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Distribution and abundance of avifauna in selected habitats of the Oliyagankele forest reserve Wilpita in the Matara district

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Abstract

Oliyagankele forest reserve is a lowland wet-zone forest, situated between Akuressa and Kamburupitiya, which covers an area of 482.9 ha. Its fauna has not been thoroughly investigated. This study was carried out to enhance the taxonomic knowledge of its avifauna. The objectives of the study were to find out the bird distribution, abundance and the evenness of avifauna in selected habitats. A survey was conducted during a period of five months (from April to August) in 2004. The study was based on the **point- scan line- transect technique.** Six different habitats were studied and a checklist of recorded bird species was prepared. Results indicated that the avifauna of Oliyagankele represented 10 orders, 24 families 35 genera, 42 species and 13 sub species including approximately 1/5 of endemic birds of Sri Lanka. There was no significant difference in the vertical vegetation distribution pattern among the six selected habitats. However, there was a significant difference in the Indices of Horizontal Heterogeneity (IHH) between selected habitats. Analysis of total bird count made during mornings and evenings as well as in rainy days and sunny days revealed that there were no significant differences in the species diversity and evenness. However, there was a significant positive correlation between the species diversity in the mornings and evenings. There were also significant differences in the abundance of bird (absolute number recorded) among the selected habitats during the mornings and the evenings and as well as during rainy days and sunny days. Similarity of all bird species was highest between site 1 and site 3; lowest between site 2 and site 4. The IHH and Indices of Vertical Heterogeneity (IVH) for selected habitats were not shown to be significantly correlated with overall species diversity, abundance and evenness. However there was a significant difference between the distribution of bird community in different vegetation strata and among selected habitats.

Introduction

A. Background

Sri Lanka is an island, 65610 km^2 in area situated close to the southeast corner of the peninsula of India. Sri Lanka, along with Western Ghats of India is recognized as one of the 25 global "hotspots" of bio diversity. (Myers *et al,* 2000). Though small in

size, Sri Lanka has a varied climate and topography, which has given rise to rich species diversity, believed to be the highest in Asia in terms of number per unit land area, especially with respect to mammals, reptiles, birds, amphibians and flowering plants.

The avifauna in the country is highly diverse and constitutes a very important part of the vertebrate community that is distributed throughout the country. There are about 23+4? endemic bird species and more than 430 species of birds (including migrants) inhabiting, different bio climatic zone (Wijesinghe *et al*, 1993). Many migratory bird species also visit and occupy various ecosystems in Sri Lanka using them as resting habitats and very rarely as breeding habitats. Due to the fact that Sri Lanka is located at the end of a migratory route (Kotagama and Wijesinghe, 1998), a vast number of birds arrive from the northern hemisphere.

There is no clear consensus as to, how many bird species are endemic to Sri Lanka. The Ceylon Bird Club, the oldest ornithological organization in the country, follows Priyantha Wijesinghe's check list of 1994. In 1994, Wijesinghe has proposed the presence of an additional three species of birds making the total number of endemics to be (23+3). Subsequently In 2004, a new species Serendib Scops owl ("panduwan bassa") *Ouls thilohaffmani* was added to the list of endemics (Warakagoda, 2001). The annotated checklist of the birds of the oriental region (Inskip *et al.*, 1996) and the Field Ornithology Group of Sri Lanka has followed Sibley and Monroe's list of birds given in 1990 and recognize only 23 endemics, (many of the endemics sub species are distinct in the field from related races on the main land) to be present in Sri Lanka. It is more likely that further studies may conclude the actual number of endemics to be even higher than the currently recognized number. In 2004, Rasmussen proposed 33 endemic birds species to be present in Sri Lanka. However, Kotagama, (2004) stressed that the definite number of endemic birds in Sri Lanka is still 23. When the distribution of the endemic vertebrates of Sri Lanka is considered, most of the endemic vertebrates are concentrated in the low country wet zone. As far as birds are concerned, they are mainly concentrated in the southwestern region of the country. The low country wet zone serves as valuable habitats for the endemic bird species. The Sinharaja rain forest situated in the low country wet zone seems to harbour 25 out of the 26 (proposed) endemic birds in Sri Lanka (Withana, 2002), indicating the importance of forest reserves as important habitats for such animals.

