



Relative abundance of owl species in Bangladesh

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Abstract

An attempt was made to document the relative abundance of available owl species in Bangladesh. The study was conducted in Gazipur, Rajshahi and Barishal districts of Bangladesh during June, 2018 to July, 2020. Owls were counted once in a month using line transect, point counting as well as look and see methods. Other owl species all over Bangladesh were recorded with the help of some Facebook group such as Birds Bangladesh, Birds and Wildlife of Bangladesh, etc. A total of 14 species of owl were documented in which the species Barn owl, spotted owl, Brown Hawk owl, Brown fish owl, Collard scops owl, etc. were recorded as the most abundant in different regions of Bangladesh. All other owl species were also present in different regions but their density was lower than those of other owl species.

Keywords: Owl species, relative abundance, documentation

Introduction

Owls are mainly a group of nocturnal (active at night time) birds which belong to the order Strigiformes, a group which is most closely related to the nightjars (Caprimulgiformes). The order is divided into two families: Tytonidae or Barn Owls and related species, and Strigidae or Typical Owls. A large, round head and huge, forward-facing eyes are features that make an Owl instantly recognizable. They also have a sharp, downward-facing beak (or bill), and soft, cryptically colored plumage. Males and females are generally similar in appearance, although the female is often up to 25% larger (Lewis 2012)

Owls are Raptors, or Birds of Prey, which means they hunt other living things for their food, using their special adaptations and unique abilities that set them apart from any other creature. Exceptional vision, and acute hearing play a major part in an Owl's hunting technique. Couple these with powerful talons and beak, plus the ability to fly silently, and you have a formidable predator, using stealth to hunt down prey. After eating, Owls regurgitate pellets, which contain the indigestible bones, fur and feathers of their victims. These pellets can be collected by researchers to study Owls' eating habits. (Lewis 2012). Owls are found on all continents except Antarctica, and are absent from some oceanic islands and in a great variety of habitats, from thick forests to open prairies.

Biodiversity is not evenly distributed throughout the world. It may be influenced by geography (Karr 1976). Elevation gradient distributions across the globe are a powerful test system for understanding biodiversity (McCain 2009). From the last decades, relation between species community composition and elevation at global level is an important theme in ecology. Urbanization and human modification of the natural landscape has profound effects on existing ecological processes occurring at a variety of scales (Crooks *et al.* 2004, McDonnell 1997). Species richness and the presence of rare species are two of the most frequently used criteria for the selection of conservation areas (RodriguezFerraro and Blake 2008). In addition, community composition and relative abundance of target species are important in selecting areas for conservation (Wijesundara and Wijesundar 2014).

Owls are not particularly efficient nest builders. Usually, they appropriately use an abandoned woodpecker hole or natural tree cavity, or an abandoned crow or hawk nest. Owls are vocal during the nesting season, and may exchange courtship and territorial calls that both enhance the pair bond necessary to raise the young owls, and discourage other intruding owls (Rachel and Tompkins 1914). Owls play an important role in the maintenance of a natural balance since they are at the apex of trophic levels in terrestrial and aquatic ecosystems (Sergio *et al.*

2008). Understanding the diversity and structure of bird communities is essential to delineate the importance of regional or local landscapes for avian conservation. Determinations of bird population in different habitats are central to understanding the community structure and niche relationships, as well as for intelligent management of populations (Sethy *et al.* 2015). Moreover, seasonal monitoring is equally important to trace the dynamic movement of owls in such habitats. According to Banglapedia, Bangladesh has 15 species of owls (family Tytonidae: 1 species; family Strigidae: 14 species), of which 3 are endangered, 1 species is vulnerable and 7 could not be evaluated due to paucity of data. At present, there is no information on how many species of owls are available in Bangladesh. Therefore, the present study was undertaken to assess the available species of owls, their distribution and locality.

