Abundance and diversity of threatened birds in Nangal Wetland, Punjab, India

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Abstract: Anthropogenic threats to wetland ecosystems, including discharge of industrial effluents, municipal sewerage, land reclamation, erosion and deforestation, have contributed to the rapid declines in populations of many bird species. The present study aimed to document avian diversity, including birds on the IUCN Red List, at Nangal Wetland, Punjab from February 2013 to January 2015. A total of 155 species belonging to 48 families (resident and migratory) under 17 orders were recorded, of which 13 come under various IUCN Red List categories: one ‘Endangered’—Egyptian Vulture Neophron percnopterus; five ‘Vulnerable’—Common Pochard Aythya ferina, Greater-Spotted Eagle Aquila clanga, Sarus Crane Grus antigone, Lesser White-Fronted Goose Anser erythropus, and Woolly-necked Stork Ciconia episcopus; and seven ‘Near Threatened’—Ferruginous Duck Aythya nyroca, River Lapwing Vanellus duvaucelli, Indian River Tern Sterna aurantia, Painted Stork Mycteria leucocephala, Oriental Darter Anhinga melanogaster, Blossom-headed Parakeet Psittacula roseata, and Alexandrine Parakeet Psittacula eupatria. The Shannon-Weaver index of diversity was highest during winter (H' = 1.9) followed by autumn (H' = 1.9) then spring (H' = 1.5), and was lowest during summer (H' = 1.4). Though this wetland is highly productive and provides homes to many threatened species, untreated industrial effluents from adjoining areas sometimes create problems. The discharge of pollutants should be stopped through strict enforcement of environmental laws and policies.

Keywords: Avifauna, conservation, IUCN Red List.
INTRODUCTION

Wetlands are important bird habitats (Mitsch & Gosselink 1986; Guadagnin et al. 2005) that provide suitable breeding, staging, and wintering grounds for a wide array of migratory birds (Kristen & Brander 1991). Wetland with multiple sub-habitats or micro habitats attract diverse species of waterbirds. Being ecologically important with high nutritional value and productivity, wetlands support a good diversity of birds (Gibbs 1993; Paracuellos 2006).

It might be predicted that migratory species are more likely to be threatened because they are dependent on different sites and habitats during breeding and non-breeding seasons. A threat operating in just one of these areas could have a severe impact (Salathe 1991). Several studies suggest that habitat destruction is one of the prime reasons for the decline of birds. For instance, it was reported that over 90 % of globally threatened birds and 86 % of other bird species are facing a serious threat mainly due to habitat degradation (Kauzeni & Kiwasila 1994; Kideghesho et al. 2006). Information on status and distribution of threatened and endemic birds, therefore, aids in prediction of disturbance level and execution of conservation measures at all potential sites where they occur (Stattersfield et al. 1998; Riley 2002; Robin & Sukumar 2002). In 2000, the ‘Threatened Birds of the World’, which listed 1,186 species worldwide and 123 species in India (BirdLife International 2000).

Restricted range and threatened bird species require special attention from ecologists and conservationists. These species are more sensitive to disturbance and invite immediate conservation concern (BirdLife International 2001; Lei et al. 2003, 2007; Wijesinghe & Brooke 2005; Pandit et al. 2007). The present article documented the threatened and near-threatened bird species recorded at Nangal wetland to provide information about the current distribution and status of bird species as baseline data where future population trends can be compared.

MATERIAL AND METHODS

Study Area

Nangal Wetland is (Figure 1) (31.404°N & 76.368°E) located in Ropar District over the Sutlej River at 357m (1172ft). It spreads over an area of 700 acres and is enriched with diverse flora, fauna and hydrology. This wetland was created in the downstream of Bhakhra Reservoir for its strategic importance as balancing reservoir to adjust the extra water during the rainy season. The water of Nangal wetland is used for drinking and irrigation purposes. This wetland is important for socio-economic, ecological, hydrological and recreational values. This unique wetland ecosystem attracts thousands of migratory birds during winter season every year for feeding and also provides suitable feeding and breeding grounds for resident birds. However, it is very important to document its various components of biodiversity and its conservation needs and management measures due to its strategic importance (PSCST 1994). It was announced as a wetland of national importance by the Ministry of Environment, Forests & Climate Change, Government of India in January, 2008 and included it under the National Lake Conservation Program. It was also declared as a wildlife sanctuary on 10 August 2009. In 2020, Nangal wetland was declared as a Ramsar site. The study area experiences various seasons and broadly divided into spring (March, April, May), summer (June, July, August), autumn (September, October, November), and winter (December, January, February) seasons.

