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Priyanka Das

A) Department of Zoology,
Bidhannagar College, EB-2,
Sector-1, Salt Lake, Kolkata –
700 064

B) Department of Zoology,
Sarojini Naidu College for
Women, 30, Jessore Road, Dum
Dum, Kolkata – 700 028, West
Bengal, India

Soma Aditya Bandyopadhyay

Department of Zoology, Sarojini
Naidu College for Women, 30,
Jessore Road, Dum Dum,
Kolkata – 700 028, West Bengal,
India

A preliminary assessment of avifaunal diversity in and around Sarojini Naidu College campus, Kolkata, West Bengal, India

Priyanka Das and Soma Aditya (Bandyopadhyay)

Abstract

Birds are highly diverse and conspicuous biota of the ecosystem. They act as potential bio-indicators and ideal models for predicting environmental changes. Owing to habitat destruction for progressive urbanization and unscientific management of natural resources, much of our native birds are facing threat. The objective of the present survey is focused on the assessment of the avifaunal diversity with vegetation composition of habitat and conservation priorities in the study area. A total of 45 species of birds under 25 families and 41 genera were recorded during September, 2013 to June, 2014 in the Sarojini Naidu College campus, Dum Dum, Kolkata. The avian species richness was highest for the order Passeriformes followed by Pelicaniformes and the rest 10 orders. Human interference, developmental activities, sound pollution, feral dogs and trimming of plants during breeding season were identified as some of the threats to avifaunal diversity in the college campus. This study is aimed towards contributing to the plan of biodiversity restoration in our campus and development of management strategies so as to ensure sustenance of birds and ecosystem services derived from them.

Keywords: avifauna, Sarojini Naidu College, biodiversity, vegetation composition, conservation

1. Introduction

Birds are the best-known class of vertebrate animals, occur worldwide in nearly all habitats, and provide many ecosystem services^[1]. The Indian subcontinent with highly varied climatic conditions, diverse habitat and long stretch of vegetation attracts and supports diverse avifauna including a large number of endemic species round the year. Out of more than 9,000 birds of the world, the Indian subcontinent harbors about 1,300 species, or over 13% of the world's birds^[2, 3]. Avian species assemblages are potent indicators of ecosystem health and functioning^[4-6]. Thus, exploration of the diversity of bird communities has become an important tool in biodiversity conservation and for identifying conservation actions in areas of high human pressure.

Of late, we are rapidly losing greenery in the name of development. There has also been an alarming rise in industrial and automobile pollution in Indian metropolitan cities. With the shrinking of trees and increase in pollution, butterflies, birds and all our wildlife are fast disappearing. The net result is a complete imbalance of the ecosystem and extinction of many species^[7].

Biodiversity assessment applying short span studies are becoming widespread and in this regard, preparation of checklists of birds on a broader scale has been given much importance^[8]. In the recent past, avian diversity has been studied by some researchers in different parts of West Bengal^[9-12]. Urban biodiversity has received very little attention from conservation biologists as compared to natural and protected ecosystems^[13-14]. Educational premises are the hotspots for urban biodiversity as they are devoid of any developmental activities and pollution. Although educational grounds occupy less than 5% of the total urban area, such areas may harbor up to half the biodiversity of the urban biota due to undisturbed natural vegetation^[15-18]. Sarojini Naidu College for Women (SNCW), Dum Dum, (22° 37' 12" N and 88° 25' 12" E) is located in a sub-urban belt having a well-wooded campus amidst a mosaic of concrete buildings (Image. 1). The campus is spread over an area of 3.5 acres with lush green vegetation having large trees, bushy shrubs and long grasses that provide feeding, nesting and breeding sites for birds. The College campus is surrounded by residential apartments, hospital, office buildings and large and small scale industries. The campus is flanked by roads with continuous vehicular movements. There are also ponds and water bodies with rich aquatic vegetation in the vicinity of the college. The study area experiences a sub-tropical climate

Correspondence:

Soma Aditya Bandyopadhyay
Department of Zoology, Sarojini
Naidu College for Women, 30,
Jessore Road, Dum Dum,
Kolkata – 700 028, West Bengal,
India

with hot summers from late March to early June (Temperature range: 25 °C-40 °C), the humid monsoon season from mid-June to late September and a cool dry winter from late November to early February (Temperature range: 12 °C-25 °C). Humidity is generally very high during summer and the area receives an average rainfall of 170 mm. The present study is focused not only on preparing the checklist of birds, but also to find out their status, feeding habit as well as to create awareness for their conservation. In addition, the study aims at providing a baseline data regarding bird diversity of the district since there is no satisfactory report on this respect till date.

