

Habitat Preference of Avifaunal Diversity of Gundolav Lake at Kishangarh, Ajmer District, Rajasthan, India

Abstract

The Avifaunal diversity of Gundolav lake was observed with the common survey methods (visual encounter, line transect, point count) and modern tools (Digital camera and Call Count method). A total of 104 species belonging to 17 orders and 44 families were observed during the study. Water mining, agricultural practices, sewage mixing, poaching etc. were identified as direct or indirect threats to the species at Gundolav Lake. By the proper management and sustainable practices, it can be developed as one of the potential Ecotourism site and locals may also get benefited.

Keywords: Avifaunal, Habitat Preference, Gundolav Lake, Water Birds.

Introduction

Birds are excellent model organisms for understanding key issues in ecology, animal behaviour, evolutionary biology and conservation (Urfi, 2011). Birds are among the nature's most beautiful animal and undoubtedly, bird habitat particularly within the lake areas seems to be strongly influenced by climatic changes and immediate human impact.

Birds which are ecologically dependent on wetlands are known as water birds. They play a significant role in human lives culturally, socially, scientifically and as a food resource (Kumar et al. 2003). Water birds are important components of most of the wetland ecosystems as they occupy several trophic levels in the food web of wetland nutrient cycles (Rajashékara and Venkatesha, 2010). Freshwater lakes one of the important types of wetlands, play a vital role in the economics of their respective regions, especially with reference to agriculture, fishing, livestock maintenance and drinking water facilities of the adjacent areas.

Diversity of avifauna is one of the most important ecological indicators to evaluate the quality of habitats. Now-a-days, avifaunal diversity has been decreasing due to the destruction of natural habitats and human disturbances. Random destruction of natural habitats by cutting nesting trees and foraging plants for commercial use of woods and lands are the main factor responsible for narrow down in avian foraging habitat and their nesting sites. Thus, many species of birds may be forced to inhabit in the urban areas and constrain them to breed there. Birds are essential animal group of an ecosystem and maintain a trophic level. Therefore, detail study on avifauna and their ecology is important to protect them.

Review of Literature

Diversity and Population Status

Sarkar et.al (2009) investigated comparative study on diversity and population status of avifauna in Uttara urban area of Dhaka city with their breeding records was done in 12-months period from August 2004 to July 2005.

Naithani and Bhatt (2010) observed avifauna of some parts of Pauri district (western Himalayas), Uttarakhand. The number of species was higher at high elevation zone than at mid- and low- elevations.

Das and Saikia (2011) highlighted the threat factors prevailing in the DeeporBeelRamsar Site. Study has been carried out to assess the water bird diversity in Dee por Beel Ramsar site of Assam from March 2007 to March 2010. Study revealed the presence of 39 species of water birds belonging to 16 families. A total of 164 species of birds belonging to 16 Orders and 44 families were recorded by Gupta et.al (2012) from the Khaparwas bird Sanctuary in Jhajjar district in Haryana, India. It was

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strongly recommended that Khaparwas has the potential to occupy a National Character as a Sanctuary.

Talmale et. al (2012) recorded 173 species of birds belonging to 16 Orders, 49 families and 9 subfamilies from whole Singhori Wildlife Sanctuary, Raichur District of Madhya Pradesh, India including agricultural fields of those villages in and around sanctuary area.

Joshi (2012) studied avian diversity in the Nainital district of Uttarakhand, India at different elevations. A total of 174 bird species belonging to 38 families were identified along with the elevational zone of forest habitats.

The occurrence and diversity of waterbirds in Barna reservoir from March 2009 to February 2011 was studied by Balapure et. al (2012). A total 63 species of water birds belonging to 7 order and 12 families were recorded from the wetland during the study. The avian diversity of Tawa Reservoir and its surrounding areas at Hoshangabad district was studied for a period of two years during January 2009 to December 2010 by Joshi and Shrivastava (2012). The Line Transect Method was used for bird survey. The area inhabits many residential and migratory bird species.

Patil et. al (2013) investigated avian fauna and physico-chemical parameters of Gajargaon pond, Maharashtra. Twenty-two different species of birds have been cited belonging to 9 orders and 14 families during the year 2011. Total number of 58 birds' species belonging 9 orders and 29 families were recorded by Chilke (2014) Bamanwada Lake is located at the outskirts of Rajura. Passeriformes is the dominating order of birds. But the future of this avian fauna is in danger due to industrial progress of the city.

Patra and Chakrabarti (2014) recorded the total number of 86 bird species belonging to 10 orders and 35 families during the 2-year long study period at thedigha that is located at the border of West Bengal and Orissa state. It was concluded that the future of the avian fauna is in danger due to unchecked growth of tourism related hotel industry and urbanization of the city.

Harney (2014) documented the avifauna in and around the Ghotnimbala Lake of Chandrapur district of Maharashtra during October 2012 to September 2013 and reported 55 species of birds belonging to 13 different orders and 37 families during the study. Total 64 bird species were observed by Rutuja (2014) revealed that there is a difference in bird richness and diversity between the habitats of agro ecosystem in the study area.

Seasonal Variations

Kait et. al (2014) surveyed an avifaunal diversity in Srinagar city of Jammu and Kashmir from November 2007 to December 2009 to assess the migratory status and local abundance of the birds. A total of 54 species of birds were recorded. Out of them 25 species were residents, 17 species were summer visitors (summer migrants) and 12 species were winter visitors (winter migrants).

