



## FEEDING GUILD STRUCTURE OF BIRDS AT KESHOPUR CHHAMB WETLAND, GURDASPUR

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### ABSTRACT

To achieve a comprehensive understanding of avian feeding guild structure the present study was conducted at Keshopur wetland Ramsar site, district Gurdaspur, Punjab, India. A total of 121 species of birds belonging to 19 orders and 47 families were observed. Direct observation techniques and focal sampling methods were used to study their foraging behaviour. Seven major feeding guilds i.e., carnivorous, insectivorous, omnivorous, granivorous, herbivorous, frugivorous and nectarivorous were found. Maximum number of species were of carnivorous guild (28%) followed by insectivorous (21%). Cattle egret and red-wattled lapwing, members of carnivorous guild were observed to feed on insects also, hence placed in multiple guilds. Northern shoveler, eurasian coots and purple moorhen were seen foraging in association with each other. The large number of insectivorous birds depicts the presence of rich number of insects. The presence of birds belonging to seven foraging guilds highlight the significance of Keshopur wetland in providing a rich feeding ground to both migratory as well as resident birds.

**Key words:** Punjab, Keshopur wetland, Ramsar, birds, feeding guilds, carnivorous, insectivorous, omnivorous, insects, migratory and resident birds, foraging

About 10,000 species of birds are known from the world of which Indian birds include 1346 species (Denis, 2016). Punjab state is rich in birds amongst faunal diversity (MOEF, 2019). The birds which depend on wetlands for procreation, roosting and food directly or indirectly are called wetland birds (Harisha, 2016). Wetlands are areas of land that are permanently or temporarily covered with water and are counted among most distinctive and high yielding ecosystems (Rajasekar et al., 2008). About 10% of the bird species globally rely entirely on wetlands, with about 20% utilizing them for foraging, resting, breeding and overwintering (Rannestad et al., 2015; Kačergyte et al., 2021). In India, about 58.2 million ha fall under wetlands, and 71878.5 ha are in Punjab (Prasad et al., 2002). In wetlands, the diversity and abundance of birds depend on vegetation and food availability (Rathore and Padate, 2017; Veeramani et al., 2018). Of the 37 Ramsar sites in India, six are located in Punjab, and one of them is Keshopur Chhamb Community reserve, in district Gurdaspur. This wetland has been declared as the first community reserve of India and announced as National wetland. Due to its conversion into productive agricultural land and fish farms by the Drainage Department of Government, the wetland area has been reduced. Due to human disturbance wetland birds get reduced, and wetlands in India cope with enormous anthropogenic pressures, with bird community getting

influenced (Anderson et al., 2019; Ringam and Shafi'u 2019). Eventhough these sites are transformed, still provide suitable environment for many birds (Bal and Dua, 2010). In order to draft conservation plans it is essential to document the bird species (Jamwal et al., 2017). Hence, the present study on the avian feeding guilds in Keshopur Chhamb Community reserve.

### MATERIALS AND METHODS

Keshopur wetland is a freshwater ecosystem (32°05'16.3"N, 75°24'24.2"E, 245 masl, 344 ha) adjacent to the town of Gurdaspur, District Gurdaspur, Punjab. The study area was divided into three sites (Site I, II and III) for taking observations from July 2019 to June 2020. Site I consisted of trees, shrubs, herbs, grasses, aquatic plants, and climbers, and located near the road surrounded by agricultural fields. Site II mainly consisted of small vegetation including herbs, shrubs, climbers, grasses, aquatic plants, some trees and fish ponds surrounded by agricultural fields. Site III was a separate patch consisted of herbs, shrubs, grasses, large number of aquatic plants and bamboo trees.

Point count method was used to study and record the birds visiting at different sites from the watchtowers weekly for 90 min between 6:00-9:00 a.m. and 4:00-7:00 p.m. Approximately 10-15 min were spent at each point to avoid repeated counting of same bird individual.

Identification of birds residing and visiting selected sites was done on the basis of visual observations on their morphological features like shape, size, color of beak, feathers, wings, eyes, feet, legs and other parts of body by using binocular and comparing them with those described by (Ali, 2002). Species were classified into resident (R), winter migrant (WM) and summer migrant (SM) and IUCN status was also assigned as per IUCN list of endangered species. To study the foraging behavior of birds, direct observation techniques and focal sampling method (Norazlimi and Ramli, 2015) were used. In direct observation, the feeding activities and techniques of birds were directly observed using binoculars. While in focal sampling method, an individual from a flock of birds was selected and all the foraging activities were recorded using binoculars for a minimum of 30 min duration. The actively foraging birds involving those searching for prey or swallowing the prey were selected. Digital single-lens reflex (DSLR) camera (Nikon D3300) was used for photography and binocular (Vanguard FR-1050W 10x 50) was used for observation of birds.