Materials and methods

The present study listed and documented the owl species that are usually found in Gazipur, Rajshahi and Barishal districts. It was carried out during June 2018 to July 2020, once in a month. Owls were counted by line transect, point counting and look and see methods by using cameras and were identified with the help of taxonomic books. Other owl species documentations were made by the help of some Facebook group such as Birds Bangladesh, Birds and Wildlife of Bangladesh etc. Line transect is a tape or string laid along the ground in a straight line between two poles as a guide to a sampling method used to measure the distribution of organisms. The essential feature of line transects is that one walks along a straight path and records the individuals seen and their perpendicular distance from the transect line. The simplest method of counting birds is called a “point count”, in which a trained observer records all the birds seen and heard from a point count station for a set period of time. A series of point counts completed over a fixed route can then be compared to the results of the same point counts in other seasons or years. Observations were made by standing and sitting from a hiding place and recorded along with their abundance. Surveys were conducted in the morning hours (from 6.30 am to 9.30

am) and evening hours (3.30 pm to 7.30 pm) by a single observer. Samplings were made in seasonal basis for the period of three years (2018 to 2020) using the same transect and time. Bird surveys were not performed during heavy rains, fog and during strong winds, since these conditions reduce bird activity and detectability (Sutherland 2004). No specimens were collected but photographs of most of the species was taken for reference.

The data collected during the whole study period were analyzed in IBM SPSS 26 statistical software. Analysis of variance (ANOVA) was used to test the hypotheses, and Tukey’s HSD post hoc analysis was carried to identify specific variables that differ significantly. Diversity and species richness was calculated by using the following formulae.

$$\text{Shannon-Wiener Index (H')} H' = -\sum \left[\left(\frac{ni}{N} \right) \times \ln \left(\frac{ni}{N} \right) \right]$$

Where ni = number of individuals or amount (e.g., biomass) of each species (the i th species) and N = total number of individuals (or amount) for the site, and $\ln$ = the natural log of the number.

$$\text{Simpson's Index, } \lambda = \frac{\sum ni(ni - 1)}{N(N - 1)}$$

Where n_i = number of individuals or amount of each species (i.e., the number of individuals of the i th species) and N = total number of individuals for the site.

$$\text{Simpson's Diversity Index, } D = 1 - \lambda$$

The value of D ranges between 0 and 1. With this index, 1 represents infinite diversity and 0, no diversity.

Results and discussion

According to Banglapedia 15 species of owl have been recorded in Bangladesh, of them one species was under the Tytonidae and fourteen species were under the Strigidae family. The total number of bird species, mean number of species/transect, and their density recorded in various zones are shown in Fig. 1 and Fig. 2. Two species of owls were detected in three locations (Fig. 1). The most abundant species of owls were Spotted owlets (mean 2.6 birds/point count and total specie 13.33/location) followed by Barn owl in Gazipur whereas, Barn owl species was

recorded higher in Rajshahi (mean 51.6/point count and total species) compared to Spotted owl (Fig. 1 and Fig. 2). In Barishal more or less equal number of owl species (barn owl and spotted owl) were recorded.

Distribution of two owl species in three region, Gazipur region had recorded the highest number of Spotted owl followed by Rajshahi and Barishal regions (Fig. 3 and 4). In case of Barn owl distribution Rajshahi had supported the highest number compared with those of other two regions and followed by Barishal and Gazipur with the lowest number of Barn owl species (Fig. 3 and 4). Among different zones, Spotted owl was the most abundant in Gazipur and Barn owl in Rajshahi zone.

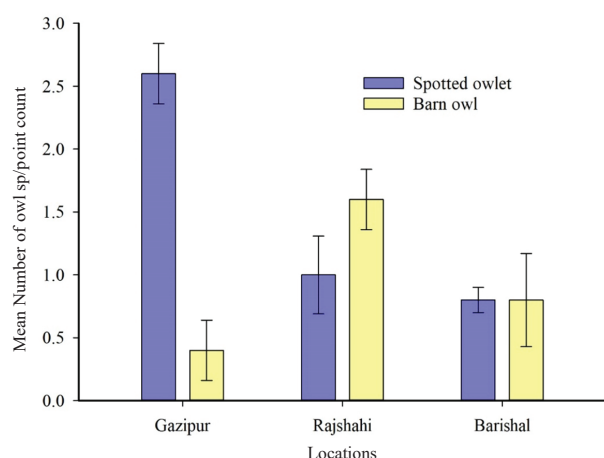


Figure 1. Mean number of owl species/count in three districts of the study areas.

