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A STUDY OF THE AVIFAUNA IN A RURAL AGRICULTURAL AREA IN KANDY DISTRICT, SRI LANKA

Manjula Wijesundara.
Council & Academic Division, University of Peradeniya.

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Author(s):
Manjula Wijesundara.

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Corresponding Author:
Manjula Wijesundara.
Council & Academic Division,
University of Peradeniya.

E-mail: mwijesundara@yahoo.com

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Abstract

Birds, undoubtedly, are the most fascinating forms of terrestrial life on Earth for the majority of humans. Even the prehistoric man, apparently, was amused by the birds, as is evidenced by the cave paintings of Cro-Magnon men in Altamira in Spain and Lascaux in France (Gooders, 1990). Birds are also depicted in the rock paintings of Australian aborigines (Baran & Martin, 2005) and Bushmen of the Kalahari Desert in South Africa. Avifauna of Sri Lanka is spectacularly diverse, with no less than 450 species on record as at present (including vagrants). Of these, some 237 species are breeding residents and the rest are migrants (species that come to Sri Lanka in search of mild climes during the northern winter).

KeyWords: *Birds,Sri Lanka, Avifuana..*

INTRODUCTION

The Agricultural Ecosystem in Menkdiwela

This area is dominated by rolling tea plantations, well-wooded cultivation (see below), and paddy fields, presenting a moderate degree of habitat heterogeneity. Clove (*Syzygium aromaticum* [karambu]), nutmeg (*Myristica fragrans* [sadikka]) and coffee (*Coffea arabica*) are commonly found in the wooded cultivation, along with jak (*Artocarpus heterophyllus* [kos]), breadfruit (*A. altilis* [rata del]), durian (*Durio zibethinus*), mangosteen (*Garcinia mangostana* [mangus]), toddy palm (*Caryota urens* [kitul]), areca palm (*Areca catechu* [puwak]) and coconut (*Cocos nucifera* [pol]). It is the experience of the present author that these areas of wooded cultivation, which hold a considerable degree of dendrological diversity, provide home for a host of forest-loving birds, including the Ceylon woodpigeon (*Columba torringtonii*), yellow-browed bulbul Figure 2 (*Iole indica*), lesser hill myna (*Gracula indica*), and scimitar babbler (*Pomatorhinus horsfieldii*).

Dadap (*Erythrina variegata* [erabadu]), *Gliricidia sepium* [wetahiriya], *Albizia falcataria* [rata mara], and *Grevillea robusta* [sabukku] are planted in tea plantations as shade trees. Tall trees like *A. falcataria* (up to 20m in height) provide vantage points for raptors such as crested serpent eagle Figure 4, (*Spilornis cheela*) and they also serve as calling posts for common hawk cuckoos (*Hierococcyx varius*) to advertise themselves during the breeding season. When they are in bloom, dadap trees attract many birds and their flowers are pollinated chiefly, if not exclusively, by them (Ali, 2002) because its scarlet flowers produce nectar that many birds find very tempting. Birds are readily attracted to red flowers and, indeed, most ornithophillous[1] flowers are red (Rodríguez-Gironés & Santamaría, 2004). The present author has observed leafbirds, bulbuls, and sunbirds feast on dadap flowers. Its soft dead wood is often chosen by woodpeckers and barbets to excavate their nest-holes (Henry, 1971). In certain places there are small patches of trees surrounded by tea plantation Figure 13. *Ficus fergusonii* [kos gona] trees in such patches, with small bead-like syconia[2] along the branchlets that turn red when ripe, also attract many birds such as the Ceylon green pigeon (*Treron pompadora*), barbets (*Megalaima* spp.), the red-vented bulbul (*Pycnonotus cafer*), the black-headed oriole Figure 7, (*Oriolus xanthornus*), and the lesser hill myna (*Gracula indica*). On certain misty mornings and towards dusk the present author has even encountered the Ceylon woodpigeon in these patches of trees, whose eerie and owl-like hooting call often betrayed its presence. Small patches of grass in tea plantation support birds such as munias (*Lonchura* spp.), wren-warblers (*Prinia* spp.), and the white-throated babbler (*Dumetia hyperythra*).

