Report on the avifaunal survey in the Faculty of Technology premises, University of Ruhuna

M.A.Y.N. Weerasinghe and E.P.S.Chandana

Faculty of Technology

University of Ruhuna

2019

Introduction

Birds are an important group of animals as they occupy every habitat in the world. Diverse ecological functions of birds are discussed elsewhere (Sekercioglu 2006). Birds play important roles in different ecosystems. They transport genetic material via seed dispersal and pollination and thereby link genetic resources (Sekercioglu 2006). Specially, frugivorous, granivorous birds help to seed dispersal of plants. Ornithophily or bird pollination is one of the major service of birds. Large number of nectar–feeding birds are bird pollinators. By transporting minerals and nutrients in their guano, they link vital resources between different ecosystems (Sekercioglu 2006). They are trophic – process linkers as they represent primary or secondary consumers in food webs across the habitats (Gandhi 2001). The ecological function of predation is a major ecosystem service that provided by birds as it help to control the population of insects, rodents etc. that act as pests for numerous plant species. In that case, insectivorous birds are important as they act as one of the best pest controllers in ecosystem. Some bird species such as vultures, condors, buzzards and crows are scavengers. They provide sanitary services such as carcass disposal, water recycling and indirect population control of scavenging mammalian disease vectors. Birds are type of ecosystem engineers (Sekercioglu 2006). They are important in construction of cavities and burrow nests. These are important to secondary cavity nesting species (Sekercioglu 2006).

Bird's territory establishment in a particular location depends on a number of site specific factors including geographical location, altitude, land productivity, microclimate, wood area, isolation and vegetation composition. Bird habitat selection in relation to forest edges may base on four main causal factors such as species specific differences in resource and patch use, biotic interactions, microclimatic modification and vegetation structure (McCollin 1998).

When a habitat becomes more complex, the bird community in that habitat usually becomes more complex as well. The number of bird species, as well as their diversity, are strongly positively correlated with aspects of the structural complexity of vegetation (Ralph 1985). Therefore vegetation is an essential factor for bird species richness, diversity and maintenance of the population.

Majority of bird species depend on plants and plant products for their survival. They depend on plants for feeding, resting, nesting and roosting. Some bird species require specific plants for the survival. As an example, some bird species such as orioles, fruit pigeons require large trees to make an area more suitable for them. Some species including robins, parrots need soft barked trees for nesting. Directly or indirectly bird species survival closely depend on the survival of plants. Habitat specificity of birds directly related to vegetation types in those habitats (Gandhi 2001).

Habitat conversion and land management practices cause loss or change in available habitats to many animal groups including birds (Martin et al. 1997). Broad scale destruction and fragmentation of native vegetation is a highly visible result of human –land use throughout the world (Bennett et al. 2010). However, recent development projects taken place all over Sri Lanka including southern Sri Lanka leads to a massive decline in available habitats for faunal groups including birds. The rapid development which has taken place all over the Southern province might have negatively affected on the natural habitats and their resident species.

Therefore, this preliminary survey is essential for the identification of available species and their diversity, their associations with plants and their risk factors in the newly established faculty premises.

The study site, faculty of technology premises is located in Kamburupitiya, Matara District in Southern Province, Sri Lanka. The Southern edge of the faculty premises is adjacent to a thick forest cover which provide a good habitat for birds, mammals, reptiles etc. From all other areas are adjacent to the village but the area is covered with trees.

