

The avian biodiversity in fragile ecosystem of Manasbal Lake of Jammu and Kashmir India and its digital documentation.

Sarvar Ahmad Dar

Research Scholar The bhagwant University Sikar Road Ajmer

Dr. Purnima Srivastava

Assistant Professor Department of Zoology Faculty of science The Bhagwant University Sikar Road Ajmer

Abstract

During the present study, 46 species of birds belonging to 23 families and 13 Orders were small reported from Manasbal region of Jammu and Kashmir in the year 2019. Out of these, 46 species maximum number of species are resident and rest of them are migrants. A comparative were account of the bird species reported from the study area during the present study with that of the bird species already reported from Indiarevealed that the order Passeriformes has the highest diversity of species at the country level (53.92%) as well as in the study area (46%) followed by Order Ciconiiformes with 21.07% at country level and 13% in the study area. However, OrderUppiformes was the third largest Order in the study area with 11% of the species reported during the present study belonged to this Order which was found to be only 3.38% at the country level. Other Orders had very little diversity of birds in the study area with Columbiformes having 7%, Gruiformes 2%, Piciformes 2%, Cuculiformes 4%, columbiformes 7%, anseriformes 9%, acciptriformes 2%, daliformes 2%, Coraciformes 2%, and Strigiformes had 2%. The least diversity of bird species were recorded in Order Gruiformes, piciformes, acciptriformes, and daliformes having only 2% each of the birds reported from the study area during the present study.

Key Words: *Manasbal, species , migrant birds, Ciconiiformes, daliformes.*

Introduction

Kashmir, since times immemorial has thrived on complete tourist attraction, adorned by the resplendent, colourful and fragrant nature. It is bestowed with lush green meadows, luxuriant forests, wetlands, gardens, flow of fresh water bodies including springs etc. Owing to its geographical location it has vast kind of biodiversity among terrestrial, aerial, aquatic and its climatic conditions has key role to attract other migratory animals in different seasons. Valley is surrounded by hills and mountains showing great character of natural beauty. Infact the fresh water bodies of this basin ranging from ponds, lakes, springs, reservoirs, streams, rivers etc. are of vital importance because they not only provide portable water and fodder for the cattle but also provide a huge habitat of flora and fauna. The Wetlands especially in northern part of Kashmir including Dal lake, Wullar lake, Mansbal lake, are treated as huge ecosystems protecting rich and large biodiversity of flora and fauna. Among fauna, birds are considered as most exposed group of vertebrates that are used as trustworthy indicators of ecological health of an ecosystem. The Kashmir is well known for its wetlands as it covers huge area of total land .

The present study was carried out at Manasbal Lake which is the deepest lake in northern state of Jammu and Kashmir. It is located at a convenient distance of 60 km from Srinagar considered as a precious gem of Kashmir. Manasbal Lake is tucked away in the lap of nature and flanked by villages of Gratbal, Jarokbal,

Nesbal and Kondabal. It reveals a kind of fragile environment by indiscriminate anthropogenic activities that has severely damaged the niche components of these fauna. The surveys were carried out in different time periods of the day of every season following the systematic methodology with an objective to assess the avifauna count which can serve as first-hand baseline data for analysis and observation for their actual number and their reducing value during human disturbance to the habitat. Although this wetland is located in a matrix of fields but the degree of disturbance is quite high and its peripheral areas on its east, north and south are now encroached by the local people for fish farms and other human settlements which has given grave concern to the flood and tourism departments.

