

Avifaunal diversity of Daranghati Wildlife Sanctuary, India

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Abstract Birds are among the most charismatic animals on our planet. Worldwide, there are about 11,000 different avian species. BirdLife International (2024) has listed 1,211 bird species that occur in India, demonstrating its immense diversity. Of these species, the majority (about 80%) are restricted to the Himalayas. To contribute to our knowledge on avian diversity in India, we conducted avifaunal surveys in the Daranghati Wildlife Sanctuary, located in Shimla district of Himachal Pradesh, India. A total of 76 species of birds, representing 11 orders, 32 families, and 59 genera, were recorded. Passeriformes dominated the avifauna with 56 species. Muscicapidae was the most abundant family enumerating 12 species. The second largest family was Fringillidae including 6 species, closely followed by Paridae and Phasianidae, with 5 species each. Of the 76 species recorded, 22 (28.95%) were classified as very common, 25 (32.90%) as common, 21 (27.63%) as uncommon, and 8 species (10.52%) as rare. The Western Tragopan (*Tragopan melanocephalus*) is a vulnerable species and the Himalayan Griffon (*Gyps himalayensis*) is listed as a near-threatened species as per IUCN Red List. Around 30% of the species belong to very narrow and restricted feeding guilds. The study also revealed the presence of 21 bird species with a decreasing population trends as provided by the global IUCN population assessments, thereby highlighting the importance and imperative of conservation measures in this Wildlife Sanctuary.

Keywords: biodiversity, Indian Himalayan Region, avifauna, threat

Összefoglalás A madarak változatos tollazatukkal és viselkedésükkel bolygónk leglenyűgözőbb állatai közé tartoznak. Világszerte körülbelül 11 000 különböző madárfaj él. A BirdLife International (2024) szerint Indiában 1 211 faj fordul elő. Ezek többsége (mintegy 80%) a Himalájára korlátozódik. A Daranghati Wildlife Sanctuary-ban madárállomány-felmérést végeztek. A terület az indiai Himachal Pradesh állam Shimla kerületében található. Összesen 76 madárfajt jegyeztek fel, amelyek 11 rendet, 32 családot és 59 nemzetséget képviselnek. A verébalakúak 56 fajjal domináltak. A légykapófélék (Muscicapidae) volt a legmagasabb abundancia-értékeket mutató család 12 fajjal. A második legnagyobb pintyfélék (Fringillidae) volt, 6 fajjal, őket követte a cinegefélék (Paridae) és a fácánfélék (Phasianidae), 5-5 fajjal. A feljegyzett 76 fajból 22 (28,95%) a nagyon gyakori, 25 (32,90%) a gyakori, 21 (27,63%) a rendszeres, 8 faj (10,52%) pedig a ritka kategóriába esett. A feljegyzett madárfajok közül a nyugati tragopán (*Tragopan melanocephalus*) a sérülékeny fajok, a himáljai keselyű (*Gyps himalayensis*) pedig a közel-veszélyeztetett fajok közé tartozik az IUCN Vörös Listáján. A fajok körülbelül 30%-a tartozik nagyon szűk és korlátozott táplálkozási guilddekhez. A tanulmány 21 olyan madárfaj jelenlétét tárta fel, amelyek populációja csökkenő tendenciát mutat az IUCN világszerte végzett állomány-felmérése szerint, ezzel is hangsúlyozva a védelmi intézkedések fontosságát és elengedhetetlenségét ebben a vadrezervátumban.

Kulcsszavak: biodiverzitás, Indiai Himalája régió, madárfauna, veszélyeztetettség

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Introduction

The Indian Himalayan Region serves as a massively diverse biological hotspot (Myers *et al.* 2000). The Himalayas, which stretch over 2,400 km, have a wide range of climatic conditions, spanning subtropical to the boreal zone (Singh & Singh 1987, Rana *et al.* 2021). The Indian Himalayan Region (IHR) encompasses thirteen states and half a million square kilometers of mountainous terrain in India (Uppendra *et al.* 2002). The Himalayan ecology is distinctive, with an incredibly rich variety of ecological resources and biological abundance (Thakur *et al.* 2010). The Himalayas are categorized into Eastern Himalayas, Central or Nepal Himalayas, and Western Himalayas depending on the environmental conditions and geographic location (Sati 2016). With elevations ranging from 300 meters to 6,000 meters, the Western Himalayas cover the Indian states of Himachal Pradesh and Uttarakhand, as well as Jammu and Kashmir (Tewari *et al.* 2017). The Western Himalayas comprise approximately 17% of the total land area of Himachal Pradesh (Kumar *et al.* 2023). The state of Himachal Pradesh is located in the northwest of India. The eastern part of Himachal Pradesh defines the international border between Tibet and India. The state is surrounded by Jammu and Kashmir in the north, Uttarakhand in the southeast, Haryana in the south, and Punjab in the west (Narwade *et al.* 2006). According to Indian State of Forest Report (2021), the state has a total geographical area of 55,673 km². About 68.16% of the state is covered by forested lands amounting to 37,948 km² total area, which is further divided into Reserved Forests, containing 1,883 km² area, Protected Forests (with 12,853 km² area under demarcated protected forests and 16,035 km² area under un-demarcated protected forests) contain about 28,887 km² area in total and other forests covering altogether an area of 7,160 km², including unclassified forests, Shamlats, co-operative forests, charagah and strip forests. The diverse climate of Himachal Pradesh, which ranges between tropical in the lower Himachal to cold in the trans-Himalayan area, is largely responsible for the extreme biodiversity of Himachal Pradesh (Negi *et al.* 2015).

