Journal of Wildlife and Ecology (2024). 8(4):257-269

Research Paper **Open Access**

Diversity of Birds at Selected Sites along the Indus River in Gilgit Baltistan, Pakistan

Abbas Haider[1], Saeed Abbas[2], Rehmat Ali[3], Kamran Khan[3], Uzair Hassan[2], Ahmed Farooq[4] and Fareeha Naseem[1]

1. Worldwide Fund for Nature, Lahore, Pakistan
2. Karakoram International University, Gilgit, Pakistan
3. Worldwide Fund for Nature, Gilgit, Pakistan
4. Pakistan Forest Institute, Pakistan

***Corresponding author e-mail:** Abbas11801haider@gmail.com

Citation: Haider, A., S. Abbas, R. Ali, K. Khan, U. Hassan, A. Farooq, and F. Naseem. 2024. Diversity of Birds at Selected Sites along the Indus River in Gilgit Baltistan, Pakistan. Journal of WIldlife and Ecology. 8: 257-269.

SUMMARY

This research aims to describe bird diversity, relative abundance, and threats along the Upper Indus River in one valley of the district Hunza (Ghulkin) and two valleys of the district Nagar (Sumayer and Chalt). The information was gathered from January to November of 2022 (fall and winter) using the line transect approach. There were 21 bird species identified, representing 7 orders and 14 families. Twelve species were determined to be part of the dominant order, Passeriformes. With 19 species reported in the autumn and 13 in the winter, species richness was found to be greater in the autumn. Thirteen of the twenty-one species were seen in the Chalt Valley, ten from Sumayer, and six from Ghulkin (Borith Lake). Based on the frequency of detection, most of the birds (n=12) observed in the study region were classified as uncommon, five species as rare, three species as common, and one species as extremely frequent. Similarly, according to residential status, eight species were identified as common residents, eight as common passage migrants, three as summer visitors, one as common, and one as an unusual passage migrant. The primary challenges to birds in the districts of Hunza and Nagar were habitat degradation, particularly land mining, pollution along the riverbank, poaching, mining, domestic drainage (sewerage), and lack of awareness. To conserve and manage the avian diversity of the study area, the relevant government department should take proactive measures. This is especially important for migratory birds that use the study area's wetlands as resting and feeding places when they fly over the study areas as passage migrants.

Keywords: Avian species, Diversity, Distribution, Threats

Received: 18-11-2024	**Revised**: 27-11-2024	**Accepted**: 18-12-2024

INTRODUCTION

Birds are essential for pollination, seed distribution, and the control of insect pests. Birds are members of the class Aves, phylum Chordata, and kingdom Animalia (Abbas et al., 2014). Numerous studies have examined Pakistani birds over time, reporting differing species counts. Mirza and Wasiq (2007) and Grimmett et al. (2008) and Roberts (1991) have documented more than 660 species of birds in Pakistan. The Oriental, Palaearctic, and Ethiopian areas are the three zoogeographical zones in Pakistan

According to the latest research, there are 360 resident and migratory bird species in Gilgit-Baltistan (GB), with around 197 belonging to the Passeriformes order (perching birds). A wide range of migrating waterfowl is found in Gilgit-Baltistan; out of them, about 17 bird species are ducks and geese, followed by 33 waders, 10 gulls and terns, and 26 crakes, grebes, egrets, and herons (Shah, 2022). Gilgit-Baltistan provides a diverse habitat for around 19 hawks and eagles, five vultures, nine owls, and six falcons (Shah, 2022). Research points out that Gilgit-Baltistan has a wide range of habitats that are home to many different bird species (Qureshi et al., 2011). Pakistan is an ideal location for biodiversity because it is between the Palearctic and Oriental zones of the planet (Abbas et al., 2014). The Rocky Mountains make up the majority of Gilgit-Baltistan, and snow covers the highest peaks throughout the year. Thousands of birds migrate to various parts of Pakistan temporarily in search of a pleasant environment before continuing to other locations in the Indian subcontinent. Each year, several migrating bird species visit Gilgit-Baltistan's charming spots, which include wetlands (lakes, rivers, streams, etc.). Water birds and other migratory birds that come from Siberia use Gilgit-Baltistan's wetlands as habitat.

BirdLife International, 2022 estimates that 409 bird species are threatened worldwide. Of them, 423 species are endangered, 755 are vulnerable, and 231 are seriously threatened. Because 33 internationally vulnerable birds call Pakistan home, the situation there is similarly not encouraging. The majority of these endangered birds also travel to the research area, which is the upper Indus region in the districts of Nagar and Hunza. The Green Route, or more often the Indus Flyway, is the fourth International Migratory Bird Route, which runs from the Karakoram down to the Indus Delta in the south, providing suitable spots for the migratory birds. Wetlands in the area, from the northern highlands to the southern beach, provide a healthy habitat for water birds that arrive from Siberia.

