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Assessments of avian diversity of Uchhali lake, Pakistan

Sana Ashraf[1*], Amna Riaz[1] and Noor Muhammad

1. Department of Zoology, University of Lahore, Sargodha Campus, Sargodha, Pakistan
2. Department of fisheries and aquaculture, Government of Punjab

***Corresponding Author:** sanaashrafdr@gmail.com

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ABSTRACT

The wetlands of Pakistan covers a variety of ecosystems . Wetlands are the main source to country economy of Pakistan as they provide a site for tourism and important habitat of many valuable species of birds. The objective of the study was to know the avian diversity especially of aquatic avian fauna at Uchhali Lake from October 2015 to September 2016 on monthly basis. During the research total 36 avian species were observed in the vicinity of Uchhali Lake with a population of 13,342. Out of total, common coot was the top populated species and population was noted as 8510. Among the 36 species observed at the Uchhali Lake 56% were noted as resident, 39% were noted as winter visitor, 5% were noted as summer breeders. During the research total 36 avian species were recorded in the vicinity of Uchhali Lake, and population was 13,342. Common coot was the most abundant species, out of total avian species, population was recorded as 8510 and relative abundance was 63.78. While common pochard was 2nd dominant species with the total count was 1275 and relative abundance (RA) was 63.78. Avian species with the lowest number was recorded as crested lark.

Key words: Avian diversity, Aquatic avifauna, Resident, Winter visitors, Summer breeder, Passage migrant, Shannon-Weiner diversity index.

INTRODUCTION

Wetlands are the vital components of ecosystem; give a source of broad range of ecosystem and water regulation. Wetlands have significance for eco-tourism (Altaf *et al.*, 2014; Umair, 2018; Misbakh-Un-Nisa and Gardazi, 2019). The wetlands in Pakistan covers a variety of ecosystems ranging from forests, natural lakes, man-made reservoir, freshwater marshes, ponds, estuaries and Marine water. Wetlands are the main source to country economy of Pakistan as they provide a pleasing site for tourism and important habitat of many valuable species of animals and plants. The high global significance of wetlands of Pakistan is also due to the diversity of species that they support (Chaudhry, 2010; Altaf *et al.*, 2014; Ali *et al.*, 2017).

The environmental quality of an area can be estimated by the mere abundance of one or more birds' species (Van Horne, 1983). Pakistan is one of the wintering areas for avian species (Combreau *et al.,* 2001). A huge population and diversity of avian species migrate from Europe as well as central Asian countries and wetlands to Pakistan. Total seven fly zones are present in the whole world and one is present in Pakistan known as Indus fly zone. Ducks, flamingos, cranes, swans, falcons, geese and waders are migratory birds in Pakistan (Ali, 2005). Pakistan is also one of the countries where these birds are at greatest risk from hunting (Combreau *et al.*, 2001; Altaf, 2016). The Objective of this study is to access the number and variety of birds visiting the wetland throughout the year.

MATERIALS AND METHODS

Study Area: The study was conducted during the month of October 2015 to September 2016 at the Uchhali Lake, and this is located in the Salt Range of Pakistan (Figure 1).

Methodology: To observe and record the avian diversity at the study site observations were made usually at early morning and at different points on each site by using binoculars (10×60). Avian data were observed by using book to the "Birds of Pakistan" by (Mirza and Wasiq, 2007). Secondary data was obtained by local meetings and published data. On each site number of individual birds was noted three times and then the average was calculated. Boat was also used for the survey purpose.

Statistical Analysis of avian fauna: Statistical analysis (i.e. Relative abundance, Shannon-wiener diversity Index, Species richness and Species evenness) was done with the help of MS Excel.

Relative abundance: Relative abundance (RA) was calculated with this formula.

$$RA: \quad \frac{\text{Whole number of individual of one avian species}}{\text{Whole number of individual of all avian species}} \times 100$$

Shannon-wiener diversity Index: Shannon-wiener diversity Index was calculated with this formula (Shannon and Weaver, 1949):

"H' = - [ΣPI In PI]"

H' = Shannon-wiener diversity Index

PI = relative abundance of avian species to whole population.

Species richness (SR): Species richness was calculated with this formula (Margalef, 1958).

"SR = (S – 1)/logn N"

S= Whole number of avian species
N = Whole number of birds present in the sample

Species evenness (E): Species evenness was calculated with this formula (Pielou, 1966).

"E = H'/ Logn S"

Where S= Whole number of avian species
H'= Shannon-wiener diversity index.

