

## AVIAN FAUNA ABUNDANCE AND DIVERSITY IN HORAGOLLA NATIONAL PARK OF SRI LANKA

P.D.R.S. PETHIYAGODA and W.A.D.MAHAULPATHA\*

University of Sri Jayewardenepura, Gangodawila, Nugegoda, Sri Lanka.

\*mahaulpatha@yahoo.com

**ABSTRACT** -Avifaunal species richness and the species diversity of the Horagolla National park of Sri Lanka was recorded using line and point transects techniques from September 2012 to August 2013. Three different habitat types inside the Horagolla National Park were identified as, the Terrestrial habitat along the water body, the Forest habitat and the Disturbed habitat. Five hundred meter transects, which provided maximum visibility was marked along in each of these habitats with the help of a global positioning system device (GPS) (Garmin e Trex). The bird species seen and heard were recorded on both sides of the transects from 8.00am to 11.00 am three times each month. Thirty eight species of birds belonging to ten orders and twenty three families were recorded during the study. This includes three winter visitors and one endemic species. These included three winter visitors, Asian Paradise Flycatcher (*Muscicapa dauurica*), Indian Pitta (*Pitta brachyuran*) and Oriental Honey Buzzard (*Pernis ptilorhynchus*). Rose Ring Parakeet (*Psittacula krameri*) and the Common Kingfisher (*Alcedo atthis*) were the most common bird species recorded and Plain Prinia (*Prinia inornata*), Brown Fish Owl (*Bubo zeylonensis*) and Black-Backed Kingfisher (*Ceyx erithacus*) were the least common bird species recorded. Terrestrial habitat along the water body had the highest species diversity.

**KEY WORDS** : Tropical forest, Avian diversity, Sri Lanka

### INTRODUCTION

Species richness and community structure of birds vary from region to region, as well as within a region, as abiotic and biotic factors vary from habitat to habitat (Johnsingh & Joshua 1994). Measurements of species diversity are crucial for assessing the natural richness, biological value and the uniqueness of a particular area and indices of species diversity have been used widely in studies of environmental factors influencing avian community dynamics (Werner 1992). Sri Lanka is home to 482 avian species including 26 endemic species, 220 residents and 203 migrants, these birds are dispersed all over the country including tropical rain forests, wetlands, urban areas, home gardens and small forest patches. (Kotagama & Ratnavira, 2010). It was observed that relatively small areas of appropriate habitat attract high number of bird species. Horagolla National

Park is one such small forest with an area of about 13.6 hectares (0.053 sq mi), surrounded by highly urbanized and populated areas. Present study attempted to document the avian species diversity and the species abundance Horagolla National Park with the aim of highlighting the need for a management plan to conserve and improve the avian community in the park.

### MATERIALS AND METHODS

#### *Study area*

Horagolla National Park is a low-country evergreen forest which was originally declared as a wildlife sanctuary on 5 September 1973 due to its rich biodiversity and on 24 June 2004, it was elevated to national park status. Horagolla is the only urban park in the Western Province of Sri Lanka. (Wikipedia 2016). It is situated

between the GPS locations of 7° 08' 30.79" N and 80° 05' 01.46 E. It has a flat terrain (less than 5% slope) and a humus soil which is sandy-mud mixture capable of retaining moisture. Major tree types are *Dipterocarpus zeylanicus*, *Canarium zeylanicum*, *Dillenia retusa*, *Caryota urens*, *Pericopsis mooniana*, *Mangifera zeylanica*, *Ficus religiosa*, *Alstonia scholaris*, *Acronychia pedunculata*, *Vitex pinnata*, *Mimusops elengi*, *Artocarpus altilis* and *Pterospermum canescens* (Wikipedia, 2016). Stratification of the forest is not evident but canopy layer occurring around 25 – 30 m and sub canopy layer occurring around 15 – 25 m can be recognized. In addition there is an area approximately about 1.5 hectares covered with grass. The forest receives rainfall from North-East monsoons during the months of December to January and South-West monsoons during May to September. The mean annual temperature lies between 27.0 °C to 28.5 °C.

