

Study on the Migratory and Dweller Birds of Band-Khushdil Khan Lake, Pishin, Pakistan Associated with Population Decline Risk Factors

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To cite this article:

Syed Inamullah, Asmatullah Kakar, Sharif Uddin, Mohammad Dawood, Rehmatullah. Study on the Migratory and Dweller Birds of Band-Khushdil Khan Lake, Pishin, Pakistan Associated with Population Decline Risk Factors. *American Journal of BioScience*. Vol. 10, No. 2, 2022, pp. 81-88. doi: 10.11648/j.ajbio.20221002.17

Received: February 4, 2022; **Accepted:** March 15, 2022; **Published:** April 20, 2022

Abstract: *Band-Khushdil Khan* lake in *Pishin (Balochistan)* support migratory *bird* population during their seasonal migration. The lake is an important stopover for migratory and native bird species. Due to habitat loss, hunting and trapping of birds, a large number of species are under threat and also result in a wide variety of biological changes, population, community and ecosystem level, which in turn extremely affect the survival of aves fauna. Therefore, to fill this gap of scientific knowledge, the present study was conducted with the aim to explore the population status of migratory and native birds of Band-Khushdil Khan lake and to determine the major threats to these birds of the area as it was ignored since long. Data was massed during the period from August 2020 to December 2021 by visiting the field and by communicating with the residents and hunters about the current and past status of the avian fauna of the study area. A total of 87 bird species were recorded belonging to 15 orders and 36 families inhabit the area. Order Passeriformes was the most abundant order with 27 representative species followed by Anseriformes with 16 species. Most of the migratory birds were found winter visitors and more abundant than native birds and summer visitors. The fauna was not very rich due to the lack of flora of the area and also due to more hunting and drainage of water from the lake for agriculture purposes. Orders Passeriformes, Anseriformes, Charadriiformes, Ciconiiformes, Falconiformes, Pteroclitiformes, Piciformes, Otidiformes, Passeriformes, Pelecaniforme were found migratory, and orders Strigiformes, Columbiformes, Galliformes, Accipitriformes, Falconiformes were found resident while few members of Passeriformes and Pelecaniformes were found migratory and few residents. In this study it was observed that feeding and habitat availability play important roles in the diversity and distribution of the avian fauna of area. It was also found that birds are intensively hunted and captured in their native range in and nearby the lake, owing to which local populations could be declining. Based on the present investigations, it is suggested that priority actions for the conservation of threatened birds and species of specific conservation interest should be supervised by responsible organizations to reestablish bird's biodiversity in Band-Khushdil Khan lake (Pakistan). Possible proposed actions include appropriate management of network site, monitoring of migratory and native birds population, and the founding of projects on bird's migration and freshwater reservoirs safety in the region.

Keywords: Native and Migratory Birds, Band-Khushdil Khan, Pishin, Declination

1. Introduction

Birds are intensively hunted and captured in Pakistan for intake and sports [1, 2, 4] due to which local populations are decreasing, but the total status of the species is considered as stable [10]. Traditionally, non-domesticated birds have been a major element of human diets [8]. Many birds species migrate from countries of Central Asia and Europe towards Pakistan [15]. Several species of birds show local or long-distance migration in search of food or to avoid harsh weather conditions during the winter season [21]. Migratory birds rely on networks of strategically located sites across their annual migration cycle. Loss or degradation of any one site can impact bird populations [12]. Migratory bird populations are decreased due to predation [11]. For birds, migration is the most significant event to complete one annual life cycle [14, 16, 17].

Many bird migration takes place from the northern arctic region towards the southern plains [18, 19]. Wintering spends in tropical areas where they inhabit 6-7 months and breeding occurs in temperate areas where they stay for two to three months [3]. The large distance migration within breeding and wintering grounds results in the evolution of certain traits in shorebirds [7, 9]. The occurrence of migratory birds in particular areas indicates that the site is favorable for feeding, nesting, and breeding. Illegal hunting is another main threat to many migratory birds like geese, coot, and ducks. The bar-headed geese are hunted brutally [10].

