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Bird Diversity of Dekinda Forest Reserve, Balana, Sri Lanka: Implications for Conservation

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ABSTRACT

Dekinda Forest Reserve, located close to the historic town of Balana, Sri Lanka (7º16' N, 80º29' E, 525-585 m above sea level) consists of rainforest plant species spanning an area of about 40 ha. The forest has been maintained since the colonial times as a watershed reserve for nearby plantations, most of which comprised tea and paddy. The objective of the present study was to measure the avifaunal diversity in Dekinda Forest Reserve, as an indicator of its overall biodiversity, and compare it with those of nearby home gardens. The study was conducted from March to June, 2012. Point counts with unlimited distance were used in conjunction with Distance© software (Release 6) to document the abundance and density of bird species. Peak counting hours were between 0600-0900 h and 1600-1830 h. Counts were made weekly. Despite its small size, the forest reserve is home to 56 bird species. Among the notable species, there were six endemic species, namely, the Sri Lanka wood pigeon (*Columba torringtoni*) (estimated density 8/km^2), Layard's parakeet (*Psittacula calthorpae*) (19/km^2), Sri Lanka lorikeet (*Loriculus beryllinus*) (70/km^2), yellow-fronted barbet (*Megalaima flavifrons*) (79/km^2), Sri Lanka scimitar babbler (*Pomatorhinus melanurus*) (11/km^2), and brown-capped babbler (*Pellorneum fuscocapillus*) (10/km^2). In addition, four proposed endemic species were also recorded. Given the importance of this forest as a watershed area and the large number of bird species it supports, Dekinda Forest Reserve is clearly an important site for biodiversity conservation.

Keywords: avifaunal diversity, density, endemic species

INTRODUCTION

Studies on bird assemblages have contributed significantly to the advancement of science in the field of community ecology (Wiens, 1989a, Wiens, 1989b). Comparative avifaunal diversity is an excellent indicator of ecosystem stability because birds respond quickly to changes in their environments (Miller and Spoolman, 2009). Furthermore, birds are relatively easy to observe and monitor. Therefore, the concept of 'using birds as indicators for recognizing land ecosystems rich in biological diversity' has now been gained a wide global acceptance (O'Connell *et al*., 2000; FOGSL, 2003; Niemi and McDonald, 2004, Schulze *et al*., 2004). Cantebury *et al.*(2000) showed that bird populations and associated habitats (habitat assemblages) appeared to be particularly useful tools in environmental monitoring and, the individual species abundance was positively correlated with assemblage species richness. Further, the assemblage members showed consistent responses to variations in disturbance levels.

Species richness and the presence of rare species are two of the most frequently used criteria for the selection of conservation areas (Rodriguez-Ferraro and Blake, 2008). In addition, community composition and relative abundance of target species are important in selecting areas for conservation. Freed and Cann (2012) used bird density to document the invasion of old-growth forest associated with restoration by an introduced bird species on the Island of Hawaii, U.S.A. Grundel and Pavlovic (2007) documented how densities of individual bird species varied with habitat differences along an open-forest gradient in northwestern Indiana, U.S.A. Cushman and McGarigal (2003) found that, in Oregon Coast Range, U.S.A., bird community diversity was influenced by both the extent and fragmentation of mature forest at the landscape level. Cushman and McGarigal (2003) noted that species richness and density responded more strongly to mature forest area than to fragmentation and were significantly lower in landscapes that were completely dominated by mature forest than in landscapes with a mixture of

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seral stages. Species evenness was more strongly related to fragmentation than to area of mature forest at the landscape level. Baker *et al*. (2002) noted that the bird density and species richness in a wood habitat were twice as high as in a heath habitat.

Birds exhibit many characteristics that suggest their potential as ecological indicators (O'Connell *et al.,* 2000). For example, the distributions of many species are affected by habitat fragmentation (Schmiegelow *et al*., 1997). Furthermore, many birds occupy high trophic levels and may show functional disturbance at lower levels (Sample *et al.,* 1993). Ecological indicators are mainly used to assess the condition of the environment or to diagnose the cause of the environmental change (Niemi and McDonald, 2004). The information provided by ecological indicators can be used to forecast future changes in the environment.