[1] The term 'ornithophily' is used to describe the form of pollination that is primarily brought about by nectar-loving birds (Greek: *ornis*, *ornith-*, a bird; *philein*, to love; *philos*, loving).

[2] The composite fruits of plants of the genus *Ficus*. Singular, syconus.

Figure 1: Satelite image of the agricultural ecosystem selected for the study. Location (pointer; top right corner): 7° 17' N, 80° 29' E. Altitude: about 500m above sea level. Eye altitude: 4326 ft (1318.5m). Legend: Tea = tea Plantation; WC= Wooded Cultivation; PF=Paddy Fields.
Source: Google Earth; (c)EuropaTechnologies

Figure 2: Yellow-browed Bulbul

Order Ciconiiformes; Family Ardeidae
Little Egret *Egretta garzetta* (R)

Figure 3: Pompadour Green Pigeon (female)

Home gardens were not taken into account since they were more or less consistent with either the wooded cultivation or tea plantation. In fact, the areas of wooded cultivation are extended home gardens themselves (Kandyan forest gardens).

The present author has observed (or recognized the calls) and positively identified more than 90 species of birds in this agricultural ecosystem during a period of about 15 years and these are given in the list below.

Birds observed by the present author in the agricultural ecosystem since 1990.

Abbreviations: R - Resident Species, E - Resident (Endemic) Species, M - Migrant Species

Order Pelecaniformes; Family Phalacrocoracidae

1. Little Cormorant *Phalacrocorax niger* (R)
2. Median Egret *Egretta intermedia* (*Mesophoyx intermedia*) (R)
3. Cattle Egret *Bubulcus ibis* (R)
4. Indian Pond Heron *Ardeola grayii* (R)

Order Falconiformes; Family Accipitridae

5. Besra Sparrowhawk *Accipiter virgatus* (R)
6. Shikra (Indian Sparrowhawk)*Accipiter badius* (R)
7. Crested Serpent Eagle *Spilornis cheela* (R)
8. Crested Hawk Eagle *Spizaetus cirrhatus* (R)
9. Brahminy Kite *Haliastur indus* (R)

Order Gruiformes; Family Rallidae

10. Slaty-breasted Rail *Rallus striatus* (R)
11. White-breasted Waterhen *Amaurornis phoenicurus* (R)

Order Columbiformes; Family Columbidae

12. Feral Pigeon *Columba livia* (R)

Figure 4: Crested Serpent Eagle

Figure 5: Common Kingfisher

Figure 6: Small Barbet

Figure 7: Black-headed Oriole

13. Ceylon Woodpigeon *Columba torringtonii* (E)
14. Spotted Dove *Streptopelia chinensis* (R)
15. Emerald Dove *Chalcophaps indica* (R)
16. Pompadour Green Pigeon *Treron pompadora* (R)

Order Psittaciformes; Family Psittacidae

17. Ceylon Lorikeet *Loriculus beryllinus* (E)
18. Alexandrine Parakeet *Psittacula eupatria* (R)
19. Rose-ringed Parakeet *Psittacula krameri* (R)
20. Plum-headed Parakeet *Psittacula cyanocephala* (R)

Order Cuculiformes; Family Cuculidae

21. Asian Koel *Eudynamys scolopaceus* (R)
22. Greater Coucal *Centropus sinensis* (R)
23. Common Hawk Cuckoo Figure8, *Hierococcyx varius* (R, M)
24. Drongo Cuckoo *Surniculus lugubris* (R)
25. Chestnut-winged Cuckoo *Clamator coromandus* (M)

Order Strigiformes; Family Strigidae

26. Collared Scops Owl *Otus bakkamoena* (R)
27. Brown Hawk Owl *Ninox scutulata* (R)
28. Brown Fish Owl *Ketupa zeylonensis* (R)
29. Brown Wood Owl *Strix leptogrammica* (R)

Order Coraciiformes; Family Alcedinidae

30. White-breasted Kingfisher *Halcyon smyrnensis* (R)
31. Three-toed Kingfisher *Ceyx erithaca* (R)
32. Common Kingfisher *Alcedo atthis* (R)