Worldwide, there are about 11,000 different species of birds. BirdLife International (2024) has listed 1,211 bird species that exist in India, demonstrating its great avian diversity. Of the 1,211 bird species, the majority (about 80%) are restricted to the Himalayas (Naithani & Bhatt 2010). In Himachal Pradesh, the Shivalik hill area has the highest avian diversity values, followed by Greater and trans-Himalayan areas (Praveen *et al.* 2016). Avifaunal studies in Himachal Pradesh has a long historical background. Due to the establishment of numerous well-known hill towns, like Dalhousie, Dharamsala, and Kullu, as well as the installation of the British summer capital Shimla, earlier research on the avian fauna of Himachal Pradesh began under the British rule. The oldest reference of the observation on bird species of Himachal Pradesh is attributed to Theobald (1862). Later, a number of field studies were performed by various scientists such as Tytler (1868), Anderson (1889) and Dodsworth (1910, 1913). Field based biological research on the diversity, distribution, abundance and presence of birds in the state has been conducted in recent decades. Mahabal and Mukherjee (1991) studied the bird diversity in Mandi district, Mahabal and Sharma (1992) studied the distribution of birds in Kangra Valley, Thakur *et al.* (2002, 2003, 2006) studied the bird diversity in Chamba, Mandi, and Shimla, Jan Willem den Besten (2004)

reported avifaunal diversity of district Kangra, Mattu and Thakur (2006), Singh *et al.* 2014, Negi *et al.* 2015 studied birds in different region of Himachal Pradesh. Though it has a long history, most of the studies were confined only to certain specific regions of the state. Majority of the state region especially the Greater Himalayan part including the present study area of Daranghati Wildlife Sanctuary has not received the attention of field biologists due to its tough terrain, less communication network, and harsh climate. Hence the present study was undertaken with an aim to elucidate the biodiversity, unique species assemblage with special reference to avian diversity of the area

Materials and Methods

Present research has been conducted in Daranghati Wildlife Sanctuary, situated between 31.3917° N, 77.803° E, in Shimla district of Himachal Pradesh, India. The sanctuary is surrounded by the Rampur, Rohru, and Kinnaur Territorial Forest Divisions. The area was used as a hunting reserve by the Rampur Bushahr royal family. It was declared a sanctuary in March 1962 and then re-notified on March 27, 1974 (*Figure 1*). Daranghati Wildlife Sanctuary I and II are the two non-contiguous parts that comprise the sanctuary. Together,

