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SCIENTIFIC NOTE

STUDY OF ECOLOGY, DISTRIBUTION AND STATUS OF BIODIVERSITY OF BIN QASIM INDUSTRIAL ZONE MALIR, KARACHI, PAKISTAN

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ABSTRACT

The present study was undertaken on the ecological distribution and status of the wildlife of Bin Qasim Industrial Zone area during the period of July 2019 to December 2019. As many as 80 species of flora, 11 species of mammals, 67 species of birds, 10 species of reptiles and two species of amphibians were recorded. Among the birds, out of 67 species, 39 species were resident and 28 species were migratory. Three species of birds viz. Dalmatian pelican (*Pelecanus crispus*) was recorded as Vulnerable, Eurasian Curlew (*Numenius arquata)* and Curlew Sandpiper (*Calidris ferruginea*) were recorded as Near Threatened. Among reptiles, two Poisonous snakes viz. Saw-scaled Viper (*Echis carinatus*) and Common Krait (*Bungarus caeruleus*) were recorded from the area. No threatened species of reptiles was recorded. The amphibians are scarcely distributed in the area. Only one toad and one frog species were recorded. No Threatened species of amphibians was recorded from the aquatic, marshy area and were commonly found during monsoon. Large scale construction activities and vehicles movements take place in the area. The prevalent threats to the species are poaching, disturbance, loss of habitat, degradation of habitat, pollution and lack of conservation and management efforts. The area is very important nearest to the coast and serves as a buffer zone to Indus Delta (Ramsar Site) and it needs to be monitored and minimize the industrial pollution.

Keywords: Bin Qasim, industrial zone, ecology, flora, fauna, distribution, status.

INTRODUCTION

Karachi is the industrial, financial and trading hub of Pakistan. Economic growth of the developing countries mostly depends on agriculture growth and Industrial development. Industrialization changes the wild land and natural habitats of the species. Construction activities alter the natural landscape into concrete structures which alter the species composition in the area. Industrial effluents and other chemical processes also affect the physical and aquatic environment of the surroundings.

The study was conducted at Bin Qasim Industrial Zone that is located at the north-east and north-west of Port Qasim in Bin Qasim Town Karachi. The Gadap Town borders Bin Qasim to the north, Thatta district and the Indus River to the east, the Arabian Sea to the south, and the Malir River and the towns of Landhi, Malir, and Korangi Cantonment areas to the west.

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The Bin Qasim Industrial zone has the potential and infrastructure to be a financial hub of Karachi in near future. Currently 190 large and medium industrial units are operational in the area and more than 20 are in the construction phase. Several working industrial units operational in the area are Karachi Electric Thermal and Coal Power Plants, Pakistan Steel Mill, Metal casting units, BOC Gas plant, Ghani Glass Industry, Coal power plants, Automobile assembly units, Toyota Indus Motors, Pak Suzuki, KIA Motors, Daewoo, Master Motors, National Foods, Nestle Pakistan, Procter & Gamble, Universal Cables, Oil Refineries, Chemical Industries, Pharmaceutical industries, Lotte Chemicals, Glumax Oleochemicals, Engro Polymers & Zarkhez Fertilizer blending plant and large container warehouses, while remaining area is under development for other industries.

Globally ecological balance is maintained by plants and animals biodiversity and responsible for the beautification of planet Earth. Without Flora and Fauna the earth will become a barren land. Recent technological advancement

in the underdeveloped countries is leading towards the destruction of natural habitat and deteriorating the plants and animals life at large scale. If deteriorating ecological conditions are neglected today then it will lead to loss of our biodiversity in the future.

Antrop (2004) studied changes in landscape due to urbanization. In another study Muhammad and Ishfaq (2011) reported the effects of industrial and agricultural growth in Pakistan. Liu *et al*. (2003) studied urbanization and rural-urban migration in China. Memon and Memon (2011) reported the important coastal flora of Sindh. Damhoureyeh and Ghalib (2014) studied wildlife of mangrove forest of Karachi coastal areas. Grimmett*et al*. (2008), Ghalib *et al*. (2018a, 2018b), Khan *et al*. (2010a,b, 2012, 2016, 2018), Khanum and Ahmed (1988), Memon and Bhatti (2002) and Roberts (1991, 1992) also worked related to wildlife of Sindh. Due to importance of flora and fauna, field surveys were conducted during July - Dec 2019 with an objective to prepare an inventory of the flora and fauna, distribution, status and threats at Bin Qasim Industrial Zone area.

MATERIALS AND METHODS

Flora and Fauna Assessment Methodology

Study Area

During the present study, from July - Dec 2019, the data of flora and fauna were collected via primary and secondary sources. Secondary data were collected through literature, studies conducted within and in the surroundings of the Industrial units and occupied area, and the information collected through direct sightings and interview from the workers and local community members.

Several standard methods were used to record the presence of flora and fauna in the area. We also used roadside or track counts, point count surveys, line transect method, tracks/ signs counts and accidental sightings.

