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RESEARCH ARTICLE

LAKH BAHOSI BIRD SANCTUARY: A WATERBIRD ABODE

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ABSTRACT

Wetland drainage and conversion is the major threat for Asian waterbirds, including the infilling of wetlands, principally for agriculture and aquaculture. Conservation action for wetland diversity and wetland habitats has been investigated and promoted at global level through Ramsar Convention on wetlands; Convention on Wetlands, Convention on Migratory Species (CMS) and Convention on Biological Diversity (CBD). Aquatic ecosystems have significant impact on migratory bird species. Wetland birds have a significant cultural and social role in local communities as well as being an important component of wetland ecosystem. The study was performed in Lakh-Bahosi Bird Sanctuary (LBS) during January 2014 to February 2015. LBS cover the 80 square kilometre area and provide excellent abode to waterbirds. Surveys were carried out seasonally and observations were made along line transects with the aid of 10x50 binoculars and Canon 70 D SLR camera. As the Lakh-Bahosi Bird Sanctuary (LBS) are a well-known bird-heaven and its abode high bird diversity and abundance, especially in winter season, in the present study we have documented the waterbirds diversity of Lakh-Bahoshi Bird Sanctuary, Kannauj District of Uttar Pradesh for better management and conservation. A total of 118 species of waterbirds have been reported including Grebes (2), Pelican (1), Ducks & Geese (21), Rails, Crakes, Gallinules & Coots (9), Jacanas (2), Cormorants & Darters (4), Herons, Egrets & Bitterns (12), Storks (6), Ibis and Spoonbills (4), Cranes (2), Waders & Shorebirds (31), Gulls (4), Terns (5), Kingfishers (3), Raptors (7) and Wagtails (5). This is a preliminary and basic effort to bring out the incredible waterbird fauna being maintained in the Lakh-Bahosi Bird Sanctuary. It is an excellent example of sustainable development and biodiversity conservation of wetland.

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INTRODUCTION

Unsustainable use of wetlands such as wetland drainage and conversion is the major threat for Asian waterbirds, including the infilling of wetlands, principally for agriculture and aquaculture. Conservation action for wetland diversity and wetland habitats has been investigated and promoted at global level through Ramsar Convention on wetlands; the Convention on Wetlands, the Convention on Migratory Species (CMS) and the Convention on Biological Diversity (CBD). Aquatic ecosystems have significant impact on migratory bird species. Waterbirds are a diverse group which are characteristic and ecologically dependent on wetland habitats. Many waterbird species are highly visible, frequently occurring in stunning concentrations. Many waterbird species are declining with 17% of waterbird species considered globally threatened (Birdlife International 2008).

In 2006, an investigation found that overall 40% of the 1,200 waterbird population's trends were in decline (Delany and Scott 2006). Although Asia is a very important region for waterbirds, trend information is relatively fewer populations. Uttar Pradesh state is an important route of migratory birds hence it is necessary to monitor the wetlands ecological condition, anthropogenic load and the species composition. Wetland birds play a significant cultural and social role in local communities as well as being an important component of wetland ecosystem. Waterbirds symbolize one of the most obvious indicators of the health and diversity of such ecosystems. The objective of this study is to provide the information about biodiversity of water birds so as to recognize this site as globally important habitat for the conservation of bird population. Baseline information is a condition for planning and monitoring management actions for waterbirds and their habitats (Wetlands Int. 2002; Arun kumar *et al.*, 2003).

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MATERIALS AND METHODS

Study site: The study was performed in Lakh-Bahosi Bird Sanctuary (LBS) during January 2014 to February 2015. Lakh Bahosi Sanctuary was established in 1988 first five kilometres from Indergarh Police Station (Fig. 1 A & B). It is about 35 km from Kannauj bus stand on the Grand Trunk Road National Highway No-91 at N- 26°54.653' and E-079°38.196'. LBS cover the 80 square kilometre area and provide excellent abode to waterbirds. Lakh Bahosi Sanctuary is a bird sanctuary spread over two "Jheels" or shallow lakes near the villages of Lakh and Bahosi, which is about 4 kilometres. Lakh-Bahosi Sanctuary in Kannauj district of Uttar Pradesh is a place of local and exotic birds. The average rainfall is about 1200 mm per annum, temperature ranges from 2-3⁰ C to 45⁰ C and humidity is about 87%.

