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AVIAN FAUNA IN THE HUMAN LANDSCAPE AROUND BIKANER CITY, RAJASTHAN, INDIA

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ABSTRACT

The present study was carried out to assess the status of birds at three major location of Bikaner district namely, Laxmi Nath temple, Jorbeer Conservation reserve and Gajner Wildlife Sanctuary. It was reported that the conservation of avian fauna at Lami Nath Temple site was due to feeding habits of locals as their cultural and religious values. While, the Jorbeer Conservation reserve, the major attraction of birds like vultures, hawks and other raptors, was due to carcass dumping at the site. On the other hand, Gajner wildlife sanctuary was dominated by water birds due to Gajner lake. It has been reported that overgrazing, urbanization, population blast and other anthropogenic causes are posing severe threats on the biodiversity, especially on avian fauna. The present effort was done for inventorization of avian fauna of Bikaner city and its vicinity. The attempt for conservation and management of birds was also made for enhancing the population of these species in the region.

Keywords: Avian fauna, Gajner wildlife sactuary, Jorbeer conservation reserve, Laxmi Nath Temple, conservation and management.

Introduction

Birds are the most beautiful and protected animals of all creatures. In biology, they are also called as avid organisms. These vertebrate animals have hollow and light bones which help them to fly high as well as maintain their body temperature optimum. Some birds can also fly high and cross the mountains. Similarly, some birds can fly thousands of kilometers across the oceans in single flight. Birds are found everywhere from the Arctic to the Antarctic. They can be sized from 2 inches to 7 feet. The smallest bird in the world is "Humming bird" weighing about 2–3 grams (0.056–0.071 oz) and length is about 5–6 cm (2.0–2.4 in), males have green phylum and fiery red throats, iridescent with elongated lateral placenta, blueness in upper parts and rest of the body mostly white. Ostrich is the largest living bird in the world. It weighs up to 120kg. It varies in length from 2.1–2.8m. Its neck and legs are long and when required it can run at a maximum speed of 40km/h which is more than any other bird found on this earth (Ali and Ripley, 1987). The ostrich bird lays the largest eggs than any other bird species. Andean Condor is a bird found in the South American Andes Mountains. It can fly up to 6,500 meters (21,300 ft) in the sky. It flies up to 200 kilometers in a day. The total size of its wingspan is 3.3 meters. Some birds can dive deep into the sea water up to 300 meters (Gill and Wright, 2006).

The avian fauna are the very important creature of nature and it provides significant ecological services from poles to equator. They add not only an aesthetic value to the nature but also help in controlling pests, pollination, seed dispersal, scavenging the dead animals etc (Khan, 2005; Das, 2012; Koli, 2014).

It has been observed that due to changing urbanization pattern and architectural style, deforestation, rapid industrialization etc., the population of different avifauna has severely affected (Fuller *et al*., 1995; Anonymous, 2000). The most common example is the house sparrow, which is rapidly losing its nesting ground leading to a drastic decline in its population. The present effort was made for inventorization of avifauna of Bikaner city and its vicinity, their conservation efforts and comparison of status of birds at three important locations of birds viz. Jorbeer conservation reserve, Laxmi Nath Temple and Gajner wildlife sanctuary.

General behavior of birds and study area

Generally, birds set a fixed place to rest and spend time throughout the night, which is called roost.

Most of the birds roost at trees to avoid predators. Trees are not only providing shelters to birds but they also provide them food in the form of fruits and seeds (Dutta, 2011). The three major bird sites of Bikaner viz. Jorbeer conservation reserve, Laxmi Nath Temple and Gajner wildlife sanctuary were studied for status of various birds. These sites have their own significance in conservation of birds. The Jorbeer Conservation reserve is dumping site of carcass and hence it attracts the scavengers, while Gajner wildlife sanctuary is providing natural habitat and due to Gajner lake, it is the home of many water birds and it also attracts some migratory birds. The third site i.e. Laxmi Nath Temple site, is major attraction of seed eater birds. The local people of the area are providing food in the form of grains to birds every day. It is the religious and cultural practice of the residents, which is boosting the roosting of birds in the nearby trees of the vicinity of the temple. The birds grounds here at fixed time very day, which may varies from summer to winter. It was observed that about 20 types of birds from different areas come to this site for eating seeds or food grains provided by inhabitants of the city. The common myna and the rosy starling come before time and roam that place; similarly, the parakeet comes in its herd before time for eating the grains. It was reported that Rosy starling has the largest number of birds at Laxmi Nath temple site.

The study area

Bikaner is a city in the northwest part of the state of Rajasthan in northern India. It is located 330 km northwest of the state capital, Jaipur. Bikaner city is the administrative headquarters of Bikaner district & Bikaner division. The city was founded by Rajput Rao Bika in 1486 and from its small origins it has developed in to the fifth largest city in Rajasthan. The Ganga canal, completed in 1928 and the Indira Gandhi canal, completed in 1987 are the source of drinking water as well as for irrigation. The Bikaner city is situated in the middle of the Thar desert and it has a hot desert climate (Koppen climate classification BWh) with very little rainfall and extreme temperature. The climate in Bikaner is characterized by significant variations in temperature. In the summer season it is very hot when the temperatures lie in the range of 28-45ºC (82.4-119.3ºF), while in the winter, it is fairly cold with temperatures lying in the range of 5-23.2ºC (941.0-73.8ºF). The annual rainfall is in the range of 260-440 mm (10-17 inch).

