

Feeding Guild Structure of Wetland Birds of Jammu (J&K), India

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ABSTRACT: The present work was conducted to record the diversity and feeding guilds of wetland birds of Jammu from July, 2012 to June, 2014. A total of 63 species of wetland birds belonging to 20 families and 10 orders were recorded from the study area. Direct observation method by focal animal sampling was utilized to study the food habits of birds. The recorded wetland birds were classified into four major feeding guilds viz. carnivorous, insectivorous, herbivorous and omnivorous depending upon the various ecological similarities among them. The overall highest proportion was of carnivorous birds (50.82%) followed by omnivorous (18.03%). The four major feeding guilds were further categorized into 16 sub guilds depending upon the foraging method utilized and foraging location.

KEYWORDS: Feeding, guild, wetland, carnivorous, foraging.

I. INTRODUCTION

Guilds have been viewed as natural 'ecological units' which are recurrent in different communities and are in a sense, the building blocks of ecological communities [1]. The term 'guild' groups together species that exploit the same class of environmental resources in a similar way and overlap significantly in their niche requirements without regard to their taxonomic position [2], [3]. The guild structure varies from site to site and is correlated with particular features of the habitat and resource use [4]. Birds are often placed into guilds depending upon their feeding habits. The feeding guilds in a bird community are described by the way species obtain food, the types of food taken, the foraging substrates exploited and the heights at which different species forage [5]. Foraging habitat use and feeding methods are important factors involved in resource partitioning [6], [7] and can be used to assign foraging guilds to birds [8], [9]. Members of guilds often differ in their precise food requirements which reduce the potential for competition among them when resources are limited. This knowledge of the ways in which different bird species exploit resources within their habitat not only increase understanding of how they use their environment but also the essential requirements for their survival. Moreover, it also helps to compare communities within and between different habitats [10]. The present document provides information about the feeding guilds of wetland birds of Jammu studied during a period of two years while recording their diversity and other parameters.

II. STUDY AREA

The present study was carried out in Jammu region of J&K State from July, 2012 to June, 2014. Nestled against the backdrop of the snow-covered Pir Panjal Mountains, the region of Jammu constitutes the southernmost unit of the state of Jammu & Kashmir. It lies between 32°45' and 33°45'N latitude and 74°25' and 76°E longitude. It forms part of the transition between the Himalayan range in the north and the dusty plains of Punjab in the south. Between these two extremities lie a series of scrub-covered hills, forested mountain ranges and river valleys, encompassing several microclimatic regions. The study area is endowed with numerous water bodies in the form of lakes, rivers, streams and marshes which support a unique aquatic avifauna. For carrying out present work following stations were selected in the

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study area: (i) Gharana Wetland Reserve (ii) Pargwal Wetland Reserve (iii) Lake Mansar (iv) Lake Surinsar (v) River Tawi (vi) River Basantar (vii) Gho-Manhasan stream and (viii) Ditch Rakh.

III. METHODOLOGY

A thorough study was undertaken to explore the diversity and feeding guilds of the wetland birds in the selected stations of the study area. Line Transect [11] and Point Transect method [12] were employed for studying the aquatic avifaunal diversity. For identification and field diagnosis of birds, coloured plates with diagnostic descriptions of birds by [13], [14], [15], [16] and [17] were used. The data was collected during morning and evening hours although several irregular visits were also made during different hours of the day. Direct observation method was used to study the food habits of different wetland birds. Direct observation by focal animal sampling [18] using a binocular provided data on some of the major food items. Photographs were taken with the aid of Canon EOS 600D camera fitted with 300 mm zoom lens. The probable food items collected from the feeding sites further helped in substantiating the observations and in evaluating the availability of food. During each scan, detailed observations on foraging substrate, if possible type of food taken and feeding technique i.e. the method of searching and catching/obtaining the prey were made.

