



REVIEW OF THE DISTRIBUTION, STATUS AND CONSERVATION OF THE WILDLIFE OF SINDH

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ABSTRACT

Wildlife Surveys were undertaken in the prime wildlife habitats of Sindh during 2010 – 2018 and a total of 82 species of mammals, 420 species of birds, 103 species of reptiles, 7 species of amphibians and 33 important plant species were recorded from these areas. There are total 50 Protected Areas in Sindh which have an extensive value regarding vertebrate biodiversity. The key species include: Sind Wild Goat, Urial, Chinkara, Leopard, Bluebull, Hog Deer, Hyaena, Caracal, Honey Badger, Fishing Cat, Desert Fox, Indus Dolphin, Humpback Dolphin, Indian Peafowl, Sarus Crane, Houbara Bustard, Marbled Teal, Grey Partridge, Chakur, Indian Whitebacked Vulture, Indian Longbilled Vulture, Shaheen Falcon, Marsh Crocodile, Green Turtle, Olive Ridley Turtle, Indian Python, Desert Monitor, Fat tailed Gecko, Spiny tailed Lizard and Freshwater Turtles. The major threats to the wildlife of the Province are: poaching, habitat degradation and lack of management. A total of 40 threatened wildlife species have been recorded. To conserve the threatened species and their habitats, an action plan is suggested.

Keywords: IBAs of sindh, protected areas, biodiversity of sindh, threatened species.

INTRODUCTION

Wildlife and wildlife habitats are vital for the ecological and biological processes that are essential for the preservation of life. Pakistan's protected areas system represents a significant contribution for the protection of global biodiversity.

The province of Sindh (Fig. 1) is rich in wildlife due to the presence of various ecosystems and diverse range of landscapes including deserts, wetlands, riverine and mangrove forests, mountains, hills, agriculture and coastal areas and its unique wildlife has been protected in a network of protected areas spread over different ecosystems in the province. Pakistan has a system of three categories of Protected Areas: National Parks, Wildlife Sanctuaries, and Game Reserves (Khan *et al.*, 2010; Begum *et al.*, 2014).

Earlier studies include Minton (1966), Siddiqui (1982), Kabraji and Asrar (1984), Firdous (1985, 1988), Roberts *et al.* (1986), Asrar (1999), Siddiqui *et al.* (2001), Ghalib *et al.* (2002, 2004, 2014), Khan (2006),

Khan *et al.* (2010, 2010a, 2012, 2015, 2017, 2018), Rais *et al.* (2008, 2009, 2010) Abbas *et al.* (2010), Begum *et al.* (2014), Zehra *et al.* (2014), Hashmi and Khan (2014) and Kanwal and Khan (2018) who have contributed some important work related to wildlife of Sindh. The objective of present study was to review the present distribution, status, threats and other relevant aspect of the wildlife of Sindh and provide scientific information for future research, conservation and management strategic planning.

Ecologically Significant Areas /Wildlife Protected Areas

To conserve the dwindling wildlife of the province, 50 Protected Areas (One National Park, 33 Wildlife Sanctuaries and 16 Game Reserves), 10 Ramsar Sites, 19 IBAs and three Eco-regions have been established representing the major ecosystems of the Province comprising of mountains, hills, deserts, wetlands, riverine forests and coastal areas (Table 1).

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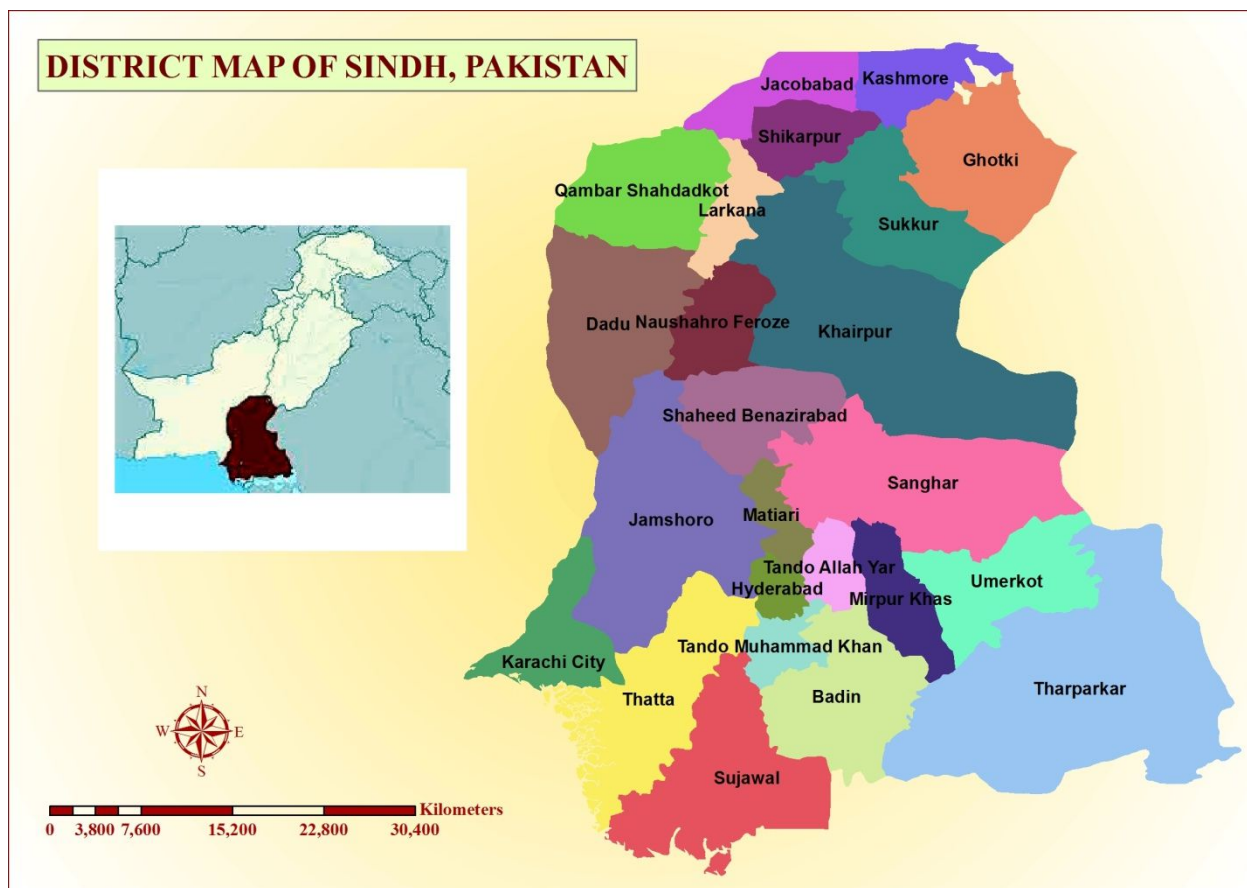


Fig. 1. Districts map of Sindh province.

Table 1. List of Wildlife Protected Areas of Sindh.