Pawar and Wanjari (2015) dealt with the avian diversity and seasonal abundance of Muchi Lake Wetland located at Yavatmal district of Maharashtra. The results revealed that the variation in food availability in different season effects on avifaunal diversity in studied area.

Puri (2015) recorded maximum abundance status species during the winter season followed by summer season at the Malguzari Lake at Zaliya, Maharashtra which was having rich aquatic vegetation and harbors several kinds of birds.

Kanaujia (2015) presented diversity of water bird in Lucknow and adjacent areas in different unprotected wetlands of Lucknow. The study revealed that in Lucknow there are maximum populations of Migratory water birds followed by residential, residential/local migratory and residential/migratory species during the period of two year.

Sharma (2016) recorded 47 species belonging to 7 orders and revealed that the avifauna is facing severe threat due to mining and urbanization.

Puri and Virani (2016) the avifaunal diversity of Khairbandha Lake was studied from February 2014 to January 2016 based on visual encounter surveys. Total 86 species including water birds and land birds were recorded belonging to different 33 families during the study period. Anatidae family dominated with 15 species throughout the study period.

Rahman et. al (2019) surveyed the avian diversity in the wetlands and suburbs of Kollam district was carried out during December 2015 to March 2017. A total of 53 species of birds belonging to 34 families from 13 orders were recorded. Out of these 34 Species of these were residents, 14 were migrants and 5 were local migrants.

Adhikari et. al (2019) suggested that human disturbance caused a significantly negative impact on the presence, distribution, diversity, and abundance of threatened birds in CNP and adjoining areas. The study recorded a total of 437 individuals of globally threatened birds belonging to 19 species of nine families and eight orders. The study done by Kumar et.al (2019) Counts and monitoring of the Greater Flamingos (*Phoenicopterus roseus*) in reservoirs of Lalitpur have been carried out since 2015. Conservation efforts in Lalitpur should include the regular monitoring and controlled human activities around the aquatic systems.

Aims and Scope

1. To provide an annotated checklist of bird species having occurrence at Gundolav lake.
2. To identify the distribution pattern and threats affecting the initiating bird species.

Profile of Study Area

Totally rain-fed Gundolav Lake is a manmade lake amidst low hills erected on almost plain surface of eastern semiarid agro-climatic zone, located in the North of Kishangarh (Rajasthan) at 26°28' N and 74°52' E, at 500 m above MSL.

Gundolav Lake is one of the many perennial shallow water bodies around Kishangarh, of which Hamir Pond, Santolav Pond, Ransamand Pond are important.

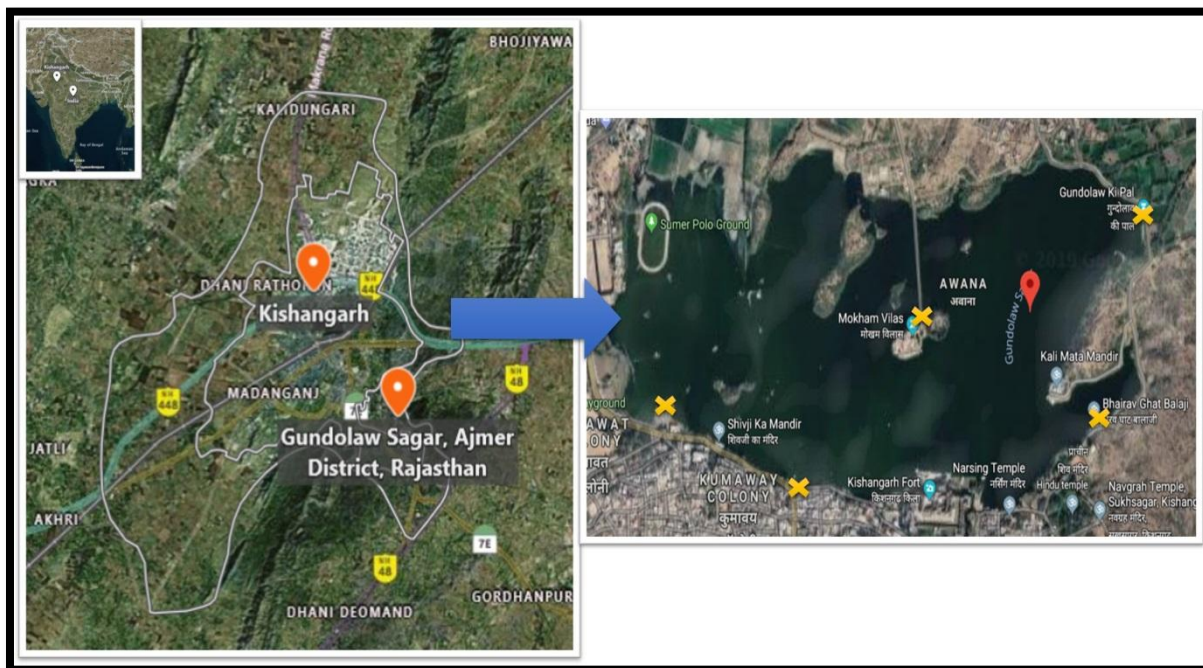
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In Vikram Samvat 1527 (1470 AD), Seth Gunda Shah Agarwal laid the foundation of the lake for public benefit. On the northern end of Gundolav, is situated the beautiful and auspicious 'Ram Tekri'. There is 'Khoob-Kutir' on the south east end of the lake. Yagya-sthali and ManakTekri, Phool Mahal are other places near the lake. 'Awanna' beautifies the eastern side of the lake from where water used to come out. Shiv-Ghat is the oldest ghat of the lake. In the middle of the lake is situated 'Mokham Vilas' which gives a marvellous view [Source: Kishangarh

Tavarikh]. Till the independence Gundolav Lake hold an important place as a source of drinking water supply to the city and was a destination for various recreational activities.

