

COMPARATIVE STUDY ON THREE DIFFERENT AVIFAUNAL COMMUNITY OF MEHSANA, NORTH GUJARAT

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AUTHORS' CONTRIBUTIONS

This work carried out in collaboration among all authors. Author HP designed the study and wrote the protocol.

Authors AP, HP, DP and VP performed all the field studies. Author PD performed the statistical analysis.

Author DV identified bird species. Author YK managed valuable comments and inputs for the improvement of the manuscripts. All authors read and approved the final manuscript.

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ABSTRACT

The purpose of the present assessment is intending to study the diversity and distribution of avifauna in the three selected sites of the Mehsana district, Northern Gujarat, India from the year 2015 to 2019. Data collection was done with a visual encounter survey method at random 04 days per season by four man-hours. A total of 113 species of birds distributed in 19 order, 54 families and 100 genera were recorded from the three sites. Among all the sites, a significant number of genera and species recorded from Chimnabai Lake. According to International Union for Conservation of Nature, a total of 104 species of recorded avifauna is Least Concern, 02 species (Sarus Crane and White-naped Tit) were Vulnerable and 07 species were Nearly Threatened. 12 species from Appendix II and one species (Indian Peafowl) from Appendix III as per the Convention of International Trade in Endangered Species database. A total of 90 species from Schedule IV, 08 species from Schedule I and one species (House crow) from Schedule V category under the conservation of Wildlife Protection Act, 1972. Migratory status shows that a significant number of common resident birds were present in all the sites. This might suggest that these habitats are very important for the preservation of the avifaunal community in the study area.

Keywords: Checklist; conservation status; migratory status; site-wise distribution; Sorenson's similarity index.

1. INTRODUCTION

Globally 9,672 species of the birds reported by Sibley and Monroe [1]. In India 1,263 species from 23 orders, 107 families and 492 genera were listed by

Praveen [2]. Parasharya listed 526 species and 76 families from the Gujarat state [3]; thereafter Ganpule has listed 574 species of birds from the various localities of the Gujarat state [4]. From the Mehsana district, Senma and Acharya reported Sarus crane in

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Chimnabai Lake [5], thereafter no such records of the avifauna of Chimnabai Lake. Patel and Patel reported 90 species of birds belonging to 11 orders, 33 families and 68 genera from Taranga Hill forest [6], 231 bird species were recorded by Birds of Gujarat [7], 337 species by the eBird [8], 411 species by the Avibase - Bird checklists of the World [9]. From the Taranga Hill forest, the Avibase-Bird database of the World listed 40 species of birds [9] and 47 species listed according to Birds of Gujarat [8]. Recently such kind of multi-sites study on the avifaunal community of Visnagar city and vicinity from the Mehsana district reported 96 species of birds [10]. Thus, the current study dealt with a checklist and systematics updates of avifauna, site-wise comparison, conservation status and photographic documentation of all the recorded birds' species from the three sites of Mehsana district.

