



# Avian Density and Diversity in Lunkaransar Lake, Rajasthan, India

Prithvi Raj Singh Rathore <sup>a++\*</sup>  
and Narendra Singh Rathore <sup>b#</sup>

<sup>a</sup> B.N University, Udaipur, Rajasthan, India.  
<sup>b</sup> Govt. Dungar College Bikaner, Rajasthan, India.

## Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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## ABSTRACT

Saltwater Lunkaransar which is known for mostly two things firstly the ruler of Bikaner Lunkaran and further for its Bird diversity, This is a year round investigation held monthly which mainly aims to identify the Avian Diversity and the number of Bird present in this region. Bird identified in an area of 100 square meter, A lot of birds travel to this region are migratory which are mostly seen in winter. Beside the fact that the Lake is salty this has no impact on its Bird Diversity, this makes this particular region a hotspot for Bird Watchers. One Such bird is (Kurja) Demoiselle Crane which migrates from Central Eurasia in the number of thousands, This study is based on identifying Bird density and diversity in Lunkaransar Lake, Rajasthan.

Keywords: Migratory birds; Lunkaransar lake.

<sup>++</sup> Research Scholar;

<sup>#</sup> Professor;

<sup>\*</sup>Corresponding author: Email: [pithubana@gmail.com](mailto:pithubana@gmail.com);

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## 1. INTRODUCTION

Considering renewable resources of all the planets, Earth has a unique place [1] due to its water availability and thus the planet Earth has been aptly described as a 'Watery Planet'. However, over 97% of the Earth's water is salinated and contained in the ocean [2]. The freshwater contain is only around 0.01%, covering 0.8% of Earth's surface [3] and providing habitat for about 1,00,000 out of approximately 1.75 million species [4] in different aquatic ecosystem. Beside the fact that the lake is salty bird diversity here is no less than any other part of the world.

Lunkaransar is named after Third Rao of Bikaner, Lunkaransar Lake is a salt water lake situated approximately 80 kilometer from Bikaner. This place is well known for its highly diverse avian diversity and a great loved place for the ornithologist for research purpose. Recent work done by some researchers are [5] conducted her work on Long Billed Vulture (*Gyps indicus*), Rathore and Abhimanyue 2024 published a paper on Qualitative and Quantitative analysis on birds of Gajner lake, Rajasthan. Studies from other countries Comparison of avian communities on restored and natural wetlands in north and south Dakota was conducted by Ratti et al. [6]. The effects of prey availability on the numerical response of wading birds were studied by Gawlik [7]. Factors affecting the distribution of a waterbird community in southeast Spain were studied by Paracuellos and Telleria [8]. Similarly, Steen et al. [9] assessed the sensitivity of wetland bird communities to the hydrological changes in the eastern Great Lakes region. Lor and Malecki [10] investigated the breeding ecology and nesting habitat associations of five marsh bird species; American Bittern (*Botaurus lentiginosus*), Least Bittern (*Ixobrychus exilis*), Pied-billed Grebe (*Podilymbus podiceps*), Sora (*Porzana carolina*) and Virginia Rail (*Rallus limicola*) in western New York. This paper will be in depth review of bird species of this particular lake and also be indentifying the number of birds spotted per month in area of 100 square meter, This study was done for a period of 1 year from July 2023 to June 2024 [11-13].

## 2. MATERIALS AND METHODS

**Specific materials and equipment used are as under:**

1. Binocular: Binoculars are essential. 8x20, 8x30, 10x50 and 10x60 are the most broadly

recommended for birdwatchers. The first number justifies the magnification of the binocular (8x or 10x), the second number is the diameter in millimetres of the objective lens, and is a measure of the light accumulation power (and also the size) of the binocular. Magnification above 10x is rarely optimal because it is difficult to hold more powerful binoculars steady. In case if we are using a high power zooming binoculars it is strictly recommended to use a tripod stand and fix that binocular on it before using it. An objective lens under 30mm in diameter is not recommended in low light conditions, and one above 50mm is way too much heavier for most of the observers. The additional robustness and optical superiority of high quality and more refined binoculars are only worth when we have additional expense or amount of money available. The binocular which, I personally used is Aculon A211 8x42 which is manufactured by Nikon corporation, The product dimensions are 14.5 x 18.5 x 4.2cm; 650g and this is one of the best binocular which I personally used.

