

Research Article

Avian Diversity and Habitat Use of Sultanpur National Park, Haryana, India

Jagjeet Singh¹, Santosh Hooda², Annu Phogat¹, Vinay Malik^{1,*}

¹Department of Zoology, Maharshi Dayanand University, India

²Department of Zoology, Government College (W), Rohtak, -124001 (Haryana), India

(Received: May 10, 2020; Revised: February 05, 2021; Accepted: February 08, 2021)

ABSTRACT

The species diversity, guild and current status of the avifauna in the Sultanpur National Park, Haryana was investigated during January 2018 to June 2019. The line transects method with constant length and variable width was used in the study. The presence of 111 species of birds belonging to 90 genera, 42 families and 17 orders were observed. Non-passerine bird species dominated over the passerine bird species in relative diversity. Data of residential status revealed that 82 species were resident and rest 29 were either winter or summer migrants. Sultanpur National Park supported 41 (36.9%) omnivorous, 29 (26.1%) carnivorous, 24 (21.6%) insectivorous, 9 (8.1%) granivorous, 6 (5.4%) frugivorous and 2 (1.8%) nectarivorous birds. It was further reported that Sultanpur National Park supported 1 endangered, 1 vulnerable and 6 near threatened species of birds. Analysis of population status as per IUCN revealed that 35 species were having stable, 32 decreasing, 25 increasing, 19 had unknown population trend. It is hoped that the study will be helpful in drawing attention, of the public and state government towards conservation of the Sultanpur National Park and, protection of its avian fauna.

Key words: Sultanpur; National Park; Birds; Diversity; Haryana.

INTRODUCTION

Biological diversity not only shows the occurrence of variety of organisms, but also reflects the variety of ecological resources of a place (Shekhawat & Bhatnagar, 2014). Biodiversity of a particular place is an indicator of the availability of the environmental resources, their distribution and utilization by the organisms in that habitat. The availability, distribution and reach to the bio-physical resources of a particular habitat are major factors for the species variety and their existence in that area (Kumar & Sahu, 2020; Kumar & Sahu, 2019). Thus the species diversity and their existence are greatly influenced by environmental resources and biological community (Pragasan & Madesh, 2018). Different habitats are selected by different types of species according to their ecological needs, survival success and evolutionary learning (Boyce *et al.*, 2016; Young *et al.*, 2019; Bailey & King, 2019). Evaluation of bird community has become an important tool for conservation of biodiversity of any area with high anthropogenic pressure (Rahman & Ismail, 2018; Koshelev *et al.*, 2019). Understanding of the structure and diversity of birds is necessary to identify the conservation action for avian community. Both the resident and migrant population of a habitat are central to determine the niche relationship, for appropriate management strategies to protect and conserve its avian fauna.

Lakes, forest patches, agriculture zones and national parks provide essential resources to the avian fauna and all these provide suitable feeding and inhabiting grounds to them. Present need of conservation for

forest areas and forest patches is to reduce threats of its natural faunal diversity (Pattimahu *et al.*, 2017). Haryana has two national parks and 10 wildlife sanctuaries and vast agro-fields, which are utopia for bird community. Sultanpur National Park is a famous fresh water low lying wetland and is the oldest national park of the state (Kaushik & Gupta, 2016). But the Sultanpur National Park is facing large scale habitat fragmentation, disturbance and degradation due to agricultural activities in the vicinity, pollution and expansion of national capital region (NCR). Thus the present study is an attempt to document the composition, status, distribution and habitat use of avifauna of Sultanpur National Park, Haryana for developing long term government conservation schemes.

MATERIALS AND METHODS

The Sultanpur National Park, Gurugram (28.46°71'N 76.89°90'E to 28.45°46'N 76.88°15'E) is located in northern India at about 32 km in south-west of the national capital, New Delhi, in the state of Haryana, India (Figure 1). It has a total area of 13,727 hectares including agriculture landscape, forest patches with vegetation. The various habitat types of Sultanpur National Park like core area, adjacent low lying marshes, bushes and park area were studied from January 2018 to June 2019.