Flora and Fauna Assessment Methodology

a) Observations and survey of targeted and incidental flora
b) Assessments of vegetation
c) Survey of fauna incidental observations

Ecological assessments were carried out via laying 20m x 20m quadrates.

The following methods were used for recording the occurrence of different animal species.

1. Point surveys
2. Roadside counts
3. Track counts
4. Line transects
5. Incidental sightings
6. Pellet identification
7. Habitat searching

RESULTS AND DISCUSSION

Principal Habitats

The study area mostly comprises of the following main habitats:

Hostel residential/Camping area, Goth Villages, Trees and Gardens, Plant operational area, Road side gardens, Marshy area, Coastal backwater, Warehouse areas, Large containers yards, Grassy and Vegetative area, Wild dense Vegetation Birds roosting and Feeding area, Sandy area, Small Seasonal/ Temporary ponds, Barren Land, Residential Area (Goth), Incomplete old buildings, Abandoned, units buildings and Pakistan Steel Mill's Nullah (Table 1).

Table 1. Important study areas with GPS Coordinates.

S. No.	GPS Coordinates	Habitat Type/Area
1	244706.6 N 672030.0 E	Port Qasim
2	244739.4 N 671943.6 E	Warehouse near Coast
3	244725.3 N 672142.0 E	Pak. Steel Nullah
4	244738.5 N 672330.9 E	Vegetation, Birds roosting and Feeding Area
5	244751.4 N 672322.8 E	Wild Grassy area
6	244725.9 N 672151.7 E	Marshy Vegetative Area
7	244726.6 N 672204.9 E	Marshy Area
8	244718.6 N 672212.6 E	Coast near Coal Power Plant
9	244708.5 N 672136.3 E	Bin Qasim Thermal Power Plant
10	244730.9 N 672244.3 E	Wild dense Vegetative area
11	244807.6 N 672118.7 E	Wild Vegetative area
12	244933.5 N 671927.1 E	Pak Steel Industrial Estate (PSIE)

13	244938.6 N 671855.3 E	Dense Vegetative Area
14	244945.9 N 671806.8 E	Barren area
15	244739.9 N 672321.2 E	Lotte Chemical Plant Operational Area
16	244959.8 N 672056.6 E	PSIE Dense Vegetative Area
17	245006.7 N 672137.1 E	Vegetative Area near Horizon Steel

Floral and Faunal Composition

Based on our present surveys, 80 species of plants, 11 Species of Mammals, 67 Species of Birds, 10 Species of Reptiles and two species of Amphibians were recorded (Table 2).

Flora of the area

Based on our present study 80 species of plants were recorded from the area. These included wild and cultivated both types (Table 3). These plants provide good habitats and nesting sites for birds.

Table 2. List of plant and animal species recorded in Bin Qasim Industrial Zone Malir, Karachi.

S. No.	Type	Number of Species
1	Plants	80
2	Mammals	11
3	Birds	67
4	Reptiles	10
5	Amphibians	02

Table 3. List of Flora of Bin Qasim Industrial Zone Malir, Karachi.

S. No.	Common Name/ Local Name	Scientific Name
1	Kalar Garh	*Aeluropus lagopoides*
2	Lawarancusa Grass/ Katan	*Cymbopogon jwarancusa*
3	Desert Cotton/ Booh	*Aerva javanica*
4	Sahaer	*Rhazya stricta*
5	Aak	*Calotropis procera*
6	Khipp	*Leptadenia pyrotechnica*
7	Ghora Wal	*Cassia italic*
8	Kirar	*Capparis decidua*
9	Kheer Wal	*Euphorbia caducifolia*
10	Lathio	*Indigofera oblongifolia*
11	Khor	*Acacia senegal*
12	Sindhi Babur	*Acacia nilotica*
13	Bhabri	*Acacia jacquemontii*
14	Khandi	*Prosopis cineraria*
15	Honey Mestique/ Devi	*Prosopis glandulosa*
16	Devi	*Prosopis juliflora*
17	Bindweed	*Convolvulus glomeratus*
18	Black Bryony	*Dioscorea communis*
19	Gokshur	*Tribulus terrestris*
20	Muskmelon	*Cucumis melo*
21	Pursaleen-leaved Aizoon	*Aizoon canariense*
22	Rudravanti	*Cressa cretica*
23	Windmill Grass	*Chloris barbata*
24	Burr	*Digeria muricata*
25	Katoori	*Cymbopogon jawarancusa*
26	Common Reed/ Nara Ghass	*Phragmites karka*
27	Thuthi	*Abutilon indicum*
28	Maltese Star-thristal	*Centaurea melitensis*
29	Indian Plun/ Berr	*Zizyphus mauritiana*
30	Indian Jujube/ Berr	*Zizyphus nummularia*
31	Jar / Peroon	*Salvadora oleoides*
32	Gangi	*Grewia tenax*

