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Bird Diversity and Threaten to Their Habitat in Sathurukondan Birding Site in Batticaloa, Sri Lanka

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Abstract: Sathurukondan situated within the urban area of Batticaloa and adjacent to Batticaloa lagoon. This area lies in the migrant route disperse from the entry points from Eastern and Andaman route. This area is locally notable for their bird diversity as well as being a major habitat in Batticaloa. Blooming of urbanization causing drastic reduction of the mangrove forest is the main threat to these birds diversity due to their habitat loss. Considering that, the objective of this study was to determine the taxonomic composition and abundance of water and wading bird in this area. Point transact method was used to count the birds, and the counting was taken monthly. A total of 8,893 records of 65 species representing 36 families were recorded from July 2015 to July 2016. Simpson's diversity index and Shannon index in this area are about 0.95 and 3.34, respectively, showing the high diversity of this area. Migrant birds, such as common sandpiper (*Actitis hypoleucos* L.), marsh sandpiper (*Tringa stagnatilis* B.), common greenshank (*Tringa nebularia* G.) and other important species, such as lesser adjutant (*Leptoptilos javanicus* H.), spot-bill pelican (*Pelecanus philippensis* G.) and near threatened jungle owlet (*Glaucidium radiatum* T.) were noted. This area contributes notably to the local avian biodiversity and has the ecotourism potential. It conceals the need of the conservation of this area.

Key words: Bird diversity, ecotourism, habitat loss, migrant, Sathurukondan, urbanization.

1. Introduction

Wetlands have one of the highest biodiversity and biological productivity in the world and various globally threatened avian species depending on them [1]. Observing birds are always being pleasure, and evaluating the diversity and abundance of birds reveal the status of an ecosystem, because it shows quick response to environmental changes [2, 3]. Presence or absence of birds may indicate the ecological conditions of the wetland area. Species composition and relative abundance of species are important in selecting areas for conservation. Sri Lanka has a rich avifauna diversity, and 439 species were recorded so far with 236 breeding and 203 purely migrant species. Among them, 33 species and a further 68 subspecies are endemic to Sri Lanka [4]. Wetlands are the most productive ecosystems due to their habitat diversity and great productivity, including rich avifauna diversity. Birds are the most noticeable and significant component of freshwater wetland ecosystem [5]. The distribution and type of animals are determined by the distribution of plants in the ecosystem [6]. Mangrove habitats are considered as biodiversity hot spots. There are several studies have been carried out to show the bird diversity in mangrove [7-9]. Mangrove forest is the major habitat for birds in Batticaloa. There were no any scientific studies have been carried to reveal the diversity abundance on bird species in the past. Mangroves are one of the most disturbed habitats due to intense human unplanned activities and characterized by important concentrations of birds at both nesting and resting sites [10]. Mangrove forest is threatened by anthropogenic activities in Batticaloa [11], destructing the habitat of birds ultimately affect the bird population in this area. Thus, the study was undertaken to determine the taxonomic composition and abundance birds in Sathurukondan birding site and find out the major threats to the bird's habitat and

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state the possible solution.

2. Materials and Methods

2.1 Study Area

The study area is located Batticaloa district, Eastern province, Sri Lanka, specifically within the urban area of Batticaloa and adjacent to Batticaloa lagoon as shown in Fig. 1. Geographical coordinates are approximately 70°44′12″ N and 810°39′47″ E. The area is between 1.20 m and 4.0 m above mean sea level. The highest annual rainfall registered during northeast monsoon was 3,081 mm. The rainy season is between October and January. The temperature is recorded between 25 °C and 36 °C. During north-east monsoonal period (November to February), high mean precipitation (1,250 ± 230 mm) was recorded, and in a dry season during the south-west monsoonal period (May to August), low mean precipitation (300 ± 23 mm) was marked [12]. It spreads along the both side of the A-15 road and with a length about 6 km. This area lies in the migrant route disperse from the entry points from Eastern and Andaman route [13].