Migration, species diversity and feeding guild were recorded every fortnightly. Birds were observed by line transects method having variable width but constant length (Shekhawat & Bhatnagar, 2014). Binoculars

*Corresponding Author's E-mail: vinaymalik71@gmail.com

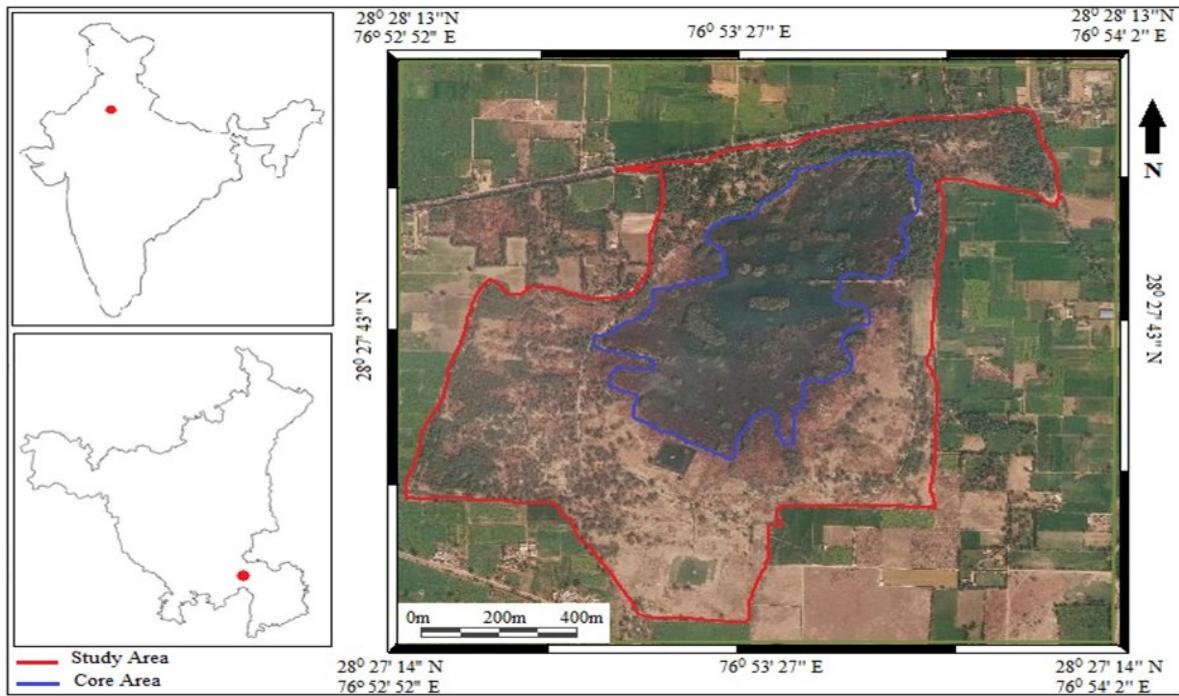


Figure 1. Location and outline map of study area: Sultanpur National Park, Haryana.

(Nikon 22*10) were used for observing the birds in morning (8:00 to 11:00 am) and evening (4:00 to 7:00pm). Opportunistic sighting was also recorded during the study. Photographs were taken with Sony DCX 400V for records and identification was done with the help of field guide by Grimmett *et al.* (2016). Feeding habits and habitats were recorded as per field observations. The different feeding guilds observed were Carnivorous (feeding on small fishes, tadpoles, amphibians, rodents, eggs and flesh); Insectivorous (feeding on ants, flies, small arthropods and caterpillars); Granivorous (feeding on seeds and grains); Omnivorous (feeding on both on small animals and seeds, fruits); Frugivorous (feeding on fruits and berries) and Nectarivorous (feeding on flower nectar). Seasonal migration data was collected as per species encountered in different seasons; bird species were classified as winter migratory

(encountered in October to March), summer migratory (encountered in March to August) and passage migratory (encountered in August to October) and resident (encountered throughout the year). Species richness, threat status and nomenclature of birds were as per IUCN Red Data List (2019.3). Relative diversity (RD) was calculated by following formula (Koli, 2014):

$$RD = \frac{\text{Total number of species in a family}}{\text{Total number of species}} \times 100$$

RESULTS AND DISCUSSION

The present study of Sultanpur National Park, Gurugram recorded the presence of 111 bird species belonging to 90 genera, distributed over 42 families, among 17 orders (Table 1).

Table 1. Systematic list and status of birds in the Sultanpur National Park, Haryana.

