Uttar Pradesh Journal of Zoology

Volume 44, Issue 22, Page 331-341, 2023; Article no.UPJOZ.2973
ISSN: 0256-971X (P)

Checklist of Birds in Majathal Wildlife Sanctuary, Solan, Himachal Pradesh, India

Navneet Kaur [a*], Harinder Singh Banyal [a] and Jyoti Thakur [a]

[a] *Department of Biosciences, Himachal Pradesh University, Shimla (171005). India.*

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.56557/UPJOZ/2023/v44i223750

Editor(s):
(1) Prof. Aurora Martínez Romero, Juarez University, Mexico.
Reviewers:
(1) Hameem, Central University of Kashmir, India.
(2) Chairil Anwar Siregar, National Institute of Research and Innovation (BRIN) Indonesia, Indonesia.

Original Research Article

Received: 03/09/2023
Accepted: 05/11/2023
Published: 10/11/2023

ABSTRACT

The present work covers the avifaunal diversity documented from February to July 2023 from the Majathal Wildlife Sanctuary, Himachal Pradesh, India. A total of 66 bird species belonging to 8 orders and 35 families were recorded. The Passeriformes order was the most diverse and abundant with 80% families and 305 individuals. The analysis of IUCN conservation status conveys the presence of 1 vulnerable species (VU), 1 near-threatened (NT), and 64 Least Concern (LC). The 44 species were observed from the harsang bhajji beat, 34 species were reported from the chandi beat, 26 species were surveyed from the Kangri beat, and 15 species from the matrech beat. The richness of bird life in the sanctuary is due to its location in a transitional zone, where it accommodates both low-elevation and high-elevation bird species. This sanctuary is home to vulnerable Cheer Pheasant (*Catreus wallichii*) and near-threatened Griffon Vulture (*Gyps himalayensis*). But Various factors, including climate change, fire, and habitat degradation, have been observed to affect the composition of bird species in the sanctuary. Therefore, the preservation of habitats effectively demands the implementation of management techniques.

**Corresponding author: Email: navneetkaurs1998@gmail.com;*

Keywords: Avifaunal diversity; Majathal Wildlife Sanctuary; Himachal Pradesh; Transitional Zone.

1. INTRODUCTION

Himalayas universally recognized as a significant biodiversity hotspot [1] accounting for nearly 13% of India's land area and sustains a diverse array of vegetation, spanning from tropical to alpine ecosystems [2]. It is divided into distinct biogeographical zones, including the north-western, western, central, eastern, and trans-Himalayan regions [3,4]. Among these, the western Himalayas stand out as a crucial area with unique species found only in this region, leading Birdlife International [5] to designate it as an Endemic Bird Area.

India is home to 1,346 of the 10,357 bird species found worldwide, comprising 21 orders, 88 families, and 432 genera [6-9]. Out of 1,346 species, 604 species were reported from Himachal Pradesh, belonging to 20 orders and 81 families [10]. Himachal Pradesh comes under Western Himalaya, known for high diversity of bird species due to different climatic and physiographic factors. The habitats include rivers, streams, lakes, marshy areas, dense and scrub forests, grasslands and high elevation meadows, glaciers, cultivated areas and coniferous slopes [11].

Birds play a critical role in assessing biodiversity and ecosystem health. Analysing avian diversity across various habitats is crucial for comprehending community structure, niche relationships, and highlighting the importance of local landscapes in avian conservation efforts. The avifaunal population of the region is prone to climate change, causing shifts in nesting, breeding and migration as to obtain optimum resources necessary for their survival. [12,13].

Study Area: The Majathal Wildlife Sanctuary is situated within the Shiwalik Range and falls within the geographical coordinates of latitude 31°15´00" N - 31°18"45" N and longitude 76°56´45" E - 77°02´18" E. It encompasses an area of approximately 30.86 sq. km [14] and is located in the Solan and Shimla districts of Himachal Pradesh (Fig. 1) [15,16]. This sanctuary is divided into four sections known as beats, namely Harsang Bhajji, Chandi, Kangri, and Matrech. The elevation within the study area ranges from 575 meters to 1975 meters above sea level.

The climate in the MWLS characterized by cold winters with temperatures dropping to as low as 1°C and hot summers with maximum temperatures reaching 40°C. Rainfall patterns follow the monsoon season, concentrated between July and September, with average annual rainfall is 1000mm [17,18].