2. MATERIALS AND METHODS

2.1 Study Area

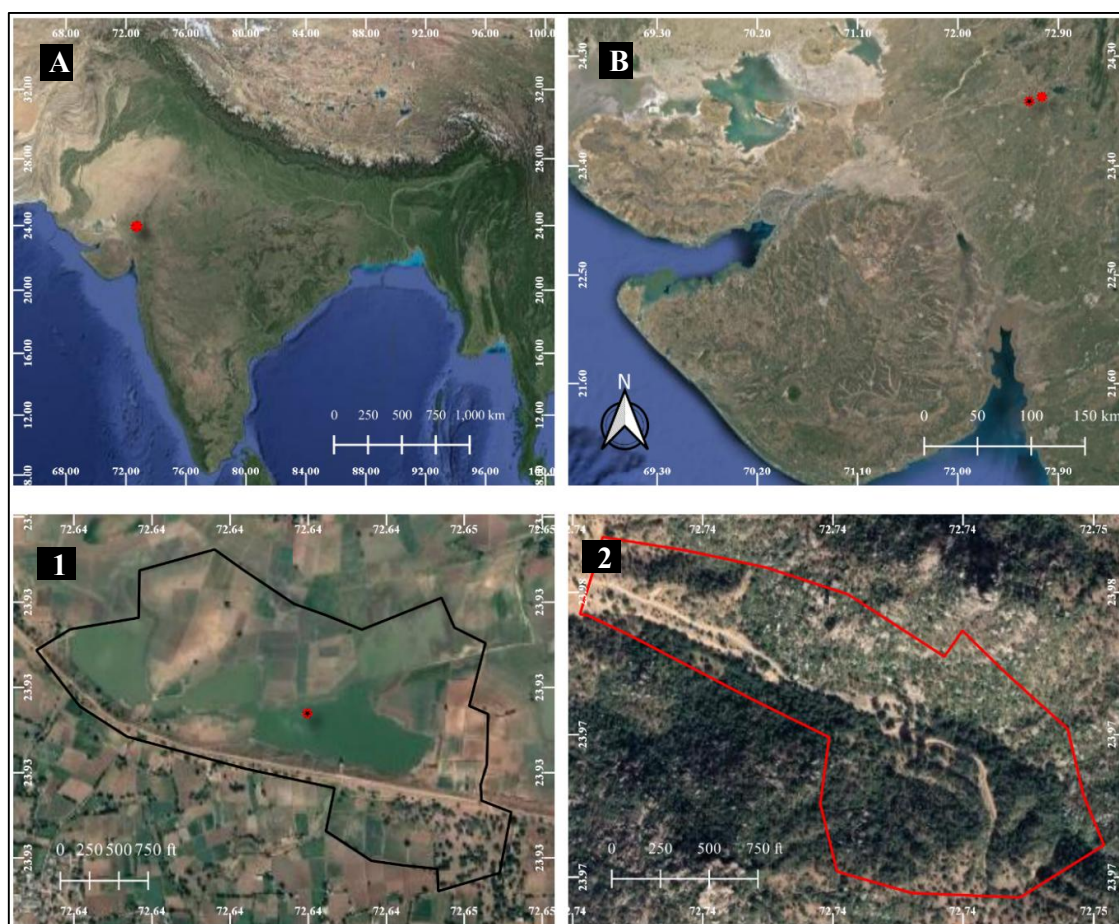
Mehsana district is the North Gujarat region of the Gujarat state. It is located in the north-west part of

Gujarat. The district has a semi-arid climate. Extreme temperatures, erratic rainfall and high evaporation are the characteristic features of this type of climate. For the study of avian fauna, three sites selected and their information is given below:

Site 1: Chimnabai Lake or Chimnabai Sarovar site is located at (23°55' N, 72°38' E) Kheralu tehsil, Mehsana district, North Gujarat (Fig. 1).

Its range is 6.4 Km² and the Government of Gujarat builds it for irrigation purposes of farmers. During the winter and summer season, there is shallow water present in the lake, whether in the monsoon season it is full-filled with rainwater.

Site 2: Taran-Dharan Mataji temple site is located 23°58' N, 72°44' E in the Taranga hills forest. The selection of this site purposely due to less anthropogenic activities occurs comparatively Taranga hill station. Seasonal stream flow through the mountain to the outside of this site (Fig. 1).



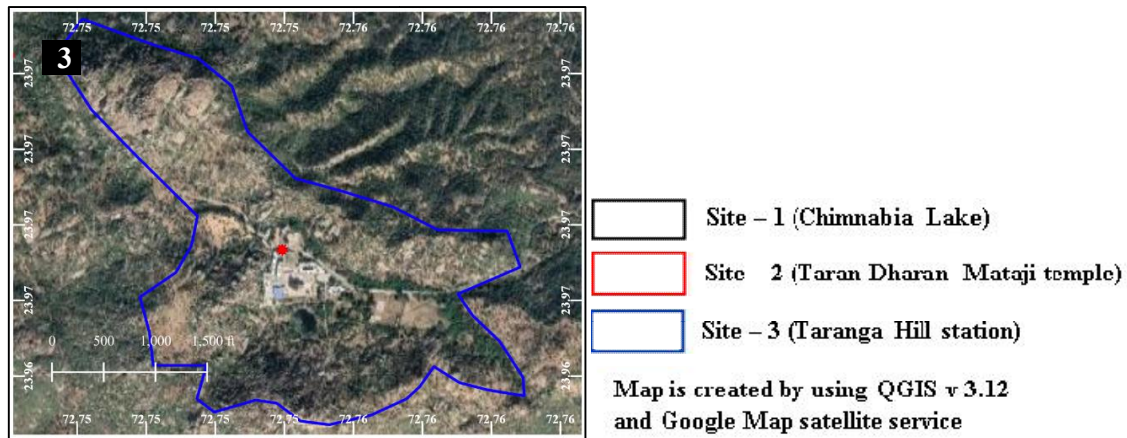


Fig. 1 A. Location of the study area in India (Red point) B. Location of Study area in Gujrat state (Red point)

Site 3: Taranga hills is one of the famous Jain pilgrim places of Northern Gujarat. It is located at the starting point of Aravalli ranges and situated at 24°00' N & 72°46' E (365.76 m) in the Mehsana district. It is one of the unclassified reserve forest (under section-IV) with a total area of 18.12 km². This forest is forest type 5/E² (Boswellia type of forest) according to Champion and Seth [11] from Northern Gujarat (Fig. 1).

