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# CHANGES IN THE AVIFAUNA OF THE WETLANDS OF DISTRICT SANGHAR, SINDH, PAKISTAN

**Muhammad Rais, Darakhshan Abbass, Muhammad Zaheer Khan, Iqbal Saeed Khan, Syed Ali Ghalib, Fozia Tabbassum, Ghulam Akber, Rab Nawaz**

**Abstract.** Present study was undertaken to collect the qualitative data on the avifaunal diversity associated with the wetlands of district Sanghar, Sindh, Pakistan. The data was compared with the past available records. It was found that species composition has changed over a period of a decade. Forty four new records of bird species were found in the area while thirty four previously recorded species were not observed. Nine more notable wetlands were identified that had been created due to seepage from water storage reservoir and irrigation canals. Hunting, new developments and overexploitation are the major factors involved in the change of species composition.

**Key words:** fauna, waterbirds, species composition, wintering, migration, conservation.

**Address:** M. Rais, Department of Wildlife Management, PMAS Arid Agriculture University, Rawalpindi, Pakistan; e-mail: sahil@uaar.edu.pk.

**Изменения авифауны водно-болотных угодий округа Сангар (Синд, Пакистан). - М. Раис, Д. Аббас, М.З. Хан, И.С. Хан, С.А. Галиб, Ф. Таббассум, Г. Акбер, Р. Наваз. - Беркут. 17 (1-2). 2008.** - Данные, собранные в 2006–2008 гг., сравниваются с результатами предыдущих исследований. Фауна птиц за десятилетие изменилась: обнаружены 44 новых вида, 34 из отмечавшихся ранее не зарегистрированы. Появились 9 новых водно-болотных угодий вследствие инфильтрации воды из водохранилищ и ирригационных каналов. Основные факторы, вызвавшие изменения авифауны, – охота, хозяйственная деятельность и переэксплуатация.

## INTRODUCTION

The province of Sindh is located between 65° 05′ to 71° 05′ latitude in the North and 22° 05′ to 27° 05′ longitude in the East and covers an area of 140,903,59 km$^2$. Sindh's natural endowments consist mainly of fisheries, livestock, industry, poultry and agriculture. Out of the total nineteen Ramsar Sites (1,343,627 ha) of Pakistan, ten (with a combined area of 1,230,257 ha) are located in Sindh Province. Every year, during the migratory season, over one million of water birds belonging to 108 species visit wetlands of Sindh. Furthermore, 329 species of birds have been recorded from Indus Delta Eco-region alone (Khan, 2005).

District Sanghar has many important wetlands of different types such as freshwater lakes, temporary ponds, water storage reservoirs, irrigation canals etc. (Photo 1–6). However, only few of them such as Nara Canal, Soonehri Lake, Sanghriaro Lake, Sadhori Lake and Bakar Lake have been studied to some extent (Leghari et al., 1999, 2004; Mahar et al., 2007).

A dearth of literature is available regarding wetlands and its associated wildlife of the Sindh Province (Murray, 1884; Ahmed, 1954; Amjad, Kidwai, 2000). Unfortunately, the wetlands of Sanghar district and their associated avifauna have not been studied in detail. However, water quality and other vertebrates have been documented (Ahmed, 1985; Leghari et al., 1999, 2004; Azam, 2002; Javed, Rehman, 2004; Gachal et al., 2007; Mahar et al., 2007). Nonetheless, some work regarding bird diversity of the Chotiari reservoir is of great value for the comparison (Scot, 1989; Roberts, 1991, 1992; Ghalib et al., 1999). Present study was, therefore, designed to collect baseline data regarding some important wetlands of the district and their associated avifauna, and to compare it with the past studies to determine if there has been any change in the avifauna of the area.

## MATERIALS AND METHODS

### Study Site

In 1953 Sanghar was given the status of a district of province Sindh. The district comprises of six sub-districts viz Sanghar, Shahdadpur, Tando Adam, Khipro, Jam Nawaz Ali

Photo 1. Nara Canal.

Photo 2. Nara Canal.

and Sinjhoro. The district Sanghar is divided into two broad parts, a green belt in the West and Desert in the East. The main Nara Canal is dividing line of the two parts. The desert comprises of sandy dunes in the eastern part of Sanghar and Khipro sub-division.