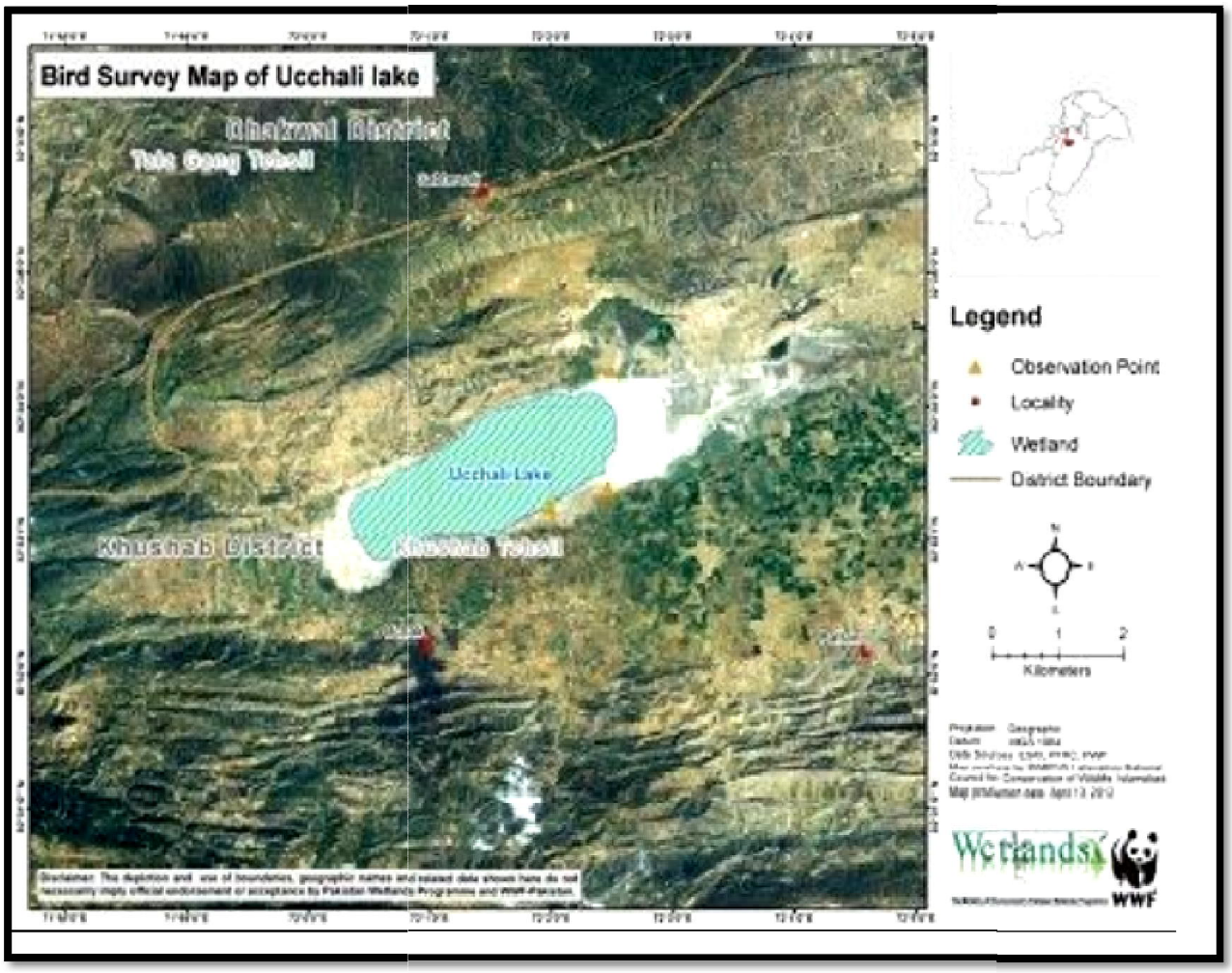

Figure 1: Map of study area.

RESULTS

During the research total 36 avian species were recorded in the vicinity of Uchhali Lake, and population was 13,342. Common coot was recorded as top populated species, out of total avian species, population was recorded as 8510 and relative abundance was 63.78. While common pochard was the 2nd dominant species with total count was 1275 and relative abundance (RA) was 63.78. Bird species with the lowest number was recorded as crested lark. Other top populated species

observed were as; little grebe (*Tachybaptus ruficollis*), Northern shoveler *(Anas clypeata)*, black wing stilt (*Himantopus himantopus*), mallard (*Anas platyrhynchos*), greater flamingo (*Phoenicopterus ruber*) and common teal (*Anas crecca*) (Table 1).

