Environmental Communication

Population Status and Habitat Requirement of Endangered Migratory Waterfowl of Patisar Lake, Bahawalpur, Pakistan

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ABSTRACT

Patisar lake is an important wetland for migratory birds in mid-winter which is located in the center of the Lal Suhanra National Park of Bahawalpur, Pakistan. In this study Patisar lake has been explored to find out the endangered bird species. We used a map, a pencil, a notebook, a watch that is used to show seconds and binoculars for the census. Point counting system is used for the monitoring of birds and their habitat requirement was also measured. Result of the study indicated that these population belonging to 6 different orders, 10 different families, 18 genera and 32 different species of waterfowl were observed (1) *Podicipediformes* iPodicipedidae; iTachybaptus iruficollis), (2) Pelecaniformes (Family: *Phalacrocoridae*; *Phalacrocorax iniger*; *P. carbo*; Family; *Anhingidae*, *Anhinga melanogaster*), (3) *Ciconiiformes* (Family: *Ardeidae*, *Ardea cinerea*, *A. purpurea*, *Ardeola grayii*, *Bubulcus ibis*, *Egretta alba*, *E. garzetta*, *E. intermedia*), (4) *Anseriformes* (Family: *Anatidae*; *Anas acuta*, *A. crecca*, *A. platyrhynchos*, *A. strepera*, *A. penelope*, *A. clypeata*, *Aythya ferina*, *A. fuligula*, *A. nyroca*), (5) *Gruiformes* (Family: *Rallidae*: *Fulica atra*, *Porphyrio porphyrio*, *Gallinula chloropus*) and (6) *Charadriiformes* (Family: *Recurvirostridae, Himantopusi himantopus*; Family: *Charadridae, Vanellusi indicus*, *V. vanellus, V. leucurus*, *Charadrius dubius*; Family: *Scolopacidae*, *Tringa tetanus*, *T. nebularia*, *Actitis hypoleucus*; Family: *Laridae,Sterna aurantia*). According to They all preferred fresh water layer of the lake and marshes near the lake as their habitat. It was concluded that Patisar lake is a prodigious natural resource for the migratory waterfowl and the number of waterfowl declining with the passage of time.

KEY WORDS: BAHAWALPUR, ENDANGERED, MIGRATORY BIRDS, PATISAR LAKE, WATERFOWL.

INTRODUCTION

Pakistan is bordered to the west by Iran and Afghanistan, while China is from the north and India is to the east by its huge neighbors. The country is divided by the Indus River, which flows throughout the country and through the vast Indus delta in the south, before entering the Arab Sea. There is a rich diversity of bird habitats in Pakistan from the dry alpine and tropical temperate western Himalayan forests to the Baluchistan and Sind deserts. A wide range variety of birds is present in Pakistan because of their broad habitat diversity (Ahmad et al. 2020). Pakistan's bird fauna is an interesting mixture making the blending species from the Palearctic region and Oriental region. For the migration of birds, Pakistan is an important crossroad. A large number and a great variety of birds pass through Pakistan in the autumn and also in spring which majorly heads towards and from the subcontinent of India and also towards East Africa. To spend the winter season many species of the birds stayed in Pakistan (Grimmett et al. 2008; Ahmad et al. 2020).

In pursuit of good conditions, thousands of birds belonging to many species pass across Pakistan and stay temporarily on their way to other destinations in the Indian subcontinent

Article Information:*Corresponding Author: wasimape@gmail.com Irfan.ashraf@iub.edu.pk
Received 18/10/2021 Accepted after revision 23/12/2021
Published: 31st December 2021 Pp- 1885-1889

Available at: https://bbrc.in/ DOI: http://dx.doi.org/10.21786/bbrc/14.4.74

at various lakes and water reservoirs. Pakistan provides many migratory birds with enticing wetlands in the winter seasons each year. In principle, for migratory birds, it serves as a central Asian flying route. Wetlands from the northern mountains to the southern coast of Siberia is used as habitats for waterbirds (Ali 2016). It is estimated that approximately 1 million birds are migrating over a distance of approximately 2800 miles by International Migratory Bird Route Number 4. Mainly the bird species that migrate from Siberia and towards the Pakistani regions are Cranes Teals, Houbara bustards, Geese, Spoonbills, Pintails, Mallards, Pelicans, and Waders (Umar et al. 2018). The Patisar lake protected area is home to many animal species. These include over 160 birds, including griffon vulture, hubara bustard, hen harrier, marsh harrier, laggar falcon, Indian sparrow hawk, kestrel, Egyptian vulture, barn owl, shrike, and wheatear.

