

## BREEDING BIRDS AT THE CHITTAGONG UNIVERSITY CAMPUS OF CHITTAGONG IN BANGLADESH

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### Abstract

A study on the breeding birds in the Chittagong University Campus (CUC) of Chittagong, Bangladesh was carried out, through direct field observations during January to June 2011. Fifty-five species of birds belonging to 27 families under 11 orders were observed to breed in the CUC. A total of 819 breeding pairs of birds were recorded, of which 25 (45.45%) species were passerines and 30 (54.55%) non-passerines. Among the breeding birds, the Asian pied starling (*Gracupica contra*) was the highest in number/frequency, comprised 128 (15.63% of the total) pairs and yellow footed green pigeon (*Treron phoenicopterus*) was the lowest, 1 (0.12% of the total) pair. Among the 27 families, Family Corvidae comprised the highest number of breeding species (7, 12.73%); Family Sturnidae and Passeridae had 4 species each (7.27%); while 4 families included 3 (5.46%), 7 families had 2 (3.64%) and 14 families had only 1 (1.82%) breeding species each. The maximum nest building was recorded in April 276 (33.70%) and minimum in January 31 (3.78%). The highest number of nests were built in plants 370 (45.18%) and among the rest 279 (34.06%) in buildings, 116 (14.16%) in hill slopes, 46 (5.62%) in lampposts and 8 (0.98%) in the ground. The birds were recorded to use 32 species of plants under 20 families, of which 21 (65.63%) were indigenous and 11 (34.37%) were exotic species for breeding purpose only. Mango (*Mangifera indica*) supported the highest number of bird species for nesting about 59 (15.94%) while the second highest was coconut (*Cocos nucifera*) 52 (14.05%), and plant species like Bhadi (*Garuga pinnata*) and Pitraj (*Aphanamixis polystachya*) was the lowest species of only 1 (0.27%). Among the 370 nests, 295 (79.73%) were recorded in the indigenous plants and the rest 75 (20.27%) were in the exotic species. Habitat degradation and destruction, pollution in and around CUC, planting exotic species, human settlements, collection of litters and firewood, and occasional fires are hampering breeding activities of birds in the CUC. Necessary steps are to be taken to overcome the problems and protect their breeding and feeding habitats, and further study is needed to know detail of their breeding behaviour.

*Key words:* Breeding birds, Nesting plants, Nesting substrates, Chittagong University Campus

### Introduction

Breeding is the natural process of reproduction in the animal kingdom that is, producing of offspring for the perpetuation of the race or species. Birds breed through laying eggs by the females after mating with males and through incubating. Birds' show breeding

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activities in different means such as, calling or singing, counter-calling, territoriality, agile movements, exhibiting breeding plumage, etc. to the opposite sex and/or rivals. Breeding of birds in an area reflects the quality of that habitat. The Chittagong University Campus (CUC) is a unique place for many species of bird to live and breed. More than 150 species of birds have been recorded from the CUC (M. F. Ahsan pers. obs.), although Asmat *et al.* (1985) reported 79 species, Ahsan and Khanom (2005) recorded 92 species from the campus and Kamruzzaman *et al.* (2007) added 34 species more to the list. Recently Kabir *et al.* (2017) reported 215 species from the campus excluding 39 species which were mentioned by early authors, although these were not seen between 2007 and 2014, but the total number of breeding species has not yet been recognized. That is why, one of the author (MFA) became interested to know the number of bird species breed in the CUC area. Therefore, an attempt was taken to study the breeding birds, breeding habitats and breeding season of the birds in the CUC.

### **Materials and Methods**

The Chittagong University Campus is situated at Fatehpur, a village under Hathazari upazila of Chittagong district in Bangladesh ( $22^{\circ}27'30''$  to  $22^{\circ}29'0''$  N and  $91^{\circ}46'30''$  to  $91^{\circ}47'45''$  E). It is about 23 km north of the Chittagong city area and 3 km south-west of Hathazari upazila headquarter and the campus is quite big, consists of about 709.78 ha (1,753.88 acres) of land decked with about 72% hills, lakes, ponds and plain land with stunningly green tall trees. The CUC is one of the floristically rich areas in Chittagong. It is situated in such an ideal place where hills, valleys and plain land are interwoven which is ideal representative place for plant exploration in Chittagong district. A total of 665 plant species (550 species dicotyledons and 115 monocotyledons) under 404 genera and 126 families are found in the CUC (Alam and Pasha 1999).

The breeding birds of CUC were studied during January to June, 2011. The total CUC area was divided into four sites (S-A, S-B, S-C and S-D) for the convenience of the study (Fig. 1). S-A included the University Railway Station to Shaheed Minar through right side of the Katapahar road and from No. 1 to No. 2 gates including the surrounding areas; S-B covered the area from Shaheed Minar to Institute of Marine Sciences and Fisheries, and from Shaheed Minar to Central Field and its adjacent areas including Shaheed Abdur Rab Hall; S-C comprised of the area from Biological Faculty to Botanic Garden and its adjacent areas; and S-D encompassed Botanic Garden to Institute of Forestry and Environmental Sciences, and the University Railway Station to Shaheed Minar through the left side of Katapahar road and its adjacent areas.