Hot arid climate prevails in the district. Average maximum daily temperature may exceed 40°C during May and June. The coolest months are December to February, when the maximum daily temperatures range from 25 to 30°C. Rainfall is sparse and erratic mostly occurs between July and August with an average of 40 mm monthly. Annual average rainfall is about 125 mm. Floods are common in monsoon season creating numerous temporary water bodies.

All the wetlands of district Sanghar lie within a same biogeographic province (Code No.1.4.15) i.e. Thar Desert of Indomalayan Realm (Udvardy, 1975). Nara Canal, Chotiari Resevoir, Sanghriaro Lake, Sadhori Lake and Bakar Lake are important of all the wetlands of the district. Seepage from Nara Canal and Chotiari Resrevoir has resulted into the formation of several other wetlands. Hence, most of these lakes are brackish with muddy bottom. These are infested with abundant *Typha*, *Tamarix*, *Phragmites* and *Saccharum* species. All the wetlands are playing a common function of ground water recharge and flood water storage. Water from the reservoir and Nara Canal is also being used as a source of water for human consumption, livestock and agriculture. These wetlands, all together, offer excellent wintering grounds for migratory birds, particularly ducks and shorebirds.

Nara Canal area (Photo 1, 2) consists of chain of small, permanent and seasonal, freshwater, brackish and saline lakes and marshes. Seepage from this canal has resulted into the formation of hundreds of lakes of less than 200 ha in area. Most of these are fresh water supporting extensive growths of aquatic vegetation, while others are saline and almost devoid of vegetation. Many dry out completely during winter and early spring (Scott, 1989). Nara Canal originates from Sukkar barrage and passes from Khairpur, Sanghar upto Tharparker district.

Chotiari reservoir (Photo 3, 4) was created in a natural depression along the left bank of the Nara Canal. Its construction began in1994 and was completed in 2003. The Chotiari reservoir was designed to store the flood water of River Indus during the flood season (June to September) and to release it as required in the winter (December to March) or early summer (April to June) season for agriculture. There are depressions and dhands (lakes) in the area that are filled up with rain water and seepage from the Lower Nara Canal as well as the surplus water of Nara Canal. The largest dhands are Bakar and Makhi reaching a depth of 45 feet in places. The aquatic feature of the reservoir comprises of numerous small

Photo 3. Chotiari reservoir inlet (Ranto canal area).

Photo 4. Chotiari reservoir outlet (Bakar lake area).

and large sized (1–200 ha) fresh and brackish water lakes such as Gun, Wari, Jajur, Phuleil, Seri and Sao Naro, Khor, Jadpur, Meena, Waguwala, Sanjaran, Bholo and Soonehri Lake. Chotiari reservoir is provided with water through Ranto Canal. Water from the reservoir is being supplied to Umer Kot, Mir Pur Khas, Khipro, and Tando Mitha Khan.

Sanghriaro Lake is a shallow water saline lake with muddy bottom. It is an important wintering area for coots, ducks and shorebirds Between 15,000 and 27,000 Anatids and coots were present in mid-winter in the mid 1970s. Waterfowl censuses in January 1987 and January 1988 produced totals of 6,850 and 10,900, respectively (Scott, 1984). Sadhori Lake is a freshwater lake with numerous associated marshes and extensive reed-beds. It has relatively little open water. It is an area of outstanding scenic beauty. Scott (1989) reported several uncommon species such as Black Stork (*Ciconia nigra*) and White-eyed Pochard (*Aythya nyroca*).

**Study Design**

The wetlands and their catchments (2 km area around each wetland) areas were regularly visited during all the seasons (i.e. spring, summer, autumn and winter) of the year (at least once) from January 2006 to January 2008. Information about the wetlands was collected as per Ramsar Information Sheet, 2006–2008. Secondary information was collected from locals and published literature. Presence/

Photo 5. Padhrio lake.

Photo 6. Kharor lake.