IV. RESULTS AND DISCUSSION

During the course of present investigation, 63 species of wetland birds belonging to 20 families and 10 orders were recorded from the study area. Out of 63, the feeding habits of 61 wetland birds were ascertained while that of 2 species could not be determined as they were sighted rarely and were observed mostly resting during field surveys. The reported wetland birds were classified into four major feeding guilds according to the various ecological similarities among them like feeding location, foraging method and type of food taken. Moreover, the different feeding techniques employed by the birds provided an excellent demonstration of the utilization of a range of sub-habitats and niches by them within a larger habitat, on the basis of which they were further categorised into various sub guilds. The similarities or differences among species in diet composition are especially relevant to the tests of niche or guild concept [6].

Out of 61 wetland birds, 31 (50.82%) belonged to carnivorous feeding guild. These species were observed to feed on animal matter like invertebrates, fishes, frogs, reptiles and mammals. The carnivorous feeding guild was further classified into 5 sub guilds. Out of 31 carnivorous species, 3 were Surface Diving Carnivore (SDC), 23 were Wading Carnivore (WC), 1 was Aerial Diving Carnivore (ADC), 1 was Arboreal Aquatic Carnivore (AAqC), 1 was ADC/AAqC and 2 species utilized two sub guilds (ATC/AAqC). The Little Cormorants and Large Cormorants were recorded to feed mainly on fishes by diving. The wading birds were observed to forage in shallow water. This may be due to fact that edges might have high level of prey availability and is easy to catch due to shallow water depth as reported by [19] and [20]. The larger wading birds like Grey Heron, Purple Heron, Large Egret, Median Egret, Little Egret, Pond Heron and Storks hunted by employing stand and wait strategy and captured the prey with their long, sharp bills. The egrets were also seen stirring water by feet to expose the prey. Small to medium sized waders like Black Winged Stilt, Sandpipers, Redshanks and Ruff used tactile hunting, visual feeding, probing and pecking methods to capture invertebrates. The White-breasted Kingfisher and Western Marsh Harrier exploited both aquatic and terrestrial habitat for foraging and were observed to feed on frogs, fishes and lizards. The White-breasted Kingfisher was also observed to feed on snakes during present study.

The insectivorous feeding guild included 8 species (13.11%) that were recorded to feed primarily on aquatic or terrestrial insects. It was further divided into 4 sub guilds. Of the 8 insectivorous species, 6 were Shore Insect Plover (SIP)/Terrestrial Insectivore (TI), 1 species was Wading Insectivore (WI)/Terrestrial Insectivore (TI) and 1 species was Aerial Insectivore (AI)/Terrestrial Insectivore (TI). The wagtails were observed to forage along the water edges by employing probing and pecking method and were also seen feeding on terrestrial habitat. The herbivorous feeding guild comprised of species that were observed to feed on young shoots, roots, seeds, leaves and sprouts of aquatic and terrestrial vegetation. It included 9 species (14.75%) that were further categorized into 3 sub guilds. Of the 9 herbivorous species, 1 was Aquatic Surface-Diving Herbivore (AqSDH), 2 were Terrestrial Herbivore (TH) and 6 were Dabbling Herbivore (DbH). The dabbling ducks viz. Mallard, Common Teal, Eurasian Wigeon, Gadwall, Northern Pintail and Spot-billed

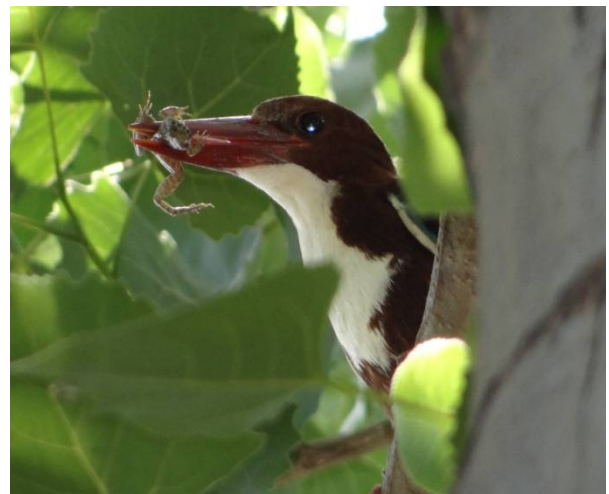
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Ducks were observed to forage in shallow water primarily along the surface by pecking, sieving or head and neck dipping. Some of them also happened to feed on the aquatic plants while some grazed on the shores.



