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Diversity of Avifauna and their Heterogeneous Habitat Preference in a Sub-Urban Area in West Bengal, India

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ABSTRACT

Avifauna are important for the ecosystem as they play various roles as scavengers, pollinators, seed dispersal agents and predators of insect pest and an important indicator to evaluate different habitats both qualitatively and quantitatively. A study was conducted during February 2012 to February 2015 in Chinsurah, the district town of Hooghly, West Bengal, India. This study was done in ix different habitats present in the core region of the town. These are agricultural land, river bank, small woody area, small water body, grassland and human habitat. A total of 67 avian species were recorded during this study. These species show preferences to various habitats, where some are specialist to one of the habitats and some are generalist to different habitats. Abundance of birds in different habitats is different, most probably due to the variation in amounts of resources in these habitats. Due to loss of natural habitats habitat specialists are gradually replaced by habitat generalists.

Keywords: Avifauna, Chinsurah, Species richness, Habitat generalist, Habitat Specialist

1. INTRODUCTION

Study of biodiversity has been of prime focus towards the latter half of the last century. What started as a fashionable hobby in the Victorian era was gradually picked up with much

seriousness, owing to the understanding of complex inter-relationships of different component of environment. More and more reports started to flow in and a panoramic overview of the global status of different organism began to emerge, of which the diversities of Indian bird populations have always been a topic of interest to ecologists. With the increase in number of natural and man made threats to the survival of different bird species, the diversity is subject to continuous changes. Bird-watching has gained much popularity, not just because of vibrant colours or the soothing notes of birds, but also because they are important members of any ecosystem and are serious markers of environmental fluctuations. A sharp decline in a specific bird's population can well mark the onset of catastrophe in an ecosystem. Hence to observe and analyse the changes, proper documentation of avifauna is necessary over different time span, in different ecosystems and geographical locations (Chaudhuri *et al.*, 2013).

Biodiversity conservation in urban areas has become significant not only because of increasing anthropogenic activities in urban centres but also because it is one of the innovative ways to conserve biodiversity as suggested by various global environmental conventions (Chaudhuri *et al.*, 2013). Progressive urbanization often leads to biotic homogenization whereby a few widespread and successful species replace a diverse avifauna (Mc Kinney and Lockwood, 2001 & Crooks *et al.*, 2004). Study of avifaunal diversity in different urban habitats gives us proper knowledge about city planning and conservation.

Objective of this study is the quantification of avifaunal diversity from diverse habitat patches of Chinsurah, a sub-urban area in West Bengal, India. The changes in the population trends of bird species due to habitat alteration were also taken into account.

Study site

Fig. 1. Map of study site (Chinsurah)

Present study is carried out in Chinsurah, the district town of Hooghly, West Bengal, India. It lies about 35 km. north of Kolkata. Chinsurah is at 22.90°N 88.39°E. The town is on the flood plain on the right bank of river Ganges (Bhagirathi-Hooghly). It is a town consisting of a large area of human habitation surrounded by small villages, farmlands and thin forest. Concretes as well as temporary colony like habitations cover most of the study area.