Order	Family	Common Name	Scientific names	P T	F G	R S
Accipitriformes	Acciptridae	Besra	<i>Accipiter virgatus</i>	D	CV	R
		Black Kite	<i>Milvus migrans</i>	U	CV	R
		Black Shouldered Kite	<i>Elanus axillaris</i>	I	CV	R
		Egyptian Vulture	<i>Neophron percnopterus</i>	D	CV	R
		Shikra	<i>Accipiter badius</i>	S	CV	R
		Western Marsh Harrier	<i>Circus aeruginosus</i>	I	OV	WM
Anseriformes	Anatidae	African Comb Duck	<i>Sarkidiornis melanotos</i>	D	OV	R
		Bar Headed Goose	<i>Anser indicus</i>	D	OV	R
		Common Teal	<i>Anas crecca</i>	U	OV	WM
		Ferruginous Duck	<i>Aythya nyroca</i>	D	OV	WM
		Gadwall	<i>Mareca strepera</i>	I	OV	WM
		Garganey	<i>Spatula querquedula</i>	D	OV	WM
		Indian Spot-billed Duck	<i>Anas poecilorhyncha</i>	D	OV	R
		Mallard	<i>Anas platyrhynchos</i>	I	OV	WM
		Northern Pintail	<i>Anas acuta</i>	D	OV	WM
Northern Shoveler	<i>Spatula clypeata</i>	D	OV	WM		

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Bucerotiformes	Bucerotidae	Indian Grey Hornbill	<i>Ocyrceros birostris</i>	S	FV	R
	Upupidae	Common Hoopoe	<i>Upupa epops</i>	D	IV	R
Charadriiformes	Charadriidae	Red Wattled Lapwing	<i>Vanellus indicus</i>	U	CV	R
	Jacaniidae	Bronze-winged Jacana	<i>Metopidius indicus</i>	U	OV	SM
	Recurvirostridae	Black Stilt	<i>Himantopus novaezelandiae</i>	I	CV	R
	Scolopacidae	Common Redshank	<i>Tringa tetanus</i>	U	CV	WM
		Common Sandpiper	<i>Actitis hypoleucos</i>	U	CV	WM
		Green Sandpiper	<i>Tringa ochropus</i>	I	IV	WM
		Ruff	<i>Calidris pugnax</i>	D	CV	WM
Ciconiiformes	Ciconiidae	Asian Openbill	<i>Anastomus oscitans</i>	U	CV	R
		Asian Wollyneck	<i>Ciconia episcopus</i>	D	CV	R
		Black Necked Stork	<i>Ephippiorhynchus asiaticus</i>	D	CV	R
		Painted Stork	<i>Mycteria leucocephala</i>	D	CV	R
Columbiformes	Columbidae	Eurasian Collard Dove	<i>Streptopelia decaocto</i>	I	GV	R
		Laughing Dove	<i>Spilopelia senegalensis</i>	S	GV	R
		Rock Dove	<i>Columba livia</i>	D	GV	R
		Yellow Footed Green Pigeon		I	GV	R
Coraciiformes	Alcedinidae	Pied Kingfisher	<i>Ceryle rudis</i>	U	CV	R
		White Breasted Kingfisher	<i>Halcyon smyrnensis</i>	I	OM	R
	Coraciidae	Indian Roller	<i>Coracias benghalensis</i>	I	OM	R
	Meropidae	Blue Tailed Bee Eater	<i>Merops philippinus</i>	S	IV	SM
		Green Bee Eater	<i>Merops orientalis</i>	I	IV	SM
Cuculiformes	Cuculidae	Greater Coucal	<i>Centropus sinensis</i>	S	OV	R
		Grey-bellied Cuckoo	<i>Cacomantis passerines</i>	S	IV	SM
		Jacobin Cuckoo	<i>Clamator jacobinus</i>	S	OV	SM
		Western Koel	<i>Eudynamys scolopaceus</i>	S	FV	R
Galliformes	Phasianidae	Black Francolin	<i>Francolinus francolinus</i>	S	OV	R
		Grey Francolin	<i>Francolinus pondicerianus</i>	S	OV	R
		Indian Peafowl	<i>Pavo cristatus</i>	S	OV	R
Gruiformes	Rallidae	Common Coot	<i>Fulica atra</i>	I	OV	R
		Common Moorhen	<i>Gallinula chloropus</i>	S	OV	R
		Purple Swamphen	<i>Porphyrio porphyrio</i>	U	OV	R
		White Breasted Waterhen	<i>Amaurornis phoenicurus</i>	U	OV	R