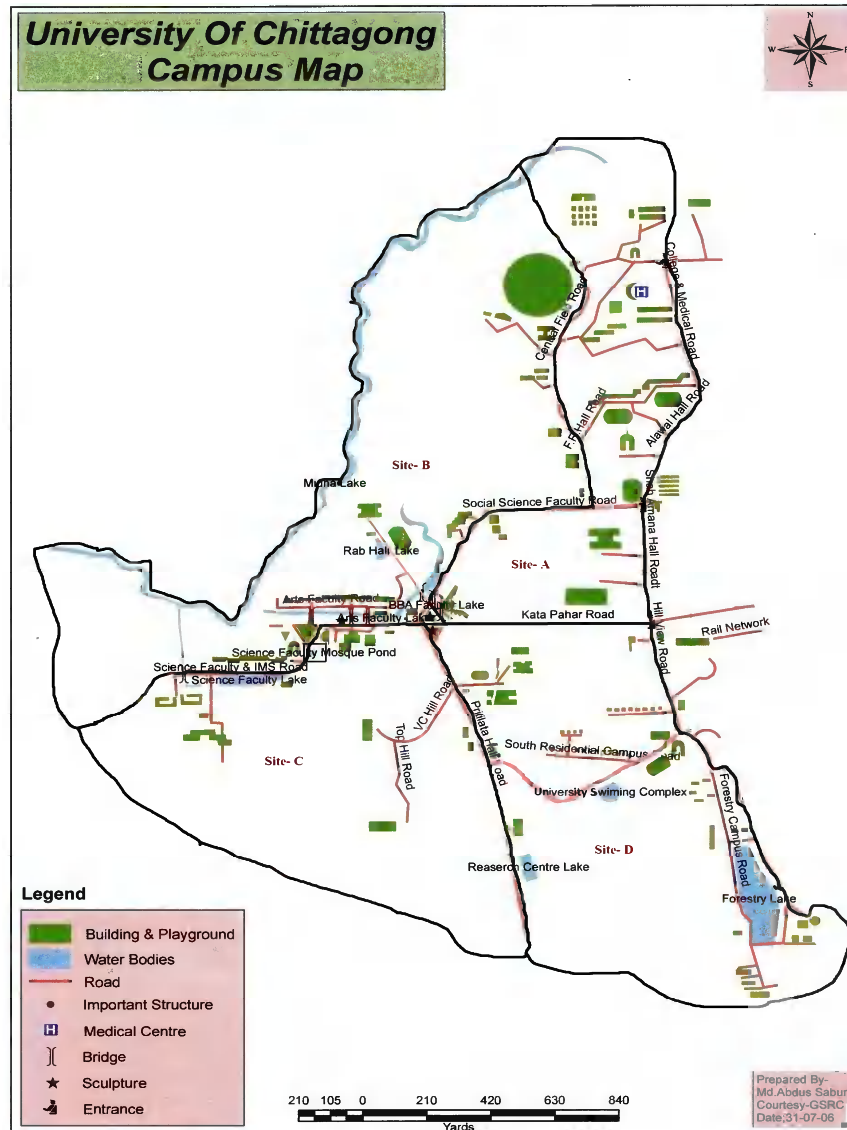


Fig. 1. Map of the CUC area with marked study sites.

Fortnight field observations were made for collecting data during the study period. Singing and calling sounds, breeding plumage, carrying nest materials and/or food for nestlings, seeing the eggs and/or nestlings, birds sitting on/in nests were considered for confirming the breeding birds in the CUC (Table 1). Besides enlisting breeding species of

birds, nest, nesting site, nesting tree and nest height from the ground were also recorded (Table 2). The birds were observed either by naked eyes and/or with the help of a pair of binoculars (Bushnell 10 × 40). A field guide book (e.g., Grimmett *et al.* 2006) was used (when necessary) for the identification of species and a digital camera (Sony Cyber shot 10.1 Mega pixels, Model no. DSC-H20) was also used for documenting photographs.

## Results

Fifty-five species of birds belonging to 27 families under 11 orders were observed to breed in the CUC during January to June, 2011 (Table 1). A total of 819 breeding pair of birds (Table 3) was recorded of which 25 (45.45%) species were passerines and 30 (54.55%) non-passerines (Table 1). Among the breeding pairs, 289 (35.3% of the total) belonged to 20 species in S-A; 143 (17.45% of the total) comprised of 23 species in S-B; 161 (19.65% of the total) included 29 species in S-C and 226 (27.6% of the total) contained 21 species in S-D (Table 2). Among the breeding species of birds, the Asian pied starling (*Gracupica contra*) was the highest in frequency, which comprised of 128 (15.63% of the total) pairs and yellow-footed green pigeon (*Treron phoenicopterus*) was the lowest, 1 (0.12% of the total) pair (Table 2).