2.2 Sampling Methods

Study sites visited 04 days in season (i.e. winter, summer and monsoon) with four person-hours from the year 2015 to 2019. Sampling was done by random by the visual encounter survey method and use a bird vocalization method (Target species: canopy birds). For the data collection and field survey, a pair of binocular (Celestron Up-close 12x50 and Celestron Up-close G2 10x25), Point and shoot camera (Canon sx50hs) and Digital Single-Lens Reflex (Canon Electro-Optical System 700D, Nikon D5800) cameras were used for photography and observed the birds accurately. Identification of avian species by using taxonomic books such as [12,13,14,15,7]. Xeno-canto database used for birdcall [16] and Systematic followed as per HBW and BirdLife International [17].

2.3 Data Analysis

Systematics and checklist of the recorded avifauna from the study area up to the genus and species level (Table 1).

Sorenson's similarity index was calculated by the formula:

$$QS = \frac{2C}{A + B}$$

Where A and B are the number of species in samples A and B, respectively and C is the number of species shared by the two samples. Documentation of bird photographs given in Plates A to C.

3. RESULTS AND DISCUSSION

A total of 113 species of birds belong to 100 genera, 54 families and 19 orders were recorded. Among them, 82 species and 74 genera recorded from the Chimnabai Lake (S1) site; 66 species and 60 genera from Taran-Dharan Mataji temple (S2) site; 56 species and 55 genera from Taranga Hill (S3) site (Table 1). Site wise comparison of recorded bird's species migratory status is described in details (Table 2).

3.1 IUCN Red List of Threatened Species

A total of 104 species of recorded avifauna is Least Concern, 02 species (Sarus Crane and White-naped Tit) were Vulnerable and 07 species were Nearly Threatened as per IUCN (Plate A: 17). Out of these, 74 species are Least Concern, only one Vulnerable species (Sarus Crane) and 07 Nearly Threatened species recorded from the Chimnabai Lake (S1) site. A total of 65 species were Least Concern and one species (White-naped Tit) of Vulnerable category recorded from the Taran-Dharan Mataji temple (S2) site. Only 56 Least Concern species recorded from the Taranga Hill (S3) site (Table 1).

3.2 CITES Species

From the birds, a total of 11 species from Appendix II and one species from Appendix III were recorded in the CITES database. From Appendix II, a total of 09 species from Chimnabai Lake (S1), 04 species from

Taran-Dharan Mataji Temple (S2) and Taranga Hill (S3) as per the CITES checklist. In Appendix III, one species (Indian Peafowl) commonly observed in all the sites during the study period (Table 1).