This study was done in six different habitats (marked by various colours) present in different regions in the ore region of Chinsurah. These habitats are agricultural land (YELLOW), river bank (BLUE), small woody area (GREEN), human habitat (RED), small water body and grassland. The last two are scattered all around the town.
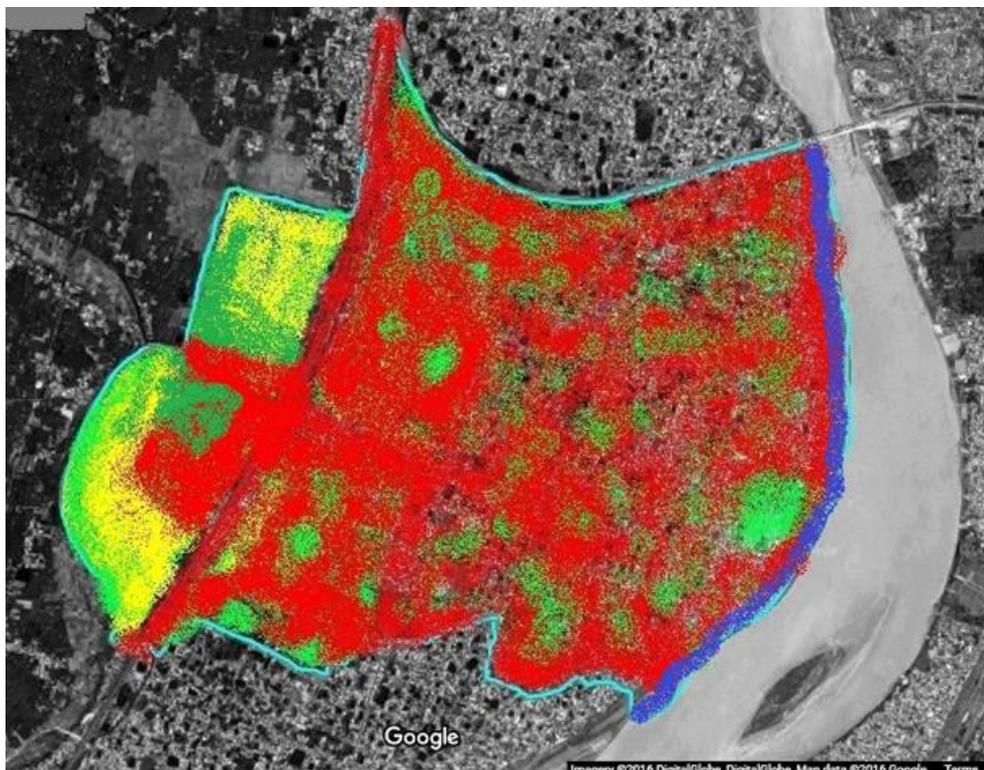

Fig. 2. Habitat distribution in Chinsurah

2. MATERIALS & METHODS

Observations were made in the morning and afternoon from February 2012 to February 2015. Surveys were conducted at different locations like human habitats, large gardens, agriculture fields, wetlands, river banks, road side trees, rice research centre campus, mango orchards, and municipal damping area. At each sighting birds were counted using a binocular and identified. In case of doubtful identification, photographs were taken and the species is identified later by consulting experts. Area search method and opportunistic observations were used for sampling. Birds were observed using a binocular (Olympus 7 x 35 DPS I) and were identified following Grimmett *et al*. (1998) and Ali (2012). Photographs were taken with a digital camera (Nikon Coolpix S6200) for documentation.

The birds are divided into habitat specialist and habitat generalist. The species that use only one habitat is called Habitat Specialist and the species that use more than one habitat is called Habitat Generalist.

The abundance of bird species in different habitats is compared in graphical representation. Chi-square test is done to verify the significance of the observed data.
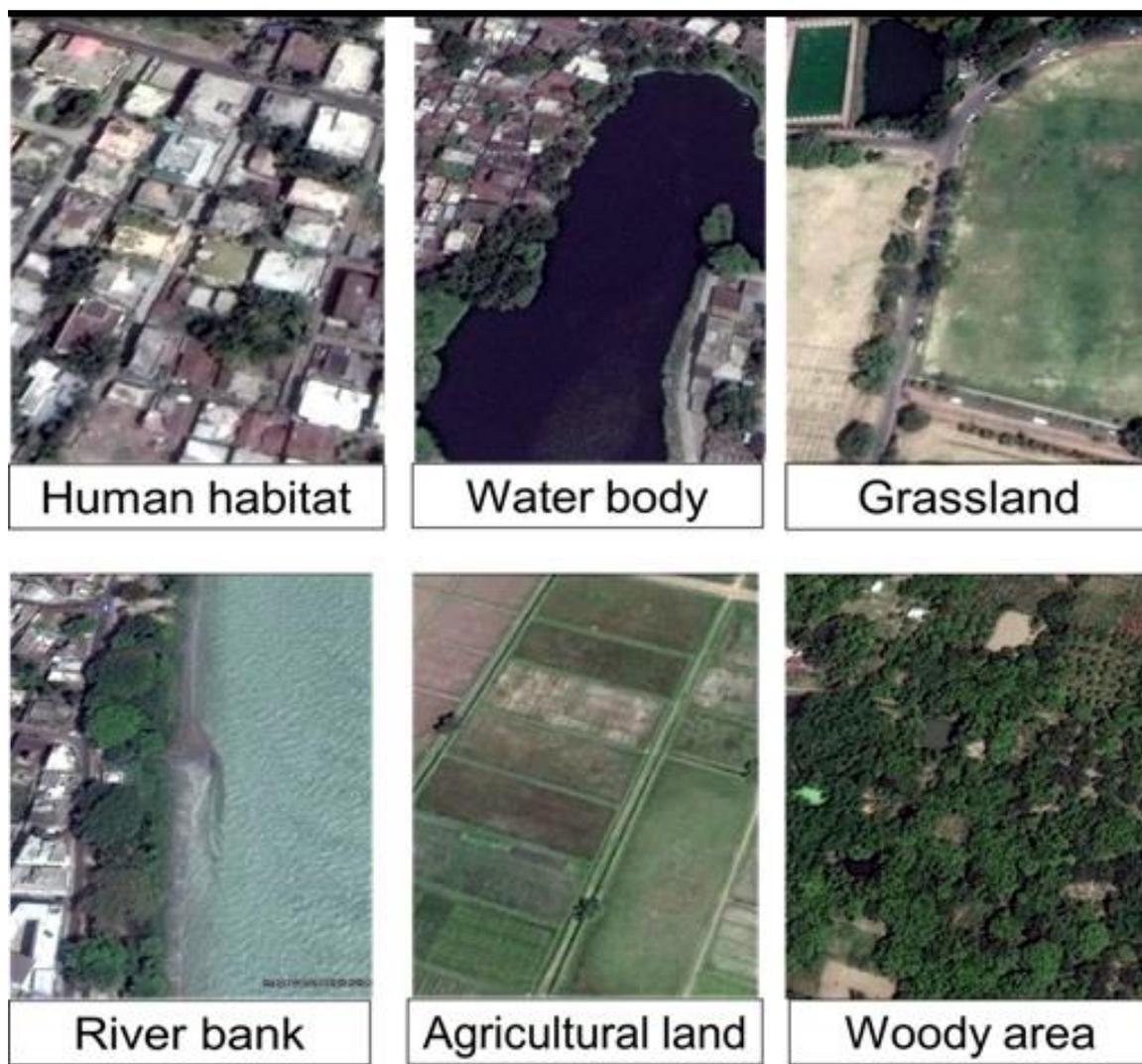