**Table 1. Breeding bird species in the Chittagong University Campus.**

Sl. No.	Family	Scientific name	Common name	Vernacular name
<b>Non-passerine</b>				
1	Phasianidae	<i>Gallus gallus</i>	Red jungle fowl	Lal Bonmurgi
2	Picidae	<i>Dendrocopos macei</i>	Fulvous breasted woodpecker	Batabi Kathkurali
3		<i>Dinopium benghalense</i>	Lesser golden back woodpecker	Bangla Kaththokra
4	Capitonidae	<i>Megalaima lineata</i>	Lineated barbet	Dagi Boshonta
5	Coraciidae	<i>Coracias benghalensis</i>	Indian roller	Neelkanta
6	Alcedinidae	<i>Alcedo atthis</i>	Common kingfisher	Pati Machranga
7	Dalcelonidae	<i>Halcyon smyrnensis</i>	White-throated kingfisher	Dholagola Machranga
8	Cerylidae	<i>Ceryle rudis</i>	Pied kingfisher	Pakra Machranga
9	Meropidae	<i>Merops leschenaultia</i>	Chestnut-headed bee-eater	Khoiramatha Shuichora
10		<i>Merops orientalis</i>	Green bee-eater	Banaspati
11		<i>Merops philippinus</i>	Blue-tailed bee-eater	Neel-lej Shuichora
12	Cuculidae	<i>Hierococyx varius</i>	Common hawk-cuckoo	Pati Chokhgelo
13		<i>Eudynamys scolopaceus</i>	Asian koel	Kokil
14		<i>Phaenicophaeus tristis</i>	Green-billed malkoha	Shobuj Thot Malkoha
15	Centropodidae	<i>Centropus bengalensis</i>	Lesser coucal	Kukka

(Contd.)

16		<i>Centropus sinensis</i>	Greater coucal	Kana-Kua
17	Psittacidae	<i>Psittacula alexandri</i>	Red-breasted parakeet	Modna Tia
18		<i>Psittacula krameri</i>	Rose-ringed parakeet	Shobuj Tia
19	Apodidae	<i>Cypsiurus balasiensis</i>	Asian palm swift	Nakkati
20		<i>Apus nipalensis</i>	Little /House swift	Ghor Batashi
21	Tytonidae	<i>Tyto alba</i>	Barn owl	Laksmi Pecha
22	Strigidae	<i>Athene brama</i>	Spotted owl	Kutare Pencha
23	Columbidae	<i>Columba livia</i>	Rock pigeon	Jalali Kobutor
24		<i>Streptopelia chinensis</i>	Spotted dove	Tila Ghughu
25		<i>Treron phoenicopterus</i>	Yellow-footed green pigeon	Holdepa Horial
26	Rallidae	<i>Amaurornis phoenicurus</i>	White-breasted waterhen	Dahuk
27	Jacaniidae	<i>Metopidius indicus</i>	Bronze-winged jacana	Dol Pipi
28	Charadriidae	<i>Vanellus indicus</i>	Red-wattled lapwing	Lal Lotika Hot-ti-ti
29	Ardeidae	<i>Bubulcus ibis</i>	Cattle egret	Go-Bok
30		<i>Ardeola grayii</i>	Indian pond heron	Kani Bok
	<b>Passerine</b>			
31	Laniidae	<i>Lanius schach</i>	Long-tailed shrike	Lenja Latora
32	Corvidae	<i>Dendrocitta vagabunda</i>	Rufous treepie	Hari Chacha
33		<i>Corvus splendens</i>	House crow	Pati Kak
34		<i>Corvus macrorhynchos</i>	Large-billed crow	Danr Kak
35		<i>Artamus fuscus</i>	Ashy woodswallow	Metey Bonababil
36		<i>Oriolus xanthornus</i>	Black hooded oriole	Halde Pakhi
37		<i>Dicrurus macrocercus</i>	Black drongo	Kala Fingey
38		<i>Aegithina tiphia</i>	Common iora	Fatik Jal
39	Muscicapidae	<i>Copsychus saularis</i>	Oriental magpie robin	Doel
40	Sturnidae	<i>Gracupica contra</i>	Asian pied starling	Gobrey Shalik
41		<i>Sturnus malabarica</i>	Chestnut-tailed starling	Kath Shalik
42		<i>Acridotheres tristis</i>	Common myna	Bhat Shalik
43		<i>Acridotheres fuscus</i>	Jungle myna	Jhuti Shalik
44	Paridae	<i>Parus major</i>	Great tit	Tit Pankhi
45	Pycnonotidae	<i>Pycnonotus cafer</i>	Red-vented bulbul	Bulbul
46		<i>Pycnonotus jocosus</i>	Red-whiskered bulbul	Sipahi Bulbul
47	Silviidae	<i>Orthotomus sutorius</i>	Common tailorbird	Pati Tuntuni
48		<i>Garrulax ruficollis</i>	Rufous necked laughing-thrush	Lalghar Penga
49	Nectariniidae	<i>Dicaeum cruentatum</i>	Scarlet backed flowerpecker	Lalpith Fuljhuri
50		<i>Leptocoma zeylonica</i>	Purple-rumped sunbird	Begunikomor Moutushi
51		<i>Cinnyris asiaticus</i>	Purple sunbird	Beguni Moutushi
52	Passeridae	<i>Passer domesticus</i>	House sparrow	Pati Chorui
53		<i>Ploceus philippinus</i>	Baya weaver	Deshi Babui
54		<i>Lonchura malacca</i>	Black-headed munia	Kalamatha Munia
55		<i>Lonchura punctulata</i>	Scally-breasted munia	Tila Munia

