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Species diversity and conservation of avifauna in three different habitat types within the Mihintale Sanctuary, Sri Lanka

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Abstract: The present study was carried out in three different habitat types within the Mihintale Sanctuary, namely aquatic, undisturbed forest and disturbed habitat from November 2008 to May 2009. The main objective of the study was to determine the species diversity and identify the threats to the birds. Line transect, point counts and opportunistic survey methods were conducted daily both in the morning and evenings. A total of 130 species of birds belonging to 47 families including 111 breeding residents, 19 winter visitors, four endemic species and four species that are being proposed as endemic species were recorded. It also included 10 rare species, one very rare winter visitor, *Zoothera citrina*, six nationally threatened and one globally threatened species, *Pelecanus philippensis*. The number of bird species that were observed in the aquatic habitat, forested habitat and the disturbed habitat were 93, 40 and 76 respectively. The results indicate that diversity of birds was significantly higher ($p<0.05$) in the aquatic habitat. It was revealed that the aquatic habitat provides more suitable niches and food resources for a wide variety of birds. Therefore, species diversity near aquatic habitat was higher compared to that of the forest. Fragmentation of forest into small patches, hunting birds for food and presence of natural predators are the major threats to the avifauna in the sanctuary. Thus, strategies should be developed to conserve the avifaunal diversity in the forest patches. The sanctuary supports different types of native bird species of Sri Lanka and is identified as one of the IBAs in Sri Lanka, it therefore plays an important role in the conservation of birds in Sri Lanka.

Keywords: Avifauna, conservation, diversity, endemic, fragmentation, Mihintale Sanctuary.

Sri Lanka's avifauna is one of the richest in the whole of Asia (Kotagama & Wijayasingha 1998). About 482 bird species were recorded of which 220 breeding residents and 26 species are endemic to the country (Kotagama et al. 2006). Sri Lanka was identified as an Endemic Bird Area (EBA 124) in 1998 (BirdLife International 2008).

Though avifaunal studies were carried out both in dry (most of the southeastern, eastern, and northern parts of the country) and wet (the mountains and the southwestern part of the country) climatic zones of Sri Lanka, majority of the previous avifaunal studies were conducted in the wet zone. There is very little information about the avifauna of the sanctuaries in the dry zone. Mihintale Sanctuary is one of the important sanctuaries located in the dry zone with very little information on its avifauna. The present study aims to identify the species diversity and conservation status of bird species in three different habitat types namely aquatic, undisturbed forest and disturbed areas within the Mihintale Sanctuary.

Materials and Methods

The Mihintale Sanctuary (as gazetted on 27/05/1938 in the Sri Lanka Government Gazette No.8370

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(Department of Government Printing 1938)), is situated in Kanadara Korale of Nuwaragam Palatha in the Anuradhapura District of the North-Central Province and encompasses an area of 2,470acres (999.6ha). There are no proper demarcated boundaries for the sanctuary. It receives an annual rainfall of 1,000–1,500 mm/year from the north-east monsoon and intermonsoons (March-April and September-October). The main source of livelihood of the residents is Chena cultivation (slash and burn) (Divisional Secretary 2007).

Mihintale Sanctuary comprises mainly of undisturbed areas of semi deciduous forest type. Scrublands, water-edge habitats, highly degraded tertiary forests, and vegetation in archaeological sites are also found. Surveys to study the avifauna in three different study sites namely, aquatic habitat and surroundings near 'Kudakirindegama Wewa' (KK) (about 6ha) (8^{0}20'36.518''N & 80^{0}31'34.034''E), Kaludiyapokuna forested area (KP) (about 05ha) (8^{0}20'51.752''N & 80^{0}30'27.498''E) and cleared up forest areas of Mihintale Hill (MH) (about 05ha) (8^{0}21'13.893''N & 80^{0}30'34.711''E) (Fig. 1) were taken up. The study was conducted from 0600–0800 hr and 1600–1830 hr in the morning and in the evening, respectively. Line transect method (200x50 m) was used for sampling terrestrial habitats while point counts were used for sampling aquatic habitats (Bibby et al. 1993). Four fixed points were selected in aquatic habitats and 20–30 minutes were spent during both the point and the transect count methods. The opportunistic observation method was used since some bird species in the sanctuary could not be observed along the line transects or points. A pair of