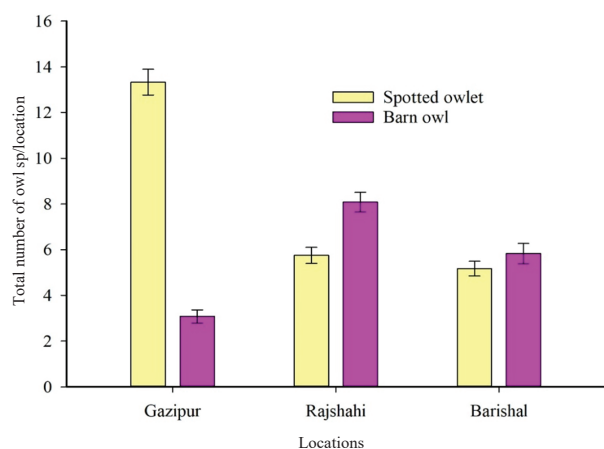


Figure 2. Total number of owl species recorded in three districts of the study area.

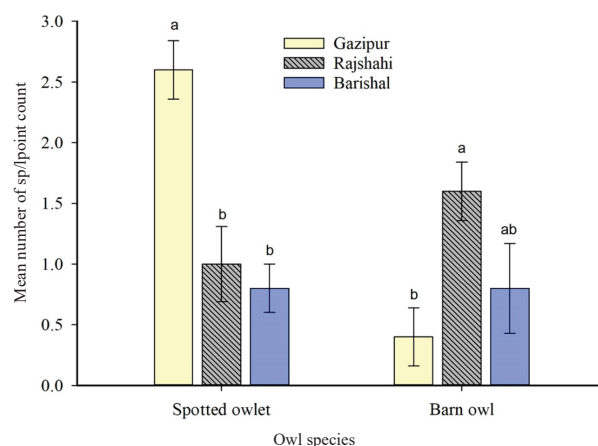


Figure 3. Abundance of owl species (Mean number/point count) in three districts of the study area.

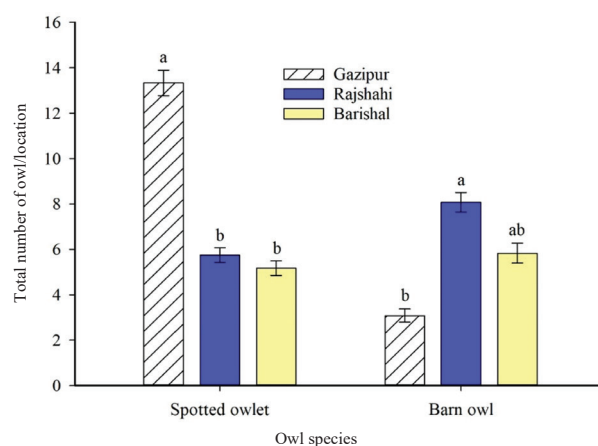


Figure 4. Abundant of owl species (total species/location) in three locations of the study area.

The species diversity index fluctuated from 0.69 (site-Barishal) to 0.5 (site- BARI Head Quarters, Gazipur) (Table 1). The highest diversity was found in coconut orchard, Barishal followed by Rajshahi (mango orchard) and the lowest diversity was recorded in Gazipur. Apart from the diversity, species evenness showed variation in the study sites with values of 0.53 (site-coconut orchard, Barishal), 0.523 (site-Mango orchard, Rajshahi), 0.038 (site-Gazipur). The variation in species diversity and species evenness at various sites may be due to the influx of visitors, vehicles and local people in and near the campus and the availability of food for the birds.

Shannon's diversity index indicated that Barishal and Rajshahi habitat had higher species diversity ($H = 0.69$ and 0.687) than Gazipur habitat ($H = 0.548$) (Table 1). The overall birds' diversity for Barishal, Rajshahi and Gazipur was ($H = 0.682$). On the other hand, the Simpson's diversity index for owl species were 0.533 , 0.523 and 0.38 , respectively. However, the overall Simpson's diversity index for the three habitats was 0.798 . This indicates greater variation in species diversity between the results obtained by using Shannon's and Simpson's diversity indices. This is because Simpson's diversity index takes into consideration relative abundance which is not the case for Shannon's diversity index. The higher diversity in the habitat may be due to high numbers of individuals in some of the bird species and diverse vegetation types as microhabitats which favored varieties of bird species. The anthropogenic disturbances by parking lots, housing developments and agricultural fields may have changed the diversity in the area which is well reflected by the species composition before human intervention (Sax and Steven 2003).