In the present study, observations were made throughout the study area from January 2014 to February 2015. The survey was carried out at suitable time (i.e. morning: 06:00 to 10:00 hr and from evening: 16:30 to 18:30 hr in summers while from 7:00 to 11:00 am in morning and 3:00-5:30 pm in evening during the winters) of the day. Observations were carried out with the aid of 10x50 binoculars. Records were supported with photography using Lumix 21 X digital zoom camera and 70D Canon SLR Camera. Waterbirds sighted during the study period were categorized according to their groups and IUCN status. Identification of birds was done with the help of key reference books (Grewal 2002, Ali S. 2002 and Grimmett *et al.*, 2007).

RESULTS AND DISCUSSION

In the present study has documented the waterbirds diversity of Lakh-Bahosi Bird Sanctuary, Kannauj District of Uttar Pradesh for better management and conservation.

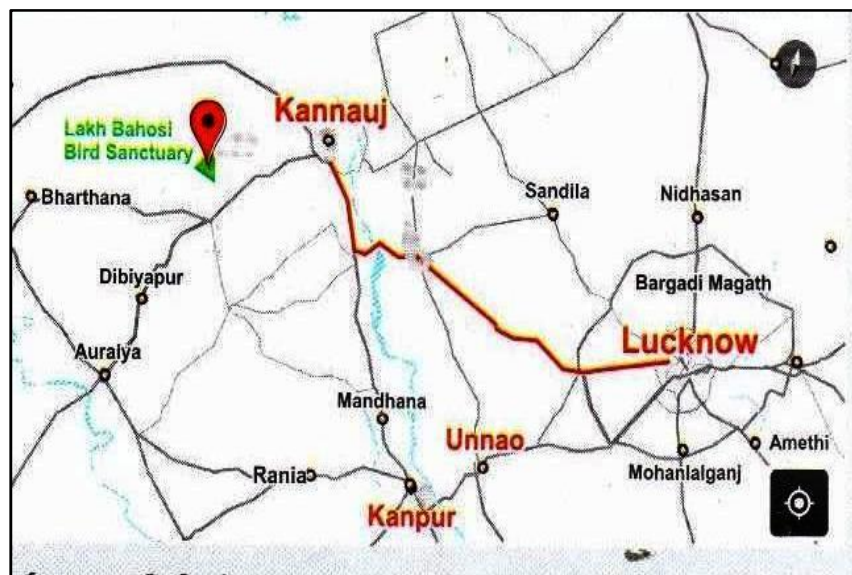


Fig. 1A Map of Study Area



(Source: mapsofindia.com)

