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Status and diversity of Avian fauna of Kot dam (Shakambari) – A conservation reserves of Sikar and Jhunjhunu District of Rajasthan

Rama Didwania[1]* and Dr. Kalpana Sharma[2]
[1]*Research Scholar, Department of Zoology, Smrat Prithviraj Government College, Ajmer 305001, Rajasthan, India.*
Email Id: ramadidwania1319@gmail.com
[2]*Associate Professor, Department of Zoology, Smrat Prithviraj Government College, Ajmer-305001, Rajasthan, India.*
Email: dr.kalpanasharma170897@gmail.com
***Corresponding author**: ramadidwania1319@gmail.com*

Abstract
As a feeding area for migratory and resident bird species as well as other faunal diversity, kot dam is significant. It makes room for other creatures because it serves as a breeding site for large numbers of birds. One bioindicator of the ecological health of wetlands is a healthy population. The biodiversity of Shakambhari's fauna and flowers is directly linked to the reserve's ecological value. Variations in the distribution of species, as well as species richness and abundance, are sources of future information that can be further quantified in the reserve to determine its ecological value and thereby support its conservation. All wetlands, however, are under danger because of growing human activity. For this reason, it's critical to designate this region as a rich biodiversity hotspot and urge the state government to take quick action to protect it. With minimal adjustments, the location has enormous potential to grow into a popular tourist destination. This research offers the first thorough analysis of the bird fauna in the area and explores how it may be exploited as a tourism destination and refuge for avian enthusiasts.

Keywords: Chisel Plow, Hardpan Layer, Crop Growth

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Introduction
Birds can indicate the overall habitat quality and act as bioindicators of inhabited areas. When birds are dependent on the habitat functioning in specific ways, the population trends of birds can tell us about how well the ecosystem is functioning. Birds are crucial part of an ecosystem and contribute to maintain a trophic level. Activities of birds are considered as indicator of superiority of ecosystem and they also form the incurable links in many food chains, hence they imitate changes originating in several different ecosystem components (Custer and Osborne 1977). The detail study on avifauna and their ecology is important to protect them. They are one of the biological pest management tools to control pests in gardens, on farms, and other places. They abet in the pollinization of plants. Birds are also good seed dispersal. Every ecosystem's avifauna is a vital component and a vital link in the food chain (Singh et al., 2018). Due to their ecological adaptability and ability to live in a variety of settings, birds have long been regarded as valuable biological indicators (Sivaperuman and Jayson, 2006). A bird is regarded as the bio-indicators of wholesome surroundings. Through their work in cleaning, pest control, seed distribution, and pollination, they contribute significantly to the well-being of the natural world. The aquatic avifauna is more vulnerable to alterations in wetlands; concurrently, since they are more noticeable within an ecosystem, it is easier to monitor the changes occurring within it (Morrison, 1986). There are migratory birds that cause variations in the number of birds in an area.

There is always scope for ecologists and other researchers for investigating a single species or a group of species or the overall biodiversity of any region or a part there of. Avian diversity is one of the most important constituents of overall biodiversity. Birds are found in almost all types of habitats present on the earth and play their vital role in various food chains. It is for this reason that Birdlife International has its logo “Save the birds; if birds die, we will die.” This slogan underlines the importance of birds. The study of Avifaunal biodiversity would be useful for further initiatives in studying the status of birds and its conservation.

Materials and Methods
2.1 Study area:
The study was performed in the Kot dam of the Shakambhari conservation reserve, Jhunjhunu district during January 2024 to April 2024. Shakambhari Conservation reserve is surrounded by Aravalli Hills and spans over 13,100 hectares of forest land. The total geographical area is131^2kilometers. Kot dam also known as sarjusagar dam is located in the Shakambhari reserve in Aravalli hills and is 13 kilometers from the Udaipur Wati town of Jhunjhunu. The dam was built between 1923 and 1924 for the purpose of irrigation and water storage. Kot dam is at the border of the Jhunjhunu district and Sikar district.

