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PJMLS

Print ISSN: 2707-4471. Online ISSN: 2707-448X

Research Article	Pak-Euro Journal of Medical and Life Sciences
DOI: 10.31580/pjmls.v6i2.2331	Copyright © All rights are reserved by Corresponding Author
Vol. 6 No. 2, 2023: pp. 133-144 www.readersinsight.net/pjmls	
	Revised: May 31, 2023 **Accepted:** June 02, 2023
Submission: April 10, 2023	**Published Online:** June 30, 2023

DIVERSITY AND DISTRIBUTIONOF RESIDENT AVIAN FAUNA OF NORTH-EASTERN REGION OF QUETTA DISTRICT, BALOCHISTAN, PAKISTAN

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Abstract

The current study was conducted in the North-Eastern region (Takatu, Murdar and Zarghoon Mountain ranges with associated plain areas including residential areas) of the Quetta district of Balochistan. During the present study, a sum of 30 resident avian species (18 passerine and 12 non-passerine) belonging to 18 families and 24 genera were recorded. Among the total 30 resident species 28 were found in wild habitats, 11 in human residents of the central city area and 9 inhabiting both wildlife and residential areas. Anthropogenic activities such as Construction/ developmental activities like industrialization zone in/near Takatu region, pollution, Deforestation, Habitat degradation and Disturbance including Fragmentation and Mining, local increase in population/ human population pressure, immigration to the surrounding areas of the city (in or near wildlife habitats) are potential threats which affect wildlife including avifauna of the region. To support and conserve the resident avifauna, it is recommended to plant all-season varieties of flowering plants, and fruiting trees, to provide artificial nests and facilitate existing nesting sites for avifaunal species. This study also recommends the implementation of conservation plans and community-based conservation initiatives.

Keywords: *Avian species, Birds, Quetta, Resident species*

INTRODUCTION

Birds are one of the most widespread life forms on the planet and have a wide variety of species, which adds to the beauty and richness of life. Besides captivating people with their naturally beautiful plumage, melodic songs, and artistic behavior, birds are also useful in many other ways, such as being sensitive pollution indicators and efficient pest controllers (1). Farmers in Pakistan consider birds as friends because they believe that they consume enormous quantities of dangerous/hazardous hexapods, their eggs and young ones, serving as an insect pest biological control agent (2). In human society, birds have a significant economic impact. They are essential in reducing the prevalence of different insects and pests. In addition to serving as scavengers and pollinators, they aid in the dispersal of plant seeds. Aves also contribute to the richness of human nutrition (3). The bird fauna is essential for maintaining a balanced or healthy ecosystem because they serve a variety of functions, including foraging, insect pest control, pollination and acting as bioindicators in various environments such as industrialization as well as suburbanization (4, 5) human pollution (6, 7)and lighting (8). Aves are the earliest indicators of various pollution concerns and the purpose of given early threats (9, 10). Avifaunal species are thought to be ecosystem barometers (11). According to the data on species conservation, Fourteen Hundred and Sixty avian species have been classified as globally threatened (12). Around 1029 species of aves are designated to

be Near Threatened (13). There are 449 endangered, 786 vulnerable and 8405 avian species of least concern (12).

Recent studies state that many bird species's populations are declining globally, with some of these attaining the status of being locally extinct as a result of habitat fragmentation and degradation (11). The main reasons for long-term bird population decline may be because of unanticipated changes like lack of food supply, global warming, inter-specific interactions and pollution as well (14, 15). Identifying hazards and anticipating future changes in avian populations are crucial steps in reducing the threats in the avifaunal community. The status of bird species can be determined by these actions (16).

The exponential rise in human population has had a severe influence on avian species in a number of ways, including invasive species, urbanization, intensive agriculture, industrialization, Overexploitation of forests, climate change, urbanization and negative interactions between humans and birds (17-20).

Because of anthropogenic activities, biodiversity in general and avian fauna in particular are under severe threat (18). Water contamination is a major global danger to biodiversity. The major causes of water pollution are sewage and industrial wastes that pollute various water bodies with heavy metals (21). Heavy metals that enter aquatic habitats can produce significant accumulation as well as bio-magnification, eventually getting into the food chains and creating major health problems in animals (including birds) by causing damage to their tissues, livers, kidneys and muscles (22).