#### Methods

Three different habitat types inside the Horagolla National Park were identified as, the Terrestrial habitat along the water body, the Forest habitat and the Disturbed habitat. Five hundred meter transects, which provided maximum visibility was marked along in each of these habitats with the help of a global positioning system device (GPS) (Garmin e Trex). The bird species seen and heard were recorded on both sides of the transects from 8.00am to 11.00am three times each month from September 2012 to August 2013. Nikon Monarch 12x42 binocular and Nikon 15~60x25 monocular was used to detect the birds. Harrison and Worfolk (1999) and Kotagama & Ratnavira (2010) field guides were used to identify the birds.

#### Data analysis

Species richness (S) was calculated as the number of species in the community (Krebs, 2014). The Shannon –Wiener index (H) of diversity was calculated using the equation  $H = -\sum p_i \ln p_i$ , where, H is index of species diversity and  $p_i$  is the proportion of the total sample belonging to the  $i^{\text{th}}$  species. Evenness values (E)

were calculated from the equation  $E = H/\ln S$ , where H is the Shannon-Wiener index and  $\ln S$  is the natural logarithm of the number of species.

#### RESULTS AND DISCUSSION

Thirty eight species of birds belonging to ten orders and twenty three families were recorded from the Horagolla National Park during the study. These included three winter visitors, Asian Paradise flycatcher (*Muscicapa dauurica*), Indian Pitta (*Pitta brachyuran*) and Oriental honey buzzard (*Pernis ptilorhynchus*). The relative abundance and the rank correlation indicated that Rose ring parakeet (*Psittacula krameri*) is the most common bird species. Plain Prinia (*Prinia inornata*), Brown fish Owl (*Bubo zeylonensis*) and Black-Backed Kingfisher (*Ceyx erithacus*) were the least common bird species recorded. Birds belonging to Capitonidae, Psittacidae, Rallidae, Sturnidae and Timaliidae families were recorded in high numbers. Dominant family was Psittacidae, which comprised 20.71% of the total species. 27 different species were recorded in the Terrestrial habitat along the water body, 21 species were recorded in the Forest habitat and 15 species were recorded in the Disturbed habitat. Rose Ring Parakeet (*Psittacula krameri*) was the most common bird species recorded and Plain Prinia (*Prinia inornata*), Brown Fish Owl (*Bubo zeylonensis*) and Black-Backed Kingfisher (*Ceyx erithacus*) were the least common bird species recorded (Table 01).

Highest Shannon–Wiener index (H) of 2.799 was recorded in the Terrestrial habitat along the water body, while the least Highest Shannon–Wiener index (H) diversity of 0.388 was recorded in the Forest habitat. The disturbed habitat had a Shannon–Wiener index (H) of 2.487. However, the species richness of the Forest habitat was relatively high compared to the Disturbed habitat (Table 02).

White breasted waterhen, Rose Ringed Parakeet, Sri Lanka Hanging Parrot, Common Kingfisher, Brown headed Barbet, Common myna, Hill Myna and Emerald Dove were the most common bird species (Table 03).