The Oliyagankele forest reserve is located in the Matara district; about 6 km away from Akuressa to the west and 1.5 km from Kamburupitiya in the east. Oliyagankele belongs to the wet zone forest type. It is a medium size lowland tropical rain forest,

and covers an area of about 483 ha. It is located at 6.05° N and 80.31° E and was declared as a strict nature reserve in 1939 (Gazette noticification, No 8497) and presently administered by the Department of Forest Conservation. The NCR (National Conservation Review) report identified Oliyagankele forest reserve as the most interesting and diverse among the forests in the Matara district. Its flora has been studied extensively and reported to be composed of 220 plant species (Samarakoon, 1999). But its fauna has not been thoroughly investigated. It was believed that this forest may be a home for many bird species including number of endemics (IUCN, 1995). NCR identified 35 bird species of which 4 are endemic to Sri Lanka. It has also been recognized that field research would be required in the near future to formulate detailed management plans for forest reserves (IUCN, 1995). However there are gaps to be filled in order to obtain a complete picture of the biological diversity, especially the faunal component of the Oliyagankele, for efficient conservation and management of this very important lowland rain forest. With the intention of fulfilling this national requirement, this study was undertaken to enhance the knowledge of avifauna occupying this MAB (Man and Biosphere) reserve.

The main objectives of this study were, to investigate the diversity of the avifauna in the Oliyagankele forest reserve in order to prepare a checklist and to find out the abundance and evenness of the distribution of birds in various habitat types within the forest reserve.

Methods and Materials

A. Site selection

Initially a preliminary study was carried out in January 2004 to select the study sites representing all the possible habitat types found with in the ecosystem. Six study sites were selected based on the distribution pattern of the vegetation namely; **1**.suburb of aquatic habitat, **2**. Undisturbed forest habitat 1, **3**. Undisturbed forest habitat 2, **4**. Open canopy thin forest, **5**. Suburb of human dwelling, **6**. Pinus plantation (figure 1).

B. Bird survey

The Survey proper was conducted during a period of five months (from April to August) in 2004. The **Point- scan line- transect technique** (Emlen, 1971, Bibby *et al*, 1993) was used to survey the birds. Six line transects, each measuring 100 meters in length, were selected from each of the above mentioned habitats to represent the entire bird community with the forest ecosystem.