Table 1. Checklist of recorded Avifauna from selected sites

Common name	Scientific name	Sites			MS
		1	2	3	
Order: Galliformes					
Family: Phasianidae (Pheasants, Partridges, Turkeys, Grouse)					
1. Common Quail	<i>Coturnix coturnix</i> ^{LC**}	-	+	+	L
2. Grey francolin	<i>Francolinus pondicerianus</i> ^{LC**}	+	+	+	C
3. Indian Peafowl ^{##}	<i>Pavo cristatus</i> ^{LC*}	+	+	+	C
Order: Anseriformes					
Family: Anatidae (Ducks, Geese, Swans)					
4. Common Teal	<i>Anas crecca</i> ^{LC**}	+	-	-	L
5. Indian Spot-billed Duck	<i>Anas poecilorhyncha</i> ^{LC**}	+	-	-	C
6. Lesser Whistling-duck	<i>Dendrocygna javanica</i> ^{LC**}	+	-	-	C
7. Cotton Pygmy-goose	<i>Nettapus coromandelianus</i> ^{LC**}	+	-	-	H
8. African Comb Duck [#]	<i>Sarkidiornis melanotos</i> ^{LC**}	+	-	-	C
9. Northern Shoveler	<i>Spatula clypeata</i> ^{LC**}	+	-	-	S
10. Ruddy Shelduck	<i>Tadorna ferruginea</i> ^{LC**}	+	-	-	K
Order: Podicipediformes					
Family: Podicipedidae (Grebes)					
11. Little Grebe	<i>Tachybaptus ruficollis</i> ^{LC**}	+	-	-	C
Order: Phoenicopteriformes					
Family: Phoenicopteridae (Flamingos)					
12. Lesser Flamingo [#]	<i>Phoeniconaias minor</i> ^{NT**}	+	-	-	C
Order: Columbiformes					
Family: Columbidae (Pigeons, Doves)					
13. Rock Dove	<i>Columba livia</i> ^{LC}	+	+	+	R
14. Laughing Dove	<i>Spilopelia senegalensis</i> ^{LC**}	+	+	+	C
15. Eurasian Collared-dove	<i>Streptopelia decaocto</i> ^{LC**}	+	+	+	C
16. Red Turtle-dove	<i>Streptopelia tranquebarica</i> ^{LC**}	+	+	+	C
17. Yellow-footed Green-pigeon	<i>Treron phoenicopterus</i> ^{LC**}	-	+	+	I
Order: Cuculiformes					
Family: Cuculidae (Cuckoos)					
18. Jacobin Cuckoo	<i>Clamator jacobinus</i> ^{LC**}	-	+	-	A
19. Greater Coucal	<i>Creptopus sinensis</i> ^{LC**}	+	+	+	C
20. Western Koel	<i>Eudynamis scolopaceus</i> ^{LC**}	+	+	+	C
21. Common Hawk-cuckoo	<i>Hierococcyx varius</i> ^{LC**}	-	+	-	J
Order: Gruiformes					
Family: Gruidae (Cranes)					
22. Sarus Crane [#]	<i>Antigone antigone</i> ^{VU**}	+	-	-	H
Order: Gruiformes					
Family: Rallidae (Rails, Gallinules, Coots)					
23. White-breasted Waterhen	<i>Amauromis phoenicurus</i> ^{LC**}	+	-	-	C
24. Common Coot	<i>Fulica atra</i> ^{LC**}	+	-	-	C
25. Common Moorhen	<i>Gallinula chloropus</i> ^{LC**}	+	-	-	C
Order: Ciconiiformes					
Family: Ciconiidae (Storks)					
26. Asian Openbill	<i>Anastomus oscitans</i> ^{LC**}	+	-	-	C
27. Painted Stork	<i>Mycteria leucocephala</i> ^{NT**}	+	-	-	P
Order: Pelecaniformes					
Family: Ardeidae (Herons)					
28. Great White Egret	<i>Ardea alba</i> ^{LC**}	+	-	-	C
29. Grey Heron	<i>Ardea cinerea</i> ^{LC**}	+	-	-	F

Common name	Scientific name	Sites			MS
		1	2	3	
30. Intermediate Egret	<i>Ardea intermedia</i> ^{LC**}	+	+	+	C
31. Indian Pond-heron	<i>Ardeola grayii</i> ^{LC**}	+	+	+	C
32. Cattle Egret	<i>Bubulcus ibis</i> ^{LC**}	+	+	+	C
33. Little Egret	<i>Egretta garzetta</i> ^{LC**}	+	+	+	C
Family: Pelecanidae (Pelicans)					
34. Great White Pelican	<i>Pelecanus onocrotalus</i> ^{LC**}	+	-	-	L
Family: Threskiornithidae (Ibises, Spoonbills)					
35. Eurasian Spoonbill [#]	<i>Platalea leucorodia</i> ^{LC*}	+	-	-	D
36. Glossy Ibis	<i>Plegadis falcinellus</i> ^{LC**}	+	-	-	J
37. Red-naped Ibis	<i>Pseudibis papillosa</i> ^{LC**}	+	+	+	C
38. Black-headed Ibis	<i>Threskiornis melanocephalus</i> ^{NT**}	+	-	-	C
Order: Suliformes					
Family: Anhingidae (Darters)					
39. Oriental Darter	<i>Anhinga melanogaster</i> ^{NT**}	+	-	-	O
Family: Phalacrocoracidae (Cormorants)					
40. Little Cormorant	<i>Microcarbo niger</i> ^{LC**}	+	-	-	M
Order: Charadriiformes					
Family: Charadriidae (Plovers)					
41. Little Ringed Plover	<i>Charadrius dubius</i> ^{LC**}	+	-	-	C
42. Red-wattled Lapwing	<i>Vanellus indicus</i> ^{LC**}	+	+	+	R
Order: Charadriiformes					
Family: Jacanidae (Jacanas)					
43. Pheasant-tailed Jacana	<i>Hydrophasianus chirurgus</i> ^{LC**}	+	-	-	C
Family: Laridae (Gulls, Terns, Skimmers)					
44. River Tern	<i>Sterna aurantia</i> ^{NT}	+	-	-	C
Family: Recurvirostridae (Avocets, Stilts)					
45. Black-winged Stilt	<i>Himantopus himantopus</i> ^{LC**}	+	-	-	C
Family: Scolopacidae (Sandpipers, Snipes, Phalaropes)					
46. Common Sandpiper	<i>Actitis hypoleucos</i> ^{LC**}	+	-	-	L
47. Temminck's Stint	<i>Calidris temminckii</i> ^{LC**}	+	-	-	L
48. Common Snipe	<i>Gallinago gallinago</i> ^{LC**}	+	-	-	L
49. Black-tailed Godwit	<i>Limosa limosa</i> ^{NT**}	+	-	-	L
50. Eurasian Curlew	<i>Numenius arquata</i> ^{NT**}	+	-	-	L
51. Wood Sandpiper	<i>Tringa glareola</i> ^{LC**}	+	-	-	L
Order: Strigiformes					
Family: Strigidae (Typical Owls)					
52. Spotted Owllet [#]	<i>Athene brama</i> ^{LC**}	-	+	-	C
Order: Accipitriformes					
Family: Accipitridae (Hawks, Eagles)					
53. Shikra [#]	<i>Accipiter badius</i> ^{LC*}	+	+	+	C
54. Black-winged Kite [#]	<i>Elanus caeruleus</i> ^{LC*}	+	-	+	C
55. Black Kite [#]	<i>Milvus migrans</i> ^{LC*}	+	-	+	C
56. Oriental Honey-buzzard [#]	<i>Pernis ptilorhynchus</i> ^{LC*}	+	+	+	F
Family: Pandionidae (Osprey)					
57. Osprey [#]	<i>Pandion haliaetus</i> ^{LC*}	+	-	-	L
Order: Bucerotiformes					
Family: Upupidae (Hoopoes)					
58. Common Hoopoe	<i>Upupa epops</i> ^{LC**}	-	+	+	L
Order: Coraciiformes					
Family: Alcedinidae (Kingfishers)					
59. Pied Kingfisher	<i>Ceryle rudis</i> ^{LC}	+	+	+	C
60. White-throated Kingfisher	<i>Halcyon gularis</i> ^{LC**}	+	+	+	R
Family: Coraciidae (Rollers)					
61. Indian Roller	<i>Coracias benghalensis</i> ^{LC**}	+	+	+	C