S. No.	Name of Protected Area	Area (ha)	District	Important Habitat for
A. NATIONAL PARK				
1.	Khirthar National Park	308,733	Jamshoro / Karachi	Sind Ibex, Urial, Chinkara
B. Wildlife Sanctures				
2.	Bijoro Chach	121	Thatta	Waterbirds
3.	Cut Munarki Chach	405	Thatta	Waterbirds
4.	Deh Akro-II	20,243	Shaheed Benazerahbad	Crocodiles and Waterbirds
5.	Dhounq Block	2,098	Shikarpur	Waterbirds
6.	Drigh Lake	164	Larkana	Waterbirds
7.	Ghandak Dhoro	31	Jacobabad	Waterbirds
8.	Gullel Khori	40	Thatta	Waterbirds
9.	Gulsher Dhund	24	Hyderabad	Waterbirds
10.	Hub Dam	27, 219	Karachi / Balochistan	Grey and Black Partridges. Sandrouses, Houbara Bustard, Water birds
11.	Hadero Lake	1,321	Thatta	Waterbirds
12.	Haleji Lake	1,704	Thatta	Waterbirds
13.	Hilaya forest	324	Thatta	Waterbirds
14.	Keti Bunder	8,948	Thatta	Waterbirds

	North			
15.	Keti Bunder South	23,046	Thatta	Waterbirds
16.	Khadi forest	81	Thatta	Waterbirds
17.	Khat Dhoro	11	Larkana	Waterbirds
18.	Keenjhar Lake	13,468	Thatta	Waterbirds
19.	Kot Dinghano	30	Shaheed Benazerahbad	Waterbirds
20.	Lakhat	101	Shaheed Benazerahbad	Waterbirds
21.	Lungh Lake	40	Larkana	Waterbirds
22.	Mahal Kohistan	70,577	Jamshoro	Waterbirds
23.	Majiran	24	Thatta	Waterbirds
24.	Marho Kotri	162	Thatta	Waterbirds
25.	Miani Dhand	57	Hyderabad	Waterbirds
26.	Mohabat Dero	16	Shaheed Benazerahbad	Waterbirds
27.	Munarki	12	Thatta	Waterbirds
28.	Nara Desert	223,590	Sukkur, Ghotki, Khairpur, Sanghar	Chinkara, Grey Partridge, Houbara Bustard
29.	Norang	243	Thatta	Waterbirds
30.	Rann of Katch	320,463	Badin / Tharparkar	Wild Ass, Chinkara, Bluebull, Houbara Bustard, Vultures, Waterbirds
31.	Samno Dhand	23	Hyderabad	Waterbirds
32.	Sadnani	84	Thatta	Waterbirds
33.	Shah Lanko	61	Thatta	Waterbirds
34.	Takkar	43,513	Khairpur	Chinkara, Grey Partridge, Houbara bustard
C. Game Reserves				
35.	Deh Jangisar	314	Thatta	Grey Partridge, Houbara Bustard
36.	Deh Khalifa	429	Thatta	Grey Partridge, Houbara Bustard
37.	Dosu Forest	2,312	Larkana	Grey Partidge, Houbara Bustard
38.	Hala Forest	954	Hyderabad	Partridges, Wild Boar, Indian Hare
39.	Indus Dolphin Reserve (Sukkur to Guddu Barrage)			Indus Dolphin, Fishing Cat
40.	Khipro Forest	3,885	Sanghar	Waterbirds
41.	Mando Dero	1,234	Sukkur	Grey and Black Partridges,
42.	Mirpur Sakro	777	Thatta	Waterbirds
43.	Nara Canal	109,966	Khairpur	Smooth-coated Otter, Hog Deer, Marsh Crocodile, Grey and Black Partridges and Waterbirds
44.	Pai Forest	1,969	Shaheed Benazerahbad	Grey and Black Partridges
45.	Sahib Samo	349	Hyderabad	Waterbirds
46.	Surjan	40,632	Jamshoro	Sind Ibex and Chinkara
47.	Sumbak	40,632	Jamshoro	Sind Ibex and Chinkara
48.	Eri	40,632	Jamshoro	Sind Ibex and Chinkara
49.	Hothiano	40,632	Jamshoro	Sind Ibex
50.	Tando Mitha Khan	5,343	Sanghar	Grey and Black Partridges, Houbara Bustard

Ramsar Sites in Sindh

As regards the wetlands of the Province, more than 400 wetlands have been identified. Being situated on the Central Asian Fly way, most of the wetlands of Sindh

provide ideal habitats for a wide variety of waterbirds. Ten such sites have been declared as Ramsar Sites in Sindh (Ramsar, 2018) (Table 2).

Table 2. List of Ramsar Sites in Pakistan.

S. No.	Wetlands	Location	Area
1	Astola (Haft Talar) Island	Balochistan	5,000 ha
2	Chashma Barrage	Punjab	34,099 ha
3	Deh Akro Wetland Complex	Sindh	20243 ha
4	Drigh Lake	Sindh	164 ha
5	Haleji Lake	Sindh	1,704 ha
6	Hub Dam	Sindh / Balochistan	27,000 ha
7	Indus Delta	Sindh	472,800 ha
8	Indus Dolphin Reserve	Sindh	125,000 ha
9	Jiwani Coastal Wetland	Balochistan	4,600 ha
10	Jabho Lagoon	Sindh	706 ha
11	Keenjhar Lake	Sindh	13,468 ha
12	Miani Hor	Balochistan	55,000 ha
13	Nurri Lagoon	Sindh	2,540 ha
14	Ormara Turtle Beaches	Balochistan	2,400 ha
15	Rann of Kutch	Sindh	566,375 ha
16	Tanda Dam	KPK	405 ha
17	Taunsa Barrage	Punjab	6,756 ha
18	Thanedar Wala	KPK	40,47 ha
19	Uachhali Complex (Including Khabbaki, Uchhali and Jahlar Lake)	Punjab	1,243 ha

Important Bird and Biodiversity Areas (IBAs) in Sindh

BirdLife International's IBA Program is a worldwide initiative aimed at identifying, documenting and working towards the conservation and sustainable management of a network of critical sites for the world's birds, termed as IBAs (BirdLife International, 2004).

Thus, IBAs are the critical sites for the conservation of birds and biodiversity. These are the places of

international importance and practical targets for conservation action used to reinforce existing protected area network. Such sites are selected as IBAs under more one or of the four global criteria.

There are 19 IBAs in Sindh. Most of these have been selected as IBAs for supporting some threatened species of birds as well as large populations of congregatory birds (Table 3).

Table 3. Important Bird and Biodiversity Areas (IBAs) in Sindh.

