



Avifaunal Assemblages in Suburban Habitat of District Udhampur, J&K (UT), India

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Abstract

The present study was carried out to report the avifaunal assemblages in suburban habitat of district Udhampur based on the survey carried from 2021 to 2022. A total of 103 avian species belongs to 15 orders were reported from study area. The suburban study area primarily was divided into four habitats i.e., Aquatic habitat (AqH), Open cultivation habitat (OCH), Scrubby Habitat (SH) and Aerial Habitat (AeH). The results indicates that open cultivation habitat reported highest Shannon diversity index (3.54) and lowest found in Scrubby habitat (1.23). Shannon Equitability Index was found highest in open cultivation area (0.88) and lowest in scrub by habitat (0.76). Margalef's index was found highest at open cultivation habitat (7.10) and lowest in aerial habitat (1.02). Similarly, Menhinick's index was found highest in Open cultivation habitat (0.99) and lowest in Aerial habitat (0.52). Out of 103 bird's species 73 were resident, 4 shows winter migrants, 24 species were reported to be summer migrant and 2 species found to be Passage migrant/Vagrant. Species abundance was found as Common (65%), Occasional (12%), Frequent (12%) and Rare (11%).

Keywords: Suburban, habitat, bird species, cultivation, aquatic, Udhampur.

1. Introduction

Aves have adapted to flourish anywhere and are known to be the most successful species in the world. Aves need habitat to survive which depends upon a species food preference, foraging strategies and nesting sites. Ornithologists have developed the habitat concept and have gathered information regarding the distribution and abundance of birds in aspects of environment

(Morrison et al., 1992). The term "habitat" is used as a unifying, theoretical concept to understand the avian diversity (Rotenberry 1981). Birds can also settle in the human altered habitats. The birds that are not able to adapt to the city life, carve a niche for themselves in the adjoining suburban habitats. Suburban areas represent a middle habitat condition between natural and urban environment which has an ideal potential for sustaining varied avian communities

(Richard et al., 1986). Thus, the suburban areas provide a habitat complex that is structurally and ecologically different from the large urban and forest zones. Suburban habitat is becoming important to biodiversity conservation efforts. The present land use alteration has affected the bird species composition and only a few species are found to dominate the suburban habitats. Though many forest birds avoid suburban areas, many native birds find it a better place as a habitat. During migration and winter, many avian species utilize these suburban habitats. In J&K state, avifaunal diversity has been reported by several workers. (Osmoston, 1927); (Choudhary, 2002); (Sharma, 2003); (Ahmed, 2004); (Kumar, 2006); (Kumar and Sahi, 2006); (Kait, 2011); (Aggarwal, 2011); (Kotwal,

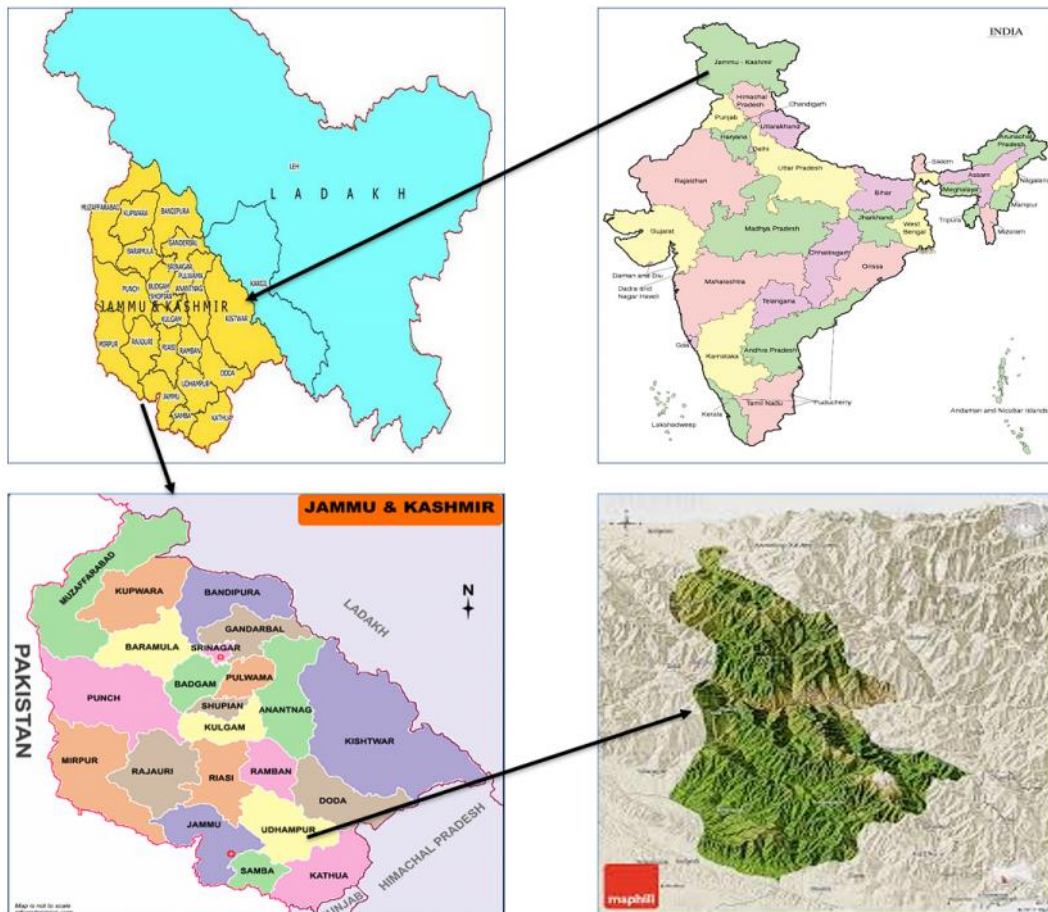
2012); (Sharma and Sharma, 2017); (Sohil and Sharma, 2019); (Wani et al., 2021). The present study reports the bird assemblages along with their resident, migratory status, and abundance in the suburban habitat of district Udhampur.