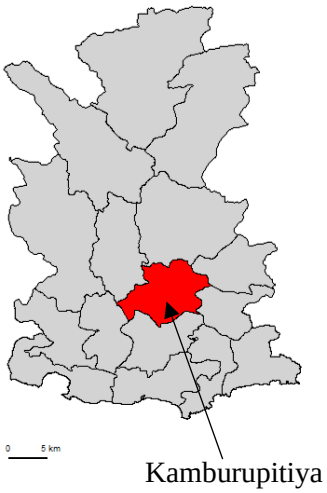

Figure 1. Area map

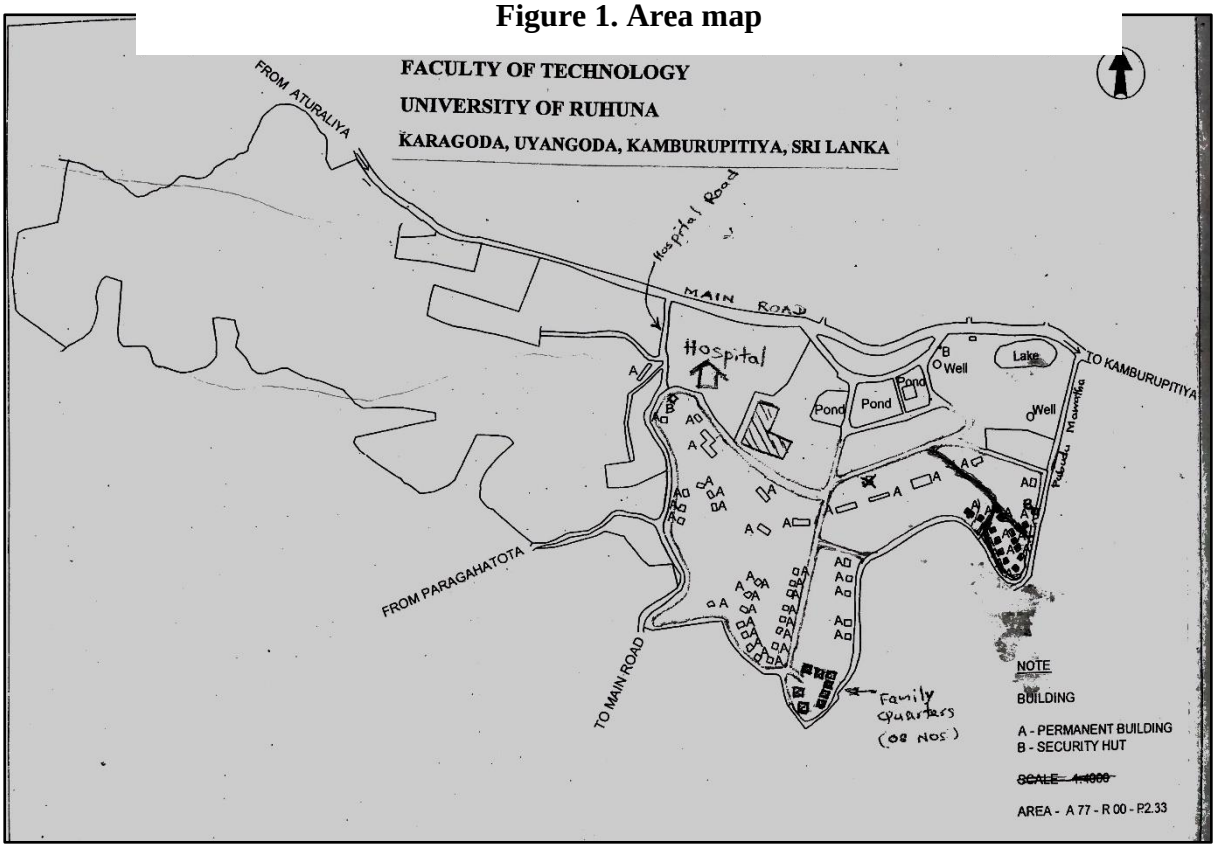

Figure 2. Map of the Faculty premises

In the faculty premises there are more than ninety different species of plants, shrubs, and herbs etc. which provide large number of habitats, feeding, resting and nesting grounds to different animal groups including birds.

Therefore, objectives of the present study as follows.

1. To identify the birds associated with the selected habitats.
2. To determine the nature of the Bird-Plant associations in the selected habitats.
3. To find the suggestions to increase the diversity and the species richness

Materials and Methods

The study site was the faculty of technology, University of Ruhuna (6˚03'N 80˚32'E; Figure 3). The study site was located in Matara District (wet zone) where the mean annual temperature is 26.8˚C and mean annual rainfall is 2147 mm (source: Department of Meteorology).

Figure 3. Map of the study site (www.google.lk)

Landscape of the study site

The area is covered with clusters of trees and the tree cover in the faculty premises is fragmented due to the construction purposes. Across the site the vegetation resembles open woodland type (Ashton et al. 1997) with a variable Emergent (> 35 m), Canopy (10 – 35 m), Shrubby understory (2 – 5 m) and Herbaceous ground cover (Figure 4). The dominant plant species are, Kottamba, Mara, Teak, Mango, Kenda, Ahu, Kumbuk, Attikka, Kos, Beli, Kithul etc. On the other hand faculty premises has three four interconnected water pond system which creates habitats for the aquatic birds.

