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Avifaunal Diversity on the Kasetsart University Campus, Chalermphrakiat Sakon Nakhon Province

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ABSTRACT

A study of the diversity of bird species was conducted from July 2006 until the end of June 2007 on the campus of Kasetsart University in Chalermphrakiat Sakon Nakhon province. The study involved a survey of the bird species and the production of a checklist, with conservation status and abundance. The results indicated that 79 species were present, belonging to 10 orders and 23 families, of which 53 were resident, 26 were migrant and 3 were passage migrant species. According to the Wildlife Preservation and Protection Act 2003, 76 of these species are protected. Based on the status of species listed in the Wildlife Thai Red List (2007), this area had only one threatened species. This study is the first report on bird diversity in the area. Recommendations are given for monitoring diversity and for limiting human disturbance in order to maintain biodiversity.

Keywords: birds, urbanization, fragmented habitat, conservation, biodiversity

INTRODUCTION

More than 986 bird species have been recorded in Thailand, accounting for 10% of the estimated total number of bird species found globally (Nabhitabhata *et al*., 2007; ONEP, 2007). However, between 1961 and 2006, Thailand's forest cover declined from 53 to 32% (ONEP, 2006). Forest destruction is a direct determinant leading to bird diversity loss (Sodhi and Brook, 2006). Recently in Thailand, four species of birds have been defined as extinct, and 180 species classified as threatened. Of the threatened species, 43 are defined as critically endangered, 66 as endangered and 71 as vulnerable (ONEP, 2007). Birds are considered indicator species that serve as monitors of changes in habitat (Reynaud and Thioulouse, 2000). Numerous studies have focused on the changes in bird diversity associated with urbanization (*e.g*. Reynaud and Thioulouse, 2000; Morberg, 2001; Crooks *et al*., 2004; Lim and Sodhi, 2004). In Thailand, there have been reports from Bangkok (*e.g*. Khobkhet, 2002; Round, 2008) and some urban reserves (*e.g*. Sukmasuang *et al*., 2007; Sukmasuang *et al*., 2009). The Kasetsart University campus in Chalermphrakiat Sakon Nakhon province (KUCSK) was established in 1996 and contains secondary dry dipterocarp forest. With the growth of building construction, it is becoming increasingly important to study ways in which urbanization influences biodiversity in this area. The aims of the study were to present the first record of bird species diversity and to provide a database for environmental monitoring on the campus.

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MATERIALS AND METHODS

Study site

KUCSK (17°17'16.27" N, 104°54'54" E) is located in Sakon Nakhon province, in northeastern Thailand. Of the University's 640 ha, 160 ha was established as the "72nd Anniversary of Her Majesty Queen Sirikit Dry Dipterocarp Forest Park <QSDDFP>" (KUCSK, 2004). The climatic conditions range from monsoonal tropical to semi-tropical, with a dry season from November to February and a hot wet season from March to October. The recorded mean annual rainfall ranges from 1742 to 1846 mm, falling on 138-157 days $year^{-1}$. Mean minimum and maximum temperatures range from 4° to 10°C during the cool season, and from 39° to 41°C during the hot season (Available from: http://www.sakonnakhon.go.th/breef-n.htm [Sakon Nakhon province, 2007]). The principal vegetation of QSDDFP is dry dipterocarp forest, with 202 plant species belonging to 68 families. The dominant species are: *Dipterocarpus intricatus*, *D. obtusifolius*, *D. tuberculatus*, *Shorea obtusa* and S. *siamensis* (KUCSK, 2004).

Bird survey

Research was conducted monthly from July 2006 until the end of June 2007 using the point-count method (Bibby *et al*., 1992). A total of 30 permanent, randomly located plots (coordinates determined using a Garmin model 60CSX GPS device), were situated in dry dipterocarp forest at least 100 m apart (see Figure 1; P01-P30). Surveys were conducted from 0700-1000 and 1600-1800 hours. During counts, observers recorded all birds seen or heard, both inside and outside a radius of 30 m from the plot center point (Bibby *et al*., 1992; Round and Brockelman, 1998). It took 10 min to complete the survey at each point. Direct observations were made using binoculars (10 × 40). The recorded data included: species identification using Lekagul and Round's (1991) bird guide book, the number of individuals, the time of observation, behavior and activity, and the visually estimated height above the ground.