Table 1

Summary of basic information on some notable wetlands of district Sanghar
Основные сведения о некоторых известных водно-болотных угодьях Сангара

| Name | Coordinates | Type | Area | Economic/ Social Value | Threats |
|---|---|---|---|---|---|
| 1. Nara Canal Area (series of numerous small wetlands) | 26° 00' – 27° 15' N 68° 47' – 69° 18' E | Majority are Freshwater | Unknown | Subsistence fishing. Water for drinking and agriculture | Seepage |
| 2. Chotiari reservoir (collection of several lakes) | 26° 01' N , 69° 04' E | Freshwater | Unknown | Subsistence fishing, Rangelands. Important wintering area for waterfowl | Seepage, Hunting, Unsustainable fishing practice, Overgrazing |
| 3. Sanghriaro Lake | 26° 07' N, 69° 12' E | Brackish | > 400 ha | Subsistence fishing. Important wintering area for waterfowl | Hunting |
| 4. Sadhori Lake | 26° 12' N, 69° 07' E | Freshwater | Unknown | Subsistence fishing. Water for drinking and agriculture | Seepage, Hunting, Unsustainable fishing practice |
| 5. Bakar Lake | 26° 06' N, 68° 10' E | Freshwater | > 1000 ha | Subsistence fishing | Unsustainable harvesting of fish stock, seepage from the reservoir is affecting its water quality |
| 6.Padhrio (inside reservoir) | 26° 11' N, 69° 09' E | Freshwater | >1000 ha | Important wintering area for *F. atra*, *A. crecca*, *A. ferina*, *Ph. carbo* (authors observed *A. ferina*, *A. crecca* and *F. atra* as early as December when there were no ducks on other lakes except Tul lake) | None |
| 7. Tul Lake | 26° 10' N, 69° 13' E | Brackish | > 160 ha | Important wintering area for ducks particularly (authors observed *A. ferina*, *A. clypeata* and *A. crecca* as early as December when there were no ducks on other lakes except Padhrio) | Eutrophication |
| 8. Dogrion Lake | 26° 04' N, 69° 08' E | Brackish | > 150 ha | Ideal for shorebirds such as *T. nebularia*, *T. totanus* which arrived here in late autumn (October). *A. crecca* overwinter here as late as March | Periodic drying |
| 9. Noonghno Lake | 26° 05' N, 69° 12' E | Brackish | > 50 ha | Important for resident *T. ruficollis* and *Ph. niger* | Hunting, Periodic drying |
| 10. Kharor Lake | 26° 07' N, 69° 13' E | Brackish | >10 ha | Important wintering area for *F. atra*, *A. acuta*, *N. rufina* and *A. penelope* | Excessive algal growth |
| 11. Punihal Lake | 26° 05' N, 69° 12' E | Brackish | > 150 ha | Important for *T. ruficollis*, *F. atra* and shorebirds species | – |
| 12. Rarr lake | 26° 05' N, 69° 14' E | Brackish | Unknown | Important wintering area for waterfowl. Subsistence fishing | Periodic drying |
| 13. Sareji lake | 26° 01' N, 69° 13' E | Brackish | Unknown | Excellent for resident birds *P. porphyrio*, *G. chloropus*, *A. phoenicurus* and *A. ginginianus* | Eutrophication, excessive organic matter |
| 14. Ithpar lake | 26° 00' N, 69° 10' E | Freshwater | Unknown | Supports population of *A. crecca*, *E. alba* and gulls | – |

absence of the bird species was established through area searches by using binoculars (10 x 50) and spotting scope (15 x 60). Birds were identified by using Field Guide to the Birds of Pakistan by Mirza (2007).

## RESULTS

The district Sangahr was found to be rich in wetlands, however the significant wetlands were Chotiari reservoir, Nara Canal Area, Sanghriaro Lake, Sadhori Lake and Bakar. Nine more notable wetlands were identified (Table 1).

In the present study 136 bird species belonging to 19 orders and 48 families were recorded from these wetlands. The 57.3% species were found to be resident, 30.1% winter visitors, 8.1% summer visitors, 3.7% winter visitor cum resident and 0.7% year round visitor. The richest families were Ardeidae and Accipitridae comprising 8.1% (n = 11) each whereas, family Anatidae comprised 7.4% (n = 10) of the recorded avifauna. 85.5% of the recorded species has abundant (33.8%) and common (52.2%) status. Eleven species were frequent; the most prominent were Eurasian Sparrow Hawk (*Accipiter nisus*) and Common Kingfisher (*Alcedo atthis*). Two globally vulnerable species Pallas's Fish Eagle (*Haliaeetus leucoryphus*) and Houbara Bustard (*Chlamydotis undulata*) and one near threatened species Eurasian Black Vulture (*Aegypius monachus*) were observed during the present study. The Houbara Bustard was found visiting the desert area in the north and north-eastern side of the Chotiari reservoir. A rare species of the province Sindh, Greater White-fronted Goose (*Anser albifrons*), was also observed.