Important migratory birds of Pakistan are flamingos (*Phoenicopterus minor*, *P. roseus*), Shaheen falcons (*Falco peregrinus peregrinator*), Lesser kestrel (*Falco naumanni*), swans i-e whooper swan also known as the common swan (*Cygnus cygnus*), geese or the domestic goose (*Anser anser*), storks like white stork (*Ciconia ciconia*) and herons (*Goliath heron* and *Ardea goliath*), cranes such as demoiselle crane (*Grus virgo*), and ducks include Indian spot-billed duck (*Anas poecilorhyncha*), mallard or wild duck (*Anas platyrhynchos*), this duck is a resident throughout Pakistan and India in freshwater wetlands [1, 2]. Among birds species, many local birds together with chakor (*Alectoris chukar*), see-see partridge (*Ammoperdix griseogularis*), crested lark (*Galerida cristata*), myna (*Acridotheres tristis*), hawks (*Buteo*), pigeons i-e rock pigeon (*Columba livia*), domestic pigeon (*Colubam livia domestica*), doves i-e spotted dove (*Streptopelia decaocto*), Asian emerald dove (*Chalcophaps indica*), spotted dove (*Spilopelia chinensis*), and several other birds are also in an alarming situation [16, 22]. Dalmatian pelican (*Pelecanus crispus*), a winter visitor in Pakistan has shown a decline in its population due to hunting and disruption. Correspondingly, black-headed Ibis is a local and irregular migratory visitor of Pakistan all over the year which encounters the extreme risk of being hunted and habitat destruction mainly by drainage and cultivation in their foraging and breeding habitats. Painted stork (*Mycteria leucocephala*) is a local winter tourist of Pakistan facing a marked decline in population size due to over hunting [5, 6].

A large number of migratory birds are killed each year in

diverse localities in Balochistan province especially in Band-Khushdil Khan lake District Pishin which resulted in the complete devastation of wildlife. Band-Khushdil Khan lake is a larger water reservoir located at the migratory route of various internationally important birds' species. According to an estimated idea, hundreds of thousands of migratory birds pass every year from January to March amongst which a wide variety of birds are killed and hunted at some point of migration towards Band-Khushdil Khan lake. Therefore, to save the avian species composition and conservation, the present study was initiated and the proposal was made for the sustainable ecosystem in this region of Balochistan to save native, migratory, and endangered birds.

2. Material and Methods

2.1. Study Site

The present study was conducted in Band-Khushdil Khan lake located in district Pishin (30.5897°N, 67.0107°E). It is a larger freshwater reservoir with a 1296 square meter covered area found on the migratory route of various internationally important birds species and distanced 11 kilometers from Pishin city in MalikYar village (Figures 2 and 3). Pishin is situated zoo-geographically in the Palearctic region and the northwest of Balochistan province (Figure 1) of Pakistan. with a 7,819 km² area and elevation of 1,555 m. Pishin typically receives about 12.68 millimeters (0.5 inches) of precipitation and has 24.82 rainy days (6.8% of the time) annually. July is the warmest month and the temperature reach 39.86°C, while the coldest month is January where temperature fall to -6.27°C (Climate: Balochistan, Pakistan - Worlddata.info, 2020).

2.2. Avian Data Collection

Data of bird (migratory and native) species were collected from Band-Khushdil Khan lake and nearby territories in five field trip from October 2020 to April 2021 utilizing personal observation, using the binocular telescope and common bird trapping net, and by getting information of their nests, feathers, waste materials, footprints. Photographs were taken by using a digital camera (Canon EOS 5D Mark IV USA) for taxonomic identification and enlisting bird species.

2.3. Negative Impact Data

The data regarding all corresponding negative parameters inside and around areas were personally detected during the field trips and local communities were also inquired to inform all concerns due to which migratory birds are moving to downfall each year. All possible photographs were taken to put in the article and conveyed to the wildlife department for strict actions to restore the avian fauna in Band-Khushdil Khan lake.

3. Results and Discussion

The province of Balochistan (Figure 1) has very rich

birds fauna due to its zoogeographical location, but many species are yet to be reported. Among 670 known species from Pakistan 380 species are found in Balochistan [7]. Band-Khushdil Khan lake (Pishin) is the largest and most important freshwater reservoir in the district Pishin, Balochistan (Figure 2). It receives rainwater from roundabout territories. Annually millions of migratory birds from different countries of the world visit the site (Figures 8, 10, 12, 13, 14, 16). Their arrival starts from October to April and last declination of migratory birds in Band-Khushdil Khan lake till May. While resident birds and some summer visitors inhabit in hotter months till October (Figures 6, 7, 9, 11, 15, 22).

