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COMPARATIVE AVIAN FAUNAL DIVERSITY OF JIWANI COASTAL WETLANDS AND TAUNSA BARRAGE WILDLIFE SANCTUARY, PAKISTAN

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ABSTRACT

This study was undertaken to compare the population of avifauna of Jiwani Coastal Wetlands Complex and Taunsa Barrage Wetland. In one year study period the number of species recorded at Jiwani Coastal Wetland was 109, representing 16 orders and 38 families and at Taunsa Barrage was 110 which belongs to 45 families. At Taunsa Barrage Ardeidae remain dominant while syllviidae were the family which has greatest bird species found at the study site. The family Oriolade had only one bird species, while out of 110 species, 66 were resident, 8 were breeding resident, 34 were winter visitor and only 2 were summer visitor. At Jiwani Coastal Wetland out of 109 bird species, 77 species were migratory and 32 species were recorded as resident. The common species found at both the study sites were 49. The most critical threat facing the birds is the destruction and fragmentation of habitat. Fishing activities and illegal hunting by local people are also the major threats to the avifauna

Key words: Avian diversity, comparative study, ramsar site, Jiwani, Taunsa barrage.

INTRODUCTION

The wetlands of Pakistan are rich in wildlife, hosting a large number of migratory waterfowls that arrive from Siberia and Russia (Khan, 2005). A large number of fresh-water birds prefer the inland water spreads of Sindh and Punjab provinces. Huge populations of shorebirds are also housed in coastal mud-flats and the tidal estuaries of Sindh and Balochistan (Rizvi, 2002). Waterbirds inhabit or temporarily use wetlands because of the diversity of microhabitats for feeding, nesting and resting, as well as food richness in the water (Mitsch and Gosselink, 1986). Such habitats are among the highly complex, diverse and biologically productive ecosysytem in the biosphere (Saifullah, 1982). Birds act as bio-indicator for the environment of the area.

The human component of the Jiwani Coastal Wetlands Complex consists of more than 100 small and large villages and towns. Jiwani, a major town located in the western most part of the study area, is a sub-division, situated at a distance of 90 km northwest of District Gawadar. This complex has a very diverse ecosystem containing a wide range of habitat types, which were later grouped together in seven different habitats.

Data collected on the comparative study of the avian diversity of Jiwani Coastal wetland and Taunsa Barrage wetland (International Ramsar Site No. 817, declared on 1996). The main objective of this study was to determine the distribution of waterbirds and the trophic levels at which different species were using within the Jiwani Coastal Wetlands and Taunsa Barrage wetland. Threats to the waterbirds population are identified and conservation measures are also proposed. It is envisaged that information so generated will be helpful in formulating future ecology and population plans for waterbirds at Jiwani Coastal Wetlands and Taunsa Barrage Wetland.

Study Areas: The first area of study for avifauna study was Taunsa Barrage (Figure, 1). Taunsa Barrage (30°42'N 070°50'E) is located on the Indus river of Punjab, Pakistan and was completed in 1958. It was declared as Wildlife Sanctuary (6,576 ha) in 1972. Taunsa Barrage was notified as Wetland of International importance in 1996 by Ramsar Convention (Ramsar, 2009). A large water storage reservoir behind a barrage on the Indus River was constructed for irrigation purposes.

The second area for avi faunal study was Jiwani Coastal Wetlands, located a few kilometres east and west of Jiwani town, in Gawadar district, Baluchistan. Jiwani coast is one of the major mangrove areas in Pakistan. The area supports the mangrove species *Avicennia marina*. Thousands of migratory waterbirds visit the area every year. Fishing is the most important human activity. Jiwani Coastal Wetlands located along gawater Bay around the delta of the Dasht River, a very significant area of mangrove forests extending westward to the Iranian frontier, contiguous with Iran's Gawater Bay and Hur-e-Bahu Ramsar Site. Ramsar Information Sheet (RIS) available for site is 2001 and Ramsar Site number was declared as 1066 (Figure 2).