Materials and Methods

In order to record the avian diversity, periodic surveys were undertaken in the study area by adopting systematic field procedures techniques for survey and collection of different species. Descriptive method, classification and identification of birds:

1. Description of a bird includes size, diagnostic features, general habits and habitat, food, call and distribution. Thus, for each species the first few lines of description point out most diagnostic characteristics. In some species, where the breeding habits were also studied, further description includes sharing of sexes in nest building, laying pattern, incubation, feeding the young ones, nestling period.
2. The nomenclature followed in the present work is in accordance with those given in the “Handbook of the Birds of India and Pakistan (Compact Edition)” by Ali and Ripley (1983). In order to maintain consistency in English names Grewal *et al.* (2002) followed that used by Grimmett *et al.* (1998). Thus, the English names used in the present work are in accordance with Grimmett *et al.* (1998). Local names used in Kashmiri wherever available are also mentioned.
3. For identification and field diagnosis of birds, coloured plates with diagnostic descriptions of birds by Grimmett *et al.*, (1998) and Pfister (2004) were always handy and proved quite useful. Colours are usually the best indicators of identity of a species at a close range or through binoculars. Calls also served as important clue in identifying and locating birds in their habitat.
4. Classification of birds is in accordance with Grewal *et al.* (2002) followed after *An Annotated Checklist of the Birds of the Oriental Region* by Inskipp *et al.* (1996).

5. The birds were observed with naked eye or with the help of Binoculars: QUECHUA by Decathlon MH B100 whenever found necessary. As far as possible, the birds were watched from behind a hide in order to avoid any disturbance to them. While going in the field, following a minimum code of conduct, such as the choice of dress matching with the surroundings, making less noise, a casual and indirect approach while observing or taking photograph of a species, were important factors so that the birds were not disturbed and its natural behavior could be observed. Casual information was collected of many breeding pairs and only a few were selected for a detailed account.

6. Bird watching was done between 0700 hours to 1100 hours and 1400 hours to 1830 hours during summer and 0800 hours to 1130 hours and 1400 hours to 1700 hours during winter. Several irregular and unscheduled visits were also made during different hours of the day as well.

7. Photographs were taken and video clips were made to record their habits and calls with the help of 1. Camera: canon SX530 HS Power Shot camera with 50x optical zoom, taking due care that the sun is behind the observer, for easy and correct identification of the bird species.

Inventorization of Aves:For inventorization of aves a combination of Line Transect method and Point Transect method were used.

Categorization of habitat

Based on availability of various relief features, the study area was divided into five different habitats and bird species were surveyed in relation to these habitats. The five habitats are enumerated as under:

1. Cultivation/Grassland habitat (CGH): Includes open meadows and the irrigated fields.

2. Plantation habitat (PH): Includes Willow predominantly *Salix* spp. and Poplar *Populus* spp. and *Hippohaespp.* near river or streams and orchards.

3. Rocky mountain slope habitat (RMH): Includes rocky mountains, boulder strewn and gravelly sandy slopes.

4. Aquatic habitat (AqH): Includes lakes, run off marshes, streams, and Rivers.

5. Aerial habitat (AeH): Includes the open sky over valleys. Morphometric measurements: These were taken with the help of common inch tape or with the help of thread measured on the scale. The metric system of measurement was followed for recording the morphometric data. The individuals which were found dead were used for morphometric measurements.

Gut content: The dead specimens, whenever found, from different stations during the study were collected and were dissected to expose their gut to analyze the gut content to know the type of food they prefer. Standard laboratory technique of dissection was followed for this purpose.

Breeding records: The breeding records of the birds in the study area was made on the basis of direct or indirect breeding evidences. Direct evidence includes observation of active nests, i.e. birds actively engaged

in different stages of breeding such as egg laying, incubating or attending to nestlings. Indirect evidence includes observation of birds with their fledglings or juveniles and near nests.

Diversity indices: Diversity indices provide important information about rarity and commonness of species in a community. The ability to quantify diversity in this way is an important tool for biologists trying to understand community structure. The data collected from different stations during the present study was analyzed using PAST Software and Shannon diversity index, Simpson's diversity index and Berger-Parker index were computed.

Shannon diversity index (H'): The Shannon diversity index (H') is commonly used to characterize species diversity in a community (Shannon and Weaver 1949). Shannon's index accounts for both abundance and evenness of the species present. The proportion of species i relative to the number of species (p_i) is calculated, and then multiplied by the natural logarithm of this proportion ($\ln p_i$). The resulting product is summed across species, and multiplied by -1:

Where,

H' – Shannon's diversity index.

S – Total numbers of species in the community (richness).

P_i – Proportion of S made up of the i th species.