33	Peepal tree	*Ficus religiosa*
34	Date palm /Khajoor	*Phoenix dactylifera*
35	Soft Grass	*Eragrostris japonica*
36	White Champa/Farangipani	*Magnolia champaca*
37	Neem Tree	*Azadirachta indica*
38	Amaltas	*Cassia fistula*
39	Carnaubeira palm	*Copernicia prunifera*
40	Hibiscus/China rose	*Hibiscus rosa-sinesis*
41	Blackberry/Jamun Tree	*Syzygium cumini*
42	Orange	*Citrus sinensis*
43	Lemon Tree	*Citrus limon*
44	Paper flower	*Bougainvillea glabra*
45	Siris	*Albizia lebbeck*
46	Mango/Aam	*Mangifera indica*
47	Crown of thorns/Christ plant	*Euphorbia milii*
48	Frangipani	*Plumeria rubra*
49	Papaya/Papita	*Carica papaya*
50	Chiku/ Nest berry	*Achras sapota*
51	Imlee	*Tamarindus indica*
52	Chinese cinnamon	*Cinnamomum cassia*
53	Royal poinciana/ Flame of the forest	*Delonix regia*
54	Cabbage tree	*Pisonia alba*
55	Faalsa	*Grewia asiatica*
56	Motia	*Jasminum sambac*
57	Jangle Jelebi	*Pithecellobium dulce*
58	Guava /Amrood	*Psidium guajava*
59	Blackboard tree	*Alstonias cholaris*
60	Blue Jacaranda /Karcunda	*Jacaranda mimosifolia*
61	Garden croton	*Codiaeum variegatum*
62	Kewra/ screw-pine	*Pandanus odorifer*
63	Areca palm	*Dypsis lutescens*
64	Chinese fan Palm	*Livistona chinensis*
65	Money plant	*Epipremnum aureum*
66	Cat Palm	*Chamaedorea elegans*
67	African oil palm	*Elaeis guineensis*
68	Bismaick palm	*Bismarckia nobilis*
69	Button Mangrove	*Conocarpus erectus*
70	The Ghost Tree	*Stercuila foetida*
71	Peacock Flower/ Gull Mohar	*Caesalpinia pulcherrima*
72	Queen of Night/ Raatki Raani	*Cestrum nocturnum*
73	Coconut/ Narial	*Cocos nucifera*
74	Safeeda	*Eucalyptus sp.*
75	Kanwal/Lotus	*Lotus garcinii*
76	Touch Me Not/ Chui Moi	*Memosapudica*
77	Drumstick tree / Suhanjana	*Moringa olifera*
78	Date Palm/Khajoor	*Phoenix sp.*
79	Camachile/ Jangly Jaleebi	*Pithecellobium dulce*
80	Mangrove/ Timmer	*Avicennia marina*

Faunal Composition

The faunal attributes recorded during the study are provided in Tables 4 to 8.

Mammals

During study period, 11 Species of Mammals belonging to six Orders and nine Families were recorded from the area (Table 4).

Table 4. List of Mammals recorded from Bin Qasim Industrial Zone Malir, Karachi.

S. No.	Order	Family	Scientific Name	Common Name	IUCN Status
1	Rodentia	Muridae	*Mus musculus*	House Mouse	LC
2	Rodentia	Muridae	*Rattus rattus*	Common Rat	LC
3	Rodentia	Sciuridae	*Funambulus pennantii*	Northern Palm Squirrel	LC
4	Rodentia	Hystericidae	*Hystrix indica*	Indian Porcupine	LC
5	Insectivora	Erinaceidae	*Hemiechinus collaris*	Long-eared Desert Hedgehog	LC
6	Eulipotyphyla	Soricidae	*Suncus murinus*	Asian House Shrew	LC
7	Chiroptera	Pteropodidae	*Rousettus aegyptiacus*	Egyptian Fruit Bat	LC
8	Carnivora	Herpestidae	*Herpestes javanicus*	Small Indian Mongoose	LC
9	Carnivora	Herpestidae	*Herpestes edwardsii*	Indian Grey Mongoose	LC
10	Carnivora	Canidae	*Canis aureus*	Indian Jackal	LC
11	Artiodactyla	Suidae	*Sus scrofa*	Indian Wild Boar	LC

LC= Least Concern

Table 5. List of Birds recorded from Bin Qasim Industrial Zone Malir, Karachi.