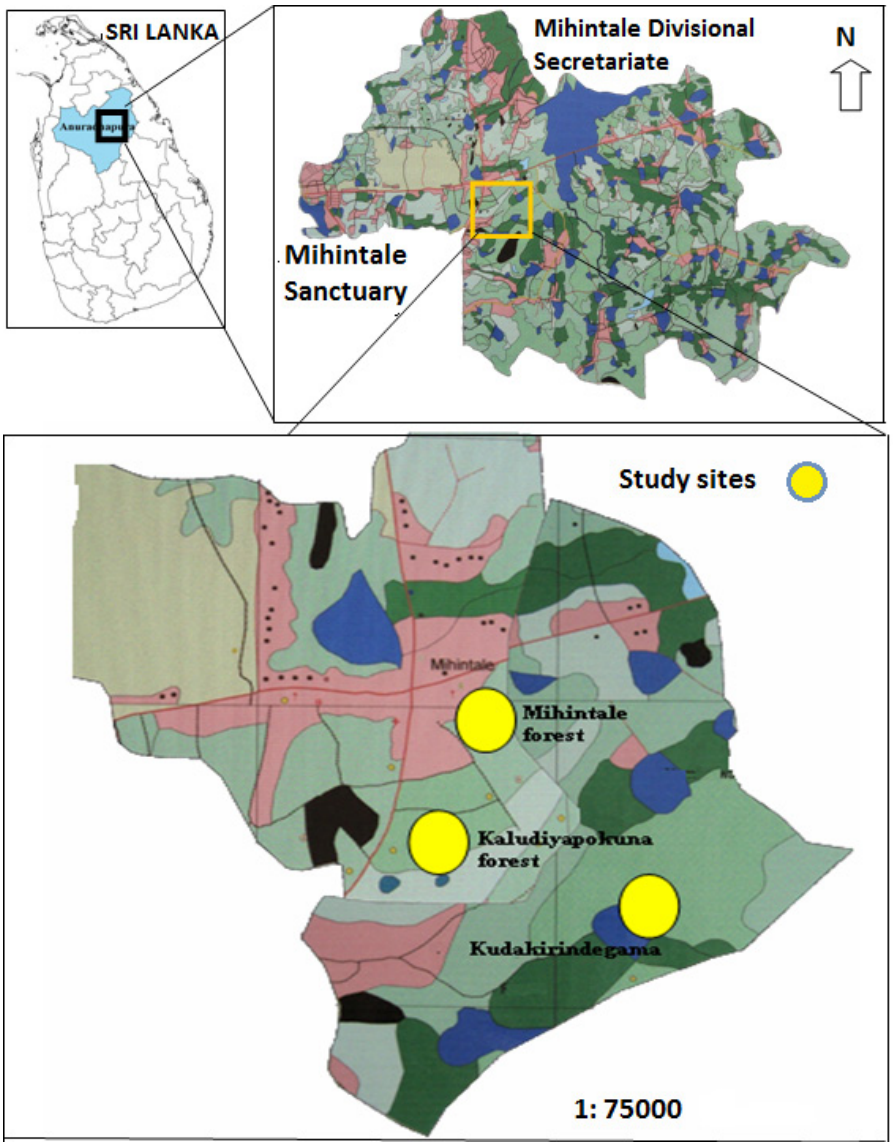

Figure 1. Sampling sites of selected habitats within the Mihintale Sanctuary

binoculars (Bushnell 13-1056C) was used to identify the birds at a distance and a tally counter was used to count the number of birds sighted. Species identification and nomenclature was based on Kotagama & Fernando (1994) and Harrison (1999).

Shannon-Wiener Diversity Index was calculated using Microsoft Excel in order to determine the species diversity. Two-way ANOVA was done to compare the avifaunal samples of each habitat using statistical software (MINITAB version 14).