$\ln$ – natural log to base 2.

Simpson's Diversity Index:

It measures the probability that two individuals randomly selected from a sample will belong to two different species (Simpson, 1949). It is calculated by using the following formula:

Where, S – total number of species in the community.

D - Simpson's diversity index.

N - total number of individuals.

n_i - number of individuals of i th species.

Berger-Parker Index: It is simply the number of individuals in the dominant taxon relative to the total number of individuals (Berger and Parker, 1970). It is calculated by the formula:

Where, N_{max} = the abundance of the dominant species.

N = the total number of individuals.

d = Berger-Parker index.

Meteorological data: The climate parameters like temperature, humidity and rainfall were calculated from the data obtained from JKTDC Manasbal lake. Snowfalls recorded in cm were converted directly into mm by equating 1cm = 10mm in order to show as rainfall measured in mm.

Tools used:

1. Camera: canon SX530 HS Power Shot camera with 50x optical zoom.

2. Binoculars: QUECHUA by Decathlon MH B100.

Results

Observation

Checklist of Birds:-(Table 1)

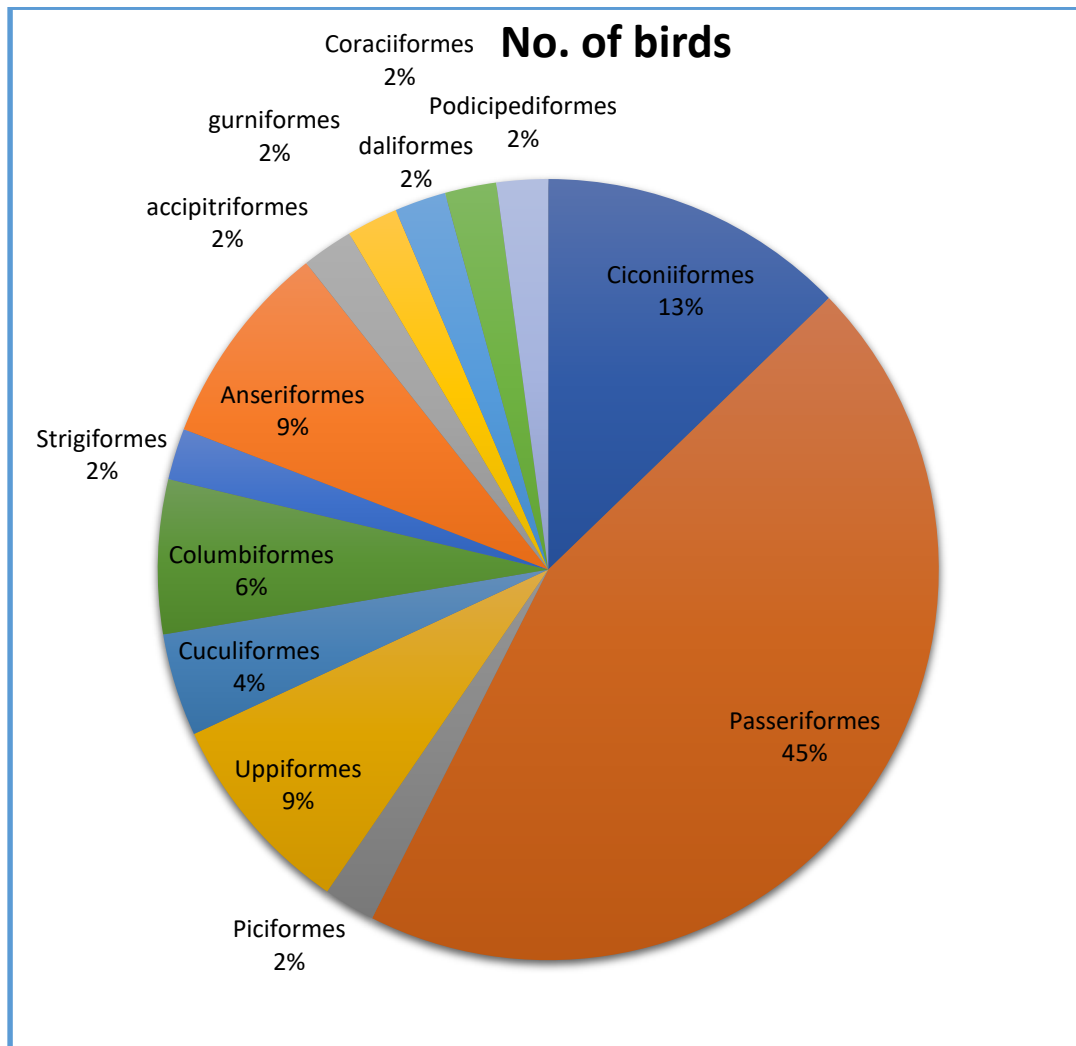
Number of Birds observed in the study area (ma 47sbal lake) in the year of 2019