About 1,254 bigha land in the basin of the Gundolav Lake is used for farming, when lake dried up. Due to multifold pressure of urbanization and industrialization, urban wastewater discharge, cloth washing activities, agricultural practices and construction of hotels and housing colonies, the major part of the lake is greatly affected.

Figure 1: Showing the location of Gundolav Lake of Kishangarh



Survey Methods

The study was conducted during July 2018 to June 2019 aims to examine the avifauna from study area. The observation of the birds was carried out by using field binocular (20x50 magnification) depending on the light conditions during the day time (Namgail et al. 2009). The bird population was estimated by direct count method twice in a month as described and employed by (Bibby et al. 2000; Urfi et al. 2005). After detection, specimen was photographed by camera and identified with the help of various diagnostics keys and methods suggested by Ali (2002), Grimmett et al. (2011) and Manakadan et al. (2011).

Sorenson Index

To assess the association of species between two study sites, Sorenson's index of similarity (Sorenson 1948) was calculated.

$$C_s = 2j / (a+b)$$

Where; j = number of species common to both sites;
a = number of species at site A;
b = number of species at site B;

Jaccard Index

To assess the association of species between two study sites, Jaccard index of similarity was calculated.

$$C_j = j / (a+b-j)$$

Where; j = number of species common to both sites;
a = number of species at site A;
b = number of species at site B;

Shrinkhla Ek Shodhparak Vaicharik Patrika

Table 1: Site wise Presence, Absence and Habitat Preference of Avifaunal diversity of Gundolav Lake of Kishangarh

S.No.	Order	Family	Common name	Scientific name	IUCN status	Site A	Site B	Site C	Site D	Site E	Deep Water	Shallow Water	Terrestrial	Arboreal
1	Anseriformes	Antidae	Common pochard	<i>Aythya ferina</i>	LC	1	1	0	0	1	1	0	1	0
2	Anseriformes	Antidae	Knob-billed duck	<i>Sarkidiornis melanotos</i>	LC	0	0	0	0	1	1	1	1	0
3	Anseriformes	Antidae	Northern Shoveler	<i>Spatula clypeata</i>	LC	1	0	0	0	1	1	1	0	0
4	Anseriformes	Antidae	Indian spotbilled duck	<i>Anas poecilorhyncha</i>	LC	1	1	0	0	1	1	1	1	0
5	Anseriformes	Antidae	Common Teal	<i>Anas crecca</i>	LC	1	1	0	0	1	1	0	0	0
6	Anseriformes	Antidae	Ruddy shelduck	<i>Tadorna ferruginea</i>	LC	1	0	0	0	0	1	0	0	0
7	Anseriformes	Antidae	Garganey	<i>Spatula querquedula</i>	LC	1	0	0	0	0	1	0	0	0
8	Anseriformes	Antidae	Gadwall	<i>Mareca strepera</i>	LC	1	1	0	0	0	1	0	1	0
9	Anseriformes	Oriolidae	Indian Golden Oriole	<i>Oriolus kundoo</i>	LC	1	1	0	0	0	0	0	0	1
10	Galliformes	Phasianidae	Indian Peafowl	<i>Pavo cristatus</i>	LC	0	0	0	1	0	0	0	1	1
11	Galliformes	Phasianidae	Grey Francolin	<i>Francolinus pondicerianus</i>	LC	1	0	0	0	0	0	0	1	0
12	Phoenicopteriformes	Phoenicopteridae	Lesser Flamingo	<i>Phoeniconaias minor</i>	NT	1	0	0	0	0	1	1	0	0
13	Phoenicopteriformes	Phoenicopteridae	Greater flamingo	<i>Phoenicopterus roseus</i>	NT	1	0	0	0	0	1	1	0	0
14	Columbiformes	Columbidae	Laughing dove	<i>Spilopelia senegalensis</i>	LC	1	1	1	1	1	0	0	0	1
15	Columbiformes	Columbidae	Eurasian collard dove	<i>Streptopelia decaocto</i>	LC	1	1	1	1	1	0	0	0	1
16	Columbiformes	Columbidae	Yellow-footed Green-pigeon	<i>Treron phoenicopterus</i>	LC	0	0	1	0	0	0	0	0	1
17	Columbiformes	Columbidae	Blue rock pegin	<i>Columba livia</i>	LC	1	1	1	1	1	0	0	0	1
18	Cuculiformes	Cuculidae	Asian koel	<i>Eudynamys scolopaceus</i>	LC	0	0	1	1	0	0	0	0	1
19	Cuculiformes	Cuculidae	Greater coucal	<i>Centropus sinensis</i>	LC	0	0	0	1	0	0	0	1	1
20	Gruiformes	Rallidae	Common coot	<i>Fulica atra</i>	LC	1	1	1	0	1	1	1	1	0
21	Gruiformes	Rallidae	Common moorhen	<i>Gallinula chloropus</i>	LC	1	0	0	1	1	1	1	1	0

