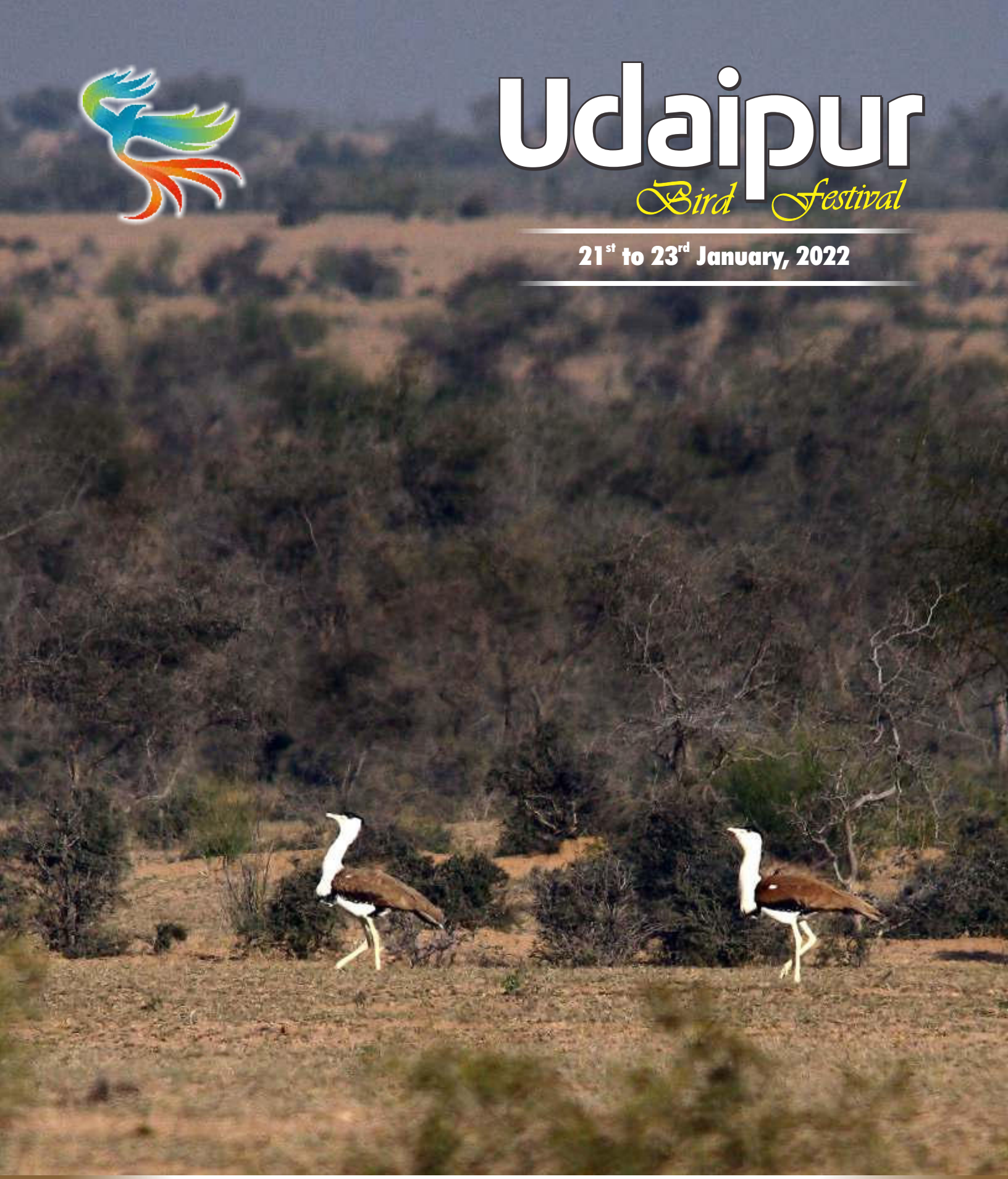
Udaipur

Bird Festival

21st to 23rd January, 2022



DEPARTMENT OF FORESTS, GOVT. OF RAJASTHAN

DEPUTY CONSERVATOR OF FORESTS, WILDLIFE UDAIPUR


Alok Upadhyay


Bhanu Pratap Singh


Bheru Bisnoi


Bheru Lal Shrimali


Indian Roller Hitesh Ameta


Indian Thick Knee Kanishka

R.K. Khairwa IFS
Chief Conservator of Forests
Wildlife, Udaipur

ACKNOWLEDGEMENTS

Existence of mankind depends on existence of biodiversity, forests, hills, streams and other components of mother nature. Among biodiversity, the common man is well acquainted with the avian diversity that also plays a vital role in survival of humanity. Southern Rajasthan is known for its forest, IBAs, sanctuaries, water bodies, bird diversity and conservation ethos. In Udaipur, we are organizing bird festival from 2014 with full enthusiasm. This is our 8th edition of bird fair now called bird festival.

Besides many lakes situated amidst Udaipur city, a large number of water bodies are confined to the southern part of the state. Some waterbodies like Kishen Kareri, Badwai and Mangalwar are situated in Chittorgarh district which are 85 to 100 km away from Udaipur city. The water bodies of Menar (recently declared as on IBA), Nagavali and Bhatewar that fall in Udaipur district are 35 to 80 km away from Udaipur city. Sai dam of Udaipur district which is also an IBA, is 75 km away from Udaipur. Jawai Bandh in Pali district is150 km far from Udaipur, accounted as a very important water body where birds of desert and Aravallis can be seen together. Rajsamand, Gapsagar, Udaisagar, Baghdarrah, Piladar, Ranakpur etc. are other important water bodies of the area where diverse varieties of birds can be seen. Various taxonomic groups of aquatic birds like Ducks, Geese, Rails and Waders etc. can be commonly seen over there.

I take this privilege to acknowledge here the sincere efforts put in by city people, students, researchers, partners, professionals, armed forces, electronic and print media, organizations, members of Eco-Development Committees and Village Forest Protection and Management Committees, NGOs and all who have contributed to organize "Udaipur Bird Festival" and to bring the souvenir in existence.

Due to Covid-19 pandemic, this time also Udaipur Bird Festival programme is being organized online. This program could have never been a success without the team role of my colleagues, all officers and personnel of Forest Department who has always remained available for this festival. My sincere thanks to all those whom I have not been able to name here, but their contribution has never been less than others.

R.K. Khairwa IFS

अशोक गहलोत
मुख्यमंत्री, राजस्थान

संदेश

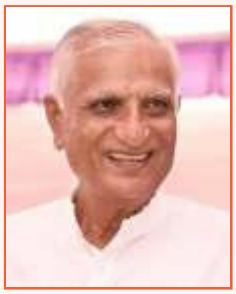
मुझे यह जानकर प्रसन्नता है कि उप वन संरक्षक, वन्यजीव, उदयपुर के तत्वावधान में 21 से 23 जनवरी, 2022 तक "राष्ट्रीय स्तर के बर्ड फेस्टिवल-2021-22" का आयोजन और इस अवसर पर एक स्मारिका का प्रकाशन किया जा रहा है।

पक्षी हमारे पारिस्थितिकी संतुलन में महत्वपूर्ण योगदान करते हैं। उनका समुचित संरक्षण आवश्यक है। इनकी सुरक्षा करके ही हम स्वच्छ और सुचारू पर्यावरण बनाए रख सकते हैं। इस प्रकार के महोत्सव के आयोजन से पक्षी प्रेमी और विषय विशेषज्ञों को विभिन्न पक्षियों की जीवनचर्या के विभिन्न पहलुओं का अध्ययन और उन पर विचार-विमर्श का अवसर मिलता है।

आशा है बर्ड फेस्टिवल के कार्यक्रम और स्मारिका की सामग्री पक्षियों की विभिन्न प्रजातियों के जीवन, दिनचर्या, उनके प्रजनन और प्रकृति संतुलन में उनके योगदान सम्बन्धी जानकारी सार्थक सिद्ध होगी।

मैं बर्ड फेस्टिवल 2021-22 के आयोजन और स्मारिका के प्रकाशन की सफलता के लिए हार्दिक शुभकामनाएं प्रेषित करता हूँ।

अशोक गहलोत



हेमाराम चौधरी
वन एवं पर्यावरण मंत्री
राजस्थान सरकार

संदेश

मुझे यह जानकर खुशी हुई कि गत वर्षों की भांति निरन्तर आठवें वर्ष भी वन विभाग, उदयपुर द्वारा वृहत् स्तर पर तीन दिवसीय "उदयपुर पक्षी पर्व 2021-22" का आयोजन किया जा रहा है।

जिस तरह हमारे घर की खुशिया बच्चों की किलकारियों से गुंजती है उसी तरह प्रकृति की खूबसूरती पक्षियों की चहचहाहट से बढ़ती है। प्रभात और सांयकाल में इनकी चहक से धरती गुंजायमान हो उठती है। इनके निवास से वन-प्रांतों की शोभा निखर उठती है। इनके आकर्षक रंगों से हर कोई मोहित हो जाता है।

पक्षी हमारे पर्यावरण के अभिन्न हिस्से हैं लेकिन अवैध शिकार एवं वन क्षेत्र घटने से कुछ पक्षियों पर संकट के बादल मंडरा रहे हैं। इनमें से कुछ दुर्लभ होते जा रहे हैं। सरकार ने इनकी रक्षा के लिए वन्य जीव संरक्षण अधिनियम एवं अभयारण्य बनाए हैं।

हर वर्ष संर्दियों में सुदूर हिमालय एवं उसके पार से आने वाले विदेशी प्रवासी मेहमान परिंदों का हमारे देश की ओर आना शुरु हो जाता है। इस वर्ष कोरोना महामारी के कारण जन सुरक्षा को ध्यान में रखकर इस कार्यक्रम का आयोजन ऑनलाईन किया जा रहा है, जो कि एक सराहनीय कदम है।

मैं इस आयोजन की परम सफलता की कामना करता हू एवं आशा करता हू कि यह आयोजन अपने उद्देश्यों में अवश्य ही सफल होगा।

हेमाराम चौधरी

Niranjan Arya
IAS
Chief Secretary
Govt. of Rajasthan

Message

It is heartening to note that the Udaipur Bird Festival, a praiseworthy initiative of the wild life wing of Forest Department, Udaipur, has been groomed into a formidable Ornithology event of National level.

I am happy to note that it is getting stronger with its next edition being organized from January 21 to 23, 2022, at Udaipur.

The Fair promises to offer an opportunity to amateur bird watchers and ornithology enthusiasts to appreciate avian fauna around Udaipur's fabulous lakes and to interact with the eminent ornithologists of the country.

An event like this, at this time of the year when a good number of popular and endangered avian species visit our lakes, not only helps stimulating young minds for environment and wild life awareness but augments meaningful engagement of tourists too.

I hope the Souvenir that the Department proposes to release on this occasion, will further the cause by showcasing biodiversity of the southern Rajasthan.

I congratulate the organizers for their efforts and wish the event a grand success.

Niranjan Arya

डॉ. डी. एन. पाण्डे
प्रधान मुख्य वन संरक्षक (हॉफ)
राजस्थान, जयपुर

संदेश

मुझे यह जानकर अत्यंत प्रसन्नता है कि गत वर्ष की भांति इस वर्ष भी उदयपुर बर्ड फेस्टिवल 2021-22 आयोजित किया जा रहा है। हम सभी जानते हैं कि बडी संख्या में पक्षी प्रजातियां भारत में ही पाई जाती है। भारत की जलवायु एवं पारिस्थितिकी विविधता विभिन्न पक्षी प्रजातियों को अनुकूल आवास प्रदान करती है। किंतु विगत कुछ वर्षों में बढ़ती जनसंख्या के दबाव में एवं शहरीकरण व औद्योगिक विकास के कारण पक्षियों की संख्या में काफी कमी आई है। ऐसे में पक्षी संरक्षण हेतु जागृति फैलाने की विशेष आवश्यकता है। संकट से घिरी प्रजातियों के संरक्षण पर तो विशेष ध्यान देने की जरूरत है है।

मुझे यह बताते हुए खुशी है कि वन विभाग के सक्रिय सहयोग से गोडावण की संख्या बढ़ाने का जो अभिनव प्रयोग डब्लू.डब्लू.आई. देहरादून एवं वन एवं पर्यावरण मंत्रालय, भारत सरकार द्वारा किया जा रहा है जिसके फलस्वरूप इन पक्षियों की संख्या बढ़ी है, जोकि वन विभाग के लिए एक गौरव की बात है।

बर्ड फेस्टिवल आयोजित किये जाने से जहां एक और बढ़ते पर्यावरण प्रदूषण के प्रति जनता में धीरे-धीरे जागरूकता में वृद्धि होगी वही जैव विविधता संरक्षण एवं हमारे पारिस्थितिकी तंत्र को सुरक्षित रखने के प्रति जनचेतना में भी वृद्धि होगी। बर्ड फेस्टिवल के आयोजन से आमजन, विशेषता पक्षी प्रेमियों में इनके हैबिटेट संरक्षण के प्रति अपने उत्तरदायित्व का एहसास होगा एवं बढ़ती जनसंख्या के दबाव में विविध पक्षी आवासों पर पड़ने वाल वाले दुष्प्रभाव को रोकने में मदद मिलेगी।