Common name	Scientific name	Sites			MS
		1	2	3	
Family: Meropidae (Bee-eaters)					
62. Asian Green Bee-eater	<i>Merops orientalis</i> ^{LC}	+	+	+	C
63. Blue-cheeked Bee-eater	<i>Merops persicus</i> ^{LC}	+	-	-	B
Order: Piciformes					
Family: Picidae (Woodpeckers)					
64. Black-rumped Flameback	<i>Dinopium benghalense</i> ^{LC **}	-	+	+	C
Order: Psittaciformes					
Family: Psittacidae (Parrots)					
65. Plum-headed Parakeet #	<i>Psittacula cyanocephala</i> ^{LC **}	-	+	-	C
66. Rose-ringed Parakeet	<i>Psittacula krameri</i> ^{LC **}	+	+	+	R
Order: Passeriformes					
Family: Aegithinidae (Ioras)					
67. Common Iora	<i>Aegithina tiphia</i> ^{LC **}	-	+	+	C
Family: Alaudidae (Larks)					
68. Indian Bushlark	<i>Mirafra erythroptera</i> ^{LC **}	+	-	-	C
Family: Cisticolidae (Cisticolas and allies)					
69. Common Tailorbird	<i>Orthotomus sutorius</i> ^{LC **}	+	+	+	C
70. Ashy Prinia	<i>Prinia socialis</i> ^{LC **}	-	+	+	C
Family: Corvidae (Crows and jays)					
71. Large-billed Crow	<i>Corvus macrorhynchos</i> ^{LC **}	-	+	-	C
72. House crow	<i>Corvus splendens</i> ^{LC ***}	+	+	+	R
73. Rufous Treepie	<i>Dendrocitta vagabunda</i> ^{LC **}	+	+	+	C
Family: Dicaeidae (Flowerpeckers)					
74. Thick-billed Flowerpecker	<i>Dicaeum agile</i> ^{LC **}	-	+	+	C
Family: Dicruridae (Drongos)					
75. White-bellied Drongo	<i>Dicrurus caerulescens</i> ^{LC **}	-	+	-	Q
76. Black Drongo	<i>Dicrurus macrocercus</i> ^{LC **}	+	+	+	R
Family: Emberizidae (Buntings, American sparrows and allies)					
77. Crested Bunting	<i>Emberiza lathami</i> ^{LC **}	-	-	+	H
Family: Hirundinidae (Swallows and martins)					
78. Red-rumped Swallow	<i>Cecropis daurica</i> ^{LC}	+	+	+	C
79. Wire-tailed Swallow	<i>Hirundo smithii</i> ^{LC}	+	+	+	C
Family: Laniidae (Shrikes)					
80. Long-tailed Shrike	<i>Lanius schach</i> ^{LC}	+	+	+	C
Family: Leiotrichidae (Laughing-thrushes and allies)					
81. Common Babbler	<i>Argya caudata</i> ^{LC **}	+	+	+	R
82. Jungle Babbler	<i>Turdoides striata</i> ^{LC **}	+	+	+	C
Family: Monarchidae (Monarchs)					
83. Indian Paradise-flycatcher	<i>Terpsiphone paradisi</i> ^{LC **}	-	+	-	E
Order: Passeriformes					
Family: Motacillidae (Wagtails and pipits)					
84. Paddy-field Pipit	<i>Anthus rufulus</i> ^{LC **}	+	-	-	C
85. White Wagtail	<i>Motacilla alba</i> ^{LC **}	+	-	-	L
86. Western Yellow Wagtail	<i>Motacilla flava</i> ^{LC **}	+	-	-	L
Family: Muscipidae (Chats and Old World flycatchers)					
87. Oriental Magpie-robin	<i>Copsychus saularis</i> ^{LC **}	+	+	+	C
88. Bluethroat	<i>Cyanecula svecica</i> ^{LC **}	+	-	-	L
89. Tickell's Blue-flycatcher	<i>Cyornis tickelliae</i> ^{LC **}	-	+	+	C
90. Red-breasted Flycatcher	<i>Ficedula parva</i> ^{LC **}	-	+	-	L
91. Desert Wheatear	<i>Oenanthe deserti</i> ^{LC **}	+	-	-	L
92. Black Redstart	<i>Phoenicurus ochruros</i> ^{LC **}	-	+	+	L
93. Pied Bushchat	<i>Saxicola caprata</i> ^{LC **}	+	+	+	L
94. Common Stonechat	<i>Saxicola torquatus</i> ^{LC **}	+	-	-	L
95. Indian Robin	<i>Saxicoloides fulicatus</i> ^{LC **}	+	+	+	C