Sathurukondan is one of the largest mangrove forest in Batticaloa district, as well as this area is being birding site. Marshy lands are rich with biodiversity and several mangrove varieties have grown in there. Dominated mangroves varieties of this marshy land are *Excoecaria agallocha* L., *Avicennia officinalis* L., *Sonneratia caseolaris* L., *Rhizopohara mucronata* Lam. and *Xylocarpus granatum* K.. This area is notably famous as a bird sanctuary. Drastic reduction of migrant bird population is observed over the years due to the destruction of mangroves by various anthropogenic impacts, such as security clearance,

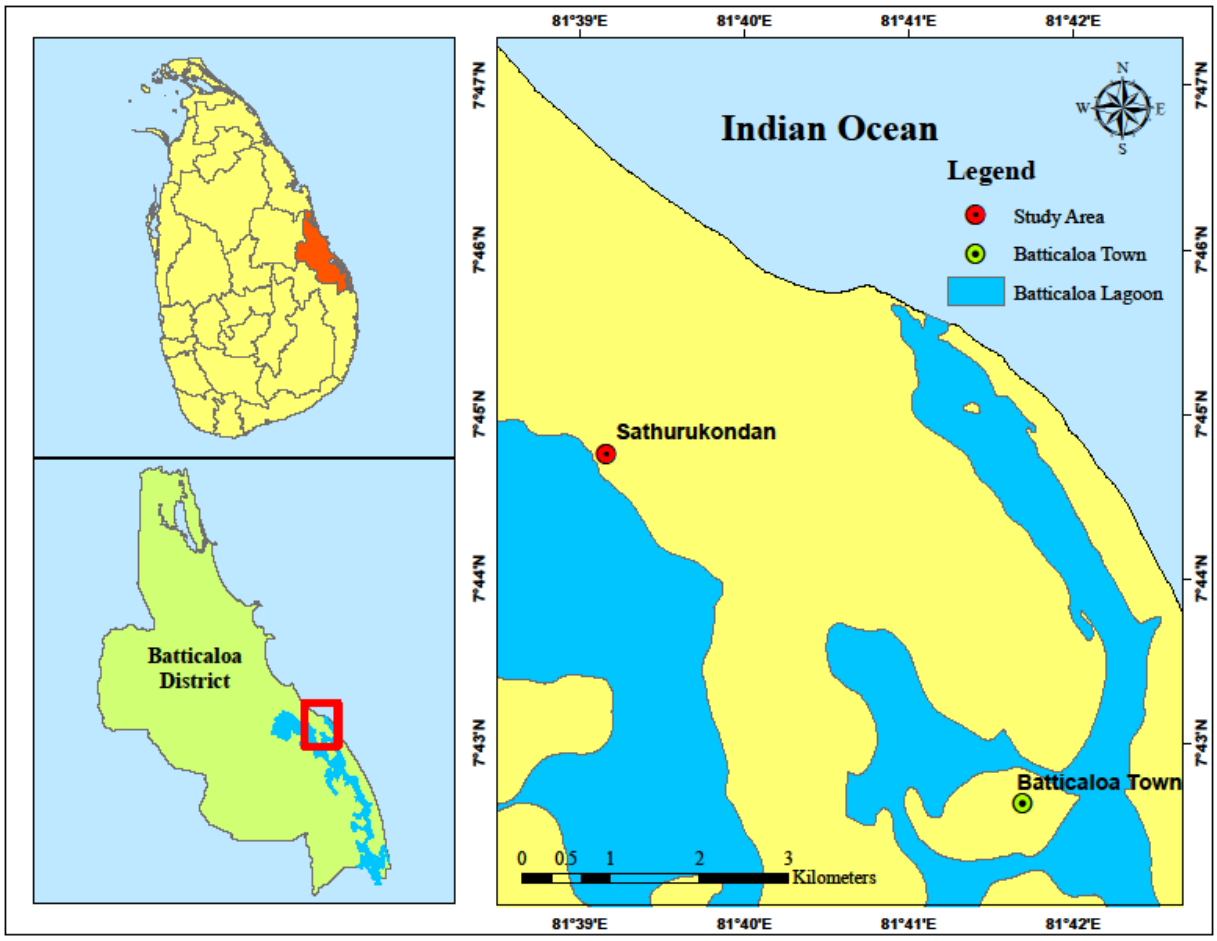

Fig. 1 Study area of Sathurukondan in Batticaloa district, Sri Lanka.

firewood and fishing [14].

