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Research Article

Diversity Analysis of Reptiles in the Natural Habitat of Haripur City, Khyber Pakhtunkhwa, Pakistan

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Abstract

Reptiles plays a significant role in the ecosystem by providing different ecological services. The study was conducted in Haripur city from cultivated, non-cultivated and road side areas by using direct and indirect methods. During the present study 112 specimen were collected. Out of which 22 species of reptiles were identified followed by 6 families and 17 genera of reptiles. Diversity was found out by using Simpson Diversity Index (SDI) and its shows 17% similarities while 83% differences among lizards, 24% similarities while 76% differences among snakes, 46% similarities while 54% differences among turtle, 24% similarities. Haripur city is the natural habitat of reptiles that supports breeding. So more areas of district should be explored and genetic makeup of species reptiles should be studied in future.

Keywords: Reptiles; Biodiversity; Simpson Diversity Index (SDI); Ecosystem

Introduction

Reptiles are cold-blooded animals that can be found all over the earth, with the exception of the poles [1]. About 195 reptile's species have been identified in Pakistan [2,3]. A total 22 species of reptiles were documented from District Haripur [4].

Reptiles are declining worldwide at an alarming rate [5,6] and, along with amphibians, are considered among the most threatened vertebrate groups [7,8].

Extinct reptiles included an even more diverse group of animals that ranged from the marine plesiosaurs, pliosaurs, and ichthyosaurs to the giant plant-eating and meat-eating dinosaurs of terrestrial environments [9].

They are bioindicators, an important component of a healthy ecosystem, and an important component of the food pyramid. They help to maintain the food web's balance by eating a variety of insects and providing food for a variety of avian and mammalian species. Furthermore, they recycle nutrients from aquatic to terrestrial environments, and removing these creatures from any ecosystem will disrupt predator Prey dynamics, invertebrate populations, leaf litter decompositions, nutrient cycling and algae communities, but their population is rapidly dwindling due to a variety of anthropogenic activities [10,11].

Overgrazing, harvesting, deforestation, soil erosion, desertification, invasive species, and chemical contamination all contribute to biodiversity loss and degradation of reptiles [5,12-14].

Materials and Methods

Study area

The research was carried out in the District Haripur in the Pakistan province of KPK. Haripur is bordered to the west by Swabi and Buner. It is 65 kilometres north of Islamabad and 35 kilometres south of Abbottabad. It is located at a height of 520 metres in a hilly plain area with the following coordinates: 33.9946° N, 72.9106° E, and hilly landscapes with grasses and pine trees [4].

Spanning a period of 1 year from start of the year till the end (2022). In order to maximize the documentation of the herpeto fauna Observations and collections were made at night and during the day. The study area was divided into three habitat types; Cultivated, Non-cultivated and Road sides [4].

Collection and preservation

A total of 30 field surveys were carried out. Observations and collections were done at night and during the day to optimize the documenting of the herpetofauna. Walking slowly during the day, thoroughly inspecting sunny sections of habitat, softly sifting through leaf litter, and turning over logs, boulders, and rock cervices were all part of the diurnal search. When species were seen, the lowest available taxon was used to identify them, the number of individuals were counted. The animals were photographed when seen. Figure 1 during the survey direct and indirect methods were used and preserved them in 70% ethanol.

Labelling

We identified specimens to species level using identification keys of [15-18] for identification of reptiles and labelled Figure 1 with their scientific names and location of collection.

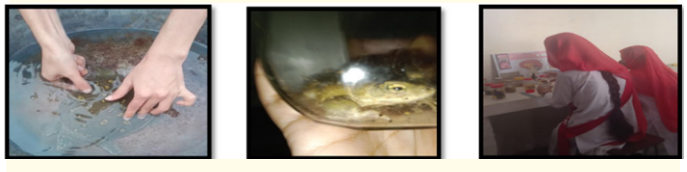

Figure 1: Collection, Identification and Preservation of Specimen's.

