



Institutional Ground Serves as A Safe Haven for Birds, Butterflies and Odonates – A Case Study from Kolkata

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Abstract

Urban biodiversity has received very little importance from environmentalists in comparison to natural and protected ecosystems. Much of our native birds, butterflies and odonates are fast disappearing due to habitat destruction in urban environment and unscientific management of our natural resources and at present, their survival is under threat. The objective of the present review is focussed on the assessment of the diversity of butterflies, birds and odonates with vegetation composition of habitat and conservation priorities in a college campus. A combination of direct search and opportunistic sighting methods were applied to record 49 species of butterflies under 5 families and 36 genera, 45 species of birds belonging to 12 orders and 25 families and 23 different Odonata species (18 dragonflies and 5 damselflies) from the study area during the period 2014-2016. Our observation emphasizes that the institutional campus fulfils an environment favourable for harbouring a rich and diverse fauna. This study aims to focus on creation of a comprehensive biodiversity management program to properly monitor the diverse flora, fauna as well as the habitat in and around the college ground.

Keywords: *bird, butterfly, Odonata, biodiversity, conservation.*

Introduction

The Indian subcontinent presents extremely diverse climate, terrain and vegetation owing to which there is tremendous diversity of flora and fauna. It has been estimated that our country harbors about 1,300 species of birds (Grimmett *et al.* 1988, Ali S. 2002). 1504 species of butterflies (Tiple AD 2011) and 474 species of Odonates (Subramanian 2014). Being very sensitive towards any type of change in their habitat, avian species assemblages, odonates and butterflies are considered potent indicators of ecosystem health and functioning. Butterflies enable sustenance of ecosystem services through their role in pollination (Nair *et al.* 2014). Butterflies and Odonates play significant role

as important food chain components. Thus, exploration of avifauna as well as lepidopterans and odonates become important in identifying and preserving potential habitats under threat.

The well-being of humans has always been inexorably linked to the health of our local environments. Unfortunately, urban biodiversity has received very little importance from environmentalists as compared to natural and protected ecosystems. In urban ecosystems, species diversity assessment can be used as a means to reduce human misconduct and pollution in industrial, rural, and managed areas (Reaka-Kudla *et al.* 1997). Taking this into consideration, diversity

studies in urban ecosystems are important to understand the effect of anthropocentric development on the sustenance of ecosystem.

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 (Nair *et al.* 2014). With the shrinking of greenery 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 (Nair *et al.* 2014). In spite of the fast growth, Indian cities still have diverse serene habitats such as the traffic island gardens in the middle of busy roads, parks or urban forest areas with mixed deciduous and non-deciduous trees and scrubland serving as ideal habitats for various types of wildlife, especially butterflies, birds and Odonata. Institutional campuses with seasonal flowering plantation and undisturbed natural vegetation provide potential habitat for bird and insect population as they are devoid of any developmental activities and pollution (Tiple *et al.* 2006; 2007; Tiple AD 2012; Mohapatra *et al.* 2013; DasGupta & Rao 2014; Jain *et al.* 2005; Wadatkar JS 2001; Dey *et al.* 2013; Reginald *et al.* 2014).

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 (Nair *et al.* 2014) (Image. 1).



Image 1. Photographs of the college campus taken from different angles

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 shelter to the butterflies, birds and Odonates (Image. 2).

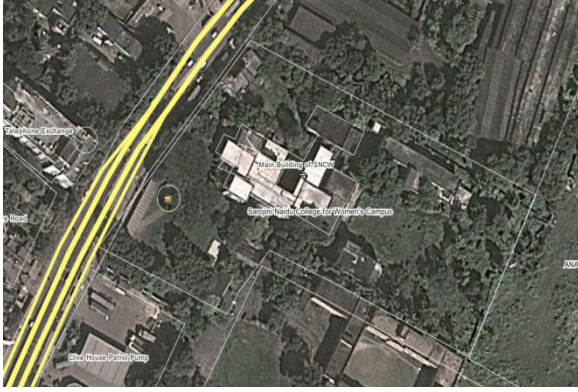


Image 2. Satellite overview map of study locality

There are also ponds and water bodies with rich aquatic vegetation in the vicinity of the college (Mandal & Aditya 2017). The study area experiences a sub-tropical climate 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 170mm (Nair *et al.* 2014). 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, butterflies and Odonates and ecosystem services derived from them.