(a)
(b)



(c)



(d)

Figure 1: Some wetland birds with carnivorous feeding guild in study area (a) Little Egret feeding on fish (b) White-breasted Kingfisher feeding on frog (c) Pond Heron feeding on leech (d) Purple Heron feeding on fish

The 11 species (18.03%) belonging to omnivore feeding guild were observed to feed on all types of food including both plant and animal matter. They were further categorized into 4 sub guilds and of the 11 omnivorous species, 1 was Wading Omnivore (WO), 3 were Dabbling Omnivore (DbO), 3 were Diving Omnivore (DvO) and 4 species belonged to Aquatic-Terrestrial Omnivore (AqTO) category. [21] reported that the wetland birds are in general heterogeneous in

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their feeding habits. The diving ducks viz. Common Pochard, Tufted Duck and Ferruginous Pochard were observed to forage in deep water. Furthermore, 2 species i.e. Cattle Egret and Red-wattled Lapwing were recorded to utilize more than one feeding guild (3.28%). They were found to shift between terrestrial and aquatic habitats. The Cattle Egrets were observed to feed on insects like grasshoppers, moths, ticks, flies as well as on frogs, tadpoles and earthworms while the Red-wattled Lapwing was recorded to feed on terrestrial and aquatic insects, earthworms and small molluscs. Such shifts between habitats are correlated with relative availability of prey and the ability of birds to use it [22].

Table 1: Feeding Guilds of Wetland birds of Jammu

S. No.	COMMON NAME	SCIENTIFIC NAME	FEEDING GUILD
I.	CARNIVORE		
1.	Little Grebe	<i>Podiceps ruficollis capensis</i> (Salvadori)	SDC
2.	Little Cormorant	<i>Phalacrocorax niger</i> (Vieillot)	SDC
3.	Great Cormorant	<i>Phalacrocorax carbo</i> (Linnaeus)	SDC
4.	Indian Pond Heron	<i>Ardeola grayii grayii</i> (Sykes)	WC
5.	Black-crowned Night Heron	<i>Nycticorax nycticorax nycticorax</i> (Linnaeus)	WC
6.	Grey Heron	<i>Ardea cinerea rectirostris</i> (Gould)	WC
7.	Purple Heron	<i>Ardea purpurea</i> (Linnaeus)	WC
8.	Little Egret	<i>Egretta garzetta garzetta</i> (Linnaeus)	WC
9.	Median Egret	<i>Mesophoyx intermedia</i> (Wagler)	WC
10.	Large Egret	<i>Ardea modesta</i> (Gray)	WC
11.	Glossy Ibis	<i>Plegadis falcinellus</i> (Linnaeus)	WC
12.	Eurasian Spoonbill	<i>Platalea leucorodia</i> (Linnaeus)	WC
13.	Black Stork	<i>Ciconia nigra</i> (Linnaeus)	WC
14.	White-necked Stork	<i>Ciconia episcopus</i> (Boddaert)	WC
15.	Black Winged Stilt	<i>Himantopus himantopus himantopus</i> (Linnaeus)	WC
16.	White-tailed Lapwing	<i>Vanellus leucurus</i> (Lichtenstein)	WC
17.	Common Snipe	<i>Gallinago gallinago gallinago</i> (Linnaeus)	WC
18.	Common Redshank	<i>Tringa totanus totanus</i> (Linnaeus)	WC
19.	Spotted Redshank	<i>Tringa erythropus</i> (Pallas)	WC
20.	Common Greenshank	<i>Tringa nebularia</i> (Gunnerus)	WC
21.	Green Sandpiper	<i>Tringa ochropus</i> (Linnaeus)	WC
22.	Marsh Sandpiper	<i>Tringa stagnatilis</i> (Bechstein)	WC
23.	Common Sandpiper	<i>Actitis hypoleucos</i> (Linnaeus)	WC
24.	Temminck's Stint	<i>Calidris temminckii</i> (Leisler)	WC
25.	Pheasant-tailed Jacana	<i>Hydrophasianus chirurgus</i> (Scopoli)	WC
26.	Ruff	<i>Calidris pugnax</i> (Linnaeus)	WC
27.	River tern	<i>Sterna aurantia</i> (Gray)	ADC
28.	White-breasted Kingfisher	<i>Halcyon smyrnensis smyrnensis</i> (Linnaeus)	ATC/AAqC