Figure 4. Vegetation and the landscape type of the study siteBird surveys

Field studies were conducted over three months from May to July 2016. Data were recorded at the line transect established in the study belt (The line transect method) (Gregory et al., 2004, Baker et al. 2002). The study sites were visited regular intervals. Bird survey was conducted in the morning (from 6.00 a.m. – 8.00 a.m.) and evening (4.30 p.m. – 6.30 p.m.) for each study site along pre – established study belts. General weather conditions were noted in each field visit (McCollin 1998). Data collection was avoided on rainy days. Birds were identified and counted while walking along the line transect at a speed of ~ 10m/min. Maximum effort was taken to avoid double counting as indicated by BBIRD protocol (Martin et al. 1997). Birds were identified by direct observations and birdcalls. Birds were observed by Field Binoculars and locations were marked by GPS. Standard bird guides were used for identification of birds. (Harrison J., 2014; Kotagama S., 1998; Wijeyrathna G.D.S., 2015)

Data Analysis

Species abundance, species richness, and species diversity were calculated. (Nur et al. 1999).

Results

At the faculty premises both terrestrial and aquatic species were observed. Significant number of aquatic species such as Intermediate Egret, Little Cormorant and Little Egret were observed during the study period. Asian Koel, Black – hooded Oriole, Brown – headed Barbet, Common Mynah, Green Imperial Pigeon, Indian Peafowl, Oriental Magpie – robin, Red – vented Bulbul, Red – wattled Lapwing, Spotted Dove, White – throated Kingfisher, Yellow – billed babbler were the most abundant terrestrial bird species. However, Black – rumped Flameback, Crimson – fronted Barbet, Flame Minivet were rarely observed. Migrant species such as Blue – tailed Bee – eater, Barn Swallow and endemic species such as Greater Flameback, Crimson – fronted Barbet and Sri Lanka Grey Hornbill were also observed during the study period. (Table1)
During the study period, there were number of bird – plants associations observed at the faculty premises. The vegetation cover supports to birdlife for feeding, nesting, roosting and resting. Several fruiting plants such as Jack, Ahu, Kumbuk, Mango, Kithul, Teak, Neam were common species recorded at this site. Fruigivores such as barbets, koels, hornbills, parakeets and fruit pigeons were the major consumers of those fruiting plants. However, omnivores such as babblers, mynahs, orioles, bulbuls, granivores such as sparrows, munias, insectivores such as

drongos, flycatchers and nectarivores such as sunbirds and flowerpeckers were also associated with plants at site. Coconut, Mango and Jack trees were occupied by several bird species including House Crow, Common Mynah, Oriental – magpie Robin and Black – backed Flameback etc. for nesting. Specific Bird – Plants associations were identified during the study period. Most of them were based on the feeding habits of birds. However, birds have also developed specific association for nesting and resting.

Table 1. List of birds in the faculty premises

No	Common Name	Scientific Name	Status		
			NCS	GCS	ES
1	Little Cormorant	*Phalacrocorax niger*	LC	LC	CR
2	Woolly Necked Stork	*Ciconia episcopus*	LC	LC	R
3	Brahminy Kite	*Haliastur indus*	LC	LC	R
4	Indian Peafowl	*Pavo cristatus*	LC	LC	R
5	Spotted Dove	*Streptopelia chinensis*	LC	LC	CR
6	Asian Koel	*Eudynamys scolopacea*	LC	LC	CR
7	White – throated Kingfisher	*Halcyon capensis*	LC	LC	CR
8	Ceylon Gray Hornbill	*Tockus gingalensis*	LC	LC	E
9	Brown – headed Barbet	*Megalaima zeylanica*	LC	LC	CR
10	Coppersmith Barbet	*Megalaima haemacephala*	LC	LC	R
11	Small Minivet	*Pericrocotus cinnamomeus*	LC	LC	R
12	Orange Minivet	*Pericrocotus flammeus*	LC	LC	R
13	Red – vented Bulbul	*Pycnonotus cafer*	LC	LC	CR
14	Common Iora	*Aegithina tiphia*	LC	LC	R
15	Yellow – billed babbler	*Turdoides affinis*	LC	LC	CR
16	Purple – rumped Sunbird	*Nectarinia zeylonica*	LC	LC	CR
17	Purple Sunbird	*Cinnyris asiaticus*	LC	LC	R
18	Common Mynah	*Acridotheres tristis*	LC	LC	R
19	White bellied Drongo	*Dicrurus caerulescens*	LC	LC	R
20	House Crow	*Corvus splendens*	LC	LC	R
21	Ceylon Scimitar Babbler	*Pomatorhinus melanurus*	LC	LC	E
22	Asian Paradise Flycatcher	*Terpsiphone paradisi*	LC	LC	M
23	Scaly – breasted Munia	*Lonchura punctulata*	LC	LC	R
24	House Sparrow	*Passer domesticus*	LC	LC	R
25	Black – hooded oriole	*Oriolus xanthornus*	LC	LC	R
26	Rose – ringed Parakeet	*Psittacula krameri*	LC	LC	CR
27	Green Imperial Pigeon	*Streptopelia tranquebarica*	LC	LC	R
28	Orange – breasted Green Pigeon	*Treron bicincta*	LC	LC	R
29	Spotted Dove	*Streptopelia chinensis*	LC	LC	CR