Fig. 1B Layout of Lakh Bahosi Bird Sanctuary

Table 1. Waterbirds recorded at Lakh Bahosi Bird Sanctuary


S.N.	Name of species	Scientific name	Hindi name	IUCN Status
GREBES				
1	Little Grebe	<i>Tachybaptus ruficollis</i>	Pandubbi	LC
2	Great Crested Grebe	<i>Podiceps cristatus</i>	Shiva Pandubbi	LC
PELICANS				
3	Spotted-billed Pelican	<i>Pelicanus phillippensis phillippensis</i>	Hawaseel	NT
DUCKS & GEESE				
4	Lesser whistling Duck	<i>Dendrocygna javanica</i>	Seelhi	LC
5	Bar headed Goose	<i>Anser indicus</i>	Sarpatti Sawan	LC
6	Comb Duck	<i>Sarkidiornis melanotos</i>	Nakta	LC
8	Cotton Teal	<i>Nettapus coromandelianus</i>	Safed Murgabi	LC
9	Mallard	<i>Anas platyrhynchos</i>	Neelsar	LC
10	Spot-billed Duck	<i>Anas poecilorhyncha</i>	Gugraal	LC
11	Northern Shoveller	<i>Anas clypeata</i>	Tidari	LC
12	Northern Pintail	<i>Anas acuta</i>	Seenkhpar	LC
13	Garganey	<i>Anas querquedula</i>	Cheta	LC
14	Common Teal	<i>Anas crecca</i>	Murgabi	LC
15	Red crested Pochard	<i>Rhodonessa rufina</i>	Lalsir	LC
16	Tufted Pochard	<i>Aythya fuligula</i>	Ablakk	LC
17	Common Pochard	<i>Aythya ferina</i>	Chota lalsir	LC
18	Gadwall	<i>Anas strepera</i>	Bekhur	LC
19	Cotton Pygmy Goose	<i>Nettapus coromendelianus</i>	Girri	LC
20	Eurasian Wigeon	<i>Anas penelope</i>	Piyasan	LC
21	Greyleg Goose	<i>Anser anser</i>	Sileti Sawan	LC
22	Ruddy Shelduck	<i>Tadorna ferruginea</i>	Surkhab	LC
23	Common Shelduck	<i>Tadorna tadorna</i>	***	LC
24	Ferruginous Pochard	<i>Aythya nyroca</i>	Kurchia	LC
RAILS, CRAKES, GALLINIULES & COOTS				
25	White-breasted Waterhen	<i>Amaurornis phoenicurus</i>	Jalmurgi	LC
26	Purple Moorhen	<i>Porphyrio porphyrio</i>	Jaamuni Jalmurgi	LC
27	Common Moorhen	<i>Gallinule chloropus</i>	Jalmurgi	LC
28	Common Coot	<i>Fulica atra</i>	Tikadi	LC
29	Watercock	<i>Gallicrex cinerea</i>	Jalmurga	LC
30	Bluebreasted Rail	<i>Gallirallus striatus</i>	***	NA
31	Spotted Crane	<i>Porzana porzana</i>	Chittidar Bater	LC
32	Brown Crane	<i>Amaurornis akool</i>	Bhura Jal Bater	LC
33	Baillon Crane	<i>Porzana pusilla</i>	Chota Jal Bater	LC
JACANAS				
34	Pheasant-tailed Jacana	<i>Hydrophasianus chirurgus</i>	Peeho	LC
35	Bronzed-winged Jacana	<i>Metopidius indicus</i>	Jalpeepi	LC
CORMORANTS & DARTARS				
36	Great Cormorant	<i>Phalacrocorax carbo</i>	Bada Pankowa	LC
37	Little Cormorant	<i>Phalacrocorax niger</i>	Chota Pankowa	LC
38	Indian Shag	<i>Phalacrocorax fuscicollis</i>	Desi Pankowa	LC
39	Darter	<i>Anbinga melanogaster</i>	Panwa	NT
HERONS, EGRETS & BITTERNES				
40	Black Crowned Night Heron	<i>Nycticorax nycticorax</i>	Naak Bagula	LC
41	Black bittern	<i>Ixobrychus flavicollis</i>	Kala Bagula	LC
42	Yellow bittern	<i>Ixobrychus sinensis</i>	Peela Bagula	LC
43	Little Egret	<i>Egretta garzetta</i>	Karchia Bagula	LC
44	Large Egret	<i>Casmerodius albus</i>	Malang Bagula	LC
45	Median Egret	<i>Mesophox intermedia</i>	Patokha Bagula	LC
46	Cattle Egret	<i>Bubulcus ibis</i>	Gaai Bagula	LC
47	Grey Heron	<i>Ardea cinerea</i>	Sileti Anjan	LC
48	Purple Heron	<i>Ardea purpurea</i>	Nari Anjan	LC
49	Indian Pond Heron	<i>Ardeola grayii</i>	Andha bagula	LC
50	Little Green Heron	<i>Butorides striatus</i>	Hara Bagula	LC
51	Chestnut Bittern	<i>Ixobrychus cinnamomeus</i>	Laal bagula	LC
STORKS				
52	Painted Stork	<i>Mycteria leucocephala</i>	Janghil	NT
53	Asian Open bill-Stork	<i>Anastomus oscitans</i>	Ghonghil	LC
54	Black Stork	<i>Ciconia nigra</i>	Kala Baaja	LC
55	White-necked Stork	<i>Ciconia episcopus</i>	Haaji Laglag	LC
56	Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>	Loharjang	NT
57	Lesser Adjutant Stork	<i>Leptoptilos javanicus</i>	Chandiyaari	V
IBIS & SPOONBILL				
58	Black-headed Ibis	<i>Threskiornis melanocephalus</i>	Safed Bujja	NT
59	Black Ibis	<i>Pseudibis papillosa</i>	Kaala Bujja	LC
60	Oriental white Ibis	<i>Threskiornis oethiopia</i>	Didhaar	NA
61	Eurasian Spoonbill	<i>Platalea leucorodia</i>	Chamcha	LC
CRANES				
62	Sarus Crane	<i>Grus antigone</i>	Sarus	V
63	Demoiselle Crane	<i>Anthropoides virgo</i>	Kurja	LC
WADERS & SHOREBIRDS				
64	Little Ringed Plover	<i>Charadrius dubius</i>	Jeera Batan	LC
65	Ringed Plover	<i>Charadrius hiaticula</i>	***	LC