**Table 01:** Bird species composition of HNP from September 2012 to August 2013

Order	Family	Common name	Scientific name	NCS	GCS	TH	FH	DH	RA*
Gruiformes	Rallidae	White breasted waterhen	<i>Amaurornis phoenicurus</i>	LC	LC	62	0	0	8.9
Ciconiiformes	Ardeidae	Indian Pond Heron	<i>Ardeola grayii</i>	LC	LC	2	0	0	0.3
		Little Egret	<i>Egretta garzetta</i>	LC	LC	2	0	0	0.3
Falconiformes	Accipitridae	Brahminy Kite	<i>Haliastur Indus</i>	LC	LC	0	1	0	0.1
		Oriental Honey buzzard	<i>Pernis ptilorhyncus</i>	NT	LC	0	5	0	0.7
Psittaciformes	Psittacidae	Rose Ringed Parakeet	<i>Psittacula krameri</i>	LC	LC	76	20	10	15.1
		Sri Lanka Hanging Parrot	<i>Loriculus beryllinus</i>	LC	LC	29	6	4	5.6
Cuculiformes	Cuculidae	Greater Coucal	<i>Centropus sinensis</i>	LC	LC	0	0	2	0.3
		Asian Koel	<i>Eudynamys scolopaces</i>	LC	LC	3	0	0	0.4
Coraciiformes	Alcedinidae	Common Kingfisher	<i>Alcedo atthis</i>	LC	LC	19	0	0	2.7
		White throated Kingfisher	<i>Halcyon smyrnensis</i>	LC	LC	7	0	0	1.0
		Black-Backed Kingfisher	<i>Ceyx erithaca</i>	NT	LC	1	0	0	0.1
		Stork-billed Kingfisher	<i>Pelargopsis capensis</i>	LC	LC	3	0	0	0.4
Piciformes	Ramphastidae	Yellow fronted Barbet	<i>Megalaima flavifrons</i>	LC	LC	2	2	0	0.6
		Brown headed Barbet	<i>Megalaima zeylanica</i>	LC	LC	29	12	14	7.9
	Picidae	Black rumped benghalense	<i>Dinopium</i>	LC	LC	8	10	4	3.1
		Greater Flameback	<i>Chrysocolaptes lucidus</i>	LC	--	0	2	0	0.3
Passeriformes	Pycnonotidae	Red Vented Bulbul	<i>Pycnonotus cafer</i>	LC	LC	4	0	6	1.4
	Mucicapidae	Oriental Magpie Robin	<i>Copsychus saularis</i>	LC	LC	2	0	4	0.9

Passeriformes	Timaliidae	Yellow billed Babbler	<i>Turdoides affinis</i>	LC	LC	23	4	22	7.0
	Sylviidae	Common Tailorbird	<i>Orthotomus sutorius</i>	LC	LC	0	10	0	1.4
	Cisticolidae	Plain Prinia	<i>Prinia inornata</i>	LC	LC	0	1	0	0.1
		Ashy Prinia	<i>Prinia socialis</i>	LC	LC	0	11	0	1.6
		Grey breasted Prinia	<i>Prinia holdgsonii leggei</i>	LC	LC	0	4	0	0.6
	Irenidae	Golden fronted Leaf bird	<i>Chloropisis aurifrons</i>	LC	LC	0	4	2	0.9
	Sturnidae	Common myna	<i>Acridotheres tristis melanosturnus</i>	LC	LC	15	29	11	7.9
		Hill Mynah	<i>Gracula religiosa</i>	LC	LC	54	14	0	9.7
	Oriolidae	Black hooded Oriole	<i>Oriolus xanthornus</i>	LC	LC	17	0	0	2.4
	Corvidae	Jungale Crow	<i>Corvus leuallatii</i>	LC	LC	17	0	0	2.4
	Dicruridae	White bellied Drongo	<i>Dicrurus caerulescens</i>	LC	LC	13	0	4	2.4
	Monarchiidae	Ceylon Paradise Flycatcher	<i>Terpsiphone paradise ceylonensis</i>	LC	LC	2	0	0	0.3
		Asian Brown Flycatcher	<i>Muscicapa dauurica</i>	LC	LC	2	0	0	0.3
	Dicaeidae	Pale billed Flowerpecker	<i>Dicaeum erythrorhynchos</i>	LC	LC	0	4	4	1.1
	Pittidae	Indian Pitta	<i>Pitta brachyuran</i>	--	--	2	0	0	0.3
Columbiformes	Columbidae	Spotted Dove	<i>Stomatopelia chinensis</i>	LC	LC	6	8	0	2.0
		Green Imperial Pigeon	<i>Ducula aenea</i>	LC	LC	6	7	3	2.3
		Emerald Dove	<i>Chalcophaps indica robinsoni</i>	LC	LC	11	23	4	5.4
Strigiformes	Tytonidae	Brown fish Owl	<i>Ketupa zeylonensis</i>	LC	LC	0	1	1	0.3