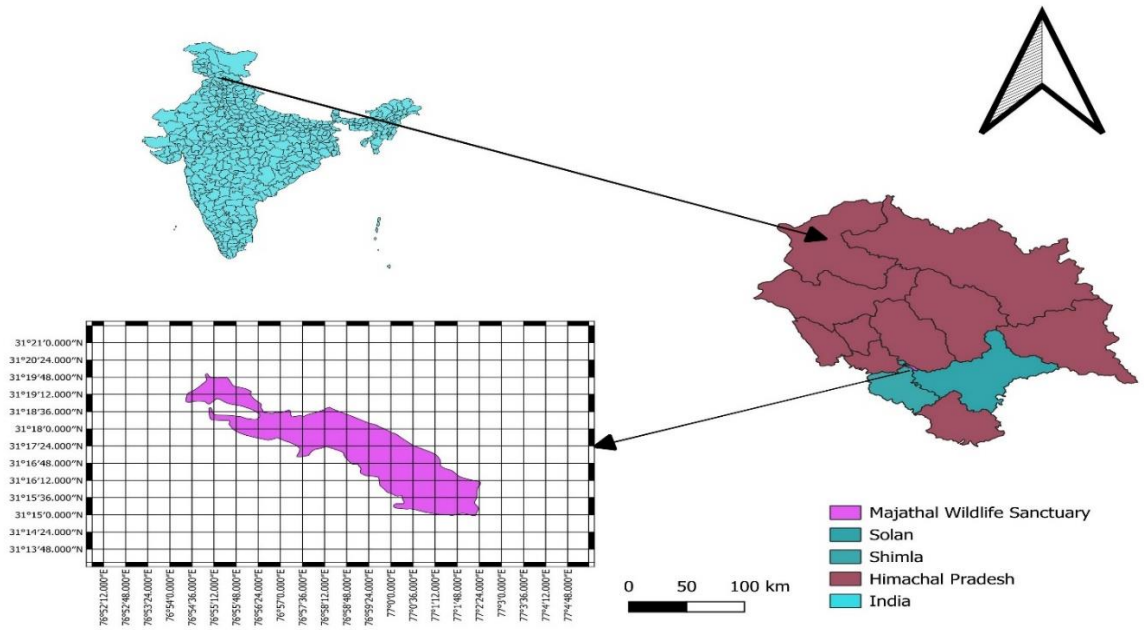


Fig. 1. Map showing Majathal Wildlife Sanctuary, Solan, Himachal Pradesh

The slopes of the sanctuary are sparsely covered with vegetation, predominantly featuring Chir Pine (*Pinus roxburghii*), Ban Oak (*Quercus leucotrichophora*), and Deodar (*Cedar deodar*), interspersed with grassy tracts.

This sanctuary serves as a habitat for globally significant wildlife species such as the Cheer pheasant (*Catreus wallichii*), Leopard (*Panthera pardus*), Black Bear (*Ursus thibetanus*), and Barking deer (*Muntiacus muntjac*).

2. METHODOLOGY

The present survey was conducted from February, 2023 to July, 2023 to analyse avian diversity in Majathal Wildlife Sanctuary. Line transect of 3-4 km in every beat and Point Count method were used to assess the species diversity of birds in the area [19,20]. The birds were observed during dawn and dusk. A Nikon Coolpix P1000 camera was used to capture the birds and Nikon Aculon binoculars (8×42) was used to observe birds. The coordinates were taken with the help of Google earth pro application. The identification of avifauna was based on standardized books and field guides [6,21-23] along with verified avian database [24].

3. RESULTS AND DISCUSSION

The current study of avifaunal diversity in MWLS provided the presence of 66 species belonging to 8 orders and 35 families in a period of six months (February-July). The Passeriformes order was the most diverse and abundant with 80% families and 305 individuals (Fig. 2). The least abundant order was Accipitriformes with 2% families and 5 individuals and Cuculiformes with 3% families and 2 individuals (Fig. 2). The analysis of IUCN conservation status conveys the presence of 1 vulnerable species (VU), 1 near-threatened (NT) and 64 Least Concern (LC) and Indian Wildlife Protection Act, 1972 conservation status show the presence of 3 species under the Schedule IV and 63 species under the Schedule I (Part III). According to the Red Data List, the global population trend indicates that 37 species were classified as stable, 18 species were categorized as decreasing, 9 species were categorized as increasing and 2 species were listed as unknown (Table 1).