Results

A total of 130 birds belonging to 47 families were recorded during the seven-month period from November 2008 to May 2009. This included 111 breeding residents, 19 winter visitors, four endemic species and four species that are proposed as endemic birds to Sri Lanka (Kotagama & Ratnavira 2010). Out of 130 birds, 58 species are very common (100% occurrence) and 61 are common, including 10 rare species, one very rare winter visitor, *Zoothera citrina* (Orange-Headed Ground Thrush), one globally threatened species, *Pelecanus philippensis* (Spot-billed Pelican) and six nationally threatened species (Table 1) (Images 1–4). The total number of bird species observed at KK, KP and MH were 93, 40 and 76, respectively. The proportions of endemic species recorded as a percentage of the total number of endemic bird species in Sri Lanka were as follows: KP 11.54% (three species), KK 11.54% (three species) and MH 7.7% (two species). Shannon Diversity Index (H') for KK, KP and MH were 3.83, 3.32 and 3.79, respectively.

The species diversity was significantly high in KK (P=0.000) than the other sites. When compared to the individual numbers in KK habitat it was significantly higher (P=0.000) than the other sites (Table 2).

The species composition in the three study areas is as shown in Fig. 2. Thirty-six (27.7%) bird species observed were confined to Kudakirindegama aquatic area (KK), 21 species (16.15%) to Mihintale disturbed area (MH) and 12 species (9.23%) were exclusive to Kaludiyapokuna forested area (KP). Thirty-three species were recorded only at KK and MH, four species were recorded only at KP and MH, six species were recorded only at KK and KP while 18 (13.85%) species were common to all the three habitats.

Copsychus malabaricus, *Nectarinia zeylonica*, *Oriolus xanthornus* are the dominant birds observed at KP. *Ardeola grayii*, *Phalacrocorax fuscicollis*, *Psittacula krameri* are some of the commonest birds observed at KK. *Pycnonotus cafer*, *Corvus macrorhynchos* and *Streptopelia chinensis* are the dominant birds identified at MH.

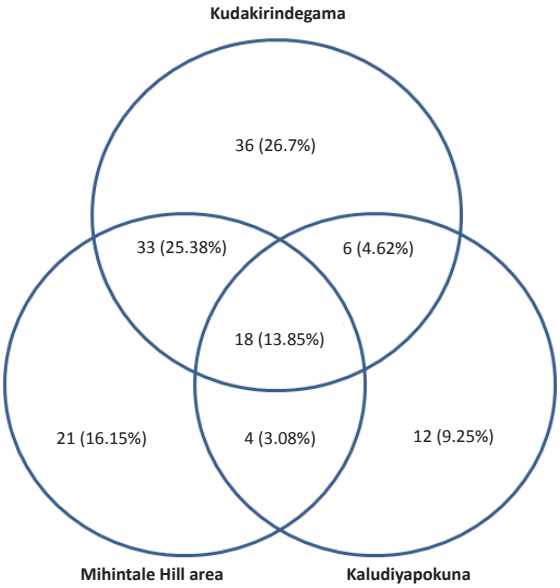

Figure 2. Species composition in different habitats within the Mihintale Sanctuary

Discussion

Out of the breeding resident species found in Sri Lanka, 48.9% were recorded within the sanctuary. So the species richness of avifauna of the whole sanctuary was quite high. However, the overall endemicity in the sanctuary was relatively low (15.4%) compared to the protected areas in the wet zone (84.6%). This is generally the expected result for dry zone habitats (Weerakoon & Goonatilleke 2007). This may be due to the absence of suitable microclimatic conditions for these endemic birds. But the wet zone rainforests provide habitats for nearly all of the country's woody endemic plants and for about three-quarters of the endemic animals (Ministry of Forestry and Environment 1999). About 20% of the winter visitors were recorded during this survey.