MATERIAL AND METHODS

Census Methods: Direct count was one of the most widely used methods for determining the species diversity and its abundance. It is very useful when conducting surveys in open lands, oceans and coasts, they were easy to observe and identify. It was done by taking random points and recording species diversity and abundance. During the survey, waterbirds were directly identified in the field based on the field identification guides, and with the help of professional's experience, the waterbirds habitat and its behavioral ecology also studied. Counting the number of waterbirds accurately in the field was made possible with the use of binoculars and spotting scopes.

Leg Method: Another method of estimating the number of birds was used the leg count method in which the number of legs of birds were counted in multiples of 2 and later divided by 2. This method was recommended when a large number of birds were hidden behind each others, e.g. for Flamingoes.

Informal Meetings with the Locals (Indirect Observations): The purpose of this information was to collect anecdotal evidences of different species of waterbirds of the study area. Dialogues with the local community other than the fishermen were held in order to know the general status of wildlife of the area and especially for the birds. These meetings were held with the community during boat and field surveys and informal meetings with various other members of the community i.e. rest house staff, drivers, coast guards, local Nazim, Tehsildar and local shopkeepers were conducted.

RESULTS

The record of the census carried out at different localities of Taunsa Barrage Wildlife Sanctuary (TBWS) an International Ramsar Site (IRS) in the year 2008; upstream of the Barrage right side (up to Jannu village), left side (along D.G. Khan canal); downstream left side (up to Sheikha wali village) and right side (up to Bait Qaim wali village).

Total number of bird species, recorded during this survey at Taunsa Barrage, was 110 (one hundred and ten), out of 110 species, 66 were resident, 8 were breeding resident, 34 were winter visitor and only 2 were summer visitor The avifauna observed during this study belonged to 45 families. Among these, family Ardeidae remained dominant in bird population while Sylviidae were the family which had greatest bird species found at the site. The family Orioldae had only one bird species as observations taken in table 1 and 2.

Data on ecology and population of waterbirds diversity at Jiwani Coastal Wetlands was taken during the year 2008. A total of 109 species of birds were recorded during surveys, out of 109 species 77 species were migratory and 32 species were resident from the area of 4,600 hectare. Recorded species were belonging to 16 orders. Out of 109 species; 34 species were belonging to order chadriiformes, 30 species were belonging to order Passeriformes, number of species belonging to order Phoenicopteriformes, Falconiformes, Piciformes, Psittaciformes and Upupiformes recorded equal in numbers; one species in each order as per the observation table 1 and 3.

The common bird species found at both the study sites were 49(forty nine) in number (Table 1).

DISCUSSION

Wetlands are biologically very productive and provide feeding grounds for a diverse range of resident and migratory waterbirds. Herons stalk the shallows, snipe feed in the long grass at the water's edge while grebes, ducks and cormorants feed in the open water. The provision of feeding and roosting habitat is very important for migratory species which in some cases migrate many thousands of kilometers. In recognition of the significance of wetlands for many trans-equatorial species of migratory waterbirds, several wetlands in the country have been identified as being internationally significant under the Ramsar Convention.

Identifying phenomenon that explains the distribution and abundance of biota has a central theme of ecological theory. Biologist believes that food abundance has an important determinant of winter abundance and distribution of migratory birds, including shorebirds (Hockey *et al.,* 1992). A number of species of shorebirds of the world (Charadriiformes: Haematopodidae; Recurvirostridae; Charadriidae and Scolopacidae) are among the migratory vertebrates in the World. Some species make two annual journeys totaling about 3500 km between high latitude breeding regions and equatorial and southern hemisphere non-breeding habitats (Morrison, 1984; Gill *et al*., 2001). It has been argued that birds in general and shorebirds in particular have evolved traits in response to the long migrations between breeding and non-breeding quarters (Piersma and Baker, 1999). It has been observed that food availability, feeding practices and habitat may be the major factors of fluctuation in population of birds rather than any other threat.