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66	Long-billed Plover	<i>Charadrius placidus</i>	***	LC
67	Grey Plover	<i>Pluvialis squatarola</i>	Bada Batan	LC
68	Kentish Plover	<i>Charadrius alexandrinus</i>	Kala Batan	LC
69	Yellow- wattled Lapwing	<i>Vanellus malabaricus</i>	Zirdi	NA
70	Red -wattled Lapwing	<i>Vanellus indicus</i>	Sharari Tithari	LC
71	Northern Lapwing	<i>Vanellus vanellus</i>	Tithari	LC
72	River Lapwing	<i>Vanellus duvaucelli</i>	Jal Tithari	NT
73	Grey-headed Lapwing	<i>Vanellus cinereus</i>	Sileti Tithari	LC
74	White-tailed Lapwing	<i>Vanellus leucurus</i>	Safed Poonch Tithari	LC
75	Wood Sandpiper	<i>Tringa glareola</i>	Titvari	LC
76	Green Sandpiper	<i>Tringa ochropus</i>	Hara Chaubaha	LC
77	Common Sandpiper	<i>Actitis hypoleucos</i>	Jalrank	LC
78	Marsh Sandpiper	<i>Tringa tetanus</i>	Jal Titvari	LC
79	Curlew Sandpiper	<i>Calidris ferruginea</i>	***	LC
80	Common Redshank	<i>Tringa tetanus</i>	Surma Chaubaha	LC
81	Spotted Redshank	<i>Tringa erythropus</i>	***	LC
82	Common Greenshank	<i>Tringa nebularia</i>	Timtima Chaubaha	LC
83	Black –winged Stilt	<i>Himantopus himantopus</i>	Ganjpaanb	LC
84	Black tailed Godwit	<i>Limosa limosa</i>	Gudera	NT
85	Common Snipe	<i>Gallinago gallinago</i>	Chaha	LC
86	Painted Snipe	<i>Rostratula benghalensis</i>	Rajchaha	LC
87	Curlew	<i>Numenius arquata</i>	Goar	NT
88	Little Stint	<i>Calidris minuta</i>	Chota Panlowwa	LC
89	Temminck’s Stint	<i>Calidris temminckii</i>	Chota Panlowwa	LC
90	Dunlin	<i>Calidris alpine</i>	***	LC
91	Avocet	<i>Recurvirostra avosetta</i>	Kusya Chaha	LC
92	Small Pranticole	<i>Glareola lacteal</i>	Chota Titeeri	NA
93	Oriental Pranticole	<i>Glariola maldivarum</i>	***	NA
94	Indian Skimmer	<i>Rhychops albicollis</i>	Panchira	V
GULLS				
95	Black-headed Gull	<i>Larus ridibundus</i>	Kalsiri Gangachili	LC
96	Brown-headed Gull	<i>Larus brunnicephalus</i>	Bhuri Gangachili	LC
97	Yellow-legged Gull	<i>Larus cachinnans</i>	***	LC
98	Palash’s Gull	<i>Larus ichthyaetus</i>	Dhomra	LC
TERNES				
99	River Tern	<i>Sterna aurantia</i>	Jal Kukri	NT
100	Little Tern	<i>Sterna albifrons</i>	Choti Kukri	LC
101	Gull-billed Tern	<i>Gelochelidon nilotica nilotica</i>	Tehari	LC
102	Whiskered Tern	<i>Chlidonias hybridus</i>	Gangacheel	LC
103	White-winged Black Tern	<i>Chlidonias leucopterus</i>	Machh Lauka	LC
KINGFISHERS				
104	Small Blue Kingfisher	<i>Alcedo atthis</i>	Chota Kilkila	LC
105	White breasted Kingfisher	<i>Halcyon smyrnensis</i>	Safechati Kilkila	LC
106	Lesser Pied Kingfisher	<i>Ceryle rudis</i>	Korilla Kilkila	LC
RAPTORS				
107	Brahminy Kite	<i>Haliastur indus</i>	Brahmani Cheel	LC
108	Osprey	<i>Pandion haliaetus</i>	Machhimaar	LC
109	Marsh Harrier	<i>Cirus aeruginosus</i>	Safed Sira	LC
110	Pallas’s Fish-Eagle	<i>Haliaeetus leucoryrhus</i>	Machhmanga	V
111	Greater Spotted Eagle	<i>Aquila clanga</i>	Kaljanga	LC
112	Crested Serpent Eagle	<i>Spilornis cheela</i>	Dogra Cheel	LC
113	Black Kite	<i>Milvus migrans</i>	Cheel	LC
WATAILS				
114	White Wagtail	<i>Motacilla alba</i>	Safed khanjan	NA
115	Large Pied Wagtail	<i>Motacilla maderaspatensis</i>	Mamula	NA
116	Yellow Wagtail	<i>Motacilla flava</i>	Pani ka Pilkya	LC
117	Grey Wagtail	<i>Motacilla cinerea</i>	Saleti Khanjan	LC
118	Citrine Wagtail	<i>Motacilla citreola</i>	Peela Khanjan	LC