In this research study, 87 species in total were recorded belonging to 36 families and 15 orders as shown in table 1. These birds include the game, water, and birds of prey. Passeriformes were observed to be the dominant bird's order with 27 species which comprises mainly small native birds and summer breeding visitors (SBV) followed by Anseriformes include 16 species mostly large to medium-sized ducks belonging to migratory and winter visitors (WV). Charadriiformes with 11 species namely gulls, terns, and sandpiper. Ciconiiformes with 8 representative species of which herons, spoonbills were found to be WV. Falconiformes and Accipiteriformes were mainly resident and carnivores species in the region mostly hunts on other migratory and small resident birds. Three species each were recorded from Coraciiformes, Galliformes, and Gruiformes. The order Columbiformes with only two resident species (pigeon and mourning doves) inhabit the study area. While only one species each of the orders Pterociliformes, Piciformes, Psitrigiformes, and Otidiformes was recorded in the study area as shown in Figures 4, 5 and Table 1. Illegal killing and trapping of migratory and local birds were also observed in this study [6, 17, 20, 21]. Ali [1] calculated the avian diversity of Central Karakoram National Park (Pakistan) during 2011-2012 and reported 108 species include 57 residents species, 26 summer and 25 winter visitors. The major risk to these migratory birds reported was habitat destruction and human activities i.e. hunting, shooting, trapping and pesticides sprays. These findings are in line with those of Umer et al. [20] where they demonstrated adverse effects of habitat loss faced by the migratory birds in Pakistan and recorded vanishing trends of migrant birds (Painted stork, Black Stork, Band tailed fish eagle, Gulls, Eagles, Terns, Ducks and Cormorants, Dalmatian pelican. Fish bird, Ducks, Cattle egrets, Geese, Siberian cranes and Bustards) from inland reservoirs which attributed mainly to continued loss of wintering habitat, habitat change, anthropogenic activities and illegal hunting have resulted in the decline of species abundance [4].

In the present study following negative factors like crops cultivation nearby the lake and water outflow were observed. Secondly, local farmers usually drain out water from the lake to cultivate the wheat, sunflower, and other edible vegetables resulting in drying the inner floor of the lake (Figure 23). They also use the out-drained water for more cultivated lands outside the lake (Figure 24).

Similarly, black-headed Ibis is an identified local and regular migratory visitor of Pakistan throughout the year which encounter extreme risk of being hunted and habitat destruction mainly happened by drainage and cultivation in their forging and breeding habitats [8].

Apart from this, illegal hunting is another harmful factor, and thousands of migratory and resident birds are killed during the last three decades and being continued till now (Figures 6, 17, 20, 21). Chakor (*Alectoris chukar* Gray, 1830) and See-see partridge (*Ammoperdix griseogularis* Brandt, 1843) had sufficient population but currently, both are endangered due to abrupt killing and are continued to decline annually. Similar findings were reported by Grimmett et al. [7] where due to over hunting of local winter visitor (Painted stork) of Pakistan facing decline in population size. Illegal hunting reported to be another main threat to many migratory birds like geese, coot and ducks [6]. The bar-headed geese are hunted brutally [13].

Moreover, in this study road lights and horns were noted to be the additional factor in that the lake (Band-Khushdil Khan) is situated just aside the local road (Figure 3) where hundreds of vehicles pass and make louder noises at day time, while during nights when most of the migratory birds particularly ducks arrives in the site, vehicles lights push them back or turn their path as results the guest birds avoid to stay in the lake. Cultural festivals were also considered as a stumbling blockade for avian fauna in the lake. During field trips of this study, it was noted that on Friday and other national festivals local people used to gather on the edges of the lake enjoying musical instruments. Motorcycle races and horse races were also observed nearby the lake turning the bird's way to reside in the water body of the study site.

To make plans for migratory birds habitats safety and conservation, prevention of illegal hunting and poaching, halting agricultural and industrial pollution, saving water reservoirs from heavy metal contamination are important considerations. Regular conduct of surveys for important migratory birds to assess the population trend, abundance and patterns of their migration is another important step towards conservation of birds.

4. Conclusion

It was concluded from the present study that major causes of migratory birds' declination are overhunting and habitat destruction. The fauna of an area depends on the flora and water bodies present in the area because it provides food and shelter to the fauna. Destruction of the habitats also results in the elimination or migration of species. In the present study, it was also observed that drainage of water from the lake, road lights close to the lake and anthropogenic activities are the extra resulting factors for migratory and native birds decline. All these risky trends must be monitored by wildlife departments properly to restore species biodiversity and to sustain a healthy ecosystem to save the aves fauna in Band-Khushdil Khan lake (Balochistan), Pakistan.