Fig. 3. Different types of habitats in Chinsurah

3. RESULTS

During the present study 67 bird species were observed and identified (Table 1; Plates 1 & 2). When the bird community of six different habitats were compared it was found that 23 species are found in 2 types of habitats; 6 species are found in 3 types of habitats; 3 species (Asian Pied Starling, Cattle Egret, Black Drongo) are found in the most no. (4) of habitats (Tables 2 & 3).

Table 1. The bird species observed in Chinsurah, West Bengal, India, along
with respective habitats
(Abbreviation: HH- Human Habitat, AL- Agricultural Land, RB- River Bank, SWA- Small
Woody Area, GL- Grassland, SWB- Small Water Body)

Sl. No.	Family	Common Name (Scientific Name)	Habitat
Order: Accipitriformes			
1	**Accipitridae**	Shikra (*Accipiter badiusi*)	SWA
2		Black Kite (*Milvus migrans*)	HH
Order: Caprimulgiformes			
3	**Apodidae**	Asian Palm Swift (*Cypsiurus balasiensis*)	HH, RB
4		House Swift (*Apus affinis*)	HH, RB
Order: Charadriiformes			
5	**Scolopacidae**	Common Sandpiper (*Actitis hypoleucos*)	RB
Order: Columbiformes			
6	**Columbidae**	Rock Pigeon (*Columba livia*)	HH
7		Eurasian Collared Dove (*Streptopelia decaocto*)	AL
8		Spotted Dove (*Streptopelia chinensis*)	HH, AL, SWB
9		Yellow-legged Green Pigeon (*Treron phoenicopterus*)	HH, SWA
Order: Coraciiformes			
10	**Alcedinidae**	Pied Kingfisher (*Ceryle rudis*)	SWB
11		Stork-billed Kingfisher (*Pelargopsis capensis*)	SWB
12		White-throated Kingfisher (*Halcyon smyrnensis*)	RB, SWB
13	**Meropidae**	Green Bee-eater (*Merops orientalis*)	HH, AL, SWA
14	**Upupidae**	Common Hoopoe (*Upupa epops*)	GL