Common fauna of the region

The herds of cattle, eg. Cow (*Bos indicus*) and Buffalo (*Bus bubalus*) and of Sheep (*Oris orienes*), Goat (*Capra hircus*) and Camel (*Camelus domesticus*), are the principal livestock which is reared and maintained by the cultivators as their subsidiary occupation. Other common mammals are Desert Gerbil (*Meriones hurrianae*), House Rat (*Rattus rattus*) and Five-stripped Squirrel (*Funambulus pennantii*) as diurnal rodents; and Indian Gerbil (*Tatera indica*) and Indian Crested Porcupine (*Hystrix indica*) as the nocturnal rodents. The nocturnal lagomorphs, Hare (*Lepus nigicollis*) is widespread. Among the insectivores Little Shrew (*Suncus stolickzkanus*), Long-eared Hedgehog (*Hemiechinus auritus*) and Indian Hedgehog (*Paraechinus micropus micropus*) are very common. Similarly, the common flying mammals including Fruit Bat (*Pteropus giganteus*) and Rat-tailed Bat (*Rhinopoma hardwickii*) living in the tunnels, abandoned building, gardens, etc. are observed. The Feral Dog (*Canis familiaris*) is the most common predator in the region. Other carnivores, e.g., Fox (*Vulpes bengalensis*), Wolf (*Canis lupus*), Jackal (*Canis aureus*) and Jungle Cat (*Felis chaus*) are also found in the wild area of the desert. Common herbivores of the region are Chinkara (*Ganzella gazelle bennettii*), Blackbuck (*Antelope cervicapra*) and Nilgai (*Boselaphus tragocamelus*). The present research was undertaken to compare the status of avifauna on prominent sites of bird dominance in the Bikaner city. These sites have their specific characteristics. The selection of these sites was based on their significance for avian fauna. One of them is the carcass dumping ground (Jorbeer Conservation reserve), another site is known for its conservation through religious activities by local community (Laxmi Nath temple) and third site is a wildlife sanctuary with minimum anthropogenic disturbances and having a lake inside it (Gajner wildlife sanctuary), which is major attraction of water birds and migratory birds.

Fig 1. Location of study area (Photo Source Google)

1. Laxmi Nath temple, Bikaner city:

The temple is located at the highest altitude of the city. It is 5km away from Bikaner railway station. The Hindus of the city have deep faith in Laxmi Nath i.e. the god *Vishnu*. The Laxmi Nath temple is one of the significant centres of worship among Hindus of the city for a long time. The locals give food grains to feed the birds every morning. After eating the food given to them by the locals, the birds leave trees and fly away. The climate here is better than the rest of the region. The trees are dense and close. The dense vegetation protects birds from strong winds and strong rains. Due to the height of the trees, the risk of attack by predators like Cats Gods etc. is also low.

Fig. 2: Laxmi Nath temple in Bikaner city and common birds at the site

Fig 3. Location of Laxmi Nath temple (Photo Source Google)

2. Jorbeer Conservation Reserve:

The great Indian Thar Desert fairly rich in plants and animals. The avian fauna plays a very significant role at different trophic levels of various food chains in desert ecosystem. Due to harsh climatic conditions, most of the birds are not easily visible to the casual observer. Faunal species have always important for their functional role in the ecosystem as potential scavengers, seed dispersers and pollinators. Jorbeer is a community reserve near Bikaner city. Vultures of 7 different species which includes Long-billed vulture (*Gyps indicus*), White-backed vulture (*Gyps bengalensis*), Red-headed vulture (*Sarcogyps calvus*), Egyptian vulture (*Neophron percnopterus*), Himalayan griffon (*Gyps himalayensis*), Eurasian griffon (*Gyps fulvus*) and Cinereous vulture (*Aegypiusmonachus*) can be frequently observed here. Besides vultures, the common raptors were also reported during the surveys. Some of these are Black winged kite, Oriental honey buzzard, White eyed buzzard, Black Kite, Lager Falcon, Pariah kite, Shikra, Sparrow-hawk, Long legged buzzard, Steppe eagle, Tawny eagle, Montagu's harrier, Marsh harrier, Short-toed eagle, Peregrine falcon and Kestrel**.**

Fig 4. map of jorbeer conservation reserve (Photo Source Google)

Fig. 5: Vultures and other raptors at Jorbeer Conservation reserve, Bikaner

3. Gajner wildlife sanctuary:

Gajner Wildlife Sanctuary is located at a distance of about 32.0 km (19.9 mi) from Bikaner. It was famous hunting ground of the Maharajas of Bikaner. There is a lake in this sanctuary and a variety of animals come here to quench their thirst in summer. This is one of the proposed site/regions for the reintroduction of *cheetas* in India. The interesting part of this sanctuary is the beautiful Gajner Palace, which has been converted into a heritage and luxury hotel now. The Gajner Palace hotel earlier used for hosting the Maharaja and his revered guests including Viceroys and other prominent figures who were invited for annual sand grouse hunting activity.