## RESULTS AND DISCUSSION

Total 121 species of birds belonging to 19 orders and 47 families were observed (Table 1), with maximum of 38 belonging to order Passeriformes. The birds were seen to have seven major feeding guilds (Fig. 1). About 34 species were observed feeding on animal matter like frogs, invertebrates, fishes and reptiles. The cormorants and pond heron were observed to feed mainly on fishes. These species were also seen competing for foraging zones at Kole wetland, Kerala (Paleeri and Jayson, 2018). Most of the small wading birds like cattle egret and red-wattled lapwing were recorded finding food in shallow water because catching of prey is easy in shallow water and also there is presence of more number of preys on the edges. The larger wading birds like grey heron and

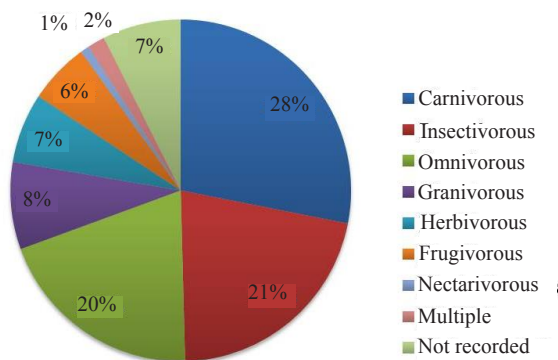


Fig. 1. Feeding guilds of birds

purple heron were seen standing and waiting to capture the prey. Grey herons are known for choosing bigger fish and neglecting smaller ones (Jakubas and Manikowska, 2011). The main food for black crowned night heron was fish while amphibians and crustaceans were secondary preferences. Mostly asian openbills were recorded feeding upon mollusks in the morning and evening only as also noted by Paleeri and Jayson (2018) at Kole wetlands (Thrissur) Kerala.

The presence of 26 insectivorous birds indicates the presence of insects. These birds perform an essential role in biocontrol of many insect pests growing in horticulture and agriculture (Thakur et al., 2010). The Asian paradise flycatcher feeds on flies, butterflies, dragonflies, and same behaviour was recorded by Das and Adhikari (2019). Insects were the key source of food for black-winged stilt chicks, with maximum of Diptera (Ueng et al., 2009), with these found in muddy areas. Long tailed shrikes were recorded mostly feeding on large insects and lizards (Abed and Salim, 2019). In omnivorous guild, common moorhen were feeding in groups as well as alone on parts of vegetation and invertebrates. Wallau et al. (2010) also observed the omnivorous behavior of the common moorhen at Rio Grande, Brazil. Asian pied starlings were seen foraging in alliance with other birds such as common myna, house crow, red-wattled lapwing as also reported by Sethi and Kumar (2018). The northern shovelers were seen feeding on vegetation in shallow waters due to the availability of crustaceans, benthic preys and insect larvae. The association of northern shoveler and eurasian coots was observed now corroborates with the results of Kallander (2005). Moreover, Eurasian coots were also seen feeding with purple moorhens showing similar behavior, walking and feeding, as also observed by Menon (2008). Species with a more active foraging mode were more prone to predation and thus can enter flocks more often (Anthal and Sahi, 2017).

All the species of Columbidae, Estrildidae and Passeridae family were found feeding on crop seeds and grains under granivorous guild. Pigeons and doves were foraging on seeds and grains fallen on ground at surrounding agricultural fields. Similar observations were made by Kumar and Sahu (2020). Herbivorous guild included 8 species feeding primarily on vegetation such as herbs, shrubs, shoots, roots, leaves of plants. The Eurasian coots were particularly seen foraging on macrophytes on floating water. The coots were observed feeding on ground and diving to get food in water. In frugivorous guild, parakeets were recorded feeding on fruits and buds of plants particularly guava, and similar observations were made by Clergeau and