S. No.	Name
1	Deh Akro Wetland complex and Wildlife Sanctuary
2	Drigh Lake Wildlife Sanctuary
3	Haleji Lake Wildlife Sanctuary
4	Hammal Lake
5	Indus Dolphin Reserve
6	Jabho Lagoon
7	Keenjhar Lake Wildlife Sanctuary
8	Keti Bundar North Wildlife Sanctuary

9	KNP and Hub Dam
10	Mahboob shah Lake
11	Manchhar Lake
12	Mahrano Reserve Lake and Rohri Canal Wetlands
13	Nara canal Wetlands and Sadori, Soncheri and Sanghriaro Lakes
14	Outer Indus Delta
15	Nara Desert Wildlife Sanctuary
16	Nurri Lagoon
17	Pugri Lake
18	Phoosna Wetland Complex
19	Rann of Kutch Wildlife Sanctuary

Global 200 Eco-regions in Sindh

The global 200 is a global ranking of the Earth's most outstanding terrestrial, freshwater and marine habitats designated to serve as blueprint for biodiversity conservation at a global scale. It classifies those eco-

regions that are considered crucial, endangered, or vulnerable as a result of direct human impacts and those that are relatively stable or intact. Out of these 238 eco-regions, 3 out of 5 in Pakistan are located in Sindh (WWF Pakistan, 2018) (Table 4).

Table 4. Global 200 and Pakistan.

Global 200 Eco region No	Biogeographical Sites	Countries in which Eco region lies	Geographical Location	Habitat Type	Biodiversity Features	General Threats
Tibetan Plateau Steppe (110)	Palaearctic	Afghanistan, China, India, Pakistan, Tajikistan	High Plateau, north of Himalayas in Central Asia	Montane Grasslands and Shrublands	Snow Leopard, Wolf, Tibetan Sand Fox, Brown Bear	Hunting
Western Himalayan Temperate Forests (68)	Indo- Malayan	Afghanistan, India, Nepal, Pakistan	Mountains north of India and Pakistan	Temperate broad leaf and mixed forests	Include Palas Valley floristically rich in Pakistan, Ungulates, Marmots	Forest Logging, Hunting
Rann of Kutch Flooded Grasslands (99)	Indo –Malayan	India and Pakistan	Eastern Asia	Flooded Grassland and Savannas	Asiatic Wild Ass, Flamingo, Sarus Crane, Indian Courser, White Stork	Vulnerable to development pressure, water scarcity
Indus River Delta (156)	Indo- Malayan	Pakistan	Western Portion of Indian sub-continent	Large River Delta	Indus River Dolphin, Riverine Forest, Mangroves, Hog Deer	Dams on the rivers, cutting of the forests, water scarcity
North Arabian Sea (232)	Western Indo Pacific	Djibouti, Iran, Oman, Pakistan, Saudia Arabia, Somalia, UAE, Yeman	Waters of Arabian Peninsula and north of the Indian Ocean	Tropical Coral	Corals, Sea Grass beds, Mangroves, Dungong, Sea turtles, Whales, Endemic algae Keep Communities	World's busiest oil tankers route, over fishing, Eutrophication, Marine pollution

MATERIALS AND METHODS

Most of the wildlife protected areas were regularly visited during summer and winter seasons from 2010 to 2018. Surveys were undertaken each year in the area for the collection of data with regard to the occurrence, distribution and habitats of the biodiversity of the area i.e. mammals, birds, reptiles, amphibians and plants, particularly for the IEE/ EIA studies for development activities in the Province from time to time. Data were also collected during Wildlife Monitoring studies undertaken in the Gharo and Jhimpir Wind Corridors in Thatta and Jamshoro districts.

Data on waterbirds and wetlands has come through the studies taken under the AWC during these years.

RESULTS AND DISCUSSION

As per data collected in respect to the wildlife of the area, as many as 82 species of mammals (Ghalib *et al.*, 2004) 420 species of birds (Ghalib *et al.*, 2002), 103

species of reptiles (Khan *et al.*, 2012) and 07 species of amphibians (Begum *et al.*, 2014) have been recorded so far (Table 5).

Table 5. Biodiversity of Sindh.

Groups	Order	Families	Species
Mammals	09	28	82
Birds	18	70	420
Reptiles	3	22	103
Amphibians	01	02	07

The breakup of families and species of various groups of fauna is given below:

Mammals

Table 6 shows number of mammalain species in each main group recorded in Sindh.

Table 6. Number of Species in each main group of Mammals recorded.

S. No.	Order	Families	Number of species recorded from Sindh	Species / Groups
1	Insectivora	02	06	Hedgehogs, Shrews
2	Chiroptera	05	20	Bats
3	Carnivora	06	15	Wolf, Jackal, Foxes, Ratel, Caracal, Otter, Civet Cat, Mongooses, Hyaena , Leopard, Fishing Cat, Desert Cat, Jungle Cat
4	Pholidota	01	01	Indian Pangolin
5	Artiodactyla	04	06	Nilgai, Gazelle, Wild Goat, Urial, Hog Deer, Wild Boar
6	Perrisodactyla	01	01	Wild Ass
7	Lagomorpha	01	01	Hare
8	Rodentia	03	19	Squirrel, Porcupine, Rats, Mice, Gerbils, Desert Jird
9	Cetacea	05	13	Whales, Dolphins, Porpoise

Birds

Five groups of birds have been made based on their ecology and habits viz. Waterbirds, Birds of prey, Game Birds, Perching Birds and Birds of varied habitats (Table 7).

Table 7. Number of Species in each main group of Birds.

S. No.	Group	No. of species in the group
1	Waterbirds	148
2	Birds of Prey	52
3	Perching Birds	146
4	Others	74

The composition of different groups is given below:

Bird Groups

Waterbirds

Grebes, Shearwaters, Storm Petrels, Tropic Birds, Pelicans, Booby, Cormorants, Darter, Herons, Egrets, Bitterns, Storks, Ibis, Spoonbill, Flamingos, Geese, Swans, Ducks, Cranes, Crakes, Rails, Waterhens, Moorhens, Coot and Waders.

Birds of Prey

Kites, Buzzards, Hawks, Eagles, Vultures, Harriers, Osprey, Falcons and Owls.

Game Birds

Partridges, Chakur, Quails, Button Quails, Peafowl, Bustards, Lesser Florican, Sandgrouses, Pigeons, Doves and Waterbirds.

Passerines / Perching Birds/ Songbirds

Larks, Swallows, Martins, Shrikes, Oriole, Drongo, Rosy Pastor, Mynas, Starling, Tree Pie, Crows, Raven, Grey Hypocolius, Waxwing, Wood Shrikes, Minivets, Bulbuls, Babblers, Flycatchers, Warblers, Prinias, Tailor Bird, White Throats, Chiffchaffs, Bluethroat, Redstart, Chats, Bushchat/ Stonechats, Wheatears, Thrushes, Pipits, Wagtails, Sunbird, White-eye, Sparrows, Weaver Birds, Munias, Finches and Buntings.

Others

Parakeets, Cuckoos / Koel, Nightjars, Swifts, Kingfishers, Bee-eaters, Rollers, Hoopoe, Wryneck and Woodpeckers.

Reptile Groups

As many as 103 species of reptiles have been recorded from Sindh comprising of the following groups (Table 8).

Table 8. Number of Species in each main group of Reptiles.