मैं इस फेस्टिवल के सफल आयोजन के लिए शुभकामनाएं देता हूँ।

डॉ. डी.एन. पाण्डे

अरिन्दम तोमर
अतिरिक्त प्रधान मुख्य वन संरक्षक एवं
मुख्य वन्यजीव प्रतिपालक
राजस्थान जयपुर

संदेश

राजस्थान में पक्षियौं की अच्छी विविधता ज्ञात है। इस विरासत को बचाने व सहजने की बड़ी जरूरत है। मुझे यह जानकर खुशी हुई कि गत वर्षों की भांति निरन्तर आठवें वर्ष भी वन विभाग, उदयपुर द्वारा वृहत् स्तर पर तीन दिवसीय "उदयपुर पक्षी पर्व 2021-22" का आयोजन किया जा रहा है। निसंदेह ऐसे आयोजन पक्षियों एवं उनके आवासों को बचाने में कारगार सिद्ध होते है।

उदयपुर शहर एवं संभाग अपनी झीलों व जलाशयों के लिये जाना जाता है। जलाशयों में पक्षियों की उपस्थिति उनकों और भी जीवन्त बना देती है। जलाशयों के पक्षीयों एवं जलीय जैव विवधता का संरक्षण-संवर्धन तब ही संभव है जब स्थानीय लोग जागरुक हो। "उदयपुर पक्षी पर्व" आम जन को जागरुक बनाने का सशक्त माध्यम है।

कोविड-19 महामारी के दौरान 'उदयपुर पक्षी पर्व 2021-22' का ऑनलाईन आयोजन किया जा रहा है, जो अपने आप में एक अनुठा प्रयोग है।

मैं इस आयोजन की सफलता के लिए हार्दिक शुभकामनाए एवं बधाई प्रेषित करता हूँ।

अरिन्दम तोमर

Mr. Ravi Singh
SG & CEO
WWF India

Message

Udaipur-the City of Lakes-will host the eighth edition of the Udaipur Bird festival from January 21-23, 2022. Enriched with a diverse mix of online and offline activities ranging from quiz, painting competitions, philatelic exhibition, spot photography, online nature literary festival and experience sharing besides birding, this annual event promises to be very engaging and interesting. We would like to complement the Rajasthan Forest Department for its leadership in conceptualizing and implementing this pioneering initiative continuously for the last several years.

The Udaipur Bird Festival (UBF) has over the years successfully showcased the rich biodiversity, connected local stakeholders to nature and contributed to enhancing our knowledge base on avian diversity by adding to the growing bird checklist. UBF has also inspired action by local champions—wetland mitras (friends of wetlands)—for conservation of wetlands. To cite an example, this is evident from the initiatives of local youth in conserving Menar and Kishan Kerari wetlands. Therefore, UBF is a pioneering initiative providing stakeholders with unique opportunities to enhance their knowledge, engagement in conservation and most importantly to be part of network of likeminded individuals and organisations who could come together for the cause of conservation of avian fauna and their habitats.

UBF 2021-2022 is also an opportunity to deliberate the four pronged approach developed by the Ministry of Environment, Forests and Climate Change, Government of India to conserve wetlands. This includes development of brief documents (as per the Wetland (Conservation and Management) Rules 2017), preparation of wetland health cards, enrollment of wetland mitras and implementing an integrated management plan for conservation. With the growing enthusiasm and interest shown by various stakeholders and the leadership of the Rajasthan Forest Department, there is a unique opportunity for Udaipur to showcase adoption of this four pronged approach for conservation of wetlands.

As the Udaipur Bird Festival 2021-2022 is expected draw a large number of children, youth, teachers, ornithologists, amateur bird watchers, wildlife photographers, nature enthusiasts, conservationists, media and others, amidst the surge in Covid-19 across the country, it is important to strictly follow Covid appropriate behavior and safety protocols as outlined by the Government.

We congratulate the Rajasthan Forest Department for this pioneering initiative on citizen engagement and nature education and extend our best wishes for the success of the Udaipur Bird Festival 2021-2022.

(Ravi Singh)

CONTENTS

Eco-tourism in Southern Rajasthan

Vikram Singh
IAS Retd. (Jaipur)

Rajasthan has been a pioneer state in terms of promotion and development of tourism. The State has almost everything that a tourist can ask for : a glorious history - showcased by its magnificent forts and palaces, intricately carved temples and havelis, amazing range of arts and crafts, rich and vibrant cultural heritage - depicted by its folk music, dances, costumes and delectable culinary delicacies, colorful fairs and festivals, a unique landscape - dominated by the mesmerizing Thar desert and one of the world's oldest mountain ranges - the Aravallis - harboring an immensely diverse range of flora and fauna. And above all, a well natured, warm and tourist friendly people - Padharo Mhare Desh !

The State also boasts of some world famous wildlife reserves, namely : Ranthambor and Sariska - famous for their tigers, Keoladeo National Park - host to more than 400 species of birds and the Desert National Park which is an arid ecosystem along with its unique wild denizens. Perhaps it is rightly said that Rajasthan has everything to lure a tourist - except snow and beaches ! Not surprisingly, 12% of the State's GDP is derived from tourism and allied activities.

Looking to its huge potential, many other states are also aggressively promoting tourism in the last few decades. This has obviously led to tough competition for our state. Another major shift has occurred - the modern tourist not only wants to "visit and see" but also desires to "feel and live the experience". With increasing disposable incomes in the hands of youth and their tendency to move out, have fun and enjoy, it is necessary to diversify the tourism products which Rajasthan has been traditionally offering.

The Eco-Tourism Policy of the State was first announced in 2010 and the same has been reissued in 2021 by the Forest Department. Meanwhile, Rajasthan Tourism Policy has also been announced in 2020. However, the State is still not a high priority destination for the eco-tourism enthusiasts. It evokes the popular image of an arid and barren landscape and this perception has been greatly reinforced over the years by the published literature and pictures and also the Bollywood movies. This stereotype image needs to be dispelled through concerted efforts.

Southern Rajasthan is most favorably placed in this respect i.e. to provide the much needed fillip to eco - tourism in Rajasthan. Its natural endowments such as the beautiful lakes, forests and hilly terrain present amazing landscapes and its ts rich flora and fauna adds another interesting dimension to it. Keeping in mind the regular high tourist influx in the Udaipur, Mt. Abu, Rajsamand and Chittoregarh regions from the neighboring states of Gujarat and Madhya Pradesh and also from other parts of the country and abroad, Southern Rajasthan has a great potential to be developed as an Eco-tourism destination. In fact, large areas of the region like Banswara, Dungarpur and Pratapgarh remain almost unexplored by the tourists.

In the last few years, a number of Bird Festivals have been organised in the various districts of southern Rajasthan. These have definitely helped in raising the awareness levels about the existing natural assets such as the birds and their habitats. The importance of natural world around us has been aptly re-emphasized. The recent Bird Festival at Menar near Udaipur by Rajasthan Patrika with the active support of the Green Peepal Society is a welcome development. It will generate interest and awareness about such lesser known destinations in the region.

Bird watching is one of the fastest growing hobbies. Apart from this, we need to promote eco-trails, hiking, trekking, rock-climbing, camping, star gazing, zip- lines, hanging bridges, tree houses, cycling ("Pedal to Jungle" has been a great success and has already well established itself), horse, camel and jeep safaris, hot-air ballooning, water sports etc. For providing these, specialist service providers will have to be roped in. The list of nature and adventure related activities which can be taken up is almost unending.

Efforts are already being made to reintroduce tiger in the region. As and when that happens, it will be an absolute game changer for the entire southern Rajasthan.

However, before we embark on such projects, we have to also work on improving our infrastructure. The road network needs to be further strengthened. A variety of hotels, motels and eateries already exist and will spring almost overnight when the opportunities arise. Tourist safety - especially that of ladies, elderly and children must be high on our priority. Basic facilities like clean washrooms and toilets, signages, trained guides, parking space etc will have to be provided. These can be arranged in coordination with the Forest and Tourism Departments and also by involving the local administration. The new Policy already envisages a District Level Committee under the Collector for all such endeavors. Another important factor is to include the local communities in these ventures. Their involvement is the key to success and their exclusion will be a sure-shot recipe for failure.

They will have to be adequately empowered and supported to own such endeavors. NGOs too can play an important role in bridging the vital gaps. It will a good idea to develop and implement projects on the PPP mode with active participation of the local people and NGOs.

The Forest and Tourism Departments had taken some good initiatives in this direction a few years ago. However, the efforts could not be continued. Sustainability is an important factor in all such innovative endeavors. It is hoped that propelled by the two new Policies the concerned will put their efforts together to plan and implement some interesting and well thought out projects.

Right now, corona looms large on us. However, every adversity is an opportunity and should be used as a stepping stone for moving forward. When the good times return, we should be ready to welcome the tourists for a more inclusive and immersive lifetime experience in the southern Rajasthan region.

The author worked as Director
Department of Tourism
GoR and MD, RTDC.

Important Bird Areas of Southern Rajasthan

Dr. Satish Kumar Sharma
RFS (Retd.)
Email: sksharma56@gmail.com

An Important Bird Area (IBA) is an area, identified using an internationally accepted set of criteria as being globally important for the conservation of bird population. Such areas provide essential habitat for one or more species of birds in breeding, wintering or migration season. IBAs are identified by BirdLife International as per International treaties such as the Biodiversity and Ramsar Conventions. Bambay Natural History Society played a very significant role with BirdLife International to declare IBAs in India (Islam & Rahmani 2004, Rahmani et al. 2016).

First time IBAs were declared in 2004 in India. During 2004, as many as 24 IBAs were identified in Rajasthan. Few more were added in 2016, making a total of 31 IBAs in the state. IBAs are scattered all over Rajasthan but a significant numbers (c. 12, 38.70%) of them are confined to southern part of the state. A list of IBAs of southern Rajasthan is present at below:

S. no.	Name of IBA	IBA code no.	Year of declar-ation	District	Habitat type	Location	
						Within exiting Protected Area	Outside of Protected Area
1.	Jaisamand lake and Wildlife Sanctuary	IN- RJ-06	2004	Udaipur	Arboreal, terrestrial and aquatic	Partly (Sanctuary Area)	Partly (Lake Area)
2.	Kumbhalgarh Wildlife Sanctuary	IN- RJ-09	2004	Udaipur, Rajasamand, Pali	Arboreal, terrestrial and aquatic	Completely	-
3.	Mt. Abu Wildlife Sanctuary	IN- RJ-10	2004	Sirohi	Arboreal, terrestrial and aquatic	Completely	-
4.	Phulwari Wildlife Sanctuary	IN- RJ-12	2004	Udaipur	Arboreal, terrestrial and aquatic	Completely	-
5.	Sajjangarh Wildlife Sanctuary	IN- RJ-15	2004	Udaipur	Arboreal and terrestrial	Completely	-
6.	Sareri (Bandh) Dam	IN- RJ-17	2004	Bhilwara	Aquatic	-	Completely
7.	Sei Dam / Sei Reservoir	IN- RJ-19	2004	Udaipur	Aquatic	-	Completely
8.	Sitamata Wildlife Sanctuary	IN- RJ-20	2004	Udaipur, Chittorgarh, Pratapgarh	Arboreal, terrestrial and aquatic	Completely	-
9.	Udaipur lakes complex	IN- RJ-23	2004	Udaipur	Aquatic	-	Completely
10.	Bagdarrah Nature Park	IN- RJ-24	2004	Udaipur	Arboreal, terrestrial and aquatic	-	Completely
11.	Jawai Dam Leopard Conservation Reserve	IN- RJ-27	2016	Pali	Terrestrial and aquatic	Completely	-
12.	Menar Lake Complex	IN- RJ-30	2016	Udaipur	Aquatic	-	Completely

Thus, 12 IBAs are confined to southern Rajasthan. These IBAs are rich in terrestrial, arboreal, aquatic, aerial and grassland bird species. Many rare, critically endangered, endangered, vulnerable and nearly threatened avian species are confined to these IBAs (Rahmani et al. 2016).

As many as 9 Wildlife Sanctuaries and 1 Conservation Reserve namely Jaisamand, Kumbhalgarh, Mt. Abu, Phulwari, Sajjangarh, Sitamata, Bassi, Bhainsrorgarh, Todgarh- Raoli Sanctuaries and Jawai Conservation Reserve are confined to southern Rajasthan. Except 3 wildlife sanctuaries namely, Todgarh- Raoli, Bassi and Bhainsrorgarh, rest all 6 are IBAs as well. Jawai Dam Leopard Conservation Reserve is also an IBA site. Bagdarrah once was a Closed Area, but now this title is no more with any Closed Area owing to changes made by Govt. of India in the Wildlife (Protection) Act, 1972. Bagdarrah is a reserve forest, which was identified as an IBA during 2004.