Table 2. Breeding birds used different substrates and sites in the CUC.

Sl. No.	Breeding species	Breeding sites, trees and substrate used	No. of nests/ breeding pair in four sites				Total pair
			S-A	S-B	S-C	S-D	
1	Red jungle fowl	Ground in the botanic garden and chicks in the north-western part of Biological faculty & Forestry area	-	-	3	1	4
2	Fulvous-breasted woodpecker	Tree holes in *VC hill & Shaheed Minar	-	-	2	-	2
3	Lesser golden-back woodpecker	Shilkoroi and coconut tree	-	-	2	-	2
4	Linedated barbet	Mango and shilkoroi tree holes	-	-	-	2	2
5	Indian roller	Jackfruit and rice straw heap	-	2	-	-	2
6	Common kingfisher	RCMPS area and Kataphar	-	-	-	2	2
7	White-throated kingfisher	Hill slopes in Kataphar and adjacent to Shah Amanat hall	2	1	-	-	3
8	Pied kingfisher	Earth bank near central field	-	1	1	-	2
9	Chestnut-headed bee-eater	Hill slopes in Kataphar & beside the VC hill near the pond	6	-	11	17	34
10	Green bee-eater	Hill slopes in Kataphar & beside the VC hill near the pond	2	-	7	3	12
11	Blue tailed bee-eater	Hill slopes in Kataphar & beside the VC hill near the pond	11	-	23	27	61
12	Common hawk-cuckoo	Breeding call confirms breeding site	-	-	-	-	-
13	Asian koel	Breeding call confirms breeding site	-	-	-	-	-
14	Green-billed malkoha	Seen juvenile as breeding record	2	-	2	-	4
15	Lesser coucal	Botanic garden and Dolasarani area	-	-	1	1	2
16	Greater coucal	Forestry pond side	-	-	-	2	2
17	Red-breasted parakeet	Shilkoroi tree in VC hill	-	-	2	-	2
18	Rose-ringed parakeet	Shilkoroi tree in VC hill	-	-	2	-	2
19	Asian palm swift	BBA faculty roof	7	-	-	-	7
20	Little/House swift	BBA faculty roof	9	-	-	-	9
21	Barn owl	SAR hall	1	1	-	-	2
22	Spotted owl	SA and SAR halls and Science faculty.	1	2	1	-	4
23	Rock pigeon	Buildings (cornice and ventilator)	4	7	3	4	18
24	Spotted dove	Forestry pond side, gamari tree	-	-	-	3	3
25	Yellow-footed green pigeon	Shimul tree in VC hill	-	-	1	-	1
26	White-breasted waterhen	Streamline and lake adj. to SAR hall, Botanic garden, RCMPS and forestry lake	-	7	3	2	12
27	Bronze-winged jacana	Forestry pond	-	-	-	2	2
28	Red-wattled lapwing	Central field and roof of Science faculty	-	2	1	-	3
29	Cattle egret	Bamboo clump	-	7	-	7	14

(Contd.)