Pakistan engages in massive bird hunting and capture for food and enjoyment (23). As a result, while the species' overall status is thought to be stable, local populations are declining (24-26). Protected areas in the world flourish biodiversity, particularly bird diversity, which promotes healthy ecosystems and environmental balance (27). The country has over four hundred and forty protected areas, including twenty-four Wildlife Parks, thirty National Parks, two Wildlife Refuges, three Marine Conservation Areas, twenty-one Private Game Reserves, ninety-seven Game Reserves, one hundred and forty-five Community Game Reserves and ninety-two Wildlife Sanctuaries (28).

Balochistan has a diverse range of ecosystems, habitats, and landscapes as a result of climatic and physical factors (29-32). Among the birds of Balochistan vultures are important scavengers, they inhibit the transmission of diseases that would harm man and other mammals (33-35). *A. chukar* living on numerous elevations of Ziarat, Killa Saifullah, Quetta, Mastung, Killa Abdullah, Kalat and Pishin districts of Balochistan (36-37), Pakistan's national bird (36). Chukar coveys, which were once so ubiquitous on all high grounds of Quetta, are now tiring to locate in Quetta Division (38). The Balochistan's wildlife is highly diverse in terms of biodiversity, therefore 6 game reserves, fourteen wildlife sanctuaries and 3 national parks are constructed in the Province for the conservation of wild animals (IUCN and Govt. of Balochistan, 2000). However, bird keeping in cages in all major cities of Pakistan is a concerning condition for avian conservation (39, 40). Bird populations (Harriers, Ospreys, Hawks, Falcons, Eagles, Buzzards, Vultures and Kites) are highly reducing throughout the country due to the destruction of habitats, hunting, poaching etc. (41). Therefore, the necessary knowledge of wildlife and its environment is required to carry out wildlife management and conservation projects or initiatives (42).

Quetta, the provincial capital of Balochistan, is located at an elevation of 5,500 ft. above sea level (43) and is surrounded by 4 mountain ranges (Murdar, Chiltan, Zarghoon, Takatu). In addition to Hazarganji Chiltan National Park (HCNP), located in the south-west of Quetta, the Northeastern region of Quetta district (with almost similar climatic conditions to the HCNP) has a number of important wildlife habitat sites including the water dams and reservoirs/ somewhat riparian habitats, scrub/ shrub grasslands, plains, foothills, highlands, vertical cliffs, steep mountain slopes and ravines. Most of its Mountain ranges have a variety of plant species. The variety of trees and vegetation in the city area provide important habitats, food and shelter to aves. In the present study, the biodiversity, Distribution, Status and Conservation of the Avifauna have been investigated, due to significant wildlife habitat sites and no previous study conducted on the Avifauna in the nominated research area.

MATERIALS AND METHODS

STUDY SITE

Geographically Baochistan (Fig. 1A) is the largest province of Pakistan covering 44% of the total land of the country (44) and located at 24.32 N and, 60.70 E (45). Quetta is the capital of the province (Fig. 2). Field surveys were conducted (from April 2022 to March 2023) repeatedly in the North-Eastern region of Quetta district(30.1798°N, 66.9750°E) including mountain ranges like Zarghoon, Murdar and Western and Eastern parts of Takattu with associated plain areas including Sra Ghurhgai, Spin Karez, Hana Urak and Hana valley (Fig. 1B). The avifaunal surveys were conducted early in the morning, evening as well as full day times.

Fig. 1A. Map of Balochistan

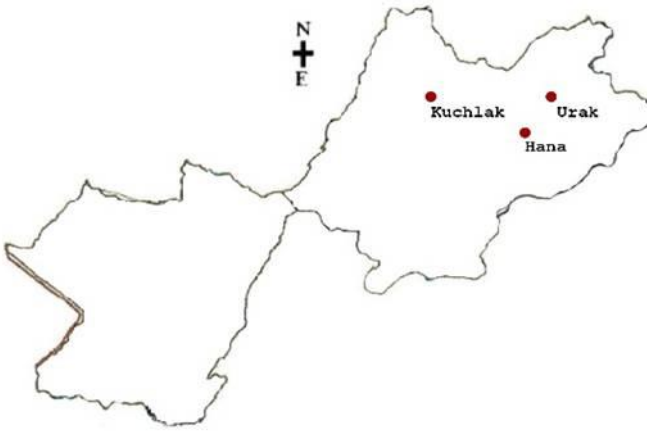

Fig. 1B. Map of Quetta district

AVIFAUNAL DATA COLLECTION

Depending upon the habitats different methods for the collection of avian data were used. Binoculars standard (1050 mm) and a highly magnifying/zooming Nikon Coolpix p1000 Camera were used for data or sample collection, mainly for taxonomic identification and enrolling avian species.