In 2008 occurrence of birds at the Jiwani Coastal Wetlands the number of bird species totaled to be 109, 77 species were migratory and 32 species were recorded as resident Studies on the same parameter have been conducted by different researchers in different parts of the world as Robert (1991-92) studied the birds of Pakistan. A total of 120 species; 46 species were recorded

as winter visitor; 40 species of birds as resident; 15 species were summer visitor; 5 species were recorded as summer breeder; 11 species were irregular year round visitor; 2 species was vagrant and one species was only recorded as spring visitor, Grimmett *et al,*. (1998) out of 101 species of birds, 35 were recorded as winter visitor; 39 were resident; summer visitor 15; summer breeder 2; irregular year round visitor 5 and 6 were recorded as vagrant, Mirza and Wasiq (2007) studied 84 species; 33 species of birds were resident; 25 winter visitor; 11 summer visitor; 4 summer breeder; 9 irregular year round visitor and 2 species as vagrant recorded at Jiwani Coastal Wetlands.

The number of bird's species, recorded during the year 2008 at Taunsa Barrage, was 110. The avifauna observed during this study belonged to 45 families, while out of 110 species, 66 were resident, 8 were breeding resident, 34 were winter visitor and only 2 were summer visitors. Among these, family Ardeidae remained dominant in bird population while Sylviidae was the family which had greatest bird species found at the site. The family Oriolidae had only one bird species. Roberts (1991, 1992) mentioned 239 bird species for the Taunsa Barrage, out of them 88 species were resident, winter visitor, 24 double passage migrant, 15 summer visitor, 15 irregular visitor round year, 6 occasional wintering, 4 autumn migrant and 1 species was passage migrant. Grimmett *et al.,* (2001) described the total birds species observed at Taunsa Barrage to be 248. Out of 248 birds species, 91 species were resident, 91 winter visitor, 21 double passage migrant, 18 irregular visitor round year,15 summer visitor, 6 occasional wintering, 4 autumn migrant and 2 species were passage migrant. Mirza (2007) reported, 265 species, out of which96 species were resident, 102 winter visitor, 20 double passage migrant, 14 irregular visitor round year, 18 summer visitor, 6 occasional wintering, 4 autumn migrant and 5 species were passage migrant.

Pakistan once supported enormous water bird populations, especially in winter, but these declined dramatically during the twentieth century. Many natural wetlands disappeared as a result of irrigation and drainage projects to provide more land for agriculture and habitation, although at the same time new swamps and marshes were created upstream of dams and barrages, or as a result of faulty drainage systems or overspill from irrigation canals. Although this overall loss of habitat was undoubtedly a factor in water bird declines, the main cause was probably the high levels of hunting and disturbance throughout much of the coastal areas. These pressures continue to depress water bird numbers, but if they could be controlled there is potential for population recoveries.