30	Indian pond heron	Streamline and lake adj. to SAR hall, Botanic garden, RCMPS and forestry lake	-	4	2	1	7
31	Long-tailed shrike	Small trees and bushes	-	-	2	-	2
32	Rufous treepie	Forestry pond side and juvenile in the Dolasrani area	-	-	-	3	3
33	House crow	Mango, Jackfruit, Coconut, Mahagani, Jam, Kul, Jhao trees	67	13	4	13	97
34	Large billed crow	Akashmoni	1	-	1	-	2
35	Ashy wood-swallow	Thatched roof of forestry academic building	-	-	-	6	6
36	Black hooded oriole	Juvenile	2	-	2	-	4
37	Black drongo	Shimul, kalokoroi	-	-	3	9	12
38	Common iora	Juvenile	-	-	2	-	2
39	Oriental magpie robin	Holes of building, trees and electric lamp post	1	1	2	-	4
40	Asian pied starling	Mango, jackfruit, mahagani, coconut, kalokoroi, segun, gamari, jamul, kul, jhao, carenga chikrassia trees & electric lamp post.	49	18	21	40	128
41	Chestnut-tailed starling	Holes of building and electric lamp post	7	6	14	8	35
42	Common myna	Cornices of building & holes of mango, jackfruit and jam tree	13	11	4	11	39
43	Jungle myna	Holes of building	34	17	21	11	83
44	Great tit	Holes of kul and mango tree	-	2	2	2	6
45	Red-vented bulbul	Bushes in the north-western part of biological faculty near streamline and adjacent to SA Hall	1	-	1	-	2
46	Red-whiskered bulbul	Small trees of SAR hall flower garden & Botanic garden	-	1	1	-	2
47	Common tailorbird	Small tree of SA and SAR Hall	1	2	-	-	3
48	Rufous necked laughing-thrush	Reed and bushes in the north-western part of Biological faculty near streamline	-	-	3	-	3
49	Scarlet backed flower-pecker	Small tree of SA and SAR Hall	1	1	-	-	2
50	Purple rumped sunbird	Small tree of SA and SAR Hall	1	2	-	-	3
51	Purple sunbird	Small tree of SA and SAR Hall	1	2	-	-	3
52	House sparrow	Building cornices and electric lamp post	64	23	11	17	115
53	Baya weaver	Coconut trees at Botanic garden area	-	-	-	33	33
54	Black headed munia	Juvenile, holes of electric lamp post and collecting nesting material	-	4	-	-	4
55	Scally breasted munia	Debdaru, holes of electric lamp post, Cornices of building and nesting material	-	6	-	-	6
<b>Total</b>			<b>289</b>	<b>143</b>	<b>161</b>	<b>226</b>	<b>819</b>

\*VC hill - Vice - Chancellor's hill; SA - Shah Amanat Hall; SAR - Shaheed Abdur Rab Hall; RCMPS - Research Centre for Mathematical & Physical Sciences.

**Table 3. Month-wise recorded breeding pairs at 4-site in the CUC.**

Month	Site-A	Site-B	Site-C	Site-D	Sub-total
January	16	7	4	4	31
February	23	13	9	14	59
March	57	28	39	47	171
April	91	41	65	79	276
May	53	29	40	47	169
June	27	21	29	36	113
<b>Total</b>	<b>267</b>	<b>139</b>	<b>186</b>	<b>227</b>	<b>819</b>

*Breeding habitat analysis:* The breeding birds in the CUC used nesting in trees, building hollows or holes and cornices, ground holes, ground, tree holes, electric lamp posts and roof of thatched houses. The present data (Table 4) reveal that the highest number of nests 370 (45.18%) were found in plants, the second highest was 279 (34.06%) nests in buildings, and the lowest number of nests 8 (0.98%) were located on the ground.

**Table 4. Recorded substrates of the breeding pairs in the CUC.**

Breeding substrates	Total no. of pairs	% of total pairs
Plant species	370	45.18
Buildings and walls	279	34.06
Hill slopes	116	14.16
Lamp post	46	5.62
Ground and earth bank	8	0.98
<b>Total</b>	<b>819</b>	<b>100.00</b>

The recorded nesting habitats of breeding substrates of all 55 breeding species in four sites of the CUC were located (Table 2). Seven species of birds (rock pigeon, house crow, Asian pied starling, chestnut-tailed starling, common myna, jungle myna and house sparrow) nested in all four sites in the CUC, of which the highest number of nests (128) was built by Asian pied starling and the lowest number of nests (35) was constructed by common myna (Table 2). Three sites were used for nesting by eight species of birds, two sites by 17 species and single site by 21 species. Two species of parasitic birds (common hawk cuckoo and Asian koel) were found to lay eggs in the nests of other birds.

Similar groups of species selected same site(s) for nesting, for instance, bee-eaters (chestnut-headed, green and blue-tailed) nested in sites A, C and D; Asian palm swift and house swift chosen site A. Site C was chosen by the maximum number of species (34) of



birds followed by site B preferred by 25 species, and both sites A and D were selected for nesting by 24 species of birds. Among the single site nesting birds eight species selected site C, seven species preferred site D, four species chosen site B and two species opted for site A. The maximum number of nests (289) were spotted in site A followed by 226 nests in site D, 161 nests in site C and 143 nests in site B.