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). Of the three habitat types present in the sanctuary, highest species diversity was recorded in the KK (H': 3.83), while the lowest species diversity was recorded in the KP forest (H': 3.32). According to the vegetation analysis, 45% of fruiting trees were present in KK while 25% of fruiting trees were recorded in KP forest. Hence, this variation in species richness may be due to the structural changes of vegetation and the availability of food resources. Bird

Table 1. List of Avifauna in Mihintale Sanctuary

Family	Common name	Scientific name	Status	KK	KP	MH	Feeding Guild
Accipitridae	Black-winged Kite	*Elanus caeruleus*	BR, C	-	-	X	AC
	Brahminy Kite	*Haliastur Indus*	BR, VC	X	X	X	AC
	Changeable Hawk-Eagle	*Spizaetus cirrhatus*	BR, C	X	-	-	AC
	Crested Serpent Eagle	*Spilornis cheela*	BR, VC	-	X	X	AC
	Grey-headed FishEagle	*Ichthyophaga ichthyaetus*	BR, R, NT	X	-	-	AC
	Oriental Honey Buzzard	*Pernis ptilorhyncus*	M, R	X	X	-	AC
	Shikra	*Accipiter badius*	BR, VC	-	X	X	ATC
	White-bellied Sea Eagle	*Haliaeetus leucogaster*	BR, C	X	X	-	AC
Alaudidae	Oriental Skylark	*Alauda gulgula*	BR, C	-	-	X	GI
	Rufous-winged Bush-Lark	*Mirafra assamica*	BR, VC	-	-	X	GI
Alcedinidae	Black-backed Kingfisher	*Cexy erithacus*	BR, R	-	-	X	ATC
	Common Kingfisher	*Alcedo atthis*	BR, VC	X	X	X	ATC
	Stork-billed Kingfisher	*Pelargopsis capensis*	BR, C	X	-	-	ATC
	White-throated Kingfisher	*Halcyon smyrnensis*	BR, VC	X	-	X	ATC
	Pied Kingfisher	*Ceryle rudis*	BR, C	X			ATC
Anatidae	Cotton Pigmy-Goose	*Nettapus coromandelianus*	BR, C	X	-	-	P
	Lesser Whistling Duck	*Dendrocygna javanica*	BR, VC	X	-	-	P
Apodidae	Asian Palm-Swift	*Cypsiurus balasiensis*	BR, C	X	-	X	AI
	Little Swift	*Apus affinis*	BR, C	-	-	X	AI
Ardeidae	Black-crowned Night-heron	*Nycticorax nycticorax*	BR, C	X	-	-	WC
	Cattle Egret	*Bubulcus ibis*	BR, VC	X	-	X	WC
	Great Egret	*Casmerodius albus*	BR, C	X	-	-	WC
	Grey Heron	*Ardea cinerea*	BR, C	X	-	-	WC
	Indian Pond-heron	*Ardeola grayii*	BR, VC	X	-	X	WC
	Intermediate Egret	*Mesophoyx intermedia*	BR, VC	X	-	-	WC
	Little Egret	*Egretta garzetta*	BR, VC	X	-	X	WC
	Purple Heron	*Ardea purpurea*	BR, C	X	-	-	WC
Bucerotidae	Malabar Pied Hornbill	*Anthracoceros coronatus*	BR, C, NT	X	-	X	AFI
Bucerotidae	Sri Lanka Grey Hornbill	*Ocyceros gingalensis*	BR, VC, E, NT	X	X	X	AFI
Campephagidae	Bar-winged Flycatcher	*Hemipus pictatus*	BR, C	X	-	-	ABI
	Black-headed Cuckooshrike	*Coracina melanoptera*	BR, R	X	-	-	FGI
	Common Woodshrike	*Tephrodornis pondicerianus*	BR, VC, PE	X	-	X	FGI
	Large Cuckooshrike	*Coracina macei*	BR, C	-	-	X	FGI,F,N
	Small Minivet	*Pericrocotus cinnamomeus*	BR, C	X	X	X	FG,I
Capitonidae	Brown-headed Barbet	*Megalaima zeylanica*	BR, VC	X	X	X	AF
	Coppersmith Barbet	*Megalaima haemacephala*	BR, C	X	-	X	AF
	Crimson-fronted Barbet	*Megalaima rubricapilla*	BR, VC, PE	X	X	-	AF
Caprimulgidae	Common Nightjar	*Caprimulgus asiaticus*	BR, C	X	-	-	ABI
Charadriidae	Red-wattled Lapwing	*Vanellus indicus*	BR, VC	X	-	-	GI
Ciconiidae	Asian Open-Bill	*Anastomus oscitans*	BR, C	X	-	-	WC
	Painted Stork	*Mycteria leucocephala*	BR, C, NT	X	-	-	WC
	Wooly-necked Stork	*Ciconia episcopus*	BR, R	X	-	-	WC
Columbidae	Emerald Dove	*Chalcophaps indica*	BR, C	-	-	X	GS
	Green Imperial-pigeon	*Ducula aenea*	BR, C	-	-	X	AF
	Orange-breasted Green-pigeon	*Treron bicincta*	BR, C	X	-	X	AF
	Pompadour Green-pigeon	*Treron pompadora*	BR, C, PE	X	-	X	AF
	Rock Pigeon	*Columba livia*	BR, VC	-	-	X	GS
	Spotted Dove	*Streptopelia chinensis*	BR, VC	X	-	X	GS
Coraciidae	Indian Roller	*Coracias bengalensis*	BR, C	-	-	X	ABI