2.2 Methods

Monthly data were recorded from 2015 July to 2016 July. Census was carried out between 6:00-9:00 and again 16:00-18:00, and each count lasted for about 20 min as described by Fernando and Amarasinghe [15], when visibility and bird activity were high. Extreme weather conditions may affect bird activity, hence to avoid possible biases [16], observations were not carried out during the rainy days. This area has open shallow water body and dense emergent mangrove forest. Therefore, random and point transact methods were used to count the birds [17]. Olympus 8 × 40 DPS I binocular was used for bird observation. Shannon index [18] and Simpson's diversity index [19] were used to measure the species diversity, as Eqs. (1) and (2):

Shannon-Wiener diversity index

$$H = -\sum_{i=1}^{n} p_i \times \ln p_i \quad (1)$$

where, p_i is the proportion of the total number of individuals in the population of species i.

Simpson's diversity index

$$D = 1 - \frac{\sum n \times (n-1)}{N \times (N-1)} \quad (2)$$

where, N = the total number of organisms of all species; n = the total number of organisms of a particular species.

Whenever a bird was spotted, the species was identified according to local and international bird guide books [13, 20-22], and the numbers were noted.

3. Results and Discussion

A total of 8,893 indivudals of 65 species represending 36 families were recorded. Out of these, six species were migratory birds (Table 1). Calculated results for Shannon index (H) and Simpson's diversity index (D) in the study area were 3.34 and 0.95, respectively. Both results show a higer diveristy of avifouna in this region.

Migrant birds, such as common sandpiper (*Actitis hypoleucos* L.), marsh sandpiper (*Tringa stagnatilis* B.), common greenshank (*Tringa nebularia* G.), garganey (*Anas querquedula*), gull-billed tern (*Gelochelidon nilotica* G.) and blue-tailed bee-eater (*Merops philippinus* L.), were observed in this area. Common sandpipers were noted along the lagoon shore and marsh sandpipers were recorded nearby pappy fields where was flooded before cultivated. Gull-billed tern and blue-tailed bee-eater are in argument, which are a breeding residence to Sri Lanka, but until now not proved scientifically. Other important species, such as lesser adjutant (*Leptoptilos javanicus* H.), spot-bill pelican (*Pelecanus philippensis* G.) and near threatened jungle owlet (*Glaucidium radiatum* T.) were noted. Egrets, herons, cormorants and purple coots are very common in this region. Unfortunately, there were no endemic or endangered species found.

Sathurukondan birding site is situated near to the Batticaloa lagoon and the area itself has small water bodies. Therefore, many aquatic birds, such as cormorants, herons, egrets, etc., are high in this region. In the rainy season, the area become flooded, leading to the lesser whistlink-ducks, gragany, spot billed pelican and other water birds as well in large amount.

Mangroves of 75-100 m stretch on both sides of main road at this study area were seriously degraded due to civil war. Abundance of birds and species richness in the mangrove forest was due to their high level of nutrients availability. Anthropogenic activities, such as shrimp farming aquaculture, unplanned disposal of small scale industrial and domestic waste, generate considerable disturbance to birds, forcing them to fly from one place to another [23].

Status of the bird species in the study area is shown in Fig. 2, classification based on Ref. [13]. The Mangrove forest is the major habitat for the divers birds in this region, but unfortunately this area has been threatened to habitat loss by degrading the mangrove

Table 1 Observed number of individual birds during the study period.

No.	Common name	Family	Individuals
1	Lesser whistling duck	Anatidae	469
2	Gargany	Anatidae	159
3	Painted stork	Ciconiidae	176
4	Asian openbill	Ciconiidae	68
5	Woolly-necked stork	Ciconiidae	26
6	Lesser adjutant	Ciconiidae	7
7	Black-headed ibis	Threskiornithidae	229
8	Eurasian spoonbill	Threskiornithidae	58
9	Black bittern	Ardeidae	3
10	Night heron	Ardeidae	46
11	little heron	Ardeidae	4
12	Indian pond-heron	Ardeidae	546
13	Cattle egret	Ardeidae	246
14	Grey heron	Ardeidae	17
15	Purple heron	Ardeidae	26
16	Great egret	Ardeidae	229
17	Intermediate egret	Ardeidae	786
18	Little egret	Ardeidae	438
19	Spot-billed pelican	Pelecanidae	56
20	Little cormorant	Phalacrocoracidae	426
21	Indian cormorant	Phalacrocoracidae	16
22	Great cormorant	Phalacrocoracidae	22
23	Oriental darter	Anhingidae	17
24	White-bellied sea eagle	Accipitridae	6
25	Brahminy kite	Accipitridae	138
26	Creasted serpent egle	Accipitridae	9
27	Shikra	Accipitridae	82
28	White-breasted waterhen	Rallidae	316
29	Purple swamphen	Rallidae	645
30	Common moorhen	Rallidae	22
31	Eurasian thick-knee	Burhinidae	16
32	Black-winged stilt	Recurvirostridae	428
33	Red-wattled lapwing	Charadriidae	138
34	Pheasant-tailed jacana	Jacanidae	269
35	Marsh sandpiper	Scolopacidae	46
36	Common greenshank	Scolopacidae	32
37	Common sandpiper	Scolopacidae	21
38	Gull-billed tern	Sternidae	44
39	Rock pigeon	Columbidae	326
40	Spotted dove	Columbidae	216
41	Greater coucal	Cuculidae	6
42	Jungle owlet	Strigidae	1
43	Barn swallow	Hirundinidae	346
44	Alpine swift	Apodidae	120
45	Indian roller	Corciidae	14
46	Stork-billed kingfisher	Alcedinidae	7
47	White-throated kingfisher	Alcedinidae	53