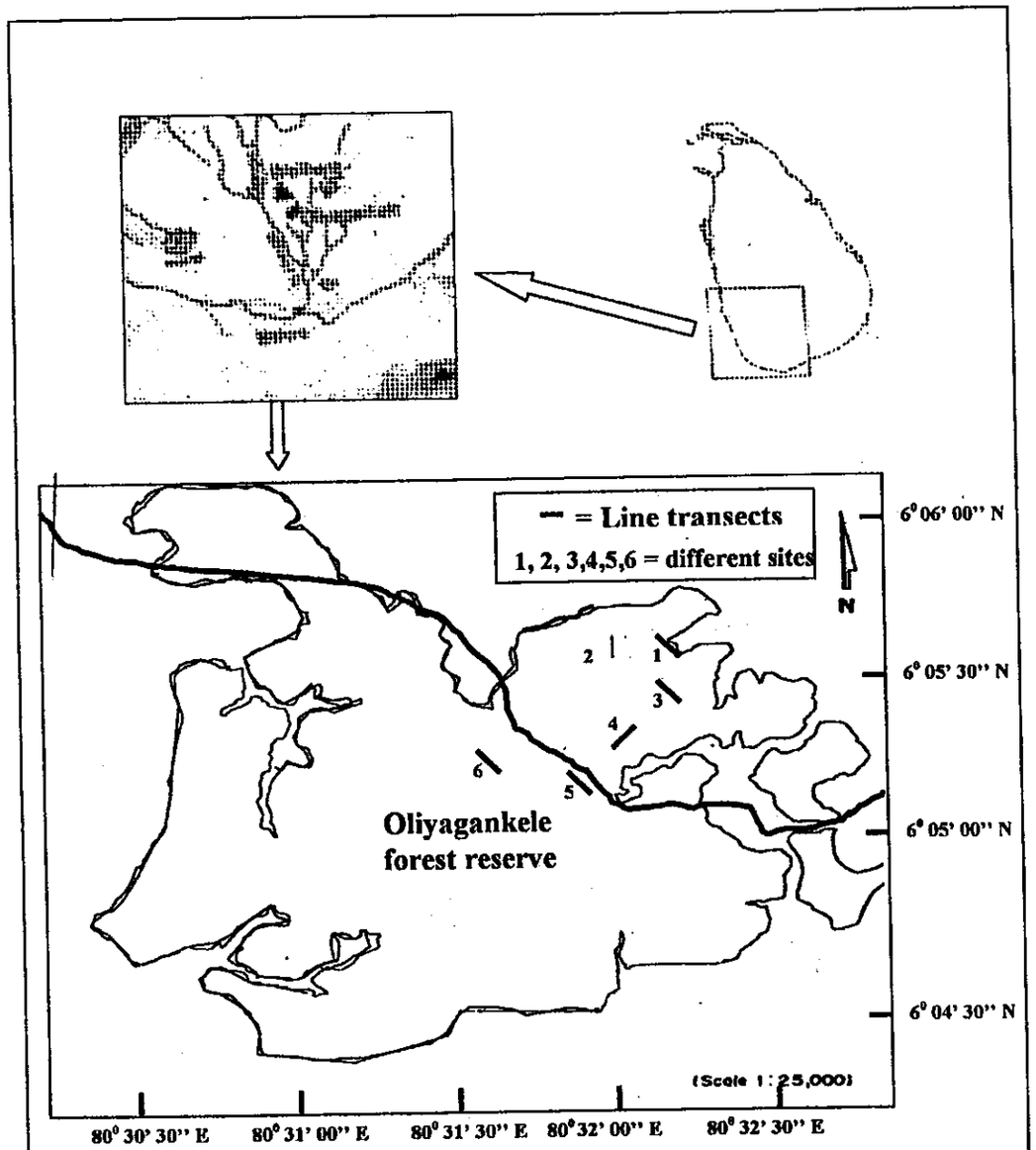


Figure 1: Locations of the study sites in forest reserve

Duration of survey along each line transect was half an hour. Five observation points were located on each of the line transect. Observations were done with in a radius of 5 meter at each point. Period of observation at each point was 5minutes. Observations were done during a period of five months at a frequency of twice a week. Censes was carried out between 6.00 am - 8.00 am and 4.00 pm - 6.00 pm

when visibility and bird activity were highest. All the species observed were recorded during the survey along line transect, the repeated counting of the same bird was avoided as much as possible. Binocular was used to observe the birds. Field characters and characteristic calls, body colors, flight patterns of birds were used for identification. Unidentified bird species were recorded with their special features to confirm their identification later. The different layers occupied by different bird species were also recorded. Number of Biological indices (such as Diversity, Evenness, Abundance, and Similarity) was estimated for each site. Chi square tests were carried out to check whether there was any significant difference in the avian diversity, abundance and evenness among selected habitats. Pearson's Correlation coefficient was applied to check whether there existed any significant relationships in the bird Diversity, Abundance and Evenness of birds observed during mornings and evenings as well as during the rainy days and sunny days.

C. Vegetation surveys

Vegetation structural measurements were recorded by **Point Centered Quarter Distance** method (Mitchell, 2001). Different indices (Indices of Horizontal Heterogeneity (Roth, 1976), Shannon index for vertical vegetation distribution (IVH) (Magurran, 1988), Morisita Horn index of similarity (MHIS; Magurran, 1988) were estimated.

D. Data analysis

JMPIN (version 3.2.6) and SPSS (version10.0) were used to analyze the data statistically.

Results

A. Vegetation structure

Average PQD values were not significantly different among habitats (χ^2=0.2779, p>0.05) Average G.B.H values were not significantly different among different habitats (χ^2=10.036, p>0.05), but significantly different between site 5 and other habitats (χ^2=4.4698, p<0.05).

Vertical vegetation distribution (H' vvd) was not significantly different among different habitats (χ^2=0.815, p>0.05). The index of horizontal heterogeneity (IHH), based on coefficient of variation of PQD values was significantly different among different habitats (χ^2=99.2048, p<0.05).

The IHH also revealed that sites 1,2,3,6 were the habitat with less horizontal heterogeneity, whereas site 4 had the highest horizontal heterogeneity while the site 5 had an intermediate value.

Table1 - Vegetation structural parameters estimated for the six sites

Parameter	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
Average PQD (cm)	3.63±0.29	3.4±0.28	3.56±0.26	4.38±0.41	3.67±0.46	3.32±0.24
Average GBH (cm)	48.75±4.86	48.39±2.26	54.14±4.47	54.56±5.52	76.75±7.73	58.95±3.86
IHH (CV of PQD)	42.98	44.31	40.18	120.31	87.82	32.51
IVH (H' VVD)	1.55	1.32	1.39	1.19	1.58	1.00

CV; Coefficient of Variation, GBH ; Girth of Breast Height, H' ;Shannon's Diversity index, IHH; Index of Horizontal Heterogeneity; PQD;Point Quarter Distance, VVD; Vertical Vegetation Distribution ,IVH;Index of Vertical Heterogeneity.

As indicated in the table 2 MHIS of G.B.H was highest between site1 and site 3 and lowest between site 2 and site 5 .In terms of vegetation height, MHIS was highest between site 3 and site 6 whereas the lowest was between site 1 and site 4.