## DISCUSSION

The wetlands of Sanghar district hosts significant number of waterbirds annually. Ghalib et al. (1999) reported 109 species (17 orders and 41 families) from Chotiari Wetlands Complex excluding the winter season; however they reported winter visitors as Curlew (*Numenius arquata*), Great White Egret (*Egretta alba*), Great Sand Plover (*Charadrius leschenaultii*), Mongolian Plover (*Ch. mongolus*) and Common Sandpiper (*Actitis hypoleucos*) arriving earlier in May and June while Coot, Black-tailed Godwit (*Limosa limosa*), Ruff (*Philomachus pugnax*), Common Redshank (*Tringa totanus*), Marsh Sandpiper (*T. stangnatilis*), Wood Sandpiper (*T. glareola*), and Starling (*Sturnus vulgaris*) were observed in early August.

We observed early arrival (in August) of few winter visitors such as Little Tern (*Sterna albifrons*), Sanderling (*Calidris alba*) and Gull-billed Tern (*Gelochelidon nilotica*). Some winter visitor species such as Common Teal and Siberian Pied Wagtail (*Motacilla maderaspatensis dukhunsis*) overwintered at the wetlands of Sanghar upto late February. Siberian Pied Wagtail was more common in late winter (March). Pheasant-tailed Jacana (*Hydrophasianus chirurgus*) was only observed during summer from shallow water accumulated near cultivated lands. We observed that most of the individuals of the Glossy Ibis (*Plegadis falcinellus*) come to winter at the district's wetlands while few are residents. We recoded greater number of species perhaps due to the development of new lakes/ponds by the seepage from the reservoir and irrigation canals; moreover, winter season is also included in our study. The obvious reason behind the observed change in the species composition of the avifauna is the alteration in the ecological conditions of the area after the construction of the Chotiari reservoir.

Ghalib et al. (1999) reported the critically endangered White-backed Vulture (*Gyps bengalensis*) from Choatari area but in three years we did not encountered any White-backed Vulture; the species has suffered a drastic decline in the population during the last decade in southeast Asia (Prakash, 1999; Gilbert et al., 2002) due to the wide use of diclofenac in livestock (Oak et al., 2004). White-eyed Pochard (*Aythya nyroca*)(Near Threatened) was reported by Scot (1989) from Sadhori

Table 2

Avifauna of Wetlands of District Sanghar
Авифауна водно-болотных угодий округа Сангар

| Species | Recorded earlier (Ghalib et al., 1999) | Recorded during present study | Occurrence | Status |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
| GAVIIFORMES | | | | |
| GAVIIDAE | | | | |
| *Tachybaptus ruficollis* | + | + | R | C |
| PELECANIFORMES | | | | |
| PHALACROCORACIDAE | | | | |
| *Phalacrocorax niger* | + | + | R | A |
| *Ph. carbo* | + | + | WV | A |
| PELECANIDAE | | | | |
| *Pelecanus onocrotalus* | – | + | WV | C |
| CICONIIFORMES | | | | |
| ARDEIDAE | | | | |
| *Ixobrychus sinensis* | – | + | SV | F |
| *I. cinnamomeus* | – | + | SV | F |
| *I. flavicollis* | – | + | SV | C |
| *Nycticorax nycticorax* | + | + | SV | C |
| *Ardeola grayii* | + | + | R | A |
| *Bubulcus ibis* | + | + | R | C |
| *Egretta garzetta* | + | + | R | C |
| *E. gularis* | + | – | | |
| *E. intermedia* | + | + | R | F |
| *E. alba* | + | + | WV | C |
| *Ardea cinerea* | + | + | WV/R | C |
| *A. purpurea* | + | + | R | C |
| THRESKIORNITHIDAE | | | | |
| *Plegadis falcinellus* | + | + | WV/R | C |
| ANSERIFORMES | | | | |
| ANATIDAE | | | | |
| *Anser albifrons* | – | + | WV | Rr |
| *Anas penelope* | – | + | WV | A |
| *A. strepera* | + | + | WV | C |
| *A. crecca* | + | + | WV | A |
| *A. platyrhynchos* | + | + | WV | A |
| *A. acuta* | + | + | WV | A |
| *A. clypeata* | + | + | WV | A |
| *A. querquedula* | + | – | | |
| *Aythya ferina* | – | + | WV | A |
| *A. fuligula* | + | + | WV | S |
| *Netta rufina* | – | + | WV | S |
| *Marmaronetta angustirostris* | + | – | | |