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Passeriformes	Alaudidae	Crested Lark	<i>Galerida cristata</i>	D	GV	R
	Cisticolidae	Ashy Prinia	<i>Prinia socialis</i>	S	IV	R
		Plain Prinia	<i>Prinia inornata</i>	S	IV	R
		Tailor Bird	<i>Orthotomus sutorius</i>	S	IV	R
	Corvidae	House Crow	<i>Corvus splendens</i>	S	OV	R
		Large Billed Crow	<i>Corvus macrorhynchos</i>	S	OV	R
		Rufous Treepie	<i>Dendrocitta vagabunda</i>	D	CV	R
	Dicruridae	Black Drongo	<i>Dicrurus macrocercus</i>	U	CV	R
	Estrildidae	Indian Silverbill	<i>Euodice malabarica</i>	S	GV	R
		Scaly-breasted Munia	<i>Lonchura punctulata</i>	S	GV	R
	Hirundidae	Plain Martin	<i>Riparia chinensis</i>	D	IV	R
		Wire-Tailed Swallow	<i>Hirundo smithii</i>	I	IV	SM
	Laniidae	Bay-backed Shrike	<i>Lanius vittatus</i>	S	CV	R
	Leiotrichidae	Common Babbler	<i>Argya caudate</i>	S	OV	R
		Jungle Babbler	<i>Turdoides striata</i>	S	OV	R
	Motacillidae	Citrine Wagtail	<i>Motacilla citreola</i>	I	IV	WM
		Grey Wagtail	<i>Motacilla cinerea</i>	S	IV	WM
		Tree Pipet	<i>Anthus trivialis</i>	D	IV	R
		White Wagtail	<i>Motacilla alba</i>	S	IV	WM
		Yellow Wagtail	<i>Motacilla tschutschensis</i>	D	IV	WM
	Muscicapidae	Black Redstart	<i>Phoenicurus ochruros</i>	I	IV	WM
		Brown Rockchat	<i>Oenanthe fusca</i>	S	IV	R
		Indian Robin	<i>Saxicoloides fulicatus</i>	S	IV	R
		Oriental Magpie Robin	<i>Copsychus saularis</i>	S	IV	R
		Pied Bushchat	<i>Saxicola caprata</i>	S	IV	R
		Red Breasted Flycatcher	<i>Ficedula parva</i>	I	IV	WM
	Nectariniidae	Purple Sunbird	<i>Nectarinia asiatica</i>	S	NV	R
	Oriolidae	Indian Golden Oriole	<i>Oriolus kundoo</i>	U	OV	SM
	Passeridae	Chestnut-Shouldered Bush-Sparrow	<i>Gymnoris xanthocollis</i>	S	GV	R
		House Sparrow	<i>Passer domesticus</i>	D	GV	R
	Phylloscopidae	Common Chiffchaff	<i>Phylloscopus collybita</i>	I	IV	WM
	Ploceidae	Baya Weaver	<i>Ploceus philippinus</i>	S	OV	R
		Black-Breasted Weaver	<i>Ploceus benghalensis</i>	S	OV	R
	Pycnonotidae	Red-Vented Bulbul	<i>Pycnonotus cafer</i>	I	OV	R
		White-Eared Bulbul	<i>Pycnonotus leucotis</i>	D	OV	R
	Stenostridae	Grey-headed Canary-flycatcher	<i>Culicicapa ceylonensis</i>	U	IV	WM
	Sturnidae	Asian Pied Starling	<i>Gracupica contra</i>	I	OV	R
		Bank Myna	<i>Acridotheres gingini-anus</i>	I	OV	R
		Brahminy Starling	<i>Sturnia pagodarum</i>	U	OV	R
		Common Myna	<i>Acridotheres tristis</i>	I	OV	R
		Common Starling	<i>Sturnus vulgaris</i>	D	OV	R
		Rosy Starling	<i>Pastor roseus</i>	U	OV	PM

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Pelecaniformes	Ardeidae	Black-Crowned Night-Heron	<i>Nycticorax nycticorax</i>	D	CV	R
		Cattle Egret	<i>Bubulcus ibis</i>	I	CV	R
		Great White Egret	<i>Ardea alba</i>	U	CV	R
		Grey Heron	<i>Ardea cinerea</i>	U	CV	WM
		Indian Pond-Heron	<i>Ardeola grayii</i>	U	CV	R
		Intermediate Egret	<i>Ardea intermedia</i>	D	CV	R
		Purple Heron	<i>Ardea purpurea</i>	D	CV	R
		Small Egret	<i>Egretta garzetta</i>	I	CV	R
	Threskiornithidae	Black Headed Ibis	<i>Threskiornis melanocephalus</i>	D	CV	R
		Eurasian Sponbill	<i>Platalea leucorodia</i>	U	CV	R
		Red-Naped Ibis	<i>Pseudibis papillosa</i>	D	OV	R
Piciformes	Megalaimidae	Brown-Headed Barbet	<i>Psilopogon zeylanicus</i>	S	FV	R
		Black-Rumped Flameback	<i>Dinopium benghalense</i>	S	IV	R
		Coppersmith Barbet	<i>Psilopogon haemacephalus</i>	I	FV	R
Podicipediformes	Podicipedidae	Little Grebe	<i>Tachybaptus ruficollis</i>	D	OV	R
Psittaciformes	Psittacidae	Alexandrine parakeet	<i>Psittacula eupatria</i>	D	FV	R
		Rose Ringed Parakeet	<i>Psittacula krameri</i>	I	FV	R
Strigiformes	Strigidae	Spotted Owlet	<i>Athene brama</i>	S	CV	R
Suliformes	Anhingidae	Oriental Darter	<i>Anhinga melanogaster</i>	D	CV	R