22	Gruiformes	Rallidae	White breasted water hen	<i>Amaurornis phoenicurus</i>	LC	1	0	0	1	1	1	1	1	0
23	Gruiformes	Rallidae	Purple swamphen	<i>Porphyrio poliocephalus</i>	LC	1	0	0	0	1	0	1	1	0
24	Pelecaniformes	Pelecanidae	Dalmatian pelican	<i>Pelecanus crispus</i>	VU	1	1	1	1	1	1	1	0	0
25	Pelecaniformes	Pelecanidae	Rosey pelican	<i>Pelecanus onocrotalus</i>	LC	1	1	1	1	1	1	0	0	0
26	Pelecaniformes	Ardeidae	Median egret	<i>Ardea intermedia</i>	LC	1	1	1	1	1	0	1	1	0
27	Pelecaniformes	Ardeidae	Little egret	<i>Egretta garzetta</i>	LC	1	1	1	1	1	0	1	1	0
28	Pelecaniformes	Ardeidae	Cattle egret	<i>Bubulcus ibis</i>	LC	1	0	1	1	1	0	1	1	1
29	Pelecaniformes	Ardeidae	Grey heron	<i>Ardea cinerea</i>	LC	1	0	0	1	1	0	1	1	0
30	Pelecaniformes	Ardeidae	Indian Pond Heron	<i>Ardeola grayii</i>	LC	1	1	1	1	1	0	1	1	0
31	Pelecaniformes	Ardeidae	Great egret	<i>Ardea alba</i>	LC	1	1	1	1	1	0	1	1	0
32	Pelecaniformes	Ardeidae	Purple heron	<i>Ardea purpurea</i>	LC	1	0	0	0	1	0	1	1	0
33	Pelecaniformes	Ardeidae	Black crowned night heron	<i>Nycticorax nycticorax</i>	LC	1	0	0	0	1	0	0	0	1
34	Pelecaniformes	Threskiornithidae	Red-naped Ibis	<i>Pseudibis papillosa</i>	LC	1	0	0	0	1	0	0	0	1
35	Pelecaniformes	Threskiornithidae	Eurasian Spoonbill	<i>Platalea leucorodia</i>	LC	1	1	0	0	0	1	1	0	0
36	Pelecaniformes	Threskiornithidae	Glossy Ibis	<i>Plegadi sfalcinellus</i>	LC	1	0	0	0	1	1	1	0	0
37	Charadriiformes	Recurvirostridae	Black-winged Stilt	<i>Himantopus himantopus</i>	LC	1	1	1	1	1	0	1	1	0
38	Charadriiformes	Recurvirostridae	Pied avocet	<i>Recurvirostra avosetta</i>	LC	1	0	0	1	1	1	1	0	0
39	Charadriiformes	Charadriidae	Red wattled lapwing	<i>Vanellus indicus</i>	LC	1	1	1	1	1	1	1	1	0
40	Charadriiformes	Charadriidae	Little ringed plover	<i>Charadrius dubius</i>	LC	1	0	0	0	0	0	1	1	0
41	Charadriiformes	Jacaniidae	Pheasant-tailed Jacana	<i>Hydrophasianus chirurgus</i>	LC	1	1	0	0	0	0	1	0	0
42	Charadriiformes	Scolopacidae	Common snipe	<i>Gallinago gallinago</i>	LC	1	0	0	1	1	0	1	0	0
43	Charadriiformes	Scolopacidae	Wood sandpiper	<i>Tringa glareola</i>	LC	1	0	0	0	1	0	1	0	0
44	Charadriiformes	Scolopacidae	Ruff	<i>Calidris pugnax</i>	LC	1	0	0	1	1	0	1	1	0
45	Charadriiformes	Scolopacidae	Little stint	<i>Calidris minuta</i>	LC	1	1	1	1	1	0	1	0	0
46	Charadriiformes	Scolopacidae	Common sandpiper	<i>Actitis hypoleucos</i>	LC	1	0	0	1	1	0	1	0	0
47	Charadriiformes	Scolopacidae	black tailed godwit	<i>Limosa limosa</i>	NT	1	0	0	0	1	0	1	0	0

