A Review on the status of Sambhar Wetland bird tragedy

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Abstract

Sambhar Lake is India's largest inland salt lake. It is a shallow Ramsar wetland Subject to seasonal fluctuations. The site is important for a variety of wintering water birds, including large numbers of flamingos. Human activities consist of salt production and livestock grazing. It is also an Important Bird Area (IBA) due to migratory avifaunal population, especially flamingo and waterfowl. Presence of salt-tolerant algae makes the lake one of the most important wintering areas for flamingos .The specialized algae and bacteria growing in the lake provide striking water colors and support the lake ecology that, in turn, sustains the migrating waterfowl.

Current conservational threats owing to the drastic reduction in water spread and anthropogenic pressures were major concerns till Oct.2019. The death of thousands of birds was detected on 11th November 2019 which belonged to 25 different species. Majority of were migratory birds and a few local species The main cause identified was avian botulism. The paper reviews the cause and efforts taken to revive it as a safe wetland.

Keywords: Sambhar Lake, migratory birds, Ramsar Wetland and conservational threats

Introduction

Sāmbhar Lake comes under Ramsar Convention. The Ramsar Convention is an international treaty for the conservation and sustainable utilization of wetlands, recognizing the fundamental ecological functions of wetlands and their economic, cultural, scientific, and recreational value.

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Fig 1 Sambhar lake

Sambhar Lake (Fig 1) was given the status of a Ramsar Site in March 1990.The lake receives water from five rivers Medtha, Samaod, Mantha, Rupangarh, Khari, and Khandela. Lake has 5700 square km catchment area. It occupies an area of 190 to 230 square kilometers based on the season. The lake is elliptically shaped with a length of approximately 35.5 km and a breadth varying between 3 km and 11 km.. The circumference of the lake is 96 km, and it is surrounded by the Aravali hills on all side.

Ecological importance

Sambhar has been designated as a Ramsar site (FIG 2) (recognized wetland of international importance) because the wetland is a key wintering area for tens of thousands of pink flamingos (Fig 3)and other birds that migrate from northern Asia and Siberia.

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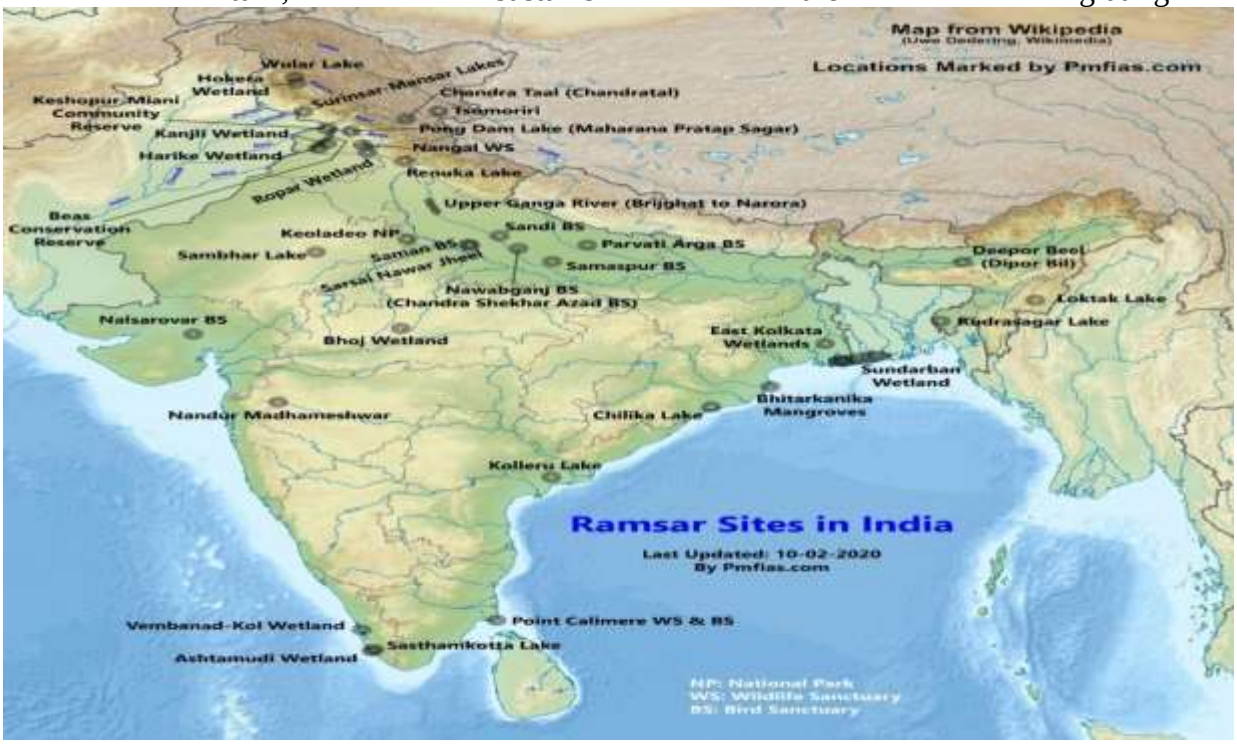

FIG 2 RAMSAR SITES OF INDIA

FIG 3 PINK FLAMINGOS

In November 2019, nearly 20,000 of migratory birds were found dead mysteriously in the lake area. The salt (NaCl) concentration in this lake water differs from season to season. The salt concentration in the pans Kyars varies and, accordingly, the color of the brine ranges from green, orange, pink, purple, pink and red due to the bloom of haloalkaliphilic microorganisms. More recently, haloalkaliphilic microalgae namely Dunaliella, Euhalothece, Nitzchia, etc. have also been isolated (Upasani ,2007).