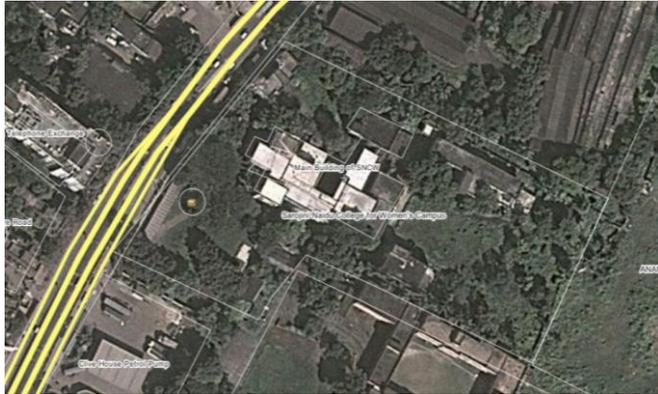


Image 1: Satellite overview map of study locality

2. Materials and Methods

The findings presented here are based on random surveys carried out from September, 2013 to June, 2014. The total college campus was surveyed from morning 6 a.m. till 5.30 p.m. Occasional sightings of birds during non-birding trips were also included in these studies. Birds were initially observed with the help of a Bushnell Binocular (8X40) and photographs were taken with a Nikon L320 camera. In some occasions, birds' calls were also noted. All identifications were based according to Grimmett *et al.* (1998)^[2] and Ali, S (2002)

^[3] and only those species with confirmed identification are listed in this paper. All individual sightings of birds were pooled and were categorized on the basis of the following abundance category in SNCW campus- Rare (1-2 sightings), Occasional (3-5 sightings), Common (16-50 sightings), and Very Common (> 50 Sightings). Foraging groups were classified as insectivorous (I), frugivorous (F), nectarivorous (N), grainivorous (G), carnivorous (CV) and omnivorous (OM) on the basis of feeding and foraging habits of the bird species according to our observation and as described by Ali and Ripley (1987)^[19].

3. Results

The present study represented the avian community structure of SNCW College campus and its surroundings of North 24 Parganas district of West Bengal. This is the first record of avifauna of SNCW College campus which depicted the presence of 45 species of birds belonging to 12 orders and 25 families (Table 1). Order Passeriformes represented by 17 species belonging to 12 families contribute to about 38 % of the total avifaunal species richness (Figure 3). Among the non-passerines, maximum richness was represented by the order Pelicaniformes (5 species) and order Piciformes (4 species) followed by Columbiformes, Cuculiformes and Coraciformes (3 species of each) (Table 1). The Ardeidae family shows the highest species richness (5 species) within the campus followed by Sturnidae, Cuculidae and Columbidae (3 species of each) (Table 1; Figure 4). Based on the frequency of sighting, 10 species of birds were very common, 19 species were common, 11 species were occasional and 5 species of birds were rare (Figure 2). Among the foraging groups, carnivores (33.33%) dominated the bird community followed by omnivores, insectivores, frugivores and granivores (Table 1). Nectarivorous (4.44%) birds were least represented in this study of avian community of SNCW College campus.