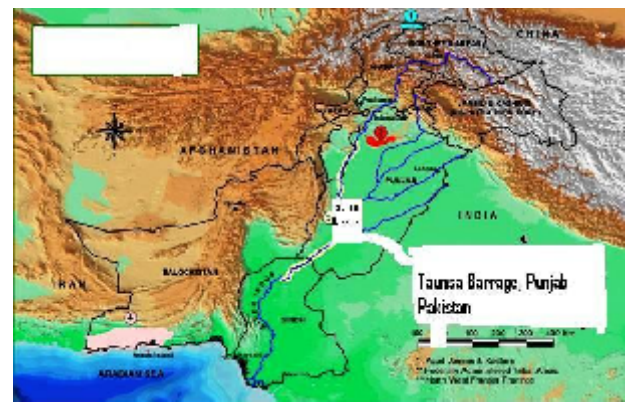

Figure 1

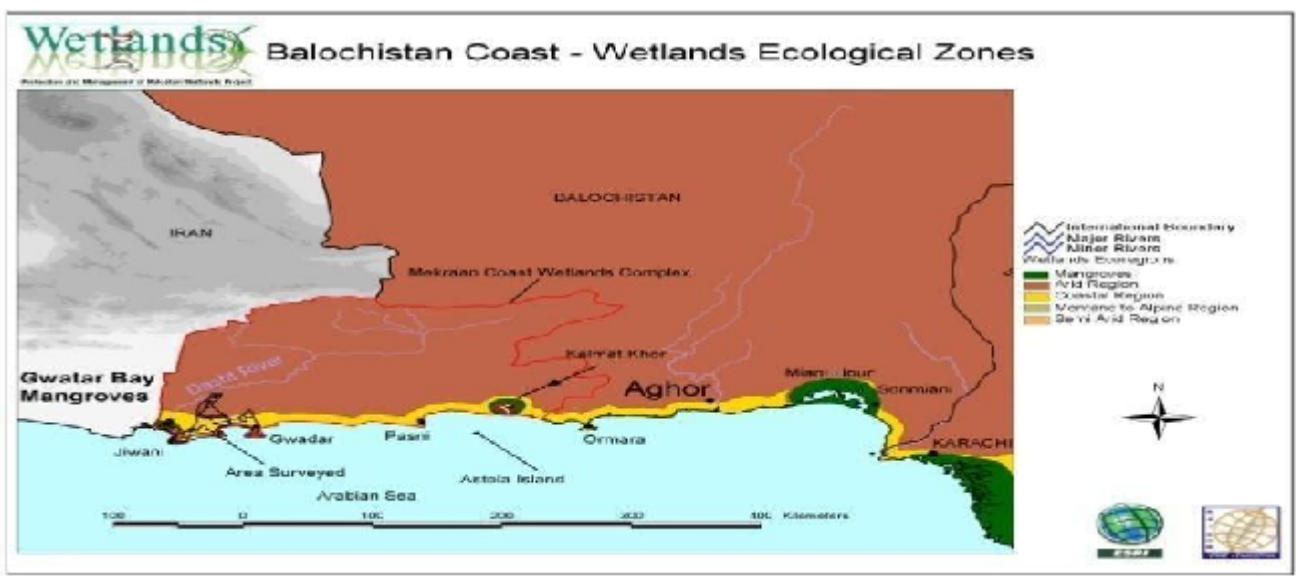

Figure 2

Table 1 Common Birds of Taunsa Barrage and Jiwani Coastal Wetlands

No.	Scientific name	Common name	Taunsa Barrage	Jiwani Coastal Wetlands
1	*Tachybaptus ruficollis*	Little Grebe or Dabchick	79	110
2	*Podiceps cristatus*	Great Crested Grebe	70	87
3	*Phalaerocorax carbosinensis*	Great Cormorant	239	4250
4	*Ardeola grayii*	Indian Pond Heron	340	9
5	*Egretta garzetta*	Little Egret	3150	116
6	*Ardea cinerea*	Grey Heron	95	46
7	*Egretta intermedia*	Intermediate Egret	325	3
8	*Anas platyrhynchos*	Mallard	6	34
9	*Anas clypeata*	Northern Shoveler	3	760
10	*Anas strepera*	Gadwall	6	550
11	*Aythya ferina*	Common Pochard	9	79
12	*Circus aeruginosus*	Marsh Harrier	2	8
13	*Accipiter badius cenchroides*	Indian Sparrow Hawk	2	4
14	*Aquila nipalensis*	Steppe Eagle	2	2
15	*Falco tinnunculus*	Eurasian Kestrel	2	11
16	*Gallinula chloropus*	Moorhen	12	6
17	*Fulica atra*	Eurasian Coot	18	2440
18	*Charadrius alexandrinus*	Kentish/Snowy Plover	2	78
19	*Hoplopterus indicus*	Red-wattled Lapwing	440	43
20	*Calidris minuta*	Little Stint	2	408
21	*Tringa stagnatilis*	Marsh Sandpiper	2	12
22	*Tringa nebularia*	Greenshank	2	26
23	*Larus marinus*	Great Black-headed Gull	6	310
24	*Columba livia*	Blue Rock Pigeon	78	48
25	*Streptopelia decaocta*	Indian Ring Dove	122	21
26	*Streptopelia senegalensis*	Little Brown Dove	12	57
27	*Psitta krameri*	Rose-ringed Parakeet	98	12
28	*Athene brama*	Spotted Little Owlet	2	8
29	*Halcyon smyrnensis*	White-throated Kingfisher	46	5
30	*Alcedo atthis*	Common Kingfisher	2	2
31	*Ceryle rudis*	Small Pied kingfisher	21	12