Family	Common name	Scientific name	Status	KK	KP	MH	Feeding Guild
Corvidae	Large-billed Crow	*Corvus macrorhynchos*	BR, VC	-	-	X	ATO
Cuculidae	Asian Koel	*Eudynamys scolopacea*	BR, VC	X	-	X	AF
	Blue-faced Malkoha	*Phaenicophaeus viridirostris*	BR, C	X	X	-	AFI
	Greater Coucal	*Centropus sinensis*	BR, VC	X	-	-	ATC
	Grey-bellied Cuckoo	*Cacomantis passerinus*	M, C	X	-	X	ABI
Dicaeidae	Pale- billed Flower Pecker	*Dicaeum erythrorhynchos*	BR, VC	X	X	X	AF
	Thick-billed Flower Pecker	*Dicaeum agile*	BR, R	-	-	X	AF
Dicruridae	White-bellied Drongo	*Dicrurus caerulescens*	BR, VC	X	-	X	ABI
Hemiprocnidae	Crested Tree-Swift	*Hemiprocne coronata*	BR, C	-	-	X	AI
Hirundinidae	Barn Swallow	*Hirundo rustica*	M, VC	X	X	X	AI
	Red-rumped Swallow	*Hirundo daurica*	BR, C	X	X	-	AI
Irenidae	Blue-winged Leafbird	*Chloropsis cochinchinensis*	BR, C	X	-	X	FGI,F,N
	Common Iora	*Aegithina tiphia*	BR, VC	X	X	X	FG,I
Jacanidae	Pheasant-tailed Jacana	*Hydrophasianus chirurgus*	BR, VC	X	-	-	WC
Laniidae	Brown Shrike	*Lanius cristatus cristatus*	M, C	X	-	-	ABI
Laridae	Whiskered Tern	*Chlidonias hybridus*	M, VC	X	-	-	AC
Meropidae	Blue-tailed Bee-eater	*Merops philippinus*	M, VC	X	-	X	ABI
	Chestnut-headed Bee-eater	*Merops leschenaulti*	BR, C	X	-	X	AI
	Little Green Bee-eater	*Merops orientalis*	BR, VC	X	-	X	ABI
Motacillidae	Forest Wagtail	*Dendronanthus indicus*	M, C	-	X	X	TI
	Paddyfield Pipit	*Anthus rufulus*	BR, VC	X	-	X	GI
	Richard's Pipit	*Anthus richardi*	M, C	X	-	X	GI
Muscicapidae	Ashy Prinia	*Prinia socialis*	BR, C	X	-	X	GI
	Asian Brown Flycatcher	*Muscicapa dauurica*	M, C	X	X	X	ABI
	Asian Paradise Flycatcher-brown	*Terpsiphone paradisi ceylonensis*	BR, C	X	X	X	ABI
	Asian Paradise Flycatcher-white	*Terpsiphone paradisi paradisi*	M, C	X	X	X	ABI
	Black-naped Monarch	*Hypothymis azurea*	BR, C	X	X	-	ABI
	Blyth's Reed Warbler	*Acrocephalus dumetorum*	M, C	-	X	-	FGI
	Common Tailorbird	*Orthotomus sutorius*	BR, VC	X	-	X	FG,I
	Dark-fronted Babbler	*Rhopocichla atriceps*	BR, C	-	X	-	TI
	Grey-breasted Prinia	*Prinia hodgsonii*	BR, C	X	-	X	GI
	Indian Robin	*Saxicoloides fulicata*	BR, VC	X	-	X	TI
	Large-billed Leaf-Warbler	*Phylloscopus magnirostris*	M, C	-	X	-	FGI
	Orange-headed Ground Thrush	*Zoothera citrina*	M, VR	-	X	-	TI
Muscicapidae	Oriental Magpie-Robin	*Copsychus saularis*	BR, VC	X	-	X	TI
	Plain Prinia	*Prinia inornata*	BR, VC	X	-	X	GI
	Sri Lanka Brown-capped Babbler	*Pellorneum fuscocapillum*	BR, C, E	-	X	-	TI
	Tawny-bellied Babbler	*Dumetia hyperythra*	BR, R	-	-	X	FGI
	Tickell's Blue Flycatcher	*Cyornis tickelliae*	BR, C	-	X	-	TI
	White-rumped Shama	*Copsychus malabaricus*	BR, VC	-	X	-	FGI
	Yellow-billed Babbler	*Turdoides affinis*	BR, VC	X	-	X	TO
	Yellow-eyed Babbler	*Chrysomma sinense*	BR, R	-	X	X	TI
	Yellowish Breasted Warbler	*Phylloscopus nitidus*	M, C	-	X	-	FGI
Nectariniidae	Long-billed Sunbird	*Nectarinia lotenia*	BR, VC	X	-	X	AN
	Purple Sunbird	*Nectarinia asiatica*	BR, VC	X	X	X	AN
	Purple-rumped Sunbird	*Nectarinia zeylonica*	BR, VC	X	X	X	AN
Oriolidae	Black-hooded Oriole	*Oriolus xanthornus*	BR, VC	X	X	X	FGI,F,N
Paridae	Great Tit	*Parus major*	BR, C	-	-	X	BGI