Studies on indicators of biodiversity have focused on biological entities, such as gene frequencies, populations, species, species assemblages, and communities (Lindenmayer *et al*., 2000). Responses of bird communities to environmental variation have been studied previously: for example, Miller *et al*. (2004) found that the overall abundance of birds in floodplain forests in Wisconsin River, U.S.A., was notably lower in some areas as a result of anthropogenic habitat alteration. O'Connell *et al*. (2000) studied bird guilds as indicators of ecological condition in the Central Appalachians by developing an index of biotic integrity based on bird communities. The responses of breeding birds to hardwood reduction in forests was studied by Provencher *et al.* (2002), who found that several bird species declined as a direct result of loss and degradation of longleaf pine forests in the southwestern United States. The diversity patterns of bird assemblages are also important from an ornithological as well as forestry perspectives because of the occurrence of restricted-range bird species (Rodriguez-Ferraro and Blake, 2008). Clergeau *et al.* (2001) found that bird species richness was negatively correlated with urbanization, while Estades and Temple (1999) found that the type of vegetation adjacent to forest fragments had a significant effect on the composition of the bird community inhabiting them.

The objective of the present study was to measure the avifaunal diversity and density in Dekinda Forest Reserve, Sri Lanka, as an indicator of its overall biodiversity. As a control experiment, the avifaunal diversity was compared with that of nearby home gardens, which represent much more disturbed habitats.

MATERIALS AND METHODS

Dekinda Forest Reserve, a hill rainforest (Ashton *et al*. 1997), is located close to the historic town of Balana, Sri Lanka (7º16' N, 80º29' E, 525-585 m above sea level). The forest has an area of about 40 ha. It is bordered by tea plantations and home gardens of mixed plant species. The forest has been maintained since colonial times as a watershed area for nearby plantations, most of which comprise tea and paddy. The mean annual rainfall in the area is about 2000 mm and the mean annual temperature is about 25 ºC (Data from the Meteorology Department, Sri Lanka).

The density of the bird species was measured using Distance© software (Thomas *et al.* 2010). The data were based on point transects with unlimited distance (variable circular plot method, VCPM). Sutherland (1996), Marsden (1999), Bibby *et al*. (2000), and Shankar Raman (2003) were followed for our point transects (details are given below). Point-transect distance sampling is one of the most widely used density estimation methods for multi-species surveys in tropical forests (Lee and Marsden, 2008).

Ten sampling stations were selected by using systematic random sampling within the reserve, with each station separated from the next by a minimum distance of about 500 paces (approximately 250 m) (see Figure 1). The same random sampling procedure was used in adjacent home gardens. To ensure correct pacing, a GPS receiver (Garmin GPS 72H, 2009, Garmin International, Inc. Kansas, U.S.A.) was used. These distances were maintained as the minimum distances between any pair of stations as far as possible in order to eliminate bias such as double counting. Nikon 8×40 binoculars were used for observing birds. All individual birds seen and heard were recorded, and the actual distance (radial distance), from the counting point to the bird was measured using a range finder (Bushnell Yardage Pro Compact 800 Bushnell Corporation, Kansas, U.S.A.) where possible; for all other contacts, the radial distance was estimated to the nearest meter. When approaching a counting station, if any birds were disturbed (flushed) near the plot, they were recorded as being present, and the distance from the counting point to the bird's take-off point was estimated. Before beginning to

count at each station, at least a few seconds were spent without counting in order to reduce the effect of disturbance on counting.

Counts were made between sunrise and sunset each day. Peak counting hours were between 0600–0900 h and 1600–1830 h, when the birds were most active. Each count lasted for about 20 minutes. Counts were made weekly from March to June 2012. Extreme weather conditions may affect bird activity (Bibby *et al*., 2000); hence, to avoid possible biases in extreme weather conditions, such as heavy rain, observations were not carried out. For groups of birds, the distance to the "center of gravity" of the group was estimated, following the method employed by Marsden (1999). The same methods were employed to census birds in nearby home garden (for comparison).

Actual distances, r (radial distances) were measured from each point to the object detected. Suppose the design comprised k points, and distances less than or equal to w were recorded. Then the surveyed area is $a = k\pi w^2$, within which n objects are detected. As for line transect sampling, P_a denotes the probability that an object within the surveyed area a is detected with estimate Pa'. Then the object density (D') was estimated by

$$D' = n / k\pi w^2 P_a'$$ (Thomas *et al.,* 2002).