S. No.	Groups	No. of species
1	Turtles and Tortoise	14
2	Lizards	42
3	Snakes (Poisonous Snakes = 19, Non- Poisonous Snakes = 26)	45
4	Crocodile	01
5	Gavial	01

Key Species

The key species of the mammals of Sindh include Sind Wild Goat (*Capra aegagrus*), Urial (*Ovis vignei*), Chinkara (*Gazella bennettii*), Hog Deer (*Axis porcinus*), Hyaena (*Hyaena hyaena*), Wolf (*Canis lupus*), Leopard, (*Panthera pardus*), Caracal (*Felis caracal*), Honey Badger (*Mellivora capensis*), Pangolin (*Manis crassicaudata*), Fishing Cat (*Prionailurus viverrinus*), Desert Fox (*Vulpes vulpes*), Indus Dolphin (*Platanista minor*), Humpbacked or Plumbeous Dolphin (*Sousa plumbea*) and Bottlenosed Dolphin (*Tursiops truncatus*). Most of these are declining but Ibex, Urial, Chinkara and Indus Dolphin have been surviving in the Protected Areas due to management efforts.

Indicator Species recorded from the area include: Sind Ibex, Urial, Chinkara, Striped Hyaena, Grey Wolf, Honey Badger and Caracal.

The key species of birds of Sindh include: Indian Peafowl (*Pavo cristatus*), Sarus Crane (*Grus antigone*), Houbara Bustard (*Chlamydotis undulata*), Marbled Teal (*Marmaronetta angustirostris*), Grey Partridge (*Francolinus pondicerianus*), Chakur (*Alectoris chukar*) and Shaheen Falcon (*Falco peregrinus*).

The key species of Reptiles of Sindh are: Marsh Crocodile (*Crocodylus palustris*), Green Turtle (*Chelonia mydas*), Olive Ridley Turtle (*Lepidochelys olivacea*), Indian Python (*Python molurus*), Desert Monitor (*Varanus griseus*) and Spinytailed Lizard (*Saara hardwickii*). These species are under threat except Marsh Crocodile which is quite common in its habitat.

Population Status of Important Wildlife Species

Declining

Leopard, Wolf, Caracal, Striped Hyaena, Chinkara, Ratel, Hog Deer, Pangolin, Whitebacked Vulture, Indian Longbilled Vulture, Sanderling, Oystercatcher, Houbara Bustard, Cinereous Vulture, Lesser Flamingo, Garganey, Spotbill Duck, Cotton Teal, Whistling Teals, Redcrested Pochard, Golden Plover, Ruddy Shelduck, Large Indian Parakeet, Indian Python, Olive Ridley, Fat-tailed Gecko and Indian Chamaeleon.

Increasing / Abundant Species

Wild Boar, Gerbils, Indian Porcupine, Sind Wild Goat, Urial, Smooth-coated Otter, Indus Dolphin, Doves, Pigeons, Sandgrouses, House Crow, Mynas, White-cheeked Bulbul, Black kite, Redwattled Lapwing, Blackwinged Stilt, and Indian Silverbill.

Marsh Crocodile (Large numbers recorded from Nara Canal area, Deh Akro Wetland Complex and Haleji)

Species Localized in Distribution

Leopard, Wolf, Hog Deer, Lesser Flamingo, Grey Hypocolius, Dusky Crag Martin, White Ibis, Indian Peafowl, Longbilled Vulture, Chakur, Seesee Partridge, House Bunting, Marbled Teal, Painted Stork, Longbilled Pipit and Indian Chamaeleon.

Restricted Range Species

Mountain Chiffchaff, Sind Sparrow, Jerdon's Babbler and Rufous-vented Prinia.

Key Wildlife Areas

The following areas were found to be the most important wildlife areas in the Province:

Chotiari Wetland Complex, Deh Akro Wetland Complex, Drigh Lake, Hadero lake, Haleji Lake, Hub Dam, Indus Dolphin Reserve, Jubho Lagoon, Keenjhar lake, Karachi Coast, Kharochhan, Khirthar National Park, Lung lake, Mahal Kohistan Wildlife Sanctuary, Manchhar Lake, Nara Desert Wildlife Sanctuary, Nara

Game Reserve including Nara Wetland Complex, Nurri-ri Lagoon, Pai Forest, Rann of Kutch Wildlife Sanctuary, Surjan, Sumbak, Eri and Huthiano Game Reserves.

Threats to the Wildlife and the Ecosystems

The major threats to the biodiversity of the Province are poaching, pollution, habitat degradation and lack of management in the PAs. However, the general threats to the species, ecosystems and the environment have been outlined below:

- 1) Hunting
- 2) Habitat loss to developmental activities
- 3) Habitat degradation
- 4) Deforestation

- 5) Pollution
- 6) Firewood collection
- 7) Drought
- 8) Sea water intrusion in the coastal areas
- 9) Human population pressure particularly in the PAs
- 10) Lack of freshwater flows/ water scarcity

Threatened Species of Wildlife of Sindh

As many as 11 species of mammals are threatened, while 02 species of mammals are Near threatened (Table 9), 18 species of birds are Threatened (Table 10), 18 species of birds are Near threatened (Table 11) and 11 species of reptiles are Threatened while 01 species of reptiles is Near-threatened (Table 12).

Table 9. Threatened / Near-threatened Mammals.

S. No.	Mammals	Scientific name	Status
1	Hog Deer	<i>Axis porcinus</i>	EN
2	Blue Whale	<i>Balaenoptera musculus</i>	EN
3	Indus Dolphin	<i>Platanista minor</i>	EN
4	Humpback Whale	<i>Megaptera novaeangliae</i>	EN
5	Indian Pangolin	<i>Manis crassicaudata</i>	EN
6	Sindh Wild Goat	<i>Capra aegagrus</i>	VU
7	Urial	<i>Ovis vignei</i>	VU
8	Smooth - Coated Otter	<i>Lutrogale perspicillata</i>	VU
9	Fishing Cat	<i>Prionailurus viverrinus</i>	VU
10	Finless Porpoise	<i>Neophocaena phocaenoides</i>	VU
11	Leopard	<i>Panthera pardus</i>	VU
12	Humpback Dolphin	<i>Sousa plumbea</i>	NT
13	Wild Ass	<i>Equus hemionus</i>	NT

Table 10. Threatened Birds.

S. No.	Birds	Scientific name	Status
1	Indian Whitebacked Vulture	<i>Gyps bengalensis</i>	CR
2	Indian (Long billed) Vulture	<i>Gyps indicus</i>	CR
3	Sociable Lapwing	<i>Vanellus gregarious</i>	CR
4	Redheaded Vulture	<i>Sarcogyps calvus</i>	CR
5	Great Indian Bustard	<i>Choriotis nigriceps</i>	EN
6	Egyptian Vulture	<i>Neophron percnopterus</i>	EN
7	Leekh or Lesser Florican	<i>Sypheotides indica</i>	EN
8	Cinereous Vulture	<i>Aegyptius monachus</i>	EN
9	Greater Adjutant	<i>Leptoptilos dubius</i>	EN
10	Dalmatian Pelican	<i>Pelecanus crispus</i>	VU
11	Marbled Teal	<i>Marmaronetta angustirostris</i>	VU
12	Pallas's Fishing Eagle	<i>Haliaeetus leucorhynchus</i>	VU
13	Sarus Crane	<i>Grus antigone</i>	VU
14	Houbara Bustard	<i>Chlamydotis undulata</i>	VU
15	Jerdon's Babbler	<i>Chrysomma altiloostre</i>	VU
16	Imperial Eagle	<i>Aquila heliaca</i>	VU
17	Greater Spotted Eagle	<i>Aquila clanga</i>	VU
18	Lesser White-fronted Goose	<i>Anser erythropus</i>	VU

Table 11. Near Threatened Birds.