Table 1. Species richness and diversity index of owl species in three locations of the study area

Locations	Shannon-Wiener Diversity Index	Simpson's Diversity Index
Gazipur	0.548	0.380
Rajshahi	0.687	0.523
Barishal	0.690	0.533
Overall	0.682	0.498

During the study of the project, 14 species of owl were recorded and documented (Anon. 2007, 2013, 2016). The owl species recorded and documented during the study period are shown in Table 2.

Conclusion

Barn owl, spotted owlet, Brown hawk owl, Brown fish owl, Collared scops owl etc. were found as the most abundant species in different regions of Bangladesh. All other owl species were also present in different study areas but density was lower than those of other owl species.

Table 2. Different species of owl recorded in different areas of Bangladesh

English Name	Scientific name	Recorded place in Bangladesh
Barn owl	<i>Tyto alba</i>	Rajshahi, Mirpur, Dhaka, Bola, Gazipur, Barishal, Dinajpur,
Brown fish owl	<i>Bubo zeylonensis</i>	Dhaka, Bogra, Nilphamari, Meherpur, Faridpur, Shariatpur, sundarban, Khulna, Thakurgaon, Lakshmipur, Hobigonj
Brown hawk owl	<i>Ninox scutulata</i>	Comilla, Narayanganj, Munsigonj, Dhaka, Chattogram, Gazipur, Moulvibazar, Rajshahi, Magura
Buffy fish owl	<i>Ketupa ketupu</i>	Sundarban, Khulna
Collared scops owl	<i>Otus lettia</i>	Mymensingh, Brahmanbaria, Satkhira, Hobogonj, Pirojpur, savar, mirpur, Dhaka, Rajshahi, Narayanganj, Jashore, Jhenaidah
Indian scops owl	<i>Otus bakkamoena</i>	Thakurgaon, Rajshahi, Natore, Pabna
Oriental scops owl	<i>Otus sunia</i>	Rajshahi, Sylhet
Asian barred owl	<i>Glaucidium cuculoides</i>	Rangamati, Hobigonj
Collared owl	<i>Glaucidium brodiei</i>	Bandarban, Rangamati
Spotted owlet	<i>Athene brama</i>	Gazipur, Barishal, Rajshahi, Dhaka, Rangpur, Chandpur, Thakurgaon, Chattogram, Dinajpur
Short-eared owl	<i>Asio flammeus</i>	Rajshahi
Dusky eagle-owl	<i>Bubo coromandus</i>	Sundarban, Khulna
Brown wood owl	<i>Strix leptogrammica</i>	Diginala, Khagrachari, Lawachara, Moulvibazar
Spot-bellied eagle-owl -	<i>Bubo nipalensis</i>	Khagrachari, Chattogram, Bandarban



Barn owl



Brown fish owl



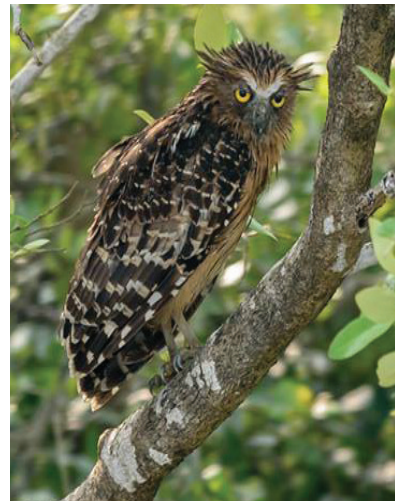
Brown hawk owl



Asian barred owl



Spotted owlet



Buffy fish owl



Dusky eagle owl



Spotted bellied eagle owl



Short eared owl



Brown wood owl



Collared owl



Collard scops owl



Indian scops owl



Oriental scops owl

Figure 5. Pictorial views of different owl species.

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