According to the majority of recent research, the number of birds in the study region has drastically decreased due to habitat degradation (Ali et al., 2016; Altaf, 2016; Altaf et al., 2012), pesticide usage in agricultural areas, and excessive and illegal shooting (Altaf et al., 2017, 2018) particularly of pheasants and waterfowl for game. Plans for the conservation and management of birds in the study region that are species-specific and site-specific cannot be developed with the data available on bird diversity, particularly migratory birds. Therefore, we carried out this study to investigate the relative abundance and seasonal variety of birds in the chosen valleys along the upper Indus River in the Districts of Hunza and Nagar.

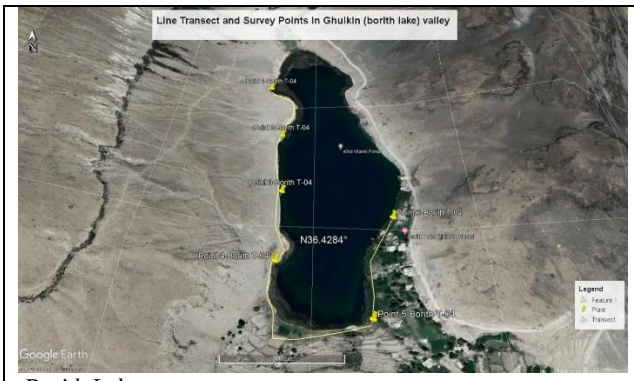
OBJECTIVES OF THE STUDY

The main objective of this study is to explore the seasonal diversity and relative abundance of birds in the selected valleys along the upper Indus River in District Hunza and Nagar. The specific objectives were to explore seasonal diversity, abundance and variation in birds in the study area, to compare bird diversity and relative abundance in three different valleys, seasons and timing of the survey and to identify threats to the species in the study area.

MATERIALS AND METHODS

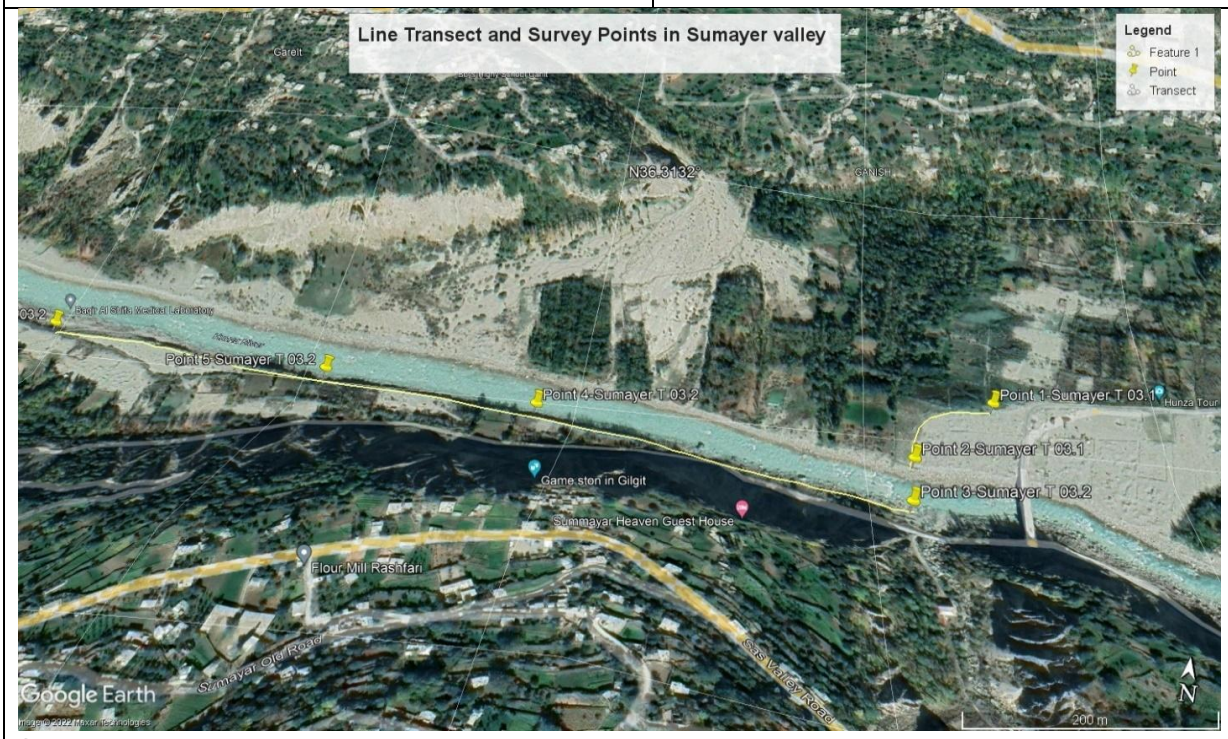
STUDY AREA

Borith is a small lake in the upper Gojal valley of the district of Hunza, whereas Chalt and Summayer are two valleys in the district of Nagar. These valleys are home to a wide variety of plants and animals (Figure 1).