House sparrow (*Passer domesticus*), jungle myna (*Acridotheres fuscus*), rock pigeon (*Columba livia*), etc. used the building hollows and cornices for constructing nests (Table 2). Bee-eaters (*Merops* spp.) and kingfishers (common kingfisher [*Alcedo atthis*], white-throated kingfisher [*Halcyon smyrnensis*] and pied kingfisher [*Ceryle rudis*]) used the self-made holes in the hill slopes, while Asian pied starling (*Gracupica contra*), house crow (*Corvus splendens*) and others used various trees like shil koroi (*Albizia lebbek*), coconut (*Cocos nucifera*), jackfruit (*Artocarpus heterophyllus*), mango (*Mangifera indica*), shimul (*Salmalia malabaricum*), jarul (*Lagerstroemia speciosa*), gamari (*Gmelina arborea*) and other large trees (Table 2). The chestnut-tailed starling (*Sturnus malabarica*) utilized mainly the electric lamp posts and building holes; while ashy wood swallow (*Artamus fuscus*), Asian palm swift (*Cypsiurus balasiensis*) and little/house swift (*Apus nipalensis*) used the thatched roofs and cornices of the buildings (Table 2). The nesting heights were from ground to several meters high and it varied even within the species.

During the study period, 370 nests of 55 species of birds were spotted in 22 plant species in the CUC, of which 295 nests were built in indigenous plant species (Table 5). The maximum number of nests (59) were found in Aam trees (*Mangifera indica*) followed by 52 on Dab/Narikel palm (*Coccus nucifera*), 52 on Kanthal trees (*Artocarpus heterophyllus*), and the lowest number of nest (1) was found in Bhadi (*Garuga pinnata*) and Pitraj (*Aphanamixis polystachya*) trees (Table 5). On the other hand, 75 nests were located in 11 exotic plant species, of which the highest number (23) of nests came across in Jhau (*Casuarina littorea*) followed by Jarul (15) trees (*Lagerstroemia speciosa*), and the lowest number (2) of nests were seen in each Akashmoni (*Acacia moniliformis*) and Christmas (*Araucaria columnaris*) trees (Table 5).

**Breeding season:** The breeding season of birds at the CUC spreads over January to June. The highest number of breeding pairs, 276 (33.70%) were recorded in April and minimum, 31 (3.78%) in January (Table 3). The breeding season of the recorded bird species varied between and even within species. It depends on the physical, physiological, environmental conditions and also food resources.

Table 5. Plant species used for nesting by breeding species of birds in the CUC.

Sl. No.	Family	Scientific name	Local name	Type	Status*	No. of nests	Nesting (%)
01	Acoraceae	<i>Calamus</i> spp.	Cane cluster	Grass	I	7	1.89
02	Anacardiaceae	<i>Mangifera indica</i> L.	Aam	Tree	"	59	15.94
03	Ammonaceae	<i>Polyalthia longifolia</i> Sonn.	Debdaru	"	"	3	0.81
04	Araucariaceae	<i>Araucaria columnaris</i> (Forst.) Hook.	Christmas tree	"	E	2	0.54
05	Areaceae	<i>Cocos nucifera</i> L.	Narikel, Dab	Palm	I	52	14.05
06	Areaceae	<i>Oreodoxa regia</i> Kunth	Bottle palm	"	E	3	0.81
07	Areaceae	<i>Phoenix sylvestris</i> (L.) Roxb.	Khejur	"	I	2	0.54
08	Burseraceae	<i>Garuga pinnata</i> Roxb.	Bhadi	Tree	"	1	0.27
09	Casuarinaceae	<i>Casuarina littorea</i> L.	Jhau	"	E	23	6.21
10	Euphorbiaceae	<i>Acalypha wilkesiana</i> (Muell. Arg.) Fosberg	Patabahar	"	I	3	0.81
11	Fabaceae	<i>Acacia montiformis</i> Hook. & Arn.	Akashmoni	"	E	2	0.54
12	Fabaceae	<i>Albizia lebeck</i> (L.) Benth.	Kalokoro	"	I	13	3.51
13	Fabaceae	<i>Albizia procera</i> (Roxb.) Benth.	Shikoro	"	"	9	2.43
14	Fabaceae	<i>Caesalpinia pulcherrima</i> (L.) Sw.	Radhachura	"	"	3	0.81
15	Fabaceae	<i>Pongamia pinnata</i> (L.) Pierre	Karenza	Shrub	"	4	1.08
16	Lamiaceae	<i>Bombax ceiba</i> L.	Shimul tula	Tree	"	14	3.79
17	Lamiaceae	<i>Gmelina arborea</i> Roxb.	Gamari	"	"	26	7.03
18	Lamiaceae	<i>Tectona grandis</i> L.	Shegun	"	E	3	0.81
19	Lythraceae	<i>Lagerstroemia speciosa</i> (L.) Pers.	Jarul	"	"	15	4.05
20	Malvaceae	<i>Hibiscus rosa-sinensis</i> L.	Jaba	"	"	5	1.35
21	Marantaceae	<i>Schumannianthus dichotomus</i> (Roxb) Gagnep.	Mestag	Shrub	I	3	0.81
22	Meliaceae	<i>Aphanamixis polystachya</i> (Wall.) R.N. Parker	Pitraj	Tree	"	1	0.27
23	Meliaceae	<i>Chukrasia tabularis</i> A. Juss.	Chikrasi	"	I	15	4.05
24	Meliaceae	<i>Swietenia mahagani</i> (L.) Jacq.	Mehagmi	"	E	5	1.35
25	Moraceae	<i>Artocarpus heterophyllus</i> Lam.	Kamthal	"	I	33	8.92
26	Myrtaceae	<i>Melaleuca leucadendra</i> (L.) L.	Mallalucha	"	E	5	1.35
27	Myrtaceae	<i>Syzygium cumini</i> (L.) Skeels	Jam	"	I	12	3.24
28	Poaceae	<i>Melocanna baccifera</i> (Roxb.) Kurz	Muli Bansh	Grass	"	18	4.86
29	Poaceae	<i>Thysanolaena maxima</i> (Roxb.) Kuntze	Reed	"	I	6	1.62
30	Pontederiaceae	<i>Eichhornia crassipes</i> (Mart.) Solms	Kachuri Pana	Hydrophyte	E	6	1.62
31	Rhamnaceae	<i>Zyziphus mauritiana</i> Lam.	Kul	Tree	I	7	1.89
32	Rubiaceae	<i>Isora coccinea</i> L.	Rangan	Shrub	E	6	1.62
33	.....	Unidentified	Undergrowth veg.	"	I	4	1.08
Total						370	100