30	Greater Flameback	*Chrysocolaptes stricklandi*	LC	LC	E
31	Rock Pigeon	*Columba torringtoni*	CR	LC	UR
32	Plain Prinia	*Prinia inornata*	LC	LC	R
33	Asian Palm Swift	*Cypsiurus balasiensis*	LC	LC	R
34	Barn Swallow	*Hirundo concolor*	LC	LC	CM
35	Red – wattled lapwing	*Vanullus indicus*	LC	LC	CR
36	Indian Black Robin	*Saxicoloides fulicata*	LC	LC	R
37	Oriental Magpie Robin	*Copsychus saularis*	LC	LC	CR
38	Ceylon Swallow	*Hirundo hyperythra*	LC	LC	E
39	Little Swift	*Apus affinis*	LC	LC	R
40	Black Drongo	*Dicrurus macrocercus*	LC	LC	E
41	Alexandrine Parakeet	*Psittacula eupatria*	LC	LC	R
42	Black – headed Cuckooshrike	*Coracina melanoptera*	LC	LC	R
43	Blue – tailed Bee - eater	*Merops apiaster*	CR	LC	CM
44	Common Kingfisher	*Alcedo atthis*	LC	LC	R
45	Common Tailor Bird	*Orthotomus sutorius*	LC	LC	CR
46	Crimson - fronted Barbet	*Megalaima rubricapilla*	LC	LC	E
47	Greater Coucal	*Centropus sinensis*	LC	LC	CR
48	Intermediate Egret	*Mesophoyx intermedia*	LC	LC	CR
49	Little Egret	*Egretta garzetta*	LC	LC	CR
50	Long – billed Sunbird	*Nectarinia lotenia*	LC	LC	R
51	Pale – billed Flowerpecker	*Dicaeum erythrorhynchos*	LC	LC	CR
52	Tri – coloured Munia	*Lonchura Malacca*	LC	LC	R
53	White – breasted Water Hen	*Amaurornis phoenicurus*	LC	LC	CR
54	White – browed Bulbul	*Pycnonotus luteolus*	LC	LC	R
55	White – browed Fantail	*Rhipidura aureola*	LC	LC	R
56	White – rumped Munia	*Lonchura striata*	LC	LC	R
57	Emerald Dove	*Chalcophaps indica*	LC	LC	CR

(Abbreviations: LC – Least Concern, CR – Critically Endangered, R – Resident, CR – Common Resident, M – Migrant, CM – Common Migrant, E – Endemic)

Data Analysis

Up to July 2019 the total number of bird species observed in the faculty premises is 57. Shannon Weiner diversity index is 4.702. Margalef's' Richness index is 8.362 for the faculty premises. (Table 2)

Table 2. Species richness and diversity indices of the study site

Parameter	Value
Shannon Weiner diversity index	4.702
Margalef's' Richness index	8.362
Total Number of Species	57
Total Number of Individuals	810

Discussion

Present study recorded 57 bird species two critically endangered species in national conservation status (IUCN, 2012) and six endemic species. This indicates a relative high diversity in the faculty premises. The number of bird species, as well as their diversity, are strongly positively correlated with aspects of the structural complexity of vegetation (Domokos et al. 2016). Therefore, plant species richness, diversity and density are important factors that correlate with bird diversity and richness. Majority of birds in the premises fed on plants at the same time they used trees for nesting and roosting. Both resident bird species in the premises and the visitor bird species from the adjacent lands used it as a feeding ground. When consider about the diversity in the premises it is a high value when compare to the previous studies. Also, the species richness is high in the premises.

However, due to constructions the available habitats have been reduced and the disturbances happen to animal groups. Therefore, following suggestions can be made for the conservation and management of the bird community in the premises.

- Habitat enrichment – canopy cover and the adjacent tree cover should be improved. Regrowth of the fruiting plants and other habitat enrichment strategies can be applied
- Introduction of a conserved zone to birds – in the southern edge of the premises the bird activities were highest therefore in that area a conserved zone can be introduced to birds. Tree felling, new building constructions could be avoided in this area.