Data was subject to MS Excel and percentage (%), average, mean and species abundance was find out. The species diversity was find out by using Simpson Diversity Index (SDI).

Results

During the present study, 112 specimen were collected. 22 species of reptiles representing 74 lizards' specimens. Upon identification, it revealed 7 species, 3 genera and 2 families. The families were Gekkonnidae and Agamidae. Upon identification, it revealed 13 species of snakes, 12 genera and 4 families. The families were Colubridae, Lamprophiidae and Leptotyphlopidae and 2 species of turtle were collected belonging to family Trionychidae.

Family: Gekkonidae

Genus: *Hemidactylus*

Hemidactylus frenatus (Dumeril and Bibron, 1836)

Remarks

In current study it has been collected from Teer, Doyian Khushki and parhala.

Family: Gekkonidae

Genus: *Hemidactylus*

Hemidactylus Turcicus (Linnaeus, 1758)

Remarks

In current study it has been collected from Teer, Doyian Khushki and parhala.

Family: Gekkonidae

Genus: *Hemidactylus*

Hemidactylus mabouia (Moreau De Jonnes, 1818)

Remarks

In current study it has been collected from Bakka, Panian, Kachi and parhala.

Family: Gekkonidae

Genus: *Hemidactylus*

Hemidactylus flaviviridis (Ruppel, 1835)

Remarks

In current study it has been collected from Bakka, Panian, Kachi and parhala.

Family: Gekkonidae

Genus: *Hemidactylus*

Hemidactylus platyurus (Schneider, 1797)

Remarks

In current study it has been collected from Bakka, Panian, Kachi and parhala.

Family: Agamidae
Genus: *Calotes*
Calotes versiciolor (Daudin, 1802)

Remarks

In current study it has been collected from Bakka, Panian, Kachi and parhala.
Genus: *Draco*
Draco volans (Linnaeus, 1758)

Remarks

In current study it has been collected from Bakka, Panian, Kachi and parhala.
Family: Colubridae
Genus: *Pantherophis*
Pantherophis emoryi (Baird and Girard, 1853)

Remarks

In current study it has been collected from Bakka, Panian, Kachi and parhala.
Family: Colubridae
Genus: *Thamnophis*
Thamnophis cyrtopsis (Kennicott, 1860)

Remarks

In current study it has been collected from Bakka, Panian, Kachi and parhala.
Genus: *Storeria*
Storeria occipitomaculata (Storer, 1839)

Remarks

In current study it has been collected from Bakka, Panian, Kachi and parhala.
Family: Colubridae
Genus: *Thamnophis*
Thamnophis sirtalis (Linnaeus, 1758)

Remarks

In current study it has been collected from Bakka, Panian, Kachi and parhala.
Genus: *Lycodon*
Lycodon rufoznatus (Cantor, 1842)

Remarks

In current study it has been collected from Bakka, Panian, Kachi and parhala.
Genus: *Lampropeltis*
Lampropeltis getula (Linnaeus, 1766)

Remarks

In current study it has been collected from Bakka, Panian, Kachi and parhala.
Genus: *Pantherophis*
Pantherophis spiloides (Dumeril, Biborn and Dumeril, 1854)

Remarks

In current study it has been collected from Bakka, Panian, Kachi and parhala.
Genus: *Hemorrhois*
Hemorrhois hippocrepis (Linnaeus, 1758)

Remarks

In current study it has been collected from Bakka, Panian, Kachi and parhala.
Family: Lamprophiidae
Genus: *Boaedon*
Boaedon capensis (Dumeril and Biborn, 1854)

Remarks

In current study it has been collected from Bakka, Panian, Kachi and parhala.
Genus: Malpolon
Malpolon monspessulanus (Hermann, 1804)

Remarks

In current study it has been collected from Bakka, Panian, Kachi and parhala.
Genus: *Lycodonomorphus*
Lycodonomorphus rufulus (Lichtenstein, 1823)

Remarks

In current study it has been collected from Bakka, Panian, Kachi and parhala.
Family: Leptotyphlopidae
Genus: *Rena*
Rena dulcis (Baird and Girard, 1853)

Remarks

In current study it has been collected from Bakka, Panian, Kachi and parhala.