Order Coraciiformes; Family Meropidae

33. Chestnut-headed Bee-eater *Merops leschenaultia* (R).

Order Coraciiformes; Family Coraciidae

34. Indian Roller *Coracias benghalensis* (R)

Order Apodiformes; Family Apodidae

35. Asian Palm Swift *Cypsiurus balasiensis* (R)
36. White-rumped Swift *Apus affinis* (R)
37. Indian Swiftlet *Aerodramus unicolor* (R)

Order Piciformes; Family Capitonidae

38. Small Barbet Figure 6, *Megalaima rubricapilla* (R)
39. Yellow-fronted Barbet *Megalaima flavifrons* (E)
40. Brown-headed Barbet *Megalaima zeylanica* (R)

Order Piciformes; Family Picidae

41. Lesser Yellow-naped Woodpecker *Picus*

Figure 8: Common Hawk Cuckoo (juvenile)

Figure 9: Indian Scimitar Babbler

Figure 10: Tickell's Blue Flycatcher

Figure 11: Crested Serpent Eagle

chlorolophus (R)
42. Red-backed Woodpecker *Dinopium benghalense* (R).
43. Crimson-backed Woodpecker *Chrysocolaptes strickland* (E)

Order Passeriformes; Family Hirundinidae
44. Red-rumped Swallow *Hirundo daurica* (E)
45. Barn Swallow *Hirundo rustica* (M)

Order Passeriformes; Family Motacillidae
46. Forest Wagtail *Dendronanthus indicus* (M)
47. Grey Wagtail *Motacilla cinerea* (M)

Order Passeriformes; Family Campephagidae
48. Large Cuckooshrike *Coracina macei* (R)
49. Black-headed Cuckooshrike *Coracina melanoptera* (R).
50. Small Minivet *Pericrocotus cinnamomeus* (R)
51. Orange Minivet *Pericrocotus flammeus* (R)
52. Pied Flycatcher-Shrike *Hemipus picatus* (R).

Order Passeriformes; Family Laniidae
53. Brown Shrike *Lanius cristatus* (M)

Order Passeriformes; Family Artamidae
54. Ashy Woodswallow *Artamus fuscus* (R)

Order Passeriformes; Family Pycnonotidae
55. Red-vented Bulbul *Pycnonotus cafer* (R)
56. White-browed Bulbul *Pycnonotus luteolus* (R)
57. Yellow-browed Bulbul *Iole indica* (R)
58. Black Bulbul *Hypsipetes ganeesa* (R)

Order Passeriformes; Family Irenidae

59. Common Iora *Aegithina tiphia* (R)
60. Jerdon's Leafbird *Chloropsis jerdoni* (R)
61. Golden-fronted Leafbird *Chloropsis aurifrons* (R)

Figure 12 : A small patch of trees surrounded by tea plantation

Table 13: This openbill stork (*Anastomus oscitans*) with a snail (probably a *Pila*) in its beak was observed, with several other birds of the same species, by the author in an abandoned rice field at Danture, some 2 km away from the agro-ecosystem selected for the present study. Several years ago, this bird was not met with in the lower hills although fairly common in the lowlands, especially in the dry zone (Henry, 1971; Harrison & Worfolk, 1999). It seems that the species is gradually extending its range to higher altitudes. The openbill is the only Indian stork that breeds well in human-disturbed areas (Rasmussen & Anderton, 2005).

Order Passeriformes; Family Oriolidae

62. Black-headed Oriole *Oriolus xanthornus* (R)

Order Passeriformes; Family Turdidae

63. Oriental Magpie Robin *Copsychus saularis* (R)
64. Black Robin *Saxicoloides fulicata* (R)

Order Passeriformes; Family Pittidae

65. Indian Pitta *Pitta brachyura* (M)

Table 14: Nest of streaked fantail warbler among mature paddy Inset: Streaked Fantail Warbler (*Cisticola juncidis*)

Order Passeriformes; Family Timaliidae

66. Brown-capped Babbler *Pellorneum fuscocapillum* (E)
67. Indian Scimitar Babbler Figure 9 *Pomatorhinus horsfieldii* (R).
68. White-throated Babbler *Dumetia hyperythra* (R)
69. Yellow-billed Babbler *Turdoides affinis* (R)