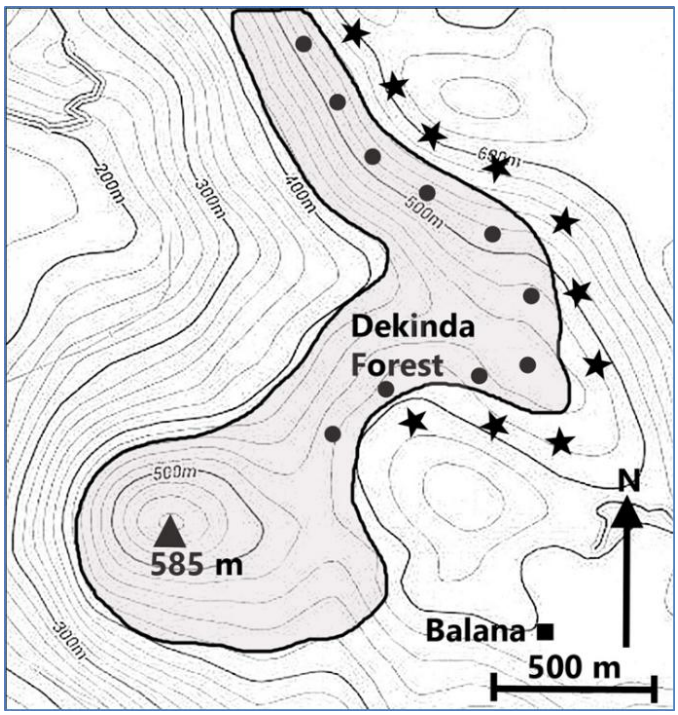

Figure 1. The Study site and sampled locations of Dekinda forest and in adjacent home gardens

As a measure of avifaunal diversity in Dekinda forest and nearby home gardens, Simpson's diversity index and Simpson's evenness measure were calculated. Species nomenclature followed Dickinson (2003), Kaluthota and Kotagama (2009), and Ripley (1982).

RESULTS

Out of more than 80 species that have been recorded previously from the Dekinda Forest Reserve (pers. obs.), the present study detected 56. Forty five species were observed in the nearby home gardens. Among the notable species that were endemics included the Sri Lanka wood pigeon (*Columba torringtoni*), Layard's parakeet (*Psittacula calthorpae*), Sri Lanka lorikeet (*Loriculus beryllinus*), yellow-fronted barbet (*Megalaima flavifrons*), Sri Lanka scimitar babbler (*Pomatorhinus melanurus*), and brown-capped babbler (*Pellorneum fuscocapillus*). This represents 23% of the endemic avifauna of Sri Lanka. Several proposed endemic species which were proposed by Kaluthota and Kotagama (2009) were also recorded from this forest reserve

and, this resulted in the rise of the proportion of endemic avifauna to 34%. Eighty per cent of the recorded endemic birds of Sri Lanka were forest inhabitants that require undisturbed conditions for survival (Santiapillai and Wijesundara, 2002). Sri Lanka green pigeon (*Treron pompadora*), Sri Lanka small barbet (*Megalaima rubricapilla*), crimson-backed flameback (*Chrysocolaptes stricklandi*), Sri Lanka wood shrike (*Tephrodornis affinis*), and Sri Lanka swallow (*Hirundo hyperythra*) were among the proposed endemic bird species.

The reserve also supports a considerable number of raptors and owls of Sri Lanka. Raptors such as the crested hawk-eagle (*Spizaetus cirrhatus*), crested serpent eagle (*Spilornis cheela*), besra sparrow-hawk (*Accipiter virgatus*), and owls such as the brown wood-owl (*Strix leptogrammica*), brown hawk-owl (*Ninox scutulata*), collared scops-owl (*Otus bakkamoena*) and forest eagle-owl (*Bubo nipalensis*) have been recorded.

Of all the species that were recorded during the present study, the red-vented bulbul showed the highest density whereas brahminy kite and besra sparrowhawk rated to be the lowest. Among the endemic species, the yellow-fronted barbet was present in the highest density (see Table 1) whereas the Sri Lanka wood pigeon showed the lowest abundance. Further, the Sri Lanka small barbet was the most abundant proposed-endemic species while the crimson-backed flameback had the lowest density.