Story of Menar IBA is worth listening. Menar IBA is made of two closely situated lakes namely, Brahm

Talab and Dhand Talab. The important and interesting aspect about this IBA is that, it is being protected by the local community. On December 14, 2021, a grand Bird Fair was organized by the Rajasthan Patrika, one of the leading newspapers of Rajasthan. Like Menar, Kishankareri water body is also being protected by the local community and next time this water body deserves to be declared as an IBA.

Photo: A stone unveiled at the bank of IBA Menar (Dhand Talab) during bird fair on December 14, 2021

Avifaunal assemblage beyond PA Part 1 -Heronry outside Keoladao National Park Bharatpur, Rajasthan, India

Harsh Singhal
Dr. Satya Prakash Mehra

Affiliations: JK College of Science & Research Technology, Bharatpur
Rajputana Society of Natural History (RSNH), International Consortium for Nature Conservation (ICNC) & Global Forum for Sustainable Rural Development (GFSRD)
1. JK College of Science & Research Technology, Bharatpur 321001 Rajasthan, India
Email: singhalharsh12102001@gmail.com
2.Global Director, GFSRD; SG&CEO, ICNC and Director (Res&Pub), RSNH, Rajputana's Shakuntalam, RSNH Campus, Village Ramnagar, P.O. Malah, Bharatpur 321001Rajasthan, India Email: drspmehra@yahoo.com
For correspondence: Kesar Bhawan, 90, Ganeshnagar, Pahada, Udaipur 313 001Rajasthan, India

Keoladeo National Park (KNP), formerly known as Bharatpur Ghana Bird Sanctuary, is still referred as "ghana" (~ dense forest) locally. A unique feature of the wetland ecosystem of KNP is its origin from a natural depression, which was an evanescent rainfed wetland. The construction of Ajan Bund (a temporary reservoir, locally known as Kohni Bund) in 18th century which is about a km from the Park, and the subsequent flooding of the area, mark the beginning of human involvement in the conversion of this natural depression into a permanent waterfowl reserve. This extensively modified and man-managed Park, supports enormous congregation of migratory waterfowl in winter whereas in the monsoon and autumn, breeding, colonies of fish-eating birds are commonly seen. The possibility of watching birds from close proximity is the main attraction of the Park. KNP was the only wintering ground for the central population of the rare and highly endangered Siberian Crane Grus *leucogeranus* in India till 2002 when the species lastly reported from India.

Impact of Climate Change and/or Anthropogenic Interference on Water Conditions

Bharatpur considered as the "Eastern Gate of Rajasthan" lies in the Yamuna flood drain area, situated on the confluence of three rivers, viz. Ruparail, Banganga and Gambhiri. It has a history of floods and droughts, the frequency of these has changed over the decades, with a decrease in floods and increase in droughts during the 1980s and than in 2000s. Banganga and Gambhiri rivers were the sources of water for Ajan Bund but Gambhiri remained only the source since 1980s. Further, the water flow of Gambhiri was also reduced due to construction of Panchana Dam at upstream which was further worsened with the increase in height of dam and scanty rainfall. Till

the mid of 2000s water influx from all the rivers feeding Bharatpur was checked resulting into acute shortage of surface water all over the region. Despite of the fact that the average rainfall continuously ranged from 600-650 during the last three decades with the exception of a couple of years in every decade. The reasons might be several but the decreased duration of the rainy days from 42-45 days to 25-30 days. The rainwater during these days remains unutilized. Thus, all these factors cumulatively affected the surface water and the wetlands including KNP.

For the alternative management of the water in KNP, the options developed were the Govardhan Drain along with subsidiary Chiksana Canal and the Dholpur-Bharatpur Chambal Project, which was primarily undertaken for the humans, also fed KNP.

Impact of Climate Change and/or Anthropogenic Interference on Heronries and associated species

The climate change and/or the human interferences inducted the water scarcity inside KNP. The mismanaged water supply affected the residential breeding birds resulting into the decreasing heronry nests and the numbers of individuals inside KNP. The conditions were upsetting the avifaunal assemblages at heronry sites.

In the last few years, since development of the Dholpur-Bharatpur Chambal Water Distribution Project Plant at Malah Village, there was accumulation of the water in close proximity of the national highway beyond KNP (Plate 1). Slowly the accumulated water transformed into a beautiful heronry.

Wetland beyond Protected Area

It was around 2015 when the water from the Dholpur-Bharatpur Chambal Water Plant started accumulating in the nearby vacant spaces. The small patch of ~52,000 sqm with the periphery of over one km is the part of KNP, therefore, timely action of constructing masonry wall gave the protection to this piece of the land from the human encroachment. Before 2010, this pocket was heavily invaded with the Prosopis juliflora and got seasonally flooded during rainy months

With the advent of the water, the aquatic vegetation developed in 2017- 2018, and provided the safe space to the local aquatic species such as egrets, herons, waterhen species (moorhens, swamphens), and to some extent ducks (comb ducks, teals), etc. Then after in 2019, grass species (Saccharum sp.) developed into thickets with the scattered Acacia sp. providing base for the large sized water birds for roosting. It was in 2020 onwards, when this small water pocket developed into a heronry, and gave an opportunity to the tourists of KNP to turn around this pocket for the birding and photography by 2021.

Location: The Malah wetland is situated near highway at Village Malah (Panchi ka Nagla), approx. 2.3 km southwest from the urban Bharatpur, surrounded by peri-urban and rural human habitation, between 27°11'49.0"N - 77°29'44.9"E (Plate 1).

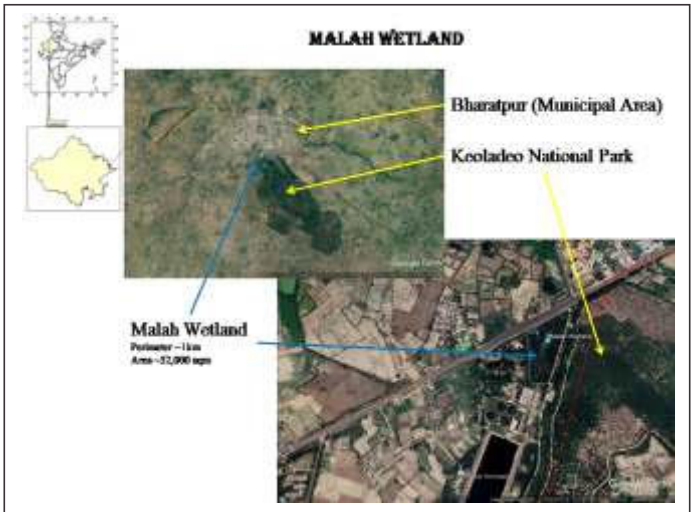


Plate 1: Location of the Malah Wetland (outside KNP)

Avifaunal Composition of Malah Wetland

Before 2010, the terrestrial birds and the local residential water birds (egrets, herons) were commonly observed for the short period in the pocket whereas the decade of 2011-2020 gave an opportunity for the development of the wetland habitat and invited the heronry species to nest. The minimum disturbances during the lockdown (year 2020) somewhere provided a base for the small sized local water birds to nest which further encouraged the large sized birds to nest in year 2021. Table 1 & 2 enlists the wetland and wetland dependent birds recorded from the newly developed Heronry Site beyond KNP. The counts are average of the periodic three counts made during the nesting months. Due to inaccessibility and hidden nesting pockets densely meshed, the number in 2021 might be more then the counts.

Table 1: List of the Heronry Species of Malah Wetland

[N – Approx. Number of Nests; T – Approx. Number of Individuals]

Sr. No.	Common Name Scientific Name	2019		2020		2021*	
		N	T	N	T	N	T
1.	Little Cormorant *Phalacrocorax niger*	11	20	15	31	5	12
2.	Indian Cormorant (Indian Shag) *Phalacrocorax fuscicollis*	4	12	8	10	9	15
3.	Great Cormorant *Phalacrocorax carb* o	0	4	0	10	0	12
4.	Darter (Snake-bird) *Anhinga melanogaster*	2	6	10	16	17	30
5.	Little Egret *Egretta garzetta*	10	35	45	100	33	60
6.	Grey Heron *Ardea cinerea*	0	0	2	5	6	10
7.	Purple Heron *Ardea purpurea*	0	0	1	2	3	5
8.	Great Egret (Large Egret) *Casmerodius albus*	5	13	10	27	12	35
9.	Intermediate Egret (Median Egret) *Mesophoyx intermedia*	3	10	5	14	8	21
10.	Indian Pond-Heron *Ardeola grayii*	25	30	20	32	23	35
11.	Black-crowned Night-Heron *Nycticorax nycticorax*	5	12	5	15	10	25
12.	Painted Stork *Mycteria leucocephala*	0	10	2	15	0	5
13.	Asian Openbill (Asian Openbill-Stork) *Anastomus oscitans*	0	12	5	10	0	2

14.	Black-headed Ibis (Oriental White Ibis) *Threskiornis melanocephalus*	0	19	10	22	123	240
15.	Eurasian Spoonbill *Platalea leucorodia*	0	21	12	37	32	60
		65	**204**	**150**	**356**	**281**	**567**

Table 2: Summary of the Heronry Species, Nests and Individuals

↓ Year	Number of Heronry Species	Number of Nests	Number of Individuals
2019	13	65	204
2020	15	150	356
2021	15	281	567

Further Readings

- Upadhyay, M., Vyas, R., Sharma, V. & Mehra, S. P. (2020). Avifaunal composition of municipal areas of Ajmer District, Rajasthan, India. Journal of Ecology and Natural Resources 4(2): 000192. https://doi.org/10.23880/jenr-16000192
- Mehra, S. P., Mehra, S., Uddin, M., Verma, V., Sharma, H., Singh, T., Kaur, G., Rimung, T. & Kumhar, H. R. (2017). Waste as a resource for avifauna: Review and survey of the avifaunal composition in and around waste dumping sites and sewage water collection sites (India). Int J Waste Resour 7(3):289. https://doi.org/10.4172/2252-5211.1000289
- Mehra, S. P. (2016) (11 July): Keoladeo National Park https://www.sahapedia.org/keoladeo-national-park
- Mehra, S. P., Mehra, S. & Sharma, K. K. (2014). Importance of urban biodiversity – A case study of Udaipur, India. Pp. 403-418. In: Maheshwari, B. L., Purohit, R C., Malano, H. M., Singh, V. P. & Amerasinghe (eds.) Securing Water, Food, Energy and the Liveability of Cities: Challenges and Opportunities for Peri-urban Futures, Springer Science+Business Media B.V. Dordrecht, The Netherlands. (https://link.springer.com/chapter/10.1007/978-94-017-8878-6_31)
- Mehra, S. P. & Mehra, S. (2014). Perspective on water and Biodiversity Issues: A Case Study of Keoladeo National Park, Bharatpur, India. Pp. 419-434. In: Maheshwari, B. L., Purohit, R C., Malano, H. M., Singh, V. P. & Amerasinghe (eds.) Securing Water, Food, Energy and the Liveability of Cities: Challenges and Opportunities for Peri-urban Futures, Springer Science+Business Media B.V. Dordrecht, The Netherlands. (https://link.springer.com/chapter/10.1007/978-94-017-8878-6_32)
- Mehra, S. P., Mehra, S. & Sen, P. (2013). Urban avifauna of Udaipur and its importance to the local population (Udaipur, Rajasthan, India). International Journal on Biodiversity Watch. Jul-Dec (2013) No. 2: 120-146.

Views of Malah Wetland

Birding at Malah Wetland

Illegal Bird Trade is becoming a serious Threat to many iconic avian species of Rajasthan

Anil Rodgers

Member Wildlife Crime Control Bureau

Keeping Birds who are protected under Wildlife (Protection) Act, 1972 as pet is though a crime but still people keep them. Many birds are every year killed due to superstitious beliefs, many of them are illegally trafficked from native places to other places, many of them are killed for consumption, many of them are poached for their body parts and feathers. Alexandrine parakeet is such a bird which vanished from Jhalawar it's hindi name Gagroni Tota has been derived from famous Jhalawar's Gagron fort where once they thrived. Similarly, rose ringed and plum headed parakeets are the birds that many people still keep as pet knowingly or unknowingly that it is an illegal act. Owls are under threat for superstitious beliefs in an incident happened years back in Gulab Bagh Zoo, Udaipur where some rescued Mottled Wood Owls were stolen. Geen Munia the iconic bird of Mt. Abu was under threat of getting vanished but due to some serious conservation efforts it's population is thriving now. Indian Peafowl's feathers are

collected for house decoration purpose but who knows by which means they are reaching in trade. There were continuous news this year about peafowls being poisoned in Nagaur, Bikaner and many other places. Some migratory birds like Bar headed goose and some other species are killed by poachers for meat consumption. One such incident was seen by myself, I then immediately informed the local forest department officials and a case was registered against unidentified people. Many local and migratory birds were poisoned at Dungarpur where regularly Bird Festivals were organized . Therefore question aises, what we can do to stop it ? Actually regular Awareness campaigns, better information network, and regular raids on culprits are some tools that can help us in mitigating such crime. Better co-ordination between wildlife lovers and forest department authorities can also help in this direction. We must avoid ourselves from putting nesting pics of Birds on Social Media with location. 'Village Volunteers' and 'Pakshi Mitras' can regularly visit wetlands and patrol the area and can inform about any illegal incident. Task force and Toll free Complaint numbers can also help us to deal with this. Though Wildlife Crime Control Bureau Volunteers of the state are doing a great job in mitigation of Wildlife Crimes, but it is a small team and a larger network is needed. Coordination between WCCB Volunteers, wildlife lovers and local villagers and Forest Department can give better results in mitigation of wildlife crime.