Table 1. Birds species with their common and scientific names, orders, families, and visiting periods.

No	Scientific name	Common name	Order	Family	Visiting period
1	<i>Pycnonotus leucotis</i>	White eared Bulbul	Passeriformes	Pyconotidae	R
2	<i>Pycnonotus cafer</i>	Red-vented Bulbul	Passeriformes	Pyconotidae	R
3	<i>Passer domesticus</i>	Old world Sparrow	Passeriformes	Passeridae	SBV
4	<i>Passer monanus</i>	Tree sparrow	Passeriformes	Passeridae	R
5	<i>Passer domesticus</i>	Old world Sparrow	Passeriformes	Passeridae	SBV
6	<i>Prinia inorta</i>	Plain prinia	Passeriformes	Cisticolidae	SBV
7	<i>Motacilla alba</i>	White Wagtail	Passeriformes	Motacillidae	R
8	<i>Motacilla cinerea</i>	Grey Wagtail	Passeriformes	Motacillidae	WV
9	<i>Motacilla flava</i>	Yellow Wagtail	Passeriformes	Motacillidae	WV
10	<i>Motacilla citreola</i>	Citrine wagtail	Passeriformes	Motacillidae	WV
11	<i>Oenanthe picata</i>	Variable wheatear	Passeriformes	Turdidae	SBV
12	<i>Oenanthe monacha</i>	Hooded Wheatear	Passeriformes	Turdidae	R
13	<i>Galerida cristata</i>	Crested lark	Passeriformes	Alaudidae	R
14	<i>Alauda arvensis</i>	Sky lark	Passeriformes	Alaudidae	WV
15	<i>Lullua arborea</i>	Wood lark	Passeriformes	Alaudidae	WV
16	<i>Ammomanes cincturus</i>	Bartailed lark	Passeriformes	Alaudidae	WV
17	<i>Calandrella acutirostris</i>	Hume's Short toed Lark	Passeriformes	Alaudidae	WV
18	<i>Melanocorypha caladra</i>	Calandra lark	Passeriformes	Alaudidae	WV
19	<i>Serinus pusillus</i>	Red fronted serin	Passeriformes	Fingillidae	R
20	<i>Carduelis carduelis</i>	Gold finch	Passeriformes	Fingillidae	R
21	<i>Acridotheres tristis</i>	Myna	Passeriformes	Sturnidae	R
22	<i>Pastor roseus</i>	Rosy starling	Passeriformes	Sturnidae	YRV
23	<i>Sturnia malabarica</i>	Chestnut tailed sterling	Passeriformes	Sturnidae	WV
24	<i>Copsychus saularis</i>	Oriental magpie Robin	Passeriformes	muscipidae	R
25	<i>Pica pica</i>	Magpie	Passeriformes	Corvidae	R
26	<i>Lanius collurio</i>	Shrike	Passeriformes	Lanidae	SBV
27	<i>Hirundo rustica</i>	Barn Swallow	Passeriformes	Hirundinidae	SBV
28	<i>Columba livia</i>	Pigeon	Columbiformes	Columbidae	R
29	<i>Spilopelia senegalensis</i>	Laughing Dove	Columbiformes	Columbidae	R
30	<i>Upupa epops</i>	Hoopoe	Coraciiformes	Upupidae	SBV
31	<i>Alcedo atthis</i>	Common Kingfisher	Coraciiformes	Alcedinidae	SV
32	<i>Merops orientalis</i>	Bee eater	Coraciiformes	Meropidae	SV
33	<i>Pelecanus onocrotalus</i>	White Pelican	Pelecaniformes	Pelecanidae	WV
34	<i>Pelecanus crispus</i>	Dalmatian Pelican	Pelecaniformes	Pelecanidae	WV
35	<i>Phalacrocorax carbo</i>	Cormorant	Pelecaniformes	Phalacrocoracidae	R
36	<i>Falco tinnulus</i>	Common kestrel	Falconiformes	Falconidae	R
37	<i>Falco peregrinus pelegrinoides</i>	Barbary falcon	Falconiformes	Falconidae	R
38	<i>Gyps indicus</i>	Vulture	Falconiformes	Accipitridae	R
39	<i>Milvus migrans</i>	Kite	Falconiformes	Accipitridae	R
40	<i>Accipiter badius</i>	Hawk	Accipitriformes	accipiterdae	R
41	<i>Buteo rufinus</i>	Long legged buzzard	Accipitriformes	accipiterdae	R
42	<i>Aquila chrysaetos</i>	Golden eagle	Accipitriformes	accipiterdae	R
43	<i>Larus ridibundus</i>	Black headed Gull	Charadriiformes	Laridae	WV
44	<i>Larus heuglini</i>	Huglin's Gull	Charadriiformes	Laridae	WV
45	<i>Hydroprogene caspia</i>	Caspian tern	Charadriiformes	Sternidae	WV
46	<i>Vanellus indicus</i>	Red Wattled Lapwing	Charadriiformes	Charadriidae	WV
47	<i>Charadrius mongolus</i>	Lesser Sand Plover	Charadriiformes	Charadriidae	WV
48	<i>Numenius phaeopsis</i>	Whimbrel	Charadriiformes	Charadriidae	WV
49	<i>Calidris tenuirostris</i>	Great Knot	Charadriiformes	Scolopacidae	WV
50	<i>Tringa ochropus</i>	Green sandpiper	Charadriiformes	Scolopacidae	WV
51	<i>Gallinago gallinago</i>	Common or Fantail Snipe	Charadriiformes	Scolopacidae	WV
52	<i>Himantopus himantopus</i>	Black winged stilt	Charadriiformes	Recurvirostridae	WV
53	<i>Recurvirostra avosetta</i>	Pied avocet	Charadriiformes	Recurvirostridae	WV
54	<i>Coturnix coturnix</i>	Quail	Galliformes	Phasinidae	R
55	<i>Ammoperdix grisioularis</i>	See see partridge	Galliformes	Phasinidae	R
56	<i>Alectoris chakor</i>	Chakor	Galliformes	phasinidae	R
57	<i>Ciconia ciconia</i>	White Stork	Ciconiiformes	Ciconiidae	WV
58	<i>Ardea alba</i>	White heron	Ciconiiformes	Ardeidae	WV
59	<i>Ardea cinera</i>	Grey Heron	Ciconiiformes	Ardeidae	WV
60	<i>Ibis leucocephalus</i>	Painted Stork	Ciconiiformes	Ardeidae	WV
61	<i>Ardea alba</i>	Egret	Ciconiiformes	Ardeidae	WV
62	<i>Platalea leucorodia</i>	Eurasian Spoonbill	Ciconiiformes	Threskiornithidae	WV
63	<i>Plegadis falcinellus</i>	Glossy Ibis	Ciconiiformes	Threskiornithidae	WV
64	<i>Phonicopterus roseus</i>	Flamingo	Ciconiiformes	Phoenicopteridae	WV
65	<i>Grus virgo</i>	Demoiselle Crane	Gruiformes	gruidae	PM
66	<i>Fulica atra</i>	Coot	Gruiformes	Rallidae	WV

