacillidae								
70.	Forest Wagtail	<i>Dendronanthus indicus</i> (Gmelin, 1789)	WM	LC	F	I	G	G
71.	Yellow Wagtail	<i>Motacilla flava</i> Linnaeus, 1758	WM	LC	F	I	G	G
72.	Grey Wagtail	<i>Motacilla cinerea</i> Tunstall, 1771	WM	LC	R	I	G	G
73.	Richard's Pipit	<i>Anthus richardi</i> Vieillot, 1818	WM	LC	R	I	G	G
74.	Red-throated Pipit	<i>Anthus cervinus</i> (Pallas, 1811)	PM	LC	F	I	G	G
Campephagidae								
75.	Andaman Large Cuckoo-Shrike	<i>Coracina javensis andamanensis</i> Whistler, 1940	R	LC	F	I	M	F
76.	Andaman Cuckoo-Shrike	<i>Coracina dobsoni</i> (Ball, 1872)	R	LC	R	I	M	F
77.	Small Minivet	<i>Pericrocotus cinnamomeus</i> (Linnaeus, 1766)	R	LC	F	I	M	F
78.	Andaman Scarlet Minivet	<i>Pericrocotus flammeus andamanensis</i> Beavan, 1867	R	LC	F	I	L	F
Pycnonotidae								
79.	Andaman Bulbul	<i>Pycnonotus fuscoflavescens</i> (Hume, 1875)	R	LC	F	F	L	F
80.	Andaman Red-whiskered Bulbul	<i>Pycnonotus jocosus whistleri</i> Deignan, 1948	R	LC	C	F	L	F
Irenidae								
81.	Asian Fairy-Bluebird	<i>Irena puella andamanica</i> Abdulali, 1964	R	LC	C	F	M	F
Lanidae								
82.	Brown Shrike	<i>Lanius cristatus</i> (Linnaeus, 1758)	WM	LC	F	I	L	S
Turdinae								
83.	Andaman Orange-headed Thrush	<i>Zoothera citrine andamanensis</i> (Walden, 1874)	R	LC	F	I	G	G
84.	Andaman Oriental Magpie-Robin	<i>Copsychus saularis andamanensis</i> Hume, 1874	R	LC	C	I	G	G
85.	Andaman Shama	<i>Copsychus albiventris</i> (Blyth, 1858)	R	LC	C	I	L	S
Sylviinae								
86.	Andaman Palefooted Bush-Warbler	<i>Cettia pallidipes osmastoni</i> (Hartert, 1908)	R	LC	R	I	L	F
87.	Indian Great Reed-Warbler	<i>Acrocephalus stentoreus</i> (Hemprich & Ehrenberg, 1833)	WM	LC	F	I	L	F