Table 1. Feeding guilds of avifauna of Keshopur wetland

S. No.	Name of species	Scientific name	Resident status	IUCN status	Feeding guild
Order-Accipitriformes, Family-Accipitridae					
1.	Black kite	<i>Milvus migrans</i> (Boddaert, 1783)	R	LC	C
2.	Lesser spotted eagle	<i>Clanga pomarina</i> (Brehm, 1831)	R	LC	C
3.	Oriental honey buzzard	<i>Pernis ptilorhynchus</i> (Temminck, 1821)	R	LC	C
4.	Western marsh harrier	<i>Circus aeruginosus</i> (Linnaeus, 1758)	WM	LC	C
Order-Anseriformes, Family-Anatidae					
5.	Bar-headed goose	<i>Anser indicus</i> (Latham, 1790)	WM	LC	H
6.	Common pochard	<i>Aythya ferina</i> (Linnaeus, 1758)	WM	VU	O
7.	Eurasian wigeon	<i>Mareca penelope</i> (Linnaeus, 1758)	WM	LC	H
8.	Ferruginous duck	<i>Aythya nyroca</i> (Güldenstädt, 1770)	WM	NT	O
9.	Gadwall	<i>Anas strepera</i> (Linnaeus, 1758)	WM	LC	H
10.	Greylag goose	<i>Anser anser</i> (Linnaeus, 1758)	WM	LC	H
11.	Indian spot billed duck	<i>Anas poecilorhyncha</i> (Forster, 1781)	R	LC	H
12.	Lesser whistling duck	<i>Dendrocygna javanica</i> (Horsfield, 1821)	SM	LC	O
13.	Mallard	<i>Anas platyrhynchos</i> (Linnaeus, 1758)	WM	LC	H
14.	Northern pintail	<i>Anas acuta</i> (Linnaeus, 1758)	WM	LC	H
15.	Northern shoveler	<i>Spatula clypeata</i> (Linnaeus, 1758)	WM	LC	O
Order-Apodiformes, Family-Apodidae					
16.	Little swift	<i>Apus affinis</i> (Gray, 1830)	R	LC	I
Order-Bucerotiformes, Family-Bucerotidae					
17.	Indian grey hornbill	<i>Ocyrceros birostris</i> (Hume, 1873)	R	LC	O
Order-Bucerotiformes, Family-Upupidae					
18.	Common hoopoe	<i>Upupa epops</i> (Linnaeus, 1758)	R	LC	O
Order-Ciconiiformes, Family-Ciconiidae					
19.	Asian openbill	<i>Anastomus oscitans</i> (Boddaert, 1783)	WM	LC	C
20.	Painted stork	<i>Mycteria leucocephala</i> (Pennant, 1769)	R	NT	C
Order-Charadriiformes, Family-Charadriidae					
21.	Little ringed plover	<i>Charadrius dubius</i> (Scopoli, 1786)	WM	LC	I
22.	Pacific golden plover	<i>Pluvialis fulva</i> (Gmelin, 1789)	WM	LC	NR
23.	Red-wattled lapwing	<i>Vanellus indicus</i> (Boddaert, 1783)	R	LC	MG
24.	White tailed lapwing	<i>Vanellus leucurus</i> (Lichtenstein, 1823)	WM	LC	C
25.	Yellow-wattled lapwing	<i>Vanellus malabaricus</i> (Boddaert, 1783)	R	LC	I
Order-Charadriiformes, Family-Jacaniidae					
26.	Pheasant tailed jacana	<i>Hydrophasianus chirurgus</i> (Scopoli, 1786)	R	LC	O
Order-Charadriiformes, Family-Laridae					
27.	Brown headed gull	<i>Chroicocephalus brunnicephalus</i> (Jerdon, 1840)	WM	LC	NR
28.	Black headed gull	<i>Chroicocephalus ridibundus</i> (Linnaeus, 1766)	WM	LC	NR
29.	River tern	<i>Sterna aurantia</i> (Gray, 1831)	WM	NT	C
Order-Charadriiformes, Family-Recurvirostridae					
30.	Black winged stilt	<i>Himantopus himantopus</i> (Linnaeus, 1758)	R	LC	I
Order-Charadriiformes, Family-Scolopacidae					
31.	Common greenshank	<i>Tringa nebularia</i> (Gunnerus, 1767)	WM	LC	C
32.	Common sandpiper	<i>Actitis hypoleucos</i> (Linnaeus, 1758)	WM	LC	C
33.	Marsh sandpiper	<i>Tringa stagnatilis</i> (Bechstein, 1803)	WM	LC	C
34.	Spotted redshank	<i>Tringa erythropus</i> (Pallas, 1764)	WM	LC	C
Order-Columbiformes, Family-Columbidae					
35.	Eurasian collared dove	<i>Streptopelia decaocto</i> (Frisvaldszky, 1838)	R	LC	G
36.	Laughing dove	<i>Spilopelia senegalensis</i> (Linnaeus, 1766)	R	LC	G
37.	Oriental turtle dove	<i>Streptopelia orientalis</i> (Latham, 1790)	R	LC	G
38.	Red collared dove	<i>Streptopelia tranquebarica</i> (Hermann, 1804)	R	LC	G
39.	Rock pigeon	<i>Columba livia</i> (Gmelin, 1789)	R	LC	G
40.	Spotted dove	<i>Spilopelia chinensis</i> (Scopoli, 1786)	R	LC	G
41.	Yellow-footed green pigeon	<i>Treron phoenicoptera</i> (Latham, 1790)	R	LC	G
Order-Coraciiformes, Family-Alcedinidae					
42.	Lesser pied kingfisher	<i>Ceryle rudis</i> (Linnaeus, 1758)	R	LC	C
43.	White-throated kingfisher	<i>Halcyon smyrnensis</i> (Linnaeus, 1758)	R	LC	C