48	Charadriiformes	Scolopacidae	green sandpiper	<i>Tringa ochropus</i>	LC	1	0	0	0	1	0	1	0	0
49	Charadriiformes	Scolopacidae	Common green shank	<i>Tringa nebularia</i>	LC	1	0	0	1	1	0	1	0	0
50	Accipitriformes	Accipitridae	Black Shoulder Kite	<i>Elanus caeruleus</i>	LC	0	0	0	1	0	0	0	0	1
51	Accipitriformes	Accipitridae	Shikra	<i>Accipiter badius</i>	LC	0	0	1	0	0	0	0	0	1
52	Accipitriformes	Accipitridae	Oriental Honey-buzzard	<i>Pernis ptilorhynchus</i>	LC	0	0	1	1	0	0	0	0	1
53	Accipitriformes	Accipitridae	Black Kite	<i>Milvus migrans</i>	LC	0	0	0	1	0	0	0	0	1
54	Bucerotiformes	Bucerotidae	Indian grey hornbill	<i>Ocyrceros birostris</i>	LC	0	0	0	1	0	0	0	0	1
55	Bucerotiformes	Upupidae	Common hoopoe	<i>Upupa epops</i>	LC	0	0	0	1	1	0	0	1	0
56	Piciformes	Megalaimidae	Copper smith barbet	<i>Psilopogon haemacephalus</i>	LC	0	0	0	1	0	0	0	0	1
57	Piciformes	Picidae	Yellow-crowned Woodpecker	<i>Leiopicus mahrattensis</i>	LC	0	0	0	0	1	0	0	1	0
58	Piciformes	Picidae	Eurasian Wryneck	<i>Jynx torquilla</i>	LC	0	0	0	0	1	0	0	0	1
59	Coraciiformes	Meropidae	Green bee eater	<i>Meropus orientalis</i>	LC	1	1	1	1	1	0	0	0	1
60	Coraciiformes	Meropidae	Blue-cheeked Bee-eater	<i>Merops persicus</i>	LC	0	0	1	1	1	0	0	0	1
61	Coraciiformes	Coraciidae	Indian roller	<i>Coracias benghalensis</i>	LC	0	0	0	0	1	0	0	0	1
62	Coraciiformes	Alcedinidae	White throated kingfisher	<i>Halcyon smyrnensis</i>	LC	1	0	0	0	1	0	0	0	1
63	Coraciiformes	Alcedinidae	Pied kingfisher	<i>Ceryle rudis</i>	LC	0	1	0	0	0	0	0	0	1
64	Coraciiformes	Alcedinidae	Common Kingfisher	<i>Alcedo atthis</i>	LC	0	0	1	0	1	0	0	0	1
65	Coraciiformes	Alcedinidae	common kingfisher	<i>Alcedo atthis</i>	LC	0	1	1	0	0	0	0	0	1
66	Psittaciformes	Psittacidae	Rose ringed parakeet	<i>Psittacula krameri</i>	LC	1	1	1	1	1	0	0	0	1
67	Passeriformes	Cisticolidae	Common tailorbird	<i>Orthotomus sutorius</i>	LC	0	0	1	1	0	0	0	0	1
68	Passeriformes	Corvidae	Rufous treepie	<i>Dendrocitta vagabunda</i>	LC	0	0	0	1	0	0	0	0	1
69	Passeriformes	Corvidae	Jungle crow	<i>Corvus culminatus</i>	LC	1	1	1	1	1	0	0	0	1
70	Passeriformes	Dicruridae	Black drongo	<i>Dicrurus macrocercus</i>	LC	1	1	1	1	1	0	0	0	1
71	Passeriformes	Hirundinidae	Dusky Crag Martin	<i>Ptyonoprogne concolor</i>	LC	0	1	1	1	1	0	0	0	1
72	Passeriformes	Hirundinidae	Wire tailed swallow	<i>Hirundo smithii</i>	LC	1	1	1	1	1	0	0	0	1
73	Passeriformes	Laniidae	Bay backed shrike	<i>Lanius vittatus</i>	LC	0	0	0	1	1	0	0	0	1