Data analysis

The checklist showing status (resident, migrant and passage migrant) was prepared following Nabhitabhata *et al*. (2007). The status of birds was based on the Wildlife Reservation and Conservation Act B.E. 2546 (A.D.2003) and the conservation status was based on ONEP (2007). Abundance criteria modified from Gupta *et al*. (2009), were used: common (C) = recorded 10-12 times out of 12 visits; fairly common (FC) = recorded 7-9 times out of 12 visits; uncommon (UC) = recorded 4-6 times out of 12 visits; and rare (R) = recorded 1-3 times out of 12 visits.

RESULTS AND DISCUSSION

A total of 79 bird species belonging to 54 genera and 27 families were recorded. Of the 79 species, 24 were non passerine and 55 were passerine species (Table 1). Passeriformes were dominant (13 families) and the family Corvidae dominated with 14 species. Of the 79 species, 53 were resident and 26 were migrant, with three of these being passage migrant species. All of the family Nectariniidae were resident birds, including the scarlet-backed flowerpecker, the olive-backed sunbird and the purple sunbird. Most of the family Sylviidae and the warblers were winter visitors and almost all are classified as protected species by law, except for the spotted dove, peaceful dove and house sparrow. Only the red-whiskered bulbul has been given near threatened (NT) status by ONEP (2007). Nine common bird species were observed, being: the greater coucal, the spotted dove, the black-naped monarch, the common iora, the white-rumped shama, the great tit, the olive-winged bulbul, the scarlet-backed flowerpecker and the olive-backed sunbird. These results were in agreement with Srikhomthair (2000), who

Table 1 List of Birds recorded on the campus of Kasetsart University, Chalermphrakiat Sakon Nakhon province.

Common name	Species name	Status			Abundance[4]
		Res[1]	Act[2]	ONEP[3]	
Family Dendrocygnidae					
1 Lesser Whistling-duck	*Dendrocygna javanica*	R	P	-	R
Family Turnicidae					
2 Yellow-legged Buttonquail	*Turnix tanki*	R	P	-	R
Family Coraciidae					
3 Indian Roller	*Coracias benghalensis*	R	P	-	R
Family Alcedinidae					
4 Common Kingfisher	*Alcedo atthis*	M	P	-	R
5 Black-capped Kingfisher	*Halcyon pileata*	P	P	-	R
Family Meropidae					
6 Green Bee-eater	*Merops orientalis*	M	P	-	UC
7 Blue-tailed Bee-eater	*Merops philippinus*	P	P	-	R
8 Chestnut-headed Bee-eater	*Merops leschenaulti*	P	P	-	R
Family Cuculidae					
9 Plaintive Cuckoo	*Cacomantis merulinus*	R	P	-	UC
10 Asian Koel	*Eudynamys scolopacea*	R	P	R	
Family Centropodidae					
11 Greater Coucal	*Centopus sinensis*	R	P	-	C
Family Apodidae					
12 Asian Palm Swift	*Cypsiurus balasinensis*	R	P	-	UC
13 House Swift	*Apus affinis*	R	P	-	R
Family Strigidae					
14 Asian Barred Owlet	*Glaucidium cuculoides*	R	P	-	UC
Family Columbidae					
15 Spotted Dove	*Streptopelia chinensis*	R	N	-	C
16 Red Collared Dove	*Streptopelia tranquebarica*	R	P	-	R
17 Peaceful Dove	*Geopelia striata*	R	N	-	R
Family Rallidae					
18 White-breasted Waterhen	*Amaurornis phoenicurus*	R	P	-	R
Family Laridae					
19 Black-shouldered Kite	*Elanus caeruleus*	R	P	-	R
20 Crested Serpent Eagle	*Spilornis cheela*	R	P	-	R
21 Shikra	*Accipiter badius*	R	P	-	UC
Family Falconidae					
22 Common Kestrel	*Falco tinnunculus*	M	P	-	R
Family Ardeidae					
23 Chinese Pond Heron	*Ardeola bacchus*	M	P	-	R
24 Cinnamon Bittern	*Ixobrychus cinnamomeus*	R	P	R	

Table 1 List of Birds recorded on the campus of Kasetsart University, Chalermphrakiat Sakon Nakhon province (cont'd).