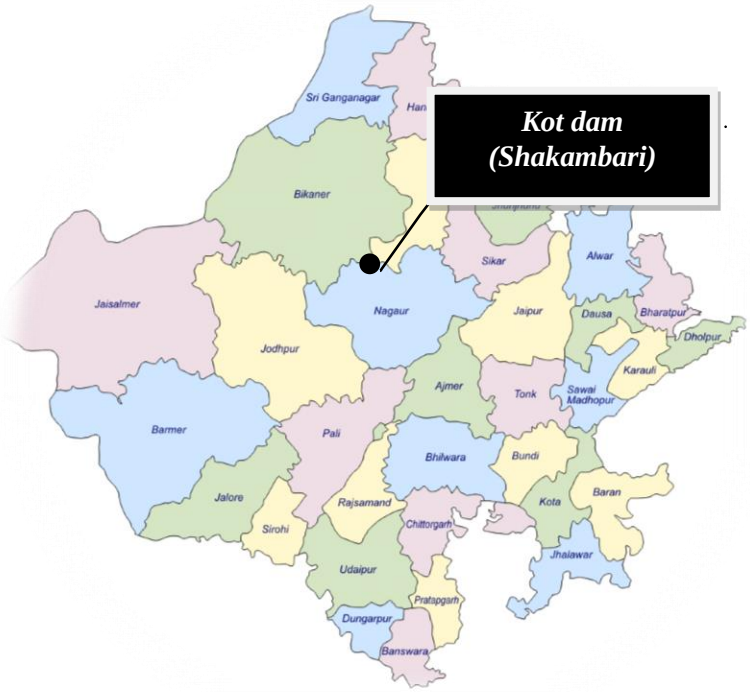

Figure - 1 Sikar and Jhunjhunu district of Rajasthan

Figure 2 - Kot Dam

Figure - 3 Google earth image of the study area

Survey work was carried out seasonally during suitable time (in summer- morning: 6:00 am to 10:00 am, evening: 3:30 pm to 6:30 pm, in winter morning: 7:00 am to 11:00 am, evening: 3:00 pm to 5:30 pm). Observations were made along line transects with the aid of 10x50 binoculars and Canon EOS 1000 D SLR camera. The birds were recorded according to their status, feeding habit, seasonal visits and variety of habitat. Birds were monitored using "Line Transect" and "Point Count Methods" in a pre-defined area. A line transect of 1-100 meter was prepared and the birds were monitored on both the sides of transect by close end transect up to 2 Km. without stopping. The birds were identified using standard field guide books of Ali & Ripley, 1995 [11], Grimmett et al., 1998 [10], Salim Ali, 2002 [12]. The following formula was used for determining percentage of occurrence of Families [27]. Percentage of occurrence is also stated as Relative diversity.

$$Percentage\ Occurrence/\ Relative\ Diversity\ = \frac{No\ of\ species\ of\ each\ family}{Total\ no.of\ different\ species\ seen} \times 100$$

2.2 Importance of work:

The present study was therefore taken up with a view to assess the diversity of bird species in Shakambari conservation reserve. An attempt has also been made to identify the local status of birds along with the population trends of migratory species. The present work would help in augmenting the information about bird diversity in the region. This will also add into country as well as the global data. The data generated in the present work will also serve as bench mark for devising better conservation strategies for avian diversity in the future.

Results And Discussion:

The Avifaunal assessment of Kot dam includes 76 species belonging to 10 orders and 30 families (Table. 1). There are a maximum of 47 bird species in the order Passeriformes and 12 in the order Ciconiiformes (Table 2). Insectivorous species accounted for the greatest number of bird species, with (42). Next in line were omnivorous (7), carnivorous (13), granivorous (6), frugivorous (3), scavenger (1), nectarivores (1), and other (I/Fr) (3) as indicated in Table 2. According to the birds' preferred diet, the avifauna's diversity and percentage composition are displayed in (Table 2). 71 species are classified as Least Concern by the IUCN, 01 as Near Threatened, and 03 as Vulnerable (Table 4). 01 Near Threatened Species: Eagle-Owl Eurasian Steppe Eagle, Black Ibis, and White-Naped Tit are the three vulnerable species that have been observed during the study period.

According to IUCN Status diversity and percentage composition of avifauna has been shown in Fig.5. It is evident from the Table 1, that family Apodidae 1.31%, Anatidae 1.31%, Bucerotidae 1.31%, Upupidae 1.31%, Scolopacidae 2.63%, Charadriae 2.63%, Accipitridae 6.57%, Aredeidae 2.63%, Threskiornithidae 1.31%, Columbidae 2.63%, Meropidae 2.63%, Coraciidae 2.63%, Dacelonidae 1.31%, Cuculidae 1.31%, Centropodidae 1.31%, Phasianidae 3.94%, Lanidae13.1%, Motacillidae 7.89%, Muscicapidae 3.94%, Nactariniidae 1.31%, Paridae 1.31%, Phylloscopidae 2.63%, Alaudidae 2.63%, Sturnidae 2.63%, Pycnonotidae 2.63%, Silvidae 6.57%, Passeridae 10.57%, Hirundinidae 2.63, Strigidae 3.94% and Turnicidae 1.31% reported respectively. Most of the families are represented by one or two species (22 families), three to five species (5 families) and Six to Ten species (3 families). Lanidae was found to be the most dominant family in the area (RD Index value = 13.1) followed by Passeridae (RD Index value = 10.5), Motacillidae (RD Index value = 7.89) Silvidae and Accipitridae (RD Index value = 6.57) and others.