(contd.)

Table 1 (contd.)

44.	Order-Coraciiformes, Family-Coraciidae Indian roller	<i>Coracias benghalensis</i> (Linnaeus, 1758)	R	LC	C
45.	Order-Coraciiformes, Family-Meropidae Green bee eater	<i>Merops orientalis</i> (Latham, 1801)	R	LC	I
46.	Blue tailed bee eater	<i>Merops philippinus</i> (Linnaeus, 1766)	SM	LC	I
47.	Order-Cuculiformes, Family-Cuculidae Asian koel	<i>Eudynamys scolopaceus</i> (Linnaeus, 1758)	R	LC	O
48.	Greater coucal	<i>Centropus sinensis</i> (Stephens, 1815)	R	LC	O
49.	Order-Falconiformes, Family-Falconidae Peregrine falcon	<i>Falco peregrines</i> (Tunstall, 1771)	R	LC	C
50.	Order-Galliformes, Family-Phasianidae Black francolin	<i>Francolinus francolinus</i> (Linnaeus, 1766)	R	LC	NR
51.	Order-Gruiformes, Family-Rallidae White breasted waterhen	<i>Amaurornis phoenicurus</i> (Pennant, 1769)	R	LC	O
52.	Purple swampphen	<i>Porphyrio porphyrio</i> (Linnaeus, 1758)	R	LC	O
53.	Common moorhen	<i>Gallinula chloropus</i> (Linnaeus, 1758)	R	LC	O
54.	Eurasian coot	<i>Fulica atra</i> (Linnaeus, 1758)	WM	LC	H
55.	Order-Passeriformes, Family-Alaudidae Ashy-crowned sparrow lark	<i>Eremopterix griseus</i> (Scopoli, 1786)	R	LC	NR
56.	Crested lark	<i>Galerida cristata</i> (Linnaeus, 1758)	R	LC	NR
57.	Order-Passeriformes, Family-Campephagidae White-bellied minivet	<i>Pericrocotus erythropygus</i> (Jerdon, 1840)	R	LC	I
58.	Order-Passeriformes, Family-Cisticolodae Yellow-bellied prinia	<i>Prinia flaviventris</i> (Delessert, 1840)	R	LC	I
59.	Order-Passeriformes, Family-Corvidae Common raven	<i>Corvus corax</i> (Linnaeus, 1758)	R	LC	O
60.	House crow	<i>Corvus splendens</i> (Vieillot, 1817)	R	LC	O
61.	Indian jungle crow	<i>Corvus macrorhynchos</i> (Wagler, 1827)	R	LC	O
62.	Indian treepie	<i>Dendrociitta vagabunda</i> (Latham, 1790)	R	LC	I
63.	Order-Passeriformes, Family-Dicruridae Ashy drongo	<i>Dicrurus leucophaeus</i>	R	LC	I
64.	Black drongo	<i>Dicrurus macrocercus</i> (Vieillot, 1817)	R	LC	I
65.	Order-Passeriformes, Family-Estrildidae Scaly breasted munia	<i>Lonchura punctulata</i> (Linnaeus, 1758)	R	LC	G
66.	Tricolour munia	<i>Lonchura Malacca</i> (Linnaeus, 1766)	R	LC	G
67.	Order-Passeriformes, Family-Laniidae Long tailed shrike	<i>Lanius schach</i> (Linnaeus, 1758)	R	LC	I
68.	Order-Passeriformes, Family-Monarchidae Asian paradise flycatcher	<i>Terpsiphone paradise</i> (Linnaeus, 1758)	SM	LC	I
69.	Order-Passeriformes, Family-Motacillidae Western yellow wagtail	<i>Motacilla flava</i> (Linnaeus, 1758)	WM	LC	I
70.	Grey wagtail	<i>Motacilla cinerea</i> (Tunstall, 1771)	WM	LC	I
71.	Citrine wagtail	<i>Motacilla citreola</i> (Pallas, 1776)	WM	LC	I
72.	White browed wagtail	<i>Motacilla maderaspatensis</i> (Gmelin, 1789)	R	LC	I
73.	Paddy field pipit	<i>Anthus rufulus</i> (Vieillot, 1818)	R	LC	I
74.	Long billed pipit	<i>Anthus similis</i> (Jerdon, 1840)	WM	LC	I
75.	Order-Passeriformes, Family-Muscicapidae Oriental magpie robin	<i>Copsychus saularis</i> (Linnaeus, 1758)	R	LC	I
76.	Indian black robin	<i>Copsychus fulicatus</i> (Linnaeus, 1766)	R	LC	I
77.	Bluethroat	<i>Luscinia svecica</i> (Linnaeus, 1758)	R	LC	I
78.	Order-Passeriformes, Family-Nectariniidae Purple sunbird	<i>Cinnyris asiaticus</i> (Latham, 1790)	R	LC	N
79.	Order-Passeriformes, Family-Passeridae House sparrow	<i>Passer domesticus</i> (Linnaeus, 1758)	R	LC	G
80.	Order-Passeriformes, Family-Ploceidae Baya weaver	<i>Ploceus philippinus</i> (Linnaeus, 1766)	R	LC	O
81.	Streaked weaver	<i>Ploceus manyar</i> (Horsfield, 1821)	R	LC	O
82.	Black breasted weaver	<i>Ploceus benghalensis</i> (Linnaeus, 1758)	R	LC	O
83.	Order-Passeriformes, Family-Pycnonotidae Red vented bulbul	<i>Pycnonotus cafer</i> (Linnaeus, 1766)	R	LC	O
84.	White eared bulbul	<i>Pycnonotus leucotis</i> (Gould, 1836)	R	LC	O