The Human connection

Sambhar is known as a source of salt production. Over the decades, salt extraction in the lake has undergone a transformation. The traditional process is monsoon-dependent. The lake taps water from seasonal rivers, streams and rivulets. This water reacts with the lake sediments and becomes brine. It evaporates over 50 days leaving behind crystallized salt. Today, most salt production units use deep bore wells to extract groundwater, reducing the entire process to barely two weeks.

FIG 4 A dead Pallas Bird

CAUSE OF BIRD TRAGEDY(Fig 4)

Thousands of birds, including this Pallas's Gull, have been found dead around Rajasthan's saline, Sambhar Lake, triggering alarm among birders. This incident needs immediate investigation and remediation. The deaths of over thousands birds in Sambhar Lake have been attributed to Avian botulism. Attached is the detailed report by the Indian Veterinary Research Institute (IVRI), Bareilly. A potential cause of the presence of the bacteria could be toxicity of the water possibly due to excessive salt extraction by illegal salt units around the lake.

Avian botulism is a neuromuscular illness caused by a toxin produced by a bacteria — *Clostridium botulinum*. It is a paralytic, often fatal, disease for birds. Heavy rains that lashed northern India this July reduced the salinity of the lake. However, when the water evaporated, it increased the salinity around the edges of the lake bed. The bacteria that caused the present outbreak — *C. botulinum* — is an anaerobic bacterium, meaning it can grow and produce toxins only in the absence of oxygen. The low-levels of warm, saline water in the lake is further estimated by ecologists to have provided an ideal location for the manifestation of botulism.

The decaying plant or animal materials are capable of hosting the bacteria for a longer period of time. A bird-to-bird cycle: Since only insectivorous and omnivorous birds were affected and not herbivores, the birds feeding on dead birds could have been a possible cause of such mortality..In studies conducted by the USGS National Wildlife Health Center, several environmental factors, including pH, salinity, temperature, and oxidation-reduction potential in the sediments and water column, appeared to significantly influence the likelihood of botulism outbreaks in wetlands.

For several years activists have highlighted commercial and other activities detrimental to the eco-system of the wetland were being carried out contrary to the provisions of the Wetland (Conservation and Management) Rules framed under the Environment Protection Acts of 1986 and 2010.

The Rajasthan state hosts one of India's largest migratory bird populations. On November 20, the Rajasthan High Court took notice of the tragedy and sought a report from amicus curiae Nitin Jain.(Fig 5)

FIG 5 Highlights of report

Authorities are burying the piling bird carcasses in pits after wrapping them in polythene sheets. This has raised concerns about the risk of contamination of soil, water and salt produced in the area. Experts also suspect poisonous algae and dumping of waste and carcasses in the lake behind the epidemic.

Sambhar Bird Diversity

A total of 71 species of wetland birds have been recorded (Tables 1 and 2)

Table 1 Sambhar Birds

Lesser Whistling Duck	Eurasian Collared Dove	Little Egret
Bar-headed Goose	Red Collared Dove	Black-headed Ibis
Graylag Goose	Spotted-necked Dove	Eurasian Spoonbill
Common Shelduck	Laughing Dove	Indian Black Ibis
Ruddy Shelduck	Yellow-legged Green Pigeon	Glossy Ibis
Red-crested Pochard	Chestnut-bellied Sandgrouse	Little Cormorant
Common Pochard	Little Swift	Great Cormorant
Ferruginous Duck	Greater Coucal	Oriental Darter
Tufted Duck	Jacobin Cuckoo	Eurasian Thick-knee
Garganey	Common Koel	Great Thick-knee
Northern Shoveled	Grey-bellied Cuckoo	Pied Avocet
Gadwall Common	Hawk Cuckoo	Black-winged Stilt
Eurasian Wigeon	White-breasted Water hen	Grey Plover
Indian Spot-billed Duck	Purple Swamphen	Pacific Golden Plover
Mallard	Common Moorhen	Little Ringed Plover
Northern Pintail	Common Coot	Kentish Plover
Common Teal	Demoiselle Crane	Greater Sand Plover
Comb Duck	Common Crane	Yellow-wattled Lapwing
Indian Peafowl	Painted Stork	Red-wattled Lapwing
Common Quail	Black Stork	White-tailed Lapwing
Rain Quail	Great White Pelican	Greater Painted-snipe
Jungle Bush Quail	Black-crowned Night Heron	Eurasian Curlew
Rock Bush Quail	Indian Pond Heron	Black-tailed Godwit
Grey Francolin	Cattle Egret	Ruddy Turnstone
Greater Flamingo	Grey Heron	Ruff
Lesser Flamingo	Purple Heron	Broad-billed Sandpiper
Little Grebe	Great Egret	Curlew Sandpiper
Rock Dove	Intermediate Egret	Temminck's Stint
Dunlin	Northern Wryneck	White-browed Wagtail
Little Stint	Black-rumped Woodpecker	White Wagtail
Common Snipe	Yellow-crowned Woodpecker	Rufous-tailed Lark
Common Sandpiper	Coppersmith Barbet	Ashy-crowned Sparrow Lark
Green Sandpiper	Green Bee-eater	Singing Bush Lark
Spotted Redshank	Blue-tailed Bee-eater	Indian Bush Lark
Common Greenshank	Blue-cheeked Bee-eater	Bimaculated Lark
Common Redshank	Indian Roller	Greater Short-toed Lark
Wood Sandpiper	European Roller	Oriental Sky Lark
Marsh Sandpiper	Common Kingfisher	Crested Lark
Red-necked Phalarope	Pied Kingfisher	Grey-breasted Prinia
Barred Buttonquail	White-throated Kingfisher	Ashy Prinia
Indian Courser	Common Kestrel	Plain Prinia