Common name	Scientific name	Sites			MS
		1	2	3	
Family: Nectariniidae (Sunbirds)					
96. Purple Sunbird	<i>Cinnyris asiaticus</i> ^{LC**}	+	+	+	C
Family: Oriolidae (Orioles and figbirds)					
97. Indian Golden Oriole	<i>Oriolus kundoo</i> ^{LC**}	-	+	+	C
Family: Paridae (Tits and chickadees)					
98. White-naped Tit	<i>Machlolophus nuchalis</i> ^{VU**}	-	+	-	N
Family: Passeridae (Sparrows, snow-finches and allies)					
99. Chestnut-shouldered Bush-sparrow	<i>Gymnoris xanthocollis</i> ^{LC}	-	+	-	C
100. House Sparrow	<i>Passer domesticus</i> ^{LC}	-	+	-	C
Family: Phylloscopidae (Leaf-warblers)					
101. Sulphur-bellied Warbler	<i>Phylloscopus griseolus</i> ^{LC}	-	+	-	L
Family: Pittidae (Pittas)					
102. Indian Pitta	<i>Pitta brachyura</i> ^{LC**}	-	+	-	G
Family: Pycnonotidae (Bulbuls)					
103. Red-vented Bulbul	<i>Pycnonotus cafer</i> ^{LC**}	+	+	+	R
104. White-eared Bulbul	<i>Pycnonotus leucotis</i> ^{LC**}	-	+	+	H
Family: Rhipiduridae (Fantails)					
105. White-throated Fantail	<i>Rhipidura albicollis</i> ^{LC}	-	+	+	H
Family: Stenostiridae (Fairy Flycatcher and allies)					
106. Grey-headed Canary-flycatcher	<i>Culicicapa ceylonensis</i> ^{LC}	-	+	+	K
Family: Sturnidae (Starlings)					
107. Bank Myna	<i>Acridotheres ginginianus</i> ^{LC**}	+	+	-	R
Order: Passeriformes					
Family: Sturnidae (Starlings)					
108. Common Myna	<i>Acridotheres tristis</i> ^{LC**}	+	+	+	R
109. Brahminy Starling	<i>Sturnia pagodarum</i> ^{LC**}	-	+	+	R
110. Rosy Starling	<i>Pastor roseus</i> ^{LC**}	+	-	+	S
Family: Sylviidae (Old World warblers)					
111. Lesser Whitethroat	<i>Sylvia curruca</i> ^{LC}	-	-	+	L
Family: Timaliidae (Babblers and parrot-bills)					
112. Tawny-bellied Babbler	<i>Dumetia hyperythra</i> ^{LC**}	-	+	-	C
Family: Zosteropidae (White-eyes)					
113. Indian White-eye	<i>Zosterops palpebrosus</i> ^{LC**}	-	+	+	C