Table 2 - Morisita-Horn similarity of Girth of breast height (below diagonal) and vegetation height (above diagonal)

	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
Site 1	-	88	65	42	90	64
Site 2	95	-	89	56	69	85
Site 3	97	92	-	55	56	97
Site 4	86	94	84	-	83	59
Site 5	73	62	78	78	-	58
Site 6	88	85	90	69	71	-

B. Bird communities

Species diversity

Total bird species diversity was not significantly different between habitats (χ^2=0.2876, p>0.05). But in generally site5 has shown the highest total species diversity, whereas site 6 has shown the least species diversity.

Total bird species diversity recorded during mornings and during evenings period was not significantly different among habitats (χ^2=0.0286, p>0.05). But it seems that most of the habitats (except site 5) have shown a higher bird's species diversity in the evening period than that recorded in the morning period. Similarly the total bird species diversity (pooled data) between rainy days and sunny days was not

significantly different among different habitats (χ^2=0.00054, p>0.05). However the sunny days have recorded a higher bird's species diversity (except site 3 & 4) when compared to the rainy days. There was a significantly positive correlation between species diversity recorded in the morning and in the evening (r^2= 0.7412, P=0.0277), but correlation was not significant between species diversity recorded during rainy days and during sunny days.

Abundance

During the study period a total of 249 birds belonged to 42 species were observed, among which five were endemic to Sri Lanka, indicating a percentage endemism of 12 % (appendix 1). The 42 birds species recorded represented 10 orders, 29 families, 35 genera, and 13 sub species. This included 40 breeding resident and 2 migrants.

Accordingly 95% of the recorded species were breeding resident while the remaining 5 % were migrants. There were 20 very common species, 19 common species and 3 rare species indicating that 48 % of observed bird species were very common, 45% of species were common and the rest of 7% were rare species. The Highest numbers of bird species belonged to the order of Passeriformes with 26 species and 11 sub species (figure 2). There was a significant difference between the abundance of birds in different habitats during the morning periods (χ^2= 55.71, p <0.05) and the abundance of bird was also significantly different among different habitats in the evening periods. (χ^2= 7.579, p<0.05). In the mornings, the highest number of birds were recorded in site 5 and the least number of birds were recorded in site 3 while in the evening the highest number of birds were recorded in site 5 and least number of birds were recorded in site 6. Similarly there were significant differences in the abundance of birds among the different habitats on rainy days (χ^2 =128.64, p<0.05) and on sunny days (χ^2=99.2948, p<0.05). The Abundance was highest in site 4 and least in the site 5 on rainy days, whereas it was highest in site 5 and least in site 4 on sunny days.

Evenness

Evenness of bird distribution was not significantly different among selected habitats (χ^2=0.0278, p>0.05). Correlation of evenness between morning and evening period (r^2=0.5155, p>0.05) as well as that between sunny days and rainy days (r^2= 0.2479, p>0.05) were also not significantly different. Evenness of bird distribution on rainy days and sunny days had not shown much variation in any of the habitats, which was also it, was true for evenness of birds in morning and evening.

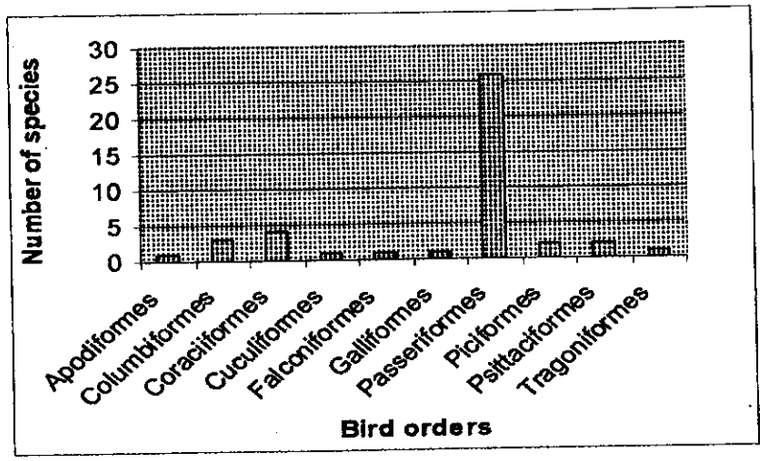


Figure 2 - Number of bird species observed in different orders

Similarity

When all bird species were considered, MHIS value (Table 3) was highest between site 1 and site 3 and lowest between site 2 and site 4, site 3 and site 4. MHIS value for very common species was highest between site 1 and site 4 and lowest between site 3 and site 6. MHIS value for common species was highest between site 1 and site 3 and lowest between site 2 and site 4.