Legend- LC= Least Concern, NA= Not Assessed, E= Endangered, NT= Near Threatened, V= Vulnerable, ***= Not Known

Table 2. Photographic representation of some waterbirds at Lakh Bahosi Bird Sanctuary

S.N.	Waterbird Groups	Photographs
1	Grebes	 <p style="text-align: center;">Little Grebe</p>

<p>2</p>	<p>Ducks & Geese</p>	 <p>Comb Duck</p>  <p>Lesser whistling Duck</p>  <p>Northern Pintail</p>
<p>3</p>	<p>Coot</p>	 <p>Common Coot</p>
<p>4</p>	<p>Jacanas</p>	 <p>Bronzed-winged Jacana</p>  <p>Pheasant-tailed Jacana</p>
<p>5</p>	<p>Cormorants & Darters</p>	 <p>Little Cormorant</p>  <p>Darter</p>
<p>6</p>	<p>Heron, Egrets & Bitterns</p>	 <p>Pond Heron</p>  <p>Little Egret</p>  <p>Cattle Egret</p>  <p>Night Heron</p>

7	Storks		
8 Ibis and Spoonbills			
9	Cranes		
10	Waders & Shorebirds		
			
11	Terns		

12	Kingfishers	 <p>Pied Kingfisher</p>  <p>White-breasted Kingfisher</p>  <p>Small Kingfisher</p>	
13	Raptors	 <p>Shikra</p>  <p>Black-Shouldered Kite</p>	
14	Wagtails	 <p>Yellow Wagtail</p>  <p>White Wagtail</p>	