These bird species do have an important part to play with. A large body of water in the center of the park, the Patisar Lake is suitable for watching birds (Waris et al. 2014). Previous studies conducted in Lal Suhanra National Park was conducted and observed that between October and December (2015), 7,443 birds from 74 species belonging to 35 family members and representatives of 16 orders had been seen while in 2001 only 40 bird species were found (Maan and Chaudhry 2001; Jambhekar et al. 2021). Patisar lake is the abandoned reservoir on the edge of the Cholistan Desert, situated at the Lal Suhanra National Park, 25 km east of Bahawalpur and 10 km south of the Sutlej River. Patisar lake which was originally maintained as a stopping point for irrigation which is fresh and then slightly brackish, ponds which are supplied by canals, streams, and springs for special purposes (Mishra et al. 2021).

The lake was initially constructed as a storage reservoir provides irrigation water during water scarcity times but is no more used for this purpose. So, it was constructed as a water reservoir, this lake (1,935 hectares) was a significant wetland as a wintering site to most waterfowl (Mishra et al. 2021). The lake water is filled by the Bahawal Canal's Desert Branch, and it also gets excess water from nearby irrigated land. The lake is permanent year-round with a stable water level with an average depth of 4.5 m, a maximum depth of 6.0 m, and a pH value of 6.8. The annual rainfall is roughly 150-200 ram, as well as the relative humidity, is 25-72%. In January the mean minimum temperature is 11.5°C, and in June the mean maximum is 37°C (extremes of 1°C and 49°C have been recorded). The lake contains large reed beds as well as an extensive growth of floating and submerged aquatic vegetation (Mahmood-ul-Hassan and Muhammad 2011). Today, though, the swamp supports numerous reed beds, watertight as well as floating vegetation, so that for the majority of birds it has lost its habitat function. (Tatu and Anderson 2017; Mishra et al. 2021).

The lake is a vital wintering ground for the various migration waterfowl. The findings were migrating to nineteen percent of the total birds. The lake, which is the home to numerous birds, has been modified in order to minimize the avian population of this region for recreational activities. They could have been brought here during the winter season by the right temperature, food supply, less predation danger as well as favorable conditions (Khan et al. 2018). Over the past three decades, the number of migratory birds coming in from Siberia has declined drastically. According to a survey conducted during the winter season, some 150,000 birds, including local and migratory waterfowl, were reported to have landed at 12 aquatic 'stopovers' which is 70 percent lower than in (2017-2018) (Mishra et al. 2021).

Migratory birds start arriving in Pakistan just at end of August as well as begin choosing to leave in February. The birds are mostly moved by March. As Siberian temperatures fall below -30 degrees Celsius, the birds make their way to warmer climates. The migratory bird path is called 'Flyway Four' in Pakistan, or the 'Natural Road.' The migrating birds are flying across Siberia, over Afghanistan, and then into Pakistan, in which they are monitoring the Indus River on the Sindh route (Ahmad et al. 2020). Therefore, we studied the population status and habitat requirement of endangered migratory waterfowl at Patisar lake, Bahawalpur.

MATERIAL AND METHODS

Patisar lake located at 29°20'41.2"N 71°56'21.0"E, which is situated in the middle of Lal Suhanra national park, Bahawalpur. Patisar lake was a large water body that was perfect for birds watching. In the middle of the winter lake become home to 10,000 to 30,000 ducks as well as common coot. The study was conducted during the 2019-2020. The Patisar lake was located about 47.4 Km away from Bahawalpur city. For the identification and selection of Endangered species of waterfowl from the Patisar lake almost every bird that has been observed was noted. To identify which of the bird was endangered IUCN Red list has been concerned.

So, from the IUCN Red list of endangered species all those waterfowl that are endangered have been described. Point counting system was used for the monitoring of birds. Perhaps the most effective and data-rich method for bird counting was the point counting process. In forested environments or in difficult terrain it was the preferred form. At points, one of the observers will observe all of the birds seen or heard at a fixed distance in multiple points standing in one position. At a certain point, the same method was repeated several times. Points – setting of counting stations were randomly, but they were not be close together at a minimum distance of 200 m.

As a relatively large number of points were expected from each research plot, point counting was not an effective technique for small areas of analysis. Counts shall be rendered at every station for a fixed time. Each bird we saw or heard was registered. Counting was done longer than 10 minutes in areas with a very rich bird fauna or where species are hard to detect or to recognize. For equipment, we used a map, a pencil, a notebook, a watch that was used to show seconds and binoculars for the census. In the field with plastic tape or streamers the routes and points are marked on a survey map to ensure that in the coming years there are similar points. Based on the distance between points and the travel method, the time available to census

one-point count routes were typically not more than four hours a day. For field work, the number of points protocols are very different, but we preferred an unlimited distance point counting system. Each bird (no matter how far) we detected at every station in 5 minutes, by sight and by the sound. Although main focus of the study was to record Endangered bird species but we recorded all birds of the Patisar lake.

The data sheet consisted of specie name and 3 columns (0-25 meters, 25-50 meters and > 50 meters with number of birds observed) of distance and total number of a single specie observed. Each bird that has been observed was place in according to the distance, hence by this method we were able to count total number of a specific bird species observed from a single point station.

RESULTS AND DISCUSSION

Patisar lake situated at the center of Lal Suhanra National Park district Bahawalpur contain a variety of bird's biodiversity because it acts as an important wetland for the migratory birds. In this study Patisar lake has been researched to find out what species of migratory birds inhabit this lake. So, we performed a well detailed study on Patisar lake of Lal Suhanra National Park specifically that runs in the center of the park. 29°20'41.2"N and 71°56'21.0"E.

Figure 3. 1: Location map of Patisar lake

Throughout Pakistan, birds being intensively hunted as well as captured for feeding and sport decreases local populations, however the overall status of the species was considered to be stable. Non-domesticated birds have become a major component of human diets, and migratory bird numbers have been found to be declining due to predation. Dalmatian pelican (*Pelecanus crispus*), a Pakistani winter visitor, has shown a decrease in their population due to poaching and disruption. Similarly, black-headed Ibis was a seasonal and intermittent migrant to Pakistan during the year who experience extreme risk of hunting and habitat destruction, mainly through irrigation and cultivation within their habitats forage and breeding. Painted stork was Pakistan 's local winter tourist facing a pronounced decrease in population size because of over-hunting (Umar et al. 2018). The survey of Patisar lake in the mid-winter and the waterfowl populations was recorded and it has been observed that population of waterfowl population has declined drastically from the previous years. During the study and data collected from all point stations a total of 67 waterfowl population was recorded (Ahmad et al. 2020).

Result of the study indicated that these population belonging to 6 different orders, 10 different families, 18 genera and 32 different species of waterfowl. The endangered Waterfowl observed in the Patisar lake has been described in detail in the following (Table. 1). Results showed the decline in the endangered species and the population from the previous conducted by Akbar et al. (2006). Patisar lake for waterfowl population. They spent 10 years exploring Patisar lake for waterfowl population and found that waterfowl population has been decreased drastically from 1996 to 2005 in the mid-winter every year.

They found total of 10,142 waterfowl belonging to six orders which are: Podicipediformes, Pelecaniformes, Ciconiiformes, Anseriformes, Gruiformes, Charadriiformes and the families Family: Podicipedidae (*T. iruficollis* spp.), Phalacrocoridae (*Phalacrocorax iiniger* spp.; *P. carbo* spp.), Anhingidae (*Anhinga melanogaster* spp.), Ardeidae (*Ardea cinereal* spp.,*A. purpurea* spp., *Ardeola grayii* spp., *Bubulcus* ibis spp., *Egretta alba* spp., *E. Garzetta* spp., *E. intermedia* spp.), Anatidae (*Anas acuta* spp., *A. crecca* spp.,*A. platyrhynchos* spp., *A. strepera* spp., *A. Penelope* spp.,*A. clypeata* spp., *Aythya ferina* spp.,*A. fuligula* spp.,*A. nyroca* spp.), Rallidae (*Fulica atra* spp.,*Porphyrio porphyrio* spp.,*Gallinula chloropus* spp.), *Recurvirostridae (Himantopusi himantopus* spp.), Charadridae (*Vanellusi indicus* spp., *V. vanellus* spp.,*V. leucurus* spp.,*Charadrius dubius* spp.), Scolopacidae (*Tringa tetanus* spp., *T. Nebularia* spp., *Actitis hypoleucus* spp.), Laridae (*Sterna aurantia*). In agreement to present study, they observed a massive decrease in the waterfowl population. In 1996 two thousand seven hundred and forty-four waterfowl were observed but they decreased to the number of one hundred and fifty-nine in 2005. Field study between October and December 2015 at Bahawalpur National Park Lal Suhanra (LSNP) to analyze its vertebrate diversity (Mishra et al. 2021).

This research was initiated to assess the status and environmental harassment of the National Park fauna. The data were obtained by method of counting points. There were 7443 birds with 74 species belonging in the study to 35 families and described 16 orders. Seasonal birds distributed by year about 76%, 7% were breeders in summer, 4% were migrants in transients while 5% were rare and 8% winter migrants were common. The LSNP's main threats to wild animals are hunting, erosion, timber harvesting, damage of human activities and habitat destruction. Increased flows and natural reservoirs are also a significant hazard for recreational purposes. Current research habitat for the survival of this biosphere reserve special animal species should be given due attention (Khan et al. 2018; Mishra et al. 2021).

Patisar Lake as a habitat there are various types of aquatic oat habitat. The hypopycnal layer was a phenomenon consisting of a fresh water layer, floating on the saline lake water, a historically rich duck habitat. Each has a substantial and persistent fresh water influx. A big source of feed for

ducks was Patisar lake itself, where they spent much of their time in the past. Ordinary ducks including mallards, green-winged teal, and gadwalls usually eat flies. The lagoons are a valuable habitat for waterfowl, particularly those close to a source of fresh water. It forms where brackish water was kept behind sediment shores and also shelters the windy days from rough lake waters. However, open water does not tend to provide useful duck environments, other than the marshes themselves. Fresh open water provides swimming and drinking areas while marsh vegetation offers food and clothes. Besides the lake itself, riverbeds are the most important habitat for waterfowl as they also combine the ecosystems alluded to above with plenty of fresh water. Since the ducks are dependent on fresh water and do not tolerate well the salt. Hyperpycnal stratification, which by far provides the most important duck habitat on Patisar Lake (Ahmad et al. 2020).

Table 1. Population status of endangered waterfowl recorded at Patisar lake during 2019-2020.

Order	Family	Specie	0-25m	25-50m	>50m	Status
Podicipediformes	Podicipedidae	*Tachybaptus ruficollis*	0	1	3	EN
Pelecaniformes	Phalacrocoridae	*Phalacrocorax niger*	1	0	1	EN
		Phalacrocorax carbo	2	1	0	EN
	Anhingidae	*Anhinga melanogaster*	1	2	1	EN
Ciconiiformes	Ardeidae	*Ardea cinerea*	0	3	1	EN
		A. purpurea	1	0	2	EN
		Ardeola grayii	1	1	2	EN
		Bubulcus ibis	0	1	3	EN
		Egretta alba	1	1	2	EN
		E. garzetta	1	0	1	EN
		E. intermedia	1	1	3	EN
Anseriformes	Anatidae	*Anas acuta*	0	0	2	EN
		A. crecca	1	1	2	EN
		A. platyrhynchos	2	2	1	EN
		A. strepera	0	2	2	EN
		A. Penelope	1	1	3	EN
		A. clypeata	0	1	2	EN
		Aythya ferina	1	2	0	EN
		A. fuligula	3	2	1	EN
		A. nyroca	1	1	2	EN
Gruiformes	Rallidae	*Fulica atra*	2	3	2	EN
		Porphyrio porphyrio	0	1	2	EN
		Gallinula chloropus	0	2	1	EN
Charadriiformes	Recurvirostridae	*Himantopus himantopus*	1	1	3	EN
	Charadridae	*Vanellus indicus*	2	1	1	EN
		V. vanellus	1	2	2	EN
		V. leucurus	3	1	3	EN
		Charadrius dubius	1	2	1	EN
	Scolopacidae	*Actitis hypoleucus*	2	1	2	EN
		Tringa tetanus	2	2	1	EN
		T. nebularia,	1	1	1	EN
	Laridae	*Sterna aurantia*	3	1	1	EN
Total	10	32	36	41	54	

CONCLUSION

The findings of the present study determine that in the Patisar lake of Lal Suhanra National Park of Bahawalpur a total population belonging to 6 different orders, 10 different families, 18 genera and 32 different species of waterfowl. They all preferred fresh water layer of the lake and marshes near the lake as their habitat. It was concluded that Patisar lake was a prodigious natural resource for the migratory waterfowl and decline occurred with time.

Conflict of Interests: Authors declare no conflict of

interests to disclose.

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