No	Scientific name	Common name	Order	Family	Visiting period
67	<i>Gallinule tenebrosa</i>	Duskey moorhen	Gruiformes	Rallidae	WV
68	<i>Tadorna tadorna</i>	Shelduck	Anseriformes	Anatidae	WV
69	<i>Anas platyrhynchos</i>	Mallard duck	Anseriformes	Anatidae	WV
70	<i>Mareca strepera</i>	Gadwall	Anseriformes	Anatidae	WV
71	<i>Anas discors</i>	Blue wing teal	Anseriformes	Anatidae	WV
72	<i>Anas cynoptera</i>	Cinnamon teal	Anseriformes	Anatidae	WV
73	<i>Spatula clypeata</i>	Shoveler	Anseriformes	Anatidae	WV
74	<i>Anas acuta</i>	Pin teal	Anseriformes	Anatidae	WV
75	<i>Aythya valisineria</i>	Canvasback	Anseriformes	Anatidae	WV
76	<i>Maraca americana</i>	Wigon	Anseriformes	Anatidae	WV
77	<i>Anser anser</i>	Graylag goose	anseriformes	anatidae	WV
78	<i>Anus bernieri</i>	Madagascar teal	Anseriformes	Anatidae	WV
79	<i>Mergus merganser</i>	Merganser	Anseriformes	Anatidae	WV
80	<i>Anas carolinensis</i>	Green winged teal	Anseriformes	Anatidae	WV
81	<i>Anas crecca</i>	Eurasian duck/ common teal	Anseriformes	Anatidae	WV
82	<i>Anas gracilis</i>	Grey teal	Anseriformes	Anatidae	WV
83	<i>Aythya ferna</i>	Pochard	Anseriformes	Anatidae	WV
84	<i>Pterocles orientalis</i>	Sandgrose	Pterocliiformes	Pteroclididae	WV
85	<i>Bubo bubo</i>	Owl	Strigiformes	strigidae	R
86	<i>Jynx torilla</i>	Wryneck/ jynx tortilla	Piciformes	Picidae	WV
87	Houbara bustard	<i>Chlamydotis undulate</i>	Otidiformes	Otididae	WV