The present study reveals the avifaunal diversity in different beats of MWLS. The four beats of the sanctuary indicate different species of birds, 44 species were observed in the harsang bhajji beat, 34 species were reported from the chandi beat, 26 species were surveyed from the Kangri beat, and 15 species from Matrech beat (Table 1). The high avian diversity found in the harsang bhajji beat is due to the presence of the Sutluj catchment area and thus the diversity differs from the high-elevation area of the beat. The most dominant birds in the sanctuary, found in good numbers were Plum-headed Parakeet (*Psittacula cyanocephala*), Large-billed Crow (*Corvus macrorhynchos*), and Himalayan Bulbul (*Pycnonotus leucogenys*). This sanctuary is home to vulnerable Cheer Pheasant (*Catreus wallichii*) and near-threatened Griffon Vulture (*Gyps himalayensis*).

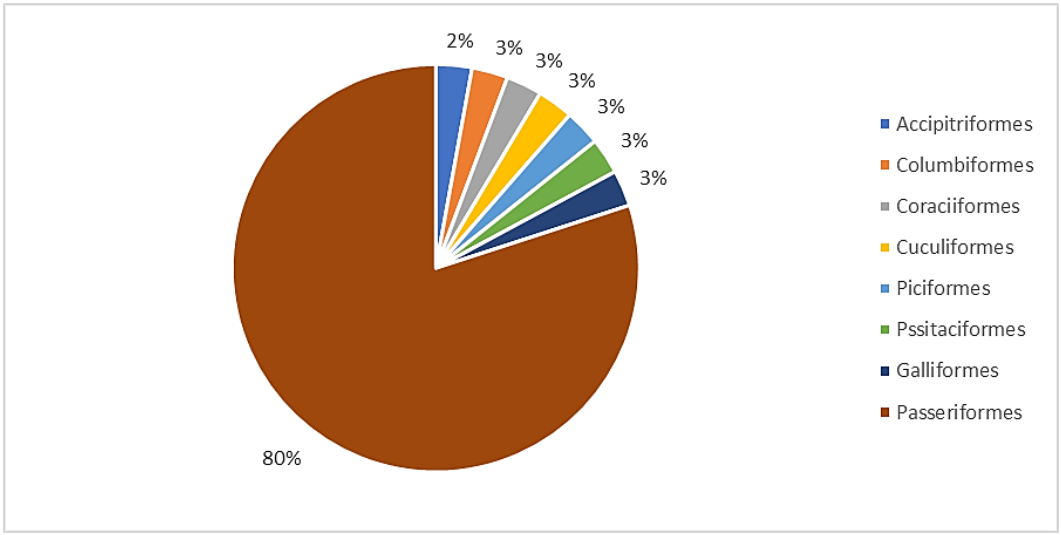


Fig. 2. Representing orders and percentage of families

Table 1. A systematic list of avian species found in Majathal Wildlife Sanctuary

Sr. No.	Scientific Name	Common Name	Conservation Status		Population Trend	Number of Individuals	Beats
			IUCN	IWPA			
Order – Accipitriformes							
Family - Accipitridae							
1	*Gyps himalayensis* (Hume, AO 1869)	Himalayan Griffon Vulture	NT	Sch IV	↓	5	HB, CH, KG
Order – Columbiformes							
Family - Columbidae							
2	*Columba livia* (Gmelin, JF 1789)	Rock Dove	LC	Sch IV	↓	10	HB
3	*Spilopelia chinensis* (Scopoli, 1786)	Spotted Dove	LC	Sch IV	↑	3	HB
4	*Streptopelia decaocto* (Frivaldszky, I 1838)	Eurasian Collared Dove	LC	Sch IV	↑	4	KG
Order – Coraciiforme							
Family – Meropidae							
5	*Merops orientalis* Latham, J 1801	Asian Green Bee Eater	LC	Sch IV	−	4	HB
Order – Cuculiformes							
Family – Cuculidae							
6	*Cuculus canorus* Linnaeus, C 1758	Common Cuckoo	LC	Sch IV	↓	2	HB
Order – Piciformes							
Family – Picidae							
7	*Dendrocoptes auriceps* (Vigors, NA 1831)	Brown-fronted Woodpecker	LC	Sch IV	−	6	HB, CH, KG, MT
8	*Picus squamatus* Vigors, NA 1831	Scaly-bellied Woodpecker	LC	Sch IV	−	2	CH, KG
Order – Psittaciformes							
Family – Psittaculidae							
10	*Pssittacula cyanocephala* (Linnaeus, C 1766)	Plum-headed Parakeet	LC	Sch IV	↓	15	HB, CH, KG, MT
Order – Galliformes							
Family – Phasianidae							
11	*Lophura leucomelanos* (Latham, J 1790)	Kaleej Pheasant	LC	Sch I (Part III)	↓	7	HB, CH
12	*Gallus gallus* (Linnaeus, C 1758)	Red Junglefowl	LC	Sch IV	↓	5	CH
13	*Pavo cristatus* (Linnaeus, C 1758)	Indian Peafowl	LC	Sch I (Part III)	−	9	HB, CH
14	*Francolinus francolinus* (Linnaeus, C 1766)	Black Francolin	LC	Sch IV	−	3	HB, CH
15	*Catreus wallichii* (Hardwicke, T 1827)	Cheer Pheasant	VU	Sch I (Part III)	↓	1	HB
Order – Passeriformes							
Family - Corvidae							