Materials and Methods

The findings presented here are based on random surveys carried out for a consecutive period of three years, from 2014-2016. The total college campus was surveyed for butterflies, birds and Odonates in the morning, noon and evening times with the help of a Bushnell binocular (8x40) and photographed with a digital camera in their natural habitats. All scientific names of the butterflies followed in the present study are in accordance with Varshney R K (1983) and common English names follow Wynter-Blyth M A(1957). Bird identifications were based according to Grimmett *et al.* (1998) and Ali, S (2002). The Odonates were identified upto the species level following Subramanian (2014).

Results

The present study represented the avian, lepidopteran and odonate community structure of SNCW College campus and its surroundings of North 24 Parganas district of West Bengal. Forty nine species of butterflies representing five families and thirty six genera have been recorded during the study (Nair *et al.* 2014) (Table 1).

Table 1: List of butterflies recorded from SNCW campus

| Sl. No. | Common Name | Scientific Name |
|---------|------------------|--|
| 1. | Common mormon | <i>Papilio polytes</i> Linnaeus |
| 2. | Spot swordtail | <i>Graphium nomius</i> (Esper) |
| 3. | Common jay | <i>Graphium doson</i> (C. & R. Felder) |
| 4. | Lime butterfly | <i>Papilio demoleus</i> Linnaeus |
| 5. | Tailed jay | <i>Graphium agamemnon</i> (Linnaeus) |
| 6. | Blue mormon | <i>Papilio polymnestor</i> Cramer |
| 7. | Blue pansy | <i>Junonia orithiya</i> (Linnaeus) |
| 8. | Commander | <i>Moduza procris</i> (Cramer) |
| 9. | Striped tiger | <i>Danaus genutia</i> (Cramer) |
| 10. | Common castor | <i>Ariadne merione</i> (Cramer) |
| 11. | Common palmfly | <i>Elymnias hypermnestra</i> (Linnaeus) |
| 12. | Grey pansy | <i>Junonia atlites</i> (Linnaeus) |
| 13. | Lemon pansy | <i>Junonia lemonias</i> (Linnaeus) |
| 14. | Tawny coster | <i>Acraea violae</i> (Fabricius) |
| 15. | Glassy tiger | <i>Parantica aglea</i> (Stoll) |
| 16. | Great eggfly | <i>Hypolimnas bolina</i> (Linnaeus) |
| 17. | Common crow | <i>Euploea core</i> (Cramer) |
| 18. | Plain tiger | <i>Danaus chrysippus</i> (Linnaeus) |
| 19. | Common bushbrown | <i>Mycalesis perseus</i> (Fabricius) |
| 20. | Peacock pansy | <i>Junonia almana</i> (Linnaeus) |
| 21. | Common baron | <i>Euthalia aconthea</i> |