Continuation of the Table 2

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| ACCIPITRIFORMES | | | | |
| ACCIPITRIDAE | | | | |
| *Elanus caeruleus* | + | + | R | C |
| *Milvus migrans* | + | + | R | C |
| *Haliaeetus leucoryphus* | + | + | R | V |
| *Circaetus gallicus* | + | – | | |
| *Aegypius monachus* | – | + | R | NT |
| *Gyps bengalensis* | + | – | | |
| *Circus aeruginosus* | – | + | R | C |
| *Accipiter nisus* | – | + | R | F |
| *A. badius* | + | + | R | C |
| *Butastur teesa* | – | + | R | A |
| *Buteo buteo* | – | + | SV | F |
| *B. rufinus* | + | + | WV | C |
| *Aquila rapax* | – | + | R | C |
| PANDIONIDAE | | | | |
| *Pandion haliaetus* | – | + | SV | C |
| FALCONIFORMES | | | | |
| FALCONIDAE | | | | |
| *Falco tinnunculus* | – | + | WV/R | C |
| *F. cherrug* | + | – | | |
| GALLIFORMES | | | | |
| PHASIANIDAE | | | | |
| *Francolinus pondicerianus* | + | + | R | C |
| *F. francolinus* | + | + | R | C |
| GRUIFORMES | | | | |
| RALLIDAE | | | | |
| *Amauronis phoenicurus* | + | + | R | C |
| *Gallinula chloropus* | + | + | R | A |
| *Porphyrio porphyrio* | + | + | R | C |
| *Gallicrex cinerea* | + | + | R | C |
| *Fulica atra* | + | + | WV | A |
| OTIDIDAE | | | | |
| *Chlamydotis undulata* | – | + | WV | V |
| CHARADRIIFORMES | | | | |
| JACANIDAE | | | | |
| *Hydrophasianus chirurgus* | + | + | R | C |
| ROSTRATULIDAE | | | | |
| *Rostratula bengalensis* | + | – | | |
| RECURVIROSTRIDAE | | | | |
| *Himantopus himantopus* | + | + | R | A |
| *Recurvirostra avosetta* | + | – | | |
| GLAREOLIDAE | | | | |
| *Glareola lactea* | + | + | SV | C |

Continuation of the Table 2

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| CHARADRIIDAE | | | | |
| *Charadrius alexandrinus* | + | + | R | C |
| *Ch. dubius* | + | – | | |
| *Ch. leschenaultii* | + | – | | |
| *Ch. mongolus* | + | – | | |
| *Hoplopterus indicus* | + | + | R | A |
| *Chettusia leucura* | + | + | R | C |
| SCOLOPACIDAE | | | | |
| *Calidris alba* | + | + | | |
| *C. minutus* | + | + | WV | A |
| *C. alpina* | + | – | | |
| *C. tenuirostris* | + | – | | |
| *Tringa totanus* | + | + | WV | A |
| *T. erythropus* | + | – | | |
| *T. nebularia* | – | + | WV | C |
| *T. stangnatilis* | + | – | | |
| *T. glareola* | + | – | | |
| *T. ochropus* | + | – | | |
| *Philomachus pugnax* | + | – | | |
| *Numenius arquata* | + | – | | |
| *Actitis hypoleucos* | + | + | WV | C |
| LARIDAE | | | | |
| *Larus marinus* | – | + | WV | F |
| *L. ridibundus* | + | + | WV | C |
| *L. brunnicephalus* | – | + | WV | A |
| *L. argentatus* | – | + | WV | A |
| *Hydroprogne caspia* | + | – | | |
| STERNIDAE | | | | |
| *Gelochelidon nilotica* | + | + | WV | C |
| *Sterna aurentia* | – | + | WV | C |
| *S. albifrons* | + | + | WV | F |
| *Chlidonias hybridus* | + | + | YRV | A |
| PTEROCLIFORMES | | | | |
| PTEROCLIDAE | | | | |
| *Pterocles exustus* | – | + | R | C |
| COLUMBIFORMES | | | | |
| COLUMBIDAE | | | | |
| *Columba livia* | + | + | R | A |
| *Streptopelia decaocto* | + | + | R | A |
| *S. tranquebarica* | – | + | SV | A |
| *S. senegalensis* | + | + | R | A |
| PSITTACIFORMES | | | | |
| PSTTACIDAE | | | | |
| *Psittacula krameri* | + | + | R | A |