Sr. No.	Scientific Name	Common Name	Conservation Status		Population Trend	Number of Individuals	Beats
			IUCN	IWPA			
16	*Corvus macrorhynchos* (Wagler, JG 1827)	Large-billed Crow	LC	Sch IV	−	30	HB, CH, KG, MT
17	*Urocissa erythroryncha* (Boddaert, P 1783)	Red-billed Blue Magpie	LC	Sch IV	−	9	HB, CH, KG, MT
18	*Dendrocitta formosae* Swinhoe, R 1863	Grey Treepie	LC	Sch IV	↓	6	CH, KG, MT
19	*Garrulus lanceolatus* Vigors, NA 1830	Black-headed Jay	LC	Sch IV	−	4	HB, CH
Family – Passeridae							
20	*Passer domesticus* (Linnaeus, C 1758)	House Sparrow	LC	Sch IV	↓	9	HB, CH, KG, MT
21	*Passer cinnamomeus* (Gould, J 1836)	Russet Sparrow	LC	Sch IV	−	10	HB, CH
Family – Aegithalidae							
22	*Aegithalos concinnus* (Gould, J 1855)	Black-throated Bushtit	LC	Sch IV	−	7	HB, CH, KG
Family – Pycnonotidae							
23	*Pycnonotus leucogenys* (Gray, JE 1835)	Himalayan Bulbul	LC	Sch IV	↑	20	HB, CH, KG, MT
24	*Hypsipetes leucocephalus* (Gmelin, JF 1789)	Black Bulbul	LC	Sch IV	−	9	HB, CH, KG, MT
25	*Pycnonotus cafer* (Linnaeus, C 1766)	Red-vented Bulbul	LC	Sch IV	↑	8	HB
Family – Fringillidae							
26	*Serinus pusillus* (Pallas, 1811)	Fire-fronted Serin	LC	Sch IV	↑	10	HB, CH, MT
27	*Caprodacus erythrinus*	Common Rosefinch	LC	Sch IV	↓	6	HB, CH
Family – Muscicapidae							
28	*Phoenicurus coeruleocephalus* (Vigors, NA 1831)	Blue-capped Redstart	LC	Sch IV	−	4	HB
29	*Saxicola torquata* (Pallas, PS 1773)	Common Stonechat	LC	Sch IV	−	3	CH
30	*Myophonus caeruleus*	Blue Whistling Thrush	LC	Sch IV	?	10	HB, CH, KG, MT
31	*Saxicola ferreus*	Grey Bush Chat	LC	Sch IV	−	8	HB, CH
32	*Eumyias thalassimus* (Swainson, 1838)	Verditer Flycatcher	LC	Sch IV	−	5	HB, CH, KG, MT
33	*Copsychus fulicata*	Indian Robin	LC	Sch IV	−	5	KG
34	*Copsychus saularis*	Oriental Magpie Robin	LC	Sch IV	−	4	KG
35	*Saxicola caprata*	Pied Bushchat	LC	Sch IV	−	7	CH
Family – Leiothrichidae							
36	*Argya striata* (Dumont, CHF 1823)	Jungle Babbler	LC	Sch IV	−	9	KG
37	*Garrulax lineatus*	Streaked Laughingthrush	LC	Sch IV	−	12	HB
38	*Garrulax leucolophus*	White-crested Laughingthrush	LC	Sch IV	↓	4	HB
Family – Tichodromidae							
39	*Trichoderma muraria* (Linnaeus, C 1766)	Wallcreeper	LC	Sch IV	−	5	KG
Family – Sittidae							
40	*Sitta himalayaensis* (Jardine, W; Selby, PJ 1835)	White-tailed Nuthatch	LC	Sch IV	↓	3	KG