| | | |
|-----|-----------------------------|---|
| | | (Cramer) |
| 22. | Blue tiger | <i>Tirumala limniace</i> (Cramer) |
| 23. | Common fourring | <i>Ypthima huebneri</i> Kirby |
| 24. | Common evening brown | <i>Melanitis leda</i> (Linnaeus) |
| 25. | Common fivering | <i>Ypthima baldus</i> (Fabricius) |
| 26. | Chestnut-streaked sailer | <i>Neptis jumbah</i> Moore |
| 27. | Common grass yellow | <i>Eurema hecabe</i> (Linnaeus) |
| 28. | Psyche | <i>Leptosia nina</i> (Fabricius) |
| 29. | Common jezebel | <i>Delias eucharis</i> (Drury) |
| 30. | Striped albatross | <i>Appias libythea</i> (Fabricius) |
| 31. | Mottled emigrant | <i>Catopsilia pyranthe</i> (Linnaeus) |
| 32. | Common emigrant | <i>Catopsilia pomona</i> (Fabricius) |
| 33. | Yellow orange tip | <i>Ixias pyrene</i> (Linnaeus) |
| 34. | Striped albatross 'olferna' | <i>Appias olferna</i> |
| 35. | Indian cabbage white | <i>Pieris canidia</i> (Sparrman) |
| 36. | Three spot grass yellow | <i>Eurema blanda</i> (Boisduval) |
| 37. | Long-banded silverline | <i>Spindasis lohita</i> (Horsfield) |
| 38. | Common pierrot | <i>Castalius rosimon</i> (Fabricius) |
| 39. | Plains cupid | <i>Chilades pandava</i> (Horsfield) |
| 40. | Tiny grass blue | <i>Zizula hylax</i> (Fabricius) |
| 41. | Lime blue | <i>Chilades lajus</i> (Stoll) |
| 42. | Common cerulean | <i>Jamides celeno</i> (Cramer) |
| 43. | Dark grass blue | <i>Zizeeria karsandra</i> (Moore) |
| 44. | Pale grass blue | <i>Pseudozizeeria maha</i> (Kollar) |
| 45. | Apefly | <i>Spalgis epius</i> (Westwood) |
| 46. | Tailless lineblue | <i>Prosotas dubiosa indica</i> Evans |
| 47. | Forget-me-not | <i>Catochrysops strabo</i> (Fabricius) |
| 48. | Gram blue | <i>Euchrysops cnejus</i> (Fabricius) |
| 49. | Small branded swift | <i>Pelopidas mathias</i> (Fabricius) |

The maximum species richness was shown by Nymphalidae comprising of 20 species (41%), followed by Lycaenidae (12 species, 25%), Pieridae (10 species, 20%), Papilionidae (6 species, 12%) and Hesperidae (1 species, 2%). Common mormon, Lime butterfly and Psyche were found in high frequencies among all the recorded butterfly species in the campus. A total of five species of butterflies from the study area were designated rare, suggesting the need for strict conservation measures. Two species, Common pierrot and Chestnut-streaked sailer belong to Schedule I, Long-banded silverline and Gram blue belonged to Schedule II and Striped Albatross belongs to Schedule IV of the Indian Wildlife (Protection) Act, 1972 (Nair *et al.* 2014).

The study depicted the presence of 45 species of birds belonging to 12 orders and 25 families (Das & Aditya 2016) (Table 2). Order Passeriformes represented by 17 species belonging to 12 families contribute to about 38 % of the total avifaunal species richness. 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) (Das & Aditya 2016) (Table 2).

A total of 23 species of Odonata representing 19 genera from 5 families was recorded from Sarojini Naidu College campus and its vicinity (Mandal & Aditya 2017) (Table 3 & 4). The most diverse and abundant family was Libellulidae among the dragonflies (suborder Anisoptera), represented by 15 species (65.21%) followed by Aeshnidae (2 species) and Gomphidae (1 species) while among damselflies (suborder Zygoptera), Coenagrionidae was the most dominant family represented by 4 species (17.39%) followed by Platycenemididae representing 1 species (4.34%) only. Orthetrum prunosum was the most abundant species recorded in the study area (Mandal & Aditya 2017).