Table 1: List of birds recorded from SNCW campus along with abundance and feeding habit

Order	Family	Common Name	Scientific Name	Abundance	Feeding Habit
Passeriformes	Passeridae	House Sparrow	<i>Passer domesticus</i>	C	G
	Corvidae	House Crow	<i>Corvus splendens</i>	VC	OM
		Rufous Tree Pie	<i>Dendrocitta vagabunda</i>	C	OM
	Muscicapidae	Oriental Magpie Robin	<i>Copsychus saularis</i>	C	OM
		Red breasted Flycatcher	<i>Ficedula parva</i>	R	I
	Dicruridae	Black Drongo	<i>Dicrurus macrocercus</i>	C	I
	Pycnonotidae	Red Vented Bulbul	<i>Pycnonotus cafer</i>	VC	OM
	Oriolidae	Black Hooded Oriole	<i>Oriolus xanthornus</i>	C	OM
	Sturnidae	Common Myna	<i>Acridotheres tristis</i>	VC	OM
		Asian Pied Starling	<i>Gracupica contra</i>	C	OM
		Jungle Myna	<i>Acridotheres fuscus</i>	C	OM
	Sylviidae	Common Tailorbird	<i>Orthotomus sutorius</i>	C	OM
	Nectariniidae	Purple sunbird	<i>Cinnyris asiaticus</i>	O	N
		Purple Rumped Sunbird	<i>Leptocoma zeylonica</i>	O	N
Timaliidae	Jungle babbler	<i>Turdoides striata</i>	VC	OM	
Aegithinidae	Common Iora	<i>Aegithina tiphia</i>	O	I	
Paridae	Great Tit	<i>Parus major</i>	O	OM	
Columbiformes	Columbidae	Yellow Footed Green Pigeon	<i>Treron phoenicopterus</i>	R	G, F
		Spotted Dove	<i>Stigmatopelia chinensis</i>	C	G
		Common Pigeon	<i>Columba livia</i>	VC	G
Psittaciformes	Psittacidae	Rose-ringed Parakeet	<i>Psittacula krameri</i>	C	F
Cuculiformes	Cuculidae	Common Hawk Cuckoo	<i>Hierococcyx varius</i>	O	CV
		Asian Koel	<i>Eudynamis scolopaceus</i>	C	F
		Greater Coucal	<i>Centropus sinensis</i>	C	CV

Falconiformes	Accipitridae	Shikra	<i>Accipiter badius</i>	R	CV
		Steppe eagle	<i>Aquila nipalensis</i>	O	CV
Strigiformes	Strigidae	Spotted Owlet	<i>Athene brama</i>	R	CV
		Barn Owl	<i>Tyto alba</i>	R	CV
Piciformes	Picidae	Streak Throated Woodpecker	<i>Picus xanthopygaeus</i>	O	I
		Lesser Goldenback	<i>Dinopium benghalense</i>	C	I
	Ramphastidae	Coppersmith Barbet	<i>Megalaima haemacephala</i>	C	F
		Blue-Throated Barbet	<i>Megalaima asiatica</i>	O	F
Suliformes	Phalacrocoracidae	Little Cormorant	<i>Phalacrocorax niger</i>	C	CV
		Great Cormorant	<i>Phalacrocorax carbo</i>	C	CV
Pelicaniformes	Ardeidae	Black-Crowned Night Heron	<i>Nycticorax nycticorax</i>	O	CV
		Indian pond Heron	<i>Ardeola grayii</i>	C	CV
		Cattle Egret	<i>Bubulcus ibis</i>	VC	CV
		Great Egret	<i>Casmerodius albus</i>	VC	CV
		Little Egret	<i>Egretta garzetta</i>	VC	CV
Gruiformes	Rallidae	White Breasted Waterhen	<i>Amaurornis phoenicurus</i>	C	OM
Apodiformes	Apodidae	Asian Palm Swift	<i>Cypsiurus balasiensis</i>	VC	I
		House Swift	<i>Apus affinis</i>	VC	I
Coraciformes	Alcedinidae	Stork Billed Kingfisher	<i>Pelargopsis capensis</i>	O	CV
		White Throated Kingfisher	<i>Halcyon smyrnensis</i>	C	CV
	Meropidae	Green Bee-Eater	<i>Merops orientalis</i>	O	I

Abbreviations - Abundance: VC-very common, C-common, O-occasional, R-rare Feeding habit: CV-carnivore, OM-omnivore, I-insectivore, F-frugivore, G-granivore, N-nectarivore



Yellow Footed Green Pigeon (*Treron phoenicopterus*)



Black Drongo (*Dicurus macrocercus*)



Oriental Magpie Robin (*Copsychus saularis*)



Spotted Dove (*Stigmatopelia chinensis*)