Sr. No.	Scientific Name	Common Name	Conservation Status		Population Trend	Number of Individuals	Beats
			IUCN	IWPA			
Family – Phylloscopidae							
41	*Phylloscopus xanthoschistos* (Gray, JE; Gray, GR 1847)	Grey-hooded Warbler	LC	Sch IV	−	10	HB, CH, KG, MT
42	*Phylloscopus chloronotus* (Gray, JE; Gray, GR 1847)	Lemon-rumped Warbler	LC	Sch IV	−	4	CH
Family – Motacillidae							
43	*Motacilla alba* (Linnaeus, C 1758)	Pied Wagtail	LC	Sch IV	−	3	HB
44	*Anthus sylvanus* (Hodgson, BH 1845	Upland Pipit	LC	Sch IV	−	2	HB
Family – Emberizidae							
45	*Emberiza stewartii* (Blyth, E 1854)	White-capped Bunting	LC	Sch IV	−	4	CH
46	*Emberiza lathami* Gray, JE 1831	Crested Bunting	LC	Sch IV	−	1	HB
Family – Hirundinidae							
47	*Cecropis daurica* (Laxmann, E 1769)	Red-rumped Swallow	LC	Sch IV	↑	7	CH, MT
48	*Hirundo smithii* Leach, W 1818	Wire-tailed Swallow	LC	Sch IV	↑	3	HB
Family – Dicruridae							
49	*Dicrurus leucophalus* Vieillot, LJ 1817	Ashy Drongo	LC	Sch IV	?	6	HB, CH, KG, MT
Family – Nectariniidae							
50	*Cinnyris asiaticus*	Purple Sunbird	LC	Sch IV	−	5	KG
51	*Aethopyga siparaja* (Raffles, TS 1822)	Crimson Sunbird	LC	Sch IV	−	3	HB
Family – Sturnidae							
52	*Acridotheres tristis*	Common Myna	LC	Sch IV	↑	12	HB, CH
Family – Rhipiduridae							
53	*Rhipidura albicolis*	White-throated Fantail	LC	Sch IV	−	4	HB
Family – Megalaimidae							
54	*Megalaima virens*	Great Barbet	LC	Sch IV	↓	6	CH, KG
55	*Psilopogon asiaticus*	Blue throated Barbet	LC	Sch IV	−	3	HB
Family – Prunellidae							
56	*Prunella himalayana*	Altai Accentor	LC	Sch IV	−	8	HB
57	*Prunella strophiata*	Rufous-breasted Accentor	LC	Sch IV	−	2	KG
Family – Certhiidae							
58	*Certhia himalayana*	Bar-tailed Treecreeper	LC	Sch IV	↓	5	KG
Family – Stenostiridae							
59	*Culicicapa ceylonensis*	Grey-headed Canary Flycatcher	LC	Sch IV	−	4	CH, KG
Family – Turdidae							

Sr. No.	Scientific Name	Common Name	Conservation Status		Population Trend	Number of Individuals	Beats
			IUCN	IWPA			
60	*Turdus merula*	Common Blackbird	LC	Sch IV	↑	1	CH
Family – Timaliidae							
61	*Cyanoderma pyrrhops* (Blyth, E 1844)	Black-chinned Babbler	LC	Sch IV	−	4	CH
Family – Zosteropidae							
62	*Zosterops palpebrosus* (Temminck, CJ 1824)	Indian White-eye	LC	Sch IV	↓	1	HB
Family – Cisticolidae							
63	*Prinia crinigera* Hodgson, BH 1836	Himalayan Prinia	LC	Sch IV	−	4	HB, CH, MT
Family – Vangidae							
64	*Hemipus picatus* (Sykes, WH 1832)	Bar winged Flycatcher Shrike	LC	Sch IV	↓	3	HB
Family – Campephagidae							
65	*Pericrocotus ethologus* Bangs, O; Phillips, JC 1914	Long-tailed Minivet	LC	Sch IV	↓	2	HB
Family – Scotocercidae							
66	*Horornis fortipes*	Brown-flanked Bush Warbler	LC	Sch IV	↓	1	HB