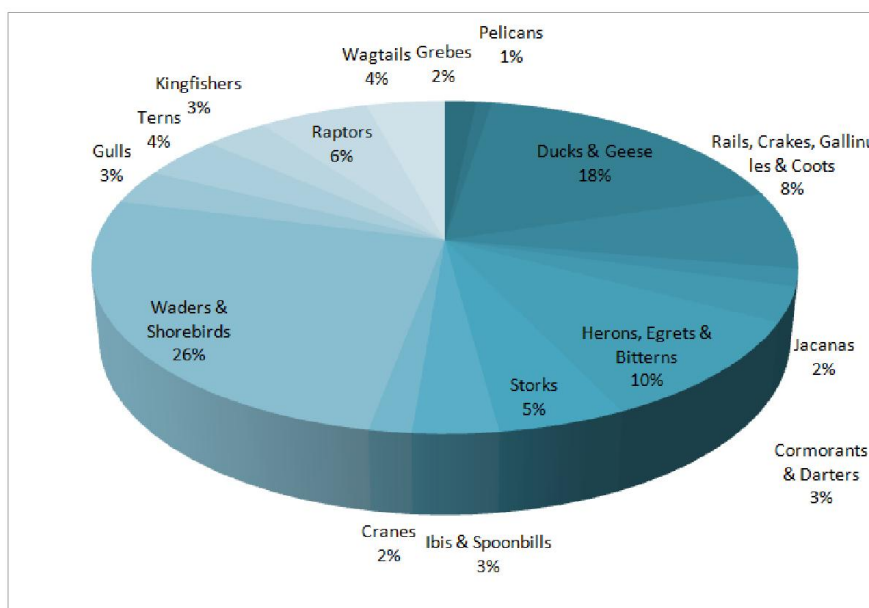


Fig.2. Group wise % composition of waterbirds species in LBS

Table 3. Waterbirds of Lakh-Bahosi Bird Sanctuary According to IUCN Status

S.N.	IUCN Status	No. of species	% composition
1	Least Concern	99	84%
2	Not Assessed	07	6%
4	Near Threatened	09	8%
4	Vulnerable	03	2%