Rajasthan State Co-ordinator
Sage Stripes and
Green Earth Foundation

Sighting of Leucistic Common Kingfisher Alcedo atthis in Udaipur, India

Bhanu Pratap Singh Rathore
32-C, Neemach Mata Scheme
Udaipur, Rajasthan, India, Pin - 313004
E-mail: bhanuprtp30s@gmail.com

Akshita Saxena
236/6, Street No. 10, Amrit Puri 'B', Garhi, East of
Kailash, New Delhi, Delhi, India, Pin - 110065
E-mail: akshita.esperanceco@gmail.com

There are a total of five species of Kingfishers in Udaipur, Rajasthan, India (Lepage, 2021) one of them is the Common Kingfisher Alcedo atthis, also known as Small Blue Kingfisher. This species is fairly widespread in India, which is categorized Least Concern species under the IUCN Red List of Threatened Species (BirdLife International 2021).

The Common Kingfisher (Alcedo atthis) is a beautiful species of bird with strikingly attractive plumage. Contrary to what the name is, they are fairly uncommon to sight, which is mainly because of their inquisitive and shy nature. (Self obs.)

On 03 August 2021, at about 0619 hr, a Common Kingfisher was sighted, perching on a tree glistering water body near Dangiyon ka Hundar, Berach River, Udaipur, Rajasthan, India (24°40'37.2 N 73°38'02.4"E).

Its 'cordial' nature wasn't the only thing that was peculiar; it also exhibited exceptionally white, leucistic morph with normal colored eyes, which could possibly be the first-ever recorded sighting in India.

Many photographs were shot from various angles, revealing the normal morph's peppered patches on its wings and tail, as well as light markings on the supercilium.

For four hours, we monitored the movement of this leucistic Alcedo atthis. During the time period specified, it made four attempts to hunt, three of which were successful. Based on these findings, we may conclude that there is no difficulty in the hunting pattern.

Leucistic Morph of Alcedo atthis

While the orange mandible is generally associated with female kingfishers (Grimmett et al. 2011), the observed bird had a completely orange beak hence it is difficult to say with certainty whether it was a male or female.

Albino Common Kingfisher has been observed in the past as well (Aggarwal, 1991., Grewal, 2000). But this particular color variant (leucistic morph) has been observed for the first time in Udaipur, and possibly in India.

Both albinism and leucism are genetic disorders. Leucistic birds show a lack of pigments in patches, or the whole body, and normal pigmentation in other regions, such as beak, eyes, and legs.

In an albinic cases, the birds lack melanin in their feathers, eyes, and skin. As a result they get bright red/ pink eyes and white plumage (Van Grouw, 2006).

Among the different types of color change, leucism seems to be the most frequent mutation in birds (Cornell University, All About Birds, 2009).

Finding this color variant in avian species is rare but it is relatively more common than albinism. Until now there was no confirmed record for a leucistic morph of Alcedo atthis in the Southern Rajasthan.

Sighting leucistic individuals in a natural environment is considered to be difficult because these animals are more prone to predation (Møller and Mousseau, 2001).

In addition, it has been proven that changes in standard coloration may be able to affect various ecological aspects of species, such as reproduction, the acquisition of food, and the exploration of the area (Silva-Alvesa et al., 2021)

Leucism does not have a specific cause, but it can be the result of genetic mutations and metabolic or dietary problems (Bensch et al., 2000; Møller and Mousseau, 2001; Cadena-Ortiz et al., 2015).

Acknowledgements:

We thank Dr. Satish Kumar Sharma and Dr. Satya Prakash Mehra for their inputs and comments.

References:

Aggarwal, M. 1991. Albino Common Kingfisher. Newsletter for Birdwatchers 31 (11 & 12): 15.

Birdlife International. 2015. European Red List of Birds. Species factsheet: Alcedo atthis. Website URL: http://www.birdlife.org. [Accessed on 04 January 2021].

Bensch, S., Hansson, B. Hasselquist, D. And Nielsen, B., 2000. Partial albinism in a semi-isolated population of Great Reed Warblers. Hereditas, vol. 133, No. 2, pp. 167-170. http://dx.doi.org/10.1111/j.1601-5223.2000.t01-1-00167.x. PMid:11338429

Cadena-Ortiz, H., Bahamonde-Vinueza, D., Cisneros-Heredia, D. And Buitrón-Jurado, G., 2015. Alteraciones de coloración en el plumaje de aves silvestres del Ecuador. Avances en Ciencias e Ingenierías, vol. 7, no. 2, pp. B75-B90. http://dx.doi.org/10.18272/aci.v7i2.259

Cornell University, All About Birds, 2009. What Can Cause Birds To Show Weird Color Variations? Website URL: https://www.allaboutbirds.org/news/what-can-cause-birds-to-show-weird-color-variations-such-as-being-all-or-partly-white-or-unusually-dark/ [Accessed on 04 August 2021].

Grewal, B., 2000. Birds of the Indian Subcontinent. 3rd revised ed. Hong Kong: Local Colour Limited.

Grimmett, R., Inskipp, C., & Inskipp, T., 2011. Birds of the Indian Subcontinent. 2nd ed. London: Oxford University Press & Christopher Helm. Pg. 240.

Lepage D. 2021. Website URL: https://avibase.bsc-eoc.org/checklist.jsp?region=INnwrjud&list=howardmoore [Accessed on 04 August 2021].

Møller, A.P. and Mousseau, T.A., 2001. Albinism and phenotype of barn swallows (Hirundo rustica) from Chernobyl. Evolution; International Journal of Organic Evolution, vol. 55, no. 10, pp. 2097-2104. http://dx.doi.org/10.1111/j.0014-3820.2001.tb01324.x. PMid:11761068

Van Grouw, H., 2006. Not every white bird is an albino: sense and nonsense about colour aberrations in birds. Dutch Birding, vol. 28, no. 2, pp. 79-89.

Silva-Alvesa, V. D., Sandera, N. L., and Nogueira, O. M. A. 2021, Brazilian Journal of Biology, vol. 82. First record of leucism in Megaceryle torquata (Coraciiformes: Alcedinidae) in Pantanal, Brazil. Website URL: https://www.scielo.br/j/bjb/a/GdT5xvPb5fTRYn3TP68qqSm/ [Accessed on 04 August, 2021].

Potential of Lake Rajsamand (Rajasthan, India) to be identified as IBA

Dr. Satya Prakash Mehra
Global Director, Global Forum for Sustainable Rural Development (GFSRD)
Director (Res. & Publ.), Rajputana Society of Natural History (RSNH)
SG & CEO, International Consortium of Nature Conservation (ICNC)
Founder Member, Raj-Parindey Nature Club, Rajsamand

India has 467 Important Bird Areas (IBAs) (Rahmani et al., 2016) marked under the Global Program of BirdLife International to identify the priority sites for conservation of avifauna. In the first phase of the IBA Program, Twenty-four sites were identified in Rajasthan as IBAs (Islam & Rahmani, 2004) whereas seven sites were added in the second phase with the total thirty-one IBAs (Rahmani et al., 2016). There are many sites in the State which have the international importance and need to be protected under the IBA Program. Among such sites, 'Lake Rajsamand' has its unique importance due to its multi-fold values.

Owing to the location and the historical importance, Rajsamand, also known as Rajsamudra, has a great potential to be identified as a heritage site for conservation of birds. Due to lack of advocacy for the site, it remained unnoticed. The present investigation highlights the importance of the avifaunal composition of the site and advocates for conserving this heritage site.

Historical Value: The erstwhile rulers of the Mewar were the great visionaries in terms of the natural resource conservation and management especially when it was concerned with the Green or Blue Spaces. Every fort and the associated habitation had the great connection with the surrounding forests and the water harvesting structures in the Aravallis. This might be due to the geography and the topographical features such as hilly terrains serving as barrier against water sources, vast stretches of forests, seasonal streams, natural depressions, and open pains for agriculture practices (Bhadani, 2012) offering much largesse to the erstwhile rulers. Due to such diverse resources, the rulers also wisely utilized the resources for the development of the well-knit water harvesting structures which not only served the purpose of the humans but also provided aquatic habitats for the other forms of life. It was over a decadal work from 1662 to 1676 when the then Ruler of Mewar, Maharana Raj Singh initiated the excavation and construction of the 'Rajsamudra' which later on known as Raj Samand (Bhadani, 2012). It was fed by the three rivers, viz. Gomti, Tal and Kelwa along with the seasonal streamlets. The bow-shape damming of these flows is one of the longest dams in Mewar with a length of near about five kms. With a capacity of 22 MCFt, it lies amidst Aravallis giving the glimpses of sea within the rocky terrain (Jugnu, 2018).

Location: It is located in the Rajsamand District of Rajasthan at 250428.44 N and 735309.89 E, the north of Udaipur at a distance of about 60 kms in the vicinity of Kankroli with an elevation ranging from 500 to 600 msl,.

Avifaunal Composition: Along with the aquatic habitats in the form of the satellite wetlands, agriculture fields and surrounding terrestrial habitats, a great variety of the avifaunal diversity harbours in the area. The adjoining habitats covered in this investigation include aerial distance of 50 kms from the central axis of the main wetland site. The first avifaunal checklist was given by Hume (1878) for the Rajsamand considered as Kunkrowlee Lake. More than fifty bird species were reported in this short study. The most important feature was the congregation of the flamingos followed by the ducks and geese. Other important aspects were presence of the globally important species such as Indian Skimmer, River Tern, Darter, etc. With a gap of over hundred years, the lake was hardly ever studied. In first decade of 21st century, Mehra (2012) studied the avifaunal diversity of the area for five years (2006 - 2010). Total 213 bird species are reported from the area which included 94 wetland or wetland dependent species (Mehra, 2012, Mehra et al. 2011). Further, Mehra et al. (2012) explored the wetland birds of Rajsamand Lake. With the involvement of the common mass the frequency of the reporting increased. Now-a-days, local mass visualizes everyday and maintain the record. Thus, the present observations as per the local groups of birders, the latest reporting is near about 300

species, one-third of which are aquatic species (Team Raj-Parindey - Pankaj Sharma 'Sufi', Himanshu Singh, Narendra Paliwal, per comm. 2021).

The noticeable species of the site are the congregation of flamingos in thousands along with waterfowls. The number of individuals in the flock of Sarus Crane varies from few tens to over hundreds which is the largest congregation at particular site in Southern Rajasthan. Besides, permanent presence of Vulnerable species River Tern and the Near-threatened heronry species make the global significance of the site. The adjoining areas with habitat diversity also harbour globally important species of terrestrial habitats.

Criteria of IBA which fits for Rajsamand and its adjoining habitats: A large congregation of the aquatic bird species especially those which are enlisted in the IUCN Red Data makes it an important site for priority conservation. The adjoining habitats considered under investigation include the satellite wetlands, woody forests, agriculture fields, etc. The adjoining habitats harbour the vulnerable Green Avadavat Amandava formosa (Sugarcane and other agriculture fields in close proximity to Kumbhalgarh WLS) which are not included in the main list. Thus, the site is covered under A1, A3, A4 criteria.