The study on avifaunal diversity at Nangal Wetland was conducted from February 2013 to January 2015. The point count method (Sutherland 1999) was used for the census of birds at the study sites. The study was undertaken by establishing 15 counting stations of 50 m radius each in the study area with 100 m intervals between two counting stations to cover the whole wetland area. Data were collected every month during winter season for five days per month and twice a day from 0700 h to 1000 h and 1600 h to 1800 h and during the summer season from 0600 h to 0900 h and 1700 h to 1900 h. The observer waited for a few minutes after arrival at each station before beginning the count. The bird count was carried out for ten minutes at each station. Each bird was counted once either seen or heard within the radius. Average count of birds at each station for five days was calculated. Identification has been done with the help of various field guides (Ali & Ripley 1987; Grewal et al. 1995; Ali 1996; Grimmett et al. 2001; Kazmierczak 2002). Shannon diversity index \((H')\) (Shannon & Weaver 1949) was calculated by using PAST (PAST: Paleontological Statistics) Software.
RESULTS AND DISCUSSION

Nangal wetland harbours a significant number of threatened bird species, belonging to different categories of the IUCN Red List. During this study, a total of 155 bird species were recorded (Table 1). Of these, 13 species belonging to seven orders and eight families were in the globally threatened category of IUCN (Table 2). According to the IUCN Red List of birds (IUCN 2018), 7.7 % were EN (n= 1), 39 % were VU (n= 5) and 54 % were NT (n= 7) (Figure 2). The ‘Endangered’ species recorded from this wetland was Egyptian Vulture Neophron percnopterus; ‘Vulnerable’ species included Common Pochard Aythya ferina, Greater-Spotted Eagle Aquila clanga, Sarus Crane Grus antigone, Lesser White-Fronted Goose Anser erythropus, and Woolly-necked Stork Ciconia episcopus. The ‘Near Threatened’ species included Ferruginous Duck Aythya nyroca, River Lapwing Vanellus duvaucelli, Indian River Tern Sterna aurantia, Painted Stork Mycteria leucocephala, Oriental Darter Anhinga melanogaster, Blossom-headed Parakeet Psittacula roseata, and Alexandrine Parakeet Psittacula eupatria.

Narayanan et al. (2011) recorded a total of 225 species of birds from Kuttanad wetlands inclusive of 10 Red Listed species, namely, Greater Spotted Eagle Clanga clanga, Ferruginous Pochard Aythya nyroca, Painted Stork Mycteria leucocephala, Oriental White Ibis Threskiornis melanoccephalus, Spot-billed Pelican Pelecanus philippensis, Oriental Darter Anhinga melanogaster, Greater-headed Fish Eagle Haliaeetus ichthyaetus, Black-tailed Godwit Limosa limosa, Eurasian Curlew Numenius arquata, and European Roller Coracias.
garrulous.

Some wetlands in Punjab are highly infested with unwanted weeds mostly *Eichhornia crassipes* which covers the entire surface area. But Nangal wetland does not support these weeds and provide plenty of space for migratory birds during winter season. Presence of 155 bird species in the Nangal wetland indicates that the area is able to give ecological security to the wetland dependent birds by providing sufficient quantity of food in the form of microflora (aquatic planktonic species, *e.g.*, *Fragillaria* spp., *Spirogyra* spp., *Oedogonium* spp., *Tabellaria* spp., *Cymbella* spp., *Gomphnema* spp.), mesoflora (aquatic vegetations, *e.g.*, *Lemna* spp., *Valisneria* spp., *Azolla* spp., *Pistia* spp.), microfauna (small microscopic animals), and mesofauna (fish, insects, and small animals) in the wetland. Besides these, resident birds were observed throughout the year due to the availability of favorable conditions for breeding, feeding, roosting, and nesting sites. This wetland not only attracts water birds, but is also favorable and rewarding spot for terrestrial birds. The occurrence of high number of terrestrial birds could be due to strong influence of vegetation cover and presence of varieties of microhabitats which provide niche to large numbers of terrestrial birds.