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29.	Lesser Pied Kingfisher	<i>Ceryle rudius leucomelanura</i> (Reichenbach)	ADC/AAqC
30.	Common Kingfisher	<i>Alcedo atthis bengalensis</i> (Gmelin)	AAqC
31.	Western Marsh Harrier	<i>Circus aeruginosus aeruginosus</i> (Linnaeus)	ATC/AAqC
II.	INSECTIVORE		
1.	Little Ringed Plover	<i>Charadrius dubius curonicus</i> (Gmelin)	WI/TI
2.	Collared Pratincole	<i>Glareola pratincola</i> (Linnaeus)	AI/TI
3.	Large Pied Wagtail	<i>Motacilla maderaspatensis</i> (Gmelin)	SIP/TI
4.	Grey Wagtail	<i>Motacilla cinerea</i> (Tunstall)	SIP/TI
5.	Citrine Wagtail	<i>Motacilla citreola</i> (Pallas)	SIP/TI
6. A	White Wagtail	<i>Motacilla alba personata</i> (Gould)	SIP/TI
6. B	White Wagtail	<i>Motacilla alba alboides</i> (Hodgson)	SIP/TI
6. C	White Wagtail	<i>Motacilla alba dukhunensis</i> (Skyles)	SIP/TI
7.	Yellow Wagtail	<i>Motacilla flava beema</i> (Skyles)	SIP/TI
8.	White-capped Water Redstart	<i>Chaimarrornis leucocephalus</i> (Vigors)	SIP/TI
III.	HERBIVORE		
1.	Common Coot	<i>Fulica atra</i> (Linnaeus)	AqSDH
2.	Mallard	<i>Anas platyrhynchos</i> (Linnaeus)	DbH
3.	Common Teal	<i>Anas crecca</i> (Linnaeus)	DbH
4.	Eurasian Wigeon	<i>Anas penelope</i> (Linnaeus)	DbH
5.	Gadwall	<i>Anas strepera</i> (Linnaeus)	DbH
6.	Northern Pintail	<i>Anas acuta</i> (Linnaeus)	DbH
7.	Spot-billed Duck	<i>Anas poecilorhyncha</i> (Forster)	DbH
8.	Bar-headed Goose	<i>Anser indicus</i> (Latham)	TH
9.	Greylag Goose	<i>Anser anser</i> (Linnaeus)	TH
IV.	OMNIVORE		
1.	Wood Sandpiper	<i>Tringa glareola</i> (Linnaeus)	WO
2.	Common Moorhen	<i>Gallinula chloropus indica</i> (Blyth)	AqTO
3.	Grey-headed Swampphen	<i>Porphyrio poliocephalus</i> (Latham)	AqTO
4.	Indian White-breasted Waterhen	<i>Amauornis phoenicurus phoenicurus</i> (Pennant)	AqTO
5.	Northern Shoveler	<i>Spatula clypeata</i> (Linnaeus)	DbO
6.	Lesser Whistling Duck	<i>Dendrocygna javanica</i> (Horsfield)	DbO
7.	Garganey	<i>Spatula querquedula</i> (Linnaeus)	DbO
8.	Common Pochard	<i>Aythya ferina</i> (Linnaeus)	DvO
9.	Tufted Duck	<i>Aythya fuligula</i> (Linnaeus)	DvO
10.	Ferruginous Pochard	<i>Aythya nyroca</i> (Guldenstadt)	DvO
11.	Ruddy Shelduck	<i>Tadorna ferruginea</i> (Pallas)	AqTO
V.	MULTIPLE GUILDS		
1.	Cattle Egret	<i>Bubulcus ibis coromandus</i> (Boddaert)	WC/TI
2.	Red-wattled Lapwing	<i>Vanellus indicus indicus</i> (Boddaert)	WC/TI
VI.	NOT RECORDED		