Table 1: Bird data of study area.

Sr.	Species		Total	Relative abundance
	Common Name	**Scientific Name**		
1	Common Coot	*Fulica atra*	8510	63.78
2	Common Pochard	*Aythya ferina*	1275	9.56
3	Northern Shoveler	*Anas clypeata*	697	5.22
4	Little Grebe	*Tachybaptus ruficollis*	529	3.96
5	Common Teal	*Anas crecca*	339	2.54
6	Black wing stilt	*Himantopus himantopus*	277	2.08
7	Gadwall	*Anas strepera*	213	1.6
8	Common Myna	*Acredotheres tristis*	209	1.57
9	Barn swallow	*Hirundo rustica*	193	1.45
10	Mallard	*Anas platyrhynchos*	190	1.42
11	Greater flamingo	*Phoenicopterus ruber*	161	1.21
12	House crow	*Corvus splendens*	144	1.08
13	Red wattled lapwing	*Vanellus indicus*	136	1.02
14	Weigon	*Anas penelope*	115	0.86
15	White wagtail	*Motacilla alba*	93	0.7
16	Northern Pin Tail	*Anas acuta*	90	0.67
17	Common Moorhen	*Gallinula chloropus*	70	0.52
18	Little egret	*Egretta garzetta*	65	0.49
19	Great crested Grebe	*Podiceps cristatus*	40	0.3
20	Indian Pond Herron	*Ardeola grayii*	39	0.29
21	Little stint	*Calidris minutus*	34	0.25
22	Red vented bulbul	*Pycnonotus cafer*	31	0.23

23	White throated kingfisher	*Halcyon smyrnensis*	30	0.22
24	Green bee-eater	*Merops orientalis*	30	0.22
25	Black kite	*Milvus migrans*	29	0.22
26	Eurasian Collard Dove	*Streptopelia decaocto*	25	0.19
27	Rock pigeon	*Columba livia*	22	0.16
28	Black drongo	*Dicrurus macrocercus*	22	0.16
29	Common Sandpiper	*Actitis hypoleucos*	20	0.15
30	Grey Heron	*Ardea cinerea*	17	0.13
31	Intermediate Egret	*Mesophoyx intermedia*	16	0.12
32	Black Shouldered Kite	*Elanus caeruleus*	16	0.12
33	Pied bush chat	*Saxicola caprata*	15	0.11
34	Purple Heron	*Ardea purpurea*	14	0.1
35	Indian Roller	*Coracias benghalensis*	14	0.1
36	Crested Lark	*Galerida critata*	10	0.07

Total area of the Uchhali Lake is 943 hectares (Arshad et al. 2015). Census Index of Uchhali Lake is 1456.00/Km^2. Shannon-Weiner diversity index calculated for Uchhali Lake is 1.71. Uchhali Lake has Richness Index also called as Margalef Index of 3.7. Evenness index of Uchhali Lake is 0.46 (Table 2).

Table 2: Summary of different analysis of birds from survey sites.

Analysis	**Uchhali**
Survey Area (ha)	943
Total Population	13730
Total Number of Species	36
Shannon-Weiner Diversity Index	1.71
Richness Index	3.7
Evenness Index	0.46

Among the 36 species observed at the Uchhali Lake 20 were resident (56%), 14 were winter visitor (39%), 2 were summer breeders (5%) (Table 3 and Figure 2).

