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DIVERSITY, DISTRIBUTION AND CONSERVATION STATUS OF HEREPTILIAN FAUNA OF QUETTA DISTRICT, BALOCHISTAN

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Abstract

Herpitiles, comprising both amphibians and reptiles, are ecologically significant organisms. Field surveys were conducted periodically in District Quetta, Balochistan, between May 2022 and August 2023, aimed at gathering data and assessing the conservation status of these reptiles and amphibians. A total of 120 individuals were observed in the research area, comprising 92 reptiles and 28 amphibian species. Among reptiles, lizards and snakes were the dominant groups. The highest number of lizards (22.5%) was observed in August, while the lowest (10%) was recorded in March. Similarly, the highest number of snakes (44.4%) was sighted in July, with the lowest (2.7%) in March. Tortoises exhibited a peak of 30.4% in August and a low of 4.3% in April. Among amphibians, the highest number of frogs (33.3%) was noted in August, with the lowest (8.3%) observed in March, April, and June. Notably, the presence of Bufotes zugmayeri was documented for the first time in the study area. The primary threats to the conservation of reptiles and amphibians include habitat loss and degradation, driven by rapid urbanization, agricultural expansion, and infrastructure development, which have led to habitat fragmentation and diminished food sources for these species.

Key words: *Amphibians, Conservation, Diversity, Quetta, Reptiles*

INTRODUCTION

Herpitiles are an ecologically significant group of organisms (1). These interesting creatures have caught the attention of researchers, scientists, and nature enthusiasts alike due to their unique characteristics and evolutionary history. The background of this study aims to shed light on the importance of Herpitiles and the motivation behind exploring their various aspects (2). Reptiles, such as snakes and lizards, often act as top predators in their respective habitats, controlling populations of small mammals and insects (3). Additionally, they influence plant communities through herbivory and seed dispersal. Amphibians, like frogs and salamanders, serve as indicators of ecosystem health due to their permeable skin, making them sensitive to environmental changes like pollution and habitat degradation (4). Amphibian fauna includes frogs (Anura) and caecilians (Gymnophiona). The anurans are represented by at least 22 genera and the caecilians are represented by two genera (5).

The scientists concentrated on the species that were disappearing from the natural world as a result of numerous anthropogenic factors since there was a growing awareness of the direct and indirect uses of biodiversity values. Scientists were compelled to protect frogs and reptiles because they are vital components of the food chain and act as environmental indicators for predicting climate change (6). Herpetofauna diversity and distribution are largely influenced by a region's geographic location and climatic circumstances. Amphibians and reptiles play an important part in a healthy ecosystem, operate as bio-indicators, and are dynamic members of the food chain. They play a significant role in the food chain since they eat insects and provide food for numerous bird and mammalian species. Tadpoles in particular play a key role in the regulation of nutrients moving from aquatic environments to terrestrial ecosystems (7).

There are 220 species of herpetofauna in Pakistan (25 amphibians' species and 195 reptiles' species) (8). Pakistan is home to 38 indigenous reptile species and six amphibian species (9). There is very little information available about the herpetofauna of the country's numerous national parks, habitat types, and localities (10) reported 32 reptile species and 9 amphibians' species in Pakistan's Margalla Hills National Park (11) identified nine reptile species and four amphibian species in the Punjabi district of Mianwali. A report claims that 195 reptiles, 24 amphibian species and 15 reptile species were found in Chakwal, Punjab, including Oriental Snake-eyed Lacerta, Striped Gras and Garden lizard (12).

Snakes (Serpents), a clade of carnivorous Squamate reptiles, are distinguished by their elongated, limbless bodies and split tongues (13). Snakes are cold-blooded creatures that are found everywhere except the poles. They make up almost one-fourth of all species of vertebrates known to science, and they require aesthetic, financial, and cultural qualities (14). The food chain and ecological equilibrium of nature depend greatly on snakes. The highest percentage of any amphibian fauna in the world 84% of amphibian species are in danger of extinction. Small distributions and dwindling habitat, primarily due to deforestation, were the main causes of placing species in the high threat level (vulnerable, endangered, and critically endangered) (15). Pakistan's mostly dry environmental patterns contribute to the country's limited amphibian diversity. Nonetheless, because of the humid riparian conditions in the Indus Valley, the torrential sand streams in the northern Himalayan sub-mountain region, and the underground water channels in the western Balochistan highland, there are 25 identified species of Amphibians found in Pakistan (16).