Family: Colubridae

Genus: *Indotypholps*

Indotypholps braminus (Daudin, 1803)

Remarks

In current study it has been collected from Bakka, Panian, Kachi and parhala.

Family: Trionychidae

Genus: *Lissemys*

Lissemys punctate (Lacepde, 1788)

Remarks

In current study it has been collected from Bakka, Panian, Kachi and parhala.

Genus: *Apalone*

Apalone spinifera (Lesueur, 1827)

Remarks

In current study it has been collected from Bakka, Panian, and parhala.

Discussion

Diversity of reptile's species of present study were also reported by [19] in Phillipine, [20] in Indonesia, [3,15,21-24] in Pakistan [4] in Mexico, [25] in Netherland, [26] in Florida, [27] in Australia, [28] in India due to the same habitat which is suitable for these species. Species of lizard study was also reported by [29] in Nigeria, [30] from Globally Alien Herptile, [31] in West African Togo Hills, [32] in Netherland, [33] in florida. [15,24,34,35] in Pakistan, [36] in Nepal, [37] in India Similarly [17] in and in Egypt, [28] from India, [19,21,29,34,35,38-40] in Indonesia, Nigeria, Sumatera, Phillipine, Pakistan, Mexico and sindh, but the results were not same with the present study, eastern China by [41] and our present study reported the highest diversity of snakes in cultivated areas that was also recorded by [19,29,34,35,42] in Nigeria, Phillipine, Pakistan. Similar work had been done by [19], but the results were not same [19,34] in Nigeria and Punjab, but the results were not