Borith Lake

Chalt Valley



Sumayer Nagar

Figure 1: Map of the study area.

AVIAN SURVEY METHODS

The line transects and point count methods were employed to study the birds in the study area, as both techniques are the most efficient and most known methods to sample avian populations and determine species composition and abundance. These methods were used by Barnett & Dutton, (1995), Bibby et al. (2000) and Zhongming

et al. (2018) in their research to study birds. The data from the field was collected using the pre-developed data sheets. The birds observed within the 50-meter radius of the points whether on the ground, water or flying over were recorded, those out of this radius were not.

The data was collected during the months of February and March 2022 (winter) and October and November 2022 (summer) to assess the diversity, abundance, threats, and seasonal variation. The data were collected twice a day during the survey. Firstly, between 6:30 am to 11:00 am in the morning and between 15:00 to 18:30 pm in the evening. The material used during the entire period of study for the bird's ID and verification included a Nikon Binocular (10×40), a Canon camera 50X for photography and three field guides viz. “Pocket Guide to the Indian Subcontinent” (Grimmett et al., 2008).

Threat Assessment

The threats were assessed based on field observation and interaction with the local communities. Based on firsthand information from the locals, threats were categorized as:

1. Habitat fragmentation and degradation.
2. Household effluents including sewerage and sewage water.
3. Illegal shooting (encountering birds shooting).
4. Temporarily made stopover points for birds shooting.
5. Detection of used ammunition for shooting birds.
6. Sand mining along the river.

The scale of threats was measured by counting each threat observed in all research sites.

STATISTICAL ANALYSIS

Shannon Weiner's diversity index was used to check the diversity of birds in all sites**.** The evenness index was used to determine if the species are evenly distributed across seasons, locations, and survey times. Pearson’s Correlation indicated the species diversity relationship between the three valleys, two seasons and two times of the day. (MacKinnon and Phillipps, 1993).

RESULT AND DISCUSSION

SPECIES RICHNESS

A total of 21 species and 1095 individuals of birds were recorded (Table 1) from the study area belonging to 7 orders (Table 2) and 14 families (Table 3). Family Anatidae has the highest individuals of bird species (n=5), following the family Muscicapidae with 3 species and Corvidae with 2 species. Diversity for the rest of the families observed was very low with only 1 species each. The number of individuals was highest in Order Gruiformes with 772 individuals followed by Anseriformes with 196 individuals, Passeriformes with 76 individuals, and Pelecaniformes with 47. Order Passeriformes has the highest diversity (11 bird species from 11 families) followed by Anseriformes (5 bird species from 5 families), Gruiformes (1 bird species and 1 family), Pelecaniformes (1 bird species and 1 family) Accipitiriformes

(1 bird species and 1 family), Piciformes (1 bird species and 1 family) and Charadriiformes (1 species and 1 family) individuals and Piciformes with 2 individuals. Only 1 individual was recorded for Accipitiriformes and Charadriiformes. In Rallidae family 772 individuals were spotted in the study, followed by Anatidae with 196 individuals, Ardeidade with 47 individuals, Muscicapidae with 31 individuals, Cinclidae with 20 species, Corvidae with 10 species, Motacilludae with 5 individuals, Paridae with 4 species, Leiothrichidae, Picadae, Tichodromidae and Emberizidae with 2 individuals each and rest of the families observed include 1 individual each (Tables 1, 2 and 3).

Table 1: Birds Diversity Reported from the Study Areas.

Order	Family	Common Name	Scientific Name
Passeriformes	Muscicapidae	Blue Whistling-thrush	*Myophonus caeruleus*
Passeriformes	Cinclidae	Brown Dipper	*Cinclus pallasii*
Passeriformes	Paridae	Cinereous tit	*Parus cinereus*
Gruiformes	Rallidae	Common Coot	*Fulica atra*
Anseriformes	Anatidae	Common Pochard	*Aythya ferina*
Anseriformes	Anatidae	Common Teal	*Anas crecca*
Charadriiformes	Scopacidae	Curlew Sandpiper	*Calidris ferruginea*
Pelecaniformes	Ardeidae	Grey Heron	*Ardea cinerea*
Anseriformes	Anatidae	Greylag goose	*Anser anser*
Passeriformes	Corvidae	Large-billed Crow	*Corvus macrorhynchos*
Passeriformes	Corvidae	Magpie	*Pica pica*
Anseriformes	Anatidae	Mallard	*Anas platyrhynchos*
Anseriformes	Anatidae	Northern Shoveler	*Spatula clypeata*
Passeriformes	Muscicapidae	Plumbeous Water-redstart	*Phoenicurus fuliginosus*
Passeriformes	Emberizidae	Rock Bunting	*Emberiza cia*
Piciformes	Picadae	Scaly-bellied Woodpecker	*Picus squamatus*
Accipitriformes	Accipitridae	Sparrow Hawk	*Accipiter nisus*
Passeriformes	Leiothrichidae	Streaked Laughingthrush	*Trochalopteron lineatum*
Passeriformes	Tichodromidae	Wall Creeper	*Tichodroma muraria*
Passeriformes	Motacillidae	White Wagtail	*Motacilla alba*
Passeriformes	Muscicapidae	White-capped Water redstart	*Chaimarrornis leucocephalus*

Table 2: shows orders of avian species.

