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Feeding Habits of Birds in the Narmada Canal Region of Rajasthan

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ABSTRACT

Study on the feeding habits of birds was carried out in the Narmada canal region of Barmer and Jalore districts from September 2020 to March 2022. During the study period we recorded the feeding habits of 80 avian species out of which 45% species were feeding upon insects, 20% species were feeding upon small fishes, frogs, reptiles, birds and rodents. However, 13.75% species were omnivores, 8.75% granivores, 6.25% frugivore, 5% herbivores and only 1.25% species were nectivore. Maximum insectivores were found in terrestrial habitats along with canal and maximum carnivores were recorded in the canal water. Four herbivores were seen in aquatic habitats, all frugivores and nectivores were seen feeding in terrestrial habitats. We applied the direct field observation method to the study of the feeding habits of the birds. Sunbirds were noted feeding both on insects and nectars. Some birds were seen searching the food in the dung of cattle. We used the Nikon Coolpix p900 camera for photography and binoculars to observe the feeding activity of birds. Field guides were also used to identify the avian species.

Keywords - Bird species, feeding habit, Narmada canal, Terrestrial habitat and aquatic habitat

INTRODUCTION

Birds are bio-indicators and play a vital role in the ecosystem (Gill, 1994; Hossain and Baki, 2015). The feeding preferences of birds are changing according to the availability of food material in the habitat. Food resources and feeding habits of birds affect the lifestyle of birds and provide a better environment for reproduction and progressive survival (Mishra, 2020). Birds consume different types of insects and pests in agricultural fields hence, they are good friends of the farmers (Narayana et al, 2011). The insecticides and contaminated insects both are harmful to the insectivore birds and affect their breeding success (Smart, 1997). The insectivore bird species occupy a maximum portion of the tropical regions (Gomes et. al, 2008). When the food materials are available in a limit and competition occurs at that time the different bird species use different types of techniques (Maynard, 1982). The people who give the food materials to birds are well known for the feeding preference of the birds and do so for aesthetic purposes, not for conservation (Lott, 1988; Cox and Gaston, 2015). Wetland habitats are highly productive sites and it provides the food materials to many avian species for breeding and migration. In these types of habitats, the distribution and abundance of the birds are influenced by their feeding behaviour (Weller, 1999). The availability of food materials is affected by seasonal changes and it also influences the abundance and richness of the birds (Williams and Middleton, 2007; Nirmala, 2016). The nutrient cycles of wetland habitats are accelerated by many aquatic birds (Morales and Pacheco, 1986). All living beings on the earth fulfil their basic needs like food material and shelter from their habitats and the sufficient amount of food materials also affect the size of the population (Perrins and Birkhead, 1983; Kerbs, 1985; Welty and Baptista, 1988). The population of Godawan (Great Indian bustard) was declining in the last few years

in Desert National Park Rajasthan (Jaipal and Gehlot, 2015).

MATERIALS AND METHODS

We selected the Narmada canal region project of the Barmer and Jalore districts. These districts are part of The Thar Desert of Rajasthan. We have selected some specific sites randomly which were suitable for the study of birds. In the Barmer district, we selected six sites those were Dhorimana, Loharwa, Bhimtal, Bhadrai, Kothala and Arniyali. However, in Jalore district seven sites were selected Shilu, Makhopura, Golasan, Paharpura, Mithiberi, Sidheswar-palri, Lalpur and some small branches of the main canal for the food and feeding ecology of the different avian species. Water is supplied through Narmada Canal in both of these areas. The Jalore region has greenery, woodlands, large agricultural lands and numerous small distributaries of the main canal. While the Barmer region is very dry and sandy. The cultivated land area and greenery were lesser than in the Jalore region. The study was conducted from September 2020 to March 2022. The study sites are a paradise for birds because of the availability of different types of food resources like fruits, seeds, worms, insects, grains of different crops, pests etc. It provides shelter and opportunity to huge avifauna for successful growth and survival.

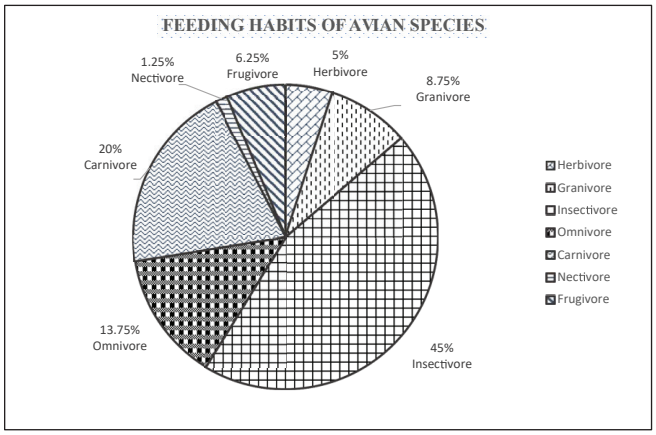
Nikon Coolpix p900 camera was used for photography of feeding activity of the different species. Standard books of Grimmett et al, (1999), Ali and Ripley, (2007) and were used to identify the avian species. Direct observation methods were applied during the study period. Investigation of feeding activity of different bird species was done during their active times early in the morning and afternoon.