S. No.	Common name	Scientific name
1	Darter	<i>Anhinga rufa</i>
2	Ferruginous Duck	<i>Aythya nyroca</i>
3	Black necked Stork	<i>Ephippiorhynchus asiaticus</i>
4	Painted Stork	<i>Ibis leucocephalus</i>
5	Lesser Flamingo	<i>Phoenicopterus minor</i>
6	Blackbellied Tern	<i>Sterna acuticauda</i>
7	Pallid Harrier	<i>Circus macrourus</i>
8	Laggar Falcon	<i>Falco jugger</i>
9	European Roller	<i>Coracias garrulous</i>
10	Rufousvented Prinia	<i>Prinia burnesii</i>
11	Lammergiar/Himalayan Bearded Vulture	<i>Gypaetus barbatus</i>
12	Rednecked Falcon	<i>Falco chiquera</i>
13	Alexandrine Parakeet	<i>Psittacula eupatria</i>
14	Falcated Teal	<i>Anas falcate</i>
15	Blacktailed Godwit	<i>Limosa limosa</i>
16	Eurasian Curlew	<i>Numenius arquata</i>
17	Indian River Tern	<i>Sterna aurantia</i>
18	Blackheaded Ibis / Oriental White Ibis	<i>Threskiornis melanocephala</i>

Table 12. Threatened / Near-threatened Reptiles.

S. No.	Reptiles	Scientific name	Status
1	Gharial	<i>Gavialis gangeticus</i>	CR
2	Green turtle	<i>Chelonia mydas</i>	EN
3	Narrow-headed Softshell Turtle	<i>Chitra indica</i>	EN
4	Marsh Crocodile	<i>Crocodylus palustris</i>	VU
5	Olive Ridley Turtle	<i>Lepidochelys olivacea</i>	VU
6	Common River Turtle/ Crowned River Turtle	<i>Hardella thurjii</i>	VU
8	Peacock Soft shell Turtle	<i>Nilssonia hurum</i>	VU
9	Indian Soft shell Turtle	<i>Nilssonia gangeticus</i>	VU
10	Black spotted Turtle	<i>Geoclemys hamiltoni</i>	VU
11	Central Asian Tortoise	<i>Testuda horsfieldi</i>	VU
12	Brown Roofed Turtle	<i>Pangshura smithi</i>	NT

Extirpated Species of Sindh

The following species of mammals, previously reported occurring wild in Sindh, have now become extinct / extirpated in the Province: Tiger (*Panthera tigris*), Lion (*Panthera leo*), Swamp Deer (*Cervus duvaucelli*), Blackbuck (*Antelope cervicapra*) and Indian Wild Ass (*Equus hemionus*) (Roberts, 1997).

Among the birds, Woolly-necked Stork (*Ciconia episcopus*), Greater Adjutant (*Leptoptilos dubius*), and Comb Duck (*Sarkidiornis melanotos*) are believed to be extirpated from Sindh (Roberts, 1991).

Among reptiles, Gavial (*Gavialis gangeticus*) has been extirpated.

Threatened Wetlands of Sindh

Majority of the most important wetlands of Sindh are under threat. The major threats to these wetlands have been identified (Table 13).

Table 13. Threats to the Wetlands of Sindh.

S. No.	Wetlands	Threats
1	Haleji Lake	Hunting
2	Hub Dam	Drought
3	Indus Delta	Pollution, lack of freshwater in flow
4	Indus Dolphin Reserve	Pollution
5	Jubho Lagoon	Hunting

6	Karachi Coast	Habitat degradation, pollution, developmental activities
7	Keenjhar Lake	Pollution, disturbance, hunting
8	Manchhar Lake	Pollution
9	Nurr-ri Lagoon	Hunting
10	Wetlands of the Rann of Kutch	Drought

Protected Families, Groups and Species (Under the Sindh Wildlife Protection Ordinance, 1972)

- Mammals: 16 species of mammals have been declared protected (Table 14).
- Birds: 14 families of birds; all Geese, all Swans and 10 species of other birds are protected (Table 15).
- Reptiles: All Monitor Lizards; all Marine and Freshwater Turtles, Tortoises, Gavial, Marsh Crocodile and Python are protected (Table 16).
- Anomalies: Such rare / scarce species as Indian Wolf, Striped Hyaena, and Indian Chamaeleon have not been included in the list of protected animals, while Rhesus Monkey, not available in the province, is protected.

Table 14. List of Protected Species of Mammals.

S. No.	Common name	Scientific name
1	Pangolin	<i>Manis crassicaudata</i>
2	Ratel	<i>Mellivora capensis</i>
3	Smooth Indian Otter	<i>Lutrogale perspicillata</i>
4	Small Indian Civet	<i>Viverricula indica</i>
5	Caracal	<i>Felis caracal</i>
6	Leopard	<i>Panthera pardus</i>
7	Fishing Cat	<i>Prionailurus viverrinus</i>
8	Indian Wild Ass	<i>Equus hemionus khur</i>
9	Hog Deer	<i>Axis porcinus</i>
10	Chinkara	<i>Gazella bennettii</i>
11	Bluebull	<i>Boselaphus tragocamelus</i>
12	Indus Dolphin	<i>Platanista minor</i>
13	Desert Cat	<i>Felis silvestris</i>
14	Jungle Cat	<i>Felis chaus</i>
15	Sindh Ibex	<i>Capra aegagrus</i>
16	Urial	<i>Ovis vignei blanfordi</i>

Table 15. List of Protected Species of Birds.

S. No.	Families	Species
1	Family Ardeidae	i.e. all herons, Paddy birds, Egrets or Bitterns

2	Family Pelecanidae	i.e. all Pelicans
3	Family Ciconiidae	i.e. all Storks
4	Family Threskiornithidae	i.e. all Ibises and Spoonbills
5	Family Phoenicopteridae	i.e. all Flamingos
6	Family Accipitridae	i.e. all Hawks, Vultures, Kites, Buzzards
7	Family Falconidae	i.e. all Falcons, Kestrels, Hobbies
8	Family Phasianidae	i.e. Partridges and Peafowls
9	Family Gruidae	i.e. all Cranes
10	Family Otididae	i.e. all Bustrads
11	Family Strigidae	i.e. all Owls
12	Family Tytonidae	i.e. all Barn Owls
13	All Geese	i.e. all members of the Genus Anser
14	All Swans	i.e. all members of the Genus Cygnus
15	Marbled Teal	<i>Marmoronetta angustirostris</i>
16	Spotbill Duck	<i>Anas poecilorhyncha</i>
17	Cotton Teal	<i>Nettapus coromandelianus</i>
18	Whiteheaded Duck	<i>Oxyura leucocephala</i>
19	Woodcock	<i>Scolopax rusticola</i>
20	Large Pintailed Sandgrouse	<i>Pterocles alchata</i>
21	Rosy Pastor	<i>Sturnus roseus</i>
22	Ruddy Shelduck	<i>Tadorna ferruginea</i>
23	Common Shelduck	<i>Tadorna tadorna</i>
24	Houbara Bustard	<i>Chlamydotis undulata/ macqueenii</i>

Table 16. List of Protected Species of Reptiles.