2. Photographic Camera: A good quality and high resolution DSLR camera is needed to take the pictures of birds. Beside the basic stock lens a zoom lens is also necessary for the detailed pictures. The Photographic camera which I utilized was a Nikon D3200 The D3200 has 6 different scene modes such as portrait, nigh portrait, close up and landscape which helps us to get the perfect shot. It also has a 420-pixel RGB sensor which power's the Camera's recognition system. This compares the site's data with a huge database to enhance the photograph correctly. As I had talked earlier beside the stock lens I bought an extra zoom lens of Nikon.

3. Spotting scope: Identifying and counting birds is usually more accurate if a tripod-mounted telescope or spotting scope is used. It is possible to manage at many sites without one, but in case of wide area sites in which birds are commonly or basically more than 400m or 600m distant are best covered using both high power zooming binoculars and a Spotting scope. It is used when observing to have a wide angle of view, and a telescope with a tripod stand and 30x or 40x magnification is preferable for this reason. The spotting scope which I used was a Vanguard Endeavour HD 82A which has an excellent zooming power of 20-60x with an objective lens diameter of 82 mm.

4. Field Guide: Most of the bird watchers spend plenty of hours familiarising themselves with the

field characteristics of all the species they may come across, mostly in the first twenty days or in a year after taking up bird watching. A best way to do this is by captivating the information given in identification guides. Nowadays in the market very good quality identification guides can easily be available in most regions of the world and a field guide is the most necessary tool of the bird counter's equipment. It is often advised best practice to make some specific notes and sketches in case of any unknown or foreign species is encountered, and to carry an identification guide to identify the species when observations are done. Identification process is time-taking and may cause an intolerable delay in the progress with a count, and it is advisable to always keep a field guide with the observer handy for occasions when an unfamiliar species is reported. Always having a field guide available is the best way to minimise or to counter the identification errors when counting. Most water birds are quite noticeable with notable exceptions, straightforward to identify in favourable and good conditions if care is taken. The most frequently faced problem or difficulty is identifying birds at long distance in the extensive and flat terrain preferred by most congregatory water birds (birds which are mostly seen in crowd). This is when the additional power of a telescope is required when some sites, a certain proportion of the birds will often remain unidentified because they are too distant to see properly. Some of the most recommended identification guides which I also brought to bear are:

A. A Pictorial guide to the Birds of the Indian Subcontinent by Salim Ali & Dillon Ripley with 106 plates depicting all the birds by John Henry.

B. A Pictorial field guide to Birds of India by Bikram Grewal, Sumit Sen, Sarwandeep Singh, Nikhil Devasar and Garima Bhatia.

### 3. RESULTS AND DISCUSSION

Lunkaransar lake beside being a salt water lake this place supports highly diverse avian fauna, This lake is not only a place where we can see some sort residential birds but it also have a number of migratory birds travelling from thousands of kilometer in winter season.

One such bird is (Kurja) Demoiselle Crane which mostly migrates from Central Eurasia to these areas in the month of September every year and stays till February and March. This particular bird is of great importance to this region because this

bird is also sung in the local songs here and believed as a messenger bird. Ornithologist travel from all around the world every year to see highly diversified bird lake.

A year round monthly investigation is done from July 2023 to June 2024. Avian diversity here varies according to months, in summer very less number of birds spotted here as compared to winter season and that is the reason why most of the bird watchers travels here in winter season.

A total of 62 species of birds were spotted in this region including- (Mentioned data includes Common Name and Scientific Name of the Bird):

