Pakistan J. Zool., pp 1-4, 2021. **DOI**: https://dx.doi.org/10.17582/journal.pjz/20190826180828

Short Communication

Amphibians and Reptiles of Sheikh Baddin National Park, Khyber Pakhtunkhwa: Diversity, Threats and Conservation Prospects

Hannan Nasib Hamid[1,*], Muhammad Rais[1], Muhammad Arif[2] and Rubina Noor[2]

[1]*Department of Wildlife Management, PMAS-Arid Agriculture University, Rawalpindi*
[2]*Khyber Pakhtunkhwa Wildlife Department, Peshawar*

Article Information
Received 26 August 2019
Revised 18 October 2019
Accepted 30 October 2019
Available online 13 July 2020

Authors' Contributions
HNH conducted field surveys, gathered data and prepared the draft e manuscript. MR designed the study, identified the species and finalized the manuscript. MA and RN provided technical input such as identification of sampling sites, assisted field visits and provided funds to cater logistic and accommodation needs.

Key words
Protected area, Herpetofauna, Habitat destruction, Common leopard gecko.

ABSTRACT

Amphibians and reptiles hold significant position amongst the vertebrates, and play a vital role in the ecosystem. The present study reports herpetofauna of Sheikh Buddin National Park for the first time which could be used as a baseline. The national park features arid climate and two main vegetation types: tropical thorn forest and sub-tropical broad-leaved ever green forest. The data were gathered from July, 2017 to August, 2018, from major habitat types of the national park using visual encounter survey method aided with pitfall and funnel trapping. Twenty three herpetofauna species (14 recorded through direct sightings) were recorded which included two species of amphibians and 21 of reptiles (eight snakes, 13 lizards). Species in the sub-tropical broadleaved evergreen forest were more diverse with Common Leopard Gecko, Persian Leaf-toed Gecko, Reticulate Plump-bodied Gecko as notable species while tropical thorn forest had species such as Indian Monitor, Large-scaled Rock Agama and Agror Agama. Common Leopard Gecko was identified as the flagship reptile species. The most frequently encountered reptilian species were Large-scaled Rock Agama and Agror Agama. Common threats include habitat degradation, fuel wood cutting, human encroachment, grazing, stone quarries and cement factory.

The diversity and distribution of many wildlife species, including herpetofauna, depend on geographical position and climatic conditions of a region. Amphibians and reptiles act as bio-indicators, play a dynamic role in food web and are significant part of a healthy ecosystem. They are a major factor in food web as they consume insects and also become food of many avian and mammalian species. Amphibians, tadpoles in particular, act as regulators of nutrients from aquatic environment to terrestrial environment. Their decline or disappearance may cause imbalance in algal communities, life litter decomposition and nutrient cycling, predator prey dynamics and invertebrate populations (Baig *et al*., 2006; Petrov, 2004).

Pakistan has 220 species (25 amphibians, 195 reptiles) of herpetofauna (Khan, 2006; Pratihar *et al*., 2014). Six amphibians and 38 reptile species are endemic to Pakistan (Khan, 2006). Herpetofauna of different national parks, various habitats and localities of the country has barely been documented. Masroor (2011) reported nine species of amphibians and 32 of reptiles from Margalla Hills National Park, Islamabad, Pakistan. Khan (1986) recorded four amphibian and nine reptile species from district Mianwali, Punjab, Pakistan. Rais *et al*. (2012) documented five species of amphibians and 30 of reptiles from Rawalpindi, Islamabad and Chakwal, Punjab, Pakistan. Bibi *et al*. (2013) reported three amphibian and nine reptile species from Taunsa Barrage Wildlife Sanctuary, Pakistan. Balouch *et al*. (2016) recorded 15 species of reptile from Chakwal, Punjab with Oriental Garden lizard, Snake-eyed Lacerta and Striped Grass Skink as the most common species. Ali *et al*. (2016) reported 18 species of herpetofauna (three amphibians and 15 reptiles) from District Kasur with Indian Wolf Snake recorded only from uncultivated land. Rais *et al*. (2011) reported three species of amphibians and 32 of reptiles from Chotiari Reservoir, Sanghar, Sindh. Sheikh *et al*. (2014) documented amphibian species namely Indus Valley Toad, Indian Bull Frog and Skittering Frog from 14 different districts of Province Sindh. Baig *et al*. (2006) reported 47 species of herpetofauna including two amphibians and 45 reptiles from District Chagai, Balochistan, Pakistan.

Regional studies are certainly important as they help compile comprehensive information on herpetofauna and make presentation at national level significant. Only a few studies are available from Province Khyber Pakhtunkhwa (KP). Younas *et al*. (2017) recorded six amphibian and 12 reptile species from District Karak, KP, with Indian

* Corresponding author: hannan.hamid@gmail.com
0030-9923/2021/0001-0001 $ 9.00/0

Bull Frog, Skittering Frog, Indian Spiny-tailed Lizard and Indian Monitor as common species.

Pakistan currently has 29 National Parks, a category of protected areas of the country. However, the data on richness, abundance and distribution of several amphibian and reptile species found in national parks of the country are meager. Most of these national parks lack baseline data, proper scientific documentation of wildlife diversity and management plans. The study was conducted to record diversity of herpetofauna of Sheikh Buddin National Park, Dera Ismail Khan (DIK), Khyber Pakhtunkhwa, document major threats to herpetofauna and propose future research and conservation strategies.