Abbreviation: "+" denotes Presence and "-" denotes Absence. Sites: 1. Chimnabai Lake, 2. Taran-Dharn Mataji Temple, 3. Taranga hill. International Union for Conservation of Nature red-list species, 2020: LC-Least Concern, NT-Nearly Threatened, VU-Venerable. Convention on International Trade in Endangered Species of Wild Fauna and Flora, 2020: # for Appendix II, ## for Appendix III. Wildlife Protection Act of India, 1972: (*) for Schedule I, (**) for Schedule IV, (***) for Schedule V. Migratory status of Birds (Ganpule, 2016): A- Common monsoon migrant. B- Common passage migrant. C- Common resident. D- Common resident and local migrant. E-Common resident and migrant. F-Common resident and winter visitor. G- Common to uncommon monsoon migrant (breeding). H- Common to uncommon resident. I- Common to uncommon resident and local migrant. J- Common to uncommon resident and migrant. K-Common to uncommon winter visitor, L-Common winter visitor. M-Fairly common resident. N- Rare resident. O- Uncommon resident. P-Uncommon to locally common resident. Q-Uncommon winter migrant and resident. R-Very common resident. S-Very common winter visitor

3.3 WPA, 1972 Species

A total of 90 species from Schedule IV, 08 species from Schedule I and only one species from Schedule V category were recorded under conservation of Wildlife Protection Act, 1972. From the Schedule IV category, 66 species from the site-1 followed by the site-2 (55 species) and site-3 (41 species) were recorded. From the Schedule I category, 07 species from the site-1 followed by the site-3 (05 species) and site-2 (03 species) were recorded. Only one species

(House crow) was recorded from the Schedule V category in all the sites.

3.4 Sorenson's Similarity Index

Sorenson's similarity index reflects that a significant number of mutual bird species were maximum (45 mutual species and 74% faunistic similarity) in between Taran-Dharn Mataji Temple (S2) and Taranga Hill (S3) sites followed by 37 mutual species and 54% faunistic similarity between Chimnabai Lake

(S1) and Taranga Hill (S3) sites and very least 37 mutual species and 24% faunistic similarity between

Chimnabai Lake (S1) and from Taran-Dharn Mataji Temple (S2) sites.

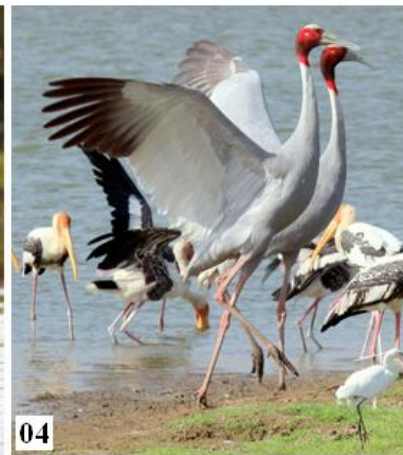


Plate A. Recorded some avifauna from the study area

1. Indian Peafowl, 2. African Comb Duck, 3. Lesser Flamingo, 4. Sarus Crane, 5. Painted Stork, 6. Eurasian Spoonbill

3.5 Migratory Status

Migratory status of the recorded avifauna shows that a maximum number of species were recorded from the Common resident (57 species) followed by the Common winter visitor (21 species), Very common residents (11 species) and Common to uncommon resident category (05 species). Only two species were records from the Common resident and winter visitor (F), Common to uncommon resident and migrant (J), Common to uncommon winter

visitor (K) and Very common winter visitor (S). Excluded from the above category only one species was recorded under the remaining categories (Table 2).

3.6 Association with Previous Studies

A total of 113 species of birds belong to 100 genera, 54 families and 19 orders were recorded from the study sites. Globally it represents 1.1% part of the total of 9672 species [1]; 10 % of the total 1263 species reported from India [2].