(Table 1 continued)

No.	Common name	Family	Individuals
48	Common kingfisher	Alcedinidae	13
49	House crow	Corvidae	986
50	Pied kingfisher	Alcedinidae	73
51	Little green bee-eater	Meropidae	128
52	Blue-tailed bee-eater	Meropidae	48
53	Chestnut-headed bee-eater	Meropidae	28
54	Brown-headed barbet	Capitonidae	18
55	Red-backed woodpecker	Picidae	5
56	Black drongo	Dicruridae	8
57	Asian paradise flycatcher	Monarchidae	4
58	Oriental skylark	Alaudidae	6
59	Red vented bulbul	Pycnonotidae	31
60	Yellow-billed babbler	Timaliidae	62
61	Common myna	Sturnidae	68
62	Oriental magpie robin	Muscicapidae	25
63	Baya weaver	Ploceidae	2
64	Paddyfield pipit	Motacillidae	6
65	Indian peafowl	Phasianidae	11
Total			8,893

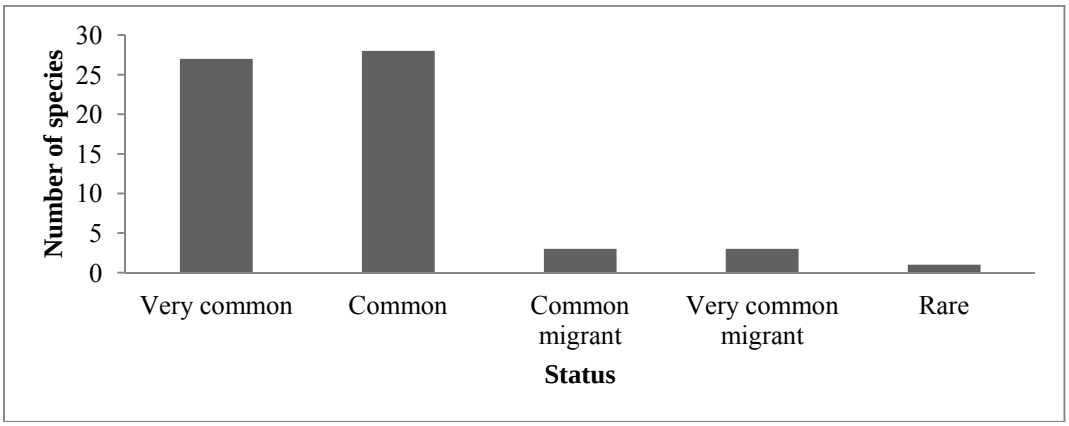

Fig. 2 Status of bird species.

forest by the anthropogenic activities, such as unplanned construction and wetland encroachment. This situations was also reported by Schmiegelow et al. [24], who stated that the distributions of many species are affected by habitat fragmentation and encroachment. Dense distribution of mangrove forest made it difficult to carry out the census in effective manner, because it reduce the bird counting, where birds hiding in the forest was the major limitation of this census.

4. Conclusions

According to the Shannon index and Simpson's diversity index, the study area shows high biodiversity and has the ecotourism potential of this region. Increased threat to the mangrove forest conceals the need of the conservation of this area and proper action to be taken to stop the unplanned developments to protect this biodiversity-rich area. Awareness should be given to the public about the bird diversity, migratory route and importance of the mangrove forest to enhance the protection of this area. More importantly, to declare this birding site as a protected area by national level, this area can survive further for being the birding habitat.

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