In the present investigations, birds were classified on the basis of their occurrence at the study area, of the 13 Red Listed species, three were migratory, eight were local migratory and two were residents. Similarly, birds were also classified on the basis of their feeding habits, it was observed that three species were herbivorous, four were omnivorous and six were carnivorous. Chaudhry et al. (2012) study on threatened and near-threatened avifauna of Pakistan recorded 16 species inclusive of resident and migratory species. Of the total recorded species, nine were ‘Near Threatened’, one ‘Endangered’, and one ‘Critically Endangered’.

The mean value and standard deviation of occurrence of monthly birds count were calculated. A well-marked seasonal variation in bird populations was recorded (Table 3). Generally the population of waterbirds started increasing from August to January, with a peak in month of December and January and thereafter started decreasing. During the present study, a sharp decline in the waterbirds count was observed after the month of February due to the partial departure of migratory species. Almost complete absence of migratory waterbirds was noticed from April to July during both years, only local resident birds reside during the remaining months. Highest diversity in winter months was attributed to the influx of migratory waterbirds during this season. Least diversity in the summer months was due to the absence of migratory waterbirds species. Similar observations of seasonal variations were also made by Saxena (1975) on avifauna of Keoladeo National Park, Bharatpur and Bhat et al. (2009) on avifauna of Anekere wetland, Karnataka. Giri & Chalise (2008) also recorded a greater diversity in winter months due to the addition of migratory birds in this season. Kershaw & Cranswick (2003) studied waterbirds become highly mobile in winter season as living conditions rendered unfavorable during this cold weather. The waterbirds start moving to other areas in response to hostile weather conditions such as changes in water levels and diminishing availability of food.

In order to investigate the variations in diversity of bird species and ecological groups during different seasons of the study period, the species diversity was calculated using Shannon-wiener index. The Shannon-Weaver index of diversity was highest during winter ($H' = 1.915$) followed by autumn ($H' = 1.868$) then spring ($H' = 1.534$) and was lowest during summer season ($H' = 1.436$). Value of index during autumn and winter seasons had revealed the greatest diversity in terms of both species richness and evenness. Gerritsen et al. (1998) revealed that the increase in the value of $H'$ is directly associated with the increase in the number and distribution of species during favorable periods (biotic diversity) within the community, thereby confirming the present observations.
Table 1. Check list of birds recorded from Nangal Wetland.

| Zoological name | Common name |
|-----------------|-------------|
| **Order: Anseriformes** | |
| Family: Anatidae | |
| 1. Anas poecilorhyncha (J.R. Forester, 1781) | Indian Spot-billed Duck |
| 2. Anas strepera Linnaeus, 1758 | Gadwall |
| 3. Aythya ferina (Linnaeus, 1758) | Common Pochard |
| 4. Netta rufina (Pallas 1773) | Red-crested Pochard |
| 5. Aythya nyroca (Golenstadt, 1770) | Ferruginous Duck |
| 6. Anas platyrhynchos Linnaeus, 1758 | Mallard |
| 7. Tadorna ferruginea (Pallas, 1764) | Ruddy Shelduck |
| 8. Tadorna tadorna (Linnaeus, 1758) | Common Shelduck |
| 9. Anser indicus (Latham, 1790) | Bar-headed Goose |
| 10. Anser anser (Linnaeus, 1758) | Graylag Goose |
| 11. Anser erythropus (Linnaeus, 1758) | Lesser White-fronted Goose |
| 12. Anas acuta (Linnaeus, 1758) | Northern Pintail |
| 13. Anas crecca Linnaeus, 1758 | Northern Shoveller |
| 14. Anas poecilorhyncha (J.R. Forester, 1781) | Indian Grey Hornbill |
| 15. Anas querquedula Linnaeus, 1758 | Garganey |
| 16. Aythya fuligula (Linnaeus, 1758) | Tufted Duck |
| 17. Anas penelope Linnaeus, 1758 | Ferruginous Duck |
| 18. Sarkidiornis melanotos (Pennant, 1769) | Knob-billed Duck |
| **Order: Ciconiiformes** | |
| Family: Ardeidae | |
| 19. Accipiter badius (Linnaeus, 1758) | Shikra |
| 20. Milvus migrans (Boddart, 1783) | Black Kite |
| 21. Elanus caeruleus (Desfontaines, 1788) | Black-winged Kite |
| 22. Aquila rapax (Temminck, 1828) | Tawny Eagle |
| 23. Aquila pomarina (Brehm CL, 1831) | Lesser-spotted Eagle |
| 24. Aquila clanga Pallas, 1811 | Greater-spotted Eagle |
| 25. Aquila nipalensis Hodgson, 1833 | Steppe Eagle |
| 26. Pandion haliaetus (Linnaeus, 1758) | Osprey |
| 27. Circus aeruginosus (Linnaeus, 1758) | Western Marsh Harrier |
| 28. Accipiter nisus (Linnaeus, 1758) | Asian Sparrowhawk |
| 29. Haliastur indus (Boddart, 1873) | Brahminy Kite |
| 30. Neophron percnopterus | Egyptian Vulture |
| **Order: Columbiformes** | |
| Family: Columbidae | |
| 31. Vanellus indicus (Boddart, 1873) | Red-wattled Lapwing |
### Birds in Nangal Wetland, Punjab