Order Passeriformes; Family Sylviidae

70. Blyth's Reed Warbler *Acrocephalus umetorum* (M)
71. Grey-breasted Wren-Warbler *Prinia hodgsonii* (R)
72. White-browed Wren-Warbler *Prinia inornata* (R)
73. Streaked Fantail Warbler *Cisticola juncidis* (R)
74. Common Tailorbird *Orthotomus sutorius* (R)
75. Green Tree Warbler *Phylloscopus trochiloides* (M)
76. Large-billed Tree Warbler *Phylloscopus magnirostris* (M)

Order Passeriformes; Family Monarchidae

77. *a.* Ceylon Paradise Flycatcher *Terpsiphone paradisi ceylonensis* (R)
b. Indian Paradise Flycatcher *Terpsiphone paradisi paradisi* (M)
78. White-browed Fantail *Rhipidura aureola* (R)

Order Passeriformes; Family Muscicapidae

79. Asian Brown Flycatcher *Muscicapa dauurica* (M)
80. Brown-breasted Flycatcher *Muscicapa muttui* (M)
81. Tickell's Blue Flycatcher *Cyornis tickelliae* (R)

Order Passeriformes; Family Paridae

82. Grey Tit (Great Tit) *Parus major* (R)

Order Passeriformes; Family Dicaeidae

83. Small Flowerpecker *Dicaeum erythrorhynchos* (R)

Order Passeriformes; Family Nectariniidae

84. Purple-rumped Sunbird *Nectarinia zeylonica* (R)
85. Loten's Sunbird *Nectarinia lotenia* (R)

Order Passeriformes; Family Zosteropidae

86. Oriental White-eye Figure12 *Zosterops palpebrosa* (R)

Order Passeriformes; Family Estrildidae

87. White-rumped Munia *Lonchura striata* (R)
88. Scaly-breasted Munia *Lonchura punctulata* (R)
89. Black-throated Munia *Lonchura kelaarti* (R)

Order Passeriformes; Family Ploceidae

90. House Sparrow *Passer domesticus* (R)

Order Passeriformes; Family Dicruridae

91. White-bellied Drongo *Dicrurus caerulescens* (R)

Order Passeriformes; Family Sturnidae

92. Lesser Hill Myna *Gracula religiosa* (R)
93. Common Myna *Acridotheres tristis* (R)

Order Passeriformes; Family Corvidae

94. Large-billed Crow *Corvus macrorhynchos* (R)
95. Grey-necked Crow *Corvus splendens* (R)

DISCUSSION

Present study revealed that if sufficient heterogeneity with adequate areas of tree cover is maintained an agricultural ecosystem can support a considerable diversity of birdlife. Even though large-scale modern agriculture is detrimental to wild birds as it creates large areas of homogeneous vegetation, man-made ecosystems with a rich interspersion of wooded and open areas have been found to have high population densities of birds (see, for example, Welty 1962 [table]). Studies in Europe and North America have also shown that habitat heterogeneity is associated with higher biodiversity in the farmed landscape (Sanjit, 2005).

In terms of avifaunal species diversity areas of wooded cultivation (Kandyan forest gardens and adjoining wooded areas) may be said to be analogous with, although not quite the same as, a forest ecosystem. A similar phenomenon has been observed by Esufali (1998) in the Illukkumbura region of the Knuckles range where it was observed that home gardens, which were well-wooded and analogous to or essentially the same as, wooded cultivation of the present agricultural ecosystem, harbored a fairly high degree of avifaunal diversity. The author further states that of all the species recorded 70% spent some time in closed canopy forest habitats. In the present study such species comprised 65% of the total number of recorded species.

Lowest diversity and highest dominance was observed in paddy fields where cattle egret (*Bubulcus coromandus*) was the dominant species. Species diversity of tea plantation was closer to that of wooded cultivation. Within the tea plantations, also, some heterogeneity could be observed with scattered patches of trees interspersed with larger areas of tea. Highest evenness and therefore the lowest dominance were observed in wooded cultivation.

The most abundant bird in wooded cultivation and roadside environments was the yellow-billed babbler (*Turdoides affinis*). In tea plantation, the pompadour green pigeon Figure 3, (*Treron pompadora*) was observed in a higher abundance where the babbler ranked 2nd, followed by the red-vented bulbul (*Pycnonotus cafer*) and the spotted dove (*Streptopelia chinensis*). In wooded cultivation Tickell's blue flycatcher (Figure 11) ranked 2nd followed by the pompadour green pigeon and spotted dove. Large-billed crow was observed frequently by the roadside (rank 3) but in other habitats it had much lower ranks (19th in wooded cultivation and tea plantation; 40th in paddy fields).