S. No	Common name	Scientific name
1	Marsh Crocodile	<i>Crocodylus palustris</i>
2	Python	<i>Python molurus</i>
3	Gavial	<i>Gavialis gangeticus</i>
4	Monitor Lizards	All lizards of Genus Varanus
	Bengal Monitor	<i>Varanus bengalensis</i>
	Yellow Monitor	<i>Varanus flavescens</i>
	Desert Monitor	<i>Varanus griseus</i>
5	Marine Turtles	All Marine Turtles of Genera Dermochelys, Caretta, Eretmochelys, Chelonia and Lepidochelys

	Loggerhead Sea Turtle	<i>Caretta caretta</i>
	Green Sea Turtle	<i>Chelonia mydas</i>
	Hawksbill Turtle	<i>Eretmochelys imbricate</i>
	Olive Ridley	<i>Lepidochelys olivacea</i>
	Leatherback Sea Turtle	<i>Dermochelys coriacea</i>
6	Freshwater Turtles	
	Yellow Spotted Mud Turtle/ Spotted Pond Turtle	<i>Geoclemys hamiltonii</i>
	Common River Turtle/ Crowned River Turtle	<i>Hardella thurjii</i>
	Indian Saw-back Turtle /Indian Roofed Turtle	<i>Pangshura tecta</i>
	Brown Roofed Turtle	<i>Pangshura smithii</i>
	Indian Flap shell Turtle	<i>Lissemys punctata</i>
	Indian Soft shell Turtle	<i>Nilssonina gangeticus</i>
	Peacock Soft shell	<i>Nilssonina hurum</i>
	Narrow-headed Soft shell Turtle	<i>Chitra indica</i>
7	Star Tortoise	<i>Geochelone elegans</i>

Game Animals

The animals allowed for hunting subject to game rules and regulations have been listed in schedule 1 of the Sind Wildlife Protection Ordinance, 1972. Among mammals, the list includes Cape Hare (*Lepus capensis*), Indian Hare (*Lepus nigricollis*) and Arabian Hare (*Lepus arabeus*).

For birds, it includes 47 species of birds comprising of waterbirds and some game birds including such rare/less common species such as Whistling Teals, White-eyed Pochard, Greater Scaup, Golden Eye, Smew, Redbreasted Merganser, Chakur, Eastern Golden Plover, Painted Snipe, Stone Curlew, 6 species of Sandgrouses (excluding Large Pintail Sandgrouse, *Pterocles alchata*). Out of these, Tibetan Sandgrouse (*Syrhaptes tibetanus*) is not found in Pakistan.

Flora of Wildlife areas of Sindh

During the study, plant specimens were collected and 33 plant species belonging to 20 families were identified (Table 17).

Table 17. Important Flora of Sindh Wildlife areas.

S. No.	Family	Plant Species	Local name	Life Form	Life Span
1	Mimosaceae	<i>Acacia jacquemontii</i>	Buburi	Shrub	Perennial
2	Mimosaceae	<i>Acacia Senegal</i>	Kor	Tree	Perennial
3	Mimosaceae	<i>Prosopis cineraria</i>	Gundo	Tree	Perennial
4	Mimosaceae	<i>Prosopis glandulosa</i>	Devi	Shrub	Perennial
5	Mimosaceae	<i>Prosopis juliflora</i>	Devi	Shrub	Perennial
6	Nyctaginaceae	<i>Boerhaavia procumbense</i>	Pathri	Herb	Annual
7	Amrarantaceae	<i>Avera javanica</i>	Booh	Sub-Shrub	Perennial
8	Poaceae	<i>Aristida adscensionis</i>	Lumb Gaah	Grass	Annual
9		<i>Cymbopogon jwarancusa</i>	Poi	Grass	Perennial
10		<i>Dactyloctenium Aegyptium</i>	Gandheer	Grass	Annual
11		<i>Lasiurus scindicus</i>	Sain	Grass	Perennial
12		<i>Ochthochloa compressa</i>	Gundir	Grass	Annual
13		<i>Panicum turgidum</i>	Ghim	Grass	Perennial
14		<i>Stipagrostis plumosa</i>	Lumb Gaah	Grass	Perennial
15	Capparidaceae	<i>Capparis deciduas</i>	Kiror	Shrub	Annual
16	Caesalpiniaceae	<i>Cassia italic</i>	Senna/ dadwahal	Herb	Annual
17	Burseraceae	<i>Commiphora wightii</i>	Gogur	Shrub	Perennial
18	Convolvulaceae	<i>Convolvulus prostratus</i>	-	Herb	Annual
19	Fabaceae	<i>Crotalaria burhia</i>	-	Shrub	Semi-Perennial
20	Fabaceae	<i>Indigofera oblongifolia</i>	Jhile	Herb	Annual
21	Euphorbiaceae	<i>Euphorbia caducifolia</i>	Thuhar	Shrub	Perennial
22	Euphorbiaceae	<i>Euphorbia prostrate</i>	-	Herb	Annual
23	Zygophyllaceae	<i>Fagonia indica</i>	Pria	Shrub	Annual
24	Zygophyllaceae	<i>Tribulus terrestris</i>	Bakhro	Herb	Annual
25	Boraginaceae	<i>Heliotropium crispium</i>	Kharsun	Shrub	Semi-Perennial
26	Boraginaceae	<i>Heliotropium europium</i>	Kharsun	Grass	Perennial
27	Asclepiadaceae	<i>Leptadenia pyrotechnica</i>	Khip	Shrub	Perennial

28	Aizoaceae	<i>Limeum indicum</i>	-	Herb	Semi- Perennial
29	Solanaceae	<i>Lycium ruthenicum</i>	Garati	Sub-Shrub	Perennial
30	Apocynaceae	<i>Rhazya stricta</i>	Sahaer	Shrub	Perennial
31	Salvadoraceae	<i>Salvadora oleoides</i>	Khabar/ Yar	Tree	Perennial
32	Tamaricaceae	<i>Tamarix aphylla</i>	Lao	Tree	Perennial
33	Rhamnaceae	<i>Zizyphus nummularia</i>	Ber	Small Tree	Perennial

Contributions of Government Departments, Academia and the NGOs in studies relating to Wildlife Ecology and Conservation in the province of Sindh

1. Baseline Data

Baseline data (unpublished) about some important sites are available such as KNP (UoM, 2000) NDWS (Halcrow, Hagler Bailley), KPAC (EMC, 2012) and NGR (Halcrow), Nara Wetlands Complex and Khyberani Forest (IFAP).