- Demoiselle Crane (*Grus virgo*)
- Common Sand Piper (*Actitis hypoleucos*)
- Cattle Egret (*Bubulcus ibis*)
- Red Wattled Lapwing (*Vanellus indicus*)
- Common Red Shank (*Tringa totanus*)
- Black Winged Stilt (*Himantopus himantopus*)
- Eurasian Teal (*Anas crecca*)
- Northern Shoveler (*Spatula clypeata*)
- Little Grebe (*Tachybaptus rubicollis*)
- Terek Sandpiper (*Xenus cineris*)
- Common Moorhen (*Galiniula chloropus*)
- Red Naped Ibis (*Pseudibis papillosa*)
- Ring Necked Dove (*Streptopelia capicola*)
- Swallows (*Hirundo rustica*)
- Marbled Teal (*Marmaronetta angustirostris*)
- Common Coot (*Fulica atra*)
- Pied Avocet (*Recuvirostra avosetta*)
- Marsh Sandpiper (*Tringa stagnatilis*)
- Grey Heron (*Ardea cinerea*)
- House Crow (*Corvus splendens*)
- Broad Billed Sandpiper (*Limicola falcinellus*)
- Laughing Dove (*Stegmapelia senegalensis*)
- Gadwall (*Anas strepera*)
- Brown Rockchat (*Oenanthe fusca*)
- Indian Pond Heron (*Ardela greyji*)
- Bank Myna (*Acridotherus ginginianus*)
- Common Myna (*Acridotheris tritis*)
- White Stork (*Ciconia ciconia*)
- Grey Frankolin (*Francolinus pondiceranus*)
- Great Egret (*Casmerodius albus*)
- Lesser Flamingo (*Phoenicopterus minor*)
- White Eared Bulbul (*Pycnonotus leucotis*)
- Black Stork (*Ciconia nigra*)
- Black Headed Ibis (*Threskiornis melanocephalus*)
- Glossy Ibis (*Plegadis falcinellus*)

- Laggar Falcon (*Falco jugger*)
- Rock Pigeon (*Columba livia*)
- Long Tailed Shrike (*Lanius schach*)
- Common Babbler (*Argya caudata*)
- Indian Spot Billed Duck (*Anas poecilorhyncha*)
- White Throated Kingfisher (*Halycon smyrnensis*)
- Rose Ringed Parakeet (*Psittacula krameri*)
- Red vented Bubul (*Pycnonotus cafer*)
- House Sparrow (*Passer domesticus*)
- Egyptian Vulture (*Neophron percynopterus*)
- Black Drongo (*Dicrurus macrocerus*)
- Yellow-Crowned Woodpecker (*Dendrocopos mahrattensis*)
- Black Winged Kite (*Elanus caeruleus*)
- Short Toed Snake Eagle (*Circaetus gallicus*)
- Rufous Treepie (*Dendrocitta vagabunda*)
- Indian Robin (*Saxicoloides fulicatus*)
- Jungle Babbler (*Argya striata*)
- Eurasian Marsh Harrier (*Circus aeruginosus*)
- Yellow Wagtail (*Motacilla flava*)
- Citrine Wagtail (*Motacilla citreola*)
- Greater Short Toed Lark (*Calandrella branchyactyla*)
- Crested Lark (*Galerida cristata*)
- Northern Pintail (*Anas acuta*)
- Lesser White Throat (*Sylvia curruca*)
- Shikra (*Accipiter badius*)
- Common Pochard (*Aythya farina*)
- Common Swift (*Apus apus*)

**Monthly Data analysis of Birds:**

**Table 1. Number of birds are mentioned as present in 100 square Meter per month: Lunkaransar lake**

S.No	Common Name (Scientific Name)	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Jun.
1.	Demoiselle Crane ( <i>Grus virgo</i> )	-	-	32	34	32	35	36	29	22	-	-	-
2.	Common Sand Piper ( <i>Actitis hypoleucos</i> )	-	-	-	4	4	6	4	5	4	-	-	-
3.	Cattle Egret ( <i>Bubulcs ibis</i> )	4	6	5	4	7	4	6	4	4	5	5	6
4.	Red Wattled Lapwing ( <i>Vanellus indicus</i> )	7	8	6	8	6	9	8	6	6	5	7	8
5.	Common Red Shank ( <i>Tringa totanus</i> )	-	-	2	3	4	5	3	2	-	-	-	-
6.	Black Winged Stilt ( <i>Himantopus himantopus</i> )	3	2	5	4	6	4	3	5	6	5	5	3
7.	Eurasian Teal ( <i>Anas crecca</i> )	-	-	6	8	9	11	13	7	6	-	-	-
8.	Northern Shoveler ( <i>Spatula clypeata</i> )	-	-	4	6	4	7	7	6	5	-	-	-
9.	Little Grebe ( <i>Tachybaptus rubicollis</i> )	5	6	4	5	5	6	8	3	2	4	7	5
10.	Terek Sandpiper ( <i>Xenus cinerus</i> )	-	-	6	8	8	6	7	6	6	-	-	-
S.No	Common Name (Scientific Name)	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Jun.
11.	Common Moorhen ( <i>Galniula chloropus</i> )	4	5	4	3	3	6	6	4	4	5	4	3
12.	Red Naped Ibis ( <i>Pseudibis papillosa</i> )	1	-	1	1	-	2	2	-	1	2	1	-
13.	Ring Necked	6	8	5	8	9	12	13	8	6	7	9	7