S. No.	Order	Family	Scientific Name	Common Name	Seasonal Status
1	Accipitriformes	Accipitridae	*Milvus migrans*	Black Kite	R
2	Accipitriformes	Accipitridae	*Elanus caeruleus*	Black-shouldered Kite	WV
3	Accipitriformes	Accipitridae	*Haliastur indus*	Brahminy Kite	R
4	Accipitriformes	Accipitridae	*Circus aeruginosus*	Marsh Harrier	WV
5	Accipitriformes	Accipitridae	*Accipiter nisus*	Eurasian Sparrow-Hawk	WV
6	Falconiformes	Falconidae	*Falco tinnunculus*	Common Kestrel	WV
7	Falconiformes	Falconidae	*Falco chicquera*	Red Headed Merlin	R
8	Falconiformes	Falconidae	*Falco peregrinus*	Peregrine Falcon	WV
9	Pelecaniformes	Pelecanidae	*Pelecanus crispus*	Dalmatian Pelican	WV
10	Pelecaniformes	Pelecanidae	*Pelecanus onocrotalus*	White or Rosy Pelican	WV
11	Ciconiiformes	Ardeidae	*Bubulcus ibis*	Cattle Egret	R
12	Ciconiiformes	Ardeidae	*Egretta garzetta*	Little Egret	R
13	Phoenicopteriformes	Phoenicopteridae	*Phoenicopterus roseus*	Greater Flamingo	WV
14	Charadriiformes	Recuvirostridae	*Himantopus himantopus*	Black-winged Stilt	R
15	Charadriiformes	Charadriidae	*Charadrius hiaticula*	Ringed Plover	WV
16	Charadriiformes	Charadriidae	*Vanellus malabaricus*	Yellow-wattled Lapwing	SBV
17	Charadriiformes	Charadriidae	*Vanellus indicus*	Red-wattled Lapwing	R
18	Charadriiformes	Scolopacidae	*Calidris temminckii*	Temminck's Stint	WV
19	Charadriiformes	Scolopacidae	*Calidris ferruginea*	Curlew-Sandpiper	WV
20	Charadriiformes	Scolopacidae	*Numenius arquata*	Eurasian Curlew	WV
21	Charadriiformes	Laridae	*Larus argentatus*	Herring Gull	WV
22	Charadriiformes	Sternidae	*Sterna aurantia*	River Tern	R
23	Charadriiformes	Sternidae	*Sterna albifrons*	Little Tern	R
24	Charadriiformes	Sternidae	*Sterna hirundo*	Common Tern	R
25	Coraciiformes	Meropidae	*Merops superciliosus*	Blue cheeked Bee-eater	R
26	Coraciiformes	Meropidae	*Merops orientalis*	Little Green Bee-eater	R
27	Coraciiformes	Upupidae	*Upupa epops*	Common Hoopoe	R
28	Coraciiformes	Alcedinidae	*Ceryle rudis*	Pied Kingfisher	R
29	Coraciiformes	Alcedinidae	*Alcedo atthis*	Common Kingfisher	R
30	Coraciiformes	Coraciidae	*Coracias benghalensis*	Indian Roller or Blue Jay	WV
31	Apodiiformes	Apodidae	*Apus affinis*	House Swift	R
32	Cuculiformes	Cuculidae	*Eudynamys scolopacea*	Asian Koel	R

33	Columbiformes	Columbidae	*Columba livia*	Blue Rock Pigeon	R
34	Columbiformes	Columbidae	*Streptopelia senegalensis*	Little Brown Dove/Laughing Dove	R
35	Columbiformes	Columbidae	*Streptopelia decaocto*	Eurasian Collard Dove	R
36	Galliformes	Phasianidae	*Francolinus pondicerianus*	Grey Partridge	SV
37	Passeriformes	Sturnidae	*Acridotheres tristis*	Common Myna	R
38	Passeriformes	Sturnidae	*Acridotheres ginginianus*	Bank Myna	R
39	Passeriformes	Sturnidae	*Sturnus vulgaris*	Common Starling	WV
40	Passeriformes	Sturnidae	*Sturnus roseus*	Rosy Starling	DPM
41	Passeriformes	Campephagidae	*Pericrocotus cinnamomeus*	Sind Small Minivet	R
42	Passeriformes	Hirundinidae	*Hirundo rustica*	Common or Barn Swallow	WV
43	Passeriformes	Nectariniidae	*Nectarinia asiatica*	Purple Sunbird	R
44	Passeriformes	Dicruridae	*Dicrurus macrocercus*	Black Drongo	R
45	Passeriformes	Sylviidae	*Orthotomus sutorius*	Tailor Bird	R
46	Passeriformes	Turdidae	*Laticilla burnesii*	Long-tailed Grass Warbler	WV
47	Passeriformes	Turdidae	*Saxicoloides fulicata*	Indian Robin	R
48	Passeriformes	Turdidae	*Saxicoloides monacha*	Hooded Chat or Wheatear	R
49	Passeriformes	Turdidae	*Oenanthe picata*	Pied Chat / Variable Wheatear	WV
50	Passeriformes	Turdidae	*Oenanthe isabellina*	Isabelline Wheatear	WV
51	Passeriformes	Timallidae	*Turdoides caudatus*	Common Babbler	R
52	Passeriformes	Timaliidae	*Turdoides striatus*	Sind Jungle Babbler	R
53	Passeriformes	Motacilliidae	*Motacilla citreola*	Yellow-headed Wagtail	WV
54	Passeriformes	Pyconotidae	*Pycnonotus leucogenys*	White-cheeked Bulbul	R
55	Passeriformes	Pyconotidae	*Pycnonotus cafer*	Red-vented Bulbul	R
56	Passeriformes	Pyconotidae	*Prinia buchanani*	Rufous-fronted Wren-Warbler	WV
57	Passeriformes	Laniidae	*Lanius excubitor*	Southern Grey Shrike	WV
58	Passeriformes	Laniidae	*Lanius vittatus*	Bay-backed Shrike	WV
59	Passeriformes	Laniidae	*Lanius isabellinus*	Isabelline Shrike / Rufous tailed Shrike	WV
60	Passeriformes	Corvidae	*Corvus splendens*	Sind House Crow	R
61	Passeriformes	Corvidae	*Dendrocitta vagabunda*	Rufous Treepie	R
62	Passeriformes	Alaudidae	*Alauda gulgula*	Oriental Skylark	R
63	Passeriformes	Alaudidae	*Galerida cristata*	Crested Lark	R
64	Passeriformes	Alaudidae	*Galerida raytal*	Indus Sand Lark	R
65	Passeriformes	Passeridae	*Passer domesticus*	House Sparrow	R
66	Passeriformes	Passeridae	*Passer pyrrhonotus*	Sind Jungle Sparrow	R
67	Passeriformes	Passeridae	*Zosterops palpebrosus*	Indian White-eye	WV