IUCN: *International Union for Conservation of Nature,* ***IWPA:*** *Indian Wildlife Protection Act,* ***LC:*** *Least Concern,* ***NT:*** *Near Threatened,* ***VU:*** *Vulnerable,* ***Sch:*** *Schedule,* ***(↑):*** *Increasing,* ***(↓):*** *Decreasing,* ***(−):*** *Stable,* ***(?):*** *Unknown,* ***Beats of the sanctuary: HB:*** *Harsang Bhajji,* ***CH:*** *Chandi,* ***KG:*** *Kangri,* ***MT:*** *Matrech.*

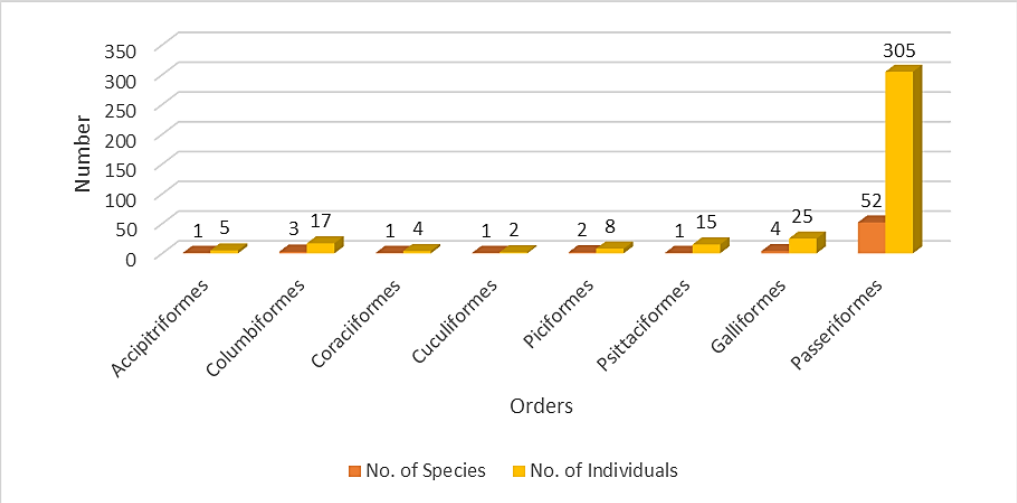


Fig. 3. Representing orders with number of families along with number of individuals

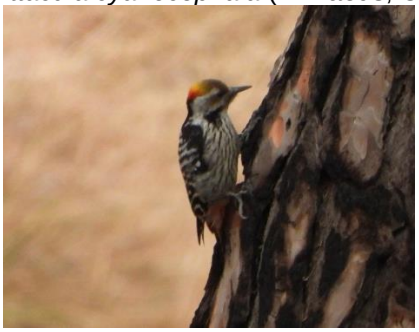
The Majathal Wildlife Sanctuary exhibits a commendable variety of bird species during the observation. The richness in bird life is due to its location in a transitional zone, where it accommodates both low-elevation and high-elevation bird species. Mishra [15] reported 106 bird species from MWLS during his study on Goral in 1996. The Grey-crowned Prinia was observed first time in the sanctuary by Bhardwaj et al. [16].

The study area has undergone different developmental initiatives, including the establishment of a cement plant near the MWLS, forest encroachment, habitat degradation and fragmentation, occurrences of fire, and the influence of climate change. These factors are expected to work together synergistically, amplifying drivers of extinction as presented in other studies [25-26].

Several checklists are available for different national parks and wildlife sanctuaries to understand the assemblage with vegetation cover and variation with habitat diversity [27-36]. Since the wildlife sanctuaries serve as habitats for numerous endangered and threatened categories, it is crucial to develop appropriate management practices to protect the sanctuaries.

Psittacula cyanocephala (Linnaeus, C 1766)

Phoenicurus coeruleocephala (Vigors NA, 1831)



Dendrocoptes auriceps (Vigors NA, 1831)

Trichoderma muraria (Linnaeus, C 1766)

Passer cinnamomeus (Gould, J 1836)

Pavo cristatus (Linnaeus, C 1758)

Plate 1. Glimpses of Avifauna of Majathal Wildlife Sanctuary.