The lake at Gajner attracts water birds in thousands which include Imperial Sand Grouse, Indian Houbara Bustards, Water fouls, Demoiselle Cranes and other varieties of migratory birds. Gajner Wildlife Sanctuary is also home to black buck, chinkara, antelope, wild boars, deer, wild fowls, neelgai (blue bull) and desert foxes which roam amidst lush gardens, wooded forests and the majestic palace. Gajner with the knock of winter, a team of foreign birds started traveling thousands of kilometres on the nearby pools including the Gajner Palace lake. The arrival of Kurjan (Siberian crane) starts every year after Sharad Purnima which continues till the last week of November. Apart from this, birds of other indigenous species also reach to the lake. This includes Dubchik, Water Crow, Imperial Sedg Grosse, Pigeon, Steppie Eagle, Northern Pitle, Pochard, Gray Shocker, Green Land, Comorat Malard Teal, Imperial Fan, Kingfisher etc.

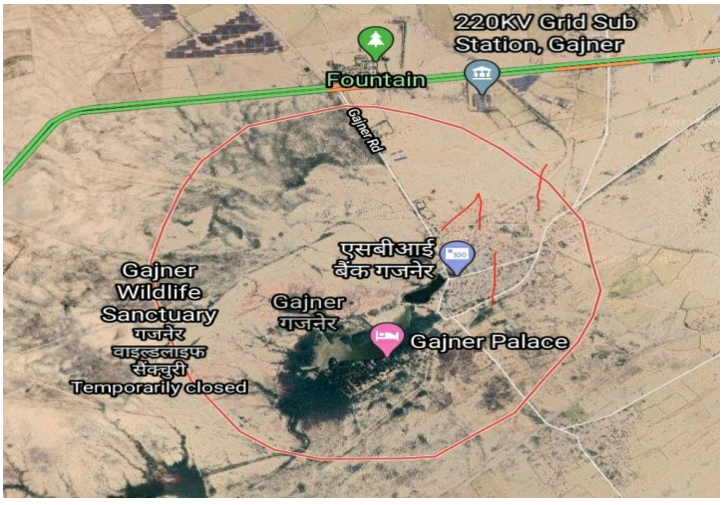

Fig 6. A map of Gajner lake and it's catchment area (Photo Source Google)

Fig. 7- Common, migrant birds and water birds at Gajner lake.

Methodology

Field surveys were carried out in three different seasons (pre-monsoon, monsoon and post-monsoon) for year 2021 for inventorization of different avian fauna in and around Bikaner city. The methodology adopted during the study was to cover the different faunal species or group of animals. The co-ordinates of each sighting will be recorded with the help of Global Positioning System (GPS). The areas used by animals for resting was also marked on the maps and vegetation parameters of such sites were also recorded. Attempts were also be made prepare inventory of the flora and fauna in the study area after confirmation based on Menon, (2003); Prater, (1965); Grewal, et.al. (1995); Kazmierczak, (2000); Bhandari, (1990) and Danial, (2002).

Result and Discussion

The floral and faunal diversity in an around Bikaner city was observed and recorded during January, 2021 to December 2021 for the period of one year. It was noticed that herds of cattle, eg. Cow (*Bos indicus*) and Buffalo (*Bus bubalus*) and of Sheep (*Oris orienes*), Goat (*Capra hircus*) and Camel (*Camelus domesticus*) are the principal livestock which is reared and maintained by the cultivators as their subsidiary occupation. Other common mammals are desert gerbil (*Meriones hurrianae*), house rat (*Rattua rattus rufescens*) and five-stripped Squirrel (*Funambulus pennantii*) as diurnal rodents; and Indian gerbil (*Tatera indica*) and Indian crested porcupine (*Hystrix indica*) as the nocturnal rodents. The nocturnal lagomorphs, Hare (*Lepus nigicollis*) is widespread. Among the insectivores the little shrew (*Suncus stolickzkanus*), long-eared hedgehog (*Hemiechinus auritus*) and Indian hedgehog (*Paraechinus micropus micropus*) were encountered during field surveys. The common flying mammals include fruit bat (*Pteropus giganteus*) and rat-tailed bat (*Rhinopoma hardwickii*) living in the abandoned building, gardens, etc. The feral dog (*Canis familiaris*) is the most common predator in the region. Other carnivores reported were fox (*Vulpes bengalensis*), wolf (*Canis lupus*), jackal (*Canis aureus*) and jungle cat (*Felis chaus*). Common herbivores noticed during field surveys were chinkara (*Ganzella gazelle bennettii*), blackbuck (*Antelope cervicapra*) and nilgai (*Boselaphus tragocamelus*). A total of 68 avian species were observed (Table 2) at Jorbeer site. Some very common avifauna found in the study area is blue rock pigeon (*Columba livia*), house sparrow (*Passer domesticus*), common crow (*Corvus splendens*), jungle crow (*Corvus macrorhynchos*), common babbler (*Turdoides caudatus*), red-vented bulbul (*Pycnonotus cafer*), tailor bird (*Orthotomus sutorius*), maina (*Acridotheres tristis*), rufus woodpecker (*Celeus brachyurus*), parrot (*Psittacula eupatria*), Bee-eater (*Merops orientalis*) and red-wattled lapwing (*Vanellus indicus*). Among larger common birds peacock (*Pavo cristatus*), red-headed vulture (*Sarcogyps calvus*), cinereous vulture (*Aegypius monachus*), egyptian vulture (*Neophron percnopterus*), eurasian griffon (*Gyps fulvus*),