Globally Threatened Species at Rajsamand Lake & its adjoining habitats
(Shankar et al. 2021, IUCN Red Data List 2021)

Sr. No.	Species	Scientific Name	IUCN Status	Habitat & Abundance* (R, C, N)
1	White-rumped Vulture	*Gyps bengalensis*	CR	Surrounding hills, R
2	Long-billed Vulture or Indian Vulture	*Gyps indicus*	CR	Surrounding hills, R
3	Red-headed Vulture	*Sarcogyps calvus*	CR	Surrounding hills, R
4	Egyptian Vulture	*Neophron percnopterus*	EN	Surrounding hills, C
5	Steppe Eagle	*Aquila nipalensis*	EN	Adjoining habitats, C
6	Black-bellied Tern	*Sterna acuticauda*	EN	Main wetland, C
7	Pallas's Fish-eagle	*Haliaeetus leucoryphus*	EN	Adjoining habitats, R
8	Indian Skimmer	*Rynchops albicollis*	EN	Main wetland (Hume 1878), R
9	Common Pochard	*Aythya ferina*	VU	Main wetland, C
10	Lesser White-fronted Goose	*Anser erythropus*	VU	Main wetland, R (R Tehsin, *in litt.*)
11	Sarus Crane	*Antigone antigone*	VU	Main wetland, A
12	River Tern	*Sterna aurantia*	VU	Main wetland, A
13	Tawny Eagle	*Aquila rapax*	VU	Adjoining habitats, C
14	Eastern Imperial Eagle	*Aquila heliaca*	VU	Adjoining habitats, R
15	White-naped Tit	*Parus nuchalis*	VU	Adjoining habitats, C
16	Ferruginous Duck	*Aythya nyroca*	NT	Main wetland, A
17	Lesser Flamingo	*Phoeniconaias minor*	NT	Main wetland, C
18	Painted Stork	*Mycteria leucocephala*	NT	Main wetland, C
19	Woolly-necked Stork	*Ciconia episcopus*	NT	Main wetland, C
20	Black-necked Stork	*Ephippiorhynchus asiaticus*	NT	Main wetland, C

21	Black-headed Ibis	*Threskiornis melanocephalus*	NT	Main wetland, A
22	Dalmatian Pelican	*Pelecanus crispus*	NT	Main wetland, C
23	Oriental Darter	*Anhinga melanogaster*	NT	Main wetland, A
24	Great Thick-knee	*Esacus recurvirostris*	NT	Adjoining habitats, C
25	Eurasian Curlew	*Numenius arquata*	NT	Main wetland, R
26	Bar-tailed Godwit	*Limosa lapponica*	NT	Main wetland, C
27	Black-tailed Godwit	*Limosa limosa*	NT	Main wetland, C
28	Pallid Harrier	*Circus macrourus*	NT	Main wetland, R

***Abundance** means **Rare (R):** Sighting 5 times in a year, **Common (C):** Sighting >5 times in a year or in a migratory season, **Abundant (A):** Regular sighting at any time of a year

Threats and Conservation Issues

The reservoir area is being prepared for the water sports activities. Paragliding project will affect the flying guests as well as residential waterfowls especially cranes, storks, pelicans, etc. The clearing of the nesting trees available for the local breeding aquatic birds as well as flattening of the mid-islands providing nesting ground for species like terns are important issues need immediate attention. Plantation of the exotic species or such species which are not the preferred plant for nesting will affect the heronry. Further, the mining waste water get mixed with the main reservoir water affecting the natural characteristics of water quality.

Acknowledgement

The present investigation is a result of the team effort which includes earlier works of Dr. Sarita Mehra along with the successive observations of the Raj-Parindey Nature Club Members which includes – Pankaj Sharma 'Sufi', Himanshu Singh Chandrawat, Adv. Neelesh Paliwal, Narendra Paliwal, Kailsah Sanchihar, Dr. Hemlata Lohar, Vinay Dave and many more to be acknowledged for their contributions.

References

Bhadani, B. L. (2012). Water harvesting, conservation and irrigation in Mewar (AD 800-1700). Centre of Advance Study, Department of History, Aligarh Muslim University. Manohar Publishers & Distributors, New Delhi. Pp. 257.

Islam, M. Z. & Rahmani, A. R. (2004). Important Bird Areas in India: Priority sites for conservation. Indian Bird Conservation Network: Bombay Natural History Society and BirdLife International (UK). Pp. xviii+1133.

IUCN Red Data List (2021). https://www.iucnredlist.org/species accessed on 5 September 2021

Hume, A. O. (1878). A lake in Oodeypoore. Stray Feathers Volume VII: 95-99.

Jugnu, S.K. (2018) (Hindi). Shilotkeern Rajprasasti: Mahakavyam. (Rajaprashasti Inscriptions). Aryavart Sanskriti Sansthan, Delhi. Pp. 304+Plates 8.

Mehra, S. (2012). The avifauna of southern Rajasthan with special emphasis on threatened species and bioacoustic applications in their identifications and monitoring. Department of Zoology, M. D. S. University, Ajmer. Ph. D. Thesis. Pp. 248+Appendices vi.

Mehra, S, Mehra, S. P. & Sharma, K. K. (2012). Importance of aquatic avifauna in southern Rajasthan, India. Pg. 159-183. In: Rawat., M. & Dookia, S. (eds.) Biodiversity of Aquatic Resources, Daya Publishing House, Delhi.

Mehra, S, Mehra, S. P. & Sharma, K. K. (2011). Aquatic avifauna of Aravalli Hills Rajasthan, India. Pp. 145-167 In Gupta, V. K. & Verma, A. K. (eds.) Animal Diversity, Natural History and Conservation Vol. I, Daya Publishing House, Delhi.

Rahmani, A.R., Islam, M.Z. and Kasambe, R.M. (2016). Important Bird and Biodiversity Areas in India: Priority Sites for Conservation (Revised and updated). Bombay Natural History Society, Indian Bird Conservation Network, Royal Society for the Protection of Birds and BirdLife International (U.K.). Pp. 1992 + xii.

Shankar, V., Urs, R., Bhavanarayeni .R, Bayani, A. and Kunte, K. (2021). Indian Birds In The Iucn Red List. In Satose, V., A. Bayani, V. Ramachandran, P. Roy, and K. Kunte (Chief Editors). Birds of India, v. 2.17. Indian Foundation for Butterflies.

Birds and webbed power supply in Udaipur, Rajasthan

Pritesh Patel
Research scholar

Dr. Nadim Chishty
Associate professor
Email- nadimchishty@gmail.com

Worldwide, the availability of electricity is now part of the standard of living. The transmission of electricity from power plants to households and industrial areas is mainly through overhead power lines. Birds as per there natural instinct are attracted to power poles for roosting and nesting in the same way they are attracted to large dead trees in open areas like scarce vegetation or edge of forest. Mostly they are preferred not only for lookout points, but also for perching and roosting sites, and sometimes as nesting sites as electric poles provide strong hold and elevation for constructing nest.

Risk of electrocution, risk of collision and risks and loss of habitat quality in staging and wintering areas are three main risks for the birds that nests and roosts on such electric poles. A better designed and regularly maintained power line immediately reduces the risk of electric shock to large birds, reduces maintenance costs and improves power reliability. Such an improved design should be used in all new infrastructure initiatives unwrapping under Udaipur smart city project, but older power supply infrastructure can be overhauled to mitigate existing risks like bird's electrocution and habitat loss.

There are many complex and poor lines in the urban and rural area of the city and more specifically old city area which not only possess potential effects of electrocution but also have high risk of attacks from feral monkeys, furthermore these entangled and webbed cables diminish the scenic beauty of Udaipur. These open and complex above ground power lines one of the direct impact threats for bird fauna. Particularly birds migrating at night, birds flying in flocks, and large and heavy birds are comparatively at higher risk. Still poorly designed and built power poles are commonly used which must be replaced by wider squarish poles. Some of our most impressive large birds, such as storks, eagles, vultures, other raptors, crows and owls, occasionally get severely damaged. Voluntary agreements between electric companies and conservationists are rare in India and so as in Udaipur. Conservation plan and legislative measures are essential to enhance the safety of birds and undergrounding of domestic supply cables will drastically reduce many of threats to birds and will also enhance scenic beauty of the city.

Importance of Responsible tourism in Conservation

Ashok Mahariya
IFS, DCF, DOD, Udaipur

In today's time when forest and wildlife facing imminent danger and loss of habitat due to various detrimental anthropogenic activities. Tourism in wildlife area and wilderness areas, which consist activities like wildlife safari, birding, nature trails, hiking, camping etc, need to do with utmost care and with harmony with the nature otherwise the tourism in this area, which usually consist of wildlife lovers, trekkers, nature lovers, tend to imposes a greater threat to the habitat. Here we do not discuss about the long-debated topic 'whether there should be tourism activities in the nature reserves or not. Tourism is more of necessity and there are large number of positive impacts of tourism, if it is taken in way of a 'responsible tourism'. If tourism is done in a responsible way, then there may be negligible negative impacts which occurred due to unregulated, unethical and over-tourism. A responsible tourism will bring many positive impacts such as nature education, training, indirect monitoring of area, awareness, funding and

livelihood of the local people. More importantly, closing tourism is not an available option so we should try to bring a responsible tourism.

What is responsible tourism

Responsible tourism is simply the concept of visiting somewhere as a tourist and trying to make a positive impact on the environment, society and economy.

How to bring responsible tourism as was defined in Cape Town in 2002 alongside the World Summit on Sustainable Development

It can be broadly divided into two parts; one part is need to ensure by authorities of park management and other part is by visitors themselves and both are complementary to each other.

Sustainable tourism practices need to be taken care by park managers and policy makers:-

- Assess environmental impacts throughout the life cycle of tourist establishments and operations – including the planning and design phase – and ensure that negative impacts are reduced to the minimum and maximising positive ones.
- Use resources sustainably, and reduce waste and over-consumption.
- Manage natural diversity sustainably, and where appropriate restore it; and consider the volume and type of tourism that the environment can support, and respect the integrity of vulnerable ecosystems and protected areas
- Promote education and awareness for sustainable development – for all stakeholders.
- involves local people in decisions that affect their lives and life changes;
- makes positive contributions to the conservation of natural and cultural heritage, to the maintenance of the world's diversity.

The responsible practices need to be ensured by every visitors:-

No sustainable system and conservation goals can be fulfilled without the active help and support from the people.

- Strictly follow do's and don'ts and other regulations of the area and cooperate park authorities. They have immense pressure in tiger reserves to handle tourism beside their regular protection works.
- Use dustbin and always keep a cloth-trash bag for using in deep area of park, where there may be no dustbin, to collect all your wastage and through it while coming back into dustbin when found.
- Do not use music, horn and don't create loud noises to keep the wilderness undisturbed.
- Do not feed wild animals, it actually harms them by changing their behaviour. It is also a punishable offence under wildlife protection act.
- Do not go near to wildlife to watch and always do video and photography from a safe distance.
- Do not block the way of wildlife by vehicles and insist your guide and driver to keep it on safe distance.
- Always admire nature as a whole and enjoy trees, birds and all form of biodiversity and do not feel mope when do not observe the flagship species of the area such as tiger, leopard etc. Admire and learn to enjoy the nature as a whole.

Respect nature... it always gives you. Be responsible and mark your presence with only your footprints...not by trash

Type of tourism in wilderness areas, its bad effects and measures for mitigation

To study various kind of nature tourism we will discuss here by type of management, protection level and legal status of the reserve. By this way it is easy to understand the management challenges and mitigate measures need to take by authorities and visitors.

Wildlife tourism in protected areas

India have just about 5% area under protected area network consist of national park, wildlife sanctuaries, conservation and community reserves. This area usually faces complex issues and interest

of various stakeholders in tiger tourism such as private hoteliers, safari operators, nature guides, district administration and political class. It is always difficult and challenging to bring all the stakeholders under one umbrella to achieve a sustainable and Eco-friendly way of tourism activities.

National Parks and Tiger Reserves: -

Usually tourism in protected areas, such as in national parks and tiger reserves, have well organised management system to handle visitors regarding booking, entry system involvement of local people in tourism by way of Eco development committees (EDC), Tiger Foundations and by means of other efforts made by forest department. But unfortunately, most tiger reserves and national parks have immense pressure of tourism beyond the carrying capacity of the parks.

Some notable parks are Periyar tiger reserves, Ranthambore national park, Kanha National Park, Corbett tiger reserve etc.

Wildlife sanctuaries:

Wildlife sanctuaries too mostly have some level of organised system for management of tourism but they usually lacking a clear system to handle visitors regarding booking, entry system and involvement of local people which is more robust in case of tiger reserves and national parks. Tough it is not the case of every sanctuary and they vary in this aspects widely from one place to another. Some sanctuaries have tapped tourism in good potential and developed a organised system of tourism management but they usually do not develop as their potential for a responsible tourism. Few Examples of wildlife sanctuaries are Kedarnath Wildlife sanctuary in Uttrakhand, Fulwari ki naal wildlife sanctuary, Udaipur, Sitamata Santaury, Chittorgrah , Bir Bara Ban Conservation Reserve, Haryana etc

Marine Protected areas:

A marine protected area (MPA) is essentially a space in the ocean where human activities are more strictly regulated than the surrounding waters – similar to parks we have on land. These places are given special protections for natural or historic marine resources by local, state, territorial, native, regional, or national authorities.

Pictures: Tourim in Marine National Park
Gulf of Kutch, Jamnagar

Conservation reserves are the places of government land other then forest land like revenue, grassland etc which is declared protected by the government, where it seems necessary to protect it owing to its importance regarding wildlife and species conservation. e.g Jawai leopard Conservation reserve, Pali, Sundhamata conservation reserve, Jalore

Community Reserves:

Community reserves are private lands of people where they together willingly want to get declare it as community reserve to protect some species or wildlife. There is no restriction on use of land for livelihood activities by the people such as agriculture. There will be only one major difference after declaration of community reserve that there will be no permission of certain detrimental activities such as mining. The protection level of the area increased and all activities which will not harm the wildlife will continue to permitted. Management of tourism in community reserves will be actively taken by eco developmental committee of the people who owns the land in the community reserve. Lot of wildlife

found in non forest and government land at many places such as on farmlands, grazing lands, wastelands etc. Therefore , declaring such lands as community reserve not only improve their protection level but also owners of land gets more opportunity on livelihood by tourism.