In terms of avifaunal diversity, Simpson's index (D) was 0.0245 for Dekinda forest reserve and 0.0401 for home gardens. The calculated value of Simpson's measure of evenness was 0.7284 for Dekinda and 0.5541 for home gardens. In Dekinda forest reserve, the most abundant species was the Red-vented Bulbul (*Pycnonotus cafer*) whereas in the home gardens it was the Common Mynah (*Acridotheres tristis*). It is interesting to note that the least abundant bird species in both Dekinda and home gardens were raptors; Besra Sparrowhawk (*Accipiter virgatus*) in Dekinda and Brahminy Kite (*Haliastur indus*) in home gardens. In general, fruit-eating birds and insectivorous birds were more abundant in the forest, whereas omnivorous species showed a greater abundance in the home gardens.

DISCUSSION

The most abundant species in the study area were those that are widely distributed in many of the avifaunal zones of Sri Lanka. The same pattern has been reported previously for birds in forest habitats and forest fragments in the tropics and temperate zones (Gaston, 1996, Rodriguez-Ferraro and Blake, 2008). Within a taxonomic assemblage, locally abundant species tend to be widespread and locally rare species tend to be restricted in their distribution (Gaston, 1996). In general, the abundance of a species and the extent of its spatial distribution are positively related (Gaston, 1996). As a result, widespread species are disproportionately more abundant than those of restricted occurrence. In a multispecies survey, it may be difficult to detect all species with equal accuracy. Furthermore, some common species are more readily detectable than some rare species. This difference in detectability may have masked the presence of rare species (Buckland, 2006). This has implications on conservation: some species which may not be detected at all may be threatened with extinction. This results in inaccurate census data and wrong inferences on the abundance of a species, hence negatively affecting conservation measures. This has been the cause of the decline of the yellow-shouldered parrot in Venezuela (Sanz and Rodriguez-Ferraro, 2006). This could be a reason why only 56 species were detected in the current study (Appendix 1), whereas our personal observations in the past have recorded about 80 species in Dekinda forest. However, another reason may be that the sampling season was mostly out of the migratory season. Hence, migrant species of birds were not recorded.

The Dekinda Forest Reserve is bordered by tea and paddy cultivations and village home gardens. Many plant species that are important as food trees for birds and other wildlife can be seen in the reserve. Many of the plant species are indigenous to Sri Lanka. Some species have been introduced by man, either accidentally or deliberately, mostly close to the border.

The edges of the reserve have already been influenced to a considerable degree by humans, resulting in the accidental or deliberate introduction of plant species that were not naturally occurring in the reserve, *e.g*. *Areca catechu*. This might have implications on the composition of the avifauna. Human-derived environmental changes are known to provide ecological opportunities in habitats for plants and animals (D´Antonio and Meyerson, 2002, Freed and Cann, 2012, Freed and Cann, 2013). In Dekinda, some of the most common bird species were associated with human habitations, *e.g.* red-

vented bulbul and Oriental white-eye. Furthermore, specialist plant feeders could be affected by tree density (Grundel and Pavlovic, 2007). For example, changes in tree density due to the introduction of alien plant species may affect native frugivorous and other plant eating bird species such as nectarivores.

The border between the Dekinda forest and nearby home gardens may act as an 'ecotone'. An ecotone is a transition between two or more diverse communities such as, for example, between a forest and grassland. One consequence of ecotones for fauna is the 'edge effect', which is the tendency for increased variety and density at community junctions (Odum, 1959). This is reflected by the observation that the most abundant species were also found in adjacent home gardens.

The results also indicate that the fruit and other plant eating species (*e.g*. nectarivores) are more abundant in the forest than other species. For example, these species comprised 36 % of the total number observed in the Dekinda forest whereas they comprised 33 % in home gardens. Many of the vegetarian species had higher densities compared to insectivorous and carnivorous species (see Appendices 1 and 2).

Distance sampling is increasingly used in bird population studies, and is generally regarded as an efficient and reliable method of estimating densities (Lee and Marsden, 2008). Point counts, when used in conjunction with Distance software, allow estimation of actual animal density by using the fall-off in probability (g) of animal detection over increasing distances (y) from the recorder, where the probability of animal detection at $y = 0$ is usually assumed to be certain [$g(0) = 1$] (Marsden, 1999). Besides the assumption that $g(0) = 1$ or at least is known, there are three more (main) assumptions of distance sampling (Buckland *et al*., 2001); that animals are detected prior to natural movement or movement in response to the recorder; that distances to animal contacts are known accurately; and that sampling points or lines are randomly positioned, or a grid of points/lines is randomly placed.