74	Passeriformes	Leiothrichidae	Jungle babbler	<i>Argyas triata</i>	LC	1	0	1	1	1	0	0	1	1
75	Passeriformes	Leiothrichidae	Large grey babbler	<i>Argya mulcolmi</i>	LC	1	0	1	1	1	0	0	1	1
76	Passeriformes	Leiothrichidae	Common babbler	<i>Argya caudata</i>	LC	1	1	1	1	1	0	0	0	1
77	Passeriformes	Motacillidae	White wagtail	<i>Motacilla alba</i>	LC	1	0	0	0	1	0	0	1	1
78	Passeriformes	Motacillidae	White browed wagtail	<i>Motacilla maderaspatensis</i>	LC	1	1	1	1	1	0	0	1	1
79	Passeriformes	Motacillidae	Yellow wagtail	<i>Motacilla flava</i>	LC	1	0	1	0	1	0	0	1	1
80	Passeriformes	Motacillidae	Citrine wagtail	<i>Motacilla citreola</i>	LC	0	0	0	0	1	0	0	1	1
81	Passeriformes	Muscicapidae	Brown Rockchat	<i>Oenanthe fusca</i>	LC	1	1	1	1	1	0	0	1	1
82	Passeriformes	Muscicapidae	Blue Rock-thrush	<i>Monticola solitarius</i>	LC	0	0	0	1	0	0	0	0	1
83	Passeriformes	Muscicapidae	Oriental Magpie-robin	<i>Copsychus saularis</i>	LC	0	0	1	1	0	0	0	0	1
84	Passeriformes	Muscicapidae	Black redstart	<i>Phoenicurus ochruros</i>	LC	0	1	0	0	0	0	0	0	1
85	Passeriformes	Muscicapidae	Indian robin	<i>Copsychus fulicatus</i>	LC	1	1	1	1	1	0	0	1	1
86	Passeriformes	Nectariniidae	Purple sunbird	<i>Cinnyris asiaticus</i>	LC	1	0	1	1	1	0	0	0	1
87	Passeriformes	Passeridae	House sparrow	<i>Passer domesticus</i>	LC	1	1	1	1	1	0	0	1	1
88	Passeriformes	Pyconotidae	Red vented bulbul	<i>Pycnonotus cafer</i>	LC	1	1	1	1	1	0	0	0	1
89	Passeriformes	Cisticolidae	Ashy prinia	<i>Priniasocialis</i>	LC	1	0	1	1	1	0	0	0	1
90	Passeriformes	Laniidae	Iberian Grey Shrike	<i>Lanius meridionalis</i>	VU	0	1	0	0	0	0	0	0	1
91	Passeriformes	Laniidae	Long tailed shrike	<i>Lanius schach</i>	LC	0	0	0	1	0	0	0	0	1
92	Passeriformes	Phylloscopidae	Common Chiffchaff	<i>Phylloscopus collybita</i>	LC	0	0	0	1	0	0	0	0	1
93	Passeriformes	Sylviidae	Lesser Whitethroat	<i>Sylvia curruca</i>	LC	1	0	0	1	0	0	0	0	1
94	Passeriformes	Estrildidae	Indian Silverbill	<i>Euodice malabarica</i>	LC	1	0	0	1	1	0	0	0	1
95	Passeriformes	Sturnidae	Rosey starling	<i>Pastor roseus</i>	LC	1	0	0	1	1	0	0	0	1
96	Passeriformes	Sturnidae	Asian pied starling	<i>Gracupica contra</i>	LC	1	1	1	1	1	0	0	0	1
97	Passeriformes	Sturnidae	Brahminy starling	<i>Sturnia pagodarum</i>	LC	1	1	1	0	1	0	0	0	1
98	Passeriformes	Sturnidae	Bank myna	<i>Acridotheres ginginianus</i>	LC	1	1	1	1	1	0	0	1	1
99	Passeriformes	Sturnidae	Common myna	<i>Acridotheres tristis</i>	LC	1	1	1	1	1	0	0	1	1
100	Passeriformes	Ploceidae	Baya weaver	<i>Ploceus philippinus</i>	LC	0	0	1	0	0	0	0	0	1
101	Strigiformes	Strigidae	Spotted owl	<i>Athene brama</i>	LC	0	0	1	1	0	0	0	0	1
102	Suliformes	Phalacrocoracidae	Little cormorant	<i>Microcarbo niger</i>	LC	1	1	1	1	1	1	1	0	0
103	Suliformes	Phalacrocoracidae	Great cormorant	<i>Phalacrocorax carbo</i>	LC	1	1	1	1	1	1	1	1	0
104	Ciconiiformes	Ciconiidae	Painted stork	<i>Mycteria leucoc ephala</i>	LC	1	1	0	1	1	0	1	1	0
						72	43	48	64	71	21	35	37	61

Table Legends:

Site A: Nala Site ; Site B:Shiv Mandir; Site C: Bhairav Ghat Balaji; Site D: Gundolaw ki pal;Site E Mokhan Vilas

'0' indicates the absence of species and '1' indicates the presence of species

LC: Least Concern; NT: Near Threatened; VU: Vulnerable.

Table 2: Order wise detail of number of species

S. No.	Observed Orders	Number of Species
1	Anseriformes	9
2	Galliformes	2
3	Phoenicopteriformes	2
4	Columbiformes	4
5	Cuculiformes	2
6	Gruiformes	4
7	Pelecaniformes	13
8	Charadriiformes	13
9	Accipitriformes	4
10	Bucerotiformes	2
11	Piciformes	3
12	Coraciiformes	7
13	Psittaciformes	1
14	Passeriformes	34
15	Strigiformes	1
16	Suliformes	2
17	Ciconiiformes	1
		104

Figure 1: Graphical Representation of order wise detail of avifaunal diversity of Gundolav Lake