Coppersmith Barbet (*Megalaima haemacephala*)



Green Bee eater (*Merops orientalis*)



Steppe Eagle (*Aquila nipalensis*)



Common Tailorbird (*Orthotomus sutorius*)



Indian Pond Heron (*Ardeola grayii*)



Shikra (*Accipiter badius*)



Lesser Goldenback (*Dinopium benghalense*)



Common Myna (*Acridotheres tristis*)



Jungle Babbler (*Turdoides striata*)



Little Cormorant (*Phalacrocorax niger*)



Red Vented Bulbul (*Pycnonotus cafer*)



Great Tit (*Parus major*)



Asian Pied Starling
(*Gracupica contra*)



White Breasted Kingfisher
(*Halcyon smyrensis*)



White Breasted Waterhen
(*Amaurornis phoenicurus*)



Purple Sunbird
(*Leptocoma zeylonica*)



Rufous Treepie
(*Dendrocitta vagabunda*)



Common Pigeon
(*Columba livia*)



Asian Koel
(*Eudynamis scolopaceus*)



Rose Ringed Parakeet
(*Psittacula krameri*)



Streak Throated Woodpecker
(*Picus xanthopygaeus*)



Common Iora
(*Aegithina tiphia*)



Black Hooded Oriole
(*Oriolus xanthornus*)



Spotted Owlet
(*Athene brama*)



Greater Coucal
(*Centropus sinensis*)



Purple Sunbird
(*Cinnyris asiaticus*)



Common Hawk Cuckoo
(*Hierococyx varius*)



Blue Throated Barbet
(*Megalaima asiatica*)