P T – Population Trend: D – Decreasing, I – Increasing, S – Stable, U – Unknown; F G – Feeding Guild: CV – Carnivorous, GV – Granivorous, IV – Insectivorous, NV – Nectarivorous, OV – Omnivorous; R S – Residential Status: R– Resident, WM – Winter Migrant, SM – Summer Migrant, PM – Passage Migrant.

Among these non passerine birds (n = 88 sp.) dominated over the passerine birds (n = 43 sp.). However Passeriformes was the most represented and dominant order with n = 43 species in 19 families followed by Pelicaniformes (n = 11 sp.); Anseriformes (n = 10 sp.); Charadriiformes (n = 7 sp.); Acciptriformes (n = 6 sp.); Coraciiformes (n = 5 sp.); Ciconiiformes, Columbiformes, Cuculiformes and Gruriformes (n = 4 sp. in each); Galliformes and Piciformes (n = 3 sp. in each); Bucerotiformes and Psittaciformes (n= 2 sp.). While the Podipediformes and Strigiformes, Suliformes were least represented (n=1 sp. in each) (Table 1).

The analysis of relative diversity revealed Anatidae (n = 10 sp.) as the most dominant family with 9.01%; followed by 7.21% relative diversity in family

Ardeidae (n = 8 sp.); 5.41% in Acciptridae, Muscicapidae and Sturnidae (n = 6 sp. in each); 4.50% in Motacillidae (n = 5 sp.); 3.60% in Scolopacidae, Ciconiidae, Columbidae, Cuculidae and Rallidae (n = 4 sp. in each); 2.70% in Phasianidae, Cisticolidae, Corvidae, Threskiornithidae and Megalaimidae (n = 3 sp. in each); 1.80% in Alcedinidae, Meropidae, Estrildidae, Hirundidae, Leiotrichidae, Passeridae, Ploceidae, Pycnonotidae and Psittacidae (n = 2 sp. in each). While the family Bucerotidae, Upupidae, Charadriidae, Jacanidae, Recurvirostridae, Coraciidae, Alaudidae, Dicruridae, Laniidae, Nectariniidae, Oriolidae, Phylloscopidae, Stenostriidae, Zosteropidae, Podicipedidae, Strigidae and Anhingidae were least represented with relative diversity of 0.90% (n = 1 sp. in each) (Figure 2).