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1.	Chestnut Bittern	<i>Ixobrychus cinnamomeus</i> (Gmelin)	NR
2.	Greater Painted-Snipe	<i>Rostratula benghalensis</i> (Linnaeus)	NR

Index: SDC – Surface Diving Carnivore; WC – Wading Carnivore; ADC – Aerial Diving Carnivore; ATC – Arboreal Terrestrial Carnivore; AAqC – Arboreal Aquatic carnivore; WI – Wading Insectivore; SIP – Shore Insect Plover; AI – Aerial Insectivore; TI - Terrestrial Insectivore; AqSDH - Aquatic Surface-Diving Herbivore; DbH – Dabbling Herbivore; TH – Terrestrial Herbivore; DvO – Diving Omnivore; DbO – Dabbling Omnivore; WO – Wading Omnivore; AqTO – Aquatic-Terrestrial Omnivore

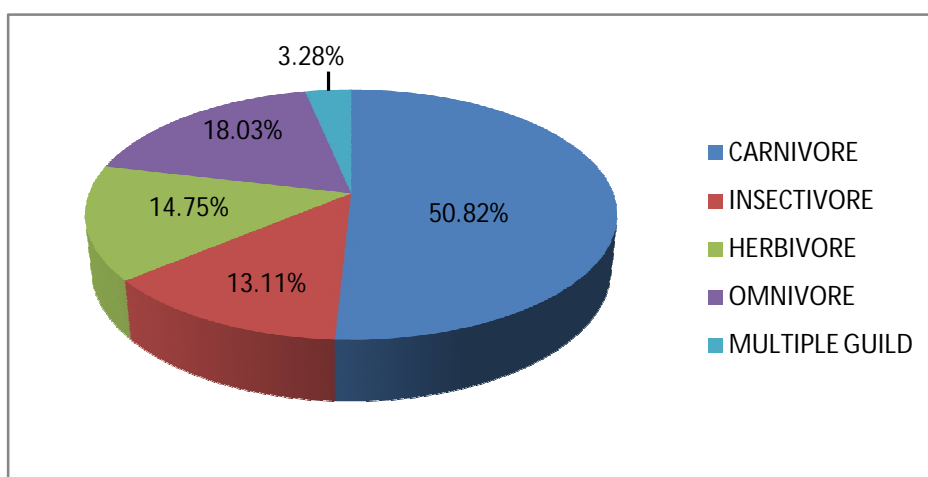


Figure 2: Percentage of Feeding Guilds of Wetland birds.

V. CONCLUSION

It can be concluded that the wealth of diverse aquatic habitats in the study area provide a wide array of food resources to the wetland birds. The different species of birds occupying a particular feeding guild and space, have evolved specialized feeding structure to explore and obtain food resources efficiently which thereby reduces competition within a guild [23]. The specialized niche requirements of the wetland birds makes them more vulnerable to increasing anthropogenic pressures and degradation of their habitat in the study area and thus accentuate the need to urgently protect the wetlands for their survival.

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