Table 1 - Feeding habits of different bird species in the study area

S. No.	Common name	Scientific Name	Family	Types of habitats	Feeding habit
1	Northern Pintail	*Anas acuta*	Anatidae	Aquatic	Herbivore
2	Mallard	*Anas platyrhynchos*	Anatidae	Aquatic	Herbivore
3	Spot-billed Duck	*Anas poecilorhyncha*	Anatidae	Aquatic	Herbivore
4	Knob-billed Duck	*Sarkidiornis melanotos*	Anatidae	Aquatic	herbivore
5	Sparrow	*Passer domesticus*	Passeridae	Terrestrial	Granivore
6	Pigeon	*Columba livia*	Columbidae	Terrestrial	Granivore
7	Ring-necked dove	*Streptopelia capicola*	Columbidae	Terrestrial	Granivore
8	Yellow-throated sparrow	*Gymnoris xanthocollis*	Passeridae	Terrestrial	Granivore
9	Indian silverbill	*Euodice malabarica*	Estrildidae	Terrestrial	Granivore
10	Grey francolin	*Ortygornis pondicerianus*	Phasianidae	Terrestrial	Granivore
11	Ashy-crowned sparrow-lark	*Eremopterix griseus*	Alaudidae	Terrestrial	Granivore
12	Rosy starling	*Pastor roseus*	Sturnidae	Terrestrial	Frugivore
13	Red-vented bulbul	*Pycnonotus cafer*	Pycnonotidae	Terrestrial	Frugivore
14	Yellow-footed green pigeon	*Terron phoenicoptera*	Columbidae	Terrestrial	Frugivore
15	Rose-ringed parakeet	*Psittacula krameria*	Psittaculidae	Terrestrial	Frugivore
16	Coppersmith barbet	*Psilopogon haemacephalus*	Megalaimidae	Terrestrial	Frugivore
17	Common coot	*Fulica atra*	Rallidae	Aquatic	Omnivore
18	Demoiselle crane	*Grus virgo*	Gruidae	Terrestrial	Omnivore
19	House crow	*Corvus splendens*	Corvidae	Terrestrial	Omnivore
20	Greater flamingo	*Phoenicopterus roseus*	Phoenicopteridae	Aquatic	Omnivore
21	Asian koel	*Eudynamys scolopaceus*	Cuculidae	Terrestrial	Omnivore
22	Indian peafowl	*Pavo cristatus*	Phasianidae	Terrestrial	Omnivore
23	Common myna	*Acrodotheres tristis*	Sturnidae	Terrestrial	Omnivore
24	Rufous treepie	*Dendrocitta vagabunda*	Corvidae	Terrestrial	Omnivore