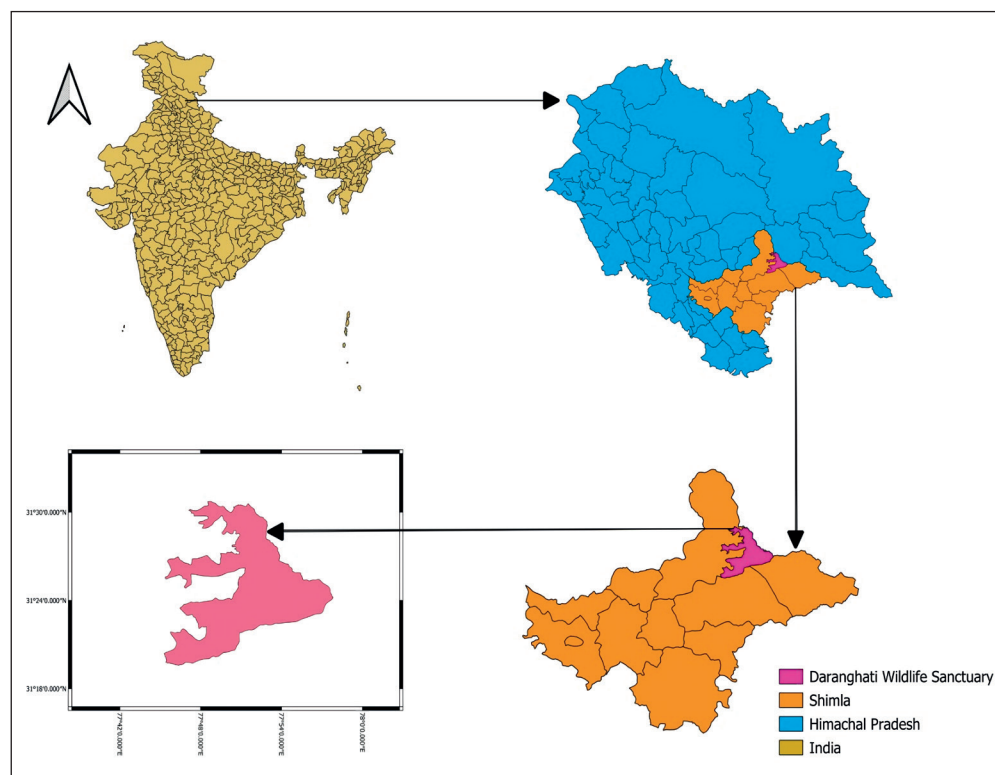


Figure 1. A map showing Daranghati Wildlife Sanctuary, Shimla, Himachal Pradesh, India
 1. ábra A Daranghati Wildlife Sanctuary térképe (indiai Himachal Pradesh állam Shimla kerület)

the two sections cover a 171.50 km² area. The two sections of the sanctuary are located on either side of the Dhauladhar Range. The altitude varies from 2,155 m (Nogli Gad upstream point) to 5,400 m (Hans Beshan peak follows the district boundary of Shimla and Kinnaur). The sanctuary is dominated by cool summers and harsh winters, temperatures varying from –8 °C in winter to 28 °C in summer. The average annual rainfall ranges from 625 to 900 mm, with intense monsoon rains from July to September and regular snowfall from December to March (Pandey 1990). The Daranghati Wildlife Sanctuary is divided into nine administrative units (Department of Forest, Govt. of Himachal Pradesh). In terms of vegetation, the Sanctuary is classified into a diverse range of forest and alpine meadows. The sanctuary has five kinds of forests: moist cedar forest, western mixed coniferous forest, moist temperate deciduous forest, oak forest and West Himalayan sub-alpine forests (Pandey 1990). The lower altitudes are dominated by mixed oak and coniferous trees, while the higher elevations feature alpine scrubs, dwarf junipers and grasslands.

The present study area of Daranghati Wildlife Sanctuary has been explored from December 2023 to May 2024 in various locations of the sanctuary. Six out of a total of nine administrative units, namely Sarahan, Runpu, Bajwa, Munish, Kasha, and Pat were explored in the present study. The surveys were conducted at the altitudinal gradient between 2,155 and 3,100 m during 3 seasons, winter (December 2023–March 2024), spring (April 2024), and summer (May 2024). Because the research area is situated in tough terrain and difficult to reach, most of the areas were explored by walking. The stratified random sample approach was used to study birds (Snedecore & Cochran 1967). During the survey, the line transect method was also used for the estimation of avian diversity which is based on the principle of walking along the specified path to record the birds on and near the line (Burnham *et al.* 1980). Also, these transect were observed as open width transect, meaning that birds were observed along the transect regardless of how far away they were from it (Mehta *et al.* 2002). During the survey, the line transect of 500 m to 1 km were selected in the aforementioned 6 areas. The transect was covered by walking slowly along the length periodically standing at random points to observe the birds all around as far as visibility permits. The line transects were also set along different altitudinal gradients extending from 2,150 m to 3,100 m above sea level. During the survey, five to six random transects were drawn in each covered area.

The study focused on various habitat types, such as woods and streams, located throughout the sanctuary at different altitudes. Birds were observed in the early morning and late evening, as the birds reach their peak activity within a couple of hours after sunrise or before nightfall (Negi *et al.* 2015). Nikon (10x40) fieldwork binoculars were used for observation. In order to verify the identifications, images of the birds were captured using a Nikon DSLR D90 equipped with a 70–300 mm telephoto lens. Birds were identified in the field using various field guides (Ali & Ripley 1983, Grimmett *et al.* 1999) and re-verified by bird database application (Merlin Bird ID by Cornell Lab version 3.0.3 (800–2023.0)). Birds were classified by the following Avibase – The World Bird Database (Lepage 2024). Feeding guild was assessed as per Ali and Ripley (1968 to 1999). The IUCN Red List was referred to examine the conservation status as well as population trends of the reported species (IUCN 2024). Data collected from several habitat categories in the study area was analyzed for

relative abundance based on frequency of encounters (McKinnon & Philips 1993). Different categories assigned based on data were Very Common (80–100% sightings), Common (50–80% sightings), Uncommon (6–50% sightings), and Scarce/Rare (1–5% sightings).