32	*Merops orientalis*	Little Green Bea-eater	139	92
33	*Upupa epops*	Common Hoopoe	188	3
34	*Coracias benghalensis*	Indian Roller/Blue Jay	56	11
35	*Dendrocopos assimilis*	Sind Pied Woodpecker	2	2
36	*Galerida cristata*	Crested Lark	21	33
37	*Riparia riparia*	Collard Sand Martin	660	34
38	*Hirundo rustica*	Barn or Common Swallow	702	96
39	*Pycnonotus leucogenys*	White-cheeked Bulbul	2	35
40	*Prinia gracilis*	Streaked Long-tailed Warbler	6	15
41	*Acrocephalus stentoreus*	Southern Great Reed Warbler	4	5
42	*Sylvia curruca*	Lesser Whitetheoat	2	18
43	*Nectarinia asiatica*	Purple Sunbird	2	19
44	*Lanius vittatus*	Bay-backed Shrike	18	7
45	*Lanius excubitor*	Great Grey Shrike	4	12
46	*Acridothere tristis*	Common Myna	115	16
47	*Acridothere ginginianus*	Bank Myna	19	16
48	*Corvus splendens*	House Crow	415	38
49	*Passer domesticus*	House Sparrow	380	365
	Total		**7930**	**10374**

Migratory birds are indicator species – a litmus test for overall environmental quality. Healthy bird populations indicate healthy habitats; declining bird populations indicate degraded habitats. One third of all endangered species makes their home in wetland areas. Through ground water recharge, small amount of water trickle into the ground providing drinking and irrigation. Wetlands act as "mother nature's" kidneys by increasing water quality. Despite their importance, wetlands are amongst the world's most vulnerable ecosystems – being threatened by conversion for agriculture and development, drought, over fishing and pollution. Consequently, an alarming 42% of the migratory waterbirds populations in the flyways are declining.