\* E = Exotic, I = Indigenous.

### Discussion

Out of 650 species of birds in Bangladesh (Siddiqui *et al.* 2008), 188 species breed and a further 59 are likely to breed (Harvey 1990) in the country. The present study confirms that 55 species of birds breed in the CUC, which is nearly 30% of the country's breeding species, and the number is likely to be increased, so, that will be the areas of future studies.

Among the breeding birds, house crow (*Corvus splendens*) and Asian pied starling (*Gacupica contra*) play a vital role in keeping healthy environment through scavenging. Huge amount of waste materials are being produced everyday at the CUC area, which are being reduced through consumption mainly by these two species among the birds. Some other bird species also play important role in pollinating, pest controlling, seed dispersing, etc. and thus birds are helping in maintaining ecological balance.

The main threats of these breeding birds at CUC are the unplanned settlements and agricultural practices, and recently introduce fish culture in the derelict ponds through cleaning and re-excavating. These directly affect breeding and feeding habitats of the birds. Cultivation of agricultural crops and burning herbs, bushes and shrubs in the hills, collecting firewood, litter-fall, etc. have negative effects on the natural activities of birds. Another threat for breeding birds is the shortage of suitable breeding habitats like indigenous tree species and presence of huge exotic species. Planted exotic species of trees play harmful effects on the environment and virtually birds avoid building nests in exotic species. Only 75 pairs (9.16% of the total recorded pairs) of bird out of 819 pairs observed to build nests in exotic species during the study period. Among the 55 species Asian pied starling (*Gracupica contra*), common myna (*Acridotheres tristis*), house crow (*Corvus splendens*), large-billed crow (*Corvus macrorhynchos*), white-breasted waterhen (*Amaurornis phoenicurus*) and bronze-winged jacana (*Metopidius indicus*) were noticed to nest in the exotic plants. The breeding pairs used exotic plant species for nesting most probably due to the shortage of suitable indigenous nesting trees nearby because in the CUC area huge number of exotic plant species were planted by the authority and these birds are trying to adapt themselves with the new environment. But, planting native fruiting trees is essential through eradicating exotic tree species for birds for keeping healthy environment and balanced ecosystems for humans also in the CUC.

The breeding season and clutch size of breeding species of birds in the CUC have been compared (Table 6) with the records of Ali and Ripley (1983) including two-year-round breeder species (Asian palm swift and rock pigeon). The available data (Table 6) reveal that the breeding season of birds in the CUC is mostly same with that of the Ali and Ripley (1983). A few additions to the report of Ali and Ripley (1983) are: in CUC barn owl breeds during April - July, red-wattled lapwing during March - July and the breeding call of common hawk cuckoo recorded during March - June. Breeding season of the birds

Table 6. Comparison of breeding records of birds between the present study and Ali and Ripley (1983).