NCS- National Conservation Status ,GCS- Global Conservation Status , LC-Least concerned, NT-Near threatened, RA\*- Relative Abundance, TH- Terrestrial habitat along the water body, FH- Forest Habitat, DH- Disturbed habitat

**Table 02:** Species richness, diversity and the evenness of the birds in the three habitats in HNP during the study period

Index	Terrestrial habitat along the water body	Forest habitat	Disturbed habitat
No. of individuals	421	184	102
Species richness	29	23	15
Shannon–Wiener index (H)	2.799	0.388	2.487
Evenness	0.831	0.1236	0.897

**Table 03:** Bird species commonness at the HNP from September 2012 to August 2013

Common name	Percentage of the bird occurrence (%)	Commonness of the bird
White Breasted Water Hen	91.7	VC
Indian Pond Heron	16.7	R
Little Egret	25	UC
Brahminy Kite	8.3	R
Oriental Honey Buzzard	8.3	R
Rose Ringed Parakeet	100	VC
Sri Lanka Hanging Parrot	83.3	VC
Greater Coucal	16.7	R
Asian Koel	16.7	R
Common Kingfisher	100	VC
White Throated Kingfisher	41.7	UC
Black-Backed Kingfisher	25	UC
Stork-billed Kingfisher	25	UC
Yellow fronted Barbet	16.7	UC
Brown headed Barbet	91.7	VC
Black rumped Flameback	58.3	C
Greater Flameback	8.3	R
Red Vented Bulbul	16.7	R
Oriental Magpie Robin	33.3	UC
Yellow billed Babbler	41.7	UC
Common Tailorbird	33.3	UC

Plain Prinia	25	UC
Ashy Prinia	25	UC
Grey breasted Prinia	8.3	R
Golden fronted Leaf bird	8.3	R
Common myna	83.3	VC
Hill Mynah	100	VC
Black hooded Oriole	50	C
Jungale Crow	58.3	C
White bellied Drongo	33.3	UC
Ceylon Paradise Flycatcher	16.3	R
Asian Brown Flycatcher	8.3	R
Pale billed Flower pecker	8.3	R
Indian Pitta	8.3	R
Spotted Dove	16.7	R
Green Imperial Pigeon	41.7	UC
Emerald Dove	75	VC
Brown fish Owl	8.3	R

VC-Very Common: Seen on 100%-75% of visits, C- Common: Seen on 74%-50% of visit  
UC-Uncommon: Seen on 49%-25% of visit, R-Rare: Seen on < 25% of visits

#### DISCUSSION

Species richness is linked pervasively to ecosystem productivity (Wilson 1992, Rozenzweig and Abramsky 1993, Wright *et al.*, 1993, Waide *et al.*, 1997). Holmes *et al.* (1991) identified changing food abundance as one of the major reasons that affects the bird species richness in a particular area. Rose Ringed Parakeet, Brown headed Barbet, Yellow billed Babbler accounted for the major portion the total population. It is evident that the Horagolla National Park may have provided them with suitable food and nesting sites which in turn may have resulted in their presence in higher numbers. It is also possible that since the park is surrounded by urban areas the birds may use the park as a roosting site and may fly out to feed on the adjacent home gardens.

On the other hand certain species including the Ceylon Paradise Flycatcher, Asian Brown Flycatcher, Pale billed Flower pecker, *Indian* Pitta, Spotted Dove and even the usually very common Red Vented Bulbul was rare inside the

park. This indicates that the park does not provide for their needs such as food and roosting sites.