	Order: Cuculiformes		
15	**Cuculidae**	Greater Coucal (*Centropus sinensis*)	SWA
16		Pied Cuckoo (*Clamator jacobinus*)	HH
17		Asian Koel (*Clamator jacobinus*)	HH, SWA
	Order: Passeriformes		
18	**Alaudidae**	Bengal Bush Lark (*Mirafra assamica*)	GL
19	**Cisticolidae**	Plain Prinia (*Prinia inornata*)	AL, SWA
20		Common Tailorbird (*Orthotomus sutorius*)	HH
21	**Corvidae**	Rufous Treepie (*Dendrocitta vagabunda*)	HH, SWA
22		House Crow (*Corvus splendens*)	HH, RB, GL
23		Large-billed Crow (*Corvus macrorhynchos*)	SWA
24	**Dicruridae**	Black Drongo (*Dicrurus macrocercus*)	HH, AL, SWA, GL
25	**Estrildidae**	Scaly-breasted Munia (*Lonchura punctulata*)	HH
26	**Laniidae**	Brown Shrike (*Lanius cristatus*)	HH, AL, SWA
27		Long-tailed Shrike (*Lanius schach*)	AL
28	**Leiothrichidae**	Jungle Babbler (*Turdoides striata*)	HH, SWA
29	**Motacillidae**	Paddy field Pipit (*Anthus rufulus*)	AL
30		Olive-backed Pipit (*Anthus hodgsoni*)	GL
31		White Wagtail (*Motacilla alba*)	GL
32		Western Yellow Wagtail (*Motacilla flava*)	GL
33	**Muscicapidae**	Oriental Magpie-Robin (*Copsychus saularis*)	HH, SWA
34		Taiga Flycatcher (*Ficedula albicilla*)	HH, SWA

35		Black Redstart (*Phoenicurus ochruros*)	HH, GL
36	**Nectariniidae**	Purple Sunbird (*Cinnyris asiaticus*)	HH
37		Purple-rumped Sunbird (*Leptocoma zeylonica*)	HH
38	**Oriolidae**	Black-hooded Oriole (*Oriolus xanthornus*)	HH, SWA
39		Indian Golden Oriole (*Oriolus kundoo*)	SWA
40		Black-naped Oriole (*Oriolus chinensis*)	SWA
41	**Paridae**	Cinereous Tit (*Parus cinereus*)	SWA
42	**Passeridae**	House Sparrow (*Passer domesticus*)	HH
43	**Pycnonotidae**	Red-vented Bulbul (*Pycnonotus cafer*)	HH, SWA
44		Red-whiskered Bulbul (*Pycnonotus jocosus*)	HH, SWA
45	**Rhipiduridae**	White-throated Fantail (*Rhipidura albicollis*)	HH, SWA
46	**Sturnidae**	Asian Pied Starling (*Gracupica contra*)	HH, AL, RB, GL
47		Chestnut-tailed Starling (*Sturnia malabarica*)	HH, SWA
48		Brahminy Starling (*Sturnia pagodarum*)	HH, SWA
49		Common Myna (*Acridotheres tristis*)	HH, AL, GL
50		Jungle Myna (*Acridotheres fuscus*)	HH, SWA
51		Bank Myna (*Acridotheres ginginianus*)	RB
Order: Pelecaniformes			
52	**Ardeidae**	Indian Pond-Heron (*Ardeola grayii*)	RB, SWB
53		Cattle Egret (*Bubulcus ibis*)	AL, RB, GL, SWB
54		Black-crowned Night Heron (*Nycticorax nycticorax*)	RB
55	**Ciconiidae**	Asian Openbill (*Anastomus oscitans*)	SWB
56	**Phalacrocoracidae**	Little Cormorant (*Microcarbo niger*)	RB, SWB

57		Indian Cormorant (*Phalacrocorax fuscicollis*)	SWB
Order: Piciformes			
58	**Picidae**	Lesser Golden-backedWoodpecker (*Dinopium benghalense*)	HH, SWA
59		Yellow-crowned Woodpecker (*Leiopicus mahrattensis*)	SWA
60		Lesser Yellow nape (*Picus chlorolophus*)	SWA
61		Fulvous-breasted Woodpecker (*Dendrocopos macei*)	SWA
62	**Ramphastidae**	Blue-throated Barbet (*Psilopogon asiaticus*)	SWA
63		Coppersmith Barbet (*Psilopogon haem acephalus*)	HH, SWA
Order: Psittaciformes			
64	**Psittaculidae**	Alexandrine Parakeet (*Psittacula eupatria*)	SWA
65		Rose-ringed Parakeet (*Psittacula krameri*)	HH, SWA
Order: Strigiformes			
66	**Strigidae**	Spotted Owlet (*Athene brama*)	HH
67	**Tytonidae**	Barn Owl (*Tyto alba*)	HH, SWA