R= Resident WV= Winter Visitor SV= Summer Visitor SBV= Summer Breeding Visitors, DPM= Double Passage Migrant

Birds

Total of 67 Species of birds belonging 12 orders, 32 families were recorded in the study area (Table 5).

Seasonal Status of the Birds

The status of the birds recorded has been determined as Resident (39 Species), Winter Visitors (25 Species), Summer Visitors (01 Species), Summer Breeding Visitors (01 Species) and Double Passage Migrant (01 Species) (Table 6).

Table 6. Seasonal status of birds recorded from Bin Qasim Industrial Zone Malir, Karachi.

S. No.	Category	Number of Species
1	Residents	39
2	Winter Visitors	25
3	Summer Visitors	01
4	Summer Breeding Visitors	01
5	Double Passage Migrant	01
Total		**67**

Reptiles

During the study period, 10 species of reptiles falling under one order and seven families were recorded in the study area (Table 7). The group includes six Lizards, four Snakes including two Venomous snakes and two non-poisonous snakes.

Amphibians

During the study period, two species of amphibians falling under one order and two families were recorded in the study area (Table 8).

Table 7. List of Reptiles recorded from Bin Qasim Industrial Zone Malir Karachi.

S. No.	Order	Family	Scientific Name	Common Name
1	Squamata	Agamidae	*Calotes versicolor*	Oriental Garden Lizard
2	Squamata	Gekkonidae	*Hemidactylus persicus*	Persian House Gecko
3	Squamata	Lacertidae	*Agamura persica*	Blunt-tailed spider Gecko
4	Squamata	Lacertidae	*Crossobamon orientalis*	Sindh Gecko
5	Squamata	Varanidae	*Varanus bengalensis*	Bengal Monitor Lizard
6	Squamata	Varanidae	*Varanus griseus*	Desert Monitor Lizard
7	Squamata	Boidae	*Eryx johnii*	Red Sand-Boa
8	Squamata	Boidae	*Eryx conicus*	Sindh Sand-Boa
9	Squamata	Viperidae	*Echis carinatus*	Saw-scaled Viper
10	Squamata	Elapidae	*Bungarus caeruleus*	Common Krait

Table 8. List of Amphibians recorded from Bin Qasim Industrial Zone Malir Karachi.

S. No.	Order	Family	Scientific Name	Common Name	Status
1	Anura	Bufonidae	*Bufo stomaticus*	Indus Valley Toad	Common
2	Anura	Ranidae	*Euphlyctis cyanophlyctis*	Skittering Frog	Common

Threats

Alteration of wild land and destruction of natural habitat is a major threat to biodiversity in the area. Illegal reclamation of coastal area for different industrial purposes is altering the natural ecosystem and distribution of biodiversity in this area. Small mammals and lizards are adapting to the modified environment. But due to several anthropogenic activities and contaminated water large mammals and some waterbirds may move to the surrounding areas, while the other species have adapted to the existing environment.

Overgrazing and large numbers of camel browsing in the area is also altering the vegetation cover of the area. Some birds trapping activities are recorded at the nearby coastal area.

Effluents of the Chemical plant are treated in the effluent treatment plant prior to disposal in the environment. There is need to monitor the effluents as per the guideline of National Environmental Quality Standards (NEQS) and Sindh Environmental Quality Standards (SEQS). Treatment plants should be installed and fully functional in each industrial unit.

Threatened / Near Threatened species of Birds

Three Species of birds were recorded as Threatened and Near Threatened. Dalmatian Pelican (*Pelecanus crispus*) Vulnerable (VU), Eurasian Curlew (*Numenius arquata*) and Curlew Sandpiper (*Calidris ferruginea*) as Near Threatened (IUCN, 2020) recorded from the area (Table 9, Figs. 1 and 2).

Table 9. Threatened / Near Threatened Birds recorded.

S. No.	Birds Common Name	Scientific Name	Status
1	Dalmatian Pelican	*Pelecanus crispus*	VU
2	Eurasian Curlew	*Numenius arquata*	NT
3	Curlew Sandpiper	*Calidris ferruginea*	NT

VU= Vulnerable, NT= Near Threatened

Fig. 1. Dalmatian Pelicans roasting at the coast.