2. Management Plan

These are not available for most of the PAs. Those available include: KNP (Hagler Bailley), Hub Dam (WWF-P), KNP (Halloway and Khan, 1974). The management plans for Haleji and Keenjhar prepared by Peter Conder are very brief and now the copies are not available.

3. Bioecological Studies on the Wetlands / PAs of Sindh

These have been made in respect of Haleji, Keenjhar, Hub Dam, Chotiari Wetland Complex and Nara Game Reserve.

4. Studies on particular species / species groups

These have been made on: Birds of Prey, Vultures, Waterbirds, Marine Turtles, Smooth-coated Otter, Marsh Crocodile and Freshwater Turtles.

5. Steps have been taken to conserve the populations of Indus Dolphin in its entire stretch of distribution. Population Census of the species is made after every five year. The total population of Indus Dolphin was recorded as 1088 in 2001, 1471 in 2006, 1452 in 2011, and 1816 in 2016, as recorded by WWF-Pakistan.

6. Publications on Wildlife of Sindh / PAs of Sindh include: Sind Game Guide, KNP, Haleji Lake and various charts published on Mammals, Birds, Reptiles, Sea Turtles, Map of Wildlife of Sindh. Pamphlets on Keti Bunder, Pai Forest, Chotiari, Keenjhar Lake and Indus Delta.

7. Ph. D Research Program in Wildlife

Department of Zoology, University of Karachi produced over 30 Ph.D's in the field of Wildlife

including 22 Ph.D's supervised by Prof. Dr. Muhammad Zaheer Khan (during 1997 - 2018). The Department of Zoology, University of Sindh, Jamshoro also produced several Ph.D's in wildlife.

8. Capacity Building

The Scientific and Cultural Society of Pakistan conducted over 100 training workshops/ courses since 1988 at the Department of Zoology, University of Karachi and trained graduate and postgraduate students in the field of wildlife conservation and management.

The IUCN Commission on Ecosystem Management (CEM), West & Central Asia also conducted several training workshops in the field of Ecosystem Conservation and Management at the Department of Zoology, University of Karachi for young scholars.

9. Trophy Hunting: Trophy Hunting of Sind Ibex and Urial takes place in Kohistan Conserancy Area in the hunting season from 5th March each year. Sind Ibex to the extent of 15 animals and Urial to the extent of 05 animals are allowed for hunting under permit in Eri and Huthiano Game Reserves and in Halalo and Pachran in Community Based Management Area in district Jamshoro, Sindh.

Action Plan

A long term action plan for the conservation and management of wildlife of Sindh is suggested as under:

1. Compilation of Inventory of the wetlands and mapping of important sites on CAF in Sindh.
2. Recording the bio-ecology of the Ramsar Sites of Sindh.
3. Assessment of the current status of the PAs particularly the degraded Game Reserves and the Riverine Forests
4. Mapping the limits and boundaries of PAs.
5. Management of the threatened wetlands particularly with reference to Keenjhar Lake, Manchhar Lake and Karachi Coast.

6. Preparation of Management Plans for the PAs. Darawat Dam (Jamshoro), Ranpur Dam and Gorano Dam (Tharparkar).
7. Preparation and implementation of Bird Monitoring Plan to determine the effect of Wind/Solar Power Plants in Gharo and Jhampir Wind Corridors.
8. Preparation of Wildlife Policy for Sindh.
9. Identification of the possibilities of developing ecotourism in Sindh particularly with reference to Karachi Coast, Nagarparkar area, Keenjhar lake, Haleji Lake, Gorakh Hills, KNP (Karchat and Khar), Manchhar lake, Chotiari Wetland Complex, Pai Forest, Sufi Anwar Shah Safari Park, Darawat Dam Area and Indus Dolphin Reserve.
10. Formulation and implementation of a Research Plan to determine the current status of the species of special conservation interest including Hog Deer, Chinkara, Indian Pangolin, Indian Wolf, Fishing Cat, Ratel, Falcons, Marbled Teal, Houbara Bustard, Indian Vulture, White-backed Vulture, Indian Peafowl, Olive Ridley, Freshwater Turtles, Indian Python, Sind Krait and Indian Chamaeleon.
11. Conservation and propagation of the threatened plant species of Sindh viz. *Salvadora oleoides* (Jaar / Khabbar), *Prosopis cineraria* (Kandi / Jand), *Tecoma undulata* (Roheerho), *Acacia senegal* (Kombhat), *Commiphora mukul* (Gugral) and *Azadirachta indica* (Neem).
12. Recognition and propagation of the importance of Sind Ibex (Provincial Mammal), Black Partridge (Provincial Bird) and Neem (Provincial Tree).
13. Preparation of a Wetland Policy for Sindh.
14. Revision and updating of wildlife legislation to regulate hunting, trade in pet animals and freshwater turtles, protection of marine fauna, safeguard of rare/ scarce species, and relaxation in laws/ rules for development activities in the PAs in national interest.
15. Setting up a Council for Conservation of Wildlife at provincial level to deal with the implementation of the provisions of International Conventions related to Biodiversity and other related matters including coordination with other provinces.
16. Studies on the less studied important wetlands viz. Charwo, Phoosna, Shakoor Dhand, Nurr-ri, Darawat Dam (Jamshoro), Ranpur Dam and Gorano Dam (Tharparkar).
17. Studies on: 1) Conservation and Management of mangroves 2) Sea Intrusion at Indus Delta 3) Impacts of the environmental effects of RBOD 4) Control of pollution at Karachi Coast, Keenjhar Lake, Manchhar Lake, Hedero Lake, and Indus Delta.
18. Establishment of a Sindh Forest and Wildlife Research Institute to impart degree courses in Forestry and Wildlife Management.
19. Action by the Wildlife Department to encourage captive breeding of commercially important wildlife species particularly Rhesus Monkey, Chukor, Demoiselle Crane, Whitebacked Vulture, Indian Peafowl, Red Munia, Roseringed Parakeet, Houbara Bustard, Fat tailed Gecko, Indian Chamaeleon along with exotic species such as Budgerigars, Java Sparrow, Cockatiels, Lovebirds, Cuckatoos and Pheasants.
20. Detailed information about the 14 IBAs in Sindh is already available, as these are PAs or Ramsar Sites but this requires updating.
21. Management Plans for the newly established Wildlife Reserves such as Takkar Wildlife Park, Soofi Anwar Shah Safari Park and Mohabbat Dero Wildlife Park need to be prepared.