Source:
http://www.wiienvis.nic.in/Database/Community%20Reserves_8228.aspx

Tourism in forest areas other than protected area network:

Pictures: Trekking activities in Himalayan region

Tourism in other types of forest land, which are not under any category of protected areas network, usually consist activities like mainly birding, trekking, hiking, camping etc. These areas have very least level of management regarding tourism. Due to severe shortage of staff and non-availability of funds and infrastructure with forest department lead to un-regulated tourism. Forest department usually limited to give entry or permit. Rest is upto the level of visitors and guides to take care about nature.

Picture: Trash near Joshimath due to over and irresponsible tourism

Challenges in bringing responsible tourism in nature reserves in Indian Context and role of visitors:

Picture: An example of unethical tourism in Tadoba tiger reserve which happens in most of tiger reserves. (Source Google images)

Most nature reserves like tiger reserves are facing height of unethical tourism. Safari gypsies run over with each other to make sighting of the tiger or other flagship species of the area.

Most tiger reserves are facing severe shortage in staff compare to area, task of protection and pressure of tourism

Most reserves have not worked out on carrying capacities of the parks and sanctuaries and most suffer with over tourism.

Wildlife Sanctuaries have less robust system of handling tourism and usually it is managed on ad hoc basis whenever request came for entry of safari. Sanctuaries usually have lot of potential to cater ecotourism and provide livelihood to local communities by ecotourism activities but due to various factors like lack of staff, unwillingness at policy and government level, these places are not tapping their full potential. Activities such as trekking, birding, nature trail, nature education should be promoted in sanctuaries in eco-friendly way.

Marine protected areas have unique challenges in management and tackling tourism due to over-fishing, pollution and other detrimental anthropogenic activities owing to its open and large area, insufficient infrastructure and staff, multi stakeholder ship and lack of effective interdepartmental coordination.

Conservation and community reserve usually have open and unregulated tourism. Though, these

reserves should be managed by a self-sustained committee of local people but usually at most of places no such management established for effective management of tourism which lead to unethical and violations of wildlife protection in various ways.

Similarly, tourism in areas which do not come under protected area network consist mainly of forest areas or other areas in hilly region of rich biodiversity and landscape. These areas are usually overcrowded by trekkers, hikers and different type of adventure sports. Such areas too badly suffer with trash and pollution due to irresponsible tourism by different tourism companies and visitors. These areas usually have very less presence of forest department for management of tourism owing to large, inaccessible and open areas.

Picture: Trash dumped by trekkers, hikers and mountaineers in upper Himalayan region

Due to lack of education and sensitization about the importance of biodiversity as a whole e.g birds, trees, reptiles etc, usually every tourist want to sight flagship species of the park e.g. tiger in tiger reserves and if not sighted then he feels regret. This create preference and demand by tourist for going into a particular zone which they feels have more chances to sight flagship species.

Visitor's Education and sensitization

Regular field nature education programmes for school kids are very useful in bringing responsible tourism in long way

The following things should be taken care in full spirit and with feel of a responsibility and duty by every visitor going to any nature reserve. Article 51 (A) of Indian constitution also mention fundamental duties for citizens which includes preservation of natural environment is a duty of all citizens.

Natural resources are important national heritage and must be taken care as national pride. Protection and conservation of these resources are utmost responsibility of all visitors.

We have discussed about different types of nature reserves and their management system specially tourism point of view and it is found that except national parks and tiger reserves, most places do not have well organised tourism management system to tackle over flow of tourists due to lack of sufficient staff, infrastructure and unfavorable policy decisions.

National parks and tiger reserves too suffer with over tourism, mismanagement and unethical tourism. It's because most national parks and tiger reserves, despite of developing a system of managing tourism in well organised way, suffers with ill effects of over tourism due to demand out of carrying capacity, lack of transparency in management owing mainly due to unwillingness of state governments to post upright officers on key management positions, insufficient support from visitors and from various stakeholder like hoteliers, people's representatives etc.

Therefore, it is important to understand that the only effective way to bring responsible tourism and to mitigate ill effects of it lies with sensitization and education of visitors. Places like wildlife

sanctuaries, conservation reserves, community reserves and non-protected areas such as trekking routes etc are on the mercy of level of sensitization and education of visitors and their responsible behaviour towards nature.

THE FOLLOWING ACTIVITIES ARE VERY USEFUL FOR VISITOR'S EDUCATION AND SENSITIZATION: -

- Therefore, to improve the situation there is need to include responsible tourism in the course curricular at school level.
- There should be use of programs like nature camps, jungle trails, story telling etc to educate school children. Activities like birding trips, nature trails etc can organised by forest department either independently or with the help of suitable volunteers, organisation to educate youth and other people.
- Other efforts through , signage, publication, advertisement and brochures at entry points will give a readily available information about dos and don'ts
- Organizing quiz, celebration of environment and wildlife related important events and days for this purpose, promoting nature lovers and volunteer to get help in organizing such programmes will also help.
- Establishment of Nature interpretation centres at entry point of parks or at other suitable places can help greatly.
- There should be some reward system to visitors who bring trash along with him by giving them a plant for planting.

It is a responsibility of every youth, parent, teacher and every citizen to bring a responsible tourism in the places of our natural heritage to save them and to fulfil our fundamental duty.

जीवन रेगिस्तान का (एक फोटो स्टोरी)

Devendra Shrimali

भारत दुनिया का एक मात्र देश हैं जहां हर प्रकार का पर्यावरण समाया हुआ है, चाहे वो हिमालय के ऊंचे बर्फीले पहाड़ हो या दक्षिणी समुद्र या फिर भारत के अंदर समाई सेकड़ो नदिया और यही नही इस विविधता से भरे देश में एक तरफ फेला हैं लंबा चौड़ा थार मरुधर।

The black-necked grebe or eared grebe
(Podiceps nigricollis)

भारत की इस विविधिता के कारण हजारो लाखो पंछी हर साल यहां शीत प्रवास के लिए आते है चाहे वे उचे लंबे क्रेन प्रजाति के पंछी हो या भारी भरकम गिद्ध या फिर नन्ही नन्ही अनेक चिडया। और इन्ही खूबसूरत पंछियो का दीदार करने एवं उनके छाया चित्र लेने में निकल पड़ता हु अलग अलग जगहों के लिए। पिछले सात सालों में मैं कई जगह गया हूं परन्तु भारतीय उपमहाद्वीप के रिगिस्तान की बात ही कुछ अलग थी। बात बीते साल की हैं जब मैने और मैने दोस्तो ने रेगिस्तान का दौरा करने का निर्णय लिया और वहां स्थित नेचर गाइड का पता कर हम निकल पड़े रिगिस्तान की और।

अभी उदयपुर से निकले ही थे कि पता पड़ा बीकानेर में ब्लैक नेक्ड ग्रीब की साइटिंग हुई हैं, तो फिर क्या था एक और नए प्रवासी की चाह में हम निकल पड़े बीकानेर की और शाम पड़े गोधूलि वेला के आस पास हम बीकानेर पहुच गए।

दूसरे दिन अल सुबह हम निकले बीकानेर के जोड़बीर वल्चर कंजर्वेशन रिजर्व की और जहां कुछ आधे घण्टे में हमने इस खूबसूरत प्रवासी पक्षी के दिद्दार एवम छायाचित्र लिए। अब चुकी जोड़बीर सिर्फ इस नन्ही दुबदुबडी का प्रवास स्थान तो है नही इस लिए हम वहां आय पिली आँख का कबूतर एवं भारी गिद्दो के छायाचित्रों में मशगूल हो गए।

The yellow-eyed pigeon or pale-backed pigeon (Columba eversmanni)

The griffon vulture (Gyps fulvus) at Jodbeer Vulture Conservation reserve with Egyptian Vulture

फिर शाम हो चली थी परन्तु अभी हमे हमारे थार मरुस्थल भी तो जाना था तो हम फिर निकल पड़े और रात होते होते पहुच गए रेगिस्तान के एक होटल में।

The cream-colored courser (Cursorius cursor)

तीसरा दिन ऐसा था मानो भगवान के दर्शन हो गए । पहले तो कुछ एक घण्टा कड़ी मशकत के बाद हमे हमारा पहला राजस्थान का राज्य पक्षी गोडावण नजर आया परन्तु वह बहुत दूरी से ही हमे देख लंबी उड़ान ले बैठा, आखिर इसका अपना क्षेत्र जो नस्ट हो रहा हैं। लगातर शिकार , बिजली के तारों में उलझना और अपने ग्रासलैंड की कमी के कारण यह पक्षी अब बहुत शर्मिला और डर के रहले वाला पंछी रह गया हैं, कुछ १५०-२००की संख्या रह गयी इसकी विश्व में।

6 Great Indian Bustard in their Habitat

The great Indian bustard (Ardeotis nigriceps)

खेर गोडावण को ढूंढते हुए अचानक हमे एक और प्रवासी पँछी नजर आया और वो था क्रीम कलर करसर, बेहद खूबसूरत इस पँछी के छायाचित्रों के बाद हम फिर निकल पड़े गोडावण की खोज में और तभी भगवान ने हमारी सुनी और अपने दर्शन दिए दिए वो भी १ नही पूरे ६, ६ गोडावण को देखना एक अलग ही अहसास था जो हम सभी पूरी जिंदगी नही भूल पाएंगे।

अगले दिन यानी चौथी सुबह हम फिर हमारी बची हुई प्रवासी पंछियो की तलाश में रेगिस्तान के धोरो पर गुम रहे थे । चौथे दिन हिमालयन वल्चर, तमपिटर फिंच, सिनेरियस वल्चर एवम कुर्जा के अनेकों चित्रों के साथ हम लहट चले उदयपुर अपनी यादों और अपने छाया चित्रों के साथ।

बीते चार दिनों के अंदर थार मरुस्थल के नाना प्रकार के पंछियो के रहना उनको अपने कैमरे में कैद करना एक ऐसा एहसास हैं जो शब्दो मे बया नही किया जा सकता।

पक्षी प्रेमी
देवेंद्र श्रीमाली

Bird response to urban environment: a case study of four major urban wetlands of Udaipur city, Rajasthan

Kanishka Mehta

Abstract

Wetlands are indispensable for the countless benefits or "ecosystem services" that they provide to humanity, ranging from freshwater supply, food and building materials, biodiversity of flora and fauna, help in flood control, groundwater recharge, and climate change mitigation. While waterbirds are important part of food chain and provide numerous ecosystem services. In this study I evaluated bird diversity as well as its composition at four major wetlands of Udaipur city, Rajasthan. Point transect methods were used to count birds at each wetland. A total of 2361 individuals belonging to 111 species were recorded during the study. Fateh Sagar Lake had highest 61 avian species followed by Govardhan Sagar Lake (n = 54), Lake Pichola (n = 53) and lowest at Badi Lake (n = 46). According to the observation, highest anthropogenic pressure was found to be on Fateh Sagar Lake.

Key words: wetlands, waterbirds, Udaipur city, Rajasthan, Urban area.

1. Introduction

Wetlands are indispensable for the countless benefits or "ecosystem services" that they provide to humanity, ranging from freshwater supply, food and building materials, biodiversity of flora and fauna, help in flood control, groundwater recharge, and climate change mitigation. According to Ramsar Convention, it uses a broad definition of wetlands including all lakes and rivers, underground aquifers, swamps and marshes, wet grasslands, peatland, oases, estuaries, deltas and tidal flats, mangroves and other coastal areas, coral reefs. It also includes all human-made sites such as fish ponds, rice paddies, reservoirs and salt pans. It is surprising to note that 64% of the world's wetlands have disappeared in the last century (Bernstein et al. 1991; Bolund and Hunhammar 1999). The wetlands play an important role in the conservation as it supports populations of both plant and animal species important for maintaining the biological diversity of a particular biogeographic region (Ramsar Convention, 2019).

The conservation and wise use of all wetlands is vital as few of them are Important Bird Areas (IBAs) which can cater a good number of bird population, especially aquatic birds. These are sites particularly important for conservation of bird as they keep a regular hold on significant population of one or more globally or regionally threatened, endemic and congregator bird species of highly representative of bird assemblages (Islam et al. 2004).

Birds are important part of food chain, often they are considered to be a keystone species in ecosystem affecting diversity of other species indirectly (Block and Brennan, 1993). They help in pollination and seed dispersion in environment. They are best ecological service provider and recognized as good bio- indicators of the quality of ecosystem and health of the environment (Gill, 1994). Birds are also natural scavengers and maintain the cleanliness of the environment. Udaipur city lakes Complex (Pichola, interconnecting water bodies and Fateh Sagar) is identified as Important Birds Areas (IBAs) of global concern (Bhatnagar et al. 2007). Hence, the study was planned to evaluate the bird species diversity as well as composition of four major wetlands of the Udaipur city area, which will be helpful to conserve avian fauna in the city area. The broad objectives were: 1) to assess avian diversity at four different wetlands 2) to make a comparison of species among four wetlands, 3) to identify the major dominant species present at each wetland, and 4) to detect the level of threat experienced by four wetlands.