The relative diversity of the families of bird is shown in (Table 1). The result revealed that the maximum number of species (51) was recorded as residence category, followed by winter Migrant (16) and passage (9). Among the 76 bird species 25 migratory species were also recorded which were Anus crecca (WM), Upupa epops (WM), Tring atotanus (WM), Vanellus leucurus (WM), Circaetus gallicus (WM), Buteo buteo (WM), Aquila nipalensis (WM), Merops philippinus (WM), Coracias garrulus (PM), Dendronanthus indicus (WM), Motacilla alba (PM), Motacilla maderaspatensis (PM), Motacilla cinerea (PM), Motacilla flava (PM), Ficedula parva (PM), Machlolophus nuchalis (WM), Phylloscopus trochiloides (PM), Hippolais caligata (PM), Calandrella brachydactyla (WM), Sturnus roseus (PM), Phylloscopus humei (WM), Motacilla alba (WM), Motacilla citreola (WM), Anthus trivialis (WM), Hirundo rustica (WM).

Table 1. Family Distribution pattern during study (RDi)

S. No.	Order	Family	Genus	RDi
1	**APODIFORMES**	Apodidae	1	1.31
2	**ASERIFORMES**	Anatidae	1	1.31
3	**BUCEROTIFORMES**	Bucerotidae	1	1.31
		Upupidae	1	1.31
4	**CICONIFORMES**	Scolopacidae	2	2.63
		Charadriae	2	2.63
		Accipitridae	5	6.57
		Ardeidae	2	2.63
		Threskiornithidae	1	1.31
5	**COLUMBIFORMES**	Columbidae	2	2.63
6	**CORACIFORMES**	Meropidae	2	2.63
		Coraciidae	2	2.63
		Dacelonidae	1	1.31
7	**CUCULIFORMES**	Cuculidae	1	1.31
		Centropodidae	1	1.31
8	**GALLIFORMES**	Phasianidae	3	3.94
9	**PASSERIFORMES**	Lanidae	10	13.1
		Motacillidae	6	7.89
		Muscicapidae	3	3.94
		Nectariniidae	1	1.31
		Paridae	1	1.31
		Phylloscopidae	2	2.63
		Alaudidae	2	2.63
		Sturnidae	2	2.63
		Pycnonotidae	2	2.63
		Silvidae	5	6.57
		Passeridae	8	10.5
		Hirundinidae	2	2.63
		Strigidae	3	3.94
10	**TURNICIFORMES**	Turnicidae	1	1.31

