



Diversity of snakes of Azad Jammu and Kashmir, Pakistan

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SUMMARY

Rich diversity of snakes is present in world; approximately 3,000 species of snakes are known, while over 600 species are venomous to humans. Recently, some studies have been focused on herpetology of Pakistan. Early studies showed that, there exist various folklores, myths, literature about snakes, which increases horror. Snake developed from lizard and having strange powers like its ability to repair, it can also change from one form to another. Now through different scientific studies it is cleared snakes have limited ability to repair, while snakes can perform none of these acts. The linear count method was applied and snake diversity was measured through direct and indirect counts. The direct count was account of physical presence while indirect count carcasses, photographs and group questionnaire analysis. According to research, total 17 species of snakes are present in state of Azad Jammu and Kashmir; including 01 order, 01 class and 05 different families.

Keywords: Amphibian, Reptiles, Kashmir, Snakes

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INTRODUCTION

Animals especially, amphibian and reptiles are good bioindicators (Adil *et al.*, 2020; Altaf *et al.*, 2021). Rich diversity of snakes is present in world; approximately 3,000 species of snakes are known, while over 600 species are venomous to humans (Holve, 2007; Pauwels *et al.*, 2008; Nonga and Haruna, 2015), while out of total, more than 57 species of snakes are identified (Khan, 2002; GOP, 2009; Lal *et al.*, 2019; Haider and Faiz, 2020). Recently, some studies have been focused on herpetology of Pakistan. Death rate caused by snakes bite is lower than other mishaps. Many studies show precautionary measures to prevent snake bite and to avoid encounter with snake (Khan, 2006).

Early studies showed that, there exist various folklores, myths, literature about snakes, which increases horror. Snake developed from lizard and having strange powers like its ability to repair, it can also change from one form to another. Now through different scientific studies it is cleared snakes have limited skills, while snakes can perform none of these acts (Khan, 2006; Altaf *et al.*, 2020; Altaf *et al.*, 2021; Faiz and Farooq, 2021; Saleem *et al.*, 2021).

Amphibian and reptiles are used in cultural and medicinal uses (Altaf *et al.*, 2018; Altaf *et al.*, 2020; Noor and Haider, 2020; Saleem *et al.*, 2021; Zainab, 2021). Early studies showed wrong ideas about snakes due to unawareness and lack of knowledge. Snake is an important part of our environment. It is friendly animal and it is not opposed to human infect human itself snake enemy and always want to eliminate it from ecosystem. Mostly snake's bites results due to human carelessness and disturbance in snakes' area. Many studies show precautionary measures to prevent snake bite and to avoid encounter with snake (Khan, 2002, 2006; Faiz and Farooq, 2021).

Some people have great influence on snake species. They act as contractor of wild animals and have role in threatening of natural reptilian species of Pakistan. In Pakistan reptiles 'species are also used in laboratories for experiment purposes, results in the threatening or removal of these species. Snake venom has medicinal use, in making of venom and antivenin. Snakes used for medicinal purposes are reserved in bad conditions which results in their extinction. Many reptilian species injured or died during road accidents (Khan, 2006; Chattha *et al.*, 2017). Present study is planned, to know the diversity of herpetofauna of the study area.

MATERIAL AND METHODOLOGY

STUDY AREA

The state of Azad Jammu and Kashmir comprises area of 5234 square miles. It lies between latitude 33°-36° and longitude 73°-75°. Biologically, Azad Jammu and Kashmir comprises mountains and hills with minute plains and valleys (Figure 1). Key rivers of this state are Poonch, Jehlum, and Neelum. Climate is typically sub-tropical and annual rain fall is 130000mm around. According to population assessment in 1998, population of Azad Kashmir was 22.973, and it was expected that population have grown to 33.4 million approximately in 2004. 100% population is Muslim. Urban and Rural population ratio is 12:88. After 1998 assessment, literacy rate increased from 55% to 60%. Mostly rural population depends on forestry, livestock and agriculture for its survival. Redundancy rate is from 35 to 50 (Research Directorate, immigration and Refugee Board, 1997). The area under the state of Azad Jammu and Kashmir (AJK) is under terrific pressure of overexploitation of medicinal plants due to local economic raise, animal treatment and herbal doctors (Ali, 2011; Dar, 2014; AJKBS-PDD, 2015).

The linear count method was applied and snake diversity was measured through direct and indirect counts from January 2018 to November 2018. The direct count was account of physical presence while indirect count carcasses, photographs and group questionnaire analysis. Binocular (32x50) was used to perceive animals; Khan (2006) was accessed to correctly identify the species.