Table 3 - Morisita –Horn index of similarities for bird communities

	Site1	Site 2	Site 3	Site 4	Site 5	Site 6
Site 1	-	47 77	48 92	68 3	42 79	24 76
Site 2	70	-	9 76	17 2	18 71	8 75
Site 3	74	38	-	10 15	25 74	6 73
Site 4	13	11	11	-	54 15	57 84
Site 5	52	59	44	39	-	
Site 6	40	46	43	32	35	-

(Above diagonal left very common, diagonal right common, below diagonal right all species).

C. Effects of vegetation structure on bird species diversity

The indices of Horizontal Heterogeneity and (IHH) and Vertical Heterogeneity (IVH) in selected habitats were not shown to be significantly correlated ($p>0.05$) with total bird species diversity, abundance and Evenness.

However there was a significant difference in the distribution of bird community among different vegetation strata as well as among different habitats (χ^2 =71.893, $P<0.0001$).

The highest number of birds was detected in the middle layer of trees whereas the lowest number of birds was detected in the ground layer (figure 3). The distribution of bird species among different vegetation strata was significantly different (χ^2=152.14, $P<0.05$).

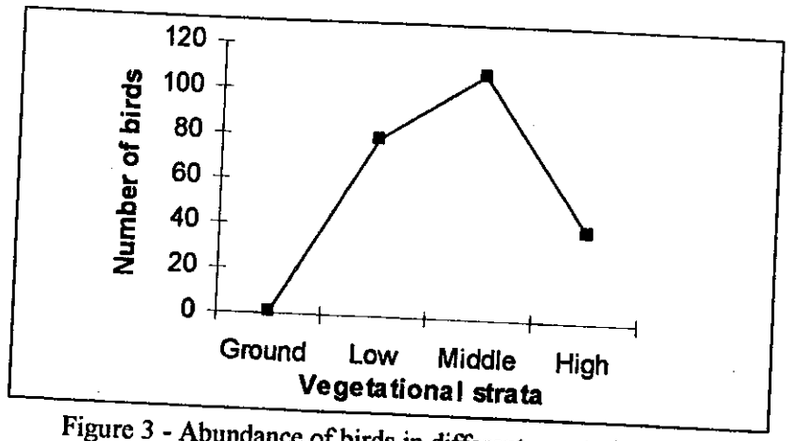


Figure 3 - Abundance of birds in different vegetation strata

Only one bird species was observed in the ground level, 19 bird species in the low-level stratum and 29 species in the middle level. 16 bird species were observed in the high level stratum.10 species have occupied both low and middle level strata, while 2 species were detected both low and high level strata. Twelve species were common to middle and higher strata while 3 species were common to low, middle and high strata (Figure 4). Accordingly the highest number of bird species were distributed in the middle strata and in the low strata when compared to ground and the high strata (figure 5, appendix 1).

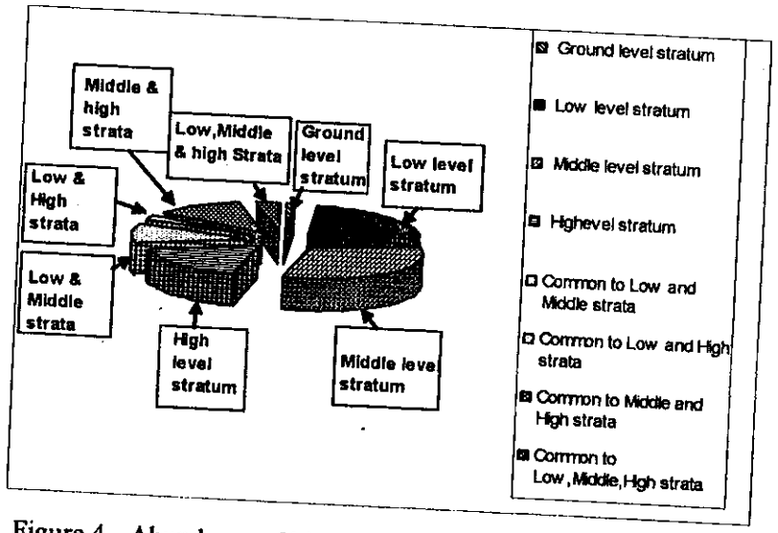
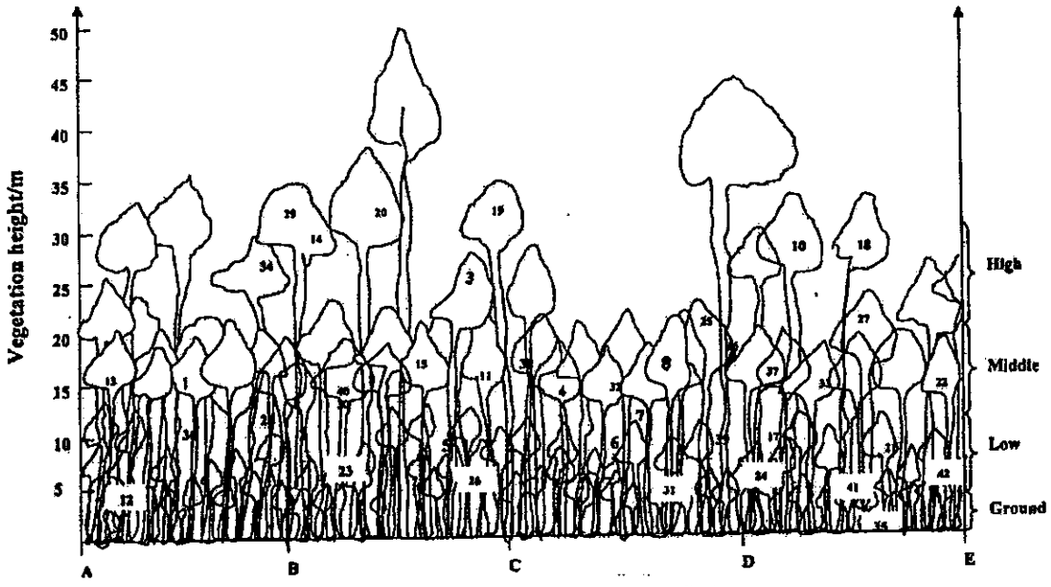