Cecropis daurica (Laxmann, E 1769)

Turdus merula Linnaeus, C 1758

Culicicapa ceylonensis (Swainson, WJ 1820)

Sitta himalayaensis (Jardine W, Selby PJ 1835)

Psilopogon asiaticus (Latham, J 1790)

Garrulus lanceolatus Vigors, NA 1830

Plate 2. Glimpses of Avifauna of Majathal Wildlife Sanctuary

4. CONCLUSION

This study has highlighted the significance of avifaunal diversity within the Majathal Wildlife Sanctuary. Various factors, including climate change, fire, and habitat degradation, have been observed to affect the composition of bird species in the sanctuary. Comprehensive, long-term bird surveys are essential for effective conservation planning and monitoring. They not only help to preserve avian diversity but also safeguard the integrity of the natural landscape by preventing further degradation. The current study delivers benchmark data regarding the composition and abundance of avian species at the regional level. The research conducted in the protected areas not only contributes to our collective human knowledge but also yields valuable information that can aid in the effective management of wildlife sanctuaries and forests, as emphasized in the current paper.

ACKNOWLEDGEMENTS

The authors express their appreciation to the Principal Chief Conservator of Forest (PCCF) Wildlife, the Chief Wildlife Warden (CWW), and the Himachal Pradesh Forest Department for granting permission and invaluable logistical assistance in conducting our research within the Majathal Wildlife Sanctuary in District Solan and Shimla. Furthermore, the authors extend their gratitude to the University Grants Commission (UGC) for providing financial support throughout the fieldwork. Special thanks are also extended to the Chairperson of the Department of Biosciences at Himachal Pradesh University, Shimla, for his support in facilitating the current research work.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Pathak R, Joshi RK. Important birds and biodiversity areas (IBAs) in Indian Himalayan Region (IHR). Birds of Indian Himalayan Region. ENVIS Newsletter Himalayan Ecology. 2018; 15(4):1-2.
2. Mondal K, Bhattacharya K, Chatterjee P, Dey PK, Maheswaran G, Alam I. Aves in Faunal diversity of Indian Himalaya. Zoological Survey of India, Kolkata. 2018; 831-854.
3. Rodger WA, Panwar HSE. Planning a Wildlife Protected Area Network in India. Wildlife Institute of India, Dehradun. 1998; 1&2:341.
4. Rodgers WA, Panwar HS, Mathur VB. Wildlife protected area network in India: A review (Executive Summary). Wildlife Institute of India, Dehradun. 2000;6(4).
5. Bird Life International 2021. Country profile: India. Downloaded from Available:http://www.birdlife.org/datazone/country/India.
6. Ali S, Ripley SD. Handbook of the birds of India and Pakistan. Oxford University Press, New Delhi; 1983.
7. Mahabal A. Aves. In: Fauna of Western Himalaya, Zoological Survey of India, Kolkata. 2005;275-339.
8. Joshi RK, Pathak R, Kapkoti B, Rawal RS, Bhatt ID, Dhyani PP. Diversity of Birds in Surya-Kunj. GBPIHED, KosiKatarmal, Almora, Uttarakhand, INDIA; 2016.
9. Banerjee D, Raghunathan C, Rizvi AN, Das D. Animal Discoveries 2021: New Species and New Records. Zoological survey of India, Kolkata, 2022;1-232.
10. Maheswaran G, Alam I, Dubey V. Aves. In: Fauna of Himachal Pradesh, State Fauna Series. Zoological Survey of India, Kolkata, 2021;26:453-480.
11. Mehta HS, Julka JM. Mountains: Northwest Himalaya. In: Ecosystems of India (The Director editor). Zoological Survey of India, Kolkata. 2022;51-72.
12. Acharya BK, Chettri B. Effect of climate change on birds, herpeto fauna and butterflies in Sikkim Himalaya: a preliminary investigation. In: Arrawatia ML, IUCN; 2017.
13. Thapliyal N. Avifauna of the Chopta-Tungnath, Rudraprayag, Region of Grahwal Himalaya, Uttarakhand. Birds of Indian Himalayan Region (IHR). ENVIS Newsletter Himalayan Ecology. 2018; 15(4):9-10.
14. WIIENVIS. EIACP Programme centre “Wildlife & protected areas management”. National Wildlife Database Centre, Wildlife Institute of India; 2023.
15. Mishra C. Pheasants and other birds of Majathal Harsang Wildlife Sanctuary, Himachal Pradesh, India. Forktail. 1996; 12:1-8.
16. Bhardwaj VK, Kapoor R, Abhinav C. Grey-crowned Prinia *Prinia cinereocapilla* in