himalayan griffon (*Gyps himalayensis*) and Kite (*Milvus migrans*) were also reported. A few resident game birds like great Indian busterd (*Choriotis nigriceps*), gray partridge (*Francolinus pondicerianus*) and common sandgrouse (*Pterocles exustus*) were also found. Some aquatic birds visiting ponds and lakes were also noticed including spoonbill (*Platalea lucorodia*), common teal (*Anas crecca*), painted stroke (*Ibis leucocephala*), little egret (*Egretta garazetta*) and sarus cranes (*Grus antigone*) etc. Since one species of vulture (*Sarcogyps calvus*) is listed in the threatened birds of world (Birdlife International, 2008), so the rare red-headed vulture (*Sarcogyps calvus*) should also be listed in the schedule-I of Indian wildlife act 1972 for the batter conservation and management of the species. A total 30 species of reptiles and amphibians were also observed, out of them four species are listed in the schedule-I of Indian wildlife act 1972. The more common reptiles found here are cobra (*Naja naja*), viper (*Echis carinata*), Indian sand boa (*Eryx johnii*), monitor (*Varanus griseus*). The important lizards of the region are Calotes (*Calotes versicolor*), House lizard (*Hemidactylus flaviviridis*) and others such as *Agama minor* and 'Skink' (*Mabuya aurata*).

The vegetation of the study area are essentially xerophytic, sparse and of the open scrub type with many endemic plants. Some of the important plants of the region are *Prosopis cineraria*, *Capparis decidua*, *Zizyphus nummularia*, *Haloxylon salicorni-cum*, *Leptadenia pyrotechnica*, *Crotalaria burhia*, *Glossonema varians*, *Blepharis sindica*, *Caralluma edulis*, *Tribulus terrestris*, *Lasiurus sindicus*, *Brachiaria ramose*, *Cymbopogon* sp. and *Cenchrus* sp. In general, the vegetation presents an 'open' appearance, since the trees, often stunted and rare and shrubs are widely spaced. The entire vegetation can be divided into two categories, viz., permanent vegetation, occurring throughout the Thar Desert round the year and subsisting mainly on subterranean water; and temporary vegetation, consisting of ephemerals coming up mainly in the short rainy season.

The plant species of Thar desert are highly drought-resistant and thrive well in extreme climatic conditions. The significant tree species noticed here are *Acacia senegal* (Kumat), *Acacia nilotica* var. indica, *Capparis deciduas* (Ker), *Euphorbia caducifolia* (Thor), *Maytenus emarginata* (Kankero), *Prosopis cineraria* (Khejri), *P. juliflora* (Angreji Banwalia), *Salvadora oleoides* (Khara Jal), *S. persica* (Mitha Jal) and *Tecomella undulate* (Rohiro). Among these, *Prosopis cineraria* and *Capparis deciduas* are dominant in the plains and *Euphorbia caducifolia* and *Acacia senegal* on the hillocks. *Prosopis juliflora* an exotic species, is the most abundant shrub and occurs in a variety of habitats, eg., plains, hillocks, in and around gardens, orchards, vegetable fields and on road sides. Other road side trees are *Azadirachta indica* (Neem), *Ficus benghalensis* (Bar) and *F. religiosa* (Peepal) and these trees are also common in gardens, orchards and near human habitations. The main shrub species reported were *Acacia jacquemontii* (Bu-banvati), *Aerva persica* (Bui), *Crotalaria burhia* (Sinio), *Leptadenia pyrotechnica* (Khimp), *Tephrosia purpurea* (Biyani) and *Zizyphus mauritiana* (Bordi, Ber). The principal grasses observed were *Cenchrus ciliaria*, *C. setigerus*, *Dactyloctenium aegyptium*, *Eleusine compressa* (Ghora dhob), *Panicum antidotale* and several species of *Aristida* (Lamp).