Results and Discussion

This study on the avifaunal diversity of the Daranghati Wildlife Sanctuary in the Shimla districts of Himachal Pradesh revealed the presence of 76 species of birds, distributed over 59 genera, 32 families, and 11 orders. The Passeriformes, with 21 families was the most species-rich order in this sanctuary, followed by Piciformes containing two families. The rest of nine orders namely Galliformes, Apodiformes, Cuculiformes, Columbiformes, Accipitriformes, Strigiformes, Bucerotiformes, Falconiformes and Psittaciformes were present with a single family each (Table 1).

The Muscicapidae family, including 12 species, was the largest family in this sanctuary. The results substantiate the fact that the family Muscicapidae, is the largest bird family in India and Himachal Pradesh (Singh *et al.* 2014, Negi *et al.* 2015). The second largest family was Fringillidae harbouring six species, closely followed by Phasianidae and Paridae with five species each. The families Corvidae, Phylloscopidae and Leiotrichidae, contain four species each, while the families Accipitridae, Picidae, Turdidae and Motacillidae were represented by three species each. The families Columbidae, Pycnonotidae and Passeridae were represented by two species each. The rest of eighteen families, such as, Apodidae, Cuculidae, Strigidae, Upupidae, Ramphastidae, Falconidae, Psittaculidae, Campephagidae, Dicruridae, Stenostiridae, Aegithalidae, Cisticolidae, Certhiidae, Sturnidae, Cinclidae, Nectariniidae, Prunellidae, and Emberizidae were present in area with single species each (Table 1).

Analysis of data on relative abundance showed that of the 76 species recorded, 22 species (28.95%) were very common, 25 species (32.90%) were common, 21 species (27.63%) were uncommon, and 8 species (10.52%) were rare to the sanctuary (Table 1, Figure 2). Among 76 bird species, eight species were found to be rare and observed only once during survey. These rare species included Common Swift (*Apus apus*), Oriental Honey-buzzard (*Pernis ptilorhynchus*), Rufous-bellied Woodpecker (*Dendrocopos hyperythrus*), Rufous-naped Tit (*Periparus rufonuchalis*), Dusky Warbler (*Phylloscopus fuscatus*), Alpine Accentor (*Prunella collaris*), Tree Pipit (*Anthus trivialis*), Himalayan Beautiful Rosefinch (*Carpodacus pulcherrimus*).

The feeding guild assessment shows a wide variety of diet strategies among the species present in the study area. Analysis of data showed that of the 76 species recorded, 12 species (15.78%) were omnivores, 19 species (25%) were insectivores, 2 (2.63%) species were carnivores, 2 species (2.63%) were granivores and 41 species (53.94%) showed a mixed feeding guild (Table 1, Figure 3). Analysis of data shows that about 70% of species have wide feeding guild while remaining 30% have restricted and narrow feeding guild.

Worldwide, IUCN assessed population trend of reported avifauna in Daranghati Wildlife Sanctuary was increasing for 4 bird species, decreasing for 21 species, stable for

Table 1. List of avian fauna recorded in Daranghati Wildlife Sanctuary, Shimla, Himachal Pradesh (India)

1. táblázat A Daranghati Wildlife Sanctuary-ban felmért madárfajok listája (India, Himachal Pradesh állam Shimla kerület)