S.No	Common Name (Scientific Name)	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Jun.
	Dove ( <i>Streptopelia capicola</i> )												
14.	Swallows ( <i>Hirundo rustica</i> )	4	6	3	8	3	6	8	4	5	6	4	5
15.	Marbled Teal ( <i>Marmaronetta angustirostris</i> )	-	-	-	6	7	5	8	6	5	-	-	-
16.	Common Coot ( <i>Fulica atra</i> )	-	-	-	8	9	7	8	5	6	-	-	-
17.	Pied Avocet ( <i>Recuvirostra avosetta</i> )	-	-	-	2	1	1	3	1	2	-	-	-
18.	Marsh Sandpiper ( <i>Tringa stagnatilis</i> )	-	-	-	2	3	3	4	4	3	-	-	-
19.	Grey Heron ( <i>Ardea cinerea</i> )	1	2	1	2	2	3	2	1	2	2	1	2
20.	House Crow ( <i>Corvus splendens</i> )	4	5	4	3	6	6	8	7	4	3	4	6
S.No	Common Name (Scientific Name)	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Jun.
21.	Broad Billed Sandpiper ( <i>Limicola falcinellus</i> )	-	-	-	4	6	4	5	4	3	-	-	-
22.	Laughing Dove ( <i>Stegmapelia senegalensis</i> )	8	7	4	5	6	4	7	4	7	6	5	9
23.	Gadwall ( <i>Anas strepera</i> )	-	-	-	2	3	3	4	4	3	-	-	-
24.	Brown Rockchat ( <i>Oenanthe fusca</i> )	1	2	-	-	2	1	-	2	3	-	-	1
25.	Indian Pond Heron ( <i>Ardela greyii</i> )	2	3	2	2	3	2	4	3	4	3	2	1
26.	Bank Myna ( <i>Acridotherus ginginianus</i> )	2	3	2	4	1	2	4	2	1	2	3	4
27.	Common Myna ( <i>Acridotheris tritis</i> )	3	2	4	2	1	3	4	3	2	1	2	2
28.	White Stork ( <i>Ciconia cinconia</i> )	-	-	-	1	1	1	1	1	1	-	-	-
29.	Grey Frankolin ( <i>Francolinus pondiceranus</i> )	4	5	4	3	4	5	6	7	4	5	4	3
S.No	Common Name (Scientific Name)	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Jun.
30.	Great Egret ( <i>Casmerodius albus</i> )	-	-	2	1	2	2	2	1	-	-	-	-
31.	Lesser Flamingo ( <i>Phoenicopterus minor</i> )	-	-	-	-	4	4	-	-	-	-	-	-
32.	White Eared Bulbul ( <i>Pycnonotus leucotis</i> )	5	5	6	7	5	6	6	4	7	4	6	5
33.	Black Stork ( <i>Ciconia nigra</i> )	-	-	-	2	2	2	2	2	-	-	-	-