STATISTICAL ANALYSIS

Shannon-wiener diversity index was used to analysis data. Formula used for statistical analysis was as;

$$H' = - [\sum PI \ln PI]$$

Where, H' = Diversity Index

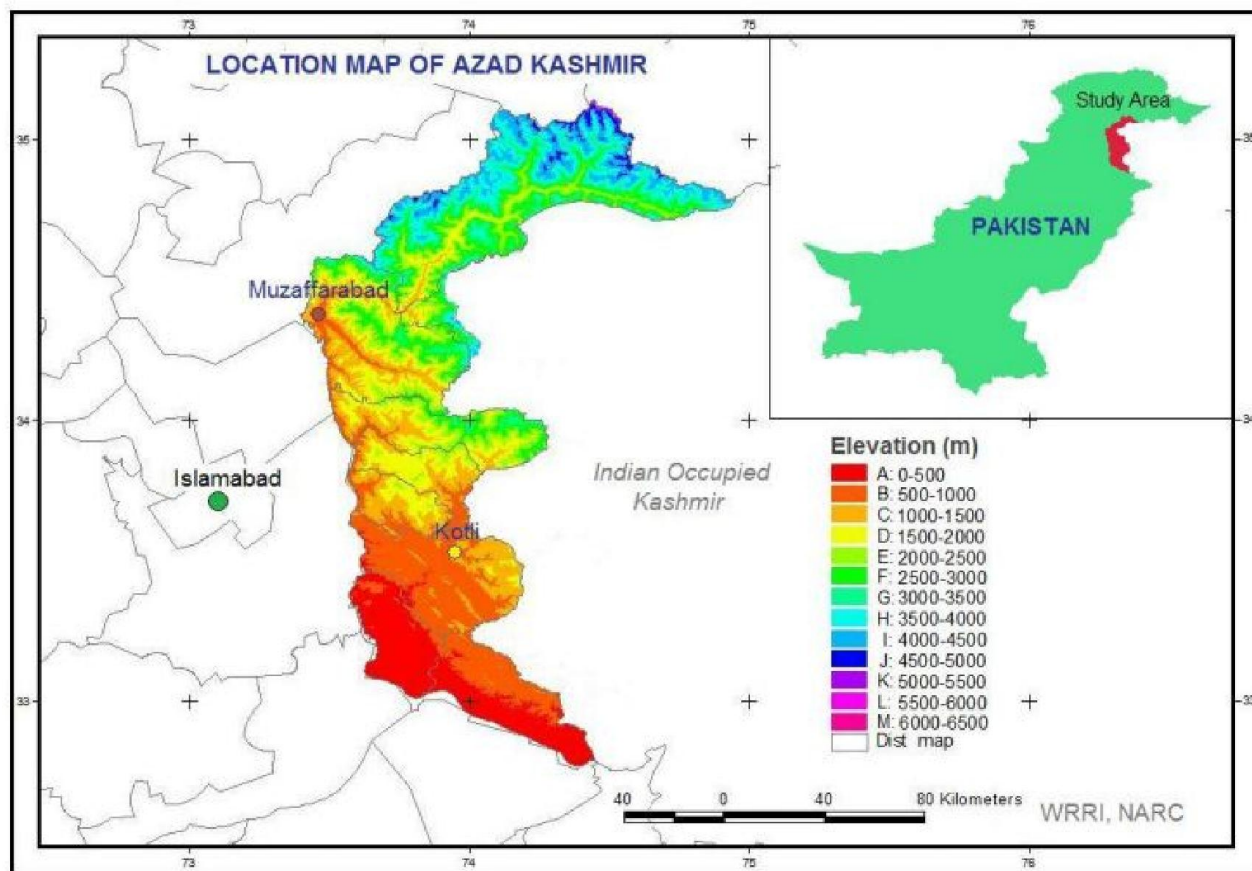


Figure 1: Map of the study area.

RESULTS AND DISCUSSION

During research data was collected from 1000 different respondents. Out of total 843 were male and 157 female. Respondents professions were as; traditional healer were 99, House wives number was 77, teachers were 295, worker were 105, number of army officers were 96, students were 123, farmer were 156, drivers were 49. In account to their age group, between 18-30 respondent were 234, between 31-40 respondent number was 245, between 41-50 respondent number was 356, between 51-60 respondent number was 95 and above 60 respondent number was 70. In account to their education, 432 were master students, bachelors were 211, intermediate student number was 95, matric students were 92, middle students were 21, primary students were 15 and illiterate were 134. In rural area data collected from 477 people and in urban area data collected from 523 people. The entire respondents (1000) were Muslim (Figure 2).

According to research, total 17 species of snakes are present in state of Azad Jammu and Kashmir; including 01 order, 01 class and 05 different families. It was also noted that relative abundance of *Eryx johni* was 0.047475 and Not Evaluated (NE) by IUCN. Relative abundance of *Python molurus* population was 0.043434 and it was Vulnerable (VU) by ICUN. Relative abundance of *Amphiema stolatum* was 0.076768 and it was Not Evaluated (NE) by ICUN.