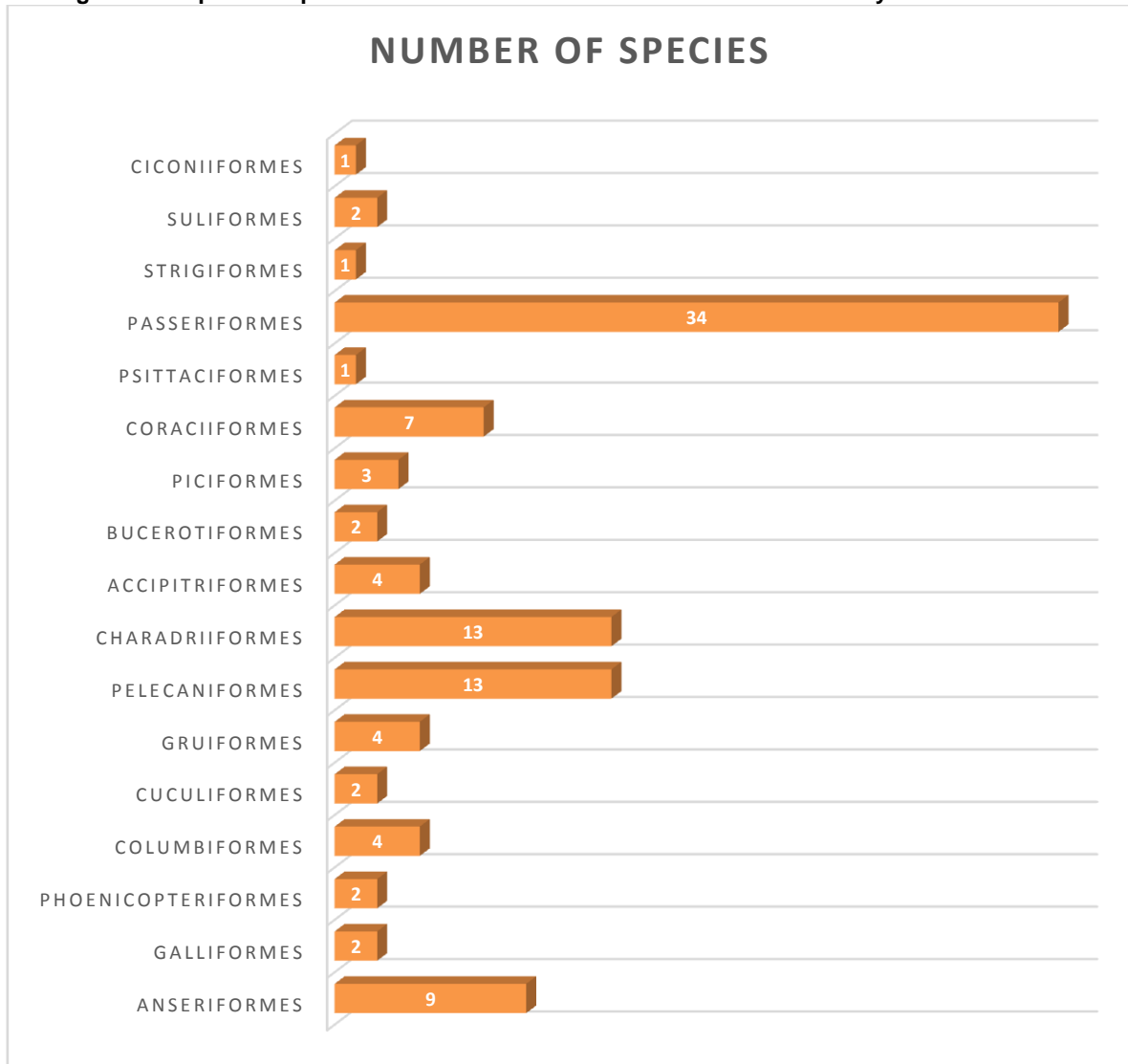


Table 3: Family wise Detail of Species

S. No	Observed Families	Number of Species
1	Antidae	8
2	Oriolidae	1
3	Phasianidae	2
4	Phoenicopteridae	2
5	Columbidae	4
6	Cuculidae	2
7	Rallidae	4
8	Pelecanidae	2
9	Ardeidae	8
10	Threskiornithidae	3
11	Recurvirostridae	2
12	Charadriidae	2
13	Jacaniidae	1
14	Scolopacidae	8
15	Accipitridae	4
16	Bucerotidae	1
17	Upupidae	1
18	Megalaimidae	1
19	Picidae	2
20	Meropidae	2
21	Coraciidae	1
22	Alcedinidae	4

23	Psittacidae	1
24	Cisticolidae	1
25	Corvidae	2
26	Dicruridae	1
27	Hirundinidae	2
28	Laniidae	1
29	Leiothrichidae	3
30	Motacillidae	4
31	Muscicapidae	5
32	Nectariniidae	1
33	Passeridae	1
34	Pyconotidae	1
35	Cisticolidae	1
36	Laniidae	2
37	Phylloscopidae	1
38	Sylviidae	1
39	Estrildidae	1
40	Sturnidae	5
41	Ploceidae	1
42	Strigidae	1
43	Phalacrocoracidae	2
44	Ciconiidae	1
		104

Figure 2: Graphical representation family wise detail of avifaunal diversity of Gundolav Lake