S. no.	Common Name	Scientific Name	Abundance Status	Feeding Guild	IUCN Status	Population Trend
Order Galliformes						
Family Phasianidae						
1	Hill Partridge	<i>Arborophila torqueola</i>	UC	G,I	LC	STABLE
2	Western Tragopan	<i>Tragopan melanocephalus</i>	UC	O	VU, LD	DECREASING
3	Himalayan Monal	<i>Lophophorus impejanus</i>	UC	O	LC, MD	DECREASING
4	Koklass Pheasant	<i>Pucrasia macrolopha</i>	C	O	LC	DECREASING
5	Kalij Pheasant	<i>Lophura leucomelanos</i>	VC	O	LC	DECREASING
Order Apodiformes						
Family Apodidae						
6	Common Swift	<i>Apus apus</i>	R	I	LC	STABLE
Order Cuculiformes						
Family Cuculidae						
7	Common Cuckoo	<i>Cuculus canorus</i>	VC	I	LC	DECREASING
Order Columbiformes						
Family Columbidae						
8	Snow Pigeon	<i>Columba leuconota</i>	UC	G,F	LC	STABLE
9	Oriental Turtle Dove	<i>Streptopelia orientalis</i>	C	G	LC	STABLE
Order Accipitriformes						
Family Accipitridae						
10	Oriental Honey Buzzard	<i>Pernis ptilorhynchus</i>	R	I	LC	DECREASING
11	Himalayan Griffon	<i>Gyps himalayensis</i>	C	C	NT	DECREASING
12	Black Kite	<i>Milvus migrans</i>	UC	C	LC	STABLE
Order Strigiformes						
Family Strigidae						
13	Asian Barred Owlet	<i>Glaucidium cuculoides</i>	VC	C, I	LC	INCREASING
Order Bucerotiformes						
Family Upupidae						
14	Eurasian Hoopoe	<i>Upupa epops</i>	C	I	LC	DECREASING
Order Piciformes						
Family Ramphastidae						
15	Great Barbet	<i>Psilopogon virens</i>	VC	F, I	LC	DECREASING
Family Picidae						
16	Rufous-bellied Woodpecker	<i>Dendrocopos hyperythrus</i>	R	I,F, G	LC	DECREASING

S. no.	Common Name	Scientific Name	Abundance Status	Feeding Guild	IUCN Status	Population Trend
17	Himalayan Woodpecker	<i>Dendrocopos himalayensis</i>	VC	I, F,G	LC	STABLE
18	Scaly-bellied Woodpecker	<i>Picus squamatus</i>	C	I,F,G	LC	STABLE
Order Falconiformes						
Family Falconidae						
19	Eurasian Kestrel	<i>Falco tinnunculus</i>	UC	I,C	LC	DECREASING
Order Psittaciformes						
Family Psittaculidae						
20	Slaty-headed Parakeet	<i>Psittacula himalayana</i>	VC	F, H, G	LC	STABLE
Order Passeriformes						
Family Campephagidae						
21	Long-tailed Minivet	<i>Pericrocotus ethologus</i>	C	I	LC	DECREASING
Family Dicruridae						
22	Ashy Drongo	<i>Dicrurus leucophaeus</i>	C	I	LC	UNKNOWN
Family Corvidae						
23	Yellow-billed Blue Magpie	<i>Urocissa flavirostris</i>	VC	C,I	LC	STABLE
24	Red-billed Blue Magpie	<i>Urocissa erythroryncha</i>	VC	C,I	LC	STABLE
25	Northern Nutcracker	<i>Nucifraga caryocatactes</i>	C	O	LC	DECREASING
26	Large-billed Crow	<i>Corvus macrorhynchos</i>	VC	O	LC	STABLE
Family Stenostiridae						
27	Grey-headed Canary Flycatcher	<i>Culicicapa ceylonensis</i>	C	I	LC	STABLE
Family Paridae						
28	Rufous-naped Tit	<i>Periparus rufonuchalis</i>	R	O	LC	STABLE
29	Rufous-vented Tit	<i>Periparus rubidiventris beavani</i>	UC	I, C, S	LC	STABLE
30	Coal Tit	<i>Periparus ater</i>	VC	I	LC	DECREASING
31	Green-backed Tit	<i>Parus monticolus</i>	VC	I,F,H	LC	STABLE
32	Indian Yellow Tit	<i>Machlolophus aplonotus</i>	UC	I,F,C	LC	STABLE
Family Pycnonotidae						
33	Black Bulbul	<i>Hypsipetes leucocephalus</i>	C	G,F,I	LC	STABLE
34	Himalayan Bulbul	<i>Pycnonotus leucogenys</i>	VC	G,F,I	LC	INCREASING
Family Aegithalidae						
35	Black-throated Tit	<i>Aegithalos concinnus</i>	VC	G,F,I	LC	STABLE
Family Phylloscopidae						
36	Buff-barred Warbler	<i>Phylloscopus pulcher</i>	UC	I	LC	STABLE
37	Dusky Warbler	<i>Phylloscopus fuscatus</i>	R	I	LC	STABLE
38	Lemon-rumped Warbler	<i>Phylloscopus chloronotus</i>	C	I	LC	STABLE
39	Grey-hooded Warbler	<i>Phylloscopus xanthoschistos</i>	C	I	LC	STABLE