Table 2. Distribution of bird species among habitats
(Abbreviation: HH- Human Habitat, AL- Agricultural Land, RB- River Bank, SWA- Small Woody Area, GL- Grassland, SWB- Small Water Body)

	HH	AL	RB	SWA	GL	SWB
HH	9	0	2	16	1	0
AL	0	3	0	1	0	0
RB	2	0	3	0	0	3
SWA	16	1	0	11	0	0
GL	1	0	0	0	5	0

SWB	0	0	3	0	0	4

*6 species are found in 3 types of habitats; 3 species (Asian Pied Starling, Cattle Egret, Black Drongo) are found in 4 types of habitats.

Table 3. Species diversity in different habitats

Habitat	Human habitat	Agricultural land	River bank	Small woody area	Grassland	Small water body
Species diversity	36	11	11	33	12	8
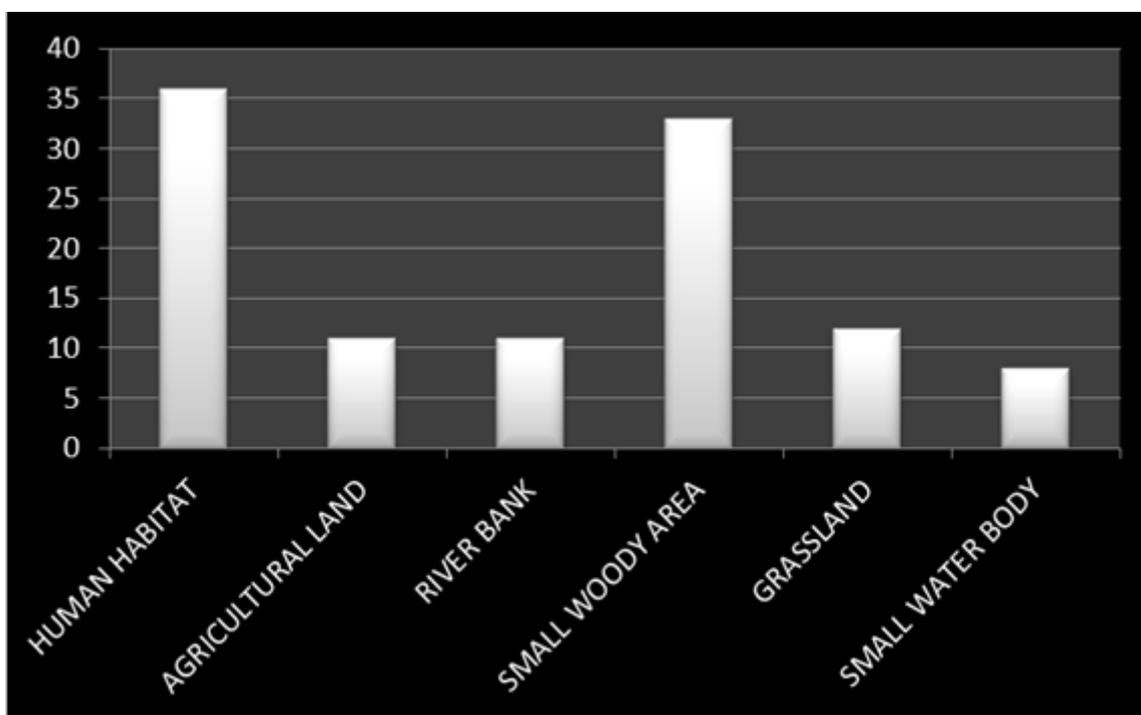
Fig. 4. Total no. of species in different habitat

A **chi-square test** was done to verify the significance of this data. The calculated value of chi-square = **42.24 > 11.07** = critical value of chi-square at 5% level of significance for degree of freedom 5. So, there is **significant variation** with the data. Now, it can be said that Human Habitat has highest species richness followed by Small Woody Area. Least amount of species richness is present in Small Water Body (Fig. 4).