In comparison to India and Southeast Asia, Pakistan has poor amphibian populations due to the country's persistent aridity and dry conditions (17). The amphibians and reptiles have ecological, economic, cultural, aesthetic and religious values, however, these creatures remained unexplored and received less attention from the scientific community (18). During summer evenings frogs and toads are the most encountered animals in the Indus Valley, and somewhere else in Pakistan (19). Many softshell turtle species were used in traditional Chinese medicine to purify blood and treat a variety of diseases; this practice is endangering turtle populations. Capturing turtles for their meat, leather, shells, and other body parts is another factor (20).

MATERIALS AND METHODS

STUDY AREA

Field surveys were conducted repeatedly in District Quetta, Balochistan from May 2022 to August 2023 in order to collect the data of both Amphibians and Reptiles. The study area included Kuchlak, Koh-i-Takatu, Koh-i-Chiltan, Nohsar, Aghbarg, Quetta city and Sariab (Fig. 1). The complete data of both Amphibians and Reptiles associated with ecology, distribution, diversity and threats were studied. A total of 120 individuals including 92 reptiles and 28 amphibians samples were studied in the study area.

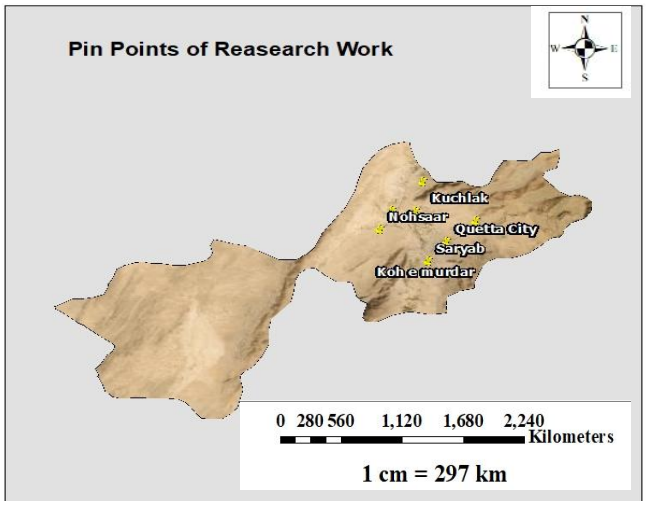

Fig. 1. Quetta district showing study area

DATA COLLECTION AND PRESERVATION OF HERPETILES

The samples were studied from each of the designated sites' gardens, plants, soil, hills, and damp, shaded areas. The number of samples has been taken from each site varied from 10 to 15. The samples that could not identify due to some reasons were preserved in 70-80% ethyl alcohol in specimen bottles. The Collected samples were taken to the Wildlife Museum of Zoology Department on the same or later days for a detailed explanation. The shells and hard covers with algae and mineral coatings were placed in a diluted oxalic acid solution for a brief period before analysis, and they were then washed with tap water before final preservation (21).

IDENTIFICATION OF AMPHIBIANS AND REPTILES

Various skin traits, including shape, size, color, ornamentation, number of scales and skin coiling, have been used for the identification of amphibians and reptiles species (22). They can be distinguished from one another by their size, form, number of whorls, and aperture shape and size, i.e. the whorls may be angular, keeled or rounded. Moreover, the spike's count, size and shape. The presence or absence of opercula (trap doors) and their design, along with the shape, size, and depth or narrowness of the apex position, form, and perforation of the columella, have been considered. Additionally, the color and pattern of the outer coating (ridged, striated), as well as the position of the hanger fangs around the eye, have been taken into account alongside a morphometric parameter.

RESULTS

During the present study, a total of 120 individuals including 92 reptiles and 28 amphibians were sampled and examined. In all the localities of the Quetta district, the reptiles were dominated. During the study period, a total of 18 reptile species were identified belonging to six families, of which snakes included 3 families (Colubridae, Viperidae and Elapidae), Fig. 2 (a, b, c, d). While lizards include 5 families (Agamidae, Eublepharidae, Lacertidae and Gekkonidae) Fig. 3 (a, b, c, d,).similarly tortoise including 1 family, Testudinidae (Fig. 4), and 1 order while 3 amphibian species were studied belonging two families (Bufonidae, Dicroglossidae), Fig. 5 (a, b) and one order were recorded (Table II).