Order	Species	Number of individuals
Passeriformes	11	78
Anseriformes	5	196
Gruiformes	1	772
Pelecaniformes	1	47
Accipitriformes	1	1
Piciformes	1	2
Charadriiformes	1	1

Table 3: Table shows families of avian species of study area.

Families	Species	Number of individuals
Muscicapidae	3	31
Corvidae	2	10
Motacillidae	1	5
Cinclidae	1	20
Leiothrichidae	1	2
Picadae	1	2
Tichodromidae	1	2
Emberizidae	1	2
Paridae	1	4
Anatidae	5	196
Rallidae	1	772
Ardeidae	1	47
Acciptridae	1	1
Scopacidae	1	1

SEASONAL VARIATION

A total of 19 avian species and 562 individuals were spotted in summer (Table 4). Out of which almost three fourth of the individuals (70.6 %) belonged to Gruiformes, followed by 17.6 % of individuals to Anseriformes, 11 % to Passeriformes, 0.35% of the individuals to Piciformes and number of individuals in Order Accipitriformes and Charadriiformes constituted 0.177% each, respectively.

Similarly, a total of 13 species with 533 individuals were detected in winter season (Table 5). Out of the total individuals counted in the winter season around three-fourths of the individuals belonged to Order Gruiformes forming 70.3%, followed by Anseriformes with 18.2% individuals, Pelecaniformes with 8.8%, and 2.6% to Passeriformes. About 19 species reported in the study area are of least concern, one species is vulnerable (Common pochard), and one was near threatened (Sand piper) as per IUCN Red List 2022.

AREA-WISE COMPARISON OF BIRD DIVERSITIES IN THE STUDY AREA

Area-wise Species Diversity

Out of the total species documented during the study period, 12 species were spotted in Chalt valley, 11 in Sumayer, and 7 were spotted in Ghulkin (Borith lake) (Figure 2).

Area-wise Abundance of individuals

During the study period, a total of 1095 individuals were observed in three valleys. Out of them, 862 individuals were recorded from Ghulkin (Borith Lake), 95 individuals were recorded from Sumayer Valley, and 112 individuals were recorded from Chalt Valley (Figure 3).

Table 4: Birds Diversity in summer season from study area.

Order	Family	Common Name	Scientific Name	Number
Passeriformes	Tichodromidae	Wall Creeper	*Tichodroma muraria*	1
Passeriformes	Emberizidae	Rock Bunting	*Emberiza cia*	1
Accipitriformes	Accipitridae	Sparrow Hawk	*Accipiter nisus*	1
Charadriiformes	Scolopacidae	Curlew Sandpiper	*Calidris ferruginea*	1
Passeriformes	Leiothrichidae	Streaked Laughingthrush	*Trochalopteron lineatum*	2
Piciformes	Picidae	Scaly-bellied Woodpecker	*Picus squamatus*	2
Passeriformes	Corvidae	Large-billed Crow	*Corvus macrorhynchos*	3
Passeriformes	Motacillidae	White Wagtail	*Motacilla alba*	3
Passeriformes	Paridae	Cinereous tit	*Parus cinereus*	4
Passeriformes	Phoenicurus	White-capped Water-redstart	*Chaimarrornis leucocephalus*	5
Passeriformes	Corvidae	Magpie	*Pica pica*	6
Passeriformes	Muscicapidae	Plumbeous Water-redstart	*Phoenicurus fuliginosus*	7
Anseriformes	Anatidae	Common Pochard	*Aythya ferina*	11
Anseriformes	Anatidae	Common Teal	*Anas crecca*	12
Passeriformes	Muscicapidae	Blue Whistling-thrush	*Myophonus caeruleus*	13
Anseriformes	Anatidae	Northern Shoveler	*Spatula clypeata*	16
Passeriformes	Cinclidae	Brown Dipper	*Cinclus pallasii*	17
Anseriformes	Anatidae	Mallard	*Anas platyrhynchos*	60
Gruiformes	Rallidae	Common Coot	*Fulica atra*	397

Table 5: Birds Diversity in winter season from study area.