Figure 4 - Abundance of bird species in different vegetation strata



(1 – 42 bird species names are given in appendix 1)

Figure 5 – Distribution of the bird species in different vegetation strata in Oliyagankele forest reserve

Discussion

A. Variation in vegetation structure

Results indicated that that PQD (point quarter distance) values did not differ significantly among six different habitats. It seems that in every habitat equal amount of open space exist between the observation point and the trees. However, site 4 (with open canopy thin forest) showed greater spaces between the trees when compared to the other sites, which could be due to the inherent condition of an open habitat.

Average G.B.H values showed significant differences between site 5 and other sites, since the site 5 (suburb of human dwelling) comprised of higher number of trees such as, *Garcinia quaesita* (Goraka), *Mangifera zeylanica* (Etamba), *Swietenia mahogany* (Mahogani) with greater G.B.H values.

Vertical vegetation distribution did not exhibit a significant difference among habitats. Generally the vegetation height of Oliyagankele forest reserve was about 15-25 meters. There were also few trees, which rose up to a height of 45 meters. However it is a lower average vegetation height when compared to the Sinharaja rain forest which had reported an average vegetation height of 30 -35 meters with some

trees even rising up to 50 meters (Withana, 2002). The IHH values (index of Horizontal Heterogeneity) have shown that the sites1,2,3,6 bear comparatively lower horizontal heterogeneity .If the IHH value is the low, the trees are uniformly distributed . Therefore, it can be concluded that habitats 1, 2, 3, 6 have a uniformly distributed vegetation. Since the Site 4 had the highest value, it can be recognized as a habitat bearing a clustered tree distribution. Our observations also confirm the said statement since it has a patchy distribution of trees. Site 5 showed an intermediate value of IHH indicating that it is a habitat with randomly distributed vegetation being a suburb of human dwelling. These results have shown that the Oliyagankele forest exhibits different types of vegetation distribution in different places.

MHIS (Morisita- Horn Index of Similarity) values show the similarity of G.B.H and Vegetation height.

Site 1 and site 3 and, site 2 and site 3 show highest similarity of G.B.H values. Site 2 and site 3 are the undisturbed natural habitats where this survey was carried out.

Similarity was lowest between site 2 and site 5, indicating a difference of G.B.H value between the natural (undisturbed) site of forest and disturbed part of the forest (suburb of human dwelling). But site 2 and site 3 showed greater similarity in G.B.H with the site 6 (Pinus plantation). Results do not provide clear evidence to support that there exist a difference of G.B.H. between undisturbed habitats and disturbed habitats. MHIS value of vegetation height was highest between site 3 and site 6 whereas it was lowest between site 1 and site 4. This explains that there is no clear evidence for difference between undisturbed and disturbed habitats with reference to estimated vegetation criteria.

B. Differences in bird communities

Much of the emphasis in avian community studies during past decades has been on patterns in species diversity, habitat relationships (MacArthur, 1972). Thus species diversity is a valuable index for avian community studies. Although the total species diversity did not exhibit a significant difference among habitats, the Suburbs of human dwelling (site 5) has shown a greater total species diversity whereas the lowest was in site 6 (Pinus plantation). The site 5 was considered as a habitat disturbed by human dwelling. However higher total species diversity indicates that there is no human impact on bird species diversity in this forest. The Pinus plantation, not being a natural forest type, showed the lowest total species diversity since it is obviously a disturbed habitat with in a natural forest.