The common ephemerals, which make their appearance immediately after first shower of rain including *Cleome gynandra* (Safed Bajra), *Corchorus trilocularis* (Bahuphali), *Farsetia hamiltonii*, *Heliotropium paniculatum*, *Indigofera cordifolia*, *Portulaca oleracea* (Luni), *Vernonia cinerea* and species of *Blumea*. The common ephemeral grasses in the study area are *Cenchrus biflorus* (Bhurat), *Melanocenchrus jacquemontii*, *Perotis hordciformis* and species of *Aristida*. The common plants of the gravelly plains noticed were *Cleome gracilis*, *Corchorus depressus*, *Fagonia cretica* and some species of *Indigofera*. Some plants like *Aerva persica* (Bui), *A. pseudotementosa*, *Calotropis procera* (Akaro), *Convolvulus microphyllus* (Santari), *Crotalaria burhia* (Shinio) and *Leptadenia pyrotechnica* (Khimp), usually occur on loose sand. The important climbers fond here are *Cocculus hirustus*, *C. pendulus* (Pilwan), *Coccinia grandis* and *Ephedra foliate*. The characteristic plants growing on moist ground and on the margin of the tanks are *Ammannia baccifera*, *Bergia ammannioides*, *Dentella repens* and *Heliotropium supinum*. Several species of the common weeds, both indigenous and

exotic, are found in the area. Those occurring commonly are: *Amaranthus spinosus* (Kantio-chandelo), *Argemone maxicana*, *Chorchorus tridens*, *C. trilocularis*, *Convolvulus arvensis* (Hiranpagi), *Gnaphalium purpureaum*, *Justicia vahlu* (Gungi-bunti), *Malvastrum cormandelianum* and *Sisymbrium irio* (Asalio).

Avian Faunal Diversity

During the survey, a total of 150 species of birds were recorded in Bikaner. Out of which 55 were resident, 66 were winter visitor, 21 were Monsoon and summer visitor and 08 were rare. Some common birds were found at Laxmi Nath temple in Bikaner city Such as sparrows, crow, pigeons etc. 20 species of birds were found in Laxmi Nath temple including 11 types of sparrows and 9 were others (Table-1).

Table1: List of Birds were recorded at Laxmi Nath temple site in Bikaner city

S. No	Common Name	Scientific name	Status
1.	Rose ringed parakeet	*Psittaculakrameri*	Common
2.	House crow	*Corvussplendens*	Very common
3.	Common myna	*Acridotherestristis*	Common
4.	Rosy starling	*Pastor roseus*	Common
5.	House sparrow	*Passer domesticus*	Very common
6.	Red vented bulbul	*Pycnonotuscafer*	Common
7.	White eared bulbul	*Pycnonotusleucotis*	Common
8.	Rock pigeon	*Columba livia*	Very Common
9.	Eurasian collared dove	*Streptopeliadecaocto*	Common
10.	Laughing dove	*Spilopelia senegalensis*	Common
11.	Common kingfisher	*Alcedoatthis*	Common
12.	White throated kingfisher	*Halcyon smyrnensis*	Common
13.	Asian koel	*Eudynamysscolopaceus*	Rare only summer visitor
14.	Greater coucal	*Centropussinensis*	Rare only summer visitor
15.	Jungle babbler	*Turdoidesstriatus*	Common
16.	Common babbler	*Turdoidescoudatus*	Common
17.	Striated babbler	*Turdoidesearlei*	Common
18.	Domestic (Rock) pigeon	*Columba liviadomestica*	Very common
19.	House little swift	*Apus affinis*	Common
20.	Purple sunbird	*Nectariniaasiatica*	Common

The sparrows which eat insects, raptors such as eagles, kites, owls, buzzards, falcons etc. and vultures were found in the Jorbeer conservation reserve, Bikaner. Some aquatic birds had also been recorded there. Aquatic birds eat insects. Raptors eat dead animal. Vultures of 7 different species and 28 types of sparrows were found in Jorbeer conservation reserve (Table-2).

Table2: List of Birds were recorded in Jorbeer Conservation reserve, Bikaner

S.No.	Common name	Scientific name	Status
1.	Egyptian vulture	*Neophron percnopterus*	Common
2.	Steppe eagle	*Aquila nipalensis*	Common
3.	Eurasian vulture	*Gyps fulvus*	Winter visitor
4.	Himalayan vulture	*Gyps himalayensis*	Winter visitor
5.	Cinerous vulture	*Aegypiusmonachus*	Winter visitor
6.	Rad headed vulture	*Sarcogyps calvus*	Very Rare
7.	White romped vulture	*Gyps bengalensis*	Very Rare
8.	Indian vulture	*Gyps indicus*	Very Rare
9.	Toney eagle	*Aquila rapax*	Winter visitor
10.	Common raven	*Corvuscorax*	summer visitor
11.	Black shouldered kite	*Elanusaxillaris*	Common
12.	Spotted owlet	*Athene brama*	Common
13.	Indian Eagle Owl	*Bubo bengalensis*	summer visitor