Table 2 : List of birds recorded from SNCW campus

| ORDER | FAMILY | COMMON NAME | SCIENTIFIC NAME |
|----------------|-------------------|----------------------------|--------------------------------|
| Passeriformes | Passeridae | House Sparrow | <i>Passer domesticus</i> |
| | Corvidae | House Crow | <i>Corvus splendens</i> |
| | | Rufous Tree Pie | <i>Dendrocitta vagabunda</i> |
| | Muscicapidae | Oriental Magpie Robin | <i>Copsychus saularis</i> |
| | | Red breasted Flycatcher | <i>Ficedula parva</i> |
| | Dicruridae | Black Drongo | <i>Dicrurus macrocercus</i> |
| | Pycnonotidae | Red Vented Bulbul | <i>Pycnonotus cafer</i> |
| | Oriolidae | Black Hooded Oriole | <i>Oriolus xanthornus</i> |
| | Sturnidae | Common Myna | <i>Acridotheres tristis</i> |
| | | Asian Pied Starling | <i>Gracupica contra</i> |
| | | Jungle Myna | <i>Acridotheres fuscus</i> |
| | Sylviidae | Common Tailorbird | <i>Orthotomus sutorius</i> |
| | Nectariniidae | Purple sunbird | <i>Cinnyris asiaticus</i> |
| | | Purple Rumped Sunbird | <i>Leptocoma zeylonica</i> |
| | Timaliidae | Jungle babbler | <i>Turdoides striata</i> |
| Aegithinidae | Common lora | <i>Aegithina tiphia</i> | |
| Paridae | Great Tit | <i>Parus major</i> | |
| Columbiformes | Columbidae | Yellow Footed Green Pigeon | <i>Treron phoenicopterus</i> |
| | | Spotted Dove | <i>Stigmatopelia chinensis</i> |
| | | Common Pigeon | <i>Columba livia</i> |
| Psittaciformes | Psittacidae | Rose-ringed Parakeet | <i>Psittacula krameri</i> |
| Cuculiformes | Cuculidae | Common Hawk Cuckoo | <i>Hierococcyx varius</i> |
| | | Asian Koel | <i>Eudynamys scolopaceus</i> |
| | | Greater Coucal | <i>Centropus sinensis</i> |
| Falconiformes | Accipitridae | Shikra | <i>Accipiter badius</i> |
| | | Steppe eagle | <i>Aquila nipalensis</i> |
| Strigiformes | Strigidae | Spotted Owlet | <i>Athene brama</i> |
| | | Barn Owl | <i>Tyto alba</i> |
| Piciformes | Picidae | Streak Throated Woodpecker | <i>Picus xanthopygaeus</i> |
| | | Lesser Goldenback | <i>Dinopium benghalense</i> |
| | Ramphastidae | Coppersmith Barbet | <i>Megalaima haemacephala</i> |
| | | Blue-Throated Barbet | <i>Megalaima asiatica</i> |
| Suliformes | Phalacrocoracidae | Little Cormorant | <i>Phalacrocorax niger</i> |
| | | Great Cormorant | <i>Phalacrocorax carbo</i> |
| Pelicaniformes | Ardeidae | Black-Crowned Night Heron | <i>Nycticorax nycticorax</i> |
| | | Indian pond Heron | <i>Ardeola grayii</i> |
| | | Cattle Egret | <i>Bubulcus ibis</i> |
| | | Great Egret | <i>Casmerodius albus</i> |
| Gruiformes | Rallidae | Little Egret | <i>Egretta garzetta</i> |
| | | White Breasted Waterhen | <i>Amaurornis phoenicurus</i> |
| Apodiformes | Apodidae | Asian Palm Swift | <i>Cypsiurus balasiensis</i> |
| | | House Swift | <i>Apus affinis</i> |
| Coraciformes | Alcedinidae | Stork Billed Kingfisher | <i>Pelargopsis capensis</i> |
| | | White Throated Kingfisher | <i>Halcyon smyrnensis</i> |
| | Meropidae | Green Bee-Eater | <i>Merops orientalis</i> |

Table 3. List of damselflies (sub order- Zygoptera) of SNCW

| Sl. no. | Family | Common name | Scientific name |
|---------|-----------------|-------------------------|---|
| 1 | Coenagrionidae | Pigmy Dartlet | <i>Agriocnemis pygmaea</i> (Rambur, 1842) |
| 2 | | Coromandel Marsh Dart | <i>Ceriagrion coromandelianum</i> (Fabricius, 1798) |
| 3 | | Golden Dartlet | <i>Ischnura aurora</i> (Brauer, 1865) |
| 4 | | Saffron-faced Blue Dart | <i>Pseudagrion rubriceps</i> Selys, 1876 |
| 5 | Platycnemididae | Yellow Bush Dart | <i>Copera marginipes</i> (Rambur, 1842) |