Relative abundance of *Amphiesma platycepus* was 0.034343 and it was Not Evaluated (NE) by ICUN. Relative abundance of *Boiga trigonata* was 0.034343 and it was Least Concern (LC) by ICUN. Relative abundance of *Oligodon arnensis arnensis* was 0.121212 and it was Not Evaluated (NE) by ICUN. Relative abundance of *Oligodon taeniolatus taeniolatus* was 0.111111 and it was Least Concern (LC) by ICUN.

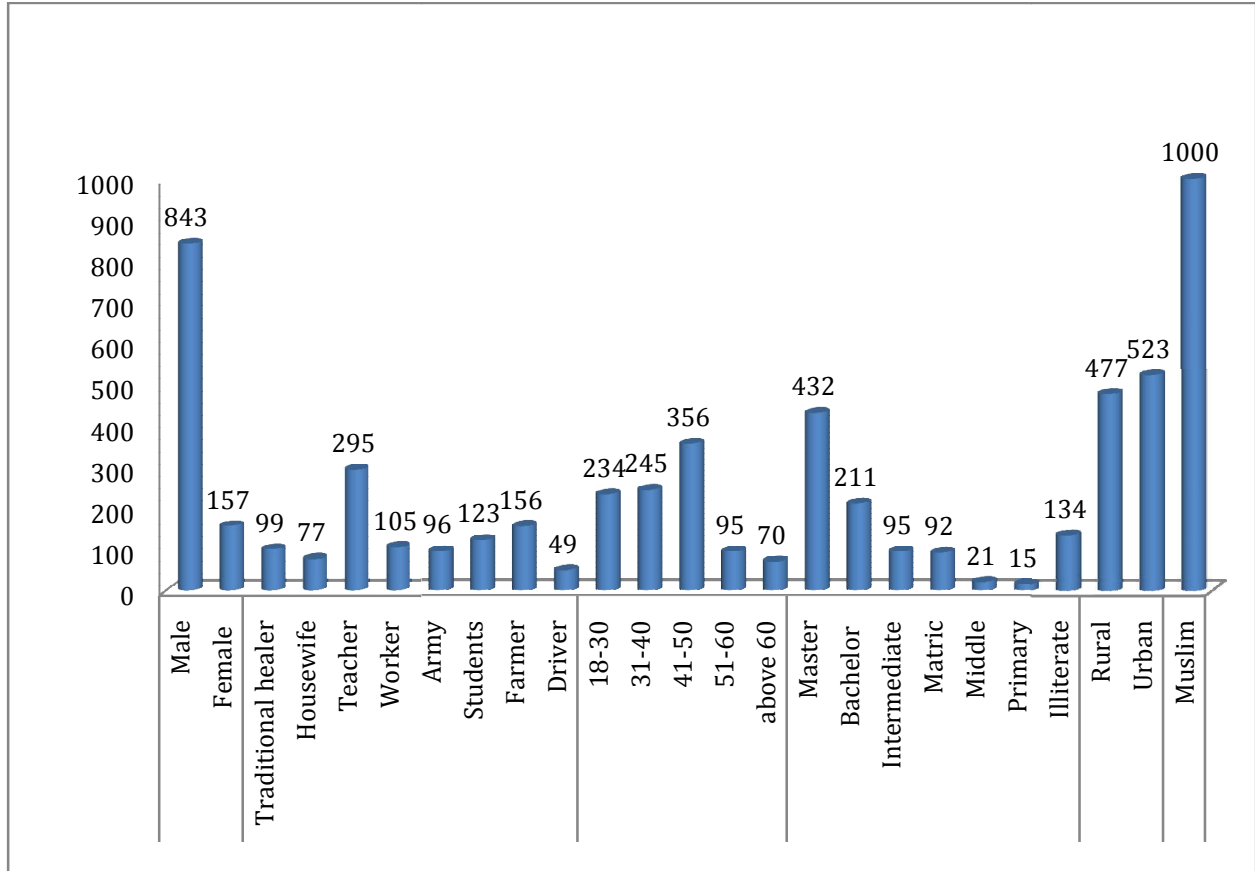


Figure 2: The profile of the respondents.