<i>S No</i>	<i>Common Name</i>	<i>Zoological Name</i>	<i>order</i>	<i>Family</i>
1	Mallard	<i>Anas Platyrhynchr</i>	<i>Anseriformes</i>	<i>Anatidae</i>
2	White Headed Duck	<i>OxyuraLeucocephala</i>	<i>Anseriformes</i>	<i>Anatidae</i>
3	Bar Headed Goose	<i>Anser Indicus</i>	<i>Anseriformes</i>	<i>Anatidae</i>
4	Himaliyan Woodpecke r	<i>DendrocoposHimalayens is</i>	<i>Piciformes</i>	<i>Picidae</i>
5	Eurasian Hoopee	<i>Upupa Epops</i>	<i>Uppiformes</i>	<i>Upupidae</i>
6	Common Kingfisher	<i>AlcedoAtthis</i>	<i>Uppiformes</i>	<i>Alcedinidae</i>
7	Blue Eared Kingfisher	<i>AlcedoMeninting</i>	<i>Uppiformes</i>	<i>Alcedinidae</i>
8	White Throated Kingfisher	<i>Halcyon Smyrenensis</i>	<i>Uppiformes</i>	<i>Alcedinidae</i>
9	Lesser Pied Kingfisher	<i>CeryleRudis</i>	<i>Coraciiformes</i>	<i>Alcedinidae</i>
10	Asian Koel	<i>EudynamysScolopacea</i>	<i>Cuculiformes</i>	<i>Cuculidae</i>
11	Eurasian Cuckoo	<i>CuculusCarnorus</i>	<i>Cuculiformes</i>	<i>Cuculidae</i>
12	Rock Pigeon	<i>Columba Liva</i>	<i>Columbiformes</i>	<i>Columbidae</i>
13	Eurasian Collared Dove	<i>StreptopeliaDecaocata</i>	<i>Columbiformes</i>	<i>Columbidae</i>
14	Common Moorhen	<i>Gallinule Chloropus</i>	<i>Columbiformes</i>	<i>Rallidae</i>

15	Common Sandpiper	<i>Actitis Hypoleucos</i>	<i>Ciconiiformes</i>	<i>Scolopacidae</i>
16	Golden Eagle	<i>Aquila Chrysaetos</i>	<i>Ciconiiformes</i>	<i>Accipitridae</i>
17	Eurasian Sparrow Hawk	<i>Accipiter Nisus</i>	<i>Ciconiiformes</i>	<i>Accipitridae</i>
18	Grey Heron	<i>Ardea Cinerea</i>	<i>Ciconiiformes</i>	<i>Ardeidae</i>
19	Indian Pond Heron	<i>Ardeola Grayii</i>	<i>Ciconiiformes</i>	<i>Ardeidae</i>
20	Little Egret	<i>Egretta Garzetta</i>	<i>Ciconiiformes</i>	<i>Ardeidae</i>
21	Grey Backed Shrike	<i>Lanius Tephronotus</i>	<i>Passeriformes</i>	<i>Laniidae</i>
22	Long Tailed Shrike	<i>Lanius Schach</i>	<i>Passeriformes</i>	<i>Laniidae</i>
23	House Crow	<i>Corvus Splendens</i>	<i>Passeriformes</i>	<i>Corvidae</i>
24	Eurasian Golden Oriole	<i>Oriolus Oriolus</i>	<i>Passeriformes</i>	<i>Corvidae</i>
25	Blue Whistling Thrush	<i>Myophonus Caeruleus</i>	<i>Passeriformes</i>	<i>Muscicapidae</i>
26	Tickell's Thrush	<i>Turdus Unicolor</i>	<i>Passeriformes</i>	<i>Muscicapidae</i>
27	Rufous Backed Red-Start	<i>Phoenicurus Erythronota</i>	<i>Passeriformes</i>	<i>Muscicapidae</i>
28	White Capped Water Res-Start	<i>Chaimarronis Leucocephalus</i>	<i>Passeriformes</i>	<i>Muscicapidae</i>
29	Common Starling	<i>Sturnus Vulgaris</i>	<i>Passeriformes</i>	<i>Sturnidae</i>
30	Great Tit	<i>Parus Major</i>	<i>Passeriformes</i>	<i>Paridae</i>
31	Charadrius Dublin	<i>Little Ringed Plover</i>	<i>Passeriformes</i>	<i>Hirundinidae</i>