(contd.)



Table 1 (contd.)

	Order- Passeriformes, Family-Rhipiduridae			
85.	White throated fantail <i>Rhipidura albicollis</i> (Vieillot, 1818)	R	LC	I
	Order-Passeriformes, Family-Sturnidae			
86.	Asian pied starling <i>Gracupica contra</i> (Linnaeus, 1758)	R	LC	O
87.	Bank myna <i>Acridotheres ginginianus</i> (Latham, 1790)	R	LC	I
88.	Common myna <i>Acridotheres tristis</i> (Linnaeus, 1766)	R	LC	O
	Order-Passeriformes, Family-Sylviidae			
89.	Common tailor bird <i>Orthotomus sutorius</i> (Pennant, 1769)	R	LC	I
	Order-Passeriformes, Family-Timaliidae			
90.	Common babbler <i>Argya caudata</i> (Dumont, 1823)	R	LC	O
91.	Jungle babbler <i>Argya striata</i> (Lesson, 1831)	R	LC	O
	Order-Passeriformes, Family-Zosteropidae			
92.	Oriental white eye <i>Zosterops palpebrosus</i> (Temminck, 1824)	R	LC	I
	Order-Pelecaniformes, Family-Ardeidae			
93.	Black crowned night heron <i>Nycticorax nycticorax</i> (Linnaeus, 1758)	R	LC	C
94.	Cattle egret <i>Bulbulcus ibis</i> (Linnaeus, 1758)	R	LC	C/I
95.	Eurasian bittern <i>Botaurus stellaris</i> (Linnaeus, 1758)	R	LC	C
96.	Great egret <i>Ardea alba</i> (Linnaeus, 1758)	R	LC	C
97.	Grey heron <i>Ardea cinerea</i> (Linnaeus, 1758)	R	LC	C
98.	Indian pond heron <i>Ardeola grayii</i> (Skyles, 1832)	R	LC	C
99.	Intermediate egret <i>Ardea intermedia</i> (Wagler, 1827)	R	LC	C
100.	Little egret <i>Egretta garzetta</i> (Linnaeus, 1766)	R	LC	C
101.	Purple heron <i>Ardea purpurea</i> (Linnaeus, 1766)	R	LC	C
102.	Yellow bittern <i>Ixobrychus sinensis</i> (Gmelin, 1789)	R	LC	C
	Order-Pelecaniformes, Family-Threskiornithidae			
103.	Glossy ibis <i>Plegadis falcinellus</i> (Linnaeus, 1766)	R	LC	C
104.	Indian black ibis <i>Pseudibis papillosa</i> (Temminck, 1824)	R	LC	C
105.	Black headed ibis <i>Threskiornis melanocephalus</i> (Latham, 1790)	R	NT	C
	Order-Piciformes, Family-Capitonidae			
106.	Blue throated barbet <i>Psilopogon asiaticus</i> (Latham, 1790)	R	LC	F
107.	Brown headed barbet <i>Psilopogon zeylanicus</i> (Gmelin, 1788)	R	LC	F
108.	Coppersmith barbet <i>Psilopogon haemacephalus</i> (Muller, 1776)	R	LC	F
	Order-Piciformes, Family-Picidae			
109.	Black rumped flameback <i>Dinopium benghalense</i> (Linnaeus, 1758)	R	LC	NR
	Order-Podicipediformes, Family-Podicipedidae			
110.	Little grebe <i>Tachybaptus ruficollis</i> (Pallas, 1764)	R	LC	C