Legends strands for: WV= winter visitors; YRV= Year round visitors; R= Residents; SV = summer visitors; SBV= summer breeding visitors; PM= Passage Migrants.



Figure 1. District Pishin in the map of Balochistan province. The red circle shows Band-Khshdil Khan lake.



Figure 2. Map of Band-Khshdil Khan lake, Pishin (Balochistan), Pakistan.



Figure 3. Road nearby Band-Khshdil Khan lake, Pishin (Balochistan), Pakistan.

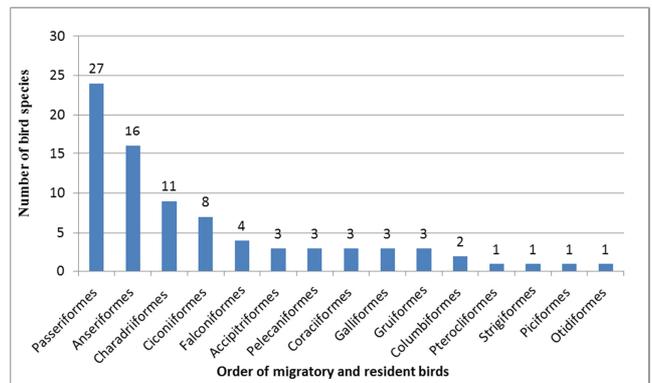


Figure 4. Orders of migratory and resident birds.

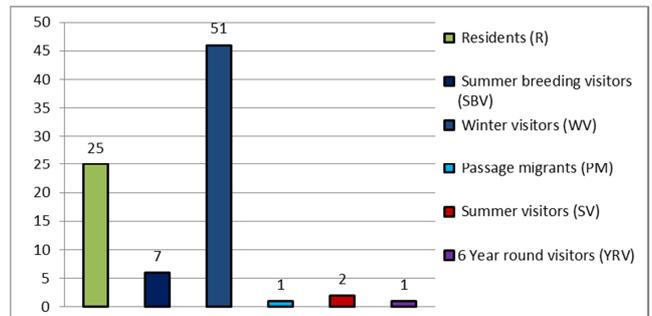


Figure 5. Number of resident and migratory birds with their corresponding visiting periods.



Figure 6. Hunted and killed mallard ducks.



Figure 7. Resident pigeon.



Figure 8. Grey heron inside the lake.



Figure 9. White wagtail.



Figure 10. Hugin's Gulls inside the lake.



Figure 11. Yellow wagtail.



Figure 12. Cormorants.



Figure 13. Green sandpiper.



Figure 14. Caspian tern and gulls.



Figure 15. Red wattled lapwing.



Figure 16. Resident magpie in the lake.



Figure 17. Hunters holding sandgrouse.



Figure 18. An injured Resident hoopoe.



Figure 19. Pied avocet.



Figure 20. Hunted Common shelduck.



Figure 21. Hunted pelican.



Figure 22. White egret inside the lake.



Figure 23. Shows wheat crops and sheep grazing inside the lake.



Figure 24. Tractor used for drainage of water from the lake.

Financial Support

This research work was supported by the forestry and wildlife department, Govt. of Balochistan Quetta under Ten Billion Tsunami Tree Project (No. 988-93) for M. Phil scholars of University of Balochistan, Quetta.

Conflict of Interest

All the authors do not have any possible conflicts of interest.

Acknowledgements

The authors are thankful to Forestry and Wildlife Departments, Quetta for providing research work opportunities. Thanks are also due to the research supervisor (Prof. Dr. Asmatullah Kakar (Chairman, Dept. of Zoology, University of Balochistan, Quetta) for his guidance throughout research work, and local peoples of district Pishin and all my friends who helped and support this research work.

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