32	<i>House Sparrow</i>	<i>Passer Domesticus</i>	<i>Passeriformes</i>	<i>Passeridae</i>
33	<i>White Wagtail</i>	<i>Motacilla Alba Personata</i>	<i>Passeriformes</i>	<i>Passeridae</i>
34	<i>Citrine Wagtail</i>	<i>Motacilla Citerola</i>	<i>Passeriformes</i>	<i>Passeridae</i>
35	<i>European Gold Finch</i>	<i>Carduelis Carduelis Caniceps</i>	<i>Passeriformes</i>	<i>Fringillidae</i>
36	<i>Winter Wren</i>	<i>Troglodytes Troglodytes</i>	<i>Passeriformes</i>	<i>Certhiidae</i>
37	<i>Rusty Tailed Fly Cather</i>	<i>Ficedula Ruficauda</i>	<i>Passeriformes</i>	<i>Muscicapade</i>
38	<i>Himalaya n Bulbul</i>	<i>Pycnonotus Leucogenys</i>	<i>Passeriformes</i>	<i>Pyconitidae</i>
39	<i>Long Tailed Myna</i>	<i>Mino Krefftii</i>	<i>Passeriformes</i>	<i>Sturnidae</i>
40	<i>Common Myna</i>	<i>Acredotheries Tristis</i>	<i>Passeriformes</i>	<i>Sturnidae</i>
41	<i>White Eared Bulbul</i>	<i>Pyconotus Leucotes</i>	<i>Passeriformes</i>	<i>Pyconitidae</i>
42	<i>Little Owl</i>	<i>Anthene Noctua</i>	<i>Strigiformes</i>	<i>Strigidae</i>
43	<i>Pallas Fish Eagle</i>	<i>Haliaeetus Leucorphus</i>	<i>Accipitriformes</i>	<i>Accipitridae</i>
44	<i>Water Rail</i>	<i>Rallus Aquaticus</i>	<u><i>Gruiformes</i></u>	<i>Rallidae</i>
45	<i>Domestic Cock</i>	<i>Galus Domesticus</i>	<i>Dalliformes</i>	<i>Phasianidae</i>
46	<i>Little Grebe</i>	<i>Tachybaptus Ruficollis</i>	<i>Podicipediformes</i>	<i>Podicipedidae</i>

Pie Chart Of Table 4.1(NO. 1)(4.1)



Showing percentage occurrence of various orders of birds in the study area

Plates of different kind of Birds which are seen during study area in Manasbal in the year of 2019



Fig.1 Rusty Tailed Flycatcher Fig.2 White Capped Redstart Fig.3 Common Kingfisher Fig.4 Himalayan Woodpecker



Fig.1 White Throated Kingfisher Fig.2 Eurasian Golden Oriole Fig.3 White Wagtail Fig.4 Grey Heron



Fig.1 Eurasian Hoopoe Fig.2 Pallas Fish Eagle Fig.3 Eurasian Collared Dove Fig.4 Rufous Backed Shrike