To determine the avian diversity of the area, both direct (taking photos, using a common bird trapping net and observations through binoculars and naked eyes) and indirect (by obtaining information about their nests, shape and color of beak and feathers, marks on the trees and waste materials/faecal pellets) methods were used. Field notebook/ Data sheets and GPS were used during the field study to record observations/collect data. Area volunteers were asked to help find sites enriched in species. In addition to interviews of related individuals such as traders, game watchers, wildlife officials, local elderly people and students, information was gathered through indirect means such as a review of scientific published literature, different field guides and knowledge of inhabitants. Mainly photos were shown to the locals and concerns for the confirmation of a species occurrence in a particular area.

Waterbirds of Asia (39), Birds of Pakistan (40), and Birds of Pakistan (41) were used as identification tools and field guides. Other field guides including Birds of Pakistan (42), The birds of Pakistan (43), The Birds of Pakistan (44) were also used. The following 3 key features were mostly used for the identification of species: external morphology (size, color and shape of beak, tail, legs and overall plumage) calls as well as songs of aves.

RESULTS

The present research was conducted (from April 2022 to March 2023) on the Biodiversity and Conservation Measures of the Avian Fauna of the North-Eastern Region of Quetta District, Balochistan, Pakistan. During the current study, a sum of 30resident species belonging to 18 families and 24 genera were recorded (Table I). Among the total 30 resident avian species (18 passerine and 12 non-passerine) 28 were found in wild habitats, 11 in human residents of the main city area and 9 in dual habitats (Table II). It is recorded that amongst bird diversity the order Passeriformes (12 families and 14 genera) dominated with 18 species followed by the order Columbiformes (with 1 family and 4 species), Galliformes (with 1 family and 3 species) and Strigiformes with two resident species in the area (Fig. 2).

Table I. Avifauna was observed during the study period in Quetta city and the North-Eastern region of Quetta district

S. #	Order	Family	Species	Common Name	F.H	Status	IUCN Status	Study Area
1	Passeriformes	*Motacillidae*	*Anthus similis*	Long Billed Pipit	I/Ca	R	LC	Spin Karez, Takatu
2	Passeriformes	Passeridae	*Passer montanus*	Eurasian Tree Sparrow	O	R	LC	Zarghoon, Murdar, Spin Karez, Sra Ghurhgai, Hanna Lake, Hana Urak, City area
3	Passeriformes	Fringillidae	*Bucanetes githagineus*	Trumpeter Finch	S,H,I	R	LC	Zarghoon
4	Passeriformes	Sturnidae	*Acridotheres tristis*	Indian Myna	O	R	LC	Zarghoon,Murdar, Spin Karez, Sra Ghurhgai, Hanna Lake, Urak, City
5	Passeriformes	Sturnidae	*Acridotheres ginginianus*	Bank Myna	O	R	LC	Spin Karez, Urak, Hana Lake, near Zarghoon, around Murdar, Sra Ghurhgai
6	Passeriformes	Pycnonotidae	*Pycnonotus leucotis*	White-Eared Bulbul	F	R	LC	Hana Lake,Urak,Spin Karez, Sra Ghurhgai, Zarghoon Mountain, near Murdar, City
7	Passeriformes	Pycnonotidae	*Pycnonotus cafer*	Red-Vented Bulbul	O	R	LC	near Zarghoon,Spin Karez,

8	Passeriformes	Scotocercidae	*Scotocerca inquieta*	Scrub Warbler	I, O	R	LC	Sra Ghurhgai, Urak, City Zarghoon, Spin Karez, Takatu, Sra Ghurhgai
9	Passeriformes	Acrocephalidae	*Acrocephalus scirpaceus*	Common Reed Warbler	I	R	LC	City area (Metropolitan)
10	Passeriformes	Laniidae	*Lanius vittatus*	Bay-Backed Shrike	I, Ca	R	LC	Zarghoon, Sra Ghurhgai, Hana Lake, Urak, Spin Karez, Takattu, city area
11	Passeriformes	Laniidae	*Lanius schach*	Rufous-Backed Shrike	I, Ca	R	LC	City area (UOB), Spin Karez
12	Passeriformes	Corvidae	*Pica pica*	Eurasian Magpie	O	R	LC	Hana Lake, Urak,Spin Karez, Sra Ghurhgai
13	Passeriformes	Corvidae	*Pyrrhocorax graculus*	Alpine Chough	I/Ca, F	R	LC	Takatu, Sra Ghurhgai
14	Passeriformes	Corvidae	*Pyrrhocorax Pyrrhocorax*	Red-billed Chough	I/Ca	R	LC	Takatu, Sra Ghurhgai
15	Passeriformes	Sittidae	*Sitta tephronota*	Eastern Rock-Nuthatch	O	R	LC	Sra Ghurhgai,Spin Karez, Zarghoon, Takatu
16	Passeriformes	Alaudidae	*Galerida cristata*	Crested Lark	O	R	LC	Whole study area except City
17	Passeriformes	Alaudidae	*Ammomanes deserti*	Desert Lark	I/Ca, S	R	LC	Sra Ghurhgai, Takatu
18	Passeriformes	Estrildidae	*Lonchura malabarica*	Indian Silverbill	G,H	R	LC	City area