A **chi-square test** was done to verify the significance of the data of Table 4, in case of Habitat Specialist species. The calculated value of chi-square = **9.74 <11.07** = critical value of chi-square at 5% level of significance for degree of freedom 5. So, there is **no significant variation** with the data.
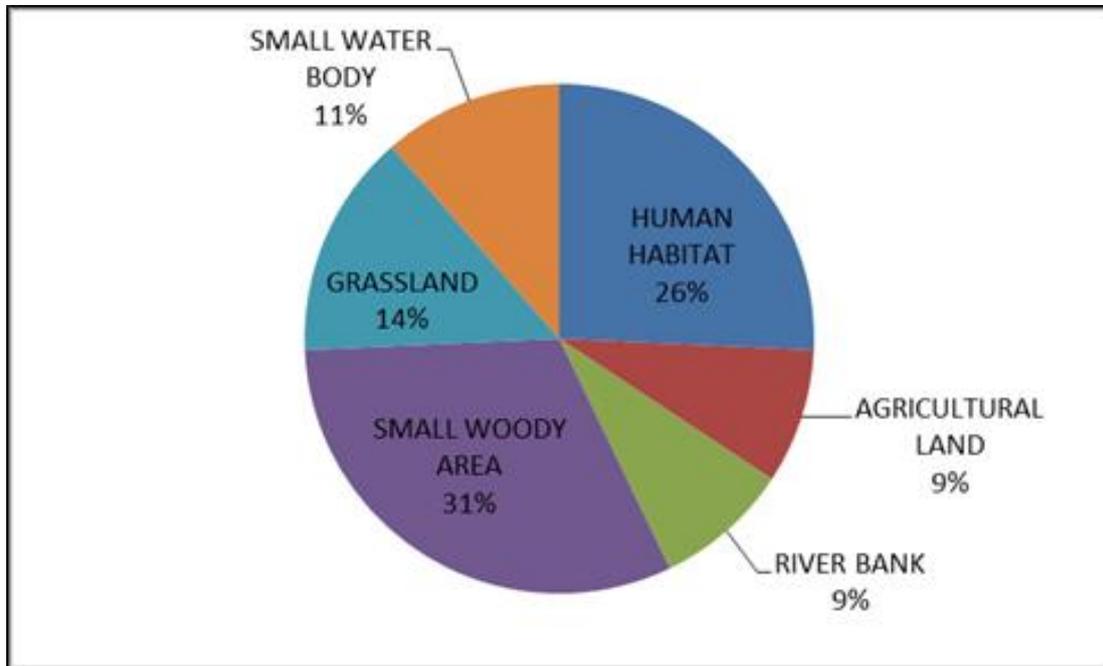
Fig. 5. Habitat preference by Specialist species
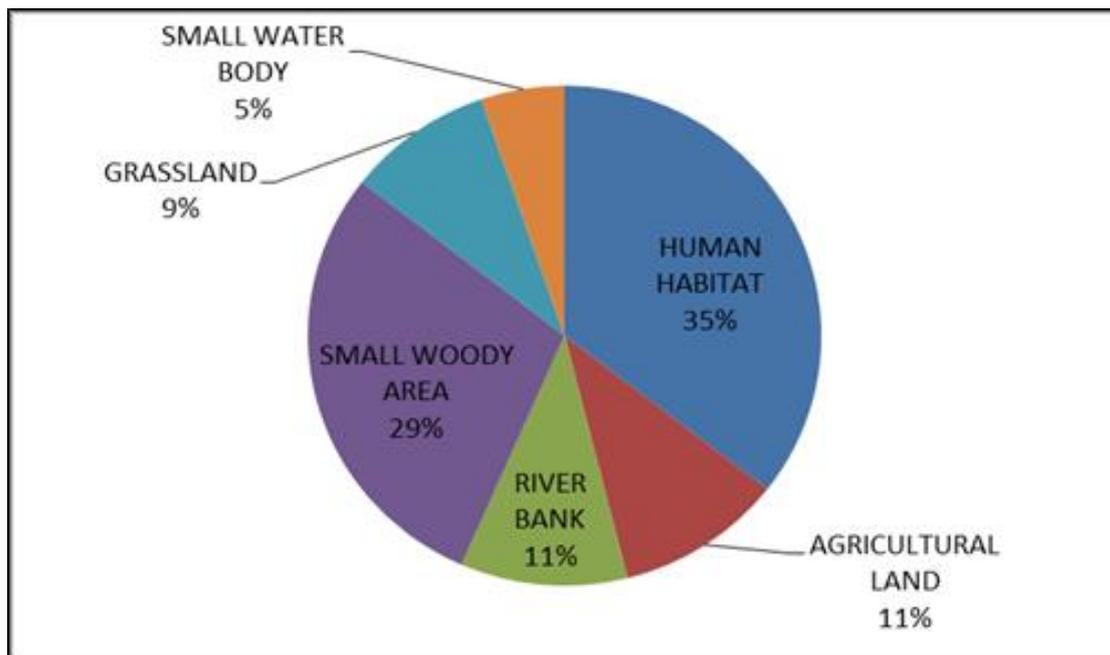

Fig. 6. Habitat preference by Generalist species

No. of Habitat specialist species (species that use only one habitat) found in this study is 35 and no. of Habitat generalist species (species that use more than one habitat) is 32.