#### Order: Coraciiformes
**Family: Alcedinidae**
- 64. *Alcedo atthis* (Linnaeus, 1758) Small Blue Kingfisher

#### Order: Falconiformes
**Family: Aquilidae**
- 61. *Haliartus leucorhynchos* (Linnaeus, 1758) Grey Goshawk

#### Order: Passeriformes
**Family: Fringillidae**
- 87. *Prunella modularis* (Linnaeus, 1758) Chaffinch
- 88. *Carduelis spinus* (Linnaeus, 1758) Redpoll
- 89. *Carduelis sericata* (Austen, 1893) Siskin
- 90. *Carduelis hoffmanni* (Cabanis, 1850) Common Greenfinch
- 91. *Carduelis chloris* (Linnaeus, 1758) Greenfinch

#### Order: Charadriiformes
**Family: Charadriidae**
- 62. *Calidris alpina* (Linnaeus, 1758) Snow Bunting
- 63. *Calidris ferruginea* (Linnaeus, 1758) Rufous-Necked Stint

#### Order: Gruiformes
**Family: Gruidae**
- 73. *Grus grus* (Linnaeus, 1758) Grey Heron

#### Order: Anseriformes
**Family: Anatidae**
- 74. *Mergus merganser* (Linnaeus, 1758) Smew
- 75. *Mergus stagnalis* (Linnaeus, 1758) Common Pochard

#### Order: Galliformes
**Family: Phasianidae**
- 76. *Phasianus colchicus* (Linnaeus, 1758) Red Grouse
- 77. *Phasianus colchicus* (Linnaeus, 1758) Grey Francolin
- 78. *Phasianus colchicus* (Linnaeus, 1758) Green Francolin

#### Order: Columbiformes
**Family: Columbidae**
- 79. *Columba livia* (Linnaeus, 1758) Rock Dove
- 80. *Columba palumbus* (Linnaeus, 1758) Rock Dove

#### Order: Coraciiformes
**Family: Coraciidae**
- 81. *Burhinus oedicnemus* (Linnaeus, 1758) Squacco Heron

#### Order: Cuculiformes
**Family: Cuculidae**
- 82. *Cuculus canorus* (Linnaeus, 1758) Cuckoo
- 83. *Cuculus saturatus* (Linnaeus, 1758) European Nightjar

#### Order: Gruiformes
**Family: Rallidae**
- 84. *Porzana arundinacea* (Linnaeus, 1758) Common Snipe
- 85. *Porzana pugnax* (Linnaeus, 1758) Pintail Snipe

#### Order: Anseriformes
**Family: Anatidae**
- 86. *Anas crecca* (Linnaeus, 1758) Mallard
- 87. *Anas platyrhynchos* (Linnaeus, 1758) Common Pintail

#### Order: Phasianidae
**Family: Phasianidae**
- 88. *Phasianus colchicus* (Linnaeus, 1758) Grey Francolin
- 89. *Phasianus colchicus* (Linnaeus, 1758) Green Francolin

#### Order: Anseriformes
**Family: Anatidae**
- 90. *Anas platyrhynchos* (Linnaeus, 1758) Common Pintail
- 91. *Anas crecca* (Linnaeus, 1758) Mallard
Brief Account of the IUCN Red Listed Species at Nangal Wetland

1. Lesser White-Fronted Goose *Anser erythropus* (VU)
   This migratory species was rarely sighted and only a single individual of this species was recorded at this wetland in the month of January, 2015.
   This is a vagrant species to northern India and generally found in islands, on foothills and mountain lakes. This species feeds mainly on plant matter, such as grass, moss, and seeds (Grimmett et al. 2001). Therefore, this wetland ensures the basic requirements of Lesser White-Fronted Goose and considered as suitable place for this bird.