19	Strigiformes	Strigidae	*Athene brama*	Spotted Owelet	I/Ca	R	LC	Takatu
20	Strigiformes	Strigidae	*Athene noctua*	Little Owl	I/Ca	R	LC	Sra Ghurhgai, Spin karez
21	Galliformes	Phasianidae	*Alectoris chukar*	Chukar Partridge	O	R	LC	Sra Ghurhgai,Takatu, Urak, Hana Lake area
22	Galliformes	Phasianidae	*Ammoperdix griseogularis*	See-See Partridge	S, I	R	LC	Takatu, Urak, Hana Lake area
23	Galliformes	Phasianidae	*Coturnix coturnix*	Common Quail	G/H, I	R	LC	Sra Ghurhgai(presence confirmed from locals and Shopekepers)
24	Columbiformes	Columbidae	*Columba livia*	Rock Pigeon	G, H	R	LC	Whole study area
25	Columbiformes	Columbidae	*Columba palumbus*	Common Wood Pigeon	G,S, H	R	LC	Takatu
26	Columbiformes	Columbidae	*Spilopelia senegalensis*	Laughing Dove	O	R	LC	Whole study area
27	Columbiformes	Columbidae	*Streptopelia decaocto*	Eurasian Collared Dove	G, H	R	LC	Urak, City area
28	Charadriiformes	Charadriidae	*Charadrius dubius*	Little Ringed Plover	I/Ca	R	LC	Sra Ghurhgai, Spin Karez,Hana Lake
29	Coraciiformes	Coraciidae	*Coracias benghalensis*	Indian Roller	I	R	LC	Spin Karez,Urak
30	Accipitriformes	Accipiterdae	*Buteo rufinus*	Long-legged Buzzard	Ca	R	LC	Sra Ghurhgai

Abbreviations: LC- Least concern, R- Resident, Dist.- Distribution, F.H- Feeding Habit, Ca- Carnivores, F-Frugivores, G-Granivores, I- Insectivores, O-Omnivores, H- Herbivore, S-Seedeater

Resident avifauna observed in the wild habitats of the North-Eastern Region of Quetta Districtinclude *Pycnonotus leucotis, Anthus similis, Columba palumbus, Buteo rufinus, Passer montanus, Bucanetes githagineus, Acridotheres ginginianus, Scotocerca inquieta, Lanius vittatus, Columba livia, Acridotheres tristis, Lanius schach, Pyrrhocorax graculus,Pyrrhocorax Pyrrhocorax, Spilopelia senegalensis, Pycnonotus cafer, Pica pica, Ammomanes deserti, Sitta tephronota, Streptopelia decaocto, Athene brama, Athene noctua, Galerida*

cristata, *Alectoris chukar*, *Coturnix coturnix* and *Ammoperdix griseogularis* (Fig. 3A, B, E, B2 respectively). In addition, *Coracias benghalensis* and Charadrius *dubius* were also recorded from wild habitats (Fig. 3E2, F2).