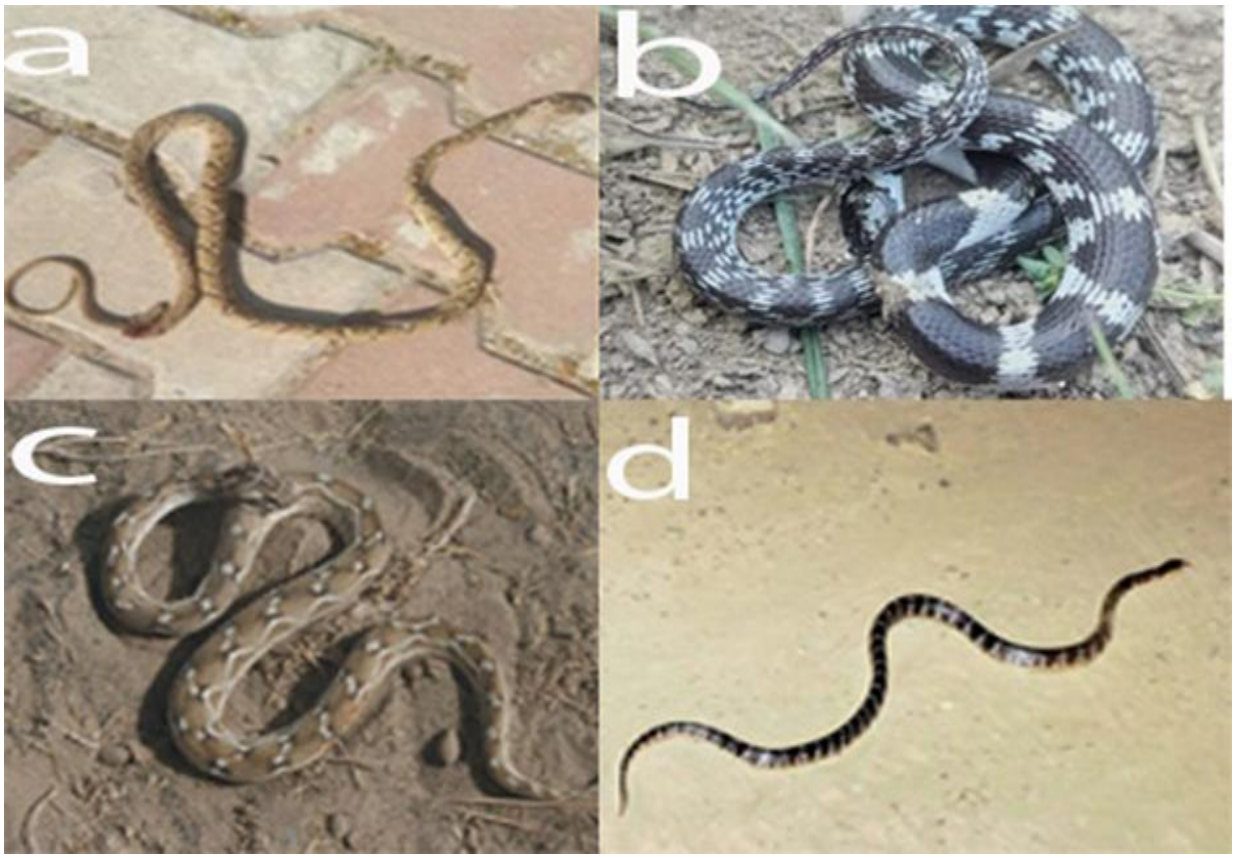

Fig. 3. **a.** *Boiga trigonata*, **b**. *Lycodon striatus*, **c**. *Echis carinatus*, **d**. *Bungarus sindanu*

Fig. 4. a *Trapelus agilis*, **b**. *Eublepharis macularius*, **c.** *Cyrtopodion watsoni* **d**. *Mesalina watsonana*

Fig. 5. *Testudo horsfieldii*

Fig. 6. a. *Bufotes zugmayeri* , **b.** *Euphlyctis cyanophlyctis*

KEY IDENTIFYING CHARACTERS

AMPHIBIANS

ANURANS (FROGS AND TOADS)

Frogs typically have webbed feet, long hind legs designed for jumping, and smooth, moist skin. Toads prefer to walk or crawl rather than jump and have rough, dry, and warty skin. They also have short hind legs that are not designed for hopping.

REPTILES

SQUAMATES (LIZARDS AND SNAKES)

Lizards have distinct eyelids and external ear openings, and most species have oilimbs (though some may be reduced or absent). Snakes lack eyelids and external ears, and their elongated, limbless bodies distinguish them.

TORTOISES

Tortoises have sturdy, elephant-like legs that are ideal for life on land.