The relative abundance of target species, as well as community composition, is an important parameter when selecting potential areas for conservation (Rodriguez-Ferraro and Blake, 2008). Areas in which the target species are common or abundant should be given priority to ensure viable populations in the long term. The present study site had notably high densities of endemic and proposed endemic bird species. Sri Lanka wood pigeon, a species classified as vulnerable by BirdLife International (2012), had the lowest density among the endemics. Almost all of these endemic species require well-wooded areas for their survival (BirdLifeInternational, 2012).

According to Simpson's index, the Dekinda forest had a higher avifaunal diversity compared with the home gardens. This index was chosen over the more popular Shannon index because Simpson's index is less sensitive to sample size (Magurran 2004; Van Dyke, 2008), and because Simpson's index is one of the most meaningful and robust diversity measurements available (Magurran, 2004). Furthermore, it is more effective than species accumulation curves in ranking communities (Magurran, 2004). According to Simpson evenness, Dekinda had a higher degree of evenness in species abundances in terms of bird species than the home gardens. In terms of avifaunal diversity, Simpson's index (D) was 0.0245 for Dekinda forest reserve and 0.0401 for home gardens. Simpson's index gives a higher value for habitats with lower diversities. The calculated value of Simpson's measure of evenness was 0.7284 for Dekinda and 0.5541 for home gardens. In Simpson's evenness, the higher the value, the higher the evenness; hence indicating that Dekinda had a comparatively higher evenness of bird species than the nearby home gardens. This means that in Dekinda, not only the bird species diversity is higher, but also they are distributed more or less evenly in this habitat. This highlights the importance of protecting the forest fragments such as Dekinda that intermingle with agricultural landscapes. Thus, the present study agrees with previous records which indicate that the type of vegetation adjacent to forest fragments had a significant impact on the composition of the bird community inhabiting them (Estades and Temple, 1999). Opdam *et al*. (1985) found that in forest patches surrounded by agricultural landscapes, the degree of isolation was shown to affect the number of bird species restricted to mature woods. Therefore, the nearby forest patches, including Motana Reserve and Alagalla Reserve, will help in maintaining viable populations of the endemic, proposed endemic as well as other resident bird species. Having such forest patches will also help the migratory species. However, during the period in which the present study was conducted, migratory species were not present (as it was mostly off-season for them). Hence, further studies are recommended to study the diversity, abundance, and composition of migratory bird

fauna in this area.

The present study recorded five species of raptors (diurnal birds of prey). In addition, at least three species of owls have been recorded previously from Dekinda (pers. obs.). The rare forest eagle-owl (*Bubo nipalensis)* has also been recorded (A. A. Jinarathne, pers. comm.). The Dekinda forest reserve supports a comparatively high number of raptors and owl species and this indicates the presences of other small animals whom they prey upon, since these carnivorous species are at the top of the avian food chain in any ecosystem. To maintain a high level of diversity of top level carnivores, an ecosystem must support a high abundance of prey species (Paine, 1966).

In addition to the high diversity of bird species, the forest also supports a large number of mammal species, of which the rare Indian pangolin (*Manis crassicaudata)* is a notable species. The present study highlights the importance of protecting such remaining forest patches in order to maintain high avifaunal diversity. The bird species that are considered as habitat specialists are benefited from having such forest patches. In light of the present data, given the importance of this forest as a watershed area, and the large number of vertebrate species it supports, Dekinda Forest Reserve is undoubtedly an important site for biodiversity conservation.

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Appendix 1. Estimated densities of bird species recorded from Dekinda Forest Reserve (sorted by abundance; *=endemic species; †=proposed endemic species; all others are indigenous species)