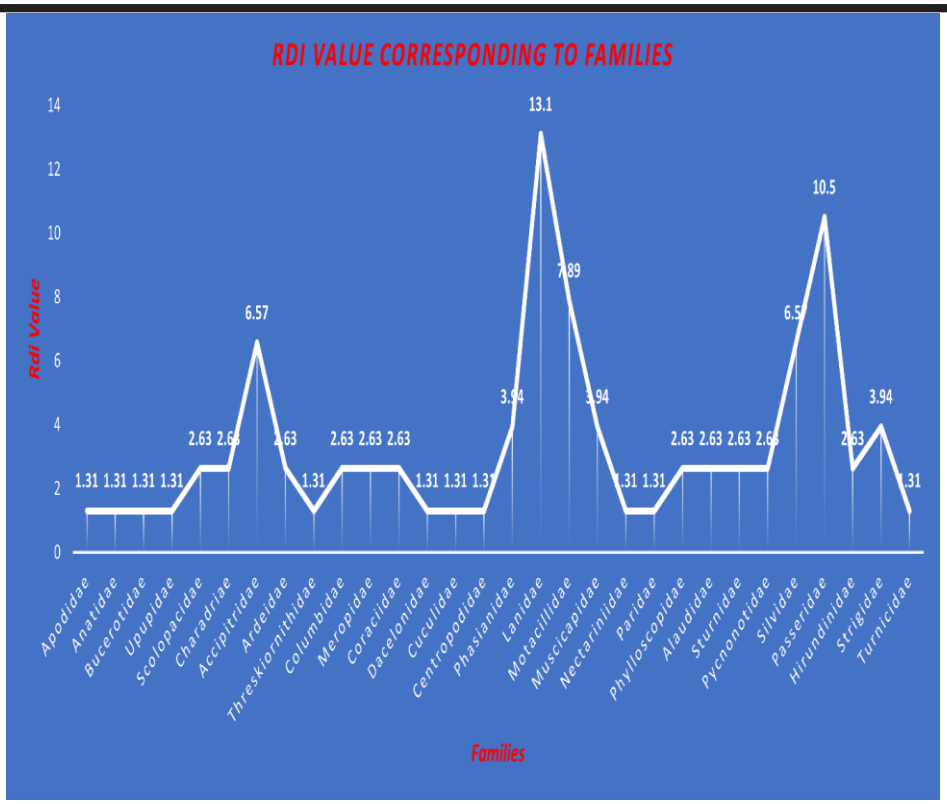

Figure 1: RDi Values Corresponding to Different Families

Table 2: Diversity, Abundance and Status of the avian fauna from the study site

Migrant Status: R= Resident, WM= Winter Migrant, SM= Summer Migrant, PM= Passage Migrant (Khan and Nahar 2009).
Feeding Types: P= Piscivorous, I= Insectivorous, Om= Omnivorous, Gr= Granivorous, Fr=Frugivorous, V= Vegetarian, C=Carnivorous, Nectarivores (Ne), Scavenger (S), Others (I/Fr, I/V, V/I, I/P),
IUCN Category: LC= Least Concern, NA= Not Assessed, E= Endangered, NT= Near Threatened, V= Vulnerable,
Population Status: Decreasing (D) and Stable (S),
Abundance: C = Common, UC = Uncommon, O = Occasional, RA = Rare (Azman et al., 2011).

S.No.	Family	Common Name	Latin Name	Status	Feeding Habit	IUC Status	Population Trend	Abundance
Order- APODIFORMES								
1	Apodidae	House Swift	Apusaffinis	R	I	LC	S	C
Order- ASERIFORMES								
2.	Anatidae	Common teal	Anas crecca	WM	Om	LC	S	O
Order- BUCEROTIFORMES								
3.	Bucerotidae	Indian grey hornbill	Ocyceros birostris	R	I	LC	S	C

4.	Upupidae	Common hoopoe	Upupa epops	WM	I	LC	S	UC
Order – CICONIFORMES								
5.	Scolopacidae	Common Redshank	Tringa totanus	WM	I	LC	S	UC
		Black winged Stilt	Himantopus Himantopus	R	I	LC	S	C
6.	Charadriae	White tailed lapwing	Vanellus leucurus	WM	I	LC	S	UC
		Little Ringed Plover	Charadrius dubius	R	I	LC	S	C
7.	Accipitridae	Black Kite	Milvus migrans	R	Sc	LC	S	O
		Short -toed snake Eagle	Circaetus gallicus	WM	C	LC	S	UC
		Common Buzzard	Buteo buteo	WM	C		S	UC
		Steppe Eagle	Aquila nipalensis	WM	C	VU	S	O
		Crested Serpent Eagle	Spilornis cheela	R	C	LC	S	C
8.	Ardeidae	Indian Pond Heron	Ardeola grayii	R	C	LC	S	C
		Cattle Egret	Bubulcus ibis	R	C	LC	S	O
9.	Threskiornithidae	Black Ibis	Pseudibis papillosa	R	Om	VU	S	R
Order – COLUMBIFORMES								

10.	Columbidae	Columba livia	Rock Pigeon	R	Gr	LC	S	C
		Treron phoenicoptera	Yellow footed green Pigeon	R	Fr	LC	S	C
Order- CORACIFORMES								
11.	Meropidae	Blue tailed Bee eater	Merops philippinus	WM	I	LC	S	O
		Green Bee eater	Meropus orientalis	R	I	LC	S	UC
12	Coraciidae	European Roller	Coracias garrulus	PM	I	LC	S	O
		Indian Roller	Coracias benghlensis	R	I	LC	S	O
13	Dacelonidae	White-Throated Kingfisher	Halcyon smyrnensis	R	C	LC	S	UC
Order- CUCULIFORMES								
14.	Cuculidae	Asian coel	Eudynamys scolopocea	R	Om	LC	S	C
15.	Centropodidae	Greater coucal	Centropus sinensis	R	C	LC	S	UC
Order – GALLIFORMES								
16.	Phasianidae	Black francolin	Francolinus francolinus	R	C	LC	S	C
		Grey francolin	Francolinus pondice	R	C	LC	S	C