S. no.	Common Name	Scientific Name	Abundance Status	Feeding Guild	IUCN Status	Population Trend
Family Cisticolidae						
40	Himalayan Prinia	<i>Prinia crinigera</i>	UC	I,C,G	LC	STABLE
Family Leiothrichidae						
41	Striated Laughingthrush	<i>Grammatoptila striata</i>	UC	I,F,G	LC	DECREASING
42	Streaked Laughingthrush	<i>Trochalopteron lineatum</i>	VC	I,F,G	LC	STABLE
43	Variegated Laughingthrush	<i>Trochalopteron variegatum</i>	VC	I,F,G	LC	DECREASING
44	Rufous Sibia	<i>Heterophasia capistrata capistrata</i>	C	F,I	LC	UNKNOWN
Family Certhiidae						
45	Bar-tailed Treecreeper	<i>Certhia himalayana</i>	C	I	LC	DECREASING
Family Sturnidae						
46	Common Myna	<i>Acridotheres tristis</i>	VC	G, F, I	LC	INCREASING
Family Turdidae						
47	Mistle Thrush	<i>Turdus viscivorus</i>	UC	I,F	LC	DECREASING
48	Tickell's Thrush	<i>Turdus unicolor</i>	C	I, C	LC	UNKNOWN
49	White-collared Blackbird	<i>Turdus albocinctus</i>	C	O	LC	UNKNOWN
Family Muscicapidae						
50	Oriental Magpie Robin	<i>Copsychus saularis</i>	UC	O	LC	STABLE
51	Rufous-bellied Niltava	<i>Niltava sundara</i>	UC	I,F	LC	STABLE
52	Verditer Flycatcher	<i>Eumyias thalassinus</i>	C	I	LC	STABLE
53	Little Forktail	<i>Enicurus scouleri</i>	UC	AqI	LC	STABLE
54	Spotted Forktail	<i>Enicurus maculatus</i>	C	I,C	LC	STABLE
55	Blue Whistling Thrush	<i>Myophonus caeruleus</i>	VC	O	LC	UNKNOWN
56	Ultramarine Flycatcher	<i>Ficedula superciliaris</i>	UC	I	LC	STABLE
57	Blue-capped Redstart	<i>Phoenicurus coeruleocephala</i>	UC	I	LC	STABLE
58	Plumbeous Water Redstart	<i>Phoenicurus fuliginosus</i>	C	AqI	LC	STABLE
59	White-capped Redstart	<i>Phoenicurus leucocephalus</i>	C	O	LC	STABLE
60	Blue-capped Rock Thrush	<i>Monticola cinclorhyncha</i>	C	O	LC	STABLE
61	Grey Bushchat	<i>Saxicola ferreus</i>	VC	I,C	LC	STABLE
Family Cinclidae						
62	Brown Dipper	<i>Cinclus pallasii pallasii</i>	UC	I,C	LC	STABLE
Family Nectariniidae						
63	Gould's Sunbird	<i>Aethopyga gouldiae</i>	UC	N,I,C	LC	STABLE
Family Passeridae						
64	Russet Sparrow	<i>Passer cinnamomeus</i>	VC	I,G,F	LC	STABLE
65	House Sparrow	<i>Passer domesticus</i>	VC	G,I	LC	DECREASING

S. no.	Common Name	Scientific Name	Abundance Status	Feeding Guild	IUCN Status	Population Trend
Family Prunellidae						
66	Alpine Accentor	<i>Prunella collaris</i>	R	I,G	LC	STABLE
Family Motacillidae						
67	Gray Wagtail	<i>Motacilla cinerea</i>	C	I,C	LC	STABLE
68	Tree Pipit	<i>Anthus trivialis</i>	R	I,G	LC	DECREASING
69	Upland Pipit	<i>Anthus sylvanus</i>	UC	I	LC	STABLE
Family Fringillidae						
70	Black-and-yellow Grosbeak	<i>Mycerobas icteroides</i>	UC	F,G	LC	STABLE
71	Plain Mountain Finch	<i>Leucosticte nemoricola</i>	C	G	LC	STABLE
72	Red-headed Bullfinch	<i>Pyrrhula erythrocephala</i>	VC	H,N,F	LC	STABLE
73	Common Rosefinch	<i>Carpodacus erythrinus</i>	C	F,G	LC	DECREASING
74	Himalayan beautiful Rosefinch	<i>Carpodacus pulcherrimus</i>	R	F,G	LC	STABLE
75	Pink-browed Rosefinch	<i>Carpodacus rodochroa</i>	C	F,G	LC	STABLE
Family Emberizidae						
76	Rock Bunting	<i>Emberiza cia</i>	VC	G,I	LC	INCREASING

Abbreviations

F – Frugivore; G – Granivore; O – Omnivore; N – Nectarivore; H – Herbivore; I – Insectivore; Aql – Aquatic Insectivore; C – Carnivore; LC – Least Concern; NT – Near Threatened; VU – Vulnerable; LD – Largely Depleted; MD – Moderately Depleted