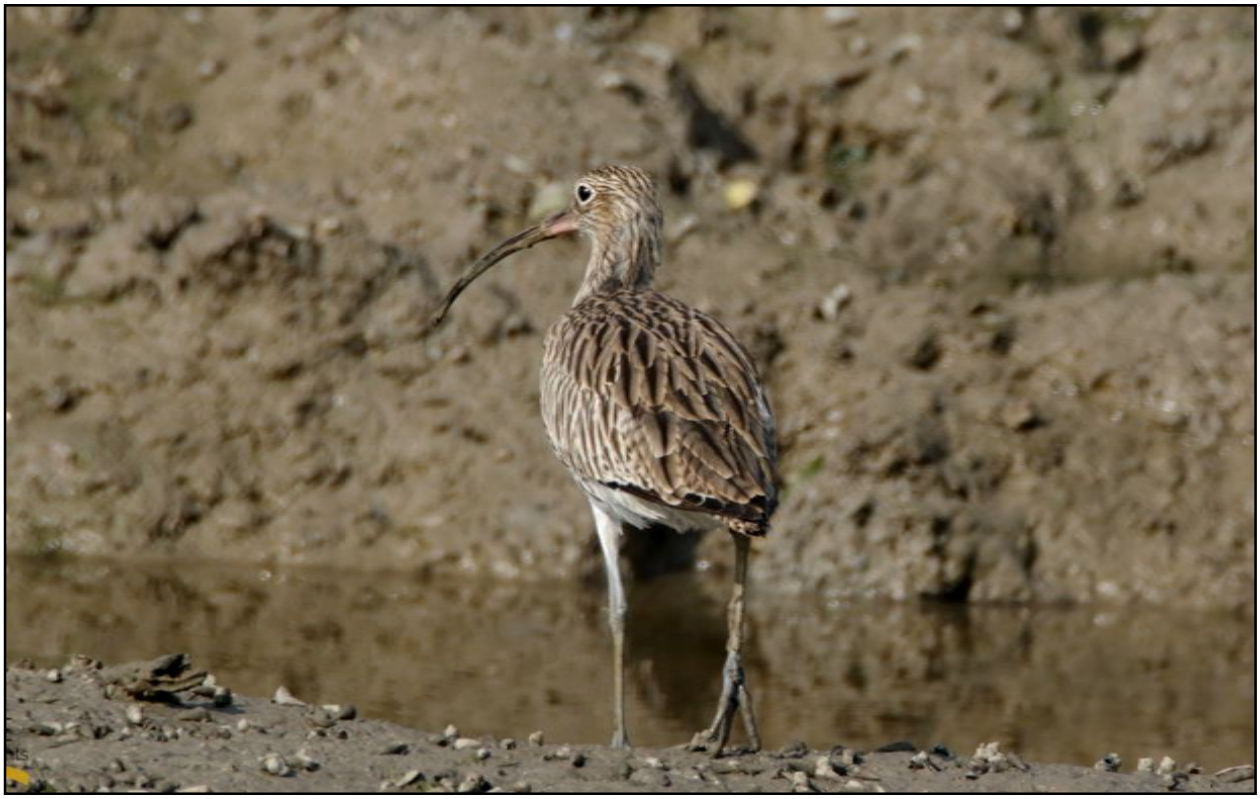

Fig. 2. Eurasian Curlew.

CONCLUSION

The study area is very important in respect to wildlife as present near the coast and mangrove habitat which is part of Indus Delta. This area is a transition zone between aquatic and terrestrial environment. The nearest coastal area is an important area for migratory waterbirds. Current study will provide baseline for the future to study the impacts of industrial development on the fauna and flora of the area. During the study we noted that Lotte Chemical runs a habitat conservation program via go green work.

RECOMMENDATIONS

Some birds were recorded from the study areas as Threatened/ Near Threatened in IUCN Red List 2020 and common visitors to coastal areas which are part of Indus Delta and just opposite to the industrial units. In the winter season these birds commonly fly over the area and feed in the coastal mudflats.

The conservation measures that may be taken include treatment of effluents and neutralizing it before releasing to the aquatic environment.

Natural ecosystem of the area is changing due to the industrial and Coal Power Plant effluents, while natural Mangroves also are degraded. Therefore Sindh Environmental Protection Agency (SEPA) need to monitors effluents quality in the area.

For restoration of the coastal ecosystem Mangrove plantations initiative should be taken in the area.

Plantation of fruit trees and local plants such as Neem, Amaltas, Ber, Guava, Sapodilla (Chiku), Mango and Moringa (Suhanjana) are suggested in the area. A special Mangrove plantation drive is suggested for restoration of the coastal ecosystem and environment.

Some common fauna recorded during the study from Bin Qasim Industrial Zone area Malir, Karachi (Figs. 3 to 22).

Fig. 3. Little and Great Egrets at the coast.

Fig. 4. Kentish Plover.