Table 2 Birds of Taunsa Barrage Only

No.	Scientific name	Common name	Birds Count
1	*Phalacrocorax cabro fuscicollis*	Indian (Shag) Cormorant	145
2	*Phalacrocorax niger*	Little/Javanese Cormorant	69
3	*Anhinga melanogaster*	Darter/Snake Bird	2
4	*Exobrychus minutus*	Little Bittern	3
5	*Exobrychus sinensis*	Chinese/Yellow Bittern	6
6	*Ixobrychus cinnamomeus*	Cinnamon/Chestnut Bittern	6
7	*Nycticorax nycticorax*	Night Heron	170
8	*Bubulcus ibis*	Cattle Egret	5240
9	*Egretta alba*	Large Egret	1670
10	*Ardea cinerea*	Purple Heron	3
11	*Plegadis falcinellud*	Glossy Ibis	8
12	*Anas poecilorhyncha*	Spotbill Duck	15
13	*Milvus migrans migrans*	Black Kite	160
14	*Elanus caeruleus*	Black Winged Kite	4
15	*Ammoperdix griseogularis*	See-see Partridge	12
16	*Francolinus francolinus*	Black partridge	19
17	*Francolinus pondicerianus*	Indian Grey Partridge	6
18	*Coturnix coturnix*	Common Quail	9
19	*Rallus aquaticus*	Water Rail	45
20	*Porzana porzana*	Spotted Crake	
21	*Porzana parva*	Little Crake	119
22	*Porzana pusilla*	Baillon's Crake	6
23	*Amaurornis phoenicurus*	White-breasted Waterhen	18
24	*Porphyrio porphyrio*	Purple Gallinul	128
25	*Hydrophasianus chirurgus*	Pheasant-tailed Jacana	2
26	*Himantopus himantopus*	Black-winged Stilt	195
27	*Recurvirostra avosetta*	Pied Avocet	2
28	*Charadrius dubius*	Little Ringed Plover	6
29	*Tringa glareola*	Wood Sandpiper	2
30	*Sterna aurantia*	Indian River Tern	18
31	*Sterna acuticauda*	Black-bellied Tern	2
32	*Streptopelia tranquebarica*	Red Turtle Dove	18
33	*Psittacula eupatria*	Alexandrine Parakeet	2
34	*Eudynamys scolopacea*	Koel	2
35	*Centropus sinensis*	Common Crow Pheasant	77
36	*Apus affinis*	Little Swift	26
37	*Merops supercilliosus*	Blue-cheeked Bee-eater	4
38	*Dinopium benghalense*	Lesser Golden-backed Woodpecker	2
39	*Eremopterix grisea*	Ashy Crowned Finch lark	4
40	*Calandrella brachydoctyla*	Greater Short-toed Lark	2
41	*Calandrella raytal*	Sand Lark	2
42	*Riparia paludicola*	Indian Sand Martin	160
43	*Anthus rufulus*	Paddyfield Pipit	2
44	*Moticilla alba*	White Wagtail	18
45	*Motacilla flava*	Yellow Wagtail	6
46	*Motacilla cinerea*	Grey Wagtail	2
47	*Pycnonotus cafer*	Red-vented Bulbul	22
48	*Phoenicurus ochruros*	Black Redstart	2
49	*Saxicola torquata*	Common Stone Chat	2
50	*Saxicoloides fulicata*	Indian Robin	9
51	*Orthotomus sutorius*	Tailor Bird	2
52	*Rhipidura aureola*	White-browned Fantail Flycatcher	6
53	*Turdoides caudatus*	Common Babler	78
54	*Turdoides earlei*	Striated Babbler	4
55	*Turdoides striatus*	Jungle Babbler	18
56	*Oriolus oriolus*	Golden Oriole	2
57	*Lanius schach*	Rufous-backed Shrike	2
58	*Sturnus vulgaris*	Common Starling	4
59	*Dendocitta vagabunda*	Indian Tree Pie	2
60	*Ploceus philippinus*	Baya Weaver	6
61	*Emberiza schoeniclus*	Reed Bunting	4