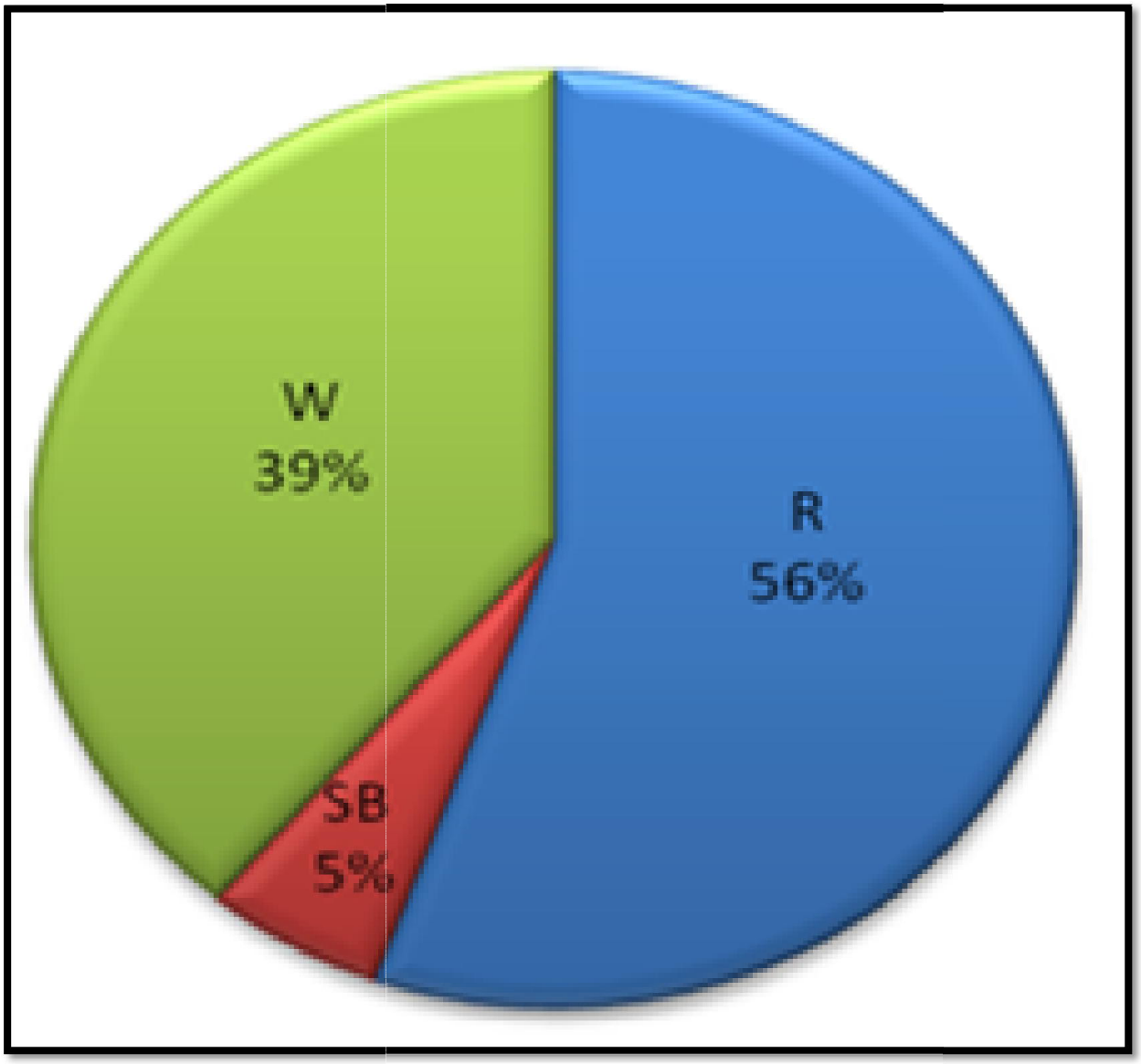

Figure 2: Status of the birds of Uchalli Lake, Punjab, Pakistan.

Table 3: Distribution of birds at Uchhali Lake

Distribution	**Uchhali Lake**
Species	36
Resident species (R)	20
Winter Visitors species (W)	14
Summer Breeder species (SB)	2
Passage Migrant species (PM)	0

DISCUSSION

Bird migration mainly depends upon many factors like location of sundown to the stars and moon. Wind also negatively impacts on migration in avian species.

Avian species like to fly when fly is suitable and dusk. In Pakistan salt range complex is the chief wintering site for the majority of the aquatic birds (Ali, 2005).

Ali and Akhtar (2005) observed Uchhali Lake during the month of January-February, 2003. During one of their study Arshad et al. (2014) recorded 11 species during the year of 2010 and 34 species during the year of 2011 at Uchhali Lake. In the present study number of observed bird species are 36 from Uchhali Lake.

Uchhali Wetland Complex supports large number of birds each year due to accessibility of different food resources and nesting sites. The variation in the number of species visited during the past years is due to the change in the morphometery and water level of the lake. In past year, Uchhali Wetland Complex had faced major climatic and morphometeric changes (Ali, 2005). It is concluded from the review of previous studies and from current study that migratory birds attracted towards the higher water level of lakes.

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Availability of data: We have included all data in the manuscript that were collected during the field survey.

Authors' contributions: Riaz has designed project, collected data and written this article; while Ashraf has supervised the project and Muhammad critically analysis this article and approved as final.

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