2. Material and Methods

2.1 Study Area:

The area under study was the suburban part of district Udhampur, Jammu & Kashmir (UT), India. Udhampur is in the Shivalik range of Himalayas which is a part of the Northwest Lower Himalayas with mostly mountainous topography (fig. 1).

Fig. 1: Map of Jammu & Kashmir (UT) and study area of district Udhampur.



Udhampur city is situated at 32.93°N 75.13°E in a relatively semi plateau part of the district at an altitude of 756m (2480 feet) from mean sea level. The climate of study area is sub-tropical and the

temperature ranges between 40 during summer while in winter dips to 2 or even sometimes to zero with yearly rainfall is 130cm mostly in rainy season and winters because of Western

disturbances. This suburban area is surrounded by the scrubby and coniferous hills. This area is traversed by intermittent Tavi River and streams in form of nalas and khad.

These stations are the agricultural areas and comprise of the agroecosystem of Udampur. Agriculture includes predominantly of *Oryza sativa* (Rice), *Triticum aestivum* (Wheat), Maize (*Zea mays*), vegetables and fruit trees. The dominant plant species include *Ficus bangalensis*, *F. religiosa*, *Toona ciliata*, *Grewia optiva*, *Morus alba*, *Mangifera indica*, *Psidium guajava*, *Ficus carica*, *Cedrus deodara*, *Pinus roxburghii*, *Pinus wallichiana*, *Cupressus*, *Pyrus malus*, *Pyrus pashia*, *Melia*. Shrubs includes *Adhatoda vesica*, *Vitex negundo*, *Berberis lycium*, *Woodfordia*, *Carissa opaca*, *Colebrookeaop positifolia*, *Dodonaea viscosa*.

2.2 Methodology:

A systematic survey was done to record the avifaunal diversity of the study area from 2021 to 2022. For data collection of avian fauna, Line transect (**Sale and Berkmuller, 1988**) and point transect (**Verner, 1985**) methods were used. Documentation of the recorded bird species was done with help of field guides, reference books and pertinent literature: “Handbook of Birds of India and Pakistan” (**Ali and Repley, 1983**), “The Book of Indian Birds”(Ali, 1996), “A photographic guide to birds of India”(Grewal et al., 2002). Confirmation of the species was done with the help of “Birds of Indian Subcontinent”(Grimmett et al., 1998). Bird watching was done early in the morning and before sunset in the evening. In order to maintain uniformity all surveys were conducted from 6.00 a.m. to 11.00 a.m. and 4.30 p.m. to 6.30 p.m. in the evening during summers and 7.30 a.m. to 11.30 a.m. and 3.30 p.m. to 5.30 p.m. during winters. Besides this, several irregular visits were also made during different hours of the day. Binocular (Bushnell make) was used to record the observations from the distance in order to avoid any disturbance to birds. Photographs were taken with help of D5300 with 70-300mm zoom camera (Nikon) for easy and correct

identification of bird species. Care was taken that the sun was always behind the observer so that the plumage patterns of the birds could be distinguished. The Shannon Diversity Index & Shannon Equitability index with formula

$$H = -\sum_{j=1}^S p_j \ln p_j$$

$$\& E_H = H / \ln(S)$$

were used to measure the diversity and evenness of species in different habitats of study area. Species richness was measured by Margalef's index formula

$$d = S - 1 / \ln N$$

and Menhinick's index by formula

$$D = \frac{s}{\sqrt{N}}$$

3. Results and Discussion

A systematic list of 103 bird species belonging to 15 orders along with their local abundance, resident /migratory status and habitat utilization has been presented in **table 1**. Out of 15 orders, order Passeriformes dominated the bird community (56.54%) followed by Piciformes(7.7%), Accipitriformes (7.6%), Psittaciformes (5.5%), Pelecaniformes (5.5%), Cuculiformes (4.4%), Galliformes (3.3%), Gruiformes (3.3%), Coraciiformes (3.3%), Charadriiformes (3.3%), Columbiformes (2.2%), Stringiiformes (2.2%), Upupiformes (7.54%), Bucerotiformes (1.1%) and Suliformes (1.1%) as shown in Graph chart 1a &1b. Among the habitats of study area Open cultivation habitat reported highest Shannon diversity (3.54) and lowest found at Scrubby habitat (1.23). Shannon Equitability Index was found highest in Open Cultivation area (0.88) and lowest at Scrubby habitat (0.76). Margalef's index was found highest at Open cultivation habitat (7.10) and lowest in Aerial habitat (1.02). Similarly, Menhinick's index was found highest in Open cultivation habitat (0.99) and lowest in Aerial habitat (0.52) as shown in **table 2**. Out of the total bird recorded, 73 species were resident, 4 species were found to be winter migrants, 24 species were reported to be summer migrant and 2 species found to be

Passage migrant/Vagrant. It was revealed that the major proportion of the bird species recorded during the study as shown in the table was found to be constituted by the resident bird species (71%), followed by summer migrant (23%), winter migrants (4%), and passage migrant/vagrant (2%) shown in Graph 3a & 3b. The habitat preference of the bird species in the different types of habitats in the study area was presented in Graph 2a & 2b, where 51 bird species were found in the open cultivation habitat, 18 species were found in the aquatic habitat, 17 species utilized more than one habitat, 11 species were found in Scrubby habitat and 6 species were of Aerial habitat.

The proportion of birds recorded was highest in the open cultivation habitat (51.50%), followed by aquatic habitat (18.17%), Mixed habitat (17.16%), Scrubby habitat (11.11% and aerial habitat (6.6%). Approximately proportions of species fell into each of the four abundance categories Common (65%), Occasional (12%), Frequent (12%) and Rare (11%). Indian Moorhen and Indian white Breasted Waterhen inhabit the aquatic habitat but were also found on the ground during feeding. The resident and summer visitors preferred the open cultivation habitat to fulfil the requirements in terms of feeding, roosting, and nesting sites. The birds feed on grains, seeds, fruits, green vegetation of the crop plants and insects(O'Connor and Shrub, 1986).The dominance of five to six bird species such as Sparrows, Crows, Mynas, Red Vented Bulbul, Himalayan bulbul and blue rock pigeon was observed in the suburban bird community. Some birds reach peak densities in suburban habitat while others reach peak densities at natural habitats (Gering and Blair, 1999). Granivorous bird species have adapted to the agricultural habitats and have increased in numbers. Suburban areas of Udhampur have intensively cultivated areas. The variety of native trees along human habitation, roadside and crop fields provide food to birds in form of tree-fruits, seeds, nectar, etc.

Sparrows, Mynas, Babblers, and crows throughout the year moved around human habitation because of easy resources of food available in the gardens and areas with ground vegetation (Koul and Sahi, 2013); (Anthal and Sahi, 2013). Pigeons, Sparrows were observed to prefer agricultural fields for foraging. Crows, Mynas and bulbuls were commonly sighted on trees, fields and roadside. Granivorous birds such as Pigeon, Doves are well adapted to the open country. They were seen perching on telephone and electric wires and on the ground for foraging the seeds in the open and semi open lightly wooded areas. The various ground feeders such as House sparrow, Pigeons, Doves, and Magpies were found to be tolerant to the human presence and activity and utilize buildings and other structures as nest sites in preference or in addition to trees and other vegetation.

4. Conclusion

To conclude it was found that the suburbs of Udhampur have a great potential as a habitat for the avian species which are resident as well as migratory. Suburban environment exhibits high abundance of some bird species. A fine mixture of habitats in the suburbs provides opportunities for birds to exploit a range of resources in the form of food and shelter. Open cultivation and aquatic habitats in form of rice fields and wetlands are the most preferred landscapes of birds and conservation measures need to be oriented in this direction. Suburban stretches of Udhampur are surrounded by matrix of built developmental environment and agriculture. They are thus important for conservation to protect bird diversity. We should understand suburban community ecology and environment in order to inform our biodiversity conservationists to conserve the avian community.

Table1a: Birds checklist of Suburban habitat of district Udhampur, JK (UT)

S.No	Common Name	Scientific Name	BC	ST	AB	Habitat
	Order- Passeriformes					
1	Baya Weaver	<i>Ploceus phillipinus</i>	75	SM	C	OCA
2	Green bee eater	<i>Merops orientalis</i>	44	SM	C	OCA
3	Blue-tailed bee eater	<i>Merops philippinus</i>	26	SM	O	OCA
4	White Wagtail	<i>Motacilla alba</i>	23	SM	F	OCA/AqH
5	Large Pied Wagtail	<i>Montacilla maderaspatens</i>	55	Res	C	AqH/OCA
6	Yellow Wagtail	<i>Montacilla flava</i>	17	SM	C	AqH
7	Purple Sunbird	<i>Nectarinia asiatica</i>	34	Res	C	OCA
8	Crimson Sunbird	<i>Aethopyga siparaja</i>	9	Res	O	OCA
9	Jungle Babbler	<i>Turdoides striatus somervillei</i>	115	Res	C	SH/OCA
10	Common Babbler	<i>Turdoides caudatus</i>	9	Res	R	SH/OCA
11	Yellow-eyed Babbler	<i>Chrysomma sinense</i>	13	Res	F	SH/OCA
12	Spotted babbler	<i>Pellorneum ruficeps</i>	4	Res	O	SH/OCA
13	Paradise Flycatcher	<i>Terpsiphone paradise</i>	13	SM	C	OCA
14	Indian Tailor Bird	<i>Orthotomus sutorius guzuratus</i>	58	Res	C	SH/OCA
15	Oriental White-eye	<i>Zosterops palpebrosus</i>	23	Res	C	SH/OCA
16	Common chiffchaff	<i>Phylloscopus collybita</i>	9	WM	C	SH/OCA
17	Ashy Prinia	<i>Prinia socialis</i>	48	Res	C	SHOCA
18	Grey Breasted Prinia	<i>Prinia hodgsonii</i>	62	Res	C	OCA
19	Plain Prinia	<i>Prinis inornata</i>	17	Res	C	OCH
20	Grey hooded warbler	<i>Phylloscopus xanthoschistos</i>	68	Res	C	OCH
21	Oriental Magpie Robin	<i>Copsychus saularis</i>	13	SM	C	OCH
22	White-throated fantail	<i>Rhipidura albicollis</i>	5	Res	O	OCH
23	Pied Bush Chat	<i>Saxicola caprata bicolour</i>	45	Res	C	OCH
24	Indian Robin	<i>Saxicoloides fulvicata cambaiensis</i>	21	Res	C	OCH
25	Brown Rock Chat	<i>Cercomela fusca</i>	67	Res	C	OCH

Table1a (Continued)

25	Brown Rock Chat	<i>Cercomela fusca</i>	67	Res	C	OCH
26	Grey Bush Chat	<i>Saxicola ferreus</i>	33	Res	C	OCH
27	Bluethroat	<i>Luscinia svecica</i>	2	WM	R	SH
28	Long-tailed Shrike	<i>Lanius scahach</i>	17	Res	C	OCH
29	Indian Golden Oriole	<i>Oriolusorioluskundoo</i>	31	SM	C	OCH
30	Black Drongo	<i>Dicrurusadsimilus</i>	47	Res	C	OCH
31	Hair Crested Drongo	<i>Dicrurushottentottus</i>	17	SM	O	OCH
32	Indian Myna	<i>Acridotheres tristis tristis</i>	295	Res	C	OCH
33	Brahminy Myna	<i>Sturnus pagodarum</i>	40	Res	F	OCH
34	Jungle Myna	<i>Acridotheres fuscus</i>	250	Res	C	OCH
35	House Crow	<i>Corvus splendens splendens</i>	18	Res	F	OCH
36	Jungle Crow	<i>C.macrorhynchos culminates</i>	205	Res	C	OCH
37	Rufous treepie	<i>Dendrocitta vagabunda</i>	41	Res	C	OCH
38	Himalayan Whistling thrush	<i>Myophonus caeruleus</i>	37	Res	C	SH/OCH
39	Long Tailed Minivet	<i>Pericrocotus ethologus</i>	54	SM	O	SH
40	Red- vented Bulbul	<i>Pycnonotus cafercafer</i>	180	Res	C	OCH
41	Himalayan Bulbul	<i>P. leucogenysleucogenys</i>	175	Res	C	OCH
42	Red-rumped Swallow	<i>Hirundo daurica</i>	43	SM	C	AqH
43	Barn Swallow	<i>Hirundo rusica</i>	44	SM	C	AqH
44	Verdicator Flycatcher	<i>Muscicapa thalassaina thalassina</i>	23	SM	F	OCH
45	White Capped Redstart	<i>Chaimarrornis leucocephalus</i>	24	Res	C	AqH
46	Plumbeous water redstart	<i>Phoenicurus fuliginosus</i>	23	Res	C	AqH
47	Indian House Sparrow	<i>Passer domesticus indicus</i>	190	Res	C	OCH
48	Russet Sparrow	<i>Passer cinnamomeus</i>	120	Res	F	OCH
49	Scaly-breasted Munia	<i>Lunchura punctulata</i>	93	Res	C	OCH
50	Cinereous Tit	<i>Parus cinereus</i>	104	Res	C	OCH
51	Green Backed Tit	<i>Parus monticolus</i>	14	Res	O	OCH
52	Rosy pipit	<i>Anthus roseatus</i>	17	Res	F	OCH
53	Paddyfield Pipit	<i>Anthus rufulus</i>		Res	C	OCH
54	Common Rose finch	<i>Carpodacus erythrinus</i>	33	WM	O	OCH
55	Yellow-breasted Green Finch	<i>Chloris spinoides</i>	35	Res	C	OCH

Table1a (Continued)

56	European goldfinch	<i>Carduelis carduelis</i>	27	SM	O	OCH
Order- Accipitriformes						
57	White-Rumped Vulture	<i>Gypus bengalensis</i>	7	Res	R	AeH
58	Himalayan Griffon	<i>Gyps himalayensis</i>	55	Res	C	AeH
59	Oriental honey buzzard	<i>Pernis ptilorhynchus</i>	8	Res	C	AeH
60	White-eyed Buzzard	<i>Butastur teesa</i>	5	Res	O	AeH
61	Black Kite	<i>Milvus migrans</i>	47	Res	C	AeH
62	Indian Shikra	<i>Accipiter badius dussumieri</i>	25	Res	C	OCH
63	Common kestrel	<i>Falcon tinnunculus</i>	11	SM	C	AeH
Order- Galliformes						
64	Indian peafowl	<i>Pavo cristatus</i>	17	Res.	C	SH
65	Jungle Bush Quail	<i>Perdica asiatica</i>	14	Res.	R	SH
66	Grey francolin	<i>Ortygornis pondicerianus</i>	70	Res.	C	SH
Order- Gruiformes						
67	Common moorhen	<i>Gallinula chloropus</i>	15	Res	F	AqH
68	White breasted waterhen	<i>Amaurornis phoenicurus</i>	58	Res	C	AqH
69	Ruddy-breasted crane	<i>Porzana fusca</i>	3	P	R	AqH
Order-Columbiformes						
70	Indian Blue Rock Pigeon	<i>Columbia livia</i>	250	Res	C	OCH
71	Indian Spotted Dove	<i>Streptopelia decaocta</i>	110	Res	C	OCH
Order- Psittaciformes						
72	Rose Ringed Parakeet	<i>Psittacula krameri</i>	132	Res	C	OCH
73	Blossom Headed Parakeet	<i>P. cynocephali</i>	64	SM	F	OCH
74	Grey-headed parakeet	<i>Psittacula finschii</i>	15	SM	C	OCH
75	Slaty-headed Parakeet	<i>Psittacula himalayana</i>	55	SM	C	OCH
76	Alexandrine Parakeet	<i>Psittacula eupatria</i>	75	Res	C	OCH
Order-Stringiiformes						
77	Northern Spotted Owllet	<i>Athene brama indica</i>	36	Res	C	SH/OCH
78	Barred Jungle Owllet	<i>Glaucidium radiatumradiatum</i>	15	Res	F	SH/OSH

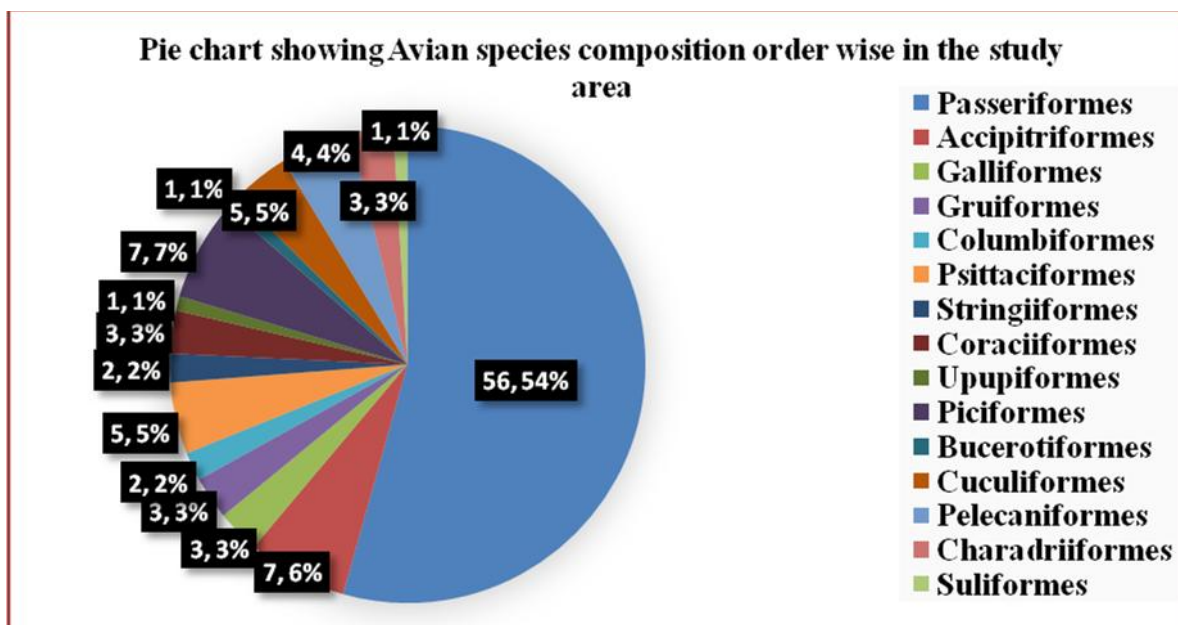
	Order-Coraciiformes					
79	White Breasted Kingfisher	<i>Halcyon smyrnensis</i>	27	Res	C	AqH
80	Crested Kingfisher	<i>Megacery lelugubris</i>	7	SM	O	AqH
81	Common Kingfisher	<i>Alcedoatthis</i>	10	SM	O	AqH
	Order- Upupiformes					
82	European Hoopoe	<i>Upupa epopsepops</i>	47	Res	C	OCH
	Order-Piciformes					
83	Lesser Golden Backed Woodpecker	<i>Dinopium benghalense</i>	27	Res	C	SH
84	Fulvous-breasted woodpecker	<i>Dendrocopos macei</i>	23	Res	C	SH
85	Grey capped pygmy woodpecker	<i>Yungipicus canicapillus</i>	7	Res	O	SH
86	Blue-throated Barbet	<i>Megalaima asiatica</i>	20	Res	C	SH
87	Brown-headed barbet	<i>Psilopogon zeylanicus</i>	38	Res	C	SH
88	Coppersmith barbet	<i>Psilopogon haemacephalus</i>	13	Res	C	SH
89	Eurasian wryneck	<i>Jynx torquilla</i>	3	SM	R	OCH/SH
	Order-Bucerotiformes					
90	Indian Grey hornbill	<i>Ocyeros birostris</i>	47	Res	C	OCH
	Order- Cuculiformes					
91	Indian Koel	<i>Eudynamys scolopacea</i>	32	Res	C	OCH
92	Greater coucal	<i>Centropus sinensis</i>	5	Res	R	OCH
93	Common hawk-cuckoo	<i>Hierococcyx varius</i>	32	SM	C	SH/OCA
94	Jacobin cuckoo	<i>Clamator jacobinus</i>	15	SM	F	OCH
	Order-Pelecaniformes					
95	Cattle Egret	<i>Bubulcus ibis</i>	93	Res	C	AqH/OCH
96	Indian Pond Heron	<i>Ardeola grayii grayii</i>	19	Res	C	AqH
97	Little Egret	<i>Egretta garzetta</i>	14	Res	R	AqH
98	Eastern Cattle Egret	<i>Bubulcus ibis coromandus</i>	6	Res	R	AqH
99	Little Bittern	<i>Ixobrychus minutus</i>	1	P	R	AqH
	Order-Charadriiformes					
100	Greater painted-snipe	<i>Rostratula benghalensis</i>	16	Res	O	AqH
101	Green sandpiper	<i>Tringa ochropus</i>	21	SM	F	AqH
102	Red-wattled lapwing	<i>Vanellus indicus</i>	52	Res	C	AqH/OCH
	Order-Suliformes					
103	Great cormorant	<i>Phalacrocorax carbo</i>	2	Res.	R	AqH

(Res-Resident, SM-Summer Migrant, WM-Winter Migrant, P/V-Passage/Vagrant, R-Rare, C-Common, O-Occasional, F-Frequent, OCH-Open Cultivation Habitat, AqH-Aquatic Habitat, AeH-Aerial Habitat, SH-Scrubby Habitat, BC-Bird count, ST-Status, AB-Abundance)

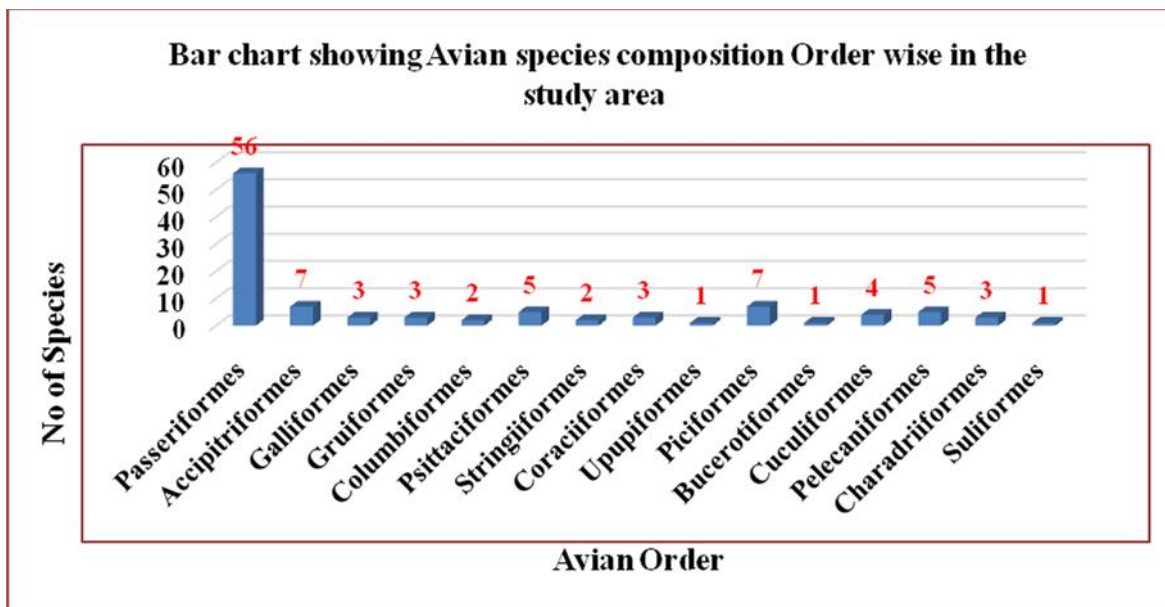
Table2: Diversity Index of Avian species in the study area

Habitat	Shannon Diversity Index	Shannon Equitability index	Margalef's index	Menhinick's index
OCH	3.54	0.88	7.10	0.99
AqH	2.44	0.84	1.7	0.58
SH	1.23	0.76	1.76	0.64
AeH	1.38	0.77	1.02	0.52
Mixed H	2.09	0.87	2.35	0.65

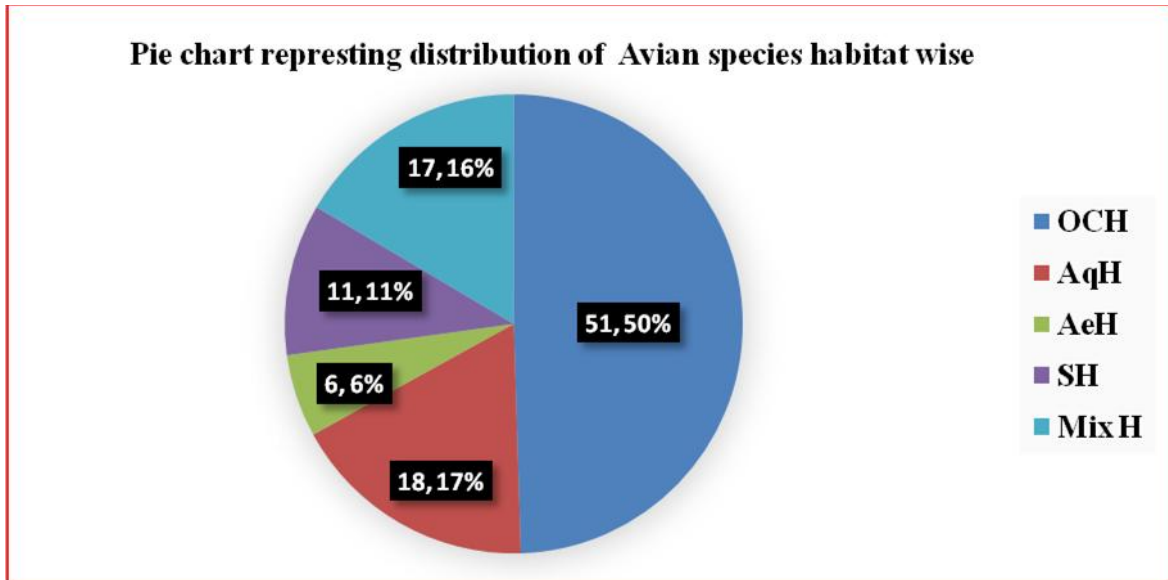
Graph 1a: Avian species composition order wise in the Sub-urban habitats of district Udhampur



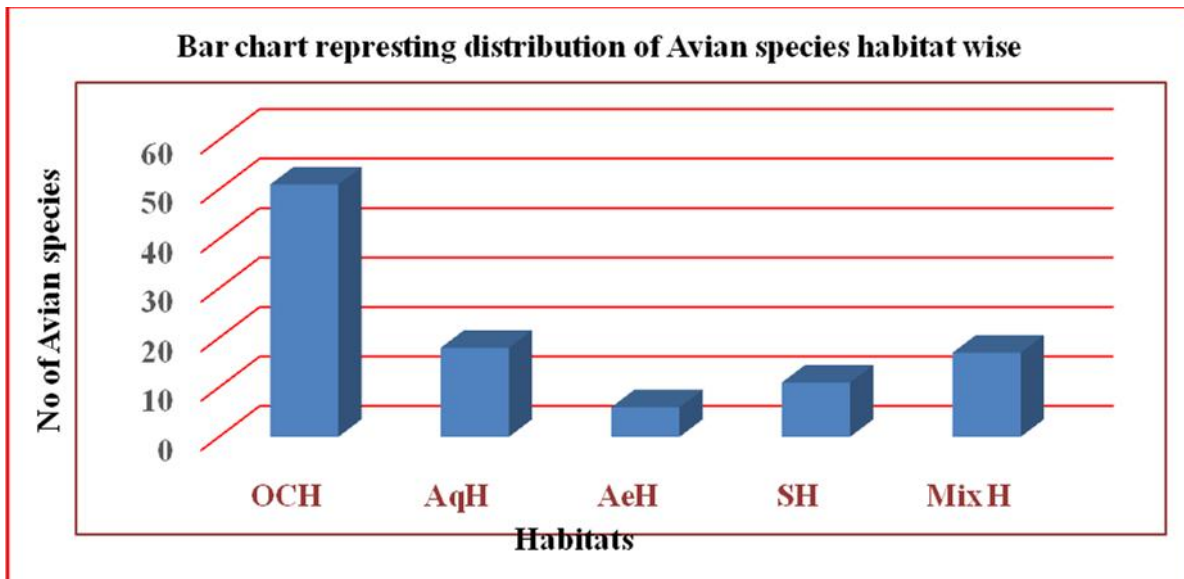
Graph 1b: Avian species composition order wise in the Sub-urban habitats of district Udhampur



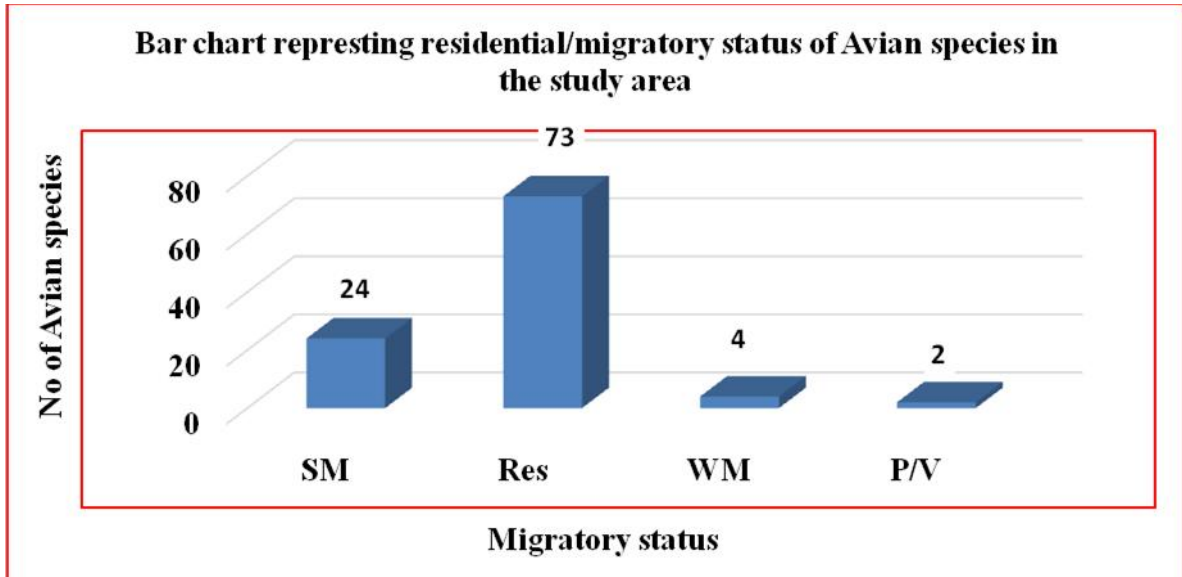
Graph 2a: Distribution of Avian species along different habitats in Sub-urban habitats of district Udhampur (OCH-Open cultivation habitat, AqH-Aquatic habitat, AeH-Aerial habitat, SH-Scrubby habitat & Mix H-Mixed habitat).



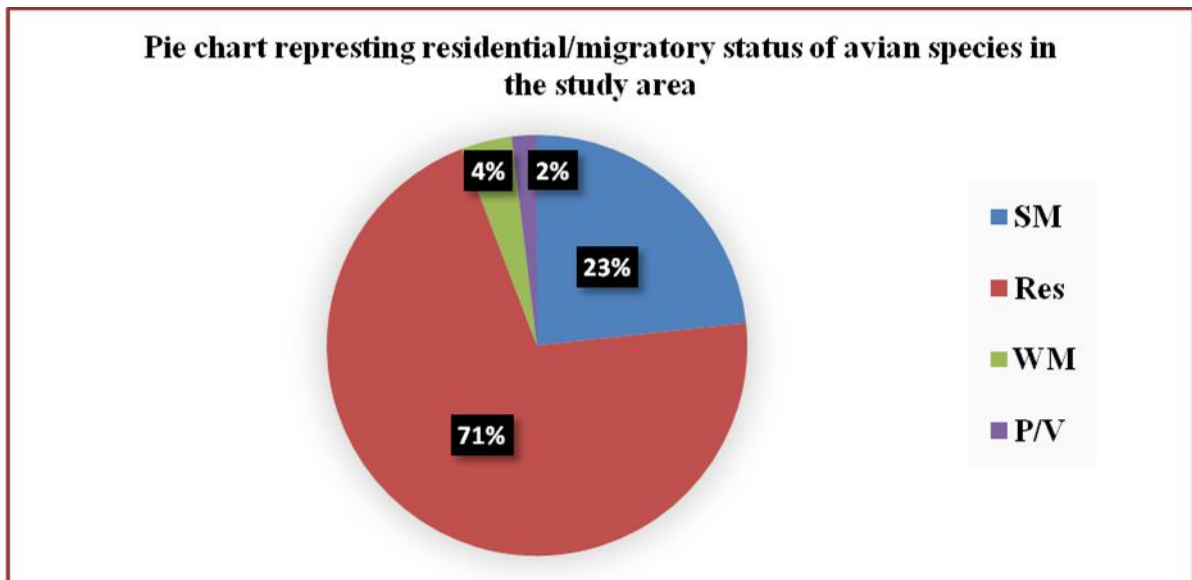
Graph 2b: Distribution of Avian species along different habitats in Sub-urban habitats of district Udhampur (OCH-Open cultivation habitat, AqH-Aquatic habitat, AeH-Aerial habitat, SH-Scrubby habitat & Mix H-Mixed habitat).



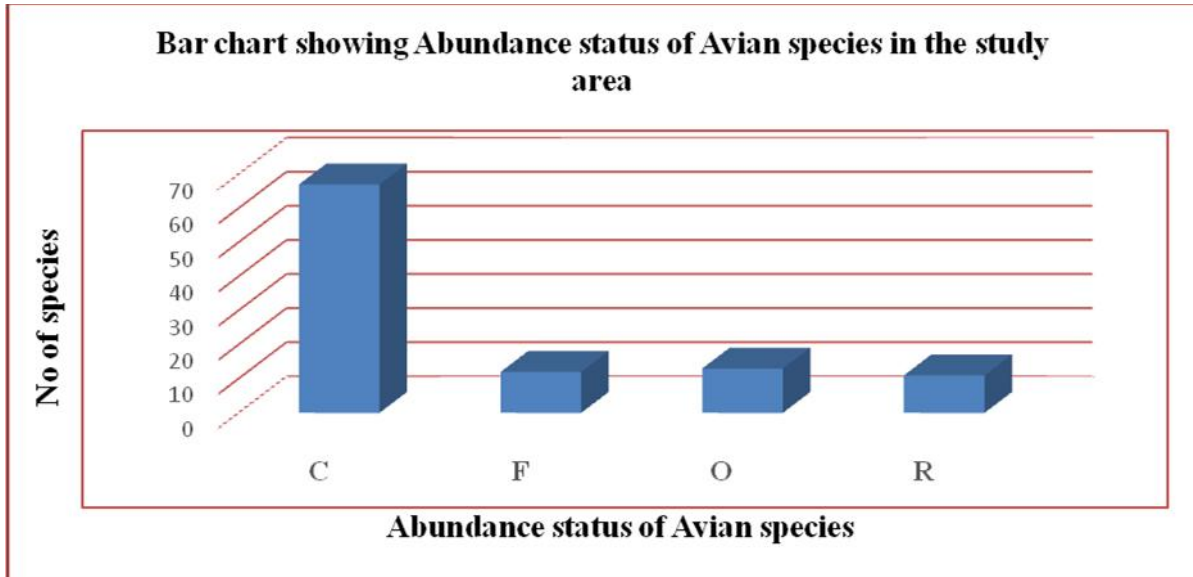
Graph 3a: Residential/Migratory status of Avian species in Sub-urban habitats of district Udhampur (SM-Summer migrants, Res-Resident, WM-Winter migrants & P/V-Passage/Vagrant)



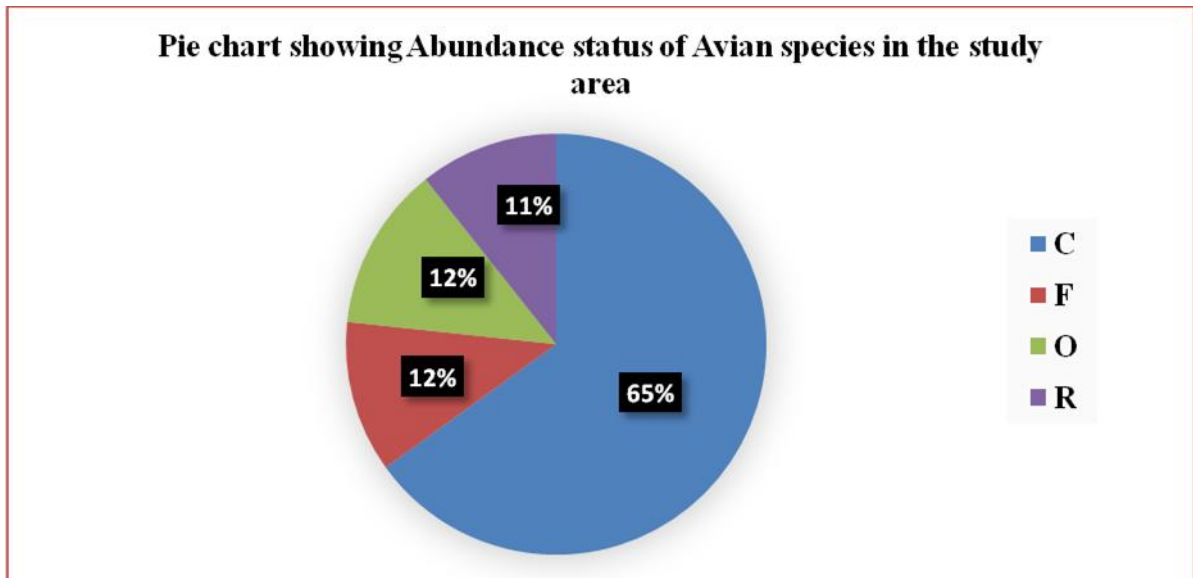
Graph 3b: Residential/Migratory status of Avian species in Sub-urban habitats of district Udhampur



Graph 4a: Abundance status of Avian species in Sub-urban habitats of district Udhampur (C-Common, F-Frequent, O-Occasional & R-Rare)



Graph 4b: Abundance status of Avian species in Sub-urban habitats of district Udhampur (C-Common, F-Frequent, O-Occasional & R-Rare)



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5. Conflict/s of interest

We declare no conflict/s of interest related to this work.

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