Order	Family	Common Name	Scientific Name	Number
Passeriformes	Tichodromidae	Wall Creeper	*Tichodroma muraria*	1
Passeriformes	Emberizidae	Rock Bunting	*Emberiza cia*	1
Passeriformes	Corvidae	Magpie	*Pica pica*	1
Passeriformes	Muscicapidae	Plumbeous Water Redstart	*Phoenicurus fuliginosus*	1
Passeriformes	Motacillidae	White Wagtail	*Motacilla alba*	2
Passeriformes	Muscicapidae	White-capped Water-redstart	*Chaimarrornis leucocephalus*	2
Passeriformes	Muscicapidae	Blue Whistling-thrush	*Myophonus caeruleus*	3
Passeriformes	Cinclidae	Brown Dipper	*Cinclus pallasii*	3
Anseriformes	Anatidae	Greylag goose	*Anser anser*	12
Anseriformes	Anatidae	Mallard	*Anas platyrhynchos*	28
Pelecaniformes	Ardeidae	Grey Heron	*Ardea cinerea*	47
Anseriformes	Anatidae	Common Teal	*Anas crecca*	57
Gruiformes	Rallidae	Common Coot	*Fulica atra*	375

Shannon-Weiner Diversity Index

The Shannon Wiener diversity index showed that Chalt valley has the highest diversity with (H=1.731) followed by Sumayer with (H= 1.623) and Ghulkin with (H=0.4631) (Figure 4 and Table 6).

AREA-WISE CALCULATION OF EVENNESS OF SPECIES

Evenness index showed that Chalt has the highest "E" value compared to Ghulkin and Sumayer, as shown in Figure 5 and Table 6.

Table 6: Shannon Weiner Diversity indices

Indices	Summer	Winter	Morning	Evening	Chalt	Sumayer	Borith
Taxa_S	19	13	20	15	13	10	6
Individuals	562	533	639	456	118	93	884
Dominance_D	0.514	0.5176	0.5119	0.5176	0.2588	0.3028	0.77
Simpson_1-D	0.486	0.4824	0.4881	0.4824	0.7412	0.6972	0.23
Shannon_H	1.259	1.088	1.272	1.165	1.893	1.608	0.5158
Evenness_e^H/S	0.1854	0.2284	0.1784	0.2138	0.5109	0.4991	0.2792

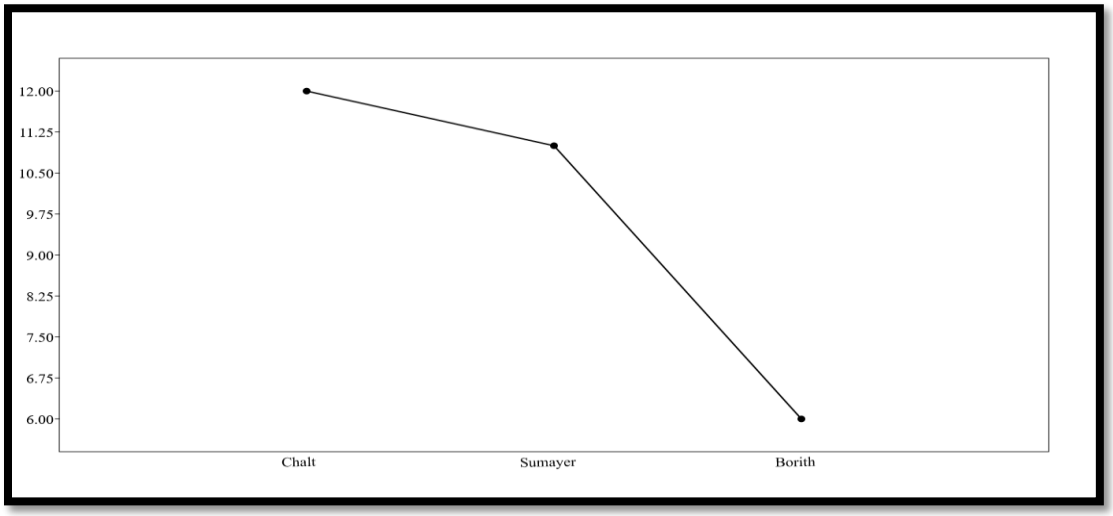


Figure2: Graph shows Area wise species richness.