88.	Dusky Warbler	<i>Phylloscopus fuscatus</i> (Blyth, 1842)	WM	LC	F	I	L	F
Muscicapinae								
89.	Asian Brown Flycatcher	<i>Muscicapa dauurica</i> Pallas, 1811	R/WM	LC	F	I	L	F
Monarchinae								
90.	Andaman Black-naped Monarch-Flycatcher	<i>Hypothymis azurea tytleri</i> (Beavan, 1867)	R	LC	C	I	L	F
Dicaeidae								
91.	Andaman Flowerpecker	<i>Dicaeum virescens</i> Hume, 1873	R	LC	F	F	L	F
Nectariniidae								
92.	Andaman Olive backed Sunbird	<i>Nectarinia jugularis andamanica</i> (Hume, 1873)	R	LC	C	N	L	F
Zosteropidae								
93.	Oriental White-eye	<i>Zosterops palpebrosus</i> (Temminck, 1824)	R	LC	F	F	L	F
Estrildidae								
94.	Andaman White rumped Munia	<i>Lonchura striata fumigata</i> (Waldeen, 1873)	R	LC	C	G	L	F
95.	Spotted Munia	<i>Lonchra punctulata</i> (Linnaeus, 1758)	R	LC	C	G	L	F
Passerinae								
96.	House Sparrow	<i>Passer domesticus</i> (Linnaeus, 1758)	R	LC	C	G	G	G
Sturnidae								
97.	Andaman Glossy Starling	<i>Aplonis panayensis tytleri</i> (Hume, 1873)	R/LM	LC	F	F	M	F
98.	Andaman White-headed Starling	<i>Sturnus erythropygius</i> (Blyth, 1846)	R	LC	F	F	M	F
99.	Common Myna	<i>Acridotheres tristis</i> (Linnaeus, 1766)	R	LC	C	C	O	S
100.	Andaman Hill Myna	<i>Gracula religiosa andamanensis</i> (Beavan, 1867)	R	LC	F	F	M	F
Oriolidae								
101.	Indian Golden Oriole	<i>Oriolus kundoo</i> Sykes, 1832	R/LM	LC	R	F	M	F
102.	Andaman Black-naped Oriole	<i>Oriolus chinensis andamanis</i> (Tytler, 1867)	R	LC	F	F	L	F
Dicruridae								
103.	Black drongo	<i>Dicrurus macrocercus</i> Vieillot, 1817	R	LC	F	I	L	F
104.	Andaman Drongo	<i>Dicrurus andamanensis</i> Beavan, 1867	R	LC	R	I	L	F
105.	Andaman Racket tailed Drongo	<i>Dicrurus paradiseus otiosus</i> (Richmond, 1903)	R	LC	C	I	L	F
Corvidae								
106.	Andaman Treepie	<i>Dendrocitta bayleyi</i> Tytler, 1863	R	NT	R	I	M	F
107.	House Crow	<i>Corvus splendens</i> Vieillot, 1817	R	LC	C	C	L	S
108.	Eastern Jungle crow	<i>Corvus levaillantii</i> Lesson, 1831	R	LC	C	C	L	S

Migratory Status: R - Resident; RM - Resident with local movements; LM - Local migrants; WM - Winter migrants;

R/WM - Resident with winter influx as well as altitudinal movements;

Abundance Status: C - Common, F - Fairly common; R - Rare; U - Uncommon; **Food:** C - Carnivore; F - Frugivore; G - Granivore; I - Insectivore; N - Nectarivore;

Foraging Stratum: A - Air; B - Bark; H - High Vegetation; M - Middle Vegetation; L - Low Vegetation; G - Ground; W - Water; O - Other;

Behaviour: F - Foliage Glean; G - Ground Glean; S - Sally; A - Aerial Feeder

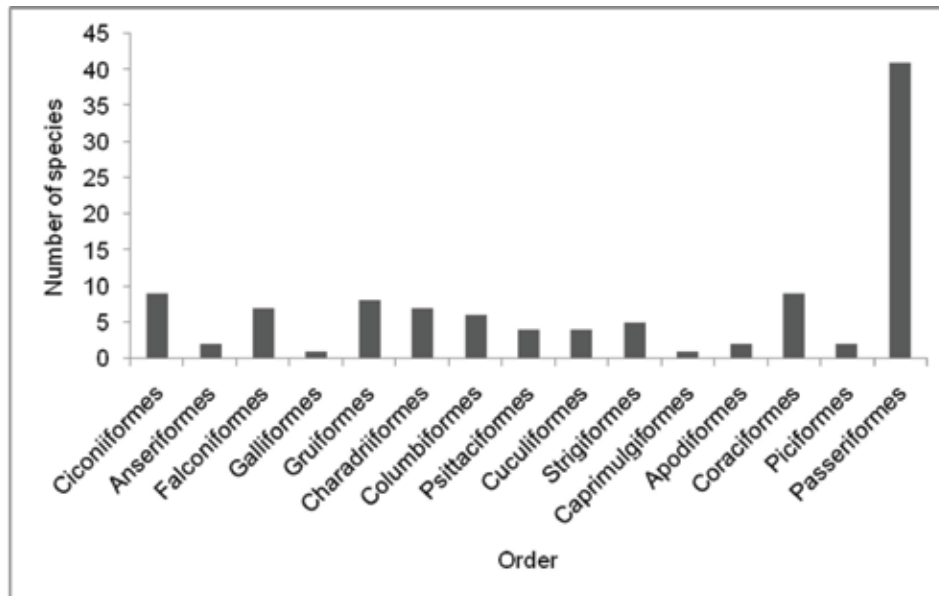


Fig. 1. Order wise distribution of birds in the CIARI campus

Of the recorded species 52 (40 per cent) are endemic species or sub-species level. Out of the 108 species of birds found in this campus, Andaman Serpent-Eagle, Andaman Crane, Andaman Cuckoo-Dove, Andaman Red-Cheeked Parakeet, Andaman Scops-Owl, Andaman Hawk-Owl, Andaman Woodpecker and Andaman Treepie were listed in the threatened birds of the world (BirdLife International, 2001).