Majathal Wildlife Sanctuary: An addition to the avifauna of Himachal Pradesh. Indian Birds. 2022;18(1).
17. Shah JN, Kalsi R, Kaul R, Khan JA. Response of broadcast calls of cheer pheasant *Catreus wallichii* on raptors in Majathal-Harsang Wildlife Sanctuary, Himachal Pradesh, India. Indian Forester. 2015;141(10):1103.
18. Rahmani AR, Islam ZUM, Kasambe RM. Important bird and biodiversity areas in India: Priority sites for conservation. Revised and updated 2nd ed. India: Bombay Natural History Society, Indian Bird Conservation Network, Royal Society for the Protection of Birds, and BirdLife International (UK). 2016;1-2:1–1002.
19. Bibby CJ, Burgess N, Hill D, Mustoe S. Bird Census Techniques. London: Academic Press Limited; 2000.
20. Sutherland WJ. Ecological census techniques: A Handbook. Cambridge University Press, Cambridge; 1996.
21. Ali S. Indian Hill Birds. Oxford University Press, Bombay. 1949;1-188.
22. Arlott N. Birds of India, Pakistan, Nepal, Bhutan, Bangladesh, and Srilanka. Willian Collins Publishers, London. 2015;1-644.
23. Grimmett R, Inskipp C, Inskipp T. Birds of Indian Sub-Continent. Christopher Helm, London. 2014;1-528.
24. IUCN. The IUCN Red list of Threatened Species. Version. 2022;2.
25. Halstead KE, Alexander JD, Hadley AS, Stephens JL, Yang Z, Betts MG. Using a species-centered approach to predict bird community responses to habitat fragmentation. Landscape Ecol. 2019;34: 1919-1935.
26. Driscoll DA, Armenteras D, Bennett AF, Brotons L, Clarke MF, Doherty TS, Haslem A, Kelly LT, Sato, CF, Sitters H, Aquilue N, Bell K, Chadid M, Duane A, Meza-Elizalde MC, Giljohann M, Gonzalez TM, Jambhekar R, Lazzari J, Moran-Ordonez A, Wevill T. How fire interacts with habitat loss and fragmentation. Biological Reviews, Cambridge Philosophical Society. 2021; 96(3):976-998.
27. Gaston AJ, Garson PJ, Pandey S. Birds recorded in Great Himalayan National Park, Himachal Pradesh. Forktail. 1993; 9:45-57.
28. Mahabal A. Birds of Talra Wildlife Sanctuary in Lower Western Himalaya, H.P., with notes on their status and altitudinal movements. Zoos' Print Journal. 2000;15(10):334-338.
29. Thakur ML, Paliwal R, Tak PC, Mehta HS, Mattu VK. Birds of Kalatop-Khajjiar Wildlife Sanctuary, Chamba district, Himachal Pradesh, India. Cheetal. 2002;42(3&4):29-36.
30. Bhargav VK, Uriyal VP, Kittur S, Sivakumar K. Bird Records from Simbalbara Wildlife Sanctuary, Himachal Pradesh. The Indian Forester. 2007;133(10):1411-1418.
31. Narang ML, Naim A, Kumar M. Avian fauna of Chail Wildlife Sanctuary in Himachal Pradesh, Western Himalaya. Indian Journal of Forestry. 2008;31(3):323-327.
32. Negi RK, Thakur ML, Banyal HS. Avifauna of Rakchham-Chhitkul wildlife sanctuary district Kinnaur, Himachal Pradesh, India. Journal of Pharmacy and Biological Sciences. 2015;10(2):18-25.
33. Saklani A, Shree T, Nathani S. Birds of Dhauladhar range of Western Himalayas in Northern India: A checklist. International Journal of Zoology Studies. 2018;3(2):41-45.
34. Tak PC, Paliwal R. Fauna of Pin valley National Park. Conservation area Series. 2008;34:97-136.
35. Sharief A, Paliwal S, Sidhu AK, Kubendran T. Studies on bird diversity of Pong Dam Wildlife Sanctuary, Kangra, Himachal Pradesh, India. Journal of Entomology and Zoology Studies. 2018;6(4):904-912.
36. Paliwal S, Sharief A, Sidhu AK, Kubendran T. Species diversity and abundance of avifauna in Bandli wildlife sanctuary, Mandi (Himachal Pradesh). LS International journal of life sciences. 2019;8(1):11-18.