Rövidítések

F – Gyümölcssevő; G – Magevő; O – Mindenevő; N – Nektárevő; H – Növényevő; I – Rovarevő; Aql – Vízirovar fogyasztó; C – Ragadozó; LC – Nem fenyegetett; NT – Mérsékelten fenyegetett; VU – Sebezhető; LD – Széleskörben lecsökkent; MD – Mérsékelten lecsökkent

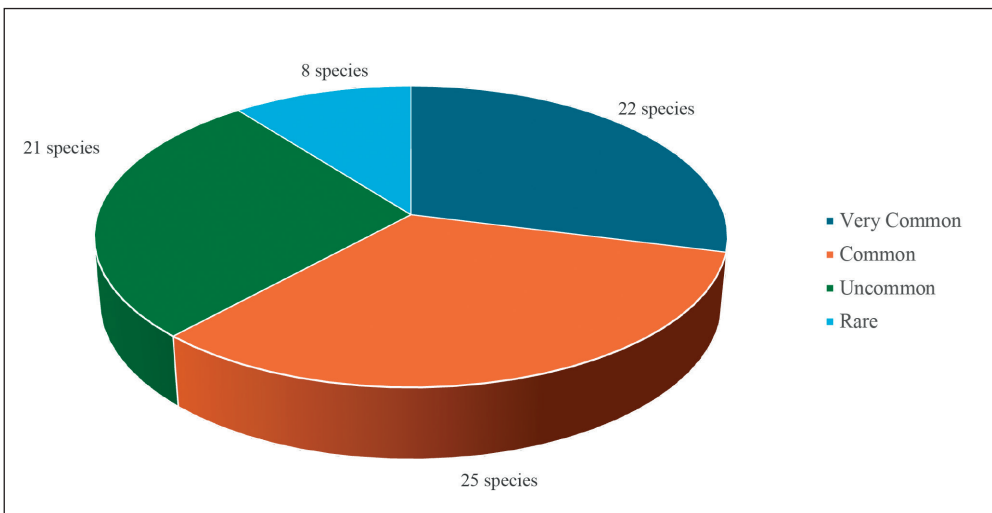


Figure 2. A pie chart representing the abundance status of recorded bird species

2. ábra A madárfajok megoszlása az egyes gyakoriság kategóriákban

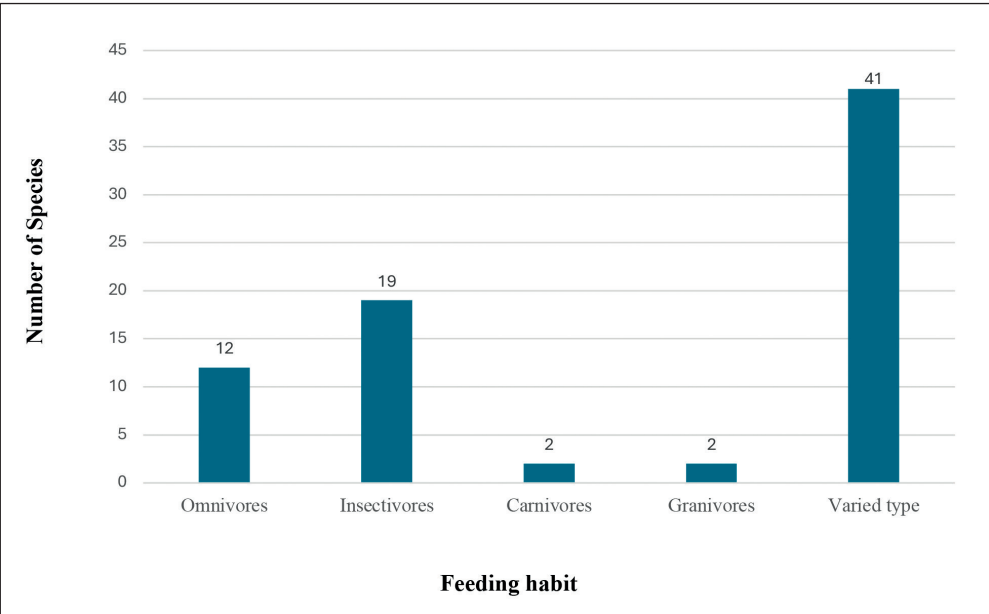


Figure 3. A column graph representing the feeding guild for recorded bird species
3. ábra A feljegyzett madárfajok táplálkozási guildek szerinti száma