Materials and methods

Dera Ismail Khan District is located in the North-Western Pakistan, and has an elevation ranging from 300 to 1350m above mean sea level (Khan, 2000). Sheikh Buddin National Park (32.38°N and 70.94°E) is located on the boundary of District Dera Ismail Khan and District Lakki Marwat, Khyber Pakhtunkhwa Province, Pakistan. The national park features arid climate and two main vegetation type *viz*., tropical thorn forest and sub-tropical broadleaved ever green forest. The former is dominated with Mesquite (*Prosopis juliflora*) and Sanatha (*Dodonaea viscosa*) while latter supports Phulai (*Acacia modesta*), Peelu (*Salvadora oleoides*), Olive tree (*Olea europaea*), Safeda (*Eucalyptus* spp.) Sihar (*Rhazya stricta*), Spalani (*Peganum harmala*) and Khabbal (*Cynodon dactylon*). The national park is accessible from a small village called Pezu by foot and vehicle through the road which runs up to Sheikh Buddin Top/Abadi Deh covering about 10-12 km on its eastern side, while from Paniala and Aghzar Khel, the national park is accessible only on foot. It features rugged mountains with steep and gentle slopes. The elevation varies from 300-1350m above mean sea level. The area receives annual rainfall from 200- 280mm, most of which occurs during monsoon period (July-August). January is the coldest and July is the hottest month of the year. The mean maximum and minimum temperatures during winter are 20.3°C and 4.2°C, respectively, compared to 30°C and 25°C during summer (Marwat *et al*. 2012).

We carried out six field surveys and spent 145 field hours (of data collection) from July, 2017 to August, 2018, at 16 sampling sites of the National Park to gather data. The National Park was stratified based on forest types, and the sampling and trapping sites within each forest type were selected randomly. We followed standard survey method-time constrained searches (visual encounter survey), line transect method, pitfall and funnel traps (Graeter *et al*., 2008). The observers actively searched all potential habitats such as under the stones, logs, tree bark and vegetation to record the species or signs. We did active searching two hours after sunrise, two hours during noon, two hours before sunset and one hour after sunset. The pitfall and funnel traps were set before sunset and were checked in the morning. Upon encountering a specimen, we identified the species and documented the specimen with a photograph taken with a Nikon D3200 (55-200mm), for later confirmation of species identity. A combination of pitfall and funnel traps was installed at five different sites. A total of 50 buckets, each with 10L capacity, along with PVC modified funnel traps were installed. Four 15 m long sheets were used as fence. The fence was installed in "T" shape. Buckets were placed at ends and center of fence while funnel traps were installed parallel to both the sides of fence. A handheld GPS unit (Garmin GPSMAP 64) was used to record coordinates and elevation of sampling sites and observations. We confirmed the occurrence of some species which were not sighted directly but reported in the literature (such as Khan, 2006). The photographs were shown to respondents (n= 30) and were asked whether they had encountered the species. Out of 30 respondents eight were from wildlife department, six farmers, two teachers, four livestock holders, ten from other professions belonging to age groups ranging from 25 to 60 years.

Results and discussion

We recorded a total of 23 herpetofauna species (belonging to 19 genera and 12 families). Fourteen species (60% of the reported species) were recorded through direct sightings. The herpetofauna comprised of two amphibians *viz*., skittering frog and Indus Valley toad, and 21 reptiles (13 lizard and eight snake species) (Table I). On the basis of encounter rate of recorded species, large-scaled rock agama, reticulate plump-bodied gecko, yellow-belly gecko and indian monitor were recorded as common while leopard gecko, Persian leaf-toed gecko, ribbon-sided skink, Indian spiny-tailed lizard and yellow monitor were recorded as uncommon species.

About 25 amphibians are known from Pakistan (Pratihar *et al*., 2014). Due to unsuitable amphibian habitat such as annual precipitation and lack of permanent freshwater wetlands in the study area, we recorded low amphibian richness from the national park. The recorded amphibian species are common amphibian species of Pakistan. Among amphibians of the country, Indus valley toad and common skittering frog have wide distribution in the country (Khan, 2006) recorded up to 1800m elevation (Khan, 2006). Our results yielded more diverse reptilian fauna particularly high richness and abundance of agamid and gecko species, for the national park features arid terrain and rocky substrate. Large-scaled rock agama and agror agama have been recorded from 700-1300 m elevation in

Table 1. Species of amphibians and reptiles recorded from Sheikh Badin National Park, Khyber Pakhtunkhwa.

Species	Encounter rate	Direct sightings	Secondary data
Family Bufonidae			
1. Indus Valley toad (*Duttaphrynus stomaticus*)	Common	+	
Family Dicroglossidae			
2. Skittering Frog (*Euphlyctis cyanophlyctis*)	Common	+	
Family Agamidae			
3. Garden Lizard (*Calotes versicolor*)	Common	+	+
4. Agror Agama (*Laudakia agrorensis*)	Abundant	+	
5. Large-scaled (Rock) Agama (*Laudakia nupta*)	Common	+	
6. Middle Eastern Agamid (*Trapelus species*)	Uncommon	+	+
Family Eublepharidae			
7. Leopard Gecko (*Eublepharis macularius*)	Uncommon	+	+
8. Reticulate Plump-bodied Gecko (*Cyrtodactylus battalensis*)	Common	+	
9. Yellow-belly gecko (*Hemidactylus flaviviridis*)	Common	+	
10. Persia Leaf-toed Gecko (*Hemidactylus persicus*)	Uncommon	+	
Family Lacertidae			
11. Indian Fringe-fingered Lizard (*Acanthodactylus cantoris*)			+
Family Scincidae			
12. Ribbon-Sided Skink (*Eurylepis taeniolata*)	Uncommon	+	
Family Uromastycidae			
13. Indian spiny-tailed lizard (*Saara hardwickii*)	Uncommon	+	
Family Varanidae			
14. Indian Monitor (*Varanus bengalensis*)	Common	+	+
15. Yellow Monitor (*Varanus flavescens*)	Uