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Birds of Coastal Jamnagar and their Feeding Guilds

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ABSTRACT

The habitat is important for any living organisms in terms of food and shelter that it provides. To understand the impact of anthropogenic pressure on the feeding guilds of the birds, one year survey was conducted in coastal talukas of Jamnagar district. A total of 79 bird species was reported during the study period. The dominant feeding guild was Omnivores (30), followed by Carnivore (23), Insectivore (5) and Graminivore (6) and Frugivore (2). The low representation of insectivores, frugivores and nectivores could be due to high industrial development in the region accompanied by low density of fruiting trees. The present study would provide for baseline information on the state of environment of the taluka and help in future development plan for the region.

Key words: Birds, feeding guilds, wetlands.

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INTRODUCTION

Food and shelter are the two basic necessities for all the living organisms that they get from their habitats. It is a long established fact that availability of food affects the population size [1-3]. Andrewartha and Birch [4] have discussed that animal's chances for survival and to multiply depend on four components of the environment such as the weather, availability of food, predators and secured shelter. The number of animals in a natural population is affected in three ways: first, by the limited supply of material resources, like food and places for building nests by inaccessibility of the material resources related to the animal's capacities for dispersal and searching, besides the shortage of time when the rate of increase is positive. For many species, food is the most important ultimate factor while for some species other resources like breeding sites, nesting materials, rain, day length *etc.* play important role for survival and breeding [5,6].

In developing world, increase in human population has lead to the fragmentation of habitat and decrease in the availability of natural resources. As the human pressure increases it modifies the habitat with change in its vegetation structure and availability of unpredictable anthropogenic food. These changes are reported to influence the urban bird communities [7]. Several species of birds adapt to these modified habitats while others leave the habitat and become extinct in that area. It is also reported that the vegetation structure is highly developed and diversified at the edges of urban areas influencing the bird diversity [8]. Birds are the biological indicators that are studied extensively to find out influence of habitat change. The changes in the bird communities occur across the gradients of urbanization [9]. According to the difference in feeding habits, different species of birds are expected to respond in different ways. The immediate response of birds to any changes in environment can be due to their specific type of feeding, nesting and roosting habits. As they are able to fly away from any adverse condition, their presence in a particular area can be associated with their dietary guilds, their type of habitat as well as human disturbances.

Reynaud and Thioulouse [10] have stated that the bird data can reflect habitat changes and the data analysis can identify the most important factors that cause changes in the bird population and bird species or it can also identified the guilds that are more suitable to represent these changes. It seems that the study of guilds is less time-consuming than that of species. The analysis of the avian response to guilds indicates those species that are most sensitive to habitat perturbations and species that are benefited or at least are not affected by environmental disturbances.

They are divided in five different categories on the basis of their feeding guilds as described by Ali [11]. These categories are **Graminivores**: The species that feed on seeds as well as grass. **Omnivores**: species eating insects and small animals as well as fruits and seeds. **Insectivores**: exclusively depending on insects. **Frugivores**: feeding exclusively on fruits and **Nectarivores**: nectar feeders, **Herbivores**: herbs from wet land. Their density and abundance in 19 different study areas are analyzed to understand.

STUDY AREA

The coastal talukas surveyed in the present study include Jamnagar, Jodiya, Kalyanpur, and Khambhaliya, Lalpur, and Okha- Dwarka of the Jamnagar district of Gujarat State. Khambhaliya is the major industrial hub with the presence of important industries like Reliance, Essar oil refinery, Essar Gujarat Power Limited, Shri Nataraj Ceramic, Chemical Industries and Ashapura Mine Chemical Ltd. The other talukas have industries at small scale level.

Fig 1: Map of study areas



MATERIALS AND METHODS:

These study areas were visited seasonally from January 2013 to November 2013, 2 hours from sunrise in the morning, amounting to total 79 visits. Birds were observed using 8×50 or 7×35 binoculars and identified on the basis of standard books by Ali [11] and Grimmett *et al.*, [12]. The birds were counted using transect method/point count method [13].

As mentioned earlier depending on the feeding habits, birds were categorized into seven different guilds: Graminivores, Omnivores, Insectivores, Frugivores, Carnivores, Herbivores and Nectarivores depending on the description given by Ali [11].

The species richness (number of species), diversity indices like Shannon Wiener index and equitability [2], abundance [13] were calculated for further analysis.

RESULT AND DISCUSSION

Highest species richness and abundance was recorded of omnivore followed by carnivore, insectivore, graminivore and frugivore guilds. Only one species of nectarivore and herbivore guilds was recorded during study period (Table 1).

In present study the abundance of omnivorous guild is high due to presence of terrestrial birds like Rosy Starling, Red-wattled Lapwing, Red Vented Bulbul, House crow, babbler as well as aquatic birds like gulls in different breeding plumage (400-500 in numbers) and spot bill duck. Though it is semi-arid region but still it has some wetlands which support migratory birds as well as residential species of birds. The region supports large number of wetlands and amongst them Lakhota Lake, Chavada Village Pond, Vijarkhi dam, Ranjitsagar Dam are the larger ones.

Wetlands also support Carnivorous guilds that mainly supply aquatic food like fish, molluscs, amphibians, etc. available in pond water. Therefore, the density of carnivores was higher at all wetlands. However, their abundance was low as compared to omnivorous birds.

Insectivorous are represented by swifts, swallows, Green bee-eaters, Ashy-crowned sparrow lark and migratory species like, Common chiff-chaff (*Phylloscopus collybita*). There is presence of higher density of insect due to garbage dumps that provide habitat for larvae of flying insects. Around 260 Tonnes per day waste is generated at Jamnagar, which increased the garbage dump sites and there are no facilities to

reduce/reuse the same (Jamnagar Municipal Corporation, 2011). Insectivores are reported to be more sensitive to the quality of the environment [9]. Lim and Sodhi [14], the richness of insectivores and carnivores increase with increasing natural vegetation and declines with increasing percentage of built up area and human population.

Graminivores guilds include only 6 species of birds. Agriculture statistics indicate decline in cultivation of food crops and increase in oil seeds and cotton production post 2011 (Jamnagar Agriculture department 2011-12). This might have played a role in presence of low diversity of graminivores species in Jamnagar. The abundance of frugivorous guild species was reported very low in this taluka. Frugivorous prefer areas with low density of residential area [14]. Jamnagar taluka is urbanized and industrialised as well, resulting in absence of fruit bearing trees, which as an impact on the population of frugivorous species. In general residential areas with backyard vegetation and the gardens or parks with large trees provide the habitat for frugivorous birds [10].

Nectarivores included only Purple sunbird (*Nectarinia asiatica*), which is hardy species. The species was noted in the areas with *Capparis decidua* and also in the areas with good number of *Prosopis juliflora* and *Acacia senegal* plantations. The latter tree species provided sites for nesting and perching. Similar use of tree species by nectarivores was reported by Young *et al.*, [15].

The results indicate dominance of Omnivores and carnivores birds. Omnivorous species have adapted to the urban environment and its particular food resources such as garbage as is also reported by Clergeau *et al.* [9]. Moreover, house sparrow is very common in all these talukas but urban condition does not suit this species. These species are more tolerant towards human disturbances because omnivorous species do exploit anthropogenic food resources effectively [16].

Figure 2: Abundance of different feeding guilds of birds at Jamnagar taluka.

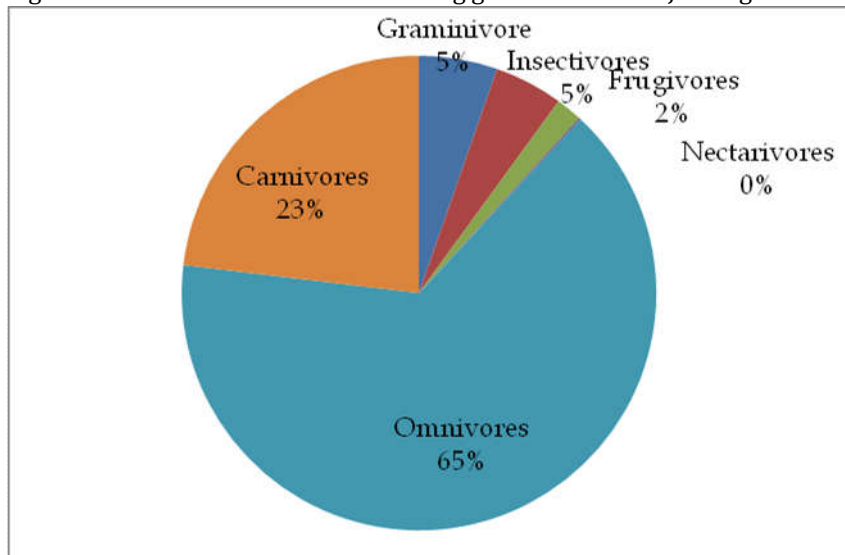


Table 1: Species richness, diversity indices and abundance of the birds according to feeding guilds.

Feeding guilds	Species richness	H'	E	Abundance (%)
Graminivores	6	0.72	0.34	5.33
Insectivores	15	2.27	0.65	4.68
Frugivores	2	0.22	0.62	1.78
Nectarivores	1			0.14
Herbivore	1			0.14
Omnivores	30	1.89	0.24	64.96
Carnivores	23	1.66	0.23	23.11

Omnivore guild showed the highest Shannon-Wiener index (H') followed by carnivore, insectivore, graminivore and frugivore. Further, insectivores and frugivores were evenly distributed with value of 0.64 and 0.62 respectively. On other hand omnivore and carnivore species were less evenly distributed as compared to other guilds (Table 1). This could be due to congregation of species at one particular habitat.

CONCLUSIONS

Coastal talukas of Jamnagar district, semi-arid region of Gujarat State, provide habitat mainly for omnivorous guild followed by carnivore and graminivorous guild. The insectivores, frugivores and nectarivores are probably adversely affected by the human disturbances and industrial development in this region.

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Appendix Checklist of birds and their feeding guilds.

Name of the Species of the Birds		Feeding guilds
Ashy Prinia	<i>Prinia socialis</i>	I
Ashy-crowned Sparrow-Lark	<i>Eremopterix grisea</i>	I
Common Chiffchaff	<i>Phylloscopus collybita</i>	I
Common Swallow	<i>Hirundo rustica</i>	I
Common Tailorbird	<i>Orthotomus sutorius</i>	I
Grey wagtail	<i>Motacilla cinerea</i>	I
House Swift	<i>Apus affinis</i>	I
Indian Robin	<i>Saxicoloides fulicata</i>	I
Redrumped Swallow	<i>Hirundo daurica</i>	I
Scaly-Breasted Munia	<i>Lonchura punctulata</i>	I
Small Bee-eater	<i>Merops orientalis</i>	I
Tickell's Flowepecker	<i>Dicaeum erythrorhynchos</i>	I
Wiretailed Swallow	<i>Hirundo smithii</i>	I
Wood Sandpiper	<i>Tringa glareola</i>	I
Yellow Wagtail	<i>Motacilla flava</i>	I
Blue Rock Pigeon	<i>Columba livia</i>	G
Comb Duck	<i>Sarkidiornis melanotos</i>	G
Eurasian collared Dove	<i>Streptopelia decaocto</i>	G
Indian Silver bill	<i>Lonchura malabarica</i>	G
Little Brown Dove	<i>Streptopelia senegalensis</i>	G
White-throated munia	<i>Lonchura malabarica</i>	G

Crimsonbreasted Barbet	<i>Megalaima haemacephala</i>	F
Roseringed Parakeet	<i>Psittacula krameri</i>	F
Purple Sunbird	<i>Nectarinia asiatica</i>	N
Spot-billed Duck	<i>Anas poecilorhyncha</i>	O
Asian Koel	<i>Eudynamys scolopacea</i>	O
Bank Myna	<i>Acridotheres ginginianus</i>	O
Baya weaver	<i>Ploceus philippinus</i>	O
Bay-backed Shrike	<i>Lanius vittatus</i>	O
Black Drongo	<i>Dicrurus macrocercus</i>	O
Black-headed Gull	<i>Larus brunnicephalus</i>	O
Brahminy Starling	<i>Sturnus pagodarum</i>	O
Brown-headed Gull	<i>Larus brunnicephalus</i>	O
Common Babbler	<i>Turdoides caudatus</i>	O
Common Coot	<i>Fulica atra</i>	O
Common Crane	<i>Grus grus</i>	O
Common Myna	<i>Acridotheres tristis</i>	O
Grey Francolin	<i>Francolinus pondicerianus</i>	O
House Crow	<i>Corvus splendens</i>	O
House Sparrow	<i>Passer domesticus</i>	O
Indian BushLark	<i>Mirafra erythroptera</i>	O
Indian Peafowl	<i>Pavo Cristatus</i>	O
Jungle Babbler	<i>Turdoides striatus</i>	O
Large Grey Babbler	<i>Turdoides malcolmi</i>	O
Lesser Whistling-Duck	<i>Dendrocygna javanica</i>	O
Lesser Whitethroat	<i>Sylvia curruca</i>	O
Mallard	<i>Anas Platyrhynchos</i>	O
Red Vented Bulbul	<i>Pycnonotus cafer</i>	O
Red-wattled Lapwing	<i>Vanellus indicus</i>	O
Rosy Starling	<i>Sturnus roseus</i>	O
Rufous-backed Shrike	<i>Lanius schach</i>	O
Rufoustailed Finch Lark	<i>Ammomanes phoenicurus</i>	O
White-eared bulbul	<i>Pycnonotus leucotis</i>	O
Black Ibis	<i>Pseudibis papillosa</i>	C
Blacktailed Godwit	<i>Limosa limosa</i>	C
Black-winged Stilt	<i>Himantopus himantopus</i>	C
Cattle Egret	<i>Bubulcus ibis</i>	C
Common Ringed Plover	<i>Charadrius hiaticula</i>	C
Common Sandpiper	<i>Actitis hypoleucos</i>	C
Common tern	<i>Sterna hirundo</i>	C
Glossy Ibis	<i>Plegadis falcinellus</i>	C
Great Cormorant	<i>Phalacrocorax carbo</i>	C
Great Thick-knee	<i>Esacus recurvirostris</i>	C
Grey Heron	<i>Ardea cinerea</i>	C
Indian Pond Heron	<i>Ardeola grayii</i>	C
Large Egret	<i>Casmerodius albus</i>	C
Little Cormorant	<i>Phalacrocorax niger</i>	C
Little Egret	<i>Egretta garzetta</i>	C
Little Grebe	<i>Tachybaptus ruficollis</i>	C
Little Stint	<i>Calidris minuta</i>	C
Median Egret	<i>Mesophoyx intermedia</i>	C
River Tern	<i>Sterna aurantia</i>	C
Shoveller	<i>Anas clypeata</i>	C
Spoonbill	<i>Platalea leucorodia</i>	C
White Pelicans	<i>Pelecanus onocrotalus</i>	C
Whitebreasted Kingfisher	<i>Halcyon smyrnensis</i>	C

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