Common name	Species name	Status			Abundance[4]
		Res[1]	Act[2]	ONEP[3]	
Family Irenidae					
25 Asian Fairy Bluebird	*Irena puella*	R	P	-	R
Family Laniidae					
26 Brown Shrike	*Lanius cristatus*	M	P	-	R
Family Corvidae					
27 Eurasian Jay	*Garrulus glandarius*	R	P	-	R
28 Black-naped Oriole	*Oriolus chinensis*	M	P	-	R
29 Black-winged Cuckooshrike	*Coracina melaschistos*	M	P	-	R
30 Ashy Minivet	*Pericrocotus divaricatus*	M	P	-	R
31 Small Minivet	*Pericrocotus cinnamomeus*	R	P	-	FC
32 Grey-chinned Minivet	*Pericrocotus solaris*	R	P	-	R
33 Scarlet Minivet	*Pericrocotus flammeus*	R	P	-	R
34 Pied Fantail	*Rhipidura javanica*	R	P	-	R
35 Black Drongo	*Dicrurus macrocercus*	R	P	-	R
36 Ashy Drongo	*Dicrurus leucophaeus*	R	P	-	UC
37 Spangked Drongo	*Dicrurus hottentottus*	M	P	-	R
38 Greater Racket-tailed Drongo	*Dicrurus paradiseus*	R	P	-	R
39 Black-naped Monarch	*Hypothymis azurea*	R	P	-	C
40 Common Iora	*Aegithina tiphia*	R	P	-	C
Family Muscicapidae					
41 Red-throated Flycatcher	*Ficedula parva*	M	P	-	FC
42 Grey-headed Flycatcher	*Culicicapa ceylonensis*	M	P	-	FC
43 Oriental Magpie Robin	*Copsychus saularis*	R	P	-	C
44 White-rumped Shama	*Copsychus malabaricus*	R	P	-	FC
45 Common Stonechat	*Saxicola torquata*	M	P	-	R
Family Sturnidae					
46 Black-collared Starling	*Sturnus nigricollis*	R	P	-	UC
47 Common Myna	*Acridotheres tristis*	R	P	-	R
48 White-vented Myna	*Acridotheres cinereus*	R	P	-	R
Family Paridae					
49 Great Tit	*Parus major*	R	P	-	C
Family Hirundinidae					
50 Barn Swallow	*Hirundo rustica*	M	P	-	R
Family Pycnonotidae					
51 Red-whiskered Bulbul	*Pycnonotus jocosus*	R	P	NT	R
52 Sooty-headed Bulbul	*Pycnonotus aurigaster*	R	P	-	R
53 Stripe-throated Bulbul	*Pycnonotus finlaysoni*	R	P	-	FC
54 Olive-winged Bulbul	*Pycnonotus blanfordi*	R	P	-	C

Table 1 List of Birds recorded on the campus of Kasetsart University, Chalermphrakiat Sakon Nakhon province (cont'd).