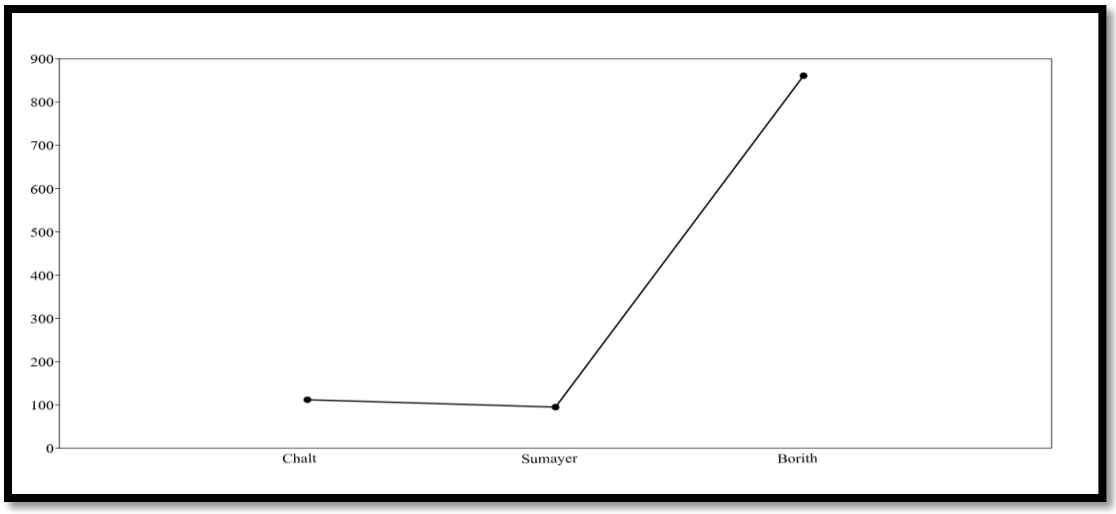


Figure 3: Graph shows Area wise species abundance.

THREATS TO THE AVIFAUNA OF THE STUDY AREA

During the entire period of the survey, intentionally made hides to shoot birds were found in the study area in addition to the detection of hunted specimens of common teals and mallard from the study area along the Indus River. Used bullets for shooting

migratory birds were also recorded from the study area. Many stopover points were also intentionally made for the shooting of the birds along the Indus River in the study area. Similarly, sewerage of households is also posing threats to the birdlife and other biodiversity of the area. Solid waste and evidence of sand mining and construction (bridge) were also reported in the study area

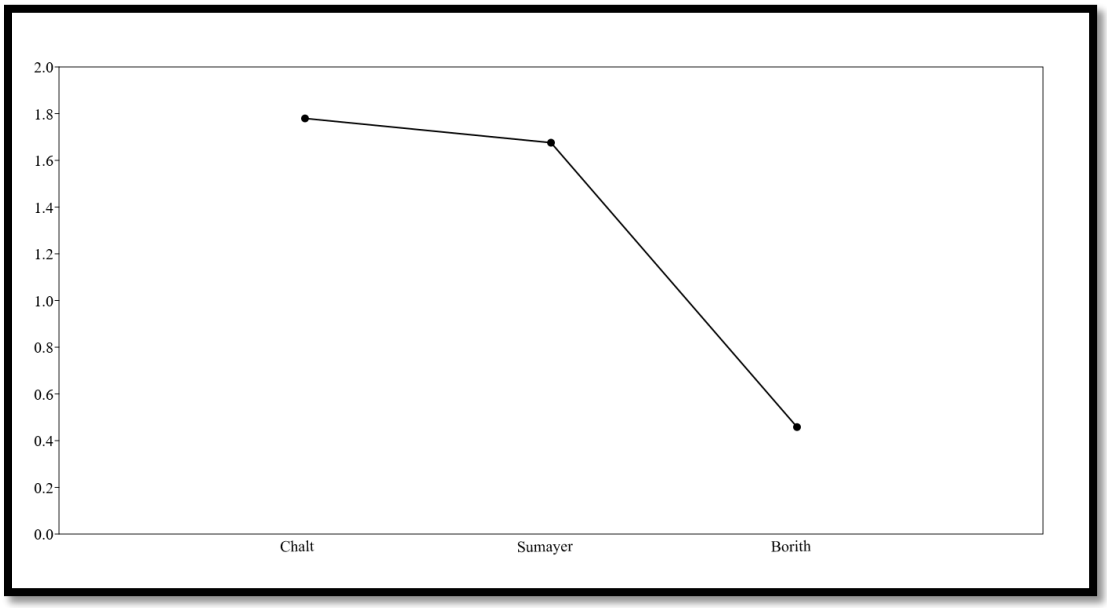


Figure 4: Graph representing area-wise Shannon Wiener Diversity index.