Table 4. No. of Specialist species present in different habitats

Habitat	Human habitat	Agricultural land	River bank	Small woody area	Grassland	Small water body
No. of Habitat Specialist species	9	3	3	11	5	4

Table 5. No. of Generalist species present in different habitats.

Habitat	Human habitat	Agricultural land	River bank	Small woody area	Grassland	Small water body
No. of Habitat Generalist species	27	8	8	22	7	4

A **chi-square test** was done to verify the significance of the data of Table 5, in case of Habitat Generalist species. The calculated value of chi-square = **35 > 11.07** = critical value of chi-square at 5% level of significance for degree of freedom 5. So, there is **significant variation** with the data.

So, it can be said that there is no significant variation in the presence of Specialist species in different habitats; rather more or less all the habitats have its own species which are specialist in occupying those habitats. But in case of Generalist species, Human habitat contains most no. of species followed by small woody area.

4. DISCUSSION & CONCLUSIONS

Human habitats are enjoyed by most no. of species, probably due to presence of various resource materials in large amount that are exploited by the birds. The garbage and thrown away foods are a huge source of food materials which are only found in human habitats. Apart from these fruits from road side trees and ground insects help the human habitat to become a place with full of resource materials for birds. In Grassland, Small water body, River bank and Agricultural land, the total percentage of habitat specialist (43%) is more than the total percentage of habitat generalist (36%). This is most probably due to the availability of specialised resources in those habitats. As most habitat specialists have a special choice in their food preference, they occupy that habitat which has a plenty supply of that resource material. One severe problem, experienced during this study is that, the natural habitats for these avian species are being destroyed at an alarming rate due to anthropogenic activities. The trees are being cut for household and commercial purposes. The water bodies are being filled regularly for construction purposes. The agricultural systems are being disturbed by large scale grazing, courtesy domestic animals of the villagers. Due to loss of natural habitats, number of Habitat

Specialist species are declining. Human Habitat, containing the most Habitat Generalist species, is engulfing the natural habitats. Habitat Specialists are solely dependent upon the habitats where they live. As those habitats are decreasing, the Habitat Specialists are being replaced gradually by Habitat generalists. Proper city planning and sustainable development are needed immediately. A balance in the total amount of all the habitats is required to protect the avifauna of this town. To save this urban avifaunal diversity awareness in the local people about the ecosystem and environment is needed.

References

[1] Ali S. 2012. The book of Indian birds.Oxford University Press, New Delhi, 13th Edn, 512 pp.

[2] Chaudhuri, P., Acharya, S. & Dey, C. 2013. Avifaunal diversity of Chandannagar suburban area of West Bengal. *J Environ and Sociobiol* 10 (2), 137-142

[3] Crooks, K.R., Suarez, A.V. & Bolger, D.T. 2004. Avian assemblages along a gradient of urbanization in a highly fragmented landscape. *Boil. Conserv*. 115: 451-462

[4] Grimmett, R., Inskipp, C. & Inskipp, T. 1998. Birds of the Indian Subcontinent. Oxford University Press, New Delhi, 888 pp.

[5] Kheraa, N., Mehtaa V, Sabatab, B.C. 2009. Interrelationship of birds and habitat features in urban greenspaces in Delhi, India. *Urban Forestry & Urban Greening*, 8: 187-196

[6] Mc Kinney, M.L. & Lockwood, J.L. 2001. Biotic homogenization: a sequential and selective process. *Biotic Homogenization*. Kluwer, New York, 1-17.

PLATE 1
Photographs of representative bird species
(see Table 4 for Sl. No.and corresponding names)
[17,46 – Human Habitat] [19,13 – Agricultural Land] [53,57 – River Bank]

PLATE 2
Photographs of representative bird species
(see Table 4 for Sl. No. and corresponding names)
[1,6 – Small Woody Area] [14,49 - Grassland] [5,11 – Small Water Body]