Fig. 2. The orders of birds and the number of species in each order

Fig. 3. A. *Pycnonotus leucotis*, B. *Anthus similis*, C. *Acridotheres tristis* D. *Acrocephalus scirpaceus*, E. *Columba palumbus*, F. *Buteo rufinus*, G. *Passer montanus*, H. *Bucanetes githagineus*, I. *Acridotheres ginginianus*, J. *Scotocerca inquieta*, K. *Lanius vittatus*,L.*Columba livia*, M. *Acridotheres tristis*, N. *Lanius schach*, O. *Pyrrhocorax graculus*, P. *Pyrrhocorax Pyrrhocorax*, Q. *Spilopelia senegalensis*, R. *Pycnonotus cafer*, S. *Pica pica*, T. *Ammomanes deserti*, U. *Sitta tephronota*, V. *Streptopelia decaocto*, W. *Athene bram* , X. *Athene noctua*, Y. *Galerida cristata*, Z. *Alectoris chukar*, A2. *Coturnix coturnix*, B2. *Ammoperdix griseogularis*, C2. *Lonchura malabarica*, D2. *Domestic Cat*, E2. *Coracias benghalensis*, F2. *Charadrius dubius*

Resident avifauna reported from the City area includes *malabarica* (Fig. 4C), *Acrocephalus scirpaceus* (Fig. 3D), *L. schach*, *P. montanus*, *A. tristis*, *P. leucotis*, *P. cafer*, *L. vittatus*, *S. senegalensis*, *S. decaocto* and *C. livia*Whereas Resident avifauna observed in the wild as well as City area include *P. leucotis*, *P. cafer*, *S. senegalensis*, *S. decaocto*, *C. livia*, *L. vittatus*, *L. schach*,*A. tristis* and *P. montanus* (Table II).Their presence in the city or wild habitats may be due to habitat preference mainly for breeding purposes, and the availability of food and shelter.

Hunting and poaching of the resident avifauna like Common Quail, Chukar and See-See Partridges are common in the area. Due to the heavy hunting of these species, their population has largely declined. In the early summer season, unlawful egg and juvenile gathering (by underprivileged children) of these species was also observed. In addition to Chukar and See-See Partridge species like Indian Myna (Fig. 4. C), Common Quail (Fig. 3A2), Bank Myna, White-Eared Bulbul and Red-Vented Bulbul are captured, kept in

cages and sold by Shopkeepers. Furthermore, a number of domesticated cats were observed while capturing, hunting and eating the juveniles, fledgelings and adult birds (Fig. 3D2). On the other hand, the presence of almost no/very few artificial nesting sites (nest boxes or birdhouses) was observed in the study area. Unsustainable hunting and poaching can lead to further population decline and ultimately local extinction of the species due to a lack of or extremely weak enforcement of the law. Therefore, Conservation of various habitats is necessary for the retention of rich avifaunal diversity in the area.

Table II. Resident avifauna observed in the North-Eastern region of Quetta district and city area

S. No.	Resident avifauna observed in wild	S. No.	Resident avifauna observed in city area	S. No.	Resident avifauna observed in both areas
1	*Pycnonotus leucotis*	1	*Pycnonotus leucotis*	1	*Pycnonotus leucotis*
2	*Pycnonotus cafer*	2	*Pycnonotus cafer*	2	*Pycnonotus cafer*
3	*Streptopelia decaocto*	3	*Streptopelia decaocto*	3	*Streptopelia decaocto*
4	*Columba livia*	4	*Columba livia*	4	*Columba livia*
5	*Spilopelia senegalensis*	5	*Spilopelia senegalensis*	5	*Spilopelia senegalensis*
6	*Lanius vittatus*	6	*Lanius vittatus*	6	*Lanius vittatus*
7	*Lanius schach*	7	*Lanius schach*	7	*Lanius schach*
8	*Passer montanus*	8	*Passer montanus*	8	*Passer montanus*
9	*Acridotheres tristis*	9	*Acridotheres tristis*	9	*Acridotheres tristis*
10	*Acridotheres ginginianus*	10	*Lonchura malabarica*		
11	*Galerida cristata*	11	*Acrocephalus scirpaceus*		
12	*Ammomanes deserti*				
13	*Bucanetes githagineus*				
14	*Coturnix coturnix*				
15	*Scotocerca inquieta*				
16	*Charadrius dubius*				
17	*Coracias benghalensis*				
18	*Alectoris chukar*				
19	*Sitta tephronota*				
20	*Pica pica*				
21	*Athene noctua*				
22	*Athene brama*				
23	*Pyrrhocorax graculus*				
24	*Pyrrhocorax Pyrrhocorax*				
25	*Columba palumbus*				
26	*Buteo rufinus*				
27	*Ammoperdix griseogularis*				
28	*Anthus similis*				

Urbanization and Anthropogenic activities such as Constructions/ developmental activities like industrialization zone in/near Takatu region, habitat disturbance like heavy firing and army training activities in a vast area close to the Zarghoon mountain range, immigration to the surrounding areas of the city (in or near wildlife habitats), local increase in population/ human population pressure, deforestation mainly by poor members of the community (chiefly in Takatu, Sra Ghurhgai and Spin Karez), Fragmentation, Mining, pollution (mainly plastic pollution), habitat degradation and disturbance are potential threats and affecting wildlife including avifauna of the region. Such activities reduce the availability of food, shelter, breeding places and species richness, which eventually result in certain kinds of avian migration.