Overall diversity indices

The overall diversity Index (H') was 3.19, (λ) 0.02, Species Richness Index (R1) was 26.18 and (R2) was

1.57. Similarly, high values were obtained for Hill's (N1) was 65.38 and (N2) was 44.40. Evenness index (E1) was 0.80 and (E2) 0.45.

Density of selected bird species

The Andaman Red-whiskered Bulbul (325.03 / km²) was highest in density followed by Andaman Red-breasted Parakeet (309.13 / km²), House Sparrow (297.88 / km²), Andaman Koel (243.11 / km²) and Common Myna (222.88 / km²) (Table 2)

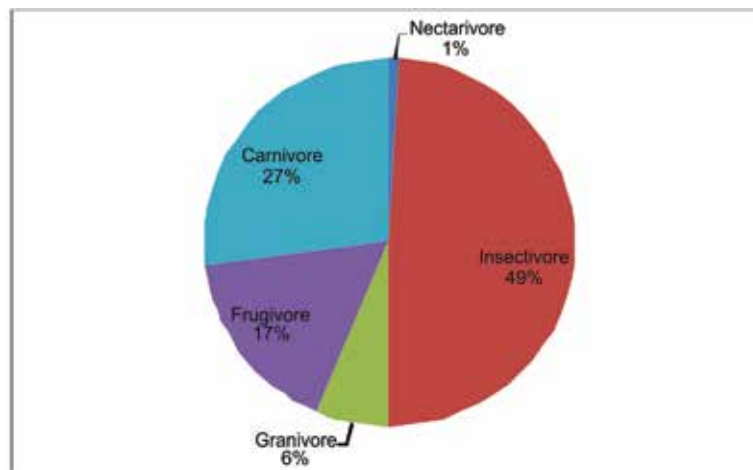
Table 2. Density of selected bird species

Name of the species	Density / km ²
Andaman Red-whiskered Bulbul	325.03
Andaman Red-breasted Parakeet	309.13
House Sparrow	297.88
Andaman Koel	243.11
Common Myna	222.88
Small Minivet	220.00
Red Collared-Dove	211.81
Andaman Large Cuckoo-Shrike	172.88
Andaman Greater Racket-tailed Drongo	166.23
Andaman White-headed Starling	159.80
Andaman Coucal	154.19
Andaman Oriental Magpie-Robin	152.48
Andaman Hill Myna	141.73
Andaman Olive backed Sunbird	124.79
Andaman Hume's Hawk-Owl	123.00
Oriental Scops-Owl	115.00
Blue-tailed Bee-eater	112.68
Andaman Black-naped Monarch-Flycatcher	108.50
Andaman White-breasted Waterhen	107.69
Indian Hanging-Parrot	105.90

Foraging guild structure of Birds of Andaman Islands

The foraging guilds of bird species were grouped based on the feeding behaviours of bird

species. Insectivore were highest in percentage (49 per cent) followed by Carnivore (27 per cent), Frugivore (17 per cent), Granivore (6 per cent) and Nectarivore (1 per cent) (Fig. 2).

**Fig. 2. Foraging guild structure of birds**

Distribution of birds in different agro-ecosystem

Highest number of species richness and abundance were observed from the Oil Palm Plantation (24.03 per cent) followed by Fruit

Orchards (18.56 per cent) and Banana Plantation (16.10 per cent) (Table 3). The frugivorous and insectivorous species were common in banana and oil palm plantations. The fruit orchards support highest abundance of frugivores species during ripening season.