S.No	Common Name (Scientific Name)	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Jun.
34.	Black Headed Ibis ( <i>Threskiornis melanocephalus</i> )	1	-	1	1	-	1	1	1	-	1	1	-
35.	Glossy Ibis ( <i>Plegadis falcinellus</i> )	-	-	1	1	1	1	1	-	-	-	-	-
36.	Laggar Falcon ( <i>Falco jugger</i> )	1	-	-	-	1	-	1	-	-	-	1	-
37.	Rock Pigeon ( <i>Columba livia</i> )	6	5	7	6	7	8	8	4	7	5	6	5
38.	Long Tailed Shrike ( <i>Lanius schach</i> )	-	-	-	1	2	2	1	-	-	-	-	-
S.No	Common Name (Scientific Name)	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Jun.
39.	Common Babbler ( <i>Argya caudata</i> )	2	3	2	5	3	2	2	4	2	3	2	2
40.	Indian Spot Billed Duck ( <i>Anas poecilorhyncha</i> )	2	-	-	-	-	2	3	2	-	-	2	-
41.	White Throated Kingfisher ( <i>Halycon smyrnensis</i> )	-	1	-	2	1	1	-	-	1	-	-	2
42.	Rose Ringed Parakeet ( <i>Psittacula krameri</i> )	2	1	1	1	2	2	2	1	1	1	1	1
43.	Red vented Bulbul ( <i>Pycnonotus cafer</i> )	1	-	1	2	1	1	1	-	1	1	1	-
44.	House Sparrow ( <i>Passer domesticus</i> )	2	2	-	3	4	4	3	4	3	2	2	-
45.	Egyptian Vulture ( <i>Neophron percynopterus</i> )	-	-	-	-	-	1	1	1	-	-	-	-
46.	Black Drongo ( <i>Dicrurus macrocerus</i> )	1	1	2	-	-	-	-	1	1	1	2	3
47.	Yellow-Crowned Woodpecker ( <i>Dendrocopos mahrattensis</i> )	1	-	-	-	1	1	1	1	-	-	1	-
S.No	Common Name (Scientific Name)	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Jun.
48.	Black Winged Kite ( <i>Elanus caeruleus</i> )	-	1	-	1	1	1	1	-	1	-	-	1
49.	Short Toed Snake Eagle ( <i>Circaetus gallicus</i> )	-	-	-	1	1	1	1	1	-	-	-	-
50.	Rufous Treepie ( <i>Dendrocitta vagabunda</i> )	1	1	-	-	-	-	-	1	1	-	-	-
51.	Indian Robin ( <i>Saxicoloides fulicatus</i> )	1	-	1	1	-	1	1	-	1	-	-	-
52.	Jungle Babbler ( <i>Argya striata</i> )	4	5	4	4	3	6	6	5	3	2	4	5
53.	Eurasian Marsh Harrier ( <i>Circus</i> )	-	-	-	1	1	2	2	2	-	-	-	-

S.No	Common Name (Scientific Name)	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Jun.
<i>aeruginosus</i>													
54.	Yellow Wagtail ( <i>Motacilla flava</i> )	1	-	1	1	-	1	1	-	1	-	-	-
55.	Citrine Wagtail ( <i>Motacilla citreola</i> )	-	-	-	1	1	1	1	-	-	-	-	-
56.	Greater Short Toed Lark ( <i>Calandrella branchyactyla</i> )	-	-	2	2	2	2	3	2	-	-	-	-
S.No	Common Name (Scientific Name)	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Jun.
57.	Crested Lark ( <i>Galerida cristata</i> )	2	1	-	-	1	1	2	-	-	-	2	-
58.	Northern Pintail ( <i>Anas acuta</i> )	-	-	-	2	4	4	4	2	-	-	-	-
59.	Lesser White Throat ( <i>Sylvia curruca</i> )	-	-	-	-	1	1	-	-	-	-	-	-
60.	Shikra ( <i>Accipiter badius</i> )	1	2	1	-	-	2	1	-	3	-	1	1
61.	Common Pochard ( <i>Aythya farina</i> )	-	-	-	2	5	4	4	5	3	-	-	-
62.	Common Swift ( <i>Apus apus</i> )	4	5	3	2	3	4	2	3	2	3	2	2

Some Researchers who contributed in this field were mentioned as- The population of marsh land birds has been used as a biological indicator of habitat quality [14,15,16,17,18]. Effects of environmental stress on bird population has also been studied by Dickson 1992.

Some other work in nearby region by Swami [19] and Chouhan [20] Khatri A.K [21]. Birds of the Darbari region Bikaner, Rathore and Abhimanyue [22].

#### 4. CONCLUSION

As reported a total of 62 species of birds were reported in this particular region, with the species diversity this report also analyse the number of birds reported in Lunkaransar Lake. Overall yearly analysis clearly states that avian diversity at this lake is none other less than any other part of the world. In the winter season Demoiselle Crane were seen in the highest number and beside that Lesser Flamingo's were also reported.

#### DISCLAIMER (ARTIFICIAL INTELLIGENCE)

We hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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