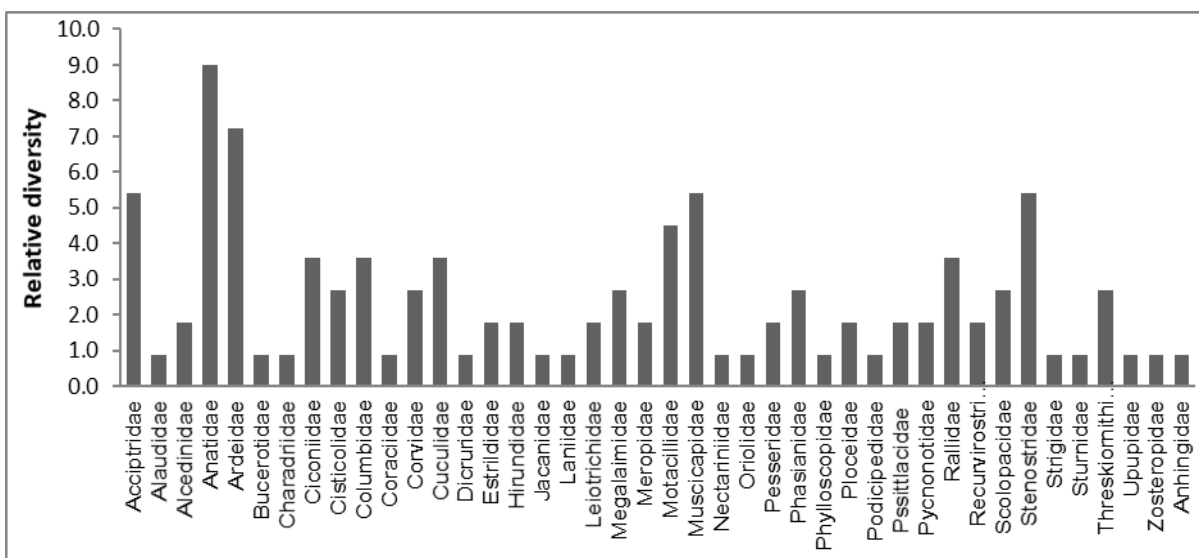


Figure 2. Number of bird species in respective families in Sultanpur National Park, Haryana.

The threat status analysis as per IUCN (Ver.4) found Egyptian Vulture (*Neophron percnopterus*) as an endangered species; Asian Wollie-neck (*Ciconia episcopus*) as a vulnerable species while Ferruginous Duck (*Aythya nyroca*), Black Necked Stork (*Ephippiorhynchus asiaticus*), Painted Stork (*Mycteria leucocephala*), Black Headed Ibis (*Threskiornis melanocephalus*), Alexandrine Parakeet (*Psittacula eupatria*) and Oriental Darter (*Anhinga melanogaster*) as the near threatened species. Rest all the recorded species (n = 103) were classified as least concerned. Vulnerable species (*Ciconia episcopus*) belonged to family Ciconiidae of Ciconiiformes order. Among near threatened species *Ephippiorhynchus asiaticus* and *Mycteria leucocephala* also belonged to family Ciconiidae of Ciconiiformes order; whereas *Aythya nyroca* belonged to family Anatidae of Anseriformes order; *Threskiornis melanocephalus* belonged to family Threskiornithidae of order Pelicaniformes, *Psittacula eupatria* belonged to family Psittacidae of order Psittaciformes and *Anhinga melanogaster* belonged to family Anhingidae of order Suliformes (Table 1).

In the feeding guild, omnivorous (n = 41 sp.) were having the maximum number, followed by carnivorous (n = 29 sp.), insectivorous (n = 24 sp.), granivorous (n = 9 sp.) and frugivorous (n = 6 sp.); while nectarivorous (n = 2 sp.) was the least shown feeding guild (Figure 3). Further analysis of feeding guild revealed that in the omnivorous feeding guild 12 species showed stable, 11 species with increasing, 11 species with decreasing and 7 species with unknown population trend. In carnivorous feeding guild 12 species showed decreasing population trend, 11 species showed unknown population trend; while stable and increasing population trend was shown by 3 species each. Insectivorous feeding guild had 12 species with stable, 7 species with increasing, 4 with decreasing and 1 with unknown population trend. Granivorous feeding guild had 4 species with stable, 3 species with decreasing and 2 species with increasing population trend. Frugivorous feeding guild had 3 species with stable, 2 species with increasing and 1 with decreasing population trend. Nectarivorous feeding guild had 1 species with decreasing and 1 with stable population trend (Figure 3). A good number of

omnivorous, carnivorous and insectivorous species along with granivorous and frugivorous species reflected heterogeneity of the habitat with respect to availability of food. Feeding guild analysis highlighted the interdependence and balance between physical and biological resources of the area.

The global population trend analysis as per IUCN (Ver.4) showed that stable population trend was the most observed, which was represented by n = 35 species. While decreasing global population trend was represented by 32 species. Whereas 25 species showed increasing global population trend and 19 species represented unknown global population trend (Figure 3).

Seasonal migration data analysis showed that out of 111 species, 82 bird species were resident while 29 species showed migration, in which 21 species were identified as winter visitors whereas 7 species as summer visitors and 1 as passage migratory (Table 1). Migratory birds were attracted towards heterogeneous feeding grounds of wetland to fulfil their feeding and nesting requirements (Kumar & Gupta, 2013). Further population trend analysis in winter migratory birds showed increasing trend in 8 species, decreasing trend in 6 species, unknown in 5 species and stable in 2 species. In summer migratory birds 2 species showed increasing and 2 species showed unknown population trend, while 3 species showed stable population trend. Resident species had 30 species with stable, 26 species with decreasing, 15 species with increasing and 11 species with unknown population trend. Whereas the only one passage migratory species showed unknown population trend (Table 1).