Table: 4. List of dragonflies (sub order- Anisoptera) of SNCW

| Sl.no | Family | Common Name | Scientific Name |
|-------|--------------|-----------------------------|--|
| 1 | Aeshnidae | Blue-tailed Green Darner | <i>Anax guttatus</i> (Burmeister, 1839) |
| 2 | | Brown Darner | <i>Gynacantha dravida</i> Lieftinck, 1960 |
| 3 | Gomphidae | Common Club Tail | <i>Ictinogomphus rapax</i> (Rambur, 1842) |
| 4 | Libellulidae | Scarlet Marsh Hawk | <i>Aethriamanta brevipennis</i> (Rambur, 1842) |
| 5 | | Rufous Marsh Glider | <i>Rhodothemis rufa</i> (Rambur, 1842) |
| 6 | | Ditch Jewel | <i>Brachythemis contaminata</i> (Fabricius,1793) |
| 7 | | Ruddy Marsh Skimmer | <i>Crocothemis servilia</i> (Drury, 1770) |
| 8 | | Black-tipped Ground Skimmer | <i>Diplacodes nebulosa</i> (Fabricius,1793) |
| 9 | | Ground Skimmer | <i>Diplacodes trivialis</i> (Rambur, 1842) |
| 10 | | Fulvous Forest Skimmer | <i>Neurothemis fulvia</i> (Drury, 1773) |
| 11 | | Pied Paddy Skimmer | <i>Neurothemis tullia</i> (Drury, 1773) |
| 12 | | Blue Marsh Hawk | <i>Orthetrum glaucum</i> (Brauer,1865) |
| 13 | | Crimson-tailed Marsh Hawk | <i>Orthetrum pruinosum</i> (Burmeister,1839) |
| 14 | | Green Marsh Hawk | <i>Orthetrum sabina</i> (Drury, 1770) |
| 15 | | Wandering Glider | <i>Pantala flavescens</i> (Fabricius,1798) |
| 16 | | Common Picture Wing | <i>Rhyothemis variegata</i> (Linnaeus, 1763) |
| 17 | | Crimson Marsh Glider | <i>Trithemis aurora</i> (Burmeister, 1839) |
| 18 | | Rufous-backed Marsh Hawk | <i>Brachydiplax chalybea</i> (Brauer, 1868) |