2. Methods

2.1. Study area

Fieldwork was conducted at four major wetlands of Udaipur city, also known by City of Lakes (Figure1). Udaipur city falls under the greener belt of southern Rajasthan having fertile plains of

Mewar region, founded by Maharana Udai Singh II in 1559. The present study includes four major wetlands of Udaipur city namely Govardhan Sagar Lake, Lake Pichola, Lake Badi and Fateh Sagar Lake, all of them built by Maharajas of the respective ruling period. These wetlands are major hotspots of bird diversity in the city. Except Lake Badi, situated 11 km. away from the center of city, all other three lakes fall under the core city limits. Lake Pichola is the oldest and second largest lake in heart part of Udaipur, first being Jaisamand Lake.

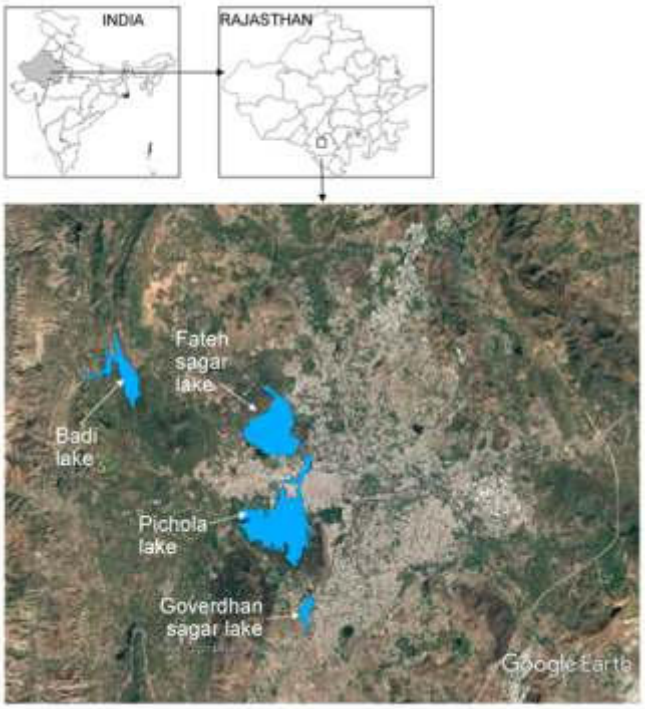


Figure 1. Location of four major wetlands of Udaipur city, Rajasthan (India).

2.2. Bird Survey

Point transect method was conducted during the entire study period having a complete transect of 500 m, where each count station was 100 m away from next station. Point transect is a method which has pre-determined transect with multiple point count stations. In this method, after approaching the count station, all the birds sighted and heard in a fixed radius is noted. A total of 20 point count stations, 5 at each with a fixed- radius of 50m were visited for assessment of bird diversity. Four visits at each wetland were performed in morning hours on clear weather days to count the bird diversity at wetland as mornings are full of bird activities. Method of detection was both direct sighting of bird and indirect evidences like vocalization of bird. I started the count as soon as we reached the count station because we didn't want to miss the individuals flushed due to my arrival. All the bird species whether detected hovering or flying in sky i.e. flyovers, seen foraging on ground or swimming in water were included in count. The flushed individuals were also recorded but individuals which were flying from an unknown point and did not stop withing count stations' radius were not recorded. However, in case of large flock of bird, an approximate flock size was counted. Details such as date and time of count, weather of day, station number, time of starting and ending the count, name and number of species along with number of individuals detected were recorded for each point count station. Another column of remark was also made to note any anthropogenic activity such as fishing, bathing, washing clothes, etc. going on at the count station. All the direct sighting of birds were done with the help of Olympus binocular and pictures of unidentified birds were shot by Nikon Coolpix B700 camera. Identification of birds was done by Grimmett et al. (2011) and consultation with experts.

2.3. Analysis

Species number at all four sites were separately added to determine the total number of species and individuals of each species observed at each wetland to attain first objective of the study. The number of species in a community is species richness while species diversity involves both species evenness and richness. This can also be a case where two communities may contain same number of species but one community numerically dominates other species while other has species evenly distributed throughout the community. Thus, while measuring species diversity the relative abundance of each species should be considered. Species diversity and species richness were calculated by using Shannon-Weiner Diversity index and Menhinick's index respectively. I compared the five most abundant species of each wetland. In addition, species exclusively found at each wetland and species shared between different wetlands were also counted. Also, to detect the level of threat at four wetlands, I measured it by studying the combined effect of different pressures acting upon wetlands during the study period. I classified the human disturbance as different types of pressure mentioned in Table 3.

Species richness is a measure of the number of species found in a sample. It can be assumed as larger the sample would be, more species can be expected to find. Here, it is calculated by number of species at particular wetland, divided by the square root of the number of individuals found at the wetland. Species richness is calculated by using Menhinick's index formula:

$$D=s/\sqrt{N}$$

where,

s= number of different species represented at wetland,

N= the total number of individuals at wetland.

Species diversity is different from species richness. In species diversity, species dominance or evenness is also considered in relation to one another. Species diversity is calculated by using Shannon Diversity Index formula:

$$H' = -\Sigma\left[\left(\frac{n1}{N}\right)\ln\left(\frac{n1}{N}\right)\right]$$

where,

n= number of individuals of a species in sample,

N= total number of individuals in a sample.

Species accumulation curve plots the cumulative number of species recorded versus the number of samples on y and x-axis respectively. Here, the cumulative number of species recorded at each wetland is plotted on y-axis and four different visits at each wetland are plotted on x-axis respectively in Table 4. This technique assumes that one would be observing new species initially, but with each subsequent visit, the chances of getting new species reduces. This increases the possibility of encountering same species which were already observed in the previous visits. Therefore, it gives a curve which starts to flatten out with subsequent visits showing no need for further visits after the curve levels off.

3. Results and discussion

A total of 2361 individuals belonging to 111 species were encountered during the study (Appendix 1). Among four wetlands, Fateh Sagar Lake had highest 61 avian species followed by Govardhan Sagar Lake (54), Lake Pichola (53) and lowest at Badi Lake (46). Species richness was found to be highest at Badi Lake with value of 2.616 given in Table 1. This explains that number of species were highest at Lake Badi despite the fact that it had least number of species than other three wetlands.

Table 1. Species richness at four major wetlands of Udaipur city, Rajasthan.

Site name	# of Species(s)	# of individuals(N)	Species richness	Species diversity
Fateh Sagar Lake	61	827	2.121	-3.439
Govardhan Sagar Lake	54	500	2.418	-3.215
Lake Pichola	53	725	1.968	-3.186
Badi Lake	46	309	2.616	-2.831

Species diversity differed from species richness and it was calculated using Shannon-Weiner diversity index showing highest species diversity i.e. 61 species at Fateh Sagar Lake and 12 species out of them were exclusively present here.

There are few species which are good bio-indicators and their presence/absence plays a significant role in determining the health of wetland and environment in total. The Bronze-winged Jacana Metopidius indicus was found at Lake Pichola and Fateh Sagar which clearly indicates presence of lotus and water hyacinth as this species prefers floating vegetation for foraging and movement. Similarly, both Ferruginous Duck Aythya nyroca and Common Pochard Aythya ferina categorized as Near Threatened and Vulnerable species respectively, under IUCN Red List were found only at Lake Pichola which are indicators of good water quality. This explicitly indicates that water quality of other three wetlands is comparatively poor.

Five dominant species at each wetland was calculated manually by selecting top five species whose number were highest (Table 2). This is

important to note the dominant species present in that area which tells more about its habitat type and quality. For example, four Bunting species were exclusively found at Lake Badi and Crested Bunting Emberiza lathami is among top 5 dominant species present there. As per the IUCN Red List (IUCN 2019), Bunting species were present only at grassland, rocky areas, shrubland and around inland cliffs or mountain peaks. This information suggests that Lake Badi is situated around rocky area and between Aravalli Mountain peaks which is an appropriate habitat for Buntings.

Table 2. Five dominant species of four major wetlands of Udaipur city, Rajasthan (RVBU = Red-vented Bulbul, LISW = Little Swift, EUCD = Eurasian Collared-Dove, CRBU = Crested Bunting, LEWH = Lesser Whitethroat, EUCO = Eurasian Coot, INSD = Indian Spot-billed Duck, RRPA = Rose-ringed Parakeet, TUDU = Tufted Duck, ROPI = Rock Pigeon, COMY = Common Myna, ROST = Rosy Starling, WTSW = Wire-tailed Swallow, BCBE = Blue-cheeked Bee-eater, BAMY = Bank Myna, ASPS = Asian Pied Starling; RWLA = Red-wattled Lapwing).

Badi lake		**Lake Pichola**		**Govardhan Sagar lake**		**Fateh Sagar Lake**	
Species	Number	Species	Number	Species	Number	Species	Number
RVBU	45	EUCO	220	COMY	108	INSD	104
LISW	33	INSD	95	ROPI	36	BCBE	80
EUCD	25	RRPA	42	ROST	32	BAMY	58
CRBU	20	TUDU	42	WTSW	31	ASPS	53
LEWH	18	ROPI	37	EUCO	17	RWLA	46

Table 3. Various type of anthropogenic pressures observed at four major wetlands of Udaipur city.

S.No.	**Types of Pressure**	**Lake Pichola**	**Govardhan Sagar Lake**	**Lake Badi**	**Fateh Sagar Lake**
1.	Human presence >50 people visit site/hour	+	-	-	+
2.	Active bathing and washing site	-	+	+	+
3.	Religious activity and waste	+	+	+	+
4.	Fishing activity	+	+	-	+
5.	Park around wetland <500 m. radius	-	+	-	+
6.	Road around the wetland	+	+	+	+
7.	Boating	+	-	-	-
8.	Plastic and other waste material in wetland	+	+	+	+
9.	Tourist spot	+	+	-	+
10.	Construction work in and around wetland	-	+	-	-
11.	Hotels around wetland <500 m. radius	-	-	-	+
Cumulative number		7	8	4	9
%		63.64%	72.73%	36.36%	81.82%

+ = Present, - = Absent

In addition, this study also included level of threat detection experienced by four wetlands. As given in Table 3, different types of pressure encountered at wetlands during point count survey were noted in a separate column of remark. The + and – sign represent presence and absence of particular pressure at that wetland respectively. According to the data, highest pressure was found to be on fourth wetland i.e., Fateh Sagar Lake which is experiencing 9 out of 11 major pressures and in turn, actually, affecting the bird diversity of the entire lake. Although, the lake has maximum diversity as compared to other wetlands but if the pressure on Fateh Sagar Lake is reduced, there is high probability of lake catering more number of species.

Table 4 showing data of four visits at four wetlands for species accumulation curve.

	Govardhan Sagar Lake	Lake Pichola	Badi Lake	Fateh Sagar Lake
Visit1	20	17	13	21
Visit2	38	25	22	45
Visit3	44	41	31	51
Visit4	53	52	45	61

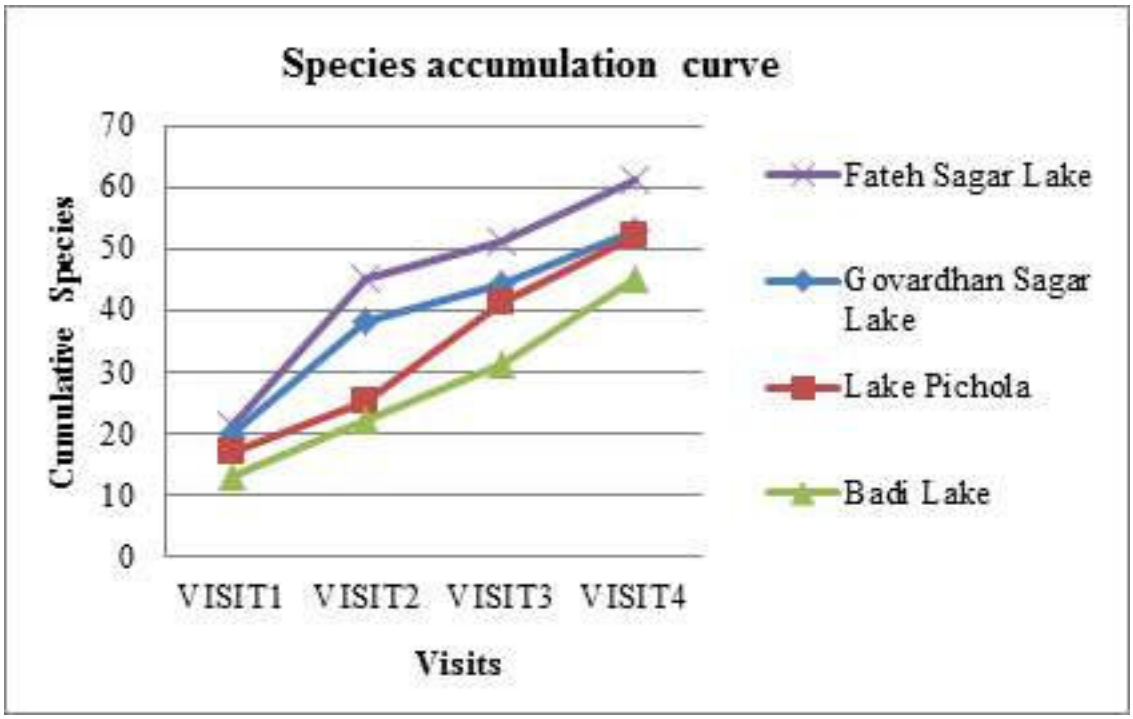


Figure 2 showing species- accumulation curve at four studied wetlands.