Paddy field habitat is clearly distinct from the other four as it holds the least amount of tree cover and bird species diversity. This habitat also has the highest dominance. A comparatively higher abundance and species diversity of carnivores were observed in the paddy fields, where they comprised some 37% of the total number of species recorded. Bambaradeniya (2000) observed a similar phenomenon in an irrigated paddy field ecosystem in Kurunegala district, followed by insectivores. In the paddy fields of the present agricultural ecosystem, however, insectivores ranked equal to carnivores in terms of the number of species. But the abundance of the latter was higher. Even though the lowest number of species was recorded in paddy fields during the present study, as Bambaradeniya (2000) points out, the avifaunal composition of a paddy field varies through vegetative, reproductive, and ripening stages of paddy. Therefore, on a temporal scale even monoculture ecosystems can turn out to be dynamic. For example, zitting cisticola or streaked fantail warbler Figure 14 (*Cisticola juncidis*) was not recorded when field observations were carried out for the present study. During that time the fields had not been ploughed or the rice plants were at a young stage of growth. During a subsequent visit (during early August 2008) the author observed a pair of these birds and photographed their nest built among mature paddy, fastened to the blades with cobwebs. It was also noticed that the fields were devoid of egrets, except for a lone pond heron here and there. Obviously, the soil invertebrate fauna (on which the egrets had depended) has now given way to the invertebrate fauna of the rice plants, paving way for the gleaning insectivores. Such temporal variation of avifaunal communities in agricultural ecosystems would

be an interesting area of research.

The cattle egret (Figure 14) was recorded as the most abundant bird in paddy fields followed by the Indian pond heron (*Ardeola grayii*) and the little egret (*Egretta garzetta*). Herons and egrets are useful in paddy fields as destroyers of grasshoppers, crabs, bugs, and beetles. In a study of the feeding habits of some Indian birds affecting agriculture, Mathew *et al*. (1980) have identified 28 or so genera of invertebrates, including leeches, crabs, spiders, grasshoppers, bugs, dragonflies, and flies, in the stomach contents of 30 pond herons. A preponderance of insectivorous species was observed in all habitats except paddy fields followed by omnivores.

In conclusion, it must be pointed out that heterogeneous agro-ecosystems such as those found in Sri Lanka are not as detrimental to birds as large areas of monoculture agro-ecosystems characteristic of industrialized countries. However, for such a mixed agro-ecosystem to sustain a 'healthy' avifauna, sufficient areas of tree cover must be available since it was observed that the majority of the birds recorded in both ecosystems foraged in trees. Such areas of tree cover, if of sufficient dendrological diversity, act as miniature forest analogs in maintaining the avifaunal diversity of a heterogeneous agro-ecosystem. For certain species that require open areas for feeding (e.g. herons, swallows, swifts), agro-ecosystems provide ideal habitats.

Agro-ecosystems were initially regarded as degraded environments where human interference is high, resulting in species poor landscapes. Recent studies in both temperate and neotropical countries have shown that this ecosystem can be treated as a new ecological system, which has its own distinctive biodiversity and role of habitat heterogeneity in improving agro-biodiversity using birds as indicator species can be an interesting area for research (Sanjit, 2005). The present study has shown that a heterogeneous agro-ecosystem can support an avifaunal diversity comparable to that of an equal sized forest ecosystem. Habitat heterogeneity enhances the diversity of birdlife in an agro-ecosystem because it provides a range of different foraging substrates so that a number of species with varying dietary habits can co-exist.

This openbill stork (*Anastomus oscitans*) with a snail (probably a *Pila*) in its beak was observed, with several other birds of the same species, by the author in an abandoned rice field at Danture, some 2 km away from the agro-ecosystem selected for the present study. Several years ago, this bird was not met with in the lower hills although fairly common in the lowlands, especially in the dry zone (Henry, 1971; Harrison & Worfolk, 1999). It seems that the species is gradually extending its range to higher altitudes. The openbill is the only Indian stork that breeds well in human-disturbed areas (Rasmussen & Anderton, 2005).

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