Table 3 Birds of Jiwani Coastal Wetlands Only

No	Scientific name	Common name	Bird Count
1	*Podiceps nigricollis*	Black-necked Grebe	18
2	*Egrette gularis*	Western Reef Heron	115
3	*Accipiter nisus*	Sparrow Hawk	4
4	*Pandion haliatus*	Osprey	14
5	*Haematopus ostralegus*	Eurasian Oyster Catcher	938
6	*Esacus recurvirostris*	Greater Thicknee or Stone Plover	10
7	*Charadrius mongolus*	Lesser Sand Plover	157
8	*Charadrius leschenaultil*	Greater Sand Plover	147
9	*Limosa lapponica*	Bar-tailed Godwit	46
10	*Numenius phaeopus*	Whimbril	6
11	*Numenius arquata*	Eurasian Curlew	66
12	*Arenaria interpres*	Ruddy-turn stone	24
13	*Xenus cinereus*	Terek Sandpiper	54
14	*Larus hemprichii*	Sooty Gull	212
15	*Larus genei*	Slender-billed Gull	49
16	*Sterna caspia*	Caspian Tern	18
17	*Sterna bergii*	Great Crested Tern	92
18	*Sterna albifrons*	Little Tern	27
19	*Sterna bengalensis*	Lesser Crested Tern	101
20	*Sterna repressa*	White cheeked Tern	17
21	*Sterna asandvicensis*	Sandwitch	10
22	*Sterna hirundo hixundo*	Common Tern	2
23	*Gelochelidon nilotica*	Gull-billed Tern	160
24	*Alaemon alaudipes*	Hoopoe Lark	2
25	*Ptyonoprogne fuligula*	Pale crag Martin	35
26	*Hirundo daurica*	Red-rumped Swallow	23
27	*Motacila alba*	White or Pied Wagtail	46
28	*Saxicola caprata*	Pied Bush-chat	7
29	*Oenanthe deserti*	Desert Wheatear	13
30	*Oenanthe picata*	Eastern Pied Wheatear	11
31	*Oenanthe monacha*	Hooded Wheatear	3
32	*Prinia buchanani*	Rofous-fronted Prinia	185
33	*Acrocephalus dumetorum*	Blyth's Reed Warbler	5
34	*Corvus ruficollis*	Brown-necked Raven	8
35	*Lonchura malabarica*	Indian Silverbill	35
36	*Emberiza striolata*	House Bunting	15
37	*Arenara interpres*	Turn Stone/Ruddy Turn Stone	24
38	*Phalaropus labatus*	Red-necked Phalarop/Northern Phalarop	661
39	*Tyto alba*	Barn Owl	2
40	*Calidris feruginea*	Curlew Sandpiper/Curlew Stint	66
41	*Larus ridibundus*	Common Black-headed Gull	481
42	*Tringa ochropus*	Green Sandpiper	8
43	*Cursorius cursor*	Cream-coloured Courser	9
44	*Gallinago gallinago*	Common Snipe	8
45	*Tringa totanus*	Red Shank	55
46	*Aythya fuligula*	Tufted Duck	60
47	*Circus macrourus*	Pallid Harrier	3
48	*Buteo rufinos*	Long-legged Buzzard	3
49	*Aquila clanga*	Greater Spotted Eagle	1
50	*Aquila heliaca*	Imperial Eagle	2
51	*Anas crecca*	Common Teal	980
52	*Anas acuta*	Common Pintail	320
53	*Platalea leucordia*	White Spoonbill	15
54	*Phoenicopterus ruber*	Greater Flamingo	142
55	*Anser albifrons*	Greater White Fronted Goose	28
56	*Podiceps cristatus*	Great Crested Grebe	87
57	*Larus cachinnans*	Yellow-legged Gull/Herring Gull	952
58	*Sterna caspia*	Caspian Tern	18
59	*Pluvialis squatarola*	Grey Plover	44
60	*Pelecanus crispus*	Dalmation Pelican	211

Waterbirds need an unbroken chain of wetlands to complete their annual life-cycles. For this reason, migratory waterbirds can only be effectively conserved through international cooperation across the entire flyway.

The mangrove ecosystem is rich in biodiversity and plays an important role in the marine ecosystem as most tropical marine species pass at least one stage of their life cycle in such forests. Over the past decade, there has been concern over the ways in which human activities have altered the mangrove ecosystem of Pakistan.

To place the blame for this decline on a single factor would be wrong. There are combinations of causes which need to be addressed in order to turn the trend of demise. Threats to birds include:

- ✓ Habitat destruction, fragmentation or alteration.
- ✓ Road fatalities increase when birds are forced into urban areas due to habitat destruction.
- ✓ Introduced species which decrease native populations through increased predation, competition for food or nesting and also can become a deadly or unhealthy food source.

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