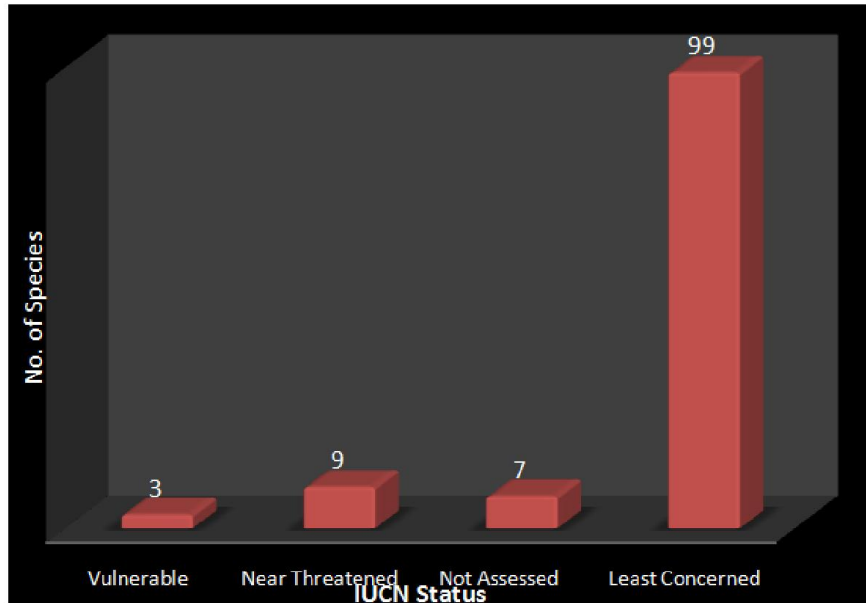


Fig. 3. Species composition of waterbirds in LBS according to IUCN Status

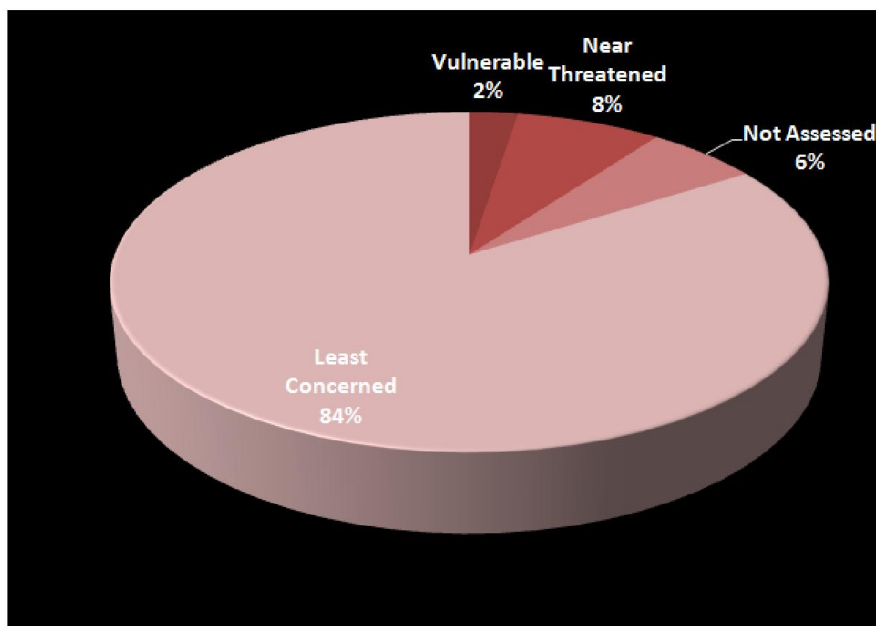


Fig.4. % composition of waterbirds in LBS according to IUCN Status

A total of 118 species of waterbirds having Grebes (2, 2%), Pelican (1, 1%), Ducks & Geese (21, 18%), Rails, Crakes, Gallinules & Coots (9, 8%), Jacanas(2, 2%), Cormorants & Darters (4, 3%), Herons, Egrets & Bitterns (12, 10%), Storks (6, 5%), Ibis and Spoonbills (4, 3%), Cranes (2, 2%), Waders & Shorebirds (31, 26%), Gulls (4, 3%), Terns (5, 4%), Kingfishers (3, 3%), Raptors (7, 6%) and Wagtails (5,4%)

groups (Table 1 & 2 and Fig.2). Sandi Bird Sanctuary abodes many migratory as well as residential waterbirds and famous as biodiversity hub in Uttar Pradesh (Adesh Kumar *et al.*, 2015; Kumar and Srivastava, 2013). The Group Waders & Shorebirds has maximum number of bird species (31) that includes the Near Threatened River Lapwings, Curlews, Black-tailed Godwits and Vulnerable Indian skimmers. The Ducks & Geese

group (21) includes Herons, Egrets & Bitterns (12) and Rails, Crakes, Gallinules & Coots group representing 09 species. Similar study on Waders and Wetland Bird Diversity by P. Joshi reports 57 species of waterbirds and waders with highly specific environment in Fresh Water Resources around Yavatmal City, Maharashtra (2014). Tatu and Pathak has studied the waterbirds and observed that waders and shorebirds have highest number of species in Nal Sarovar Bird Sanctuary (2012).

Analysis of IUCN status of recorded waterbirds species the data reveals that 3 species (2%) are under vulnerable (V) category, 9 species (8%) under Near Threatened (NT) category, 7 species (6%) are Not Assessed (NA) and rest of species (84%) are under Least Concerned (LC) of red list category of IUCN, 2010 (Table 3 and Fig.3 & 4). A similar result with one species of vulnerable category, 2 Near Threatened and 54 Least Concerned species has been previously reported from Lakhara Wetlands, Kachchh Biosphere Reserve (Koladiya *et al.*, 2014). A Study on Waterbirds of Lucknow according to their IUCN status has performed (Kanaujia *et al.*, 2015). A study on Indian birds has been done by Kumar *et al.*, according to their conservation status (2003).

Conclusion

This is a preliminary and basic effort to bring out the incredible waterbird fauna being maintained in the Lakh-Bahosi Bird Sanctuary. It is an excellent example of sustainable development and biodiversity conservation of waterbirds. Lakh-Bahosi Bird Sanctuary has a rich avian diversity including many Vulnerable, Near Threatened waterbirds as well as many species of wetlands dependent birds such as raptors and wagtails. There are no threats to this tremendous diversity. However the detail study on feeding and nesting behaviour of various bird species will enhance the population of the dwelling birds and maintain the healthy ecosystem for the future. The purpose is to know and improve the waterbird diversity around LBS by sustainable development. The maintenance and improvement of flora of the LBS will also support the residential birds. A further study on the various other important aspects of residential and migratory birds will help conservation to enrich the fauna.

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Authors competing interest

The authors have no competing interests.

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