Fig 1: Photographs of some of the birds recorded from SNCW campus

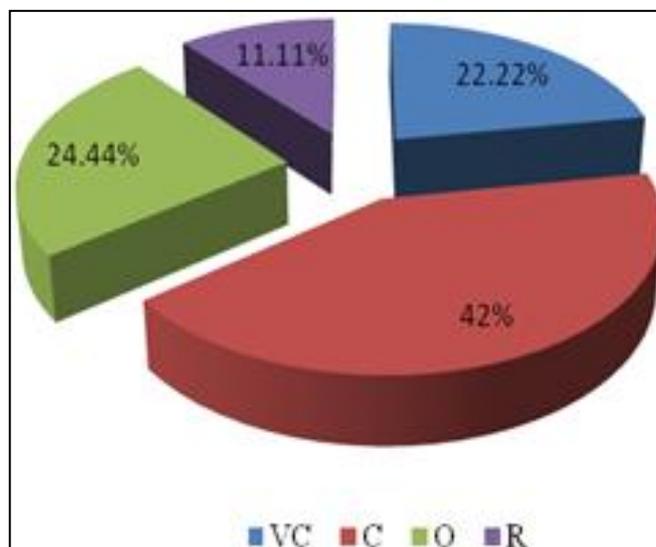


Fig 2: Abundance of birds in SNCW campus

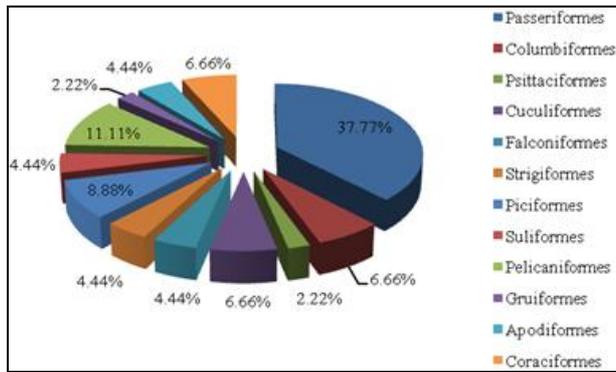


Fig 3: Percentage composition of birds in different orders of avifauna

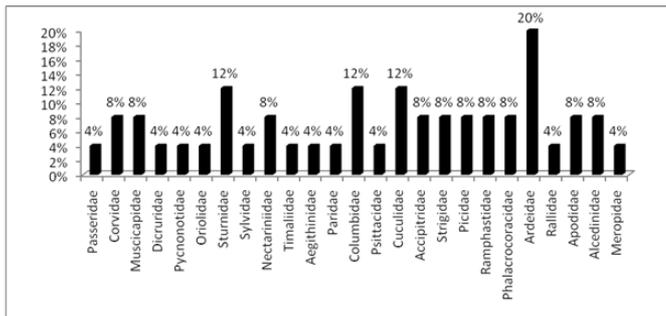


Fig 4: Percentage composition of birds in different families of avifauna

4. Discussion

Ecologically, birds are of tremendous importance to the human society. Birds act as a good medium for dispersing seeds, pollinating plants, biological control and they are important to continue the ecological cycle. Birds occupy almost all habitat types and diversity of birds often serves as a good indicator of overall diversity of a given area. Birds are also known to be responsive to any kind of changes to their ambient conditions hence can be used as bioindicator [20]. Different anthropogenic activities and change in climate can cause severe loss of avifaunal diversity [21-22]. Moreover, progressive urbanization often leads to biotic homogenization whereby a few widespread and successful species replace a diverse avifauna [23]. Therefore, assessment of the avifaunal diversity is essential to delineate the importance of local landscapes for avian conservation and creating a scientific database for proper management of the ecosystem to ensure better conservation, both of the habitat as well as the avian diversity. The study of bird diversity besides office, residential buildings, large parks and reserves in urban areas where humans interact with the nature on a daily basis may support high species diversity because these protected areas are the habitat fragments of highly diverse ecosystems [24]. The various landscapes serve as a balancing reservoir for sustaining native flora and fauna. The study area, despite small in size, appears to support an extremely rich and diverse bird community because the dimension of the green space and the amount of tree cover are critical factors supporting avian ecological diversity in urban environments. Residential areas are likely to provide both greater structural diversity and greater diversity of feeding opportunities [25]. The diverse feeding habit of the avifauna suggests that the study area provides a rich source of a variety of food resources. However, anthropogenic interference, developmental activities, sound pollution, feral dogs and trimming of plants during breeding season were identified as some of the threats to avifaunal

diversity in the college campus.

The distribution and occurrence of avifauna correlate well with the vegetation pattern of the area [26]. The flora in our campus is a mixed type with trees, herbs and shrubs comprising the vegetation. The study area is dominated by plant species belonging to families Annonaceae, Apocynaceae, Fabaceae, Malvaceae, Acanthaceae, Rubiaceae etc. namely *Ficus sp*, *Calotropis sp*, *Tridax sp*, *Polyalthia longifolia*, *Cassia fistula*, *Citrus sp*, *Terminalia arjuna*, *Murraya sp*, *Psidium guajava*, *Areca catechu*, *Cocos nucifera*, *Mangifera indica*, *Tabernaemontana sp*, *Alstonia scholaris*, *Ixora sp*, *Lantana camara*, *Cleome viscosa*, *Aegle sp*, *Hibiscus sp*, *Zizyphus jujuba*, *Justicia sp*, *Sida sp*, *Nerium sp*, *Mussaenda frondosa*, *Cosmos sp*, *Zinnia sp*, *Bougainvillea sp* and grasses [7] which provide diverse nesting, feeding and breeding sites for birds. With the pressing needs of the growing human population in India, natural greeneries are being clear-felled giving way to urbanization, pollution and overgrazing. Loss of prime habitat is the major threat to all wildlife including birds. Although we cannot completely nullify the ill effects of urbanization and development, we can at least try to reduce them by planting endemic trees and plants supporting the local wildlife. This will make sure that by no means the common species will go on to the verge of extinction.

5. Conclusion

The findings of the present study underline the importance of institutional campuses as a preferred habitat for birds. If the landscaping and vegetation pattern are well maintained, the diversity of birds may increase in our college campus providing a rich ground for avifauna conservation as well as for research. Further, human interference should not increase in the area over a period of time to maintain diverse species composition. This study will also add to our future attempts in understanding the complex nature of mutualistic interaction between birds and flowering plants that is essential for continuity of ecosystem services. This is the first effort in exploring the avifaunal wealth of SNCW. The present list of bird species is not conclusive and exhaustive and future exploration will be continued to update this checklist.

6. Acknowledgement

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7. Conflict of interest

The authors declare that there is no conflict of interest.

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