Species		Feeding habit	Density (km^{-2})
Red-vented Bulbul	*Pycnonotus cafer*	Frugivore, insectivore	99
Oriental White-Eye	*Zosterops palpebrosus*	Insectivore, nectarivore	88
Tickell's Blue Flycatcher	*Cyornis tickelliae*	Insectivore	81
*Yellow-fronted Barbet	*Megalaima flavifrons*	Frugivore	79
Common Myna	*Acridotheres tristis*	Frugivore	78
Brown-headed Barbet	*Megalaima zeylanica*	Frugivore	78
†Sri Lanka Small Barbet	*Megalaima rubricapilla*	Frugivore	78
*Sri Lanka Lorikeet	*Loriculus beryllinus*	Frugivore, nectarivore	70
Spotted Dove	*Streptopelia chinensis*	Grainivore, frugivore	63
Yellow-browed Bulbul	*Iole indica*	Frugivore, insectivore	56
Black Bulbul	*Hypsipetes leucocephalus*	Frugivore, insectivore	52
Rose-ringed Parakeet	*Psittacula krameri*	Frugivore	50
Indian Hill Myna	*Gracula indica*	Frugivore	49
Large-billed Crow	*Corvus macrorhynchos*	Omnivore	45
Purple-rumped Sunbird	*Nectarinia zeylonica*	Nectarivore, insectivore	38
Small Minivet	*Pericrocotus cinnamomeus*	Insectivore	35
Red-backed Woodpecker	*Dinopium benghalense*	Insectivore	34
Small Flowerpecker	*Dicaeum erythrorhynchos*	Frugivore	33
Black-headed Oriole	*Oriolus xanthornus*	Frugivore, insectivore	28
Asian Koel	*Eudynamys scolopacea*	Frugivore	26
Gray-necked Crow	*Corvus splendens*	Omnivore	23
Pied Flycatcher Shrike	*Hemipus picatus*	Insectivore	21
*Layard's Parakeet	*Psittacula calthorpae*	Frugivore	19
Scarlet Minivet	*Pericrocotus flammeus*	Insectivore	18
Loten's Sunbird	*Nectarinia lotenia*	Insectivore, nectarivore	18
Chestnut-headed Bee-Eater	*Merops leschenaulti*	Insectivore	18
†Sri Lanka Wood-Shrike	*Tephrodornis affinis*	Insectivore	17
Common Tailorbird	*Orthotomus sutorius*	Insectivore	16
Yellow-billed Babbler	*Turdoides affinis*	Insectivore, frugivore + other vegetable matter	15
Jerdon's Leafbird	*Chloropsis jerdoni*	Insectivore, frugivore, nectarivore	15
Indian Roller	*Coracias benghalensis*	Insectivore + other small animal eater	13
Common Coucal	*Centropus sinensis*	Insectivore + other small animal eater	12
*Sri Lanka Scimitar Babbler	*Pomatorhinus melanurus*	Insectivore	11
Common Iora	*Aegithina tiphia*	Insectivore	11
Lesser Yellow-naped Woodpecker	*Picus chlorolophus*	Insectivore	11
*Brown-capped Babbler	*Pellorneum fuscocapillus*	Insectivore	10
Emerald Dove	*Chalcophaps indica*	Grainivore, frugivore	10
Large Cuckoo Shrike	*Coracina macei*	Insectivore	10
Gold-fronted Leafbird	*Chloropsis aurifrons*	Insectivore, frugivore, nectarivore	10
White-bellied Drongo	*Dicrurus caerulescens*	Insectivore	10
†Sri Lanka Green Pigeon	*Treron pompadora*	Grainivore, frugivore	10
Gray Tit	*Parus major*	Insectivore	9
Common Hawk-Cuckoo	*Hierococcyx varius*	Insectivore, frugivore	9
†Sri Lanka Swallow	*Hirundo hyperythra*	Insectivore	9
*Sri Lanka Wood Pigeon	*Columba torringtoni*	Grainivore, fruigivore	8
Jungle Prinia	*Prinia subflava*	Insectivore	7

Species Contd.		Feeding habit	Density (km^{-2})
Black Robin	*Saxicoloides fulicata*	Insectivore	6
Plum-headed Parakeet	*Psittacula cyanocephala*	Frugivore	6
Shikra	*Accipiter badius*	Carnivore	6
White-browed Fantail	*Rhipidura aureola*	Insectivore	6
Crested Serpent-Eagle	*Spilornis cheela*	Carnivore	5
†Crimson-backed Flameback	*Chrysocolaptes stricklandi*	Insectivore	5
Drongo Cuckoo	*Surniculus lugubris*	Insectivore	4
Crested Hawk-Eagle	*Spizaetus cirrhatus*	Carnivore	4
Brahminy Kite	*Haliastur indus*	Carnivore	3
Besra Sparrowhawk	*Accipiter virgatus*	Carnivore	3