The presence of 32 species with decreasing population trend along with 19 species of unknown population trend in the area highlighted the need of attention and further research on its bird community with an aim to conserve and protect the avian fauna.

Earlier Chopra *et al.* (2012) had studied the avian diversity of Sultanpur National Park and enlisted 113 bird species; out of that 49 were migratory and 64 were resident. The very next year Chopra *et al.* (2013) again compiled the information of only wetland birds of Sultanpur National Park and documented 79

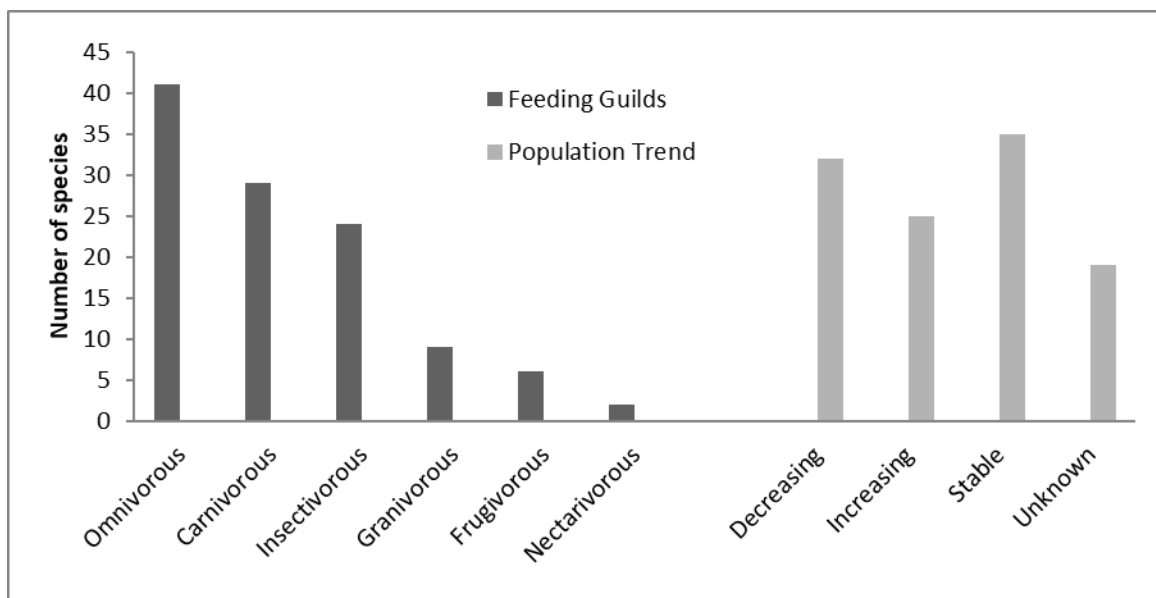


Figure 3. Feeding Guilds and population trend of birds in Sultanpur National Park, Haryana, India.

wetland birds; out of which 20 were residents while 59 were migrants. Recently Kaushik & Gupta (2016) reported 161 species of birds in Sultanpur National Park during 2009-2014, out of which 62 were migrant species and 99 were resident species. Moreover the presence of 37 globally concerned species in Sultanpur National Park at some point of time from 1970-2000, as documented by Haryana forest department suggested repetitive surveys as a mandatory exercise to evaluate its avian faunal diversity (Banerjee & Pal, 2016). However the present study reported a total of 111 species in which 82 bird species were resident and 29 species were migrants. It has been observed that number of migrant visitor species reduced both in counts and species number when compared to past studies. Nonetheless, all the studies claimed importance of this site as a rich avian diversity area.

Despite of its urban surrounded small area, the presently recorded 111 bird species included one endangered, one vulnerable and 6 near threatened species. All the threatened, vulnerable and endangered species in the present study were non-passerine. This was due to narrow feeding spectrum of non passerine birds as they usually feed exclusively on aquatic fauna and flora. While passerine birds showed a broad spectrum of feeding habits both in agrifields and marshy areas; hence they were less prone to habitat destruction and anthropogenic activities. Therefore the feeding guild analysis can be used as an important tool to understand the composition and threat factors of the biodiversity. Our study also revealed that except Egyptian Vulture (*Neophron percnopterus*) and Alexandrine Parakeet (*Psittacula eupatria*) all near threatened, vulnerable and endangered species were water-birds, which were facing wanton destruction of nesting habitat and feeding grounds due to shrinkage of catchment area and decreasing vegetative cover. Over the last 25 years lake area had already faced a decrease from 3.32 km² in 1995 to mere 1.12 km² in 2015 (Singh *et al.*, 2017). Nesting zones and feeding grounds are still facing deforestation in and around the Sultanpur National Park which imposes a major threat to the avian diversity and their survival.