Continuation of the Table 2

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| CUCULIFORMES | | | | |
| CUCULIDAE | | | | |
| *Clamator jacobinus* | – | + | SV | C |
| *Eudynamys scolopacea* | + | + | R | C |
| *Centropus sinensis* | + | + | R | C |
| STRIGIFORMES | | | | |
| TYTONIDAE | | | | |
| *Tyto alba* | – | + | R | S |
| STRIGIDAE | | | | |
| *Athene brama* | + | + | R | C |
| *Bubo coromandus* | + | – | | |
| CAPRIMULGIFORMES | | | | |
| CAPRIMULGIDAE | | | | |
| *Caprimulgus mahrattensis* | + | + | R | C |
| APODIFORMES | | | | |
| APODIDAE | | | | |
| *Apus apus* | + | + | R | C |
| *A. affinis* | + | + | R | C |
| CORACIIFORMES | | | | |
| ALCIDINIDAE | | | | |
| *Halcyon smyrnensis* | + | + | R | C |
| *Alcedo atthis* | + | + | R | F |
| *Ceryle rudis* | + | + | R | A |
| MEROPIDAE | | | | |
| *Merops orientalis* | + | + | R | A |
| *M. superciliosus* | + | + | SV | A |
| *M. apiaster* | + | – | | |
| CORACIIDAE | | | | |
| *Coracias benghalensis* | + | + | R | C |
| UPUPIDAE | | | | |
| *Upupa epops* | + | + | WV/R | C |
| PICIFORMES | | | | |
| PICIDAE | | | | |
| *Dinopium benghalensis* | – | + | R | C |
| *Picoides adsimilis* | + | – | | |
| PASSERIFORMES | | | | |
| ALAUDIDAE | | | | |
| *Eremopterix grisea* | + | + | R | C |
| *Ammomanes deserti* | + | + | R | C |
| *A. phoenicurus* | + | – | | |
| *Galerida cristata* | + | + | R | A |
| *Alauda gulgula* | + | + | WV | A |
| HIRUNDINIDAE | | | | |
| *Riparia paludicola* | – | + | R | A |

Continuation of the Table 2

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| *Hirundo rustica* | + | + | R | A |
| *H. smithi* | + | + | R | C |
| *H. fluvicola* | + | + | R | C |
| MOTACILLIDAE | | | | |
| *Anthus rufulus* | – | + | R | C |
| *A. campestris* | – | + | WV | C |
| *Motacilla flava thunbergi* | – | + | WV | C |
| *M. maderaspatensis* | + | + | R | C |
| *M. m. dukhunsis* | + | + | WV | A |
| CAMPEPHAGIDAE | | | | |
| *Tephrodornis pondicerianus* | + | – | | |
| PYCNONOTIDAE | | | | |
| *Pycnonotus leucogenys* | + | + | R | A |
| *P. cafer* | + | + | R | A |
| TURDIDAE | | | | |
| *Luscinia svecica* | – | + | WV | C |
| *Phoenicurus ochruros* | – | + | WV | C |
| *Saxicola torquata* | – | + | WV | C |
| *S. caprata* | + | + | R | A |
| *Oenanthe deserti* | – | + | WV | C |
| *Saxicoloides fulicator* | | + | R | C |
| SYLVIIDAE | | | | |
| *Cettia cetti* | – | + | WV | S |
| *Prinia gracilis* | – | + | R | C |
| *P. buchanani* | – | + | R | A |
| *P. inornata* | + | + | R | C |
| *P. flaviventris* | + | – | | |
| *P. burnesii* | + | – | | |
| *P. socialis* | + | – | | |
| *Chrysomma altirostre* | + | – | | |
| *Acrocephalus scirpaceus* | + | – | | |
| *Sylvia curruca* | – | + | WV | F |
| *Phylloscopus sindianus* | – | + | WV | F |
| *Ph. collybita* | + | + | WV | A |
| RHIPIDURIDAE | | | | |
| *Rhipidura aureola* | + | + | R | C |
| TIMALIIDAE | | | | |
| *Turdoides caudatus* | + | + | R | A |
| *T. earli* | – | + | R | C |
| *T. striatus* | – | + | R | A |
| NECTARINIDAE | | | | |
| *Nectarinia asiatica* | + | + | R | A |
| LANIIDAE | | | | |
| *Lanius vittatus* | + | + | R | C |