REFERENCES

- Abbas, D., Rais, M., Ghalib, SA. and Khan, MZ. 2010. First Record of Spotted Munia (*Lonchura punctulata*) from Karachi. Pakistan J. Zool. 42(4):503-505.
- Asrar, FF. 1999. Decline of Marine Turtle Nesting Population in Pakistan. Marine Turtle Newsletter 83:13-14.
- Begum, A., Ghalib, SA., Khan, MZ., Zehra, A., Khan, AR., Babar, H., Latif, T. and Tabbassum, F. 2014. An overview of the current status and distribution of amphibians in Sindh. African Journal of Science and Research 3(4):21-23.
- BirdLife International. 2004. Important Bird Areas in Asia: Key Sites for Conservation. Birdlife International, Cambridge. AJAR. (3)4:21-23.
- Firdous, F. 1985. Research and Conservation of Marine Turtle along Karachi Coast. In: Endangered Marine

- Animals and Parks, India. Proc. Symp. Ed. Silas, EG. Marine Biological Association of India. 1:280-282.
- Firdous, F. 1988. Conservation of Turtles at Sandspit and Hawkes Bay, Karachi. In: Proc. of International Conference on Marine Sciences of the Arabian Sea. Eds. Thompson, MF. and Tirmizi, NT. American Institute of Biological Sciences, Washington, DC, USA. 217-222.
- Ghalib, SA., Hasnain, SA., Perveen, S. and Khan, AR. 2002. Current status of the Birds of Sindh. J. Nat. Hist. Wild. 1:37-57.
- Ghalib, SA., Hasnain, SA. and Khan, AR. 2004. Current status of the Mammals of Sindh. J. Nat. Hist. Wild. 3(1):1-6.
- Ghalib, SA., Khan, MZ., Ahmed, SM., Begum, A., Hussain, B. and Ahmed, W. 2014. Study of the wildlife of Jhimpir wind Corridor; district Thatta, Sindh and development of bird monitoring strategy in the area. African Journal of Science and Research. 3(6):01-09.
- Hashmi, MUA. and Khan, MZ. 2014. Studies on Some Aspects of Burrows of Monitor Lizard (*V. brngalensis*) in the Karachi and Hyderabad, Sindh, Pakistan. International Journal of Innovation and Scientific Research. 8(2):153-158.
- Holloway, CW. and Khan, KM. 1974. Management plan for Kirthar National Park, Sind, Pakistan.
- Kabraji, AM. and Asrar, F. 1984. Conservation of Turtles at Sandspit & Hawkes Bay, Pakistan. World Wildlife Fund Project 1451. WWF International and Sindh Wildlife Management Board. pp52.
- Kanwal, R. and Khan, MZ. 2018. A Study of Status and Recent Conservation Measures of Sindh Province Freshwater Turtles. Journal of Entomology and Zoology Studies. 6(2):953-960.
- Khan, MZ. 2006. Current Status and Biodiversity of Indus Dolphin Reserve and Indus Delta Wetlands (Ramsar Sites). Proc. 9th International River Symposium, Brisbane, Australia. 01-26.
- Khan, MZ., Ghalib, SA. and Hussain, B. 2010. Status and New Nesting Sites of Sea Turtles of Pakistan. Chelonian Conservation and Biology. 9(1):119-123. DOI: 10.2744/CCB-0767.1
- Khan, WA., Qasim, M., Ahmad, E., Chaudhry, AA., Bhagat, HB. and Akhtar, M. 2010^a. Status of Smooth-coated Otter (*Lutrogale perspicillata sindica*) in Pakistan. Pakistan J. Zool. 42(6):817-824.
- Khan, MZ., Ghalib, SA., Siddiqui, S., Siddiqui, TF., Farooq, RY., Yasmeen, G, Abbas, D. and Zehra, A. 2012. Current Status and Distribution of Reptiles of Sindh. Journal of Basic & Applied Sciences. 8(1):26-34. DOI: <http://dx.doi.org/10.6000/1927-5129.2012.08.01.05>.
- Khan, AZ., Khan, WA. and Chaudhry, AA. 2015. Mammalian Diversity in Thar Desert Habitat of Tharparkar District, Sindh, Pakistan. Pakistan J. Zool. 47(5):1205-1211.
- Khan, MZ., Kanwal, R. and Ghalib, SA. 2018. Study of Freshwater Turtles in selected Districts of Sindh-Pakistan: Threats, Illegal trade and Conservation. The Journal of Animal and Plant Sciences. 28(3):915-926.
- Khan, MZ., Rizvi, SA., Kanwal, R., Siddiqui, S., Safi, A., Iqbal, MA., Zehra, A., Manzoor, U., Ullah, U. and Khan, MA. 2017. Seasonal and Environmental Changes and their Effects on Selected Ramsar Wetlands Health and Birds Population. Canadian Journal of Pure and Applied Sciences. 11(3):4313-4320.
- Minton, SA. 1966. A Contribution to the Herpetology of West Pakistan. Bulletin of the American Museum of Nat. Hist. 134:27-184.
- Rais, M., Abbass, D., Khan, MZ., Khan, IS., Ghalib, SA., Tabbassum, F., Akber, G. and Nawaz, R. 2008. Changes in the avifauna of the wetlands of District Sanghar, Sindh, Pakistan. Berkut Ukrainian Journal of Ornithology . 17 (1-2):13-24.
- Rais, M., Khan, MZ., Ghalib, SA., Abbass, D., Khan, WA., Islam, S. and Husnain, A. 2009. Recent Records of Smooth-Coated Otter (*Lutrogale perspicillata*) from Sindh, Pakistan. Pakistan J. Zool. 41(5):413-414.
- Rais, M., Khan, MZ., Abass, D. and Akber, G. 2010. Study on Some Medium-sized and Large Mammals of Chotiari Wetlands Complex, Sanghar, Sindh, Pakistan. Journal of Basic and Applied Sciences. 6(1):63-67.
- Ramsar. 2018. Ramsar Sites of Pakistan. <https://www.ramsar.org/wetland/pakistan>.
- Roberts, TJ., Passburg, R. and Zalinge, NPV. 1986. A Checklist of Birds of Karachi and Lower Sindh., Pakistan. WWF Pakistan. pp37.
- Roberts, TJ. 1991. The Birds of Pakistan. Oxford University Press, Karachi.

Roberts, T.J. 1997. Mammals of Pakistan. Oxford University Press, Karachi.

Siddiqui, PA. 1982. Bioecological of avifauna in the province of Sind. Final Technical Report PL- 480. Department of Zoology, University of Karachi, Karachi, Pakistan.

Siddiqui, PA., Saqib, TA. and Kazmi, MA. 2001. Birds Population in Different Coastal Areas of Sindh. Pakistan Journal of Marines Science. 10 (1):49-60.

WWF Pakistan. 2018. Global 200: Eco-regions of Pakistan. <http://www.wwpak.org/ecoregions/>

Zehra, A., Ghalib, SA., Khan, MZ., Hussain, B., Begum, A., Khan, AR., Tabbassum, F. and Lateef, TA. 2014. Current Distribution and Status of the Wildlife of Deh Akro-2 Wildlife Sanctuary, District Shaheed Benazirabad, Sindh, Pakistan. Int. J. Biol. Biotech. 11 (2-3):351-356.

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