Common name	Species name	Status			Abundance[4]
		Res[1]	Act[2]	ONEP[3]	
Family Cisticolidae					
55 Rufescent Prinia	*Prinia rufescens*	R	P	-	R
56 Plain Prinia	*Prinia inornata*	R	P	-	R
Family Sylviidae					
57 Oriental Reed Warbler	*Acrocephalus orientalis*	M	P	-	R
58 Common Tailorbird	*Orthotomus sutorius*	R	P	-	R
59 Dark-necked Tailorbird	*Orthotomus atrogularis*	R	P	-	R
60 Yellow-browed Warbler	*Phylloscopus inornatus*	M	P	-	UC
61 Two-barred Warbler	*Phylloscopus plumbeitarsus*	M	P	-	UC
62 Greenish Warbler	*Phylloscopus trochiloides*	M	P	-	C
63 Pale-legged Leaf Warbler	*Phylloscopus tenellipes*	M	P	-	R
64 Eastern Crowned Warbler	*Phylloscopus coronatus*	M	P	-	R
65 Puff-throated Babbler	*Pellorneum ruficeps*	R	P	-	FC
Family Alaudidae					
66 Indochinese Bushlark	*Mirafra marionae*	R	P	-	R
Family Nectariniidae					
67 Plain Flowerpecker	*Dicaeum concolor*	R	P	-	R
68 Scarlet-backed Flowerpecker	*Dicaeum cruentatum*	R	P	-	C
69 Ruby-cheeked Sunbird	*Anthreptes singalensis*	R	P	-	R
70 Olive-backed Sunbird	*Nectarinia jugularis*	R	P	-	C
71 Purple Sunbird	*Nectarinia asiatica*	R	P	-	UC
72 Little Spiderhunter	*Arachnothera longirostra*	R	P	-	R
Family Passeridae					
73 House Sparrow	*Passer domesticus*	R	N	-	R
74 Eurasian Tree Sparrow	*Passer montanus*	R	P	-	R
75 White Wagtail	*Motacilla alba*	M	P	-	R
76 Grey Wagtail	*Motacilla cinerea*	M	P	-	R
77 Richard's Pipit	*Anthus richardi*	M	P	-	R
78 Olive-backed Pipit	*Anthus hodgsoni*	M	P	-	R
79 Scaly-breasted Munia	*Lonchura punctulata*	R	P	-	R

Remarks: [1] Res = residential status, following Nabhitabhata *et al.* (2007): R = resident; M = migrant; and P = passage migrant.
[2] Status based on the Wildlife Reservation and Conservation Act B.E. 2546 (A.D.2003): P = protected species; and N = none.
[3] Status based on the Wildlife Thai Red List (2007); NT = Near Threatened species.
[4] Abundances criteria; C = Common, FC = Fairly common, UC = Uncommon, R = Rare

reported on bird diversity in a disturbed dry dipterocarp forest and discovered an almost identical species composition to the current study, but with more diversity (92 species).

Many reports have indicated that the diversity of birds increases as the size of a habitat is increased (for example, Marsden *et al*., 2001; Cook *et al*., 2002; Chaiyes *et al*., 2009). This appeared to be the case in the current study, when its size (640 ha) was compared to studies from other larger areas. Surprisingly, the great tit (*Parus major*) was a common resident in the current study, given the many reports that indicate that this species is common in the mountains in Northern Thailand (Lekagul and Round, 1991; Nabhitabhata *et al*., 2007). While the Eurasian tree sparrow was found to be rare overall in the study area, it was very common in the urban areas of the campus. Before 1991, the house sparrow had not been recorded in this area (Lekagul and Round, 1991). Nabhitabhata *et al*. (2007) reported the house sparrow in their distribution map of the campus, which was confirmed by the results of the current study. This result is further confirmed by the absence of tree-hollow nest species, such as woodpeckers and parakeets, most likely due to a lack of big trees for nesting. As was found in previous research (Pattanavibool, 1993; Poonswad, 1997), hollows occurring in live trees are an essential factor that supports the occurrence of woodpeckers and parakeets. Poonswad (1997) suggested that as a minimum, a tree of 1.3 m in height requires a trunk diameter of more than 17 cm to support tree-hollow nesting species.

Recommendations

Although this study area covered only 640 ha, the area provides an important green island (see Figure 1) to maintain local biodiversity. Managers should consider the following:

1. Future studies should continue to monitor bird diversity and the breeding habits of birds.

2. Human disturbance, such as the release of domesticated cattle into the area, tree cutting and wildlife poaching, should be strictly limited and controlled.

3. There should be an emphasis on

Figure 1 Location of the study area showing the 30 sample sites (P01 – P30).

habitat improvement including the planting of fruit trees (fig and cherry trees as food sources), the addition of artificial nests for woodpeckers and parakeets and the improvement of water resources.

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