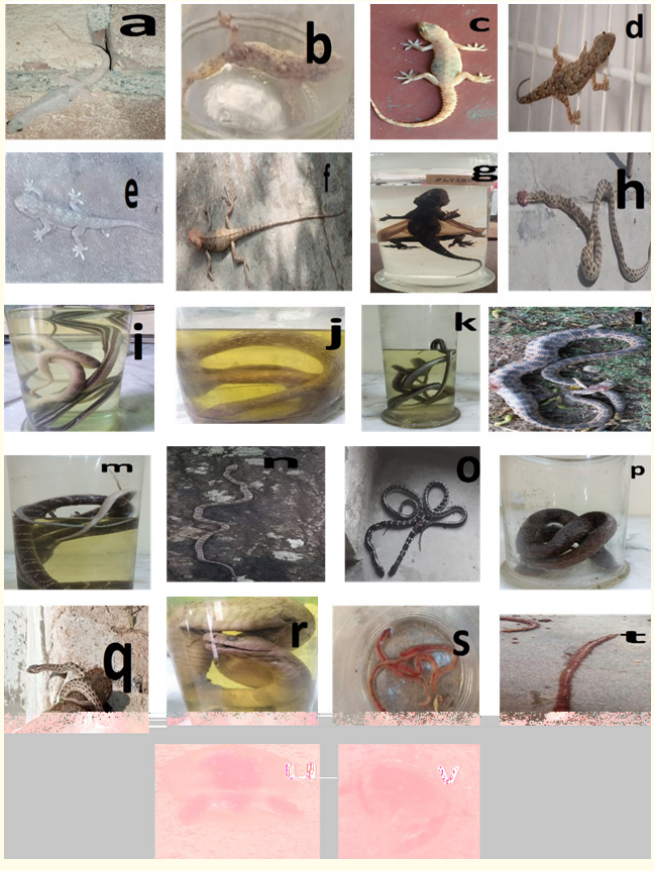

Figure 2: a: *Hemidactylus frenatus* (Common House Gecko), b: *Hemidactylus Turcicus* (Mediterranean House Gecko), c: *Hemidactylus mabouia* (Tropical House Gecko), d: *Hemidactylus flaviviridis* (Yellow-Bellied Gecko), e: *Hemidactylus platyurus* (Flat-tailed house gecko), f: *Calotes versiciolor* (Common Garden lizard), g: *Draco volans* (Common flying dragon), h: *Pantherophis emoryi* (Great plains rat snake), i: *Thamnophis cyrtopsis* (Black-necked garter snake), j: *Storeria occipitomaculata* (Red-bellied snake), k: *Thamnophis sirtalis* (Common garter snake), l: *Lycodon rufoznatus* (Red-banded Snake), m: *Lampropeltis getula* (Chain king snake), n: *Pantherophis spiloides* (Gray rat snake), o: *Hemorrhois hippocrepis* (Horseshoe Snake), p: *Boaedon capensis* (Brown house snake), q: *Malpolon monspessulanus* (Montpellier Snake), r: *Lycodonomorphus rufulus* (Common Brown Water Snake), s: *Rena dulcis* (Blind snake), t: *Indotypholps braminus* (Brahminy blind snake), u: *Lissemys punctate* (Indian Flapshell turtle), v: *Apalone spinifera* (Spiny soft shell turtle).

Lizards			
Families	**Scientific name**	**Common name**	**No. of Species**
Gekkonidae	*Hemidactylus frenatus*	Common house gecko	20
	Hemidactylus turcicus	Mediterranean House Gecko	10
	Hemidactylus mabouia	Tropical house gecko	11
	Hemidactylus flaviviridis	Yellow-Bellied Gecko	15
	Hemidactylus platyurus	Flat- tailed house gecko	12
Agamidae	*Calotes versicolor*	Common Garden lizard	5
	Draco volans	Common flying dragon	1
SNAKES			
Colubridae	*Pantherophis emoryi*	Great Plains rat snake	2
	Thamnophis cyrtopsis	Black-necked garter snake	1
	Storeria occipitomaculata	Red-bellied snake	1
	Thamnophis sirtalis	Common garter snake	1
	Lampropeltis getula	Chain king snake	1
	Pantherophis spiloides	Gray rat snake	1
	Hemorrhois hippocrepis	Horseshoe Snake	2
	Lycodon rufoznatus	Red-banded Snake	1
	Indotypholps braminus	Brahminy blind snake	2
Lamprophiidae	*Boaedon capensis*	Brown house snake	1
	Lycodonomorphus rufulus	Common Brown Water	1
	Malpolon monspessulanus	Montpellier Snake	1
Leptotyphlopidae	*Rena dulcis*	Blind snake	15
TURTLES			
Trionychidae	*Lissemys punctuate*	Indian Flapshell turtle	3
	Apalone spinifera	Spiny soft shell turtle	5

Table 1: Checklist of Reptiles in and around areas of District Haripur.

same with the present study recorded by [35,42] in Pakistan, India, Bangladesh, Myanmar, Nepal, and Mexico.

Our present study reported that lizards diversity were high in cultivated areas that was also recorded by [19-21,35,40] in Nigeria, Phillipine, Pakistan, Sumatera, Southeast Asia, Indoneshia. Similar work had been done by [43], but the results were not same due to the climate change and habitate difference between different countries.

Family Trionychidae was most abundant family in the Haripur district as compare to other families of reptiles. Present study showed the diversity of trionychidae that was also recorded by [37,38] in Pakistan, India, Sindh and [19] in Nigeria but the results were not same to the present study.

Conclusion

During the present, study 112 specimen were collected. 22 species of reptiles were identified. In the present research, administration area and in and around areas of Haripur showed least reptile's

species as compared to the residential area because species composition and abundance is always dependent upon maintenance of natural habitat. If survey was done for long time there would have been a substantial increase in number of species. In the present study, the highest number of reptile's species was collected from cultivated areas. The main reason behind this were probably due to the urbanization, deforestation and reproduction and verities of reptile's species is look less in number

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Conflict of Interest

All the authors confirmed that the content of this manuscript has no conflict of interest.

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