14.	Barn owl	*Tyto alba*	summer visitor
15.	Common hoopoe	*Upupa epops*	Common
16.	Yellow eyes pigeon	*Colmbaeversmanni*	Common
17.	Great grey shrike	*Laniuscristatus*	Common
18.	Long tailed shrike	*Laniusschach*	Common
19.	Black drongo	*Dicrurusmacrocercus*	Common
20.	Bayback shrike	*Laniuscristatus*	Winter visitor
21.	Red tailed shrike		
22.	Brahminy starling	*Sturniapagodarum*	Winter visitor
23.	Green bee-ratter	*Meropsorientalis*	Common
24.	Blue tailed bee eater	*Meropsphilippinus*	summer visitor
25.	Glossy (Black) ibis	*Plegadusfalcinellus*	Common
26.	Rad headed ibis	*Pseudibispapillosa*	Common
27.	Black headed ibis	*Threkiarnismelancephalus*	Common
28.	Oriental Honey-buzzard	*Pernisptilorhynchus*	Winter visitor
29.	White Eyed Buzzard	*Butasturteesa*	
30.	Black-kite	*Milvus migrans*	Rare
31.	Shikra	*Accipiter badius*	Common
32.	Common Kestrel	*Falco tinnunculus*	Winter visitor
33.	Laggar Falcon	*Falco jugger*	Rare
34.	Short-toed Snake Eagle	*Circaetusgallicus*	Rare
35.	Saker Falcon	*Falco cherrug*	Winter visitor
36.	Pallid Harrier	*Circus macrourus*	PM
37.	Western marsh harrier	*Circus aeruginosus*	Winter visitor
38.	Montagu's Harrier	*Circus pygargus*	Winter visitor
39.	Common Buzzard	*Butteo buteo*	Winter visitor
40.	Eurassian Sparrow hawk	*Accipiter nisus*	Winter visitor
41.	(Eastern) Imperial Eagle	*Aquila heliacal*	Winter visitor
42.	Black-shouldered Kite	*Elanuscareuleus*	summer visitor
43.	Chestnut bellied sandgrouse	*Pteroclesexustus*	Monsoon and summer visitor
44.	Grey francolin	*Froncolinuspondicerianus*	Common
45.	Black francolin	*Froncolinusfrancolinus*	Monsoon and summer visitor
46.	Rufous tailed lark	*Ammomomanesphoenicurus*	Monsoon and summer visitor
47.	Ashy crowned sparrow lark	*Eremopterixgrisea*	Monsoon and summer visitor
48.	Black crowned sparrow lark	*Eremopterixnigriceps*	Monsoon and summer visitor
49.	Oriental skylark	*Alauda gulgula*	Monsoon and summer visitor
50.	Clamorous reed warbler	*Acrocephalusstentoreus*	Winter visitor
51.	Common chiffchaff	*Phylloscopuscollybita*	Winter visitor
52.	Indian robin	*Saxicoloidesfulicata*	Common
53.	Oriental magpie robin	*Copsychussaularis*	Common
54.	Home's wheatear	*Oenanthe alboniger*	Common
55.	Variable wheatear	*Oenanthe picata*	Common
56.	Red backed shrike	*Laniuscollurio*	summer visitor
57.	Indian roller	*Coracias benghalensis*	Common
58.	European roller		Passage visitor
59.	Brown shrike	Laniuscristatus	Winter visitor
60.	Bay backed shrike	Loniusvittatus	Common
61.	Plain martin	Ripariapaludicola	Common
62.	Large grey babbler	Argyamalcolmi	Winter visitor
63.	Sand Martin	RipariaRiparia	
64.	Wire tailed swallow	Hirundosmithii	summer visitor
65.	Pied kingfisher	Cerylerudis	Winter visitor
66.	Lsabelline wheatear	Oenanthe isabelline	Winter visitor
67.	Desert wheatear	Oenanthe deserti	Winter visitor
68.	Red Headed bunting	Emberizabruniceps	Monsoon and summer visitor

Total 62 species of birds were recorded in Gajner (Table-3). Out of them 50 species were migratory and rest were residential birds. Gajner wildlife centaury and 4 other small water bodies attract birds in this protected area. During winter season, lake becomes home for more than 50 species of Migratory birds.

Table3: List of birds were recorded in Gajner wildlife sanctuary, Bikaner

S. No	Common name	Scientific name	Status
1.	Black winged stilt	*HimantopusHimantopus*	Common
2.	Indian peafowl (peacock)	*Povocristatus*	Common
3.	Black necked grebe	*Podicepsnigricollis*	Winter visitor
4.	Common pochard	*Aythya farina*	Common
5.	Common teal	*Anas crecca*	Common
6.	Northern shoveler	*Spatula clypeata*	Winter visitor
7.	Common coot	*Fulicaatra*	Common
8.	Moorhen	*Gallinula*	Winter visitor
9.	Wood sand piper	*Tringaglareola*	Common
10.	Little ringed plover	*Charadriusdubius*	Winter visitor
11.	Common sand piper	*Actitishypoleucos*	Common
12.	White tailed lapwing	*Vanellusleucurus*	Winter visitor
13.	Gadwall	*Maraca Strepera*	Winter visitor
14.	Ruff	*Philomachuspugnax*	Common
15.	Pied avocet	*Recurvirostraavosetta*	Winter visitor
16.	Painted stork	*Mycterialeucocephala*	Winter visitor
17.	Ruddy shelduck	*Tadornaferruginea*	Winter visitor
18.	Spot billed duck	*Anas poecilorhyncha*	Winter visitor
19.	Knob billed duck	*Sarkidiornismelanotos*	Winter visitor
20.	Common Greenshank	*Tringanebularia*	Common
21.	Pintail	*Anas acuta*	Winter visitor
22.	Little egret	*Egrettagarzetta*	Winter visitor
23.	Spoon bill	*Platalea*	Winter visitor
24.	Pointed stork	*Mycterialeucocephala*	Monsoon and summer visitor
25.	Little cormorant	*Microcarboniger*	Winter visitor
26.	Great egret	*Ardea alba*	Winter visitor
27.	Indian cormorant	*Phalacrocoroaxfuscicllis*	Winter visitor
28.	Great cormorant	*Phalacrocoroax carbo*	Winter visitor
29.	Tufted duck	*Aythyafuligula*	Winter visitor
30.	Green sandpiper	*Tringaochropus*	Common
31.	Mallard	*Anas platyrhynchos*	Winter visitor
32.	Yellow wagtail	*Motacilla flava*	Winter visitor
33.	Crested pochard	*Nettarufina*	Winter visitor
34.	Little grebe	*Tachybaptusruficollis*	Common
Cranes			
35.	Demoiselle crane	*Grus virgo*	Winter visitor
36.	Common crane	*Grus grus*	Winter visitor
Herons			
37.	Indian pond heron	*ardeolagrayii*	Common
38.	Purple heron	*ardeapurpurea*	Winter visitor
39.	Grey heron	*Ardeacinerea*	Winter visitor
40.	Pond heron	*Ardeola*	Common
Lapwing			
41.	Red wattled lapwing	*Vanellus indicus*	Common
42.	Northern lapwing	*Vanellusvanellus*	Rare