Sl. No.	Breeding species	Present study		Ali and Ripley (1983)	
		Breeding season	Clutch size/ juvenile	Breeding season	Clutch size
01	Red jungle fowl	March - May	5 - 6	March-May, odd clutch January - October	5 or 6
02	Fulvous-breasted woodpecker	April - May	3	April - May	Normally 3, sometimes 4 or 5
03	Lesser golden-back woodpecker	February - July	3	February - July	3
04	Linedated barbet	March - June	2	March - June	2 - 4
05	Indian roller	April - May	3	March - June	3, sometimes 4, rarely 5
06	Common kingfisher	March - June	4 - 6	March - June	5 - 7
07	White-throated kingfisher	March - June	4 - 7	March - July	4 - 7
08	Pied kingfisher	March - June	5 - 6	Throughout the year	5 - 6
09	Chestnut-headed bee-eater	February - June	5 - 6	February - June	5 - 6
10	Green bee-eater	February - June	4 - 7	February - June	4 - 7
11	Blue tailed bee-eater	March - June	5 - 7, normally 7	March - June	5 - 7
12	Common hawk-cuckoo	March - June	Breeding call	-	-
13	Asian Koel	March - July	1	March - August, chiefly May - July	1
14	Green-billed malkoha	April - August	2	April - August	2 - 4, most commonly 3
15	Lesser coucal	March - October	3	March - October	3 or 4
16	Greater coucal	June - August	3 or 4	June - August	3 or 4, exceptionally 5
17	Red-breasted parakeet	January - April	3 - 4	January - April	3 - 4
18	Rose-ringed parakeet	January - July	3 or 4	January - July	3 or 4, sometimes 5, rarely 6
19	Asian palm swift	Throughout the year	2 - 3	Throughout the year	2 - 3
20	Little/House swift	April - July	2 or 3	April - July	2 or 3, rarely 4
21	Barn owl	April - July	4 - 7	Undefined	4 - 7
22	Spotted owl	February - April	3 - 4	February - April	3 - 4
23	Rock pigeon	Throughout the year, (mainly May - July)	2	Throughout the year,	2
24	Spotted dove	April - July	2	April - July	2

(Contd.)

25	Yellow-footed green pigeon	March - June	2	March - June	2
26	White-breasted waterhen	March - October	6 or 7	March - October	6 or 7
27	Bronze-winged jacana	June - September	4	June - September	4
28	Red-wattled lapwing	March - September	3 - 4	-	-
29	Cattle egret	June - August	3 or 4, sometimes 5	June - August	3 or 4, sometimes 5
30	Indian pond heron	May - August	3 or 5	May - August	3 or 5
31	Long-tailed shrike	January - July	-	March - July	3 or 5
32	Rufous treepie	March - July	4 or 5	March - July	4 or 5
33	House crow	January - June	4 - 5	January - June	4 - 5
34	Large billed crow	February - June	3 - 5	February - June	3 - 5
35	Ashy wood-swallow	March - June	2 - 3	March - June	2 - 3
36	Black hooded oriole	March - August	2	March - August	2 - 4, usually 3
37	Black drongo	February - August	3 - 4	February - August	3 - 4, usually 3
38	Common iora	January - September	2	January - September	2, occasionally 4
39	Oriental magpie robin	March - July	-	March - July	-
40	Asian pied starling	March - September	4 - 6	March - September	4 - 6, commonly 5
41	Chestnut-tailed starling	April - July	3 - 5	April - July	3 - 5
42	Common myna	March - September	4 - 5	March - September	4 - 5
43	Jungle myna	February - July	3 - 6	February - July	3 - 6
44	Great tit	March - June	4 - 6	March - June	4 - 6, occasionally 4
45	Red-vented bulbul	April - August	3	April - August	2 or 3
46	Red-whiskered bulbul	March - September	3	March - September	3
47	Common tailorbird	May - July	3 - 5	May - July	3 - 5, usually 4
48	Rufous necked laughing-thrush	March - August	3	March - August	3, sometimes 2 or 4
49	Scarlet backed flower-pecker	April - August	2 - 3	April - August	2 - 3
50	Purple rumped sunbird	February - June	2	February - June	2, occasionally 1
51	Purple sunbird	April - June	2	April - June	2, sometimes 1 or 3
52	House sparrow	March - June	3 - 6	March - June	3 - 6, usually 4
53	Baya weaver	May - August	-	May - August	2 - 4, usually 3
54	Black headed munia	May - November	5	May - November	5, sometimes 6
55	Scaly breasted munia	May - September	4 - 6	May - September	4 - 6, usually 5 - 7

in the CUC starts in January but the majority (24 species) starts in March and the maximum (16 species) complete by June.

The clutch size of birds varied from 2 to 7 in the CUC, which are mostly similar with Ali and Ripley (1983) with slightly different in a few cases (Table 6). Two eggs were laid by lineated barbet, green-billed malkoha, rock pigeon, spotted dove, yellow-footed pigeon, black-hooded oriole, common iora, purple-rumped sun bird and purple sun bird; while seven or up to seven eggs laid by white-throated kingfisher, green bee-eater, blue-tailed bee-eater, barn owl and white-breasted waterhen (Table 6).

### Conclusion

The population of some bird species is decreasing but the diversity is increasing in the Chittagong University Campus (CUC) day by day (M. F. Ahsan pers. obs. since 1982). Habitat degradation and destruction, pollution in and around CUC, planting exotic species, human settlements, collection of litters and firewood, cutting undergrowth and bushes for sealing litters in the sacs, and occasional fire hampering breeding activities of birds in the CUC. For conserving bird species in the CUC, it is necessary to take steps to overcome the mentioned problems.

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