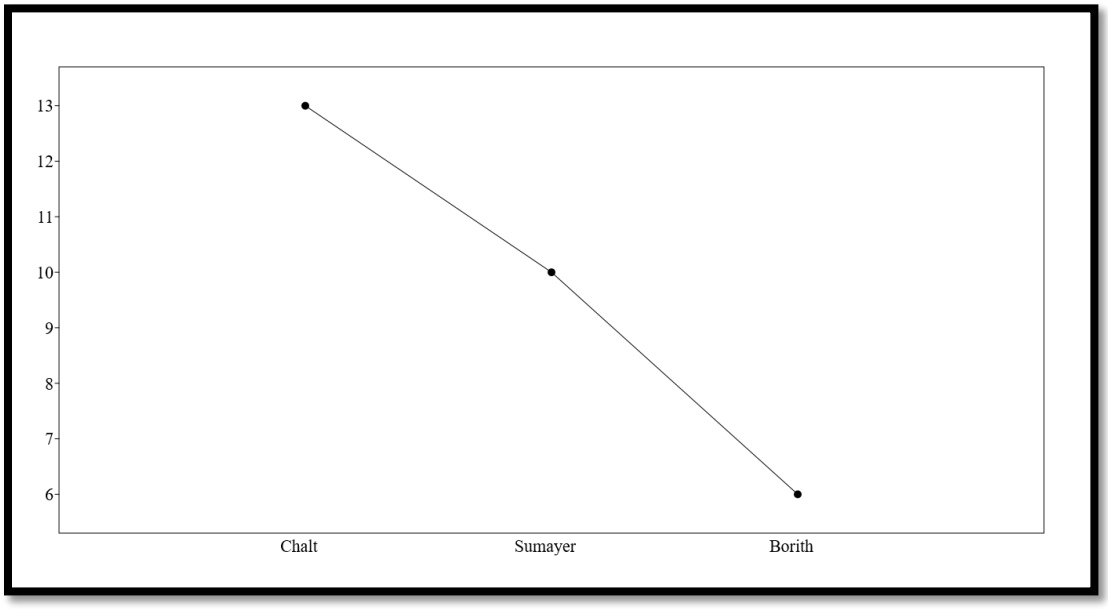


Figure 5: Graph shows the evenness of the study area.

SPECIES RICHNESS AND SEASONAL VARIATION OF BIRDS

During the current study surveys were conducted in only two seasons (Autumn and Winter) out of the four seasons prevailing in the area due to academic time

constraints, therefore, the overall species diversity (21 species) and observed population (1095 individuals) is not that much encouraging. Secondly, several threats were also documented in the study area including infrastructural development, sand mining, intentionally made stopovers for illegal shooting of the birds, pollution etc. The reason for low diversity is also evident from the studies conducted by (Cueto qnd Lopez de Casenave, 2000), which indicates that the species distribution and richness are highly affected by seasonal variation. The species diversity and abundance (19 species, and 562 individuals) in autumn is relatively higher as compared to the winter season with 13 species and 533 individuals.

There are around 260 bird species in the district of Hunza and 263 in the district of Nagar. The Passeriformes (perching birds) comprise about half of the species (more than 130 species). Over 16 species of ducks and geese, 9 gulls and terns, and over 21 species of crakes, grebes, egrets, and herons are among the important migratory species found in the districts of Hunza and Nagar (Shah, 2022). According to (Parajuli, 2016) more species were documented during with the summer season as compared to the winter season in Karra River, Hetauda, Makwanpur, Nepal, which is also the case in our study area.

COMPARISON OF BIRD DIVERSITY AND RELATIVE ABUNDANCE IN THREE VALLEYS

One-way ANOVA indicated that there were not any significant differences in the seasonal diversity of birds in summer and autumn as shown in Table 1. Species richness was higher in Chalt than in Sumayer and Ghulkin. The reason for the relatively higher species richness in Chalt is because of an additional transect in Chalt Valley. Karl Pearson's correlation coefficient showed that there was a weak positive correlation of 0.164 among Chalt and Sumayer and a weak negative correlation of -0.09 among Sumayer and Ghulkin. Species richness was found to be lower in Ghulkin than in other valleys because of anthropogenic activities including construction of hotels and boating. Shannon Weiner's diversity index shows that Chalt has the highest diversity with (H=1.731) followed by Sumayer with (H=1.623) and Ghulkin with (H= 0.4631) respectively. Out of the total species (21) found in the study area, species richness was found to be highest in the family Anatidae and lowest with one species each in the families' Gruiformes and Ardeidae.

The bird's diversity in summer was less evenly distributed in the morning time and more evenly distributed in the evening. We had observed a greater number of hunters along the Indus River, especially in the winter season. Most aquatic birds were spotted especially from Ghulkin Valley, there were fewer aquatic birds found in Chalt in the summer visit. Due to the short time tenure, we spotted a smaller number of species.

THREATS TO BIRDS

Anthropogenic disturbances, including sand mining, the construction of stopover spots for the illegal shooting of birds, solid waste, and the inclusion of untreated sewerage water with water resources, were found in all the sites, posing serious threats to the birdlife diversity of the study area (Figure 6). Such types of threats were also severely destroying Karra's bird habitat in Nepal (Parajuli, 2016). Poaching of

migratory birds and many cases of fired bullets and blood from some migratory birds from transect were also observed during the field visits. This may also be the reason for the low diversity of birds in the study area.

Figure 6: Glimpses of threats to the Birdlife of the study area.