43.	Yellow wattled lapwing	*Vanellusmalabaricus*	Winter visitor
44.	Sociable lapwing	*Vanellusgregarius*	Winter visitor
45.	Common woodshrike	*Tephrodornispondicerianus*	Common
46.	Rufous fronted prinia	*Priniabuchanani*	Common
47.	Plain prinia	*Priniainornata*	Common
48.	Common tailorbird	*Orthotomussutorius*	Winter visitor
49.	Lesser whitethroat	*Sylvia curruca*	Winter visitor
50.	Hume's Lesser whitethroat	*Sylvia (curruca) althaea*	Winter visitor
51.	Black redstart	*Phoenicuruochruros*	Winter visitor
52.	Tawny pipit	*Anthus campestris*	Winter visitor
53.	White browed wagtail	*Motacillamaderaspatensis*	Common
54.	White wagtail	*Motacilla alba*	Winter visitor
55.	Citrine wagtail	*Motacillacitreola*	Winter visitor
56.	Indian silverbill	*Lonchurastriata*	Common
57.	Wire tailed swallow	*hirundosmithii*	Summer and monsoon
58.	Black tailed Godwit	*Limosalimosa*	Summer visitor
59.	Ruff	*Calidrispugnax*	Summer visitor
60.	Purple swamphen	*Porphyrioporphyrio*	Winter visitor
61.	Common snipe	*Gallinagogallinago*	Winter visitor
62.	Indian stonechat	*Saxicola maurus indicus*	Monsoon and summer visitor

The month-wise presence of birds observed in different seasons in the region was assessed (Table-4).

Table-4: Month-wise status of different birds in and around Bikaner city

S. No.	Name of bird	Month wise status											
		Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
1	**Road headed vulture**	√	√	√	√	√	√	√	√	√	√	√	√
	(*Sarcogyps calvus*)												
2	**Cinereous vulture**	√	√	√	√	✗	✗	✗	✗	✗	√	√	√
	(*Aegypius monachus*)												
3	**Egyptian vulture**	√	√	√	√	√	√	√	√	√	√	√	√
	(*Neophron percnopterus*)												
4	**Eurasian griffon**	√	√	√	√	✗	✗	✗	✗	✗	√	√	√
	(*Gyps fulus*)												
5	**Himalayan griffon**	√	√	√	√	✗	✗	✗	✗	✗	√	√	√
	(*Gyps himalayensis*)												
6	**Long-billed vulture**	√	√	√	√	√	√	√	√	√	√	√	√
	(*Gyps indicus*)												
7	**White backed vulture**	√	√	√	√	√	√	√	√	√	√	√	√
	(*Gyps bengalensis*)												
8	**Tawny eagle**	√	√	√	√	√	√	✗	✗	✗	√	√	√
	(*Aquila rapax*)												
9	**Steppe eagle**	√	√	√	√	✗	✗	✗	✗	✗	√	√	√
	(*Aquila nipalensis*)												
10	**Black Kite**	√	√	√	√	√	√	√	√	√	√	√	√
	(*Milicus migrans*)												
11	**Cattle Egret**	√	√	√	√	√	√	√	√	√	√	√	√
	(*Bubulcus ibis*)												
12	**Black headed ibis**	√	√	√	√	✗	✗	✗	✗	✗	√	√	√
	(*Threskiornis melanocephalus*)												
13	**Indian Roller**	√	√	√	√	√	√	√	√	√	√	√	√
	(*Coracias benghalensis*)												
14	**Common Hoopoe**	√	√	√	√	√	√	√	√	√	√	√	√
	(*Upupa epops*)												