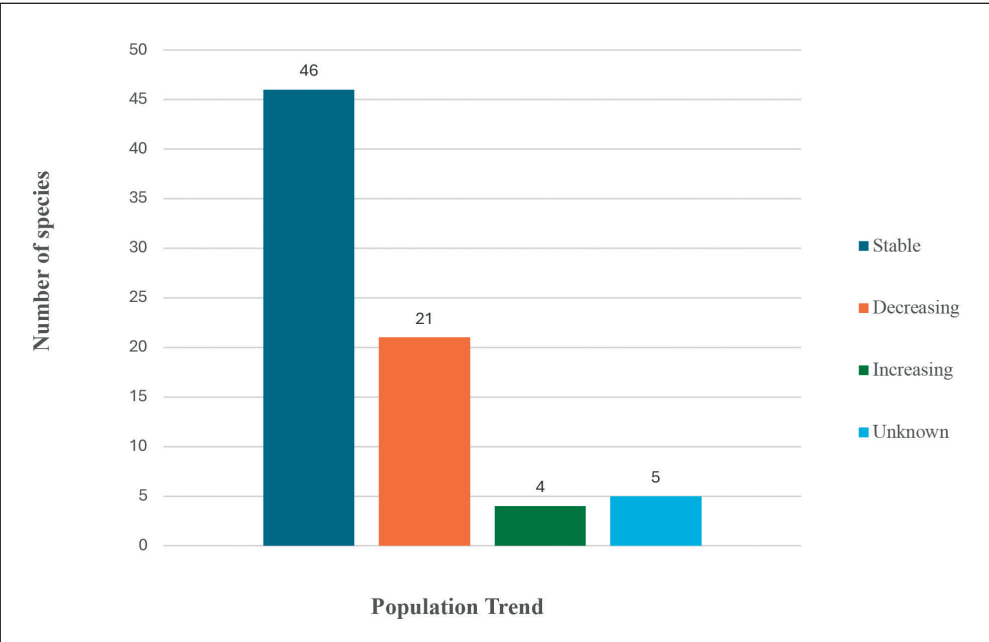


Figure 4. A column graph representing the population trend for recorded bird species
4. ábra A feljegyzett madárfajok száma populációs trendjeik alapján

46 bird species, and unknown for 5 bird species (Table 1, Figure 4). The species with a decreasing population trend worldwide reported in this sanctuary are Western Tragopan (*Tragopan melanocephalus*), Himalayan Monal (*Lophophorus impejanus*), Koklass Pheasant (*Pucrasia macrolopha*), Kalij Pheasant (*Lophura leucomelanos*), Common Cuckoo (*Cuculus canorus*), Oriental Honey-buzzard (*Pernis ptilorhynchus*), Himalayan Griffon (*Gyps himalayensis*), Eurasian Hoopoe (*Upupa epops*), Great Barbet (*Psilopogon virens*), Rufous-bellied Woodpecker (*Dendrocopos hyperythrus*), Eurasian Kestrel (*Falco tinnunculus*), Long-tailed Minivet (*Pericrocotus ethologus*), Northern Nutcracker (*Nucifraga caryocatactes*), Coal Tit (*Parus ater*), Striated Laughingthrush (*Grammatoptila striata*), Variegated Laughingthrush (*Trochalopteron variegatum*), Bar-tailed Tree-Creeper (*Certhia himalayana*), Mistle Thrush (*Turdus viscivorus*), House Sparrow (*Passer domesticus*), Tree Pipit (*Anthus trivialis*) and Common Rosefinch (*Carpodacus erythrinus*). The sanctuary is home to species of key conservation values. The Western Tragopan, which is found in the study area, has been assigned the status of vulnerable by IUCN Red List. In addition, the Himalayan Griffon Vulture is classified into the near threatened category which is commonly found in the study area.

The study area is witnessing increased anthropogenic activities which may lead to habitat destruction, fragmentation, degradation and over-exploitation, which will have a direct effect on its biodiversity values including avian diversity. The sanctuary provides shelter to threatened birds species as well as is home to 21 bird species with a global decreasing population trends. These facts highlight the importance of the study area for the conservation of avifauna in the region.

Bird composition and diversity can be influenced by vegetation structure, foraging substrates, and the availability and abundance of food (MacArthur & MacArthur 1961). Around 30% of the species have a very narrow and restricted feeding guild, indicating that they are precariously surviving on limited food supply. Since the sanctuary is located in a region of harsh and fragile climatic conditions and is home to rare and threatened species, therefore, further scientific studies and conservation planning are required to preserve these valuable species. The current study brings to light an initial checklist of avifaunal diversity in the sanctuary and will serve as a baseline reference for future research on avifauna and biodiversity of Daranghati Wildlife Sanctuary.

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