			rianus					
		Indian peacock	Pavo cristatus	R	Om	LC	S	C
Order – PASSERIFORMES								
17.	Lanidae	Long -tailed Shrike	Lanius Schach	R	I	LC	S	C
		Southern Grey Shrike	Lanius meridionalis	R	I	LC	S	C
		Lesser -grey Shrike	Lanius minor	R	I	LC	S	C
		Bay-Backed Shrike	Lanius vittatus	R	I	LC	S	C
		Common wood Shrike	Tephrodornis pondicerians	R	I	LC	S	C
		Asian paradise Flycatcher	Terpsiphoneparadisi	R	I	LC	S	O
		House Crow	Corvus splendens	R	Om	LC	S	C
		White – Browed Fantail	Rhipidura aureola	R	I	LC	S	C
		Black Drongo	Dicrurus macrocercus	R	C	LC	S	C
		Small Minivet	Pericrocotus cinnamomeus	R	I	LC	S	UC
	Motacillidae	Forest Wagtail	Dendronanthus indicus	WM	I	LC	S	UC

18.		White Wagtail	Motacilla alba	PM	I	LC	S	UC
		Large Pied Wagtail	Motacilla maderaspatensis	PM	I	LC	S	UC
		Yellow Wagtail	Motacilla flava	SM	I	LC	S	UC
		Grey Wagtail	Motacilla cinerea	PM	I	LC	S	UC
		Paddy-field Pipit	Anthus rufulus	R	I	LC	S	UC
19.	Muscicapidae	Indian Robin	Saxicoloides fulicata	R	I	LC	S	C
		Pied Thrush	Zoothera wardii	R			S	C
		Red-breasted Flycatcher	Ficedula parva	PM	I	LC	S	O
20.	Nectariniidae	Purple Sunbird	Cinnyris asiaticus	R	Ne	LC	S	C
21.	Paridae	White naped Tit	Machlolophus nuchalis	WM	I	VU	D	R
22.	Phylloscopidae	Greenish Warbler	Phylloscopus trochiloides	PM	I	LC	S	O
		Booted Warbler	Hippolais caligata	PM	I	LC	S	O
23.	Alaudidae	Greater Short-Toed Lark	Calandrella brachydactyla	WM	Gr	LC	S	UC
		Eremopterix	Ashy	R	Gr	LC	S	C

		grisea	Crowned Sparrow Lark					
24.	Sturnidae	Common myna	Acridotheristis	R	I/Fr	LC	S	C
		Rosy Starling	Sturnus roseus	PM	I/Fr	LC	S	O
25.	Pycnonotidae	White eared Bulbul	Pycnonotus leucotis	R	Fr	LC	S	C
		Red vented Bulbul	Pycnonotus cafer	R	Fr	LC	S	C
26.	Silvidae	Common Tailor bird	Orthotomus sutorius	R	I	LC	S	C
		Common Babbler	Turdoides caudatus	R	Om	LC	S	C
		Large grey Babbler	Turdoides malcolmi	R	C	LC	S	C
		Hume's Warbler	Phylloscopus humei	WM	I	LC	S	UC
		Jungle Babbler	Turdoides striatus	R	Fr/I	LC	S	C
27.	Passeridae	House Sparrow	Passer hispaniolensis	R	Gr	LC	S	C
		Sind Sparrow	Passer pyrrhonotus	R	Gr	LC	S	C
		Spanish Sparrow	Passer domesticus	R	Gr	LC	S	UC
		White	Motacilla	WM	I	LC	S	C

		Wagtail	alba					
		Citrine Wagtail	Motacilla citreola	WM	I	LC	S	C
		Paddy-Field Pipit	Anthus rufulus	R	I	LC	S	C
		Indian Silverbil	Lonchura malabarica	R	I	LC	S	C
		Tree-Pipit	Anthus trivialis	WM	I	LC	S	C
28.	Hirundinidae	Barn Swallow	Hirundo rustica	WM	I	LC	S	UC
		Dusky Crag Martin	Hirundo concolor	R	I	LC	S	UC
29.	Strigidae	Eurasian Eagle-Owl	Bubo bubo	R	C	NT	D	R
		Spotted Owlet	Athenebrama	R	I	LC	S	C
		Jungle Owlet	Glaucidium radiatum	R	I	LC	S	C
Order – TURNICIFORMES								
30.	Turnicidae	Yellow crowned Woodpecker	Dendrocopos mahrattensis	R	I	LC	S	C