MONTHS-WISE DISTRIBUTION OF HERPITILES

The monthly distribution of the Reptiles and Amphibians shows the highest number of reptiles and amphibians in different months. The highest number of lizards was recorded at 9 (22.5%) in the month of August and the lowest number was 4 (10%) in March, The highest number of snakes was 16 (44.4%) in July and the lowest number was 1 (2.7%) in march, the highest number of tortoises were 7 (30.4%) in August and the lowest number was 1 (4.3%) in April, the highest number of frogs were 4 (33.3%) in august and the lowest number was 1(8.3%) in March, April and June, the highest number of toads were 3 (33.3) in July and the lowest number was 1(11.1%) in April and June (Fig. 6).

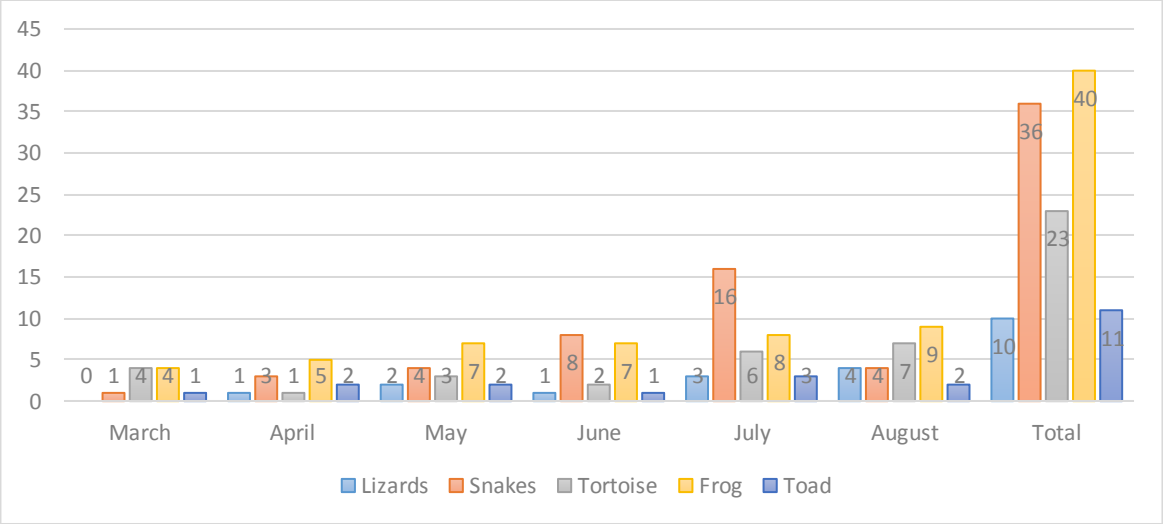

Fig. 6. Distribution of Herpitiles in different months

THREATS FOR THE CONSERVATION OF HERPTILES

There are several threats to the reptiles and amphibians of Balochistan. Some of the major threats include such as habitat loss and degradation, the rapid expansion of agriculture, urbanization, and infrastructure development has resulted in the loss and fragmentation of natural habitats. This has significantly affected the reptile populations by reducing their available habitat and food sources. Reptiles, including snakes and turtles, are often illegally captured and traded for their skins, meat, and exotic pets. This illegal trade puts immense pressure on reptile populations, leading to their decline. Climate change and pollution: Reptiles and their habitats may suffer because of improper waste disposal, agricultural runoff, and pollution from industrial activities (Table I).

Table I. Threats for the conservation of Reptiles and Amphibians (Herptiles)

S. No.		Species of Herpitiles	Threats
1	Reptiles	Lizards	Habitat Loss, Climate Change, Predation and Road Mortality
		Snakes	Illegal Collection and trade, Persecution, Disease Climate Change, Road Mortality and Killing
		Tortoise	Wildfires, Disease, Agricultural Activities and Invasive Species
2	Amphibians	Frogs	Overharvesting, Land Use Practices, Drought and Persecution
		Toad	Water Pollution, Water Quality Decline Wetland Drainage and Climate Disruption