CONCLUSION

Avian species are an important component of an ecosystem, with vital roles such as pest manager (controlling rodents and insect populations), dispersal of seeds leading

to diversity, abundance and conservation of plants including important medicinal and aromatic plants, as a source of food for predatory birds, as environmental cleaners etc. Unfortunately, the avian diversity and abundance were found to be exceptionally low in the study area, despite the area having high number of wetlands and other habitat types. Evidence of habitat destruction, water pollution, illegal shooting and poaching were also seen in the study area, which are posing serious issues for the birdlife diversity of the study area. Therefore, concrete actions should be taken by the relevant Government department to conserve and manage the avian diversity of the three valleys, especially the migratory birds which use the wetlands of the valleys as resting and feeding points as passage migrants.

RECOMMENDATIONS

Some important recommendations based on the current study are mentioned below;

a) Declaring the key areas of the birds like wetlands (Borith Lake, Hunza, and Nagar rivers) in the study area as no-hunting zones
b) Declare Borith Lake as a bird refuge
c) lowering the bag limit and shooting license period,
d) improving ward and watch systems in the community to minimize poaching, trapping, and shooting
e) Updating the legislation to protect rare and threatened avian species
f) Water from the household should be treated effectually before releasing on the river.
g) Ban on use of pesticides and students should be engaged in conducting research and creating awareness among the local communities through research and bird-watching campaigns.

ACKNOWLEDGEMENTS

The author extends his gratitude to Haider Raza, Director of NbS and Regional Head of WWF-Pakistan, for his support in the successful conclusion of this research project.

REFERENCES

Abbas, S., R. Tabassum, M. Z. Khan, B. Khan, S. Hussain, G. Khan, G., and S. Awan. 2014. Avian diversity in Central Karakoram National Park, Gilgit-Baltistan. International Journal of Agriculture and Biology, 16(2): 377–382.

Ali, A., M. Altaf, and M. S. H. Khan. 2016. Winter survey of birds at Keti Bunder, district Thatha, Pakistan. Punjab Univ. J. Zool. 31: 203-208.

Altaf, M. 2016. Assessment of avian and mammalian diversity at selected sites along river Chenab, University of Veterinary and Animal Sciences, Lahore, Pakistan.

Altaf, M., A. Javid, A. M. Khan, M. Khan, M. Umair, and Z. Ali. 2018. Anthropogenic impact on the distribution of the birds in the tropical thorn forest, Punjab, Pakistan. Journal of Asia-Pacific Biodiversity. 11: 229-236.

Altaf, M., A. Javid, M. Umair, K. J. Iqbal, Z. Rasheed, and A. M. Abbasi. 2017. Ethnomedicinal and cultural practices of mammals and birds in the vicinity of river Chenab, Punjab-Pakistan. Journal of ethnobiology and ethnomedicine. 13: 41.

Altaf, M., A. M. Khan, M. Umair, Irfan, and M. A. Munir. 2012. Status of wild birds and mammals in urban habitats of Gujranwala, Punjab, Pakistan. Punjab University Journal of Zoology. 27: 9-12.

Barnett, A., and J. Dutton, J. 1995. Expedition field techniques small mammals.

Bibby, C. J., N. D. Burgess, D.M. Hillis, D.A. Hill, S. Mustoe. 2000. Bird census techniques. Elsevier.

Birdlife International, B. (2022). Birdlife International.

Cueto, V. R., J. Lopez de Casenave. 2000. Seasonal changes in bird assemblages of coastal woodlands in east-central Argentina. Studies on Neotropical Fauna and Environment, 35(3): 173–177.

Grimmett, R., T. J. Roberts, T. Inskipp and C. Byers, C. 2008. Birds of Pakistan. A&C Black.

MacKinnon, J. R. and K. Phillipps. 1993. A field guide to the birds of Borneo, Sumatra, Java, and Bali, the Greater Sunda Islands. Oxford University Press.

Parajuli, K. 2016. Diversity and relative abundance of avifauna of Karra River, Hetauda, Makwanpur, Nepal.

Qureshi, R., W. Khan, G. Bhatti, B. Khan, S. Iqbal, M. Ahmad, M. Abid, and A. Yaqub. 2011. First Report on the Biodiversity of Khunjerab National Park, Pakistan. In Pakistan J. Botany, 43: 2.

Roberts, T. J. (1991). The birds of Pakistan: Passeriformes (Vol. 2). Oxford University Press.

Shah, S., J. Haider, K. Hussain, N. U. Khan, N. Shah, S. Khan, W. Karim. 2022. *No Title. Birds of Gilgit-Baltistan.*

Zhongming, Z., L. Linong, Y. Xiaona, Z. Wangqiang & L.Wei. 2018. Biodiversity Baseline Assessment: Phipsoo Wildlife Sanctuary in Bhutan.

***Competing interests**:* Authors have declared that no competing interests exist.
***Funding**:* This research was funded by WWF-Pakistan.
Authors' contributions: Haider and Abbas designed this project, collected data, analyzed data and wrote this article, all authors have critically analyzed this article and approved it as final.