Fig. 5. Laughing Dove/ Little Brown Dove.

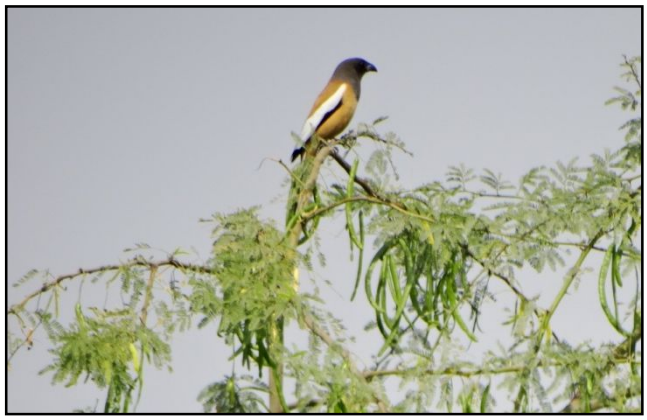

Fig. 6. Rufous Treepie

Fig. 7. Red-wattled Lapwing.

Fig. 8. Blue cheeked Bee-eater.

Fig. 9. Red-vented Bulbul.

Fig. 10. Brahminy Kite.

Fig. 11. Common Babbler.

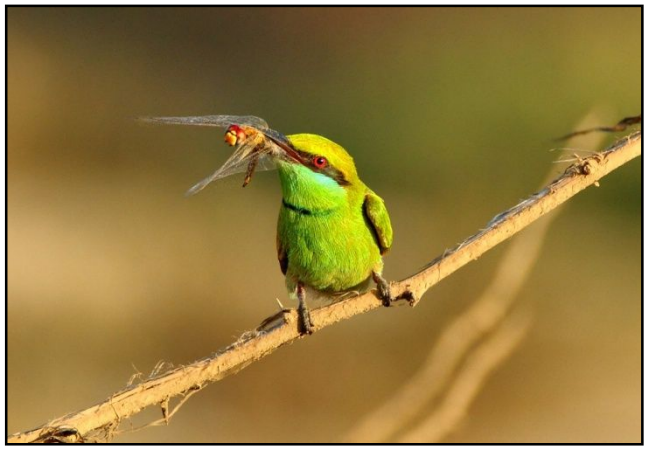

Fig. 12. Green Bee-eater.

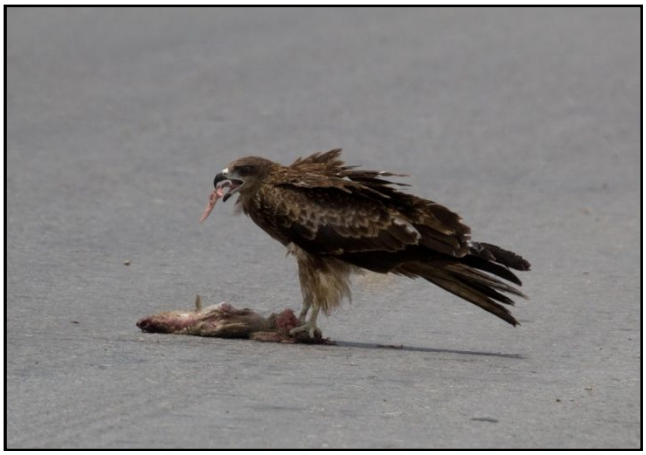

Fig. 13. Black Kite.

Fig. 14. Common Kestrel.

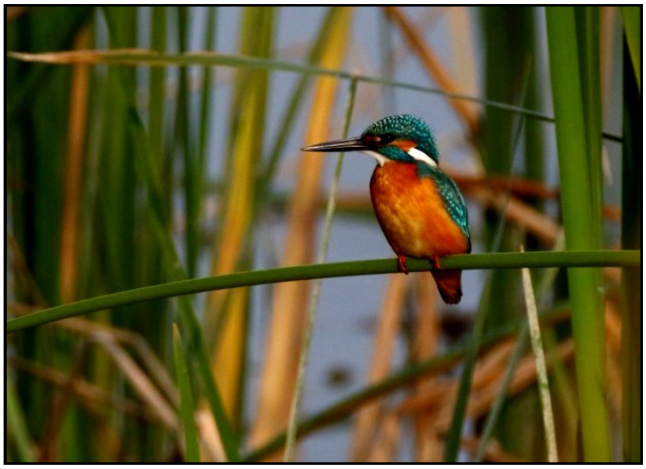

Fig. 15. Common Kingfisher.