Appendix 2. Abundance of bird species recorded from Dekinda Forest Reserve and nearby home gardens (sorted by abundance in Dekinda; *=endemic species; †=proposed endemic species, all others are indigenous species)

Species		Abundance	
		Dekinda Forest	Home gardens
Red-vented Bulbul	*Pycnonotus cafer*	112	174
Oriental White-Eye	*Zosterops palpebrosus*	99	123
Tickell's Blue Flycatcher	*Cyornis tickelliae*	99	133
*Yellow-fronted Barbet	*Megalaima flavifrons*	85	70
Common Myna	*Acridotheres tristis*	78	183
Brown-headed Barbet	*Megalaima zeylanica*	77	95
†Sri Lanka Small Barbet	*Megalaima rubricapillus*	74	51
*Sri Lanka Lorikeet	*Loriculus beryllinus*	72	65
Spotted Dove	*Streptopelia chinensis*	68	143
Yellow-browed Bulbul	*Iole indica*	67	12
Black Bulbul	*Hypsipetes leucocephalus*	65	0
Rose-ringed Parakeet	*Psittacula krameri*	65	82
Indian Hill Myna	*Gracula indica*	64	12
Large-billed Crow	*Corvus macrorhynchos*	63	79
Purple-rumped Sunbird	*Nectarinia zeylonica*	63	82
Small Minivet	*Pericrocotus cinnamomeus*	62	43
Red-backed Woodpecker	*Dinopium benghalense*	58	48
Small Flowerpecker	*Dicaeum erythrorhynchos*	58	61
Black-headed Oriole	*Oriolus xanthornus*	56	49
Asian Koel	*Eudynamys scolopacea*	55	68
Gray-necked Crow	*Corvus splendens*	54	83
Pied Flycatcher Shrike	*Hemipus picatus*	52	0
*Layard's Parakeet	*Psittacula calthorpae*	50	0
Scarlet Minivet	*Pericrocotus flammeus*	50	48
Loten's Sunbird	*Nectarinia lotenia*	48	52

Species (contd.)		Abundance	
		Dekinda Forest	Home gardens
Chestnut-headed Bee-Eater	*Merops leschenaulti*	45	0
†Sri Lanka Wood-Shrike	*Tephrodornis affinis*	44	0
Common Tailorbird	*Orthotomus sutorius*	40	91
Yellow-billed Babbler	*Turdoides affinis*	40	162
Indian Roller	*Coracias benghalensis*	38	20
Jerdon's Leafbird	*Chloropsis jerdoni*	38	17
Common Coucal	*Centropus sinensis*	37	45
Common Iora	*Aegithina tiphia*	35	14
*Sri Lanka Scimitar Babbler	*Pomatorhinus melanurus*	35	36
Lesser Yellow-naped Woodpecker	*Picus chlorolophus*	33	0
*Brown-capped Babbler	*Pellorneum fuscocapillum*	32	41
Emerald Dove	*Chalcophaps indica*	30	39
Large Cuckoo Shrike	*Coracina macei*	28	7
Gold-fronted Leafbird	*Chloropsis aurifrons*	27	11
White-bellied Drongo	*Dicrurus caerulescens*	26	49
†Sri Lanka Green Pigeon	*Treron pompadora*	24	33
Gray Tit	*Parus major*	20	29
Common Hawk-Cuckoo	*Hierococcyx varius*	18	2
Sri Lanka Swallow	*Hirundo hyperythra*	16	22
Jungle Prinia	*Prinia subflava*	15	18
*Sri Lanka Wood Pigeon	*Columba torringtoni*	15	0
Black Robin	*Saxicoloides fulicata*	14	0
Plum-headed Parakeet	*Psittacula cyanocephala*	11	8
Shikra	*Accipiter badius*	9	16
White-browed Fantail	*Rhipidura aureola*	9	12
Crested Serpent-Eagle	*Spilornis cheela*	7	10
†Crimson-backed Flameback	*Chrysocolaptes striklandi*	6	0
Drongo Cuckoo	*Surniculus lugubris*	4	0
Brahminy Kite	*Haliastur indus*	2	1
Crested Hawk-Eagle	*Spizaetus cirrhatus*	2	2
Besra Sparrowhawk	*Accipiter virgatus*	1	0