Table II. Abundance of Amphibians and Reptiles in study area with IUCN status

S. No	Family	Order	Scientific name	Common name	F.H	IUCN Status
1	Colubridae	Squamata	*Spalerosophis diadema*	Diadem snake	C	LC
2			*Spalerosophis atriceps*	Royal snake	C	LC
3			*Boiga trigonata*	Common cat snake	C	LC
4			*Platyceps ventromaculatus*	Spotted bellied snake	C	LC
5			*Lycodon striatus*	wolf snake	C	LC
6			*Ptyas mucosa*	Oriental rat snake	C	LC
7			*Eirenis persicus*	Dark-headed dwarf racer	C	LC
8			*Platyceps karelini*	Spotted desert racer	C	LC
9	Viperidae		*Echis carinatus*	Saw-scaled viper	C	LC
10			*Daboia russelii*	Daboia	C	LC
11	Elapidae		*Bungarus sindanus*	Sind krait	C	LC
12			*Bungarus caeruleus*	Common krait	C	LC
13	Eublepharidae		*Eublepharis macularius*	Leopard gecko	C	LC
14	Gekkonidae		*Hemidactylus frenatus*	Common house gecko	I	LC
15	Gekkonidae		*Cyrtopodion watsoni*	Watson's thin-toed gecko	C	LC
16	Lacertidae		*Ophisops jerdonii*	Snake Eyed Lacerta	I	LC
17	Lacertidae		*Mesalina watsonana*	Long-tailed spotted lacerta	C	LC
18	Agamidae		*Trapelus agilis*	Common Field Agama	C	LC
19	Testudinidae	Testudines	*Testudo horsfieldii*	Afghan tortoise	H	VU
			Amphibians			
20	Dicroglossidae	Anura	*Euphlyctis cyanophlyctis*	Common skittering frog	C	LC
21	Bufonidae		*Chrysopaa sternosignata*	Karez frog	C	LC
22			*Bufotes zugmayeri*	Baloch green toads	C	LC

Abbreviations: LC – Least concern, VU–Vulnerable C – Carnivores, I – Insectivore, H- Herbivores, FH–Feeding habit, IUCN–International Union for the Conservation of Nature

DISCUSSION

During the present study a total of 120 individuals counting 92 reptiles and 28 amphibians were sampled and examined from study area, out of 18 reptiles species were recorded belonging to (6) families (Colubridae, Viperidae, Elapidae, Eublepharidae, Lacertidae, and Testudinidae and (2) orders similarly 3 amphibian species were studied belonging to (2) families and (1) orders were recorded. The Samples has been studied randomly from the gardens, soil, hills, vegetation, humid and shaded places of each selected

sites through DSLR camera, hand picking and Snake stick. However, (23) used forceps, drag nets and noose traps for the collection of reptiles. Similarly, (24) suggested the use of pitfall and double ended funnel traps for the collection of Herpitiles.

Among snake species, Lycodon aulicus has been reported from Sind, Lahore and district Jhang (25). Ptyas mucosus is reported throughout India, Sri Lanka, Afghanistan, Iran, Pakistan and Adaman islands (26). There have been reports of Bungarus caeruleus from Punjab, KPK, Azad Kashmir, Sind, and Southern Baluchistan. (25). Naja oxiana occurs from trans Caspian, Turkmenistan, eastern Iran and Afghanistan. In Pakistan, it is reported from KPK, Baluchistan, Punjab and Kashmir (25). Echis carinatus is distributed throughout Middle East, Russia, Iran, Pakistan, Afghanistan, India and Sri Lanka (26). The distribution of these species has been conformed in the present study. Euphlyctis cyanophlyctis is widely distributed from Thailand to Nepal, throughout India, Sri Lanka and almost throughout Pakistan (27) while Bufotes zugmayeri were firstly recoded from the study area. while among Lizards species, Hemidactylus frenatus has been recorded from Tehsil Samar bagh, Dir Lower KP (28)). Trapelus agilis has been reported from Hub Dam area (29).

CONCLUSION

This study serves as a crucial foundation for future conservation efforts, emphasizing the need to protect and preserve these unique and important members of our ecosystem. As we move forward, it is imperative to continue fostering a collaborative approach between researchers, policymakers, and the public to safeguard the rich tapestry of life that relies on the presence of amphibians and reptiles. Only through collective efforts can we secure a sustainable future for both these remarkable creatures and the environments they inhabit.

RECOMMENDATIONS

Reptiles and amphibians are crucial contributors to food chains and are important to maintaining the dynamics of the ecosystem. However, in district Quetta, Balochistan the literacy rate is appealingly low as compared to other provinces, and many myths, misconceptions, and superstitions are common leading these creatures toward extinction. The scientific community also pays little attention to the population counts or protection of these eco-friendly organisms because amphibians and reptiles are not well liked by society. Tortoise species are also in danger in the district Quetta, Balochistan due to ignorance and illegal hunting. Involving government agencies, local communities, scientists, habitat restoration, effective law enforcement and awareness campaigns about the ecological significance of reptiles and amphibians can help to restore the Herpetiles populations in the nation.

Conflict of interest:

Authors have no conflict of interest.

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