Family	Common name	Scientific name	Status	KK	KP	MH	Feeding Guild
Pelecanidae	Spot-billed Pelican	*Pelecanus philippensis*	BR, VC, GT	X	-	-	P
Phalacrocoracidae	Indian Cormorant	*Phalacrocorax fuscicollis*	BR, VC	X	-	-	P
	Little Cormorant	*Phalacrocorax niger*	BR, VC	X	-	-	P
	Oriental Darter	*Anhinga melanogaster*	BR, C, NT	X	-	-	P
Phasianidae	Indian Peafowl	*Pavo cristatus*	BR, C	X	X	X	TO
	Sri Lanka Jungle Fowl	*Gallus lafayetii*	BR, C, E, NT	X	X	X	TO
Picidae	Black-rumped Flameback	*Dinopium benghalense*	BR, C	X	-	-	BGI
	Brown-capped-Woodpecker	*Dendrocopos nanus*	BR, C	-	-	X	BGI
Pittidae	Indian Pitta	*Pitta brachyura*	M, C	-	X	-	TI
Ploceidae	Baya Weaver	*Ploceus philippinus*	BR, VC	X	-	-	GS
	Black-headed Munia	*Lonchura malacca*	BR, VC	X	-	-	GS
	House Sparrow	*Passer domesticus*	BR, VC	-	-	X	GS
	Scaly-breasted Munia	*Lonchura punctulata*	BR, VC	X	-	X	GS
	White-rumped Munia	*Lonchura striata*	BR, VC	-	-	X	GS
Podargidae	Frogmouth	*Batrachostomus monilieger*	BR, R	-	-	X	ABI
Podicipedidae	Little Grebe	*Tachybaptus ruficollis*	BR, C	X	-	-	P
Psittacidae	Rose-ringed Parakeet	*Psittacula kramerii*	BR, VC	X	X	X	AF,N,G,S
	Alexandra Parakeet	*Psittacula eupatria*	BR, C	X	X	X	AF,N,G,S
Pycnonotidae	Black-crested Bulbul	*Pycnonotus melanicterus*	BR, C, PE	-	X	-	AFI
	Red-vented Bulbul	*Pycnonotus cafer*	BR, VC	X	-	X	AFI
	White-browed Bulbul	*Pycnonotus luteolus*	BR, VC	X	X	X	AFI
	Yellow-browed Bulbul	*Iole indica*	BR, C	-	X	-	AFI
Rallidae	Purple Swamp hen	*Porphyrio porphyrio*	BR, VC	X	-	-	WC
	Salty-legged Crake	*Rallina eurizonoides*	M, C	X	-	-	WC
	White- breasted Water Hen	*Amaurornis phoenicurus*	BR, VC	X	-	X	WC
Scolopacidae	Marsh Sandpiper	*Tringa stagnatilis*	M, VC	X	-	-	WC
	Wood Sandpiper	*Tringa glareola*	M, VC	X	-	-	WC
Strigidae	Brown Fish-Owl	*Ketupa zeylonensis*	BR, C	-	X	-	ATC
Sturnidae	Common Mynah	*Acridotheres tristis*	BR, VC	X	-	X	ATO
Threskiornithidae	Black-headed Ibis	*Threskiornis melanocephalus*	BR, VC	X	-	-	WC
Turnicidae	Barred Buttonquail	*Turnix suscitator*	BR, C	-	-	X	TO
Zosteropidae	Oriental White-eye	*Zosterops palpebrosa*	BR, VC	X	-	X	FGI,F,N
47		**130 species (4 endemics)**		**96**	**40**	**76**	