Earlier studies have documented three critically endangered species i.e. White Rumped Vulture, Long Billed Vulture and Red Headed Vulture; one endangered species i.e. Black-bellied Tern; eight vulnerable species i.e. Spot-billed Pelican, Lesser Adjutant, Greated Spotted Eagle, Eastern Imperial Eagle, Sarus Crane, White-browed Buschat, Finn's Weaver, Asian Wollyneck; and twelve near threatened species i.e. Oriental Darter, Painted Stork, Black Necked Stork, Black Headed Ibis, Lesser Flamingo, Ferruginous Duck, Lesser Fish Eagle, Pallied Harrier, Black Tailed Godwit, Eurasian Curlew, Alexandrine Parakeet and Eurassian Roller at Sultanpur National Park (Kaushik & Gupta, 2016; Rahmani *et al.*, 2016). However no critically endangered species has been spotted in the study. Though the present study documented one endangered species i.e. Egyptian Vulture, which has not been spotted at the Sultanpur national Park by any of the earlier studies. Among the vulnerable species only Asian Wolly-neck was recorded in the present study, though eight vulnerable species has previously been recorded from Sultanpur National Park. In the near threatened species six out of twelve previously documented were spotted. Our study has

revealed that number of species in threatened categories have reduced over past. This reduction in these threatened species might be due to low water availability, habitat and nesting site destruction at the national park.

The major threats to the Sultanpur National Park are drying of water bodies in the years of low rainfall, urbanisation, expansion of highways and industrial development in the surrounding areas. Besides these the anthropogenic activities in the buffer zone and tourist activity are also a major concern to its avifaunal diversity. Nature awareness programmes regarding birds and importance of wetland ecosystem for sustenance of biodiversity should be given to the local people for the conservation of this National Park.

CONCLUSION

Our study concluded that park provides a suitable habitat with easy and abundant food to the resident as well as the migratory birds. But the decreasing population trend of many documented birds and less number of migratory birds spotted, in the present study than the earlier studies draws the attention towards the immediate action plans for its conservation. Hence the implementations of appropriate steps are required to make it a more suitable habitat for the several resident and migratory bird species.

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Photo plate 1. Some important birds of the Sultanpur National Park, Haryana, India.



White Breasted Kingfisher



Oriental Darter



Plain Prinia



Purple Heron



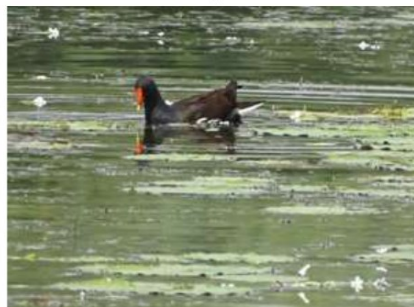
Common Myna



Grey-headed Canary-flycatcher



Indian Pond-Heron



Common Moorhen



Black Necked Stork



Flock of Painted Storks at Sultanpur National Park



Nesting of Painted Stork



Black-Breasted Weaver



Painted Stork



Bronze-winged Jacana



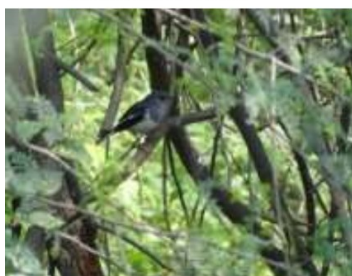
Bar Headed Goose



Great White Egret



Tailor Bird



Oriental Magpie Robin



Black-Rumped Flameback



Indian Golden Oriole



Black Redstart



Purple Swamphen



Black Shouldered Kite



Jacobin Cuckoo



Asian Wollyneck



Brown-Headed Barbet



Citrine Wagtail



Western Koel



Grey Heron



Flock of black winged stilts



Flock of migratory ducks



Common Redshank



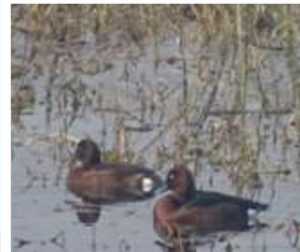
Flock of spot-billed duck



Red-Naped Ibis



Red-Vented Bulbul



Ferruginous Duck



Indian Peafowl



Comb Duck



Green Bee Eater



Northern Pintail



Egyptian Vulture & Black Kite