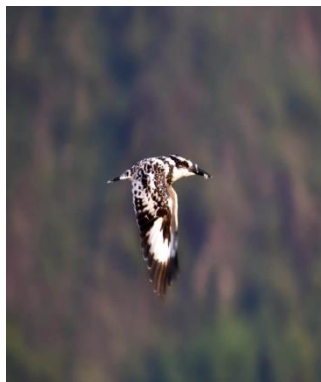
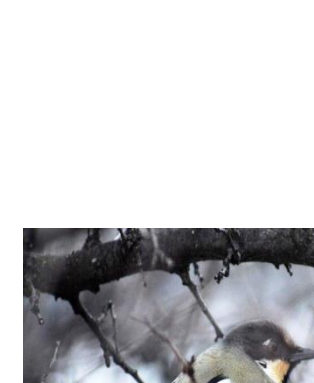
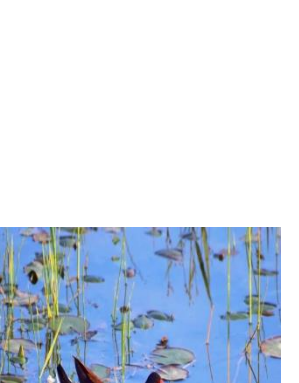
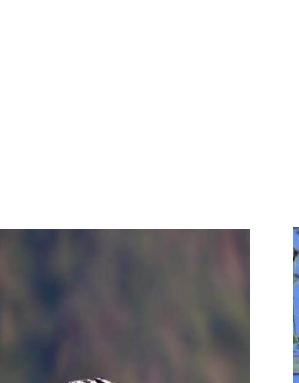


Fig.1 Tickell's Thrush Fig.2 Lesser Pied Kingfisher Fig.3 Common Moorhen Fig.4 Indian Wabler

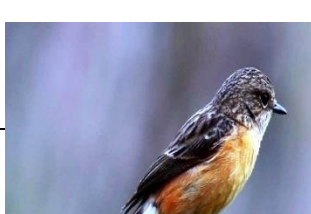


Fig.1 Grey Wagtail Fig.2 White Throated Buschat Fig.3 House Sparrow Fig.4 European Golden Finch Male



Fig.1 Little Ringed Plover Fig.2 Eurasian Winter Wren Fig.3 White Throated Kingfisher Fig.4 Water Rail

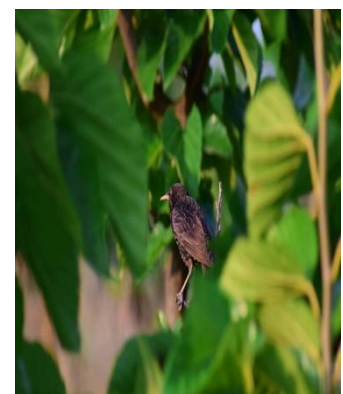


Fig.1 Great Tit Fig.2 Grey backed shrike Fig.3 Indian Pond Heron Fig.4 Common Starling

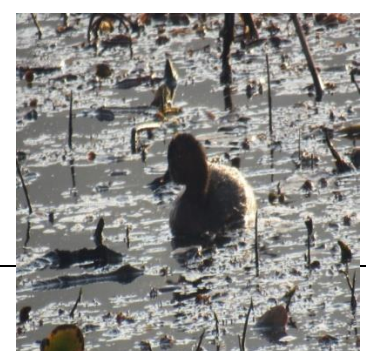


Fig.1 White Throated Dipper Fig.2 Long Tailed Myna Fig.3 White Cheeked Bulbul Fig.4 Little Grebe



Fig.1 Indian Pond heron Fig.2 European Bea Eater Fig.3 Black Naped Oriole Fig.4 European Goldfinch



Fig.1 Common Cock Fig.2 Citrine Wagtail Fig.3 Blue Whistling Thrush Fig.4 Common Hen