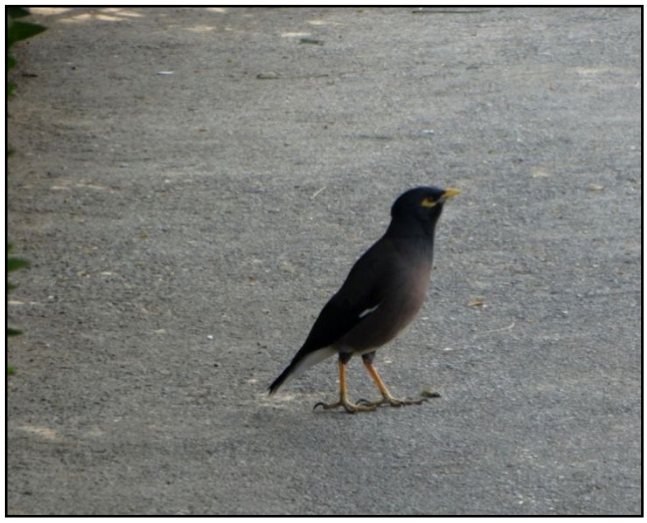

Fig. 16. Common Myna.

Fig. 17. Crested Lark.

Fig. 18. House Crow.

Fig. 19. White-cheeked Bulbul.

Fig. 20. Northern Palm Squirrel.

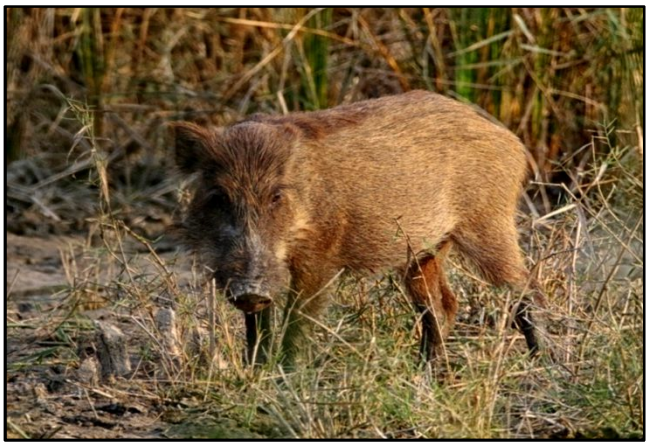

Fig. 21. Indian Wild Boar.

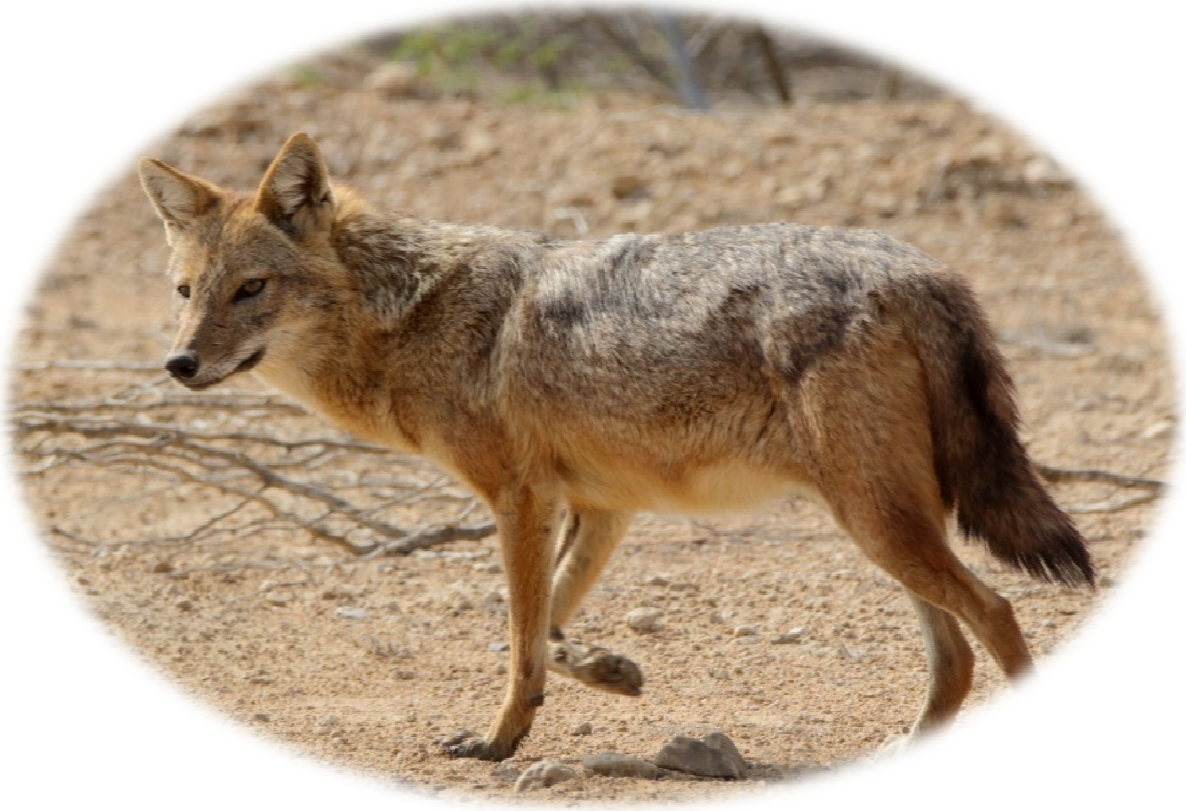

Fig. 22. Golden Jackal.

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