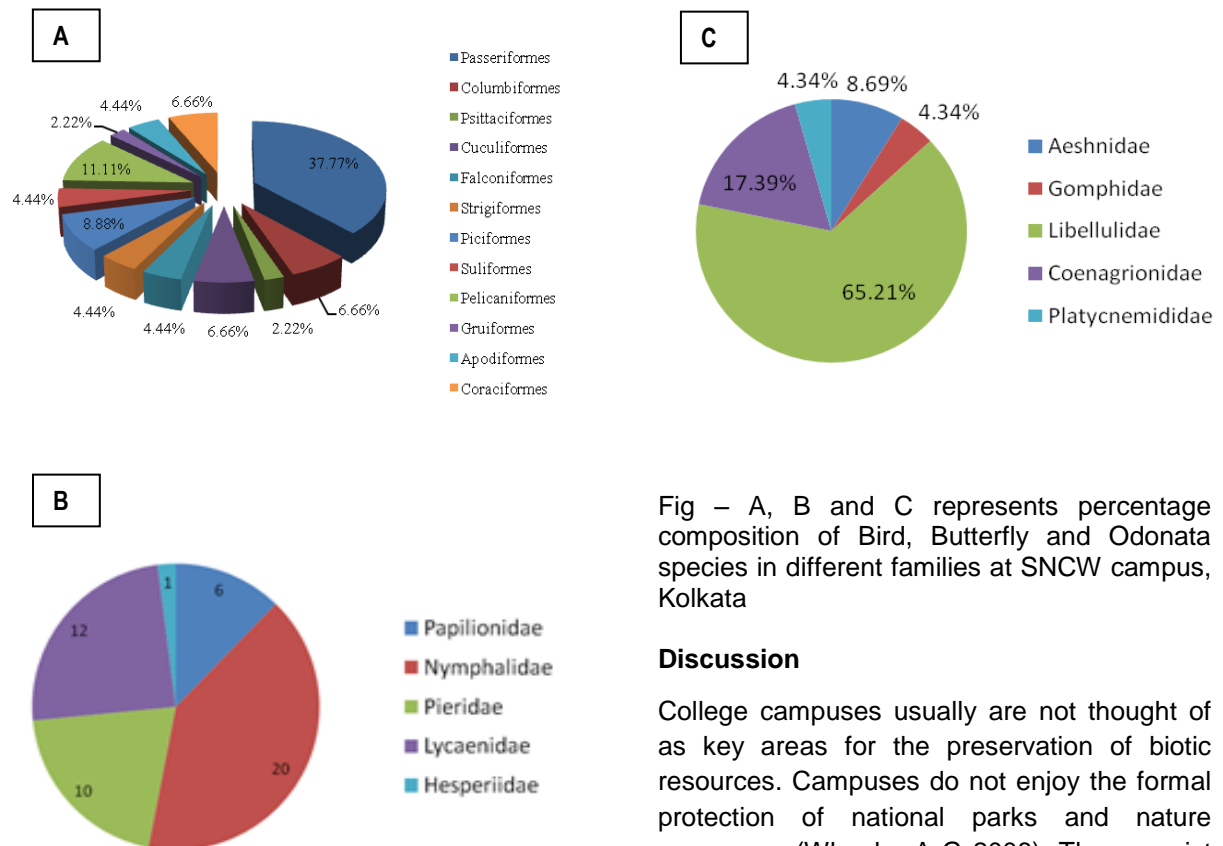


Fig – A, B and C represents percentage composition of Bird, Butterfly and Odonata species in different families at SNCW campus, Kolkata

Discussion

College campuses usually are not thought of as key areas for the preservation of biotic resources. Campuses do not enjoy the formal protection of national parks and nature preserves (Wheeler A G 2008). They consist largely of human-modified landscapes and are the habitat fragments of highly diverse

ecosystems and the corridors that link them. Thus, it is important to maintain this connectivity in order to sustain the rich faunal diversity on the campus. 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 (Mohapatra et al. 2013; DasGupta & Rao 2014; Jain et al. 2005; Wadatkar JS 2001; Dey et al. 2013; Reginald et al. 2014). Our observation emphasizes the importance of urban green spaces in conserving regional biodiversity as the area houses 49 species of butterflies [5], 45 species of birds (Das & Aditya 2016) and 23 species of Odonates (Mandal & Aditya 2017). Such high diversity and abundance in urban areas may be attributed to the grasslands, shrubs and small water bodies in and around the campus with minimal disturbance.

The distribution and occurrence of avifauna, Lepidopterans and Odonates correlate well with the vegetation pattern of the area. The preference of butterflies for particular habitats is associated with the availability of larval host plants and adult nectar plants. The flora in our campus is a mixed type with herbs and shrubs dominating the vegetation in the tropical climate (Nair et al. 2014). Trees are comparatively lesser in number. 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 which provide diverse habitat, nesting, feeding and breeding sites for birds and butterflies (Nair et al. 2014).

The study area, despite small in size, appears to support an extremely rich and diverse faunal community because the dimension of the green space and the amount of tree cover are critical factors supporting biodiversity in

urban environments. However, anthropogenic interference, developmental activities, and trimming of plants during breeding season were identified as some of the threats to biodiversity in the college campus. In addition to these, a variety of threats from human recreational and developmental activities, trampling, run-off from roads, litter deposition and weeds, sound pollution, feral dogs are common factors which affect bird, butterfly and Odonate populations (Das & Aditya 2016).

Urbanization in cities has generated many small, isolated fragmented patches which can be exploited for the conservation of local flora and fauna. Such green patches in the highly industrialized and polluted landscape of Kolkata indicate the potentiality of the habitat to support a substantial amount of biodiversity. Similar habitation need to be identified in other urban centres in West Bengal as well as India and development of long-term protection and management are required for conserving regional biodiversity. 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 butterflies, birds and Odonates (Nair et al. 2014). 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 at least the common species will not go on to the verge of extinction (Nair et al. 2014).

Conclusion

The findings of the present study underline the importance of institutional campuses as a preferred habitat for birds, butterflies and odonates. Our results highlighted that a small compact area like a segregated college campus supports a diverse fauna. If the landscaping and maintenance of the gardens within the campus are carefully planned, the diversity of wildlife may increase providing a rich ground for conservation as well as for research. Further, human interference and developmental activities should not increase in the area over a period of time to maintain diverse species composition.

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Conflicts of Interest:

The author declare that the research was conducted in the absence of any commercial or economic associations that could be construed as a potential conflict of interest

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