This study was carried out only during morning hours and evening hours where both the visibility and the bird activity were at the highest. Total species diversity noted during the mornings and evenings also did not exhibit a significant difference. However apart from the site 5, other sites have recorded higher species diversity during the evenings, when compared to morning periods. This would be due to greater visibility and activity of bird during the evening rather than in the morning. There is no significant difference in the species diversity between rainy days and sunny days. However, apart from site 3 and the site 4, the other sites have recorded higher bird species diversity in sunny days when compared to rainy days. Most of the birds are not greatly active during rainy days compared to sunny days thus the visibility of bird also poses difficulties. It may be a reason for the recorded low species diversity in rainy days compared to sunny days. Correlation of species diversity between morning and evening was positive, indicating that when species diversity is higher in the morning; it is also higher in the evening period and vise versa.

The endemic bird species recorded during this study were; ***Dicaeum vincens*** (White throated flowerpecker, Lanka pilalichcha, a breeding resident of wet zone), ***Ocyceros gingalensis*** (Sri Lanka Grey hornbill, Alu kandaththa, a very common breeding resident of low country), ***Galloperdix bicalarata*** (Sri Lanka spur fowl, Haban kukula, a rare endemic, a breeding resident of wet zone), ***Eumyras sordida*** (Sri Lanka dull blue flycatcher, Lanka andurunil masimara, a breeding resident of wet zone) ***Loriculus beryllinus*** (Sri Lanka Hanging parrot, Lanka giramaliththa a breeding resident). The Sri Lanka's avifauna includes 441 breeding resident and migrant species of which 23 are endemics (Kotagama, 2004). The percentage endemism is about 6%. In Oliyagankele forest reserve, 42 bird species were recorded including 40 breeding resident and 2 migrants with 5 are endemics. The percentage endemism is about 12%. Therefore the avifauna at Oliyagankele forest reserve represents approximately 1/5 of the endemic species in Sri Lanka. However, the percentage of recorded migrant species was low (5%) which could be due to the isolated nature of the forest, since the forest ecosystem of the Matara district occurs as widely separated forest patches scattered on an extensive area.

Results have shown that most of the recorded bird species belonged to order Passeriformes (26 species Out of 42 Species). 20 very common species, 19 common species are been represented in the forest. However, the representation of the rare species was rather low (7 %). All the rare species were found in the undisturbed habitats (site 1, site 2). Abundance of birds exhibited significant difference among different habitat during the mornings as well as in the evenings. Suburbs of human

dwelling (site 5) have recorded the highest abundance both in the morning and evening periods. Because this site is confined to the margin of a small village in the forest, the fruit trees in the home gardens provide an ample source of food for bird species. It may be a reason for the abundance of bird in site 5. Abundance of bird in rainy days and sunny days exhibited a significant difference among different habitats. Abundance was higher in sunny days compared to rainy days. Evenness of birds did not show a significant difference among habitats during morning and evening and also during rainy days and sunny days. This indicates that the different parts of forest provide facilities more or less equally for the avian community. This fact also reveals that, although the daily climatic changes impose changes on the number of bird species and the number of individuals seen on a particular day, it will not affect the general distribution pattern of birds.

According to the MHIS (Morisita- Horn Index of Similarity) values for all bird species, similarity was highest between site 1 and site 3 as well as site1 and site 2. These three sites were considered as undisturbed natural habitats. Suburb of aquatic habitat (site 1) was located closer to the Lenabatuwa tank. Site 3 was located within the forest and little closer to the tank. As a result, kingfisher species such as *Halcyon smyrnensis* (White throated kingfisher, Laya sudu pilihuduwa) was observed in both sites. As the site 2 lies within an undisturbed natural forest habitat, 2 endemic species *Galloperdix bicalarata* (S.L Spur fowl Haban kukula), *Eumyras sordida* (Dull blue flycatcher, Lanka andurunil masimara) were seen there, whereas in the site 4, an area of open canopy thin forest none of the endemics were seen. This fact could be attributed to the difference in bird composition observed between site 2 and site4. Site 3 and site 4 also exhibited less similarity in bird composition, which can be explained by the fact that the site 3 is also an undisturbed natural forest habitat. Similarity of site 1 and site4 harbored the highest number of very common bird species including Acridotheres *Tristis melanoturnus* (Common myna), *Corvus macrorhychos* (Jungle crow,Kalu kaputa), *Dicrurus caerulescens* (White belied drongo, Podu kauda), *Ocyceros gingalensis* (S.L Grey hornbill,Alu kandaththa) etc. This may be due to the similarities observed with respect to the vegetational condition, in these two sites. Similarity of bird composition was lowest at the site 3 and site 6. Only Ocyceros gingalensis (S.L Grey hornbill, Alu kandaththa) was observed in both sites as a very common species. In respect of the common species, similarity of bird composition was highest at site 1 and site 3.