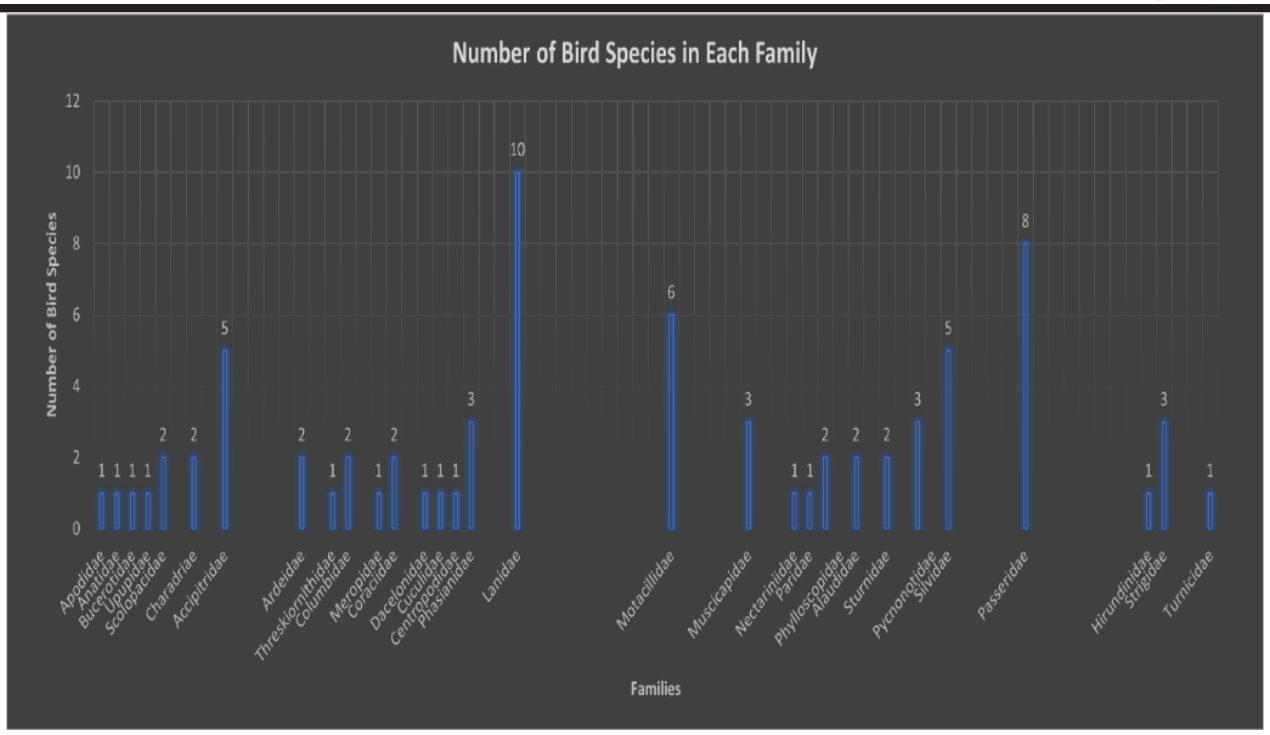

Figure 2: Number of Bird Species in Each Family

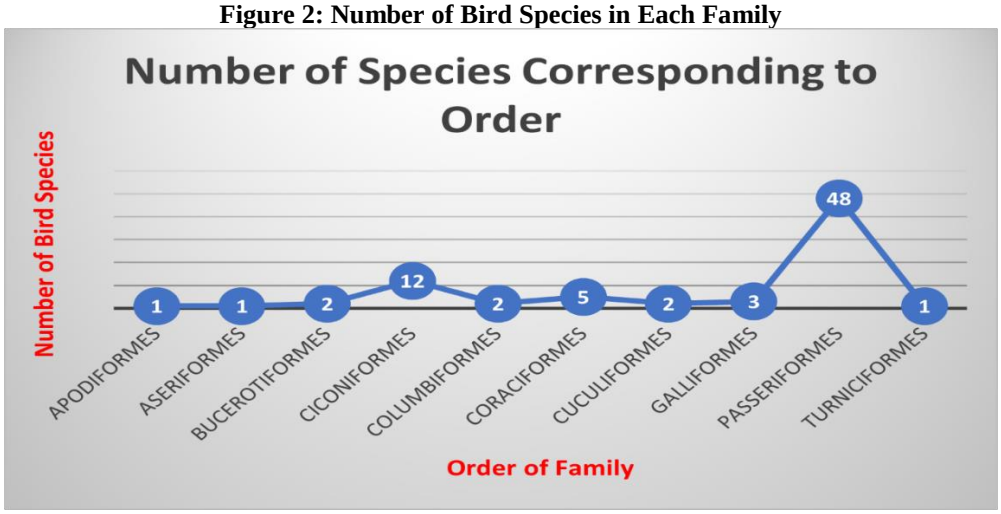

Figure 3: Number of Species Corresponding to Order of Families

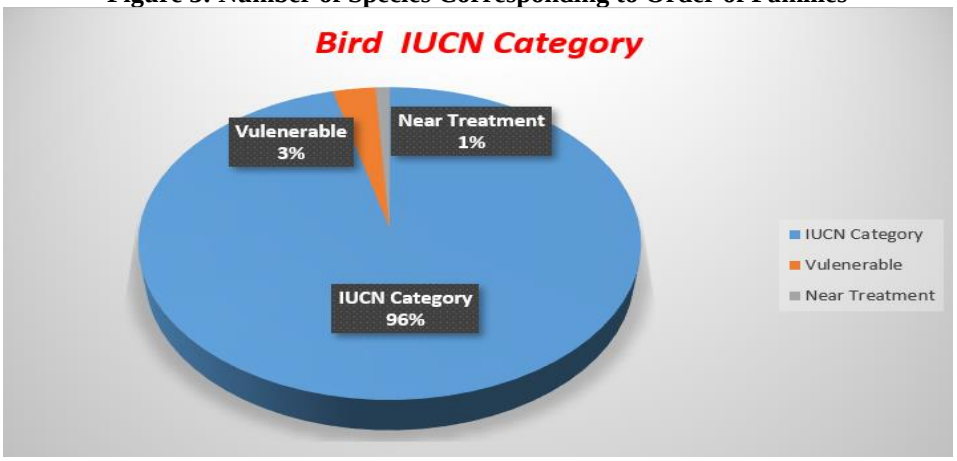

Figure 4: Bird IUCN Category

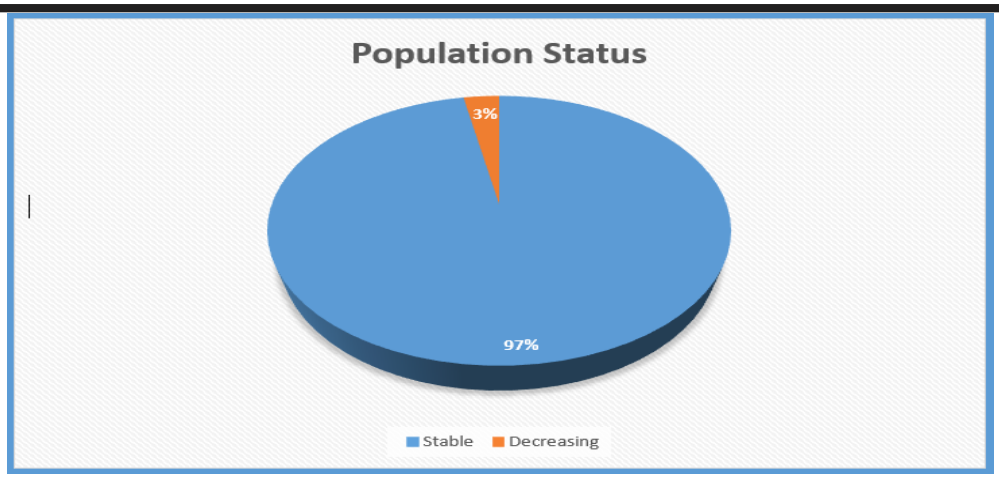

Figure 5: Population Status

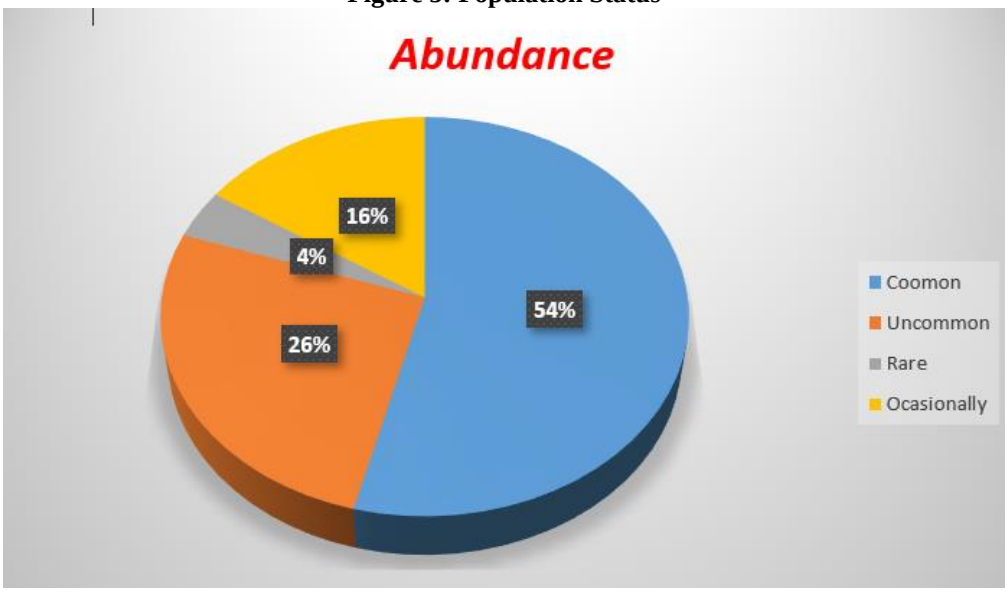

Figure 6: Abundance

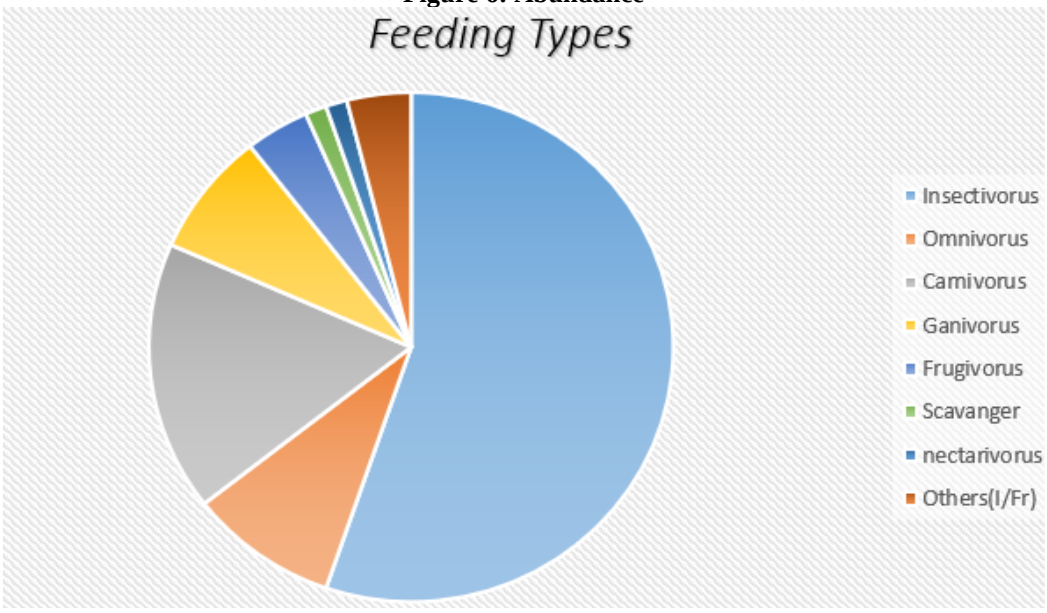

Figure 7: Feeding Types

Conclusion

Since there is no published Avifaunal checklist prior to this, the present work can form the baseline for further research and comparative studies. Preliminary study performed in the discussed area would reveal a baseline data which is important for further research and conservation.

Kot dam is important as a feeding ground for the Migratory and residential species of birds and other faunal diversity. Being a breeding ground of numbers of birds, it creates space for other animals. Healthy population is a bioindicator of ecological status of wetlands. Ecological value of Shakambhari conservation reserve is directly related to its faunal and floral biodiversity, changes in distribution of species, species richness and abundance are source of the future which can further be quantified in Shakambhari conservation reserve for calculating its ecological value, which would further contribute to its conservation. However, due to increasing anthropogenic activities all wetlands are under threat and it is therefore important to earmark this area as a rich abode of biodiversity and necessary action to preserve the biodiversity should be adopted by the state government immediately.

The site also holds an immense potential to be developed as a tourist spot with few improvisations. This report provides the first extensive study of the bird fauna of this region and its potential to be developed as a haven for bird watchers and a tourist spot.

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