2. Common Pochard *Aythya ferina* (VU)
   This species was mainly found in open water with submerged and emergent vegetation at Nangal wetland.

3. Ferruginous Duck or White-eyed Pochard *Aythya nyroca* (NT)
   This species is chiefly migratory and forms a small contributor to the duck population. During the entire study period it occurred in small numbers. This duck remains hidden in the patches of *Typha angustifolia*. This wetland meets the basic characteristics of a habitat preferred by the Ferruginous Duck, i.e., floating, submerged vegetation, and shallow marshy areas.

### Zoological name | Common name
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121. *Tersiphone paradisi* | Asian Paradise Flycatcher
122. *Ficedula westermanni* (Sharpe, 1888) | Little Pied Flycatcher
123. *Eumyias thalassinus* (Swainson, 1838) | Verderer Flycatcher
124. *Oriolus oriolus* (Linnaeus, 1758) | Golden Oriole
125. *Parus major* (Linnaeus, 1758) | Great Tit
126. *Passer domesticus* (Linnaeus, 1758) | Indian House Sparrow
127. *Pitta brochyrus* (Linnaeus, 1766) | Indian Pitta
128. *Placeus philipinus* (Linnaeus, 1766) | Weaver Bird
129. *Placeus benghalensis* (Linnaeus, 1758) | Black-breasted Weaver
130. *Placeus manyor* (Horsfeld, 1821) | Streaked Weaver
131. *Pycnonotus cafer* (Linnaeus, 1766) | Red-Vented Bulbul
132. *Pycnonotus leucotis* (Gould, 1836) | White-Eared Bulbul
133. *Rhipidura albicollis* (Vieillot, 1818) | White-Throated Fantail
134. *Sturnus pagodarum* (Gmelin, 1789) | Brahminy Starling
135. *Acidotheres tristis* (Linnaeus, 1766) | Common Myna
136. *Acidotheres ginginianus* (Latham, 1790) | Bank Myna
137. *Sturnus contra* Linnaeus, 1758 | Asian Pied Starling
138. *Turdoides striatus* (Dumont, 1823) | Jungle Babbler
139. *Turdoides caudatus* (Dumont, 1823) | Common Babbler
140. *Turdoides earlei* (Blyth, 1844) | Striated Babbler
141. *Chrysoma sinense* (Gmelin, 1789) | Yellow Eyed Babbler
142. *Nectarinidae*
143. *Nectarinia asiatica* (Latham, 1790) | Purple Sunbird
144. *Zosteropidae*
145. *Zosterops palpebrosus* (Temminck, 1824) | Indian White-Eye
146. *Megalaimidae*
147. *Megalaima haemacephala* (Status Muller, 1776) | Crimson-breasted Barbet
148. *Sturnidae*
149. *Dicaeum agile* (Tickell, 1833) | Thick-billed Flowerpecker
150. *Nectarinia asiatica* (Latham, 1790) | Common Hoopoe
151. *Megalaima zeylanica* (Gmelin, JF, 1788) | Large Green Barbet
152. *Megalaima haemacephala* (Statius Muller, 1776) | Crimson-breasted Barbet
153. *Psittaciformes*
154. *Psittacula krameri* (Scopoli, 1769) | Roseringed Parakeet
155. *Psittacula cyanocephala* (Linnaeus, 1766) | Plum Headed Parakeet
156. *Psittacula roseata* Biswas, 1951 | Blossom-headed Parakeet
157. *Upupa epops* Linnaeus, 1758 | Common Hoopoe

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ducks leave the site by April end.

4. River Lapwing *Vanellus duvaucellii* (NT)

The River Lapwing is a shore bird and its preferred habitats include shallower areas (Ali 1996). This wetland fulfills its habitat requirements as well as food and feeding habitat. They make nests on sand banks and forage mainly on ground.

5. Indian River Tern *Sternula aurantia* (NT)

This species locally migrates during the winter season and found in the study area during winter months only. It arrived in August to September. It was found in the range of 2–6 individuals during different months of the winter season.