Feeding Guild: ABI - Arboreal Insectivore; AI - Areal Insectivore; FGI - Foliage Gleaning Insectivore; BGI - Bark-Gleaning Insectivore; TI - Terrestrial Insectivore; GI - grassland Insectivore; AC - Aerial Carnivore; ATC - Arboreal-Terrestrial Carnivore; WC - Wading Carnivore; AN - Arboreal Nectarivore; AF - Arboreal Frugivore; AFNGS - Arboreal Frugivore, Nectarivore, Granivore, Seed-eater; GS - Granivore, Seed-eater; AFI - Arboreal Frugivore, Insectivore; FGIFN - Foliage Gleaning Insctivore, Frugivore, Nectarivore; ATO - Arboreal-Terrestrial Omnivore; TO - Terrestrial Omnivore; P - Psicivore.
Status: BR - Breeding Resident; M - Migrant; VC - Very Common; C - Common; R - Rare; VR - Very Rare; E - Endemic; PE - Proposed Endemic; GT - Globally Threatened; NT- Nationally Threatened.

species distribution of an area may also depend on the insect and biomass of the area (Holmes & Sherry 1997). These factors may change due to human influences, climatic and topographic conditions of the area.

Kudakirindegama area is composed of mainly aquatic habitat and is surrounded by many habitat types including grasslands, scrub forest, paddy fields etc. These habitat types provide suitable niches and food resources for many types of birds. Daniels (1989) found an increase in bird species diversity when forests are disturbed, as in disturbed forests fewer specialist species and more generalist species are seen, as was observed in MH where the species richness was high (76 bird species) compared to KP. This can be attributed to the fact that the primary habitat of KP area is rocky due to which availability of food resources is low although in certain areas there is presence of good amount of leaf litter.