-
- **References**

- Baker, J. and French, K., Whelan, R. 2002. The edge effect and ecotonal species: Bird communities across a natural edge in southeastern Australia. *Research Online*, Retrieved from www.onlinelibrary.wiley.com
- Balaz, M. and Balazova, M. 2012. Diversity and abundance of bird communities in three mountain forests stands: Effect of the habitat heterogeneity. *Polish Journal of Ecology* **60.3**: 629 – 634
- Bennett, A.F. and Saunders, D.A. 2010. Habitat fragmentation and landscape change. *Conservation Biology for all*, Oxford University Press, pp. 88 – 106
- Bereczki, K., Hajdu, K., Báldi, A. 2015. Effects of Forest Edge on Pest Control Service Provided By Birds in Fragmented Temperate Forests. *Acta Zoologica Academiae Scientiarum Hungaricae* **61(3)**: 289 – 304
- Brand, L.A. and George, T.L. 2001. Response to passerine birds to forest edge in coast redwood forest edge in coast redwood forest fragments. *The Auk* **118(3)**: 678 – 686
- Domokos, E. and Domokos, J. 2016. Bird communities of different woody vegetation types from the Niraj Valley, Romania. *Turkish Journal of Zoology* **40**
- Fahrig, L. 2009. Effects of Habitat Fragmentation on Biodiversity. *Annual Review of Ecology, Evolution and Systematics* **Vol. 34**: 487 - 515
- Fairl, J. M., Paul, E., Jones, J., Clark A.B., Davie, A., Kaiser, G. 2010. Guidelines to the use of wild birds in research (Third Edition). Washington, D.C.: Ornithological Council. 58
- Ikin, K., Barton, P.S., Stirnemann, I.A., Stein, J.R., Michael D, et al. (2014). Multi-Scale Associations between Vegetation Cover and Woodland Bird Communities across a Large Agricultural Region. *PLoS ONE* **9(5)**: e97029.
- Jacobson, S.L. 2005. Mitigation measures for highway – caused impacts to birds. *USDA Forest Service Gen. Tech. Report* **191**: 1043 – 1050
- Jones, J. 2001. Habitat selection studies in avian ecology: a critical review. *The Auk* **118(2)**: 557 - 562
- Joshi, K.K., Bhatt, D., Thapliyal, A. 2012. Avian diversity and its association with vegetation structure in different elevational zones of Nainital district (Western

Himalayan) of Uttarakhand. *International Journal of Biodiversity and Conservation* **Vol. 4(11)**: pp. 364-376

- Lindell, C.A., Riffell, K., Kaiser, S.A., Battin, A.L., Smith, M.L., Sisk T.D. 2007. Edge responses of tropical and temperate birds. *The Wilson Journal of Ornithology* **119(2)**: 205 – 220
- Martin, T.E., Paine, C., Conway, C.J., Hochachka, W.M., Allen, P., Jenkins, W. 1997. Breeding Biology Research & Monitoring Database – Montana Coop. *Wildlife Research Unit*. pp. 34 – 49
- McCollin, D. 1998. Forest edges and habitat selection in birds: a functional approach
- MOE. 2012. The National Red List 2012 of Sri Lanka; Conservation Status of the Fauna and Flora. Ministry of Environment, Colombo, Sri Lanka. pp. 114 – 134 59
- Nur, N., Jones, S.L., Geupel, G.R. 1999. Statistical Guide to Data Analysis of Avian Monitoring Programs. *Biological Technical Publication BTP – R6001*
- Ralph, C.J. 1985. Habitat Association Patterns of Forest and Steppe Birds of Northern Patagonia, Argentina. *The Condor* **87**:471483
- Sekercioglu, C.H. 2006. Increasing awareness of avian ecological function. *TRENDS in ecology and evolution* **Vol. 21, No.8**: 484 - 471
- Sisk, T.D. & Battin, J. 2002. Habitat edges and avian ecology: Geographic patterns and insights for western landscapes. *Studies in Avian Biology* **25**: 30 – 48
- Whitworth, D., Newman, S., Mundkur, T., Harris, P. 2007. Wild birds and avian influenza: An introduction to applied field research and disease sampling techniques. *FAO Animal Health and Production Manual,* **No.5**: 85 – 94
- Wijeyeratne, G.S. 2015. *A Naturalist's Guide to the Birds of Sri Lanka*. John Beaufoy Publishing Ltd, Oxford, England. pp. 16 – 173