Table 2 Sambhar Birds

Little Pratincole	**Merlin**	**Common Tailorbird**
Brown-headed Gull	**Peregrine Falcon**	**Streak-throated Swallow**
Black-headed Gull	**Blossom-headed Parakeet**	**Red-rumped Swallow**
Pallas's Gull	**Plum-headed Parakeet**	**Wire-tailed Swallow**
Caspian Gull	**Alexandrine Parakeet**	**Barn Swallow**
Gull-billed Tern	**Rose-ringed Parakeet**	**Dusky Crag Martin**
Whiskered Tern	**Small Minivet**	**Plain Martin**
River Tern	**Common Woodshrike**	**White-eared Bulbul**
Black-winged Kite	**Black Drongo**	**Red-vented Bulbul**
Egyptian Vulture	**Isabelline Shrike**	**Common Chiffchaff**
Short-toed Eagle	**Bay-backed Shrike**	**Greenish Leaf Warbler**
White-rumped Vulture	**Long-tailed Shrike**	**Lesser Whitethroat**
Indian Vulture	**Great Grey Shrike**	**Yellow-eyed Babbler**
Cinereous Vulture	**Rufous Treepie**	**Oriental White-eye**
Indian Spotted Eagle	**Common Raven**	**Large Grey Babbler**
Steppe Eagle	**House Crow**	**Scrub Babbler**
Bonelli's Eagle	**Large-billed Crow**	**Jungle Babbler**
Booted Eagle	**Purple Sunbird**	**Common Starling**
Western Marsh Harrier	**Baya Weaver**	**Rosy Starling**
Pallid Harrier	**Red Avadavat**	**Purple-backed Starling**
Montagu's Harrier	**Indian Silverbill**	**Asian Pied Starling**
Shikra	**Scaly-breasted Munia**	**Brahminy Starling**
Eurasian Sparrow hawk	**House Sparrow**	**Common Myna**
Black Kite	**Spanish Sparrow**	**Bank Myna**
White-eyed Buzzard Chestnut	**Bush Sparrow**	**Indian Robin**
Long-legged Buzzard	**Tree Pipit**	**Oriental Magpie Robin**
Spotted Owlet	**Olive-backed Pipit**	**Black Redstart**
Short-eared Owl	**Paddy field Pipit**	**Eastern Stonechat**
Dusky Eagle Owl	**Tawny Pipit**	**Pied Bush Chat**
Indian Grey Hornbill	**Grey Wagtail**	**Isabelline Wheatear**
Common Hoopoe	**Citrine Wagtail**	**Desert Wheatear**
Pied Wheatear	**Brown Rock Chat**	**Variable Wheatear**

Anatids were largest in number and 27 species have been sighted for the first time from the lake waters. Under Ramsar definition, some twenty families of water birds have been designated as birds ecologically dependent on wetland. Out of 20 families recognized, 15 families are recorded from Sambhar Lake. The other two families also form the part of wetland dependent birds. All the 17 families recorded from Sambhar Lake are taxonomically categorized to define clearly the nature of dependence and status of wetland birds.

Discussion

Notable contributions have been made by Cornell Lab of Ornithology 2018,Dickinson and Remsen 2013, Sangha 2009 and Kumar 2005.

Sambhar Lake is not the first instance where deaths due to botulism have been recorded. 7,000 water birds died in Lake Michigan in 2007 and 2008. In Hawaii, the toxin killed around 183 Laysan Ducks in 2008.The botulism outbreaks are likely to become more frequent as climate change alters wetland conditions to favour bacteria and pathogens.

Conclusion

Thus, the establishment of rescue and medical centres along with the mitigation of climate change need to be considered by the government as a precautionary measure for the future. There is a need to further provide a good climate in the wetland so that the birds can survive in the environment.

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