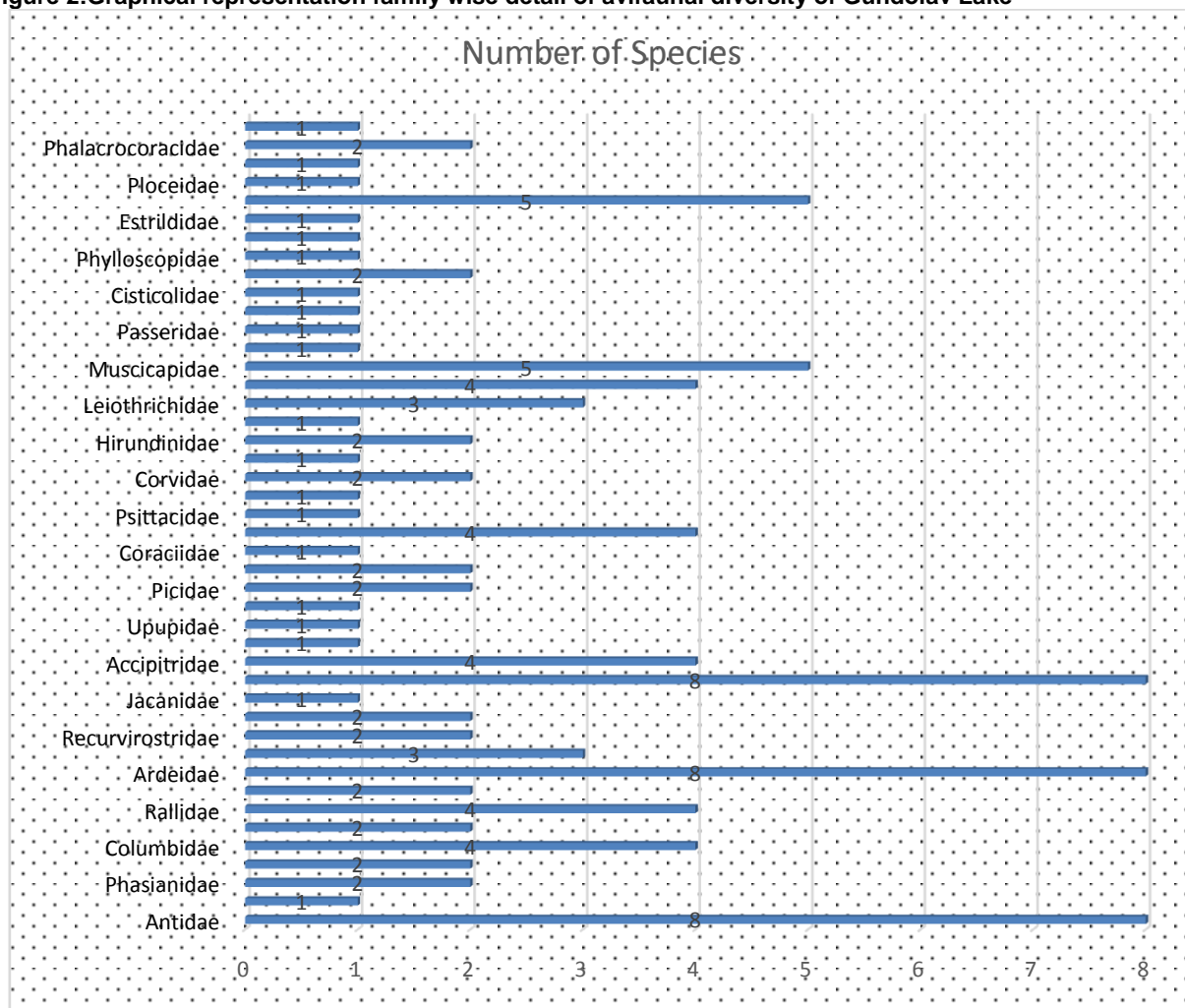


Table 4: Jaccard and Sorenson Index Details Site Wise

		Jaccard Index					
		A	B	C	D	E	
Sorenson Index	A		0.49	0.42	0.49	0.74	
	B	0.66		0.51	0.38	0.44	
	C	0.6	0.68		0.57	0.48	
	D	0.66	0.56	0.73		0.55	
	E	0.85	0.61	0.65	0.71		

Table 5: Jaccard and Sorenson Index Details Microhabitat Wise

		Jaccard Index					
		DW	SW	T	A		
Sorenson Index	DW		0.36	0.18	0		
	SW	0.53		0.35	0.01		
	T	0.18	0.35		0.16		
	A	0	0.01	0.16			

Conclusion

A total of 104 species belonging to 17 orders and 44 families were observed during the study. Out of observed species only 21 species preferred deep water as microhabitat while 35 species were residing shallow water microhabitat whereas 61 species were found utilizing the arboreal habitat and 37 species were preferably utilizing the terrestrial micro-habitat. The maximum eight species were recorded from Antidae, Ardeidae and Scolopacidae families. Study area was represented by variety of microhabitats simultaneously the study area was classified in five different study sites for the proper assessment of the study on the basis of their location and ecological characteristics (Table 1, 2 & 3 and Fig 1 & 2). The maximum similarity was exhibited by study site A and site E as the Jaccard and Sorenson similarity indices were found as 0.74 and 0.85 for the both sites respectively. In contrast the maximum dissimilarity was exhibited by study site B and site D as the indices was found only 0.38 and 0.54 for the both sites respectively. In terms of microhabitat utilization the deep water and shallow water microhabitat were utilized more commonly as Jaccard and Sorenson similarity indices were found as 0.36 and 0.53 for both the microhabitats (Table 4 & 5). On the other hand species utilizing deep water and arboreal microhabitat were not having any similarity as both the indices are observed as 0. Hence the species utilizing these microhabitats are more specialized in terms of ecological requirement.

Several direct and indirect threats facing by the birds residing at Gundolav Lake were also identified during the study period.

Poaching

Few local tribes and residents were involved in hunting and poaching of the birds. They preferably hunted on various duck species but recently they also

found to poached on flamingos and declare is as "Gulabi Meat" delicacy.

Sewage Mixing

As Gundolav Lake is surrounded by the human settlements, several small to large sewage drains dumping the sewage matter into the lake hence negatively affecting the water quality and birds residing the lake.

Agricultural Practices

Few agricultural fields were also situated in the catchment area of the lake and using the lake water for the irrigation and other purposes in large quantity. Simultaneously, they were using the chemical fertilizers and insecticides in heavy amounts which ultimately washed out in the lake and further depleted the water quality.

Others

One potential threat indirectly associated with the nearby human settlement was feral dogs. Several times these feral dogs also hunted on birds residing the lake and thus considered as the disturbing elements to the birds.

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