Plate B. Recorded some avifauna from the study area

7. Black-headed Ibis, 8. Oriental Darter, 9. River Tern, 10. Black-tailed Godwit, 11. Eurasian Curlew, 12. Spotted Owlet, 13. Shikra

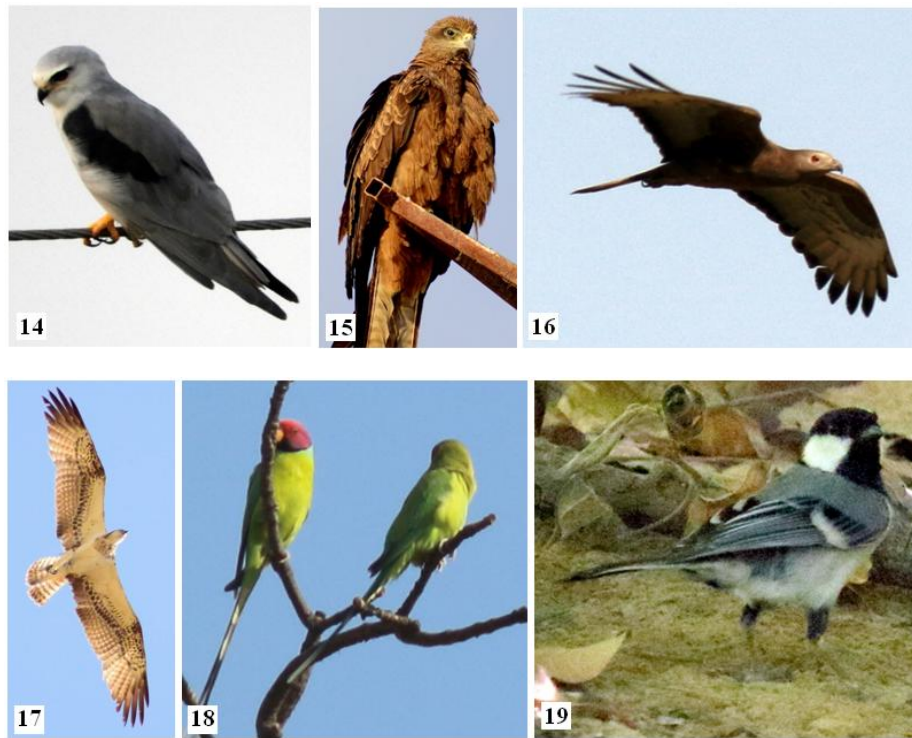


Plate C. Recorded some avifauna from the study area

14. Black-winged Kite, 15. Black Kite, 16. Oriental Honey-buzzard, 17. Osprey, 18. Plum-headed Parakeet, 19. White-naped Tit

Table 2. Site-wise migratory status of the study area

Code	Name	No. of species			
		Total	S1	S2	S3
A	Common monsoon migrant	1	0	1	0
B	Common passage migrant	1	1	0	0
C	Common resident	57	44	38	34
D	Common resident and local migrant	1	1	0	0
E	Common resident and migrant	1	0	1	0
F	Common resident and winter visitor	2	2	1	1
G	Common to uncommon monsoon migrant (breeding)	1	0	1	0
H	Common to uncommon resident	5	2	2	3
I	Common to uncommon resident and local migrant	1	0	1	1
J	Common to uncommon resident and migrant	2	1	1	0
K	Common to uncommon winter visitor	2	1	1	1
L	Common winter visitor	21	15	6	5
M	Fairly common resident	1	1	0	0
N	Rare resident	1	0	1	0
O	Uncommon to locally common resident	1	1	0	0
P	Uncommon resident	1	1	0	0
Q	Uncommon winter migrant and resident	1	0	1	0
R	Very common resident	11	10	11	10
S	Very common winter visitor	2	2	0	1
Total		113	82	66	56

19.7% of the total 574 species reported from Gujarat [4]; 27% of the total 411 species reported from the

Mehsana district records by [9], 33.5% of 337 species of birds by [8], 50% of 231 species recorded by [7].

4. CONCLUSION

Comparative studies of the avifaunal community reflect that Chimnabai Lake has a maximum number of species diversity and richness, because of their multi habitat characteristics (i.e. Aquatic/semi-aquatic and terrestrial habitat). All the Nearly Threatened species were wader birds among all three site and only one (Chimnabai Lake) site have the adaptive habitat for wader birds as well as terrestrial birds. Chimnabai Lake has supported also one Vulnerable species (Sarus crane) and because of very few anthropogenic activities, this site plays a very important role in the breeding ground for many bird species. The other two sites also play a significant role in forest birds or terrestrial bird's community. These two sites allow birds to disperse for the food and shelter. One remarkable species White-naped Tit is Vulnerable and its most common habitat present here. So, we conclude that data records from the three sites are essential for the conservation of the avifaunal community and suggests that the Gujarat government conserve the Chimnabai Lake site and control the anthropological activities. Documentation of some photographically recorded avifauna from the three study sites were given in Plates A, B, C.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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