Habitat choice of birds are known to be highly specific and driven by plant communities and variations in bird communities for different regions suggests different habitat types which may reflect different levels of habitat degradation (Schwartz and Schwartz, 1951). Present study revealed that the Terrestrial habitat along the water body is the most preferred habitat of the birds inhabiting the park. Horagolla National Park bird composition includes a sizeable population of birds directly dependent on water for food such as White Breasted Water Hen, Indian Pond Heron, Stork-billed Kingfisher, Black-Backed Kingfisher, White Throated Kingfisher and the Common Kingfisher. Their presence in large numbers along the banks and in the water as well as all the other species utilizing the Terrestrial habitat along the water body for food, nesting, resting and roosting may have contributed for the

Terrestrial habitat along the water body been the preferred habitat for the avifauna of the Horagolla National Park. Diversity indexes also indicated that the disturbed habitat was preferred over the Forest Habitat by the birds inhabiting the park. The study provides information to the visitors as well as researches where to look for specific species and where they are likely to be found.

Low species richness observed at Forest habitat indicated that it was not the preferred habitat of many bird species. However, this habitat was vital for forest species such as Brown fish Owl, Emerald Dove, Green Imperial Pigeon, Pale billed Flower Pecker and Black Rumped Flameback.

The conservation implication of present findings is that the availability of different habitat types enhances the bird species richness within the Horagolla National Park. The present study also demonstrated that the Horagolla National Park has high bird species richness. Hence the management should carefully evaluate the possible disturbances to avifauna from the park visitors specifically during the breeding season and if necessary restrict admission to the same during the breeding season to minimize and mitigate their impact to improve the quality of this important National Park.

ACKNOWLEDGEMENT

The Head/department of Zoology, University of Sri Jayewardenepura, Gangodawila provided the support to carry out this research for which we are grateful. We are also thankful to Department of Wild Life Conservation of Sri Lanka for granting us permission to carry out this study at this National Park.

REFERENCES

Harrison, J. and T. Worfolk, (1999). A field guide to the birds of Sri Lanka, Oxford University press.  
 Holmes, R.T., T.W.Sherry, F.W.Sturges. (1991). Numerical and Demographic responses of temperate forest birds to annual fluctuations in their food resources. Proceedings from the X X th Interna-

tional Ornithological Congress: 1559-1567.  
 Johnsing, A.J.T. & Joshua, J.(1994), Avifauna in three vegetation types on Mundanthurai plateau, South India, *Journal of Tropical Ecology* 10: 323-335  
 Krebs, C.J., (2014), *Ecology Methodology* 3rd ed. Addison – Wesley Educational Publication. Inc  
 Kotagama, S. and G. Ratnavira, (2010). An illustrated Guide to the Birds of Sri Lanka. Field Ornithology Group of Sri Lanka, Colombo.  
 Rozenzweig, M.L. and Z. Abramsky. (1993), How are diversity and productivity related? Pp. 52-65. *Species Diversity in Ecological Communities* (R.E.Ricklefs and D.Schluter, eds.). Chicago IL: University of Chicago Press.  
 Schwartz, W. Charles, and E.R. Schwartz, (1951), "An ecological reconnaissance of the pheasants in Hawaii." *The Auk* 68.3 (1951): 281-314.  
 Waide R.B., D.J.Lodge, Camilo, and W.Silver. (1997). Biodiversity at the LUQ Long – term Ecological Research Site. [http://atlantic.evsc.virginia.edu/LTER\\_biod//luq.html](http://atlantic.evsc.virginia.edu/LTER_biod//luq.html)  
 Werner, W. L., and S. Balasubramaniam (1992). Structure and dynamics of the upper montane rain forests of Sri Lanka. In *Tropical forests in transition*, edited by F. G. Goldammer, 165–172. Basel, Boston: Birkhauser Verlag. CrossRef  
 Wikipedia, (2016), "Horagolla National Park", The Free Encyclopedia, Web. [https://en.wikipedia.org/wiki/Horagolla\\_National\\_Park](https://en.wikipedia.org/wiki/Horagolla_National_Park), 05 Nov. 2016.  
 Wilson, E.O. (1992). The diversity of life. Harvard Univ. Press, Cambridge, MA. 424pp.