Species accumulation curve for the current study shows an increase in number of species after each visit at each wetland site (Figure 2), which explicitly means there is a need of more visits at all wetland.

In conclusion, my study shows a good number of bird diversity in and around four urban wetlands of Udaipur city despite of different anthropogenic factors. However, this was a preliminary study with limited field visits; still I could cover a significant number of both resident and winter migratory avian fauna. Hence I recommend more studies at all the wetlands of the Udaipur city in future.

Acknowledgements:

I thank to Dr. Vijay Kumar Koli and Dr. K. S. Gopi Sundar for their guidance in the present work.

References:

Bernstein CM, Krebs JR, Kacelnik A. Distribution of birds amongst habitats: theory and relevance to conservation. In: Bird population studies: relevance

to conservation and management, edited by Perrins CM, Lebreton JD, Hirons GJM. UK: Oxford University Press, p 317-345, 1991.

Bhatnagar C, Jani K, Sharma V (2007). Vanishing habitats of aquatic birds in the city of lakes, Udaipur: A case study. Indian forester, 1395-1402.

Block WM, Brennan LA. The habitat concept in Ornithology: Theory and applications. Curr Ornithol 11:35-91, 1993.

Bolund P, Hunhammar S, 1999. Ecosystem services in urban areas. Ecological Economics, 29, 293-301.

Gill FB. Orthinology 2nd edition, Oxford university press 117, 1994.

Grimmett R, Inskipp C. and Inskipp T. 2011. Birds of the Indian Subcontinent. Oxford. 480 pp.

Islam ZA, Rahmani AR. Important Bird Areas in India. Priority sites for conservation. Indian Bird Conservation Network: J. Bombay Nat. Hist. Soc. And Birdlife International (U.K.) Pp. XVII +1133, 2004.

IUCN. 2019. The IUCN Red List of Threatened Species. Accessed on 13 January 2019 at http://www.iucnredlist.org

Appendix 1. List of bird species recorded at the four major wetlands of Udaipur city, Rajasthan. Species presence is shown with '+' at a wetland.

S. No.	Order	Family	English Name	Scientific Name	Badi lake	Lake Pichola	Govardhan sagar lake	Fateh Sagar Lake
1	Anseriformes	Anatidae	Lesser Whistling-Duck	Dendrocygna javanica				+
2			Cotton Pygmy-Goose	Nettapus coromandelianus		+		
3			Northern Shoveler	Spatula clypeata		+		+
4			Gadwall	Mareca strepera		+		
5			Eurasian Wigeon	Mareca penelope				+
6			Indian Spot-billed Duck	Anas poecilorhyncha		+	+	+
7			Northern Pintail	Anas acuta		+		+
8			Green-winged Teal	Anas crecca		+		
9			Common Pochard	Aythya ferina		+		
10			Ferruginous Duck	Aythya nyroca		+		
11			Tufted Duck	Aythya fuligula		+		
12	Galliformes	Phasianidae	Indian Peafowl	Pavo cristatus	+	+		
13	Podicipediformes	Podicipedidae	Little Grebe	Tachybaptus ruficollis	+			+
14	Columbiformes	Columbidae	Rock Pigeon	Columba livia	+	+	+	+
15			Eurasian Collared-Dove	Streptopelia decaocto	+		+	+
16			Spotted Dove	Streptopelia chinensis	+			
17			Laughing Dove	Streptopelia senegalensis	+		+	+
18	Cuculiformes	Cuculidae	Greater Coucal	Centropus sinensis	+	+	+	+
19			Asian Koel	Eudynamys scolopaceus				+
20	Caprimulgiformes	Apodidae	Little Swift	Apus affinis	+	+	+	+
21	Gruiformes	Raillidae	Eurasian Moorhen	Gallinula chloropus	+	+	+	
22			Eurasian Coot	Fulica atra		+	+	+
23			Grey-headed Swamphen	Porphyrio poliocephalus		+	+	
24			White-breasted Waterhen	Amaurornis phoenicurus	+	+	+	

25	Charadriiformes	Recurvirostridae	Black-winged Stilt	Himantopus himantopus		+		+
26	Charadriiformes	Charadriidae	Red-wattled Lapwing	Vanellus indicus	+	+	+	+
27	Charadriiformes		Little Ringed Plover	Charadrius dubius				+
28	Charadriiformes	Jacanidae	Pheasant-tailed Jacana	Hydrophasianus chirurgus				+
29	Charadriiformes		Bronze-winged Jacana	Metopidius indicus		+		+
30	Charadriiformes	Scolopaacidae	Black-tailed Godwit	Limosa limosa				+
31	Charadriiformes		Common Snipe	Gallinago gallinago				+
32	Charadriiformes		Green Sandpiper	Tringa ochropus	+		+	+
33	Charadriiformes		Wood Sandpiper	Tringa glareola				+
34	Charadriiformes	Laridae	River Tern	Sterna aurantia		+	+	+
35	Ciconiiformes	Ciconiidae	Asian Openbill	Anastomus oscitans			+	+
36	Suliformes	Phalacrocoracidae	Little Cormorant	Microcarbo niger			+	+
37	Suliformes		Indian Cormorant	Phalacrocorax fuscicollis	+	+		+
38	Pelicaniformes	Ardeidae	Gray Heron	Ardea cinerea	+		+	+
39			Purple Heron	Ardea purpurea			+	+
40			Great Egret	Ardea alba		+		+
41			Intermediate Egret	Ardea intermedia	+	+	+	+
42			Little Egret	Egretta garzetta			+	+
43			Indian Pond-Heron	Ardeola grayii		+	+	+
44	Pelicaniformes	Threskiornithidae	Glossy Ibis	Plegadis falcinellus		+	+	+
45	Pelicaniformes		Black-headed Ibis	Threskiornis melanocephalus		+		+
46	Pelicaniformes		Red-naped Ibis	Psudibis papillosa		+	+	+
47	Accipitriformes	Accipitridae	Black-winged Kite	Elanus caeruleus			+	
48	Accipitriformes		Shikra	Accipiter badius		+		
49	Accipitriformes		Black Kite	Milvus migrans		+		+
50	Bucerotiformes	Upopidae	Eurasian Hoopoe	Upupa epops	+			+
51	Coraciiformes	Alcedinidae	Common Kingfisher	Alcedo atthis	+	+		+
52	Coraciiformes		White-throated Kingfisher	Halcyon smyrnensis		+	+	+
53	Coraciiformes		Pied Kingfisher	Ceryle rudis			+	
54	Coraciiformes	Meropidae	Green Bee-eater	Merops orientalis			+	
55	Piciformes	Megalaimidae	Blue-cheeked Bee-eater	Merops persicus				+
56	Psittaciformes	Psittaculidae	Rose- ringed Parakeet	Psittacula krameri		+		
57	Passeriformes	Laniidae	Long-tailed Shrike	Lanius schach	+		+	
58	Passeriformes	Dicruridae	Black Drongo	Dicrurus macrocercus		+	+	+
59	Passeriformes		White-bellied Drongo	Dicrurus caerulescens		+		
60	Passeriformes	Rhipiduridae	Spot-breasted Fantail	Rhipidura albogularis	+	+		
61	Passeriformes		White-browed Fantail	Rhipidura aureola	+			
62	Passeriformes	Corvidae	Rufous Treepie	Dendrocitta vagabunda	+			
63	Passeriformes		House Crow	Corvus splendens			+	+
64	Passeriformes		Large-billed Crow	Corvus macrorhynchos			+	+

65	Passeriformes	Hirundinidae	Dusky Crag-Martin	Ptyonoprogne concolor			+	
66	Passeriformes		Wire-tailed Swallow	Hirundo smithii	+	+	+	
67	Passeriformes		Red-rumped Swallow	Cecropis daurica			+	
68	Passeriformes		Streak-throated Swallow	Petrochelidon fluvicola			+	
69	Passeriformes	Paridae	Cinereous Tit	Parus cinereus		+		
70	Passeriformes	Pycnonotidae	Red-vented Bulbul	Pycnonotus cafer	+	+	+	+
71	Passeriformes	Phylloscopidae	Common Chiffchaff	Phylloscopus collybita	+	+	+	
72	Passeriformes	Acrocephalidae	Booted Warbler	Iduna caligata			+	
73	Passeriformes		Clamorous Reed Warbler	Acrocephalus stentoreus			+	
74	Passeriformes	Cisticolidae	Common Tailorbird	Orthotomus sutorius		+		+
75	Passeriformes		Ashy Prinia	Prinia socialis	+	+	+	+
76	Passeriformes		Plain Prinia	Prinia inornata	+	+	+	+
77	Passeriformes	Sylviidae	Lesser Whitethroat	Sylvia curruca	+	+		+
78	Passeriformes	Paradoxornithidae	Yellow-eyed Babbler	Chrysomma sinense	+			
79	Passeriformes	Zosteropidae	Indian White-eye	Zosterops palpebrosus	+	+		+
80	Passeriformes	Leiothrichidae	Large Gray Babbler	Turdoides malcolmi	+	+		
81	Passeriformes	Muscicapidae	Indian Robin	Copsychus fulicatus	+	+	+	+
82	Passeriformes		Oriental Magpie-Robin	Copsychus saularis		+	+	+
83	Passeriformes		Bluethroat	Luscinia svecica			+	
84	Passeriformes		Red-breasted Flycatcher	Ficedula parva		+		
85	Passeriformes		Black Redstart	Phoenicurus ochruros	+			
86	Passeriformes		Blue Rock-Thrush	Monticola solitarius	+			
87	Passeriformes		Siberian Stonechat	Saxicola maurus	+			
88	Passeriformes		Pied Bushchat	Saxicola caprata			+	
89	Passeriformes		Brown Rock Chat	Oenanthe fusca	+			
90	Passeriformes		Isabelline Wheatear	Oenanthe isabellina	+			
91	Passeriformes	Sturnidae	Rosy Starling	Pastor roseus			+	+
92	Passeriformes		Asian Pied Starling	Gracupica contra			+	+
93	Passeriformes		Brahminy Starling	Sturnia pagodarum			+	+
94	Passeriformes		Common Myna	Acridotheres tristis			+	+
95	Passeriformes		Bank Myna	Acridotheres ginginianus			+	+
96	Passeriformes	Nectariniidae	Purple Sunbird	Cinnyris asiaticus	+	+	+	+
97	Passeriformes	Motacillidae	Gray Wagtail	Motacilla cinerea		+		
98	Passeriformes		Western Yellow Wagtail	Motacilla flava		+	+	+
99	Passeriformes		Citrine Wagtail	Motacilla citreola				+
100	Passeriformes		White-browed Wagtail	Motacilla maderaspatensis	+			
101	Passeriformes		White Wagtail	Motacilla alba				+
102	Passeriformes		Tree Pipit	Anthus trivialis	+			
103	Passeriformes	Fringillidae	Common Rosefinch	Carpodacus erythrinus		+		
104	Passeriformes	Emberizidae	Crested Bunting	Emberiza lathami	+			
105	Passeriformes		White-capped Bunting	Emberiza stewarti	+			
106	Passeriformes		Grey-necked Bunting	Emberiza buchanani	+			
107	Passeriformes		Striolated Bunting	Emberiza striolata	+			
108	Passeriformes	Passeridae	House Sparrow	Passer domesticus	+		+	+
109	Passeriformes		Yellow-throated Sparrow	Gymnornis xanthocollis	+			
110	Passeriformes	Estrildidae	Red Avadavat	Amandava amandava			+	
111	Passeriformes		Indian Silverbill	Euodice malabarica	+		+	

)URP 9DULRXV :HWODQGV RI 5DMDVW


Shrike — Krishna Asawra


Lokesh Talesara


Niramay Upadhyay


Rain Quail — Rajat Chordia


Sharad Agarwal


Ujjwal Dadheech

ORGANIZED BY

: CONTACT US :

Office of the Deputy Conservator of Forests , Wildlife, Udaipur
Badi Road, Dewali, Udaipur (Raj.) Tel. : 0294-2453686
E-Mail : dcfwludz@gmail.com
Web : www.udaipurbirdfestival.com