111.	Black necked grebe <i>Podiceps nigricollis</i> (Brehm, 1831)	WM	LC	C
	Order-Psittaciformes, Family-Psittaculidae			
112.	Slaty headed parakeet <i>Psittacula himalayana</i> (Lesson, 1832)	R	LC	F
113.	Plum headed parakeet <i>Psittacula cyanocephala</i> (Linnaeus, 1766)	R	LC	F
114.	Rose ringed parakeet <i>Psittacula krameri</i> (Scopoli, 1769)	R	LC	F
115.	Alexandrine parakeet <i>Psittacula eupatria</i> (Linnaeus, 1766)	R	NT	F
	Order-Suliformes, Family-Anhingidae			
116.	Oriental darter <i>Anhinga melanogaster</i> (Pennant, 1769)	R	NT	NR
	Order-Suliformes, Family-Phalacrocoracidae			
117.	Indian cormorant <i>Phalacrocorax fuscicollis</i> (Stephens, 1826)	R	LC	C
118.	Great cormorant <i>Phalacrocorax carbo</i> (Linnaeus, 1758)	R	LC	C
119.	Little cormorant <i>Microcarbo niger</i> (Vieillot, 1818)	R	LC	C
	Order-Strigiformes, Family-Strigidae			
120.	Indian eagle owl <i>Bubo bengalensis</i> (Franklin, 1831)	R	LC	NR
121.	Spotted owl <i>Athene brama</i> (Temminck, 1821)	R	LC	C

Resident status: R- Resident; WM- Winter migratory; SM- Summer migratory, IUCN status: V- Vulnerable; NT- Near threatened; LC- Least concern, Feeding guild: C- Carnivorous; O- Omnivorous; I- Insectivorous; H- Herbivorous; G- Granivorous; F- Frugivorous; N- Nectarivorous; MG- Multiple Guild; NR- Not recorded

Vergnes (2011). Purple sunbird (*Cinnyris asiaticus*) feeds on nectar of flowers. Nectarivorous bird can also feed on fruit juice (Ghadirian et al., 2008). Cattle egret and red-wattled lapwing, members of carnivorous guild were observed to feed on insects also, hence placed in

multiple guilds. The foraging activities of nine species could not be observed as these were mostly roosting. Feeding is an important activity in the life of the bird which is indispensable for their survival (Panda et al., 2021). Feeding guilds of birds provide insight into the

ecology of species and are particularly useful in studies that assess specific ecological drivers of community change. Species belonging to the same guild utilize the same kind of resource in a similar manner. Guild categorization among birds emphasizes upon functional component of community in an ecosystem. Keshopur wetland is biologically very productive and provides feeding grounds for a diverse range of resident and migratory birds.

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