Fig.1 Common Crow Fig.2 Little Owl Fig.3 Golden Eagle Fig.4 Common Myna

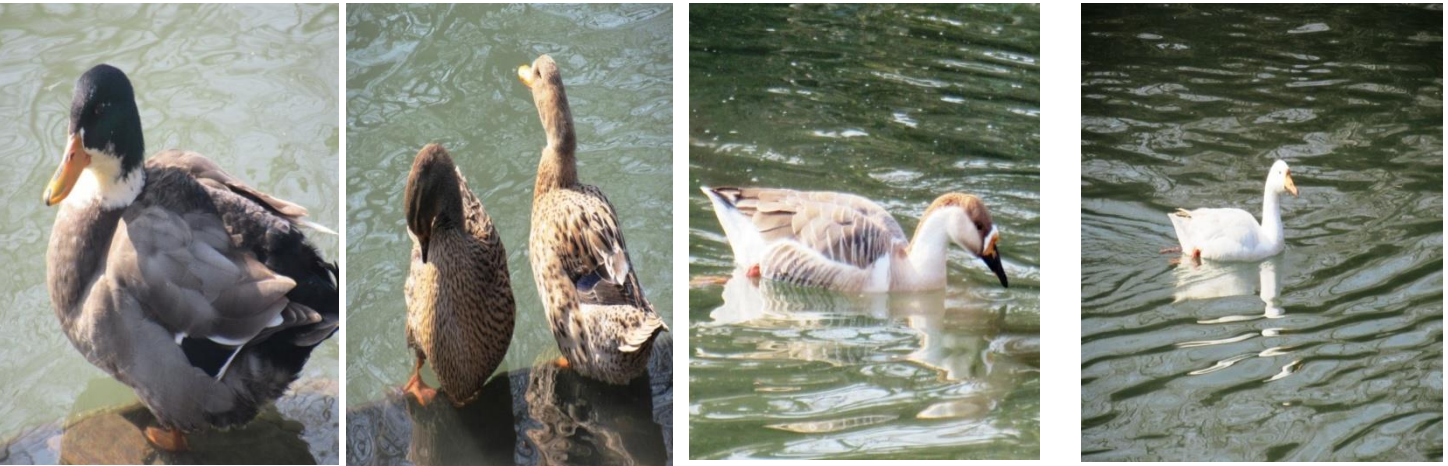


Fig.1 Domestic Duck Male Fig.2 Domestic Duck Female Fig.3 Male Goose Fig.4 Female Goose



Fig.1 Himalayan Bulbul Fig.2 Himalayan Cuckoo Fig.3 Rock Pigeon Fig.4 Little Egret

Discussion and Conclusion

During the present study, 46 species of birds belonging to 23 families and 13 Orders were reported from manasbal region of Jammu and Kashmir in the year of 2019. Out of these 46 species were maximum number of species are resident and rest of them are migrants. A comparative account of the bird species reported from the study area during the present study with that of the bird species already reported from India (Table 1.1a) revealed that Order Passeriformes has the highest diversity of species at the country level (53.92%) as well as in the study area (46%) followed by Order Ciconiiformes with 21.07% at country level and 13% in the study area. However, Order Upiformes was the third largest Order in the study area with 11% of the

species reported during the present study belonged to this Order which was found to be only 3.38% at the country level. Other Orders had very little diversity of birds in the study area with Columbiformes having 7%, Gruiformes 2%, Piciformes 2%, Cuculiformes 4%, columbiformes 7%, anseriformes 9%, acciptriformes 2%, daliformes 2%, Coraciiformes 2%, and Strigiformes had 2%. The least diversity of bird species were recorded in Order Gruiformes, piciformes, acciptriformes, and daliformes having only 2% each of the birds reported from the study area during the present study. While as Orders Craciiformes, Turniciformes, Bucerotiformes, Trogoniformes, Coraciiformes, Apodiformes, Galliformes, and Psittaciformes were found to be not represented in the study area during the course of present investigation.

A study of the distribution of avian species in manasbal lake are included Bar-headed Goose, and common Crane which were reported to visit the wetland often. During summer they spend their time for the breeding purpose and were found dwelling in different habitats providing them food and shelter.