DISCUSSION

The province of Balochistan (Fig. 1) has very rich bird fauna due to its zoogeographical location, but many species are yet to be reported. Among 10960 species of birds in the globe (12) 214 species are waders/shorebirds (of Charadriiformes family), out of which 85 are found in Asia, 69 on the Indian subcontinent and 57 in Pakistan (45). In Asia more than 2700 species of birds (46) including 2060 in the Indo-Pak subcontinent (47) 1340 in India (48) nearly 700 in Bangladesh (49) 534 in Iran (50), 482 including 26

endemic, 220 residents and 203 migrants in Sri Lanka (51, 52), 1,372 including 77 endemic species in China (53), 515 in Egypt, with 17 endemic and about 186 resident (54, 55) more than 500 bird faunistic species in Palestine (56, 57), more than 600 in Philippine (58) with 195 endemic and seventy-four of which are threatened with universal extinction (59) and 502 in Turkey (60-61-62) were reported.

670 bird species in Pakistan (42) and their presence in three zoogeographical zones (Oriental, Ethiopian and Palearctic) is unusual in the globe (40). Out of 670 bird species in Pakistan (42), belonging to 85 families with large numbers of winter visitors (43, 44), and 380 species are found in Balochistan (63, 64). Recent research shows that Pakistan is home to 700 bird species (65) while Balochistan has 410 avian species (66), although Ghalib et al. (2019) recorded 373 species of birds in Balochistan (67).

Enough population of Eurasian Collared Dove, which was found rare in the Winter Season, was observed in the City area and Hana Urak in the Summer Season. Due to its larger number in Summer in the Urak area, its presence in the Winter Season was also confirmed by the locals. It was reported by Khan & Siddiqui, (2011) from Hazarganji Chiltan National Park (68) and Ghalib et al. (2019) from around Balochistan (67-72) as Resident/Summer Breeding Visitors, however in the present study it is concluded that the species is a Resident in this study area.

CONCLUSION

The current survey provides the prefatory framework to know the avian diversity of the North-Eastern region of Quetta. This is the first-ever study on the biodiversity, Distribution and conservation measures of the resident avian fauna of North-Eastern region of Quetta district and city area. On the basis of field surveys of the selected study areas, a sum of 30 bird species (18 passerine and 12 non-passerine) belonging to 24 genera and 18 families were recorded. Among the total 30 resident avian species (18 passerine and 12 non-passerine) 28 were found in wild habitats, 11 in human residents of the main city area and 9 in dual habitats. The localities surveyed in this study include Zarghoon, Murdar, and Eastern and Western parts of Takattu with associated areas including Sra Ghurhgai, Spin Karez, Hana Urak, Hana Valley as well as main city area. Anthropogenic activities such as Construction/ developmental activities like industrialization zone in/near Takatu region, Pollution, Deforestation, Habitat degradation and Disturbance including Fragmentation and Mining, local increase in Population/Human Population Pressure, Immigration to the surrounding areas of the city (in or near wildlife habitats) are potential threats which affect wildlife including avifauna of the region.

Recommendations:

Research on birds diversity, residential status, habitats and abundance should be conducted on a regular basis so that the causes for the decline in population size, diversity as well and ecological reasons can be figured out. It is recommended that in order to support, preserve and conserve the resident avifauna, it is necessary to plant all-season varieties of angiosperms (flowering plants and fruiting trees), to provide artificial nests and facilitate existing nesting sites for avifaunal species. Plantation of trees can act as a source of food, shelter and refuge for birds. Regular monitoring of the survey sites, particularly the Wildlife and bird-rich areas like Spin Karez, Sra Ghurhgai, Hana Urak and Takatu should be conducted every year and season, with the help of university faculties, students and the Wildlife department to conserve the magnificent and sustainable ecosystems in order to ensure greater protection/ maintenance of natural resources as well as sustainable ground for avian welfare. This study also recommends the implementation of conservation plans as well as community-based conservation initiatives.

Acknowledgements:

I am highly thankful to the local people of district Quetta and all my friends who helped and supported me in this research work

Conflict of Interest:

All authors do not have any possible conflicts of interest

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