Both sites represented *Rhopocichia atriceps* (Dark fronted babbler,Hisa kalu panduru demalichcha), *Pycnonotus melanicterus* (Black crested bulbul, Hisa kalu kondaya)

species. The number of common bird species was lowest between the site 2 and site 4. Only *Chalocophaps indica* (Emerald dove, Neela kobeiya) represented both sites.

C. Vegetation structure and bird communities

The relation of birds to features of their habitats has been a major focus of studies in avian ecology, perhaps because at least some aspects of habitats use are so conspicuous in birds (MacArthur, 1972) Most studies of avian habitat relations have not included behavioral observations but have some simply measured or recorded various features of habitats occupied by species in a community, such as IHH (Index of Horizontal Heterogeneity), IVH (Index of vertical vegetation distribution). In this study IHH, IVH vegetation parameters were used to study the avian habitat relationships. However, both IHH and IVH did not show a significant correlation with overall species diversity, abundance and evenness. The important feature is that there was a significant difference between the distribution of bird community in different vegetation strata and selected habitats. The highest number of birds was recorded in the middle stratum and the lowest was recorded in the ground layer of vegetation. The highest number of birds was recorded in site 5 whereas the lowest was recorded in Pinus plantation. This may due to the fact that the pinus plantation does not provide a variety of habitats. In respect of the numbers of birds, one species was detected in the ground stratum and 19 species was observed in the low level stratum. Middle stratum represented 28 species while 16 species occupied the high-level stratum. Niches differentiation is closely related to habitat distribution of species in the community (Brush *et al*, 1993). It depends on the characteristics of the habitats. In this study, 10 species have occupied both low level and middle level strata. Two species were detected in both lower and higher strata.12 species were observed in both middle and higher strata.3 species namely *Pycnonotus melanicterus* (Black crested bulbul, Hisa kalu kondaya), *Acridotheres tristis melanosturnus* (Common myna), *Dicaeum erythrorhychos ceylonense* (Pale billed flowerpecker, Kuda pilalichcha) represented low, middle and higher strata. The results have shown that there exists some degree of niche overlapping in Oliyagankele forest reserve.

Since this study was confined to only a period of five months (from April to August) corresponding to the southwest monsoon (May-September) receiving the highest rainfall, obviously the number of bird species detected would have been much less than those detected during the dry season. Future investigations should be conducted over a longer period corresponding to different climatic seasons in order to give a complete picture of the species diversity, abundance and evenness of the avifauna of the Oliyagankele forest reserve.

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Appendix 1- Recorded birds species in different vegetation strata

Number	Common name	Ground	Low	Middle	High
1	Brown headed barbet			√	√
2	Black crested bulbul		√	√	√
3	Black hooded oriole			√	√
4	Black naped monarch			√	
5	Brown shrike		√	√	
6	Blue wing leaf bird			√	
7	Common iora		√	√	
8	Crested tree swift				√
9	Crested serpent eagle			√	
10	Crested drongo				√
11	Common mynah		√	√	√
12	Dark fronted babbler		√	√	
13	Dull blue flycatcher**			√	
14	Emerald dove			√	√
15	Green imperial pigeon			√	√
16	Grey hornbill **			√	√
17	Greater caucal		√		
18	Greater flameback			√	√
19	Hanging parrot **				√
20	Jungle crow			√	√
21	Long billed sunbird		√		
22	Malabar trogon			√	
23	Oriental magpie robin		√		
24	Oriental dwarf kingfisher		√		
25	Oriental white eye			√	
26	Plain prinia		√		
27	Pale billed flower pecker		√	√	√
28	Purple sunbird		√		
29	Rose ringed parakeet				√
30	Red vented bulbul		√	√	
31	Spotted dove		√	√	
32	Scarlet minivet			√	
33	Small minivet		√	√	
34	Stork billed kingfisher			√	√
35	Sri lanka spur fowl **	√			
36	Scimitar babbler		√		
37	S.L white throated flowerpecker **			√	√
38	Tickell's blue flycatcher		√	√	
39	White throated kingfisher			√	
40	White belied drongo			√	
41	White rumped munia		√		
42	Yellowish breasted warbler		√		

** =Endemic Species