25	Common ravan	*Corvus corax*	Corvidae	Terrestrial	Omnivore
26	White-eared bulbul	*Pycnonotus leucotis*	Pycnonotidae	Terrestrial	Omnivore
27	Common pochard	*Aythya ferina*	Anatidae	Aquatic	Omnivore
28	Ashy prinia	*Prinia socialis*	Cisticolidae	Terrestrial	Insectivore
29	Barn swallow	*Hirundo rustica*	Hirundinidae	Terrestrial	Insectivore
30	Common sandpiper	*Actitis hypoleucosa*	scolopacidae	Aquatic	Insectivore
31	Bay-backed shirke	*Lanius vittatus*	Laniidae	Terrestrial	Insectivore
32	Baya weaver	*Ploceus philippinus*	Ploceidae	Terrestrial	Insectivore
33	Desert wheatear	*Oenanthe deserti*	Muscicapidae	Terrestrial	Insectivore
34	Wood sandpiper	*Tringa glareola*	scolopacidae	Aquatic	Insectivore
35	Spotted redshank	*Tringa erythropus*	scolopacidae	Aquatic	Insectivore
36	Common woodshrike	*Tephrodornis pondicerianus*	Vangidae	Terrestrial	Insectivore
37	Red-wattled lapwing	*Vanellus indicus*	Charadriidae	Common	Insectivore
38	Yellow-crowned Woodpecker	*Leiopicus mahrattensis*	Picidae	Terrestrial	Insectivore
39	Large grey babbler	*Turdoides malcolmi*	Leiothrichidae	Terrestrial	Insectivore
40	Tawny pipit	*Anthus campestris*	Motacillidae	Terrestrial	Insectivore
41	White-wagtail	*Motacilla alba*	Motacillidae	Common	Insectivore
42	Streak-throated swallow	*Petrochelidon fluvicola*	Hirundinidae	Terrestrial	Insectivore
43	Black redstart	*Phoenicurus ochruros*	Muscicapidae	Terrestrial	Insectivore
44	Isabelline Shrike	*Lanius isabellinus*	Laniidae	Terrestrial	Insectivore
45	Indian roller	*Coracias benghalensis*	Coraciidae	Terrestrial	Insectivore
46	Variable wheatear	*Oenanthe picata*	Muscicapidae	Terrestrial	Insectivore
47	Wire-tailed swallow	*Hirundo smithii*	Hirundinidae	Terrestrial	Insectivore
48	Rufous-fronted prinia	*Prinia buchanani*	Cisticolidae	Terrestrial	Insectivore
49	Common hoope	*Upupa epops*	Upupidae	Terrestrial	Insectivore
50	Grey-backed Shrike	*Lanius tephronotus*	Laniidae	Terrestrial	Insectivore
51	White-browed wagtail	*Motacilla maderaspatensis*	Motacillidae	Common	Insectivore
52	Green bee-eater	*Merops orientails*	Meropidae	Terrestrial	Insectivore
53	Indian robin	*Saxicoloides fulicatus*	Muscicapidae	Terrestrial	Insectivore
54	Black drongo	*Dicrurus macrocercus*	Dicruridae	Terrestrial	Insectivore
55	Common tailorbird	*Orthotomus sutorius*	Cisticolidae	Terrestrial	Insectivore
56	Plain prinia	*Prinia inornata*	Cisticolidae	Terrestrial	Insectivore
57	Brahminy starling	*Sturnia pagodarum*	Sturnidae	Terrestrial	Insectivore
58	White-naped woodpecker	*Chrysocolaptes festivus*	Picidae	Terrestrial	Insectivore
59	Spotted owlet	*Athene brama*	Strigidae	Terrestrial	Insectivore
60	Green sandpiper	*Tringa ochropus*	Scolopacidae	Aquatic	Insectivore
61	Long-tailed Shrike	*Lanius schach*	Laniidae	Terrestrial	Insectivore
62	Common babbler	*Turdoides caudata*	Leiothrichidae	Terrestrial	Insectivore
63	Jungle babbler	*Turdoides striata*	Leiothrichidae	Terrestrial	Insectivore
64	Common kingfisher	*Alcedo atthis*	Alcedinidae	Common	Carnivore
65	Shikra	*Accipiter badius*	Accipitridae	Terrestrial	Carnivore
66	Greater coucal	*Centropus sinensis*	Cuculidae	Terrestrial	Carnivore
67	Black-shouldered kite	*Elanus axillaris*	Accipitridae	Terrestrial	Carnivore
68	Red-naped ibis	*Pseudibis papillosa*	Threskiornithidae	Aquatic	Carnivore

69	Black-winged stilt	*Himantopus himantopus*	Threskiornithidae	Aquatic	Carnivore
70	Black kite	*Milvus migrans*	Accipitridae	Terrestrial	Carnivore
71	Intermediate egret	*Ardea intermedia*	Ardeidae	Aquatic	Carnivore
72	Little black cormorant	*Phalacrocorax sulcirostris*	Phalacrocoracidae	Aquatic	Carnivore
73	River tern	*Sterna aurantia*	Laridae	Aquatic	Carnivore
74	Great cormorant	*Phalacrocorax carbo*	Phalacrocoracidae	Aquatic	Carnivore
75	Little grebe	*Tachybaptus ruficollis*	Podicipedidae	Aquatic	Carnivore
76	Indian pond heron	*Ardeola grayii*	Ardeidae	Aquatic	Carnivore
77	Grey heron	*Ardea cinerea*	Ardeidae	Aquatic	Carnivore
78	Cattle egret	*Bubulcus ibis*	Ardeidae	Terrestrial	Carnivore
79	White-throated kingfisher	*Halcyon smyrnensis*	Alcedinidae	Aquatic	Carnivore
80	Purple sunbird	*Cinnyris asiaticus*	Nectariniidae	Terrestrial	Nectivore