Relative abundance of *Platyceps rhodorachis rhodorachis* was 0.039394 and it was Not Evaluated (NE) by ICUN. The relative abundance of *Psammophis leithii leithii* was 0.022222 and it was Not Evaluated (NE) by ICUN. The relative abundance (RA) of *Ptyas mucosus mucosus* was 0.068687 and it was Not Evaluated (NE) by ICUN. Relative abundance of *Spalerosophis diadema diadema* was 0.075758 and it was Not Evaluated (NE) by ICUN. The RA of *Xenochrophis piscator piscato* was 0.058586 and it was Not Evaluated (NE) by ICUN. Relative abundance of *Bungarus caeruleus caeruleus* was 0.066667 and it was Not Evaluated (NE) by ICUN. Relative abundance of *Naja oxiana* was 0.022222 and it was Not Evaluated (NE). Relative abundance of *Naja naja naja* was 0.048485 and it was Least Concern (LC) by ICUN. Relative abundance of *Daboia russelii russelii* was 0.050505 and it was Not Evaluated (NE) by ICUN. The relative abundance of *Echis carinatus sochureki* was 0.034343 and it was Not Evaluated (NE) by ICUN (Table 1).

During research 17 species of snakes were recorded in Ajk, out of these 17 species 10 spp were non-venomous, 6 were venomous and 1 was semi-venomous; while Khan (2006) recorded 82 species of snakes from Pakistan. Adil *et al.* (2020) documented total 28 amphibian and reptiles' species were recorded from Daphar Forest Sanctuary, Pakistan. Altaf *et al.* (2021) documented 23 species of herpetofauna from Dhirkot, Azad Jammu and Kashmir, Pakistan. Masroor (2011) 32 species of reptiles were documented from Margalla Hills National Park, Pakistan.

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Table 1: Total number of snake's species in different cities of Azad Jammu and Kashmir.

Sr	Scientific name	Species Authority	Common name	Class	Order	Family	Status	Pi/RA	LogPi	PiLogPi
1	<i>Eryx johni</i>	Russell, 1801	Common Sand boa	Reptilia	Squamata	Boidae	NE	0.047475	-1.32354	-0.06283
2	<i>Python molurus</i>	Linnaeus, 1758	Rock pathon	Reptilia	Squamata	Boidae	VU	0.043434	-1.36217	-0.05916
3	<i>Amphiesma stolatum</i>	Linnaeus, 1758	Striped keelback	Reptilia	Squamata	Colubridae	NE	0.076768	-1.11482	-0.08558
4	<i>Amphiesma platycepus</i>	Blyth, 1854	Spotted keelback	Reptilia	Squamata		NE	0.034343	-1.46416	-0.05028
5	<i>Boiga trigonata</i>	Schneider, 1802	Common cat snake	Reptilia	Squamata	Colubridae	LC	0.034343	-1.46416	-0.05028
6	<i>Oligodon arnensis arnensis</i>	Shaw, 1802	Banded kukri snake	Reptilia	Squamata	Colubridae	NE	0.121212	-0.91645	-0.11109
7	<i>Oligodon taeniolatus taeniolatus</i>	Jerdon, 1853	Streaked kukri snake	Reptilia	Squamata	Colubridae	LC	0.111111	-0.95424	-0.10603
8	<i>Platyceps rhodorachis rhodorachis</i>	Jan, 1865	Cliff racer	Reptilia	Squamata	Colubridae	NE	0.039394	-1.40457	-0.05533
9	<i>Psammophis leithii leithii</i>	Gunther, 1869	Steppe ribbon snake	Reptilia	Squamata	Psammophiidae	NE	0.022222	-1.65321	-0.03674
10	<i>Ptyas mucosus mucosus</i>	Linnaeus, 1758	Rope-snake	Reptilia	Squamata	Colubridae	NE	0.068687	-1.16313	-0.07989
11	<i>Spalerosophis diadema diadema</i>	Schelegel, 1837	Red spotted diadem snake	Reptilia	Squamata	Colubridae	NE	0.075758	-1.12057	-0.08489
12	<i>Xenochrophis piscator piscator</i>	Schneider, 1802	Chekered keelback	Reptilia	Squamata	Colubridae	NE	0.058586	-1.23221	-0.07219
13	<i>Bungarus caeruleus caeruleus</i>	Schneider, 1801	Common krait	Reptilia	Squamata	Elapidae	NE	0.066667	-1.17609	-0.07841
14	<i>Naja oxiana</i>	Eichwald, 1837	Brown Cobra	Reptilia	Squamata	Elapidae	NE	0.022222	-1.65321	-0.03674
15	<i>Naja naja naja</i>	Linnaeus, 1768	Black cobra	Reptilia	Squamata	Elapidae	LC	0.048485	-1.31439	-0.06373
16	<i>Daboia russelii russelii</i>	Shaw and Nodder, 1797	Russell's chain viper	Reptilia	Squamata	Viperidae	NE	0.050505	-1.29667	-0.06549

17	<i>Echis carinatus sochureki</i>	Stemmler, 1964	Sind Valley saw snake viper	Reptilia	Squamata	Viperidae	NE	0.034343	-1.46416	-0.05028
Shannon-Wiener Diversity Index										-1.14895