Table 3. Species richness and abundance of birds in different agroecosystem

Sl. No.	Habitat description	No. of Points	Species Richness	Species Abundance	Dominance Index
1.	Oil Palm plantation	60	46	676	24.03
2.	Fruit orchards	60	42	522	18.56
3.	Banana plantation	60	28	453	16.10
4.	Water bodies	60	49	431	15.32
5.	Areca nut plantation	60	39	276	9.81
6.	Coconut plantation	60	47	232	8.25
7.	Evergreen Forests	60	60	223	7.93

Though, this study carried out in a smaller pristine area in Andaman Islands, the area support high species richness and abundance. The following near threatened species were observed during the study period namely, Andaman Serpent-Eagle, Andaman Crake, Andaman Cuckoo-Dove, Andaman Red-cheeked Parakeet, Andaman Scops-Owl, Andaman Hawk-Owl, Andaman Woodpecker and Andaman Treepie. Out of twenty bird species endemic to Andaman Islands, eighteen were recorded *viz.* Andaman Teal *Anas gibberifrons*, Andaman Crake *Rallina canningi*, Andaman Cuckoo-Dove *Macropygia rufipennis*, Andaman Coucal *Centropus andamanensis*, Andaman Barn Owl *Tyto deroepstorffi*, Andaman Scops-Owl *Otus balli*, Andaman Hume's Hawk Owl *Ninox obscura*, Andaman Green-Pigeon *Treron chloropterus*, Andaman Hawk-Owl *Ninox affinis*, Andaman Nightjar *Caprimulgus andamanicus*, Andaman Cuckoo-Shrike *Coracina dobsoni*, Andaman Woodpecker *Dryocopus hodgei*, Andaman Shama *Copsychus albiventris*, Andaman Flowerpecker *Dicaeum virescens*, Andaman White-headed Starling *Sturnus erythropygius*, Andaman Treepie *Dendrocitta bayleyi*, Andaman Bulbul *Pycnonotus fuscoflavescens*, and Andaman Drongo *Dicrurus andamanensis*. Thirty four endemic sub species also observed (Table 1). Many studies suggest that different plantations support variety of species richness (Laurance, 1991a,b; Stouffer and Bierregaard, 1995; Warburton, 1997). Various

previous studies have documented seasonal shifts in bird communities within a region, generally driven by food abundance (Levey and Stiles 1994; Loiselle and Blake 1991; Greenberg *et al.*, 1997). During our study, we also observed evidence for a shift in bird community structure moving from islands to islands according to the abundance of availability of food resources.

Birds are an important component of the agricultural ecosystem, having natural value, and right of existence. Birds are also considered ecological indicators as of various features, such as their rapid response to habitat changes and disturbances, their conspicuity and relative ease of identification (Dhindsa and Saini, 1994; Goijman, 2005; Narayana *et al.*, 2013). The role of birds in agriculture is well recognized (Ali, 1949 and 1971). The diversity of bird species, with their different ecological requirements, are useful to assess the wide range of relationships between them and the habitat, the availability of feeding and nesting resources, and may also represent other ecological groups. In addition, birds also provide a broad spectrum of ecosystem services to human welfare and the agricultural enterprise. Agricultural ecosystem provides a concentrated and highly predictable source of food to many birds (O'Connor and Shrubbs, 1986; Dhindsa and Saini, 1994; Asokan *et al.*, 2009). Birds feed on harmful insects and other pests from the agro-ecosystem are beneficial to agriculturists (Sivakumaran and Thiyagesan, 2003; Asokan *et al.*, 2009; Asokan *et al.*, 2010; Narayana

et al., 2013). Our results indicate that the conservation of biodiversity and ecological processes in agro-ecosystem are possible with appropriate management strategies. A remarkably high number of bird species used the fruiting trees in different agro-ecosystem. Relatively small changes in land use, such as increasing the density of fruiting trees, maintaining live fences, and protecting rain forest remnants, could enhance the capacity of agricultural lands to support a diverse avifauna and could contribute substantially to the dispersal of rain forest plants. This study shows that the agro ecosystem in this study area provides habitat for a wide variety of resident and migratory bird species. Considering current land use trends in this region, we suggest that action must be taken to preserve the land uses with biodiversity conservation value. The present study is emphasis the need to conduct detailed investigation on the status and distribution of avifauna of agro-ecosystem in Andaman and Nicobar Islands and their economic role.

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