RESEULT AND DISCUSSION

During our survey, we recorded the feeding activity of different avian species in both terrestrial and aquatic habitats in the canal and on its both sides up to 2 kilometers. A total of 80 species belonging to 40 families were found feeding on different types of food materials like fishes, beetles, spiders, insects, grains, nectar etc. Shekhawat and Bhatnagar (2014) recorded the feeding activity of 101 bird species in the Jhunjhunu district and found 41.58% of species as insectivores, 26.73% omnivores, 15.84% carnivores, 2.97% frugivores, 11.88% granivores and 0.99% nectivores. Upadhyay, et al. (2019) noted the feeding activity of 56 bird species in Sophia girls' College Campus, Ajmer, and found 29% of species are insectivores, 23% omnivores, 21% carnivores, 14% granivores, 11% frugivores and 2% nectivores. Choudhary, et al. (2020) recorded 191 bird species from Southern Nagaur (Parbatsar, Kuchaman, Nawa, Makrana) of which 77 species were insectivores, 45 carnivores, 24 granivores, 23 omnivores, 11 herbivores, 10 frugivores and one species was nectivore. In the present study, we observed the feeding activity of 80 avian species. Among those 07 species (8.75%) were granivores, 16 species (20%) were carnivores, 36 species (45%) were insectivores, 11 species (13.75%) were omnivores, 5 species (6.25%) were frugivores, 4 species (5%) were herbivores and 1 species (1.25%) was nectivore (Graph 1). Some bird species were found feeding on more than one type of food material. On the basis of main food items, we categorized them into different feeding habit groups. Birds species those were feeding upon the fish, amphibians, small lizards, snakes, birds, and rodents, were placed under the category of carnivores, and other birds species those were feeding upon invertebrates were placed in the insectivore category. About 8.75 % of bird species were mainly granivorous and consumed the seeds of different crops like millet, wheat, barley, and corn as the main food. We noted the starling, house sparrow, and babblers searching the grains in the dung of ruminant animals like cows and buffalos. All these birds were terrestrial and noticed near the Dhanies and agricultural fields.

Out of 80 bird species maximum (45%) were insectivores and these were mainly observed in terrestrial and aquatic habitats. We found the insectivore bird species feeding upon the grasshoppers, beetles, worms, bugs, small larvae of insects, spiders, termites, and ants. Maximum (29) avian species were seen on both sides of the canal and feeding upon different types of terrestrial insects. Four species like wood sandpiper, common sandpiper, spotted redshank and green sandpiper were found only in the canal water and fed upon the insects living in the canal. Red-wattled lapwing, white wagtail and white-browed wagtail were mainly living in terrestrial habitats but these three species were found feeding both in canal water and outside the canal. All these 36 species belong to 17 families. Maximum (80.55%) insectivore birds were recorded in terrestrial habitat and derived their food materials from the terrestrial habitat. However, 8.33% of

species were dependent on both aquatic and terrestrial habitats and 11.11% of species derived their required food from the canal water (Table 1)

Sixteen carnivore species of birds were recorded from terrestrial and aquatic habitats. Maximum (62.5%) carnivores were seen in aquatic habitats and they generally feed upon small invertebrates, small fishes, and large-size frogs. However, terrestrial birds were observed feeding upon different types of arthropods like spiders, beetles, grasshoppers, dragonflies and crickets also found feeding upon lizards, small snakes, small birds, squirrels, rats, mouse etc. Eleven species of omnivore birds were recorded in both aquatic and terrestrial habitats but the maximum (72.72%) species were noted in terrestrial habitats. They were seen feeding upon grains, pods, flowers, fruits and also feeding upon beetles, grasshoppers, moths, butterflies, dragonflies, mayflies, larvae, eggs, small lizards etc. We observed the Asian koel engulfing the entire egg of ring-dove. It is mainly considered as insectivore but it also feeds upon buds, fruits, and small lizards.

There were five frugivore avian species that were eating the fruits, and berries of different types of plants like banyan, ber, lemon, pomegranate, papaya, and Indian gooseberry. There were only one nectivore species (purple sunbird) that was seen feeding on the colorful flower-like Calotropis, pomegranate, hibiscus, lemon, sunflower etc. It is also an insectivore and fed upon the insects during the chick-rearing and rest of the period it did not feed upon the insects. So, we can say it is an omnivore but mainly it is nectivore. It acts as an insectivore for short period during the chick-rearing. We found a strong relation between feeding habits with the types of food materials and habitats. Feeding habit was closely related and depended on the types of habitat and food materials.

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Declaration: *We also declare that all ethical guidelines have been followed during this work and there is no conflict of interest among authors.*

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