On the basis of availability of various natural characteristics, the study area was divided into five different habitats and bird species were surveyed in relation to these habitats, i.e. Cultivation/Grassland habitat (CGH), Plantation habitat (PH), Rocky mountain slope habitat (RMH), Aquatic habitat (AqH), Aerial habitat (AeH).

During the present study, records were made of the food preferred by different species of birds and the reported birds were categorized into insectivorous, carnivorous, grainivorous, frugivorous, herbivorous and omnivorous. Some Insectivorous categories were further subdivided into Terrestrial Insectivores

(TI), Aquatic Insectivores (AqI), Aerial Insectivores (AI), Shore Insect Probers (SIP), Shore Aerial Insectivore, Trunk or Bark Feeders (TBF), Understorey Insectivores (UI), Canopy Insectivores (CI), Wading Insectivores (WI) and Diving Insectivores (DI).

Carnivorous category was also categorized into Aquatic Carnivores (AqC),

Arboreal Aquatic Carnivores (AAqC), Wading Carnivores (WC), Diving Carnivores (DC), Terrestrial Carnivores (TC) and Arboreal Terrestrial Carnivores (A).. Interesting among these was Water Rail which was observed to feed on plankton and aquatic vegetation in water and comes out on the shore to graze on the tender vegetation including the leaves of *Hippophae* scrubs. Thus, this species was categorized as Pl/AqH/TH.

Some waterfowls were recorded to utilize the aquatic and shore vegetation as their chief source of food. Accordingly, they were categorized as Herbivores. Thus, Herbivores were further divided into Aquatic Herbivores (AqH) and Terrestrial Herbivores (TH).

In the study area it was observed that some of the birds hatch their eggs as the availability of insects, on which they feed their young ones, were more in these months besides the milder climatic conditions, tall grasses and thick foliage on the tree

Order Anseriformes was represented by 4 species belonging to Family Anatidae which include 3 sub-families namely, Anserini, Anatidae and Anatini. Subfamily Anserini was represented by Bar-headed Goose.

Subfamily Anatini includes Mallard and white headed duck species and sub family anatidea was represented by common duck.

Order Upiformes included only one species belonging to Family Upidae. Common Hoopoe was a mainly found in summer season and hence it is summer visitor.

Family Alcedinidae was represented by Common Kingfisher, Blue Eared Kingfisher, White Throated Kingfisher, and lesser pied Kingfisher in the study area during the period of study.

Common Kingfisher was observed throughout year during the study period.

Order Cuculiformes was represented by 2 species belonging to Family Cuculidae.

Eurasian Cuckoo was an occasional summer visitor to the study area.

Order Strigiformes was represented by only one species viz Little Owl belonging to Family Strigidae. Little Owl was a resident bird and was observed, from the area.

Order: Ciconiiformes Family: Accipitridae, Golden Eagle was frequently seen gliding over the area. From Order Passeriformes 21 species belonging to 10 families were recorded. Two species from Family Laniidae were observed in the study area.

Rufous backed Shrike. SubFamily: Oriolini, Eurasian Golden Oriole.

Family: Corvidae, House Crow was observed occasionally from this area belonging to family corvidae.

Family: Muscicapidae, Blue whistling thrush was recorded and also Tickell's Thrush was observed from the area.

Family Passeridae: Subfamily Passerinae: House Sparrow was observed to be a common resident bird in the study area cut during ending July/September in manasbal lake.

Order coraciiformes was represented by only one species namely Domestic Cock belonging to Family Phasianidae.

References

Pfister, O. (2004). Birds and Mammals of Ladakh. Oxford University Press, New Delhi.

Pfister, O. (2001). Birds recorded during visits to Ladakh, India from 1994 to 1997. Forktail, 17: 81-90

Ripley, S. D., Bheeler, B. M. and Krishna Raju, K. S. R. (1988). Birds of the Vishakhapatnam Ghats, Andhra Pradesh. J. Bomb. Nat. Hist. Soc., 84: 540-559; 85: 90-107.

Ali, S. (1941). Book of Indian Birds. Bombay Natural History Society.