15	**Black drongo**	√	√	√	√	√	√	√	√	√	√	√	√
	(*Dicrurus macrocercus*)												
16	**Rosy sterling**	√	√	√	√	√	✗	✗	✗	√	√	√	√
	(*Sturnus roseus*)												
17	**Common sterling**	√	√	√	√	✗	✗	✗	✗	✗	√	√	√
	(*Sturnus vulgaris*)												
18	**Grey Shrike**	√	√	√	√	√	√	√	√	√	√	√	√
	(*Lanius excubitor*)												
19	**Common mayna**	√	√	√	√	✗	✗	✗	✗	✗	√	√	√
	(*Acridotheres tristis*)												
20	**Bank mayna**	√	√	√	√	√	√	√	√	√	√	√	√
	(*Acridotheres ginginianus*)												
21	**House Crow**	√	√	√	√	√	√	√	√	√	√	√	√
	(*Corvus splendens*)												
22	**Common raven**	√	√	√	√	√	✗	✗	✗	√	√	√	√
	(*Corvus corasc*)												
23	**Large-billed crow**	√	√	√	√	✗	✗	✗	✗	√	√	√	√
	(*Corvus macrorhynchos*)												
24	**Blue checked bee-eater**	√	√	√	√	√	✗	✗	√	√	√	√	√
	(*Merops persicus*)												
25	**Blue tailed bee-eater**	√	√	√	√	√	✗	✗	√	√	√	√	√
	(*Merops philippinus*)												
26	**Green bee eater**	√	√	√	√	√	√	√	√	√	√	√	√
	(*Merops orientalis*)												
27	**Yellow headed wagtail**	√	√	√	✗	✗	✗	✗	✗	✗	√	√	√
	(*Motacilla flava*)												
28	**Grey wagtail**	√	√	√	√	√	✗	✗	✗	✗	√	√	√
	(*Motacilla cinerea*)												
29	**Red wattled lapwing**	√	√	√	√	√	√	√	√	√	√	√	√
	(*Vanellus indicus*)												
30	**Indian robin**	√	√	√	√	√	√	√	√	√	√	√	√
	(*Sexicoloides fulicata*)												

√= present, X= absent

Different vulture species observed in Bikaner region

1. Cinereous vultures – (*Aegypiusm monachus)*, size – 105cm.
2. Egytian vultures – (*Neophron percnopterus)*, size –64cm.
3. Long-billed vulture - (*Gyps indicus*), size-92cm.
4. Himalayan griffon - (*Gyps himalayensis*), size-120cm.
5. Eurasian griffon - (*Gyps fulvus*), size – 100cm.

Vultures are large, broad-winged birds of prey that feed almost exclusively on dead animals. Their food habits often lead to large gatherings at the corpse. Such groups often belong to several different species from which comparisons can be made. Most vultures have this at the head or at least partially. They search for the carriage, cruising at great height, as well as keep an eye on their brothers and follow any other vulture that appears to be descending towards food. Vultures are largely silenced except for a corpse, when a corpse has to be eaten by them. There seems to have been a very worrying population crash in the region in recent years. Gyps vultures can be difficult to identify. It takes years for a bird to become an adult, and intermediate ploughing can be confusing, although juveniles that infest young more closely resemble and older sub-adult birds resemble adults. It helps to first become familiar with adults and common species. White ramped culture is by far the most common in the plains, while the Himalayan Griffon is the most commonly encountered species in the Himalayas above 1,000 meters, although even this species may descend to the foothills and plains in winter. The first is best for the age of a bird: the wings of a juvenile are equally long and pointed, while the majority of an adult is rounded. This difference is most easily seen on the low and middle cover of a bowing bird, However, in flight the posterior edge of the juvenile's wing appears serrated, but not so in the adult. In adults (except in

Tenuirostris long-billed culture) the bill is largely yellow, while in juveniles there is usually a black bill, sometimes on criminals. A compact fluffy white ruff (instead of long and straggle) identifies an adult (except Himalayan griffon) bird.

Fig.8: Cinereous vulture and Egyptian vulture

Fig.9: Eurasian griffon and Himalayan griffon

Conservation and management

Due to habitat loss the declining number of safe nesting and roosting site are the main threat to the *Gyps* vulture population in the Great Indian Thar Desert. This is mainly due to massive mining, tree cutting and unnatural predation. These threats increased many folds in the last few years due to consecutive droughts, due to massive mining the nesting and roosting sites of Long-billed vulture (*Gyps indicus*) is declined up to 50% and in some area up to 80%. Whereas since last 3 year due to consecutive droughts the nesting and roosting trees of White-backed vulture (*Gyps bengalensis*) and king vulture (*Sarcogyps calvus*) were cut down massively for providing livelihood to the people. Besides this the looping of nesting trees like Khejri (*Prosopis cineraria*), Babool (*Acacia nilotica*) and Jal (*Salvadora oleoides*) has also effected the breeding population of King and Long-billed vulture. In absence of safe and proper nesting sites any birds species build their nest at relatively unsafe sites which are exposed to predators like Jackal, Jungle cat, Fox, etc. If the habitat loss is continues without any holt this is going to be serious problem for the avian fauna of Bikaner city.

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