End of the Table 2

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| *L. schach* | – | + | R | C |
| *L. excubitor* | + | + | R | C |
| DICRURIDAE | | | | |
| *Dicrurus macrocercus* | + | + | R | A |
| CORVIDAE | | | | |
| *Dendrocitta vagbunda* | + | + | R | C |
| *Corvus splendens* | + | + | R | A |
| STURNIDAE | | | | |
| *Sturnus vulgaris* | + | + | WV | A |
| *S. roseus* | + | + | SV | C |
| *S. pogodarum* | + | – | | |
| *Acridotheres tristis* | + | + | R | A |
| *A. ginginianus* | + | + | R | A |
| PASSERIDAE | | | | |
| *Passer domesticus* | + | + | R | A |
| *P. pyrrhonotus* | + | + | R | F |
| *Petronia xanthocollis* | – | + | WV | C |
| PLOCEIDAE | | | | |
| *Ploceus philippinus* | + | + | R | C |
| ESTRILDIDAE | | | | |
| *Lonchura malabarica* | + | + | R | C |
| *Estrilda amandava* | + | – | | |
| EMBERIZIDAE | | | | |
| *Emberiza melanocephala* | + | – | | |
| FRINGILLIDAE | | | | |
| *Pyrrhula nipalensis* | + | – | | |

Status according to Roberts (1991, 1992) and IUCN Red List of Threatened Birds: R – Resident, SV – Summer visitor, WV – Winter visitor, YRV – Year round visitor; Rr – Rare, A – Abundant, C – Common, F – Frequent, S – Scarce, V – Vulnerable, NT – Near threatened.

Lake but it was not found anywhere in Sanghar. Moreover, microclimate required for these species might have changed.

We failed to get any evidence concerning two more globally vulnerable and rare bird species of the area i.e. Marbled Teal (*Marmaronetta angustirostris*) and Sindh Babbler (*Chrysomma altirostre scindicum*) despite our best efforts. Ghalib et al. (1999) counted 122 chicks/juveniles along with 76 adults of Marbled Teal from the Chotiari reservoir. Even interviews with local people, especially hunters, revealed that Marbled Teal has not been visiting wetlands we surveyed for at least past three years mainly due to excessive hunting of this species.

In present study, we found 44 new records of bird species (27 non-passerine and 17 passerine species; Table 2) not reported by Ghalib et al. (1999). The most important were Eurasian Black Vulture (Near Threatened), Yellow Bittern (*Ixobrychus sinensis*), Cinnamon Bittern (*I. cinnamomeus*), Black Bittern (*I. flavicollis*), White-fronted Goose, Wigeon (*Anas penelope*), Red-crested Pochard (*Netta rufina*), Eurasian Sparrow Hawk (*Accipiter nisus*), Marsh Harrier (*Circus aeruginosus*), Common Kestrel (*Falco tinnunculus*), Tawny

Eagle (*Aquila rapax*), Great Black-headed Gull (*Larus marinus*), Brown-headed Gull (*L. brunnicephalus*) and Golden-backed Woodpecker (*Dinopium benghalensis*). Evidences concerning 34 species reported by Ghalib et al. (1999) were not found during present study period (Table 2).

The results reveal how the changes in land use practices, hunting, fishing and overexploitation could effect the bird species composition and distribution. After the construction of the Chotiari reservoir, ecological conditions have changed. Rangelands have been inundated; eliminating scrub vegetations. New seepage ponds have arisen that has encouraged the growth of hydrophytes. Further, human impact has increased on previously relatively undisturbed lakes e.g. Soonheri Lake, Bakar Lake and Makhi Lake. However, it is concluded that the area is rich in bird diversity. It is suggested that the management plan of the reservoir should be implemented in its true letter and spirit. More robust studies should be designed to research and monitor the threatened bird species of the area. Complete ban should be imposed on the hunting of Houbara in Sand dunes areas on the north and northeastern side of the reservoir. Alternatively, sustainable practices should be adopted. Relict areas of the Sindh Babbler's original habitat should be identified and protected.

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