Table 2. Comparison of the total number of species and individuals of the avifauna at the three habitat types

Sites		P value
Total number of Species	KK*KP*MH	P=0.000*
	KK*MH	P=0.065
	KK*KP	P=0.000*
	KP*MH	P=0.001*
Total number of Individuals	KK*KP*MH	P=0.000*
	KK*MH	P=0.078
	KK*KP	P=0.001*
	KP*MH	P=0.002*

KK - Kudakirindegama; KP - Kaludiyapokuna; MH - Mihintale Hill area

Since understory birds are the most sensitive to disturbances in forest structure, they ought to be reliable indicators of forest regeneration (Wong 1985). Among tropical forest birds, understory insectivores are particularly sensitive to habitat disturbance and fragmentation (Sekercioglu et al. 2002). So the bird species like *Zoothera citrina, Rhopocichla atriceps, Acrocephalus dumetorum, Pellorneum fuscocapillum, Cyornis tickelliae, Copsychus malabaricus* etc, which are found only in KP forested area can be considered as indicator species for forest fragmentation and disturbance.

Bird species like *Columba livia, Corvus macrorhynchos, Hemiprocne coronata, Parus major, Passer domesticus, Lonchura striata* are confined to MH disturbed area and since they live in disturbed habitats are able to tolerate all the disturbances and pollution caused to the habitat. Fragmentation of large tracks of natural ecosystems in to small patches is one of the major impediments to long term conservation of biodiversity. Improper land use planning is the primary cause of fragmentation. Fragmentation also results in the reduction of species richness as species richness is dependent on the extent of the habitat (Rodrigo 2007). The forest of Kaludiyapokuna is fragmented in to small patches by the land use practices of nearby villagers. Which could be a reason for lowest species diversity (H': 3.32) in KP, and also bird species like *Zoothera citrina, Rhopocichla atriceps, Pellorneum fuscocapillum* were observed in low numbers in this habitat due to the low extent of the forest habitat.

Lack of demarcation of boundaries is one of the major reasons for the increased human activities within the sanctuary. Therefore proper boundaries should be established and manned to minimize this human encroachment. Although the sanctuary harbours large

Image 1. *Mycteria leucocephala*

Image 2. *Gallus lafayetii*

Image 3. *Anhinga melanogaster*

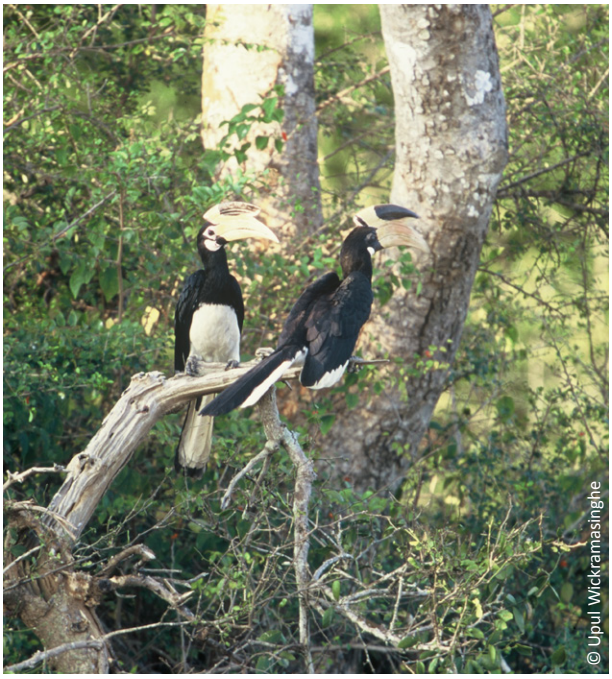

Image 4. ***Anthracoceros coronatus***

number of birds, a proper conservation action plan is not in place and as this area is also an archeological site it is frequently subjected to the mining or excavation. There is no adverse effect to the habitat by tourists who visit the sanctuary in general. But the pressure is intense on the days of the main festival during the month of June.

Conclusions

The Brown-capped Babbler (*Pellorneum fuscocapillum*), is endemic to Sri Lanka, and birds such as this species need to be conserved by taking steps to reduce habitat fragmentation. Strategies should be developed to conserve the bird diversity that exists in the forest patches and further research is needed to help conserve the forest fragments.

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