6. Painted Stork *Mycteria leucocephala* (NT)

Painted Storks locally migrate along with other water birds. They arrived in the study area during September and left the area by March and mid April. Painted Storks are colonial nesting species and build their nests on trees in small islands situated in Nangal wetland. Nests were made of dry branches and twigs of plants.

7. Oriental Darter *Anhinga melanogaster* (NT)

It occurs at Nangal wetland due to roosting, feeding and breeding habitats provided by the wetland. It is found in the range of 1–10 individuals during different months of the year.

8. Sarus Crane *Grus antigone* (VU)

It is a resident bird of India but locally migrates to different localities subject to the availability of feeding and nesting habitats. During winter season, it prefers the nearby grasslands in the study area which provide nesting site for Sarus Crane. Their nests were located in shallow water where short emergent vegetation was dominant. Two adult pairs were seen in the surrounding area of Nangal wetland.

9. Woolly-necked Stork *Ciconia episcopus* (VU)

The Woolly-necked Stork is a widespread tropical species, which breeds in Africa and in Asia from India to Indonesia (Ali & Ripley 1987). It migrates locally in the winter season in India. It is observed that this bird stands calmly in an isolated shallow bank of the wetland and abruptly pounced upon the fishes and other small organisms in the water. Only a pair of this species was recorded at study area during January 2015.

10. Greater-Spotted Eagle *Aquila clanga* (VU)

Mainly a winter visitor, it was spotted in the wetland during the month of August and finally left the wetland completely by the end of March or mid April. Presence of feeding and roosting sites, i.e., large trees (e.g., *Acacia catechu, Acacia nilotica, Dalbergia sissoo, Eucalyptus globules, Ficus religiosa, Ficus benghalensis, Mangifera indica*), stumps of broken trees, crevices in the Shiwalik Hills largely attract this bird. It was seen in the range of 1–4 individuals during different months of the two-year period.

11. Egyptian Vulture *Neophron perenopterus* (EN)

It is a resident species and spotted mainly on large trees (*Acacia catechu, Acacia nilotica, Dalbergia sissoo, Eucalyptus globules, Ficus religiosa, Ficus benghalensis, Mangifera indica*) adjoining this wetland. Egyptian Vultures feed upon animal carcasses nearby this wetland. It was found in the range of 2–5 individuals during different months of the years.

12. Alexandrine Parakeet *Psittacula eupatria* (NT)

Alexandrine Parakeet is a local migratory species and found in maximum number during the winter months. Its preferred habitat is forested area where it lives in holes of dry trees, thick canopy of shady trees, and hill crevices. This area also provides a variety of food (i.e. plant buds, fruits, figs, berries), safe nesting and roosting sites. Maximum of 30–32 individuals were seen in the month of January 2014.

13. Blossom-headed Parakeet *Psittacula roseata* (NT)

Its preferred habitats were the open woodland and forested areas; generally found in flocks of 10–12. Its occurrence in the study area concluded that the area provides favorable conditions for breeding, feeding, and nesting purposes.

In the present study, the diversity of birds reflects that most of the species were observed mainly due to the availability of various types of microhabitats used by different species of birds. Each of these microhabitats (e.g., beneath the boulders, large stones, pebbles, and submerged vegetation) was supported with a variety of food such as fishes, crustaceans, mud-dwelling invertebrates, aquatic plants, and plankton. Unfortunately, it is observed that these organisms are on declining spere due to fragmentation of habitats caused by reclamation. During the last five decades, rampant deforestation has occurred in the catchment area of the wetland – hills were denuded which cause the silting up of the wetland. The silitation ultimately reduces the depth as well as water carrying capacity of the wetland.

Besides fragmentation of habitats, other anthropogenic activities like discharge of effluents from adjoining industries (National fertilizer limited; PACL), domestic sewage from Nangal township, rampant deforestation in the catchment area, silitation, and tourism pose a major threat to its existence. The discharge of pollutants should be stopped by strictly enforcing stringent environmental legislations of the
nation. Awareness should be created amongst the local people towards conservation and to understand the importance of such diverse avifauna existing in this wetland.

**CONCLUSIONS**

This study provides an ornithological baseline data of Red Listed species of the wetland for researchers and general public. It will also provide an opportunity to compare trends of population of these birds in future. Therefore, it is recommended that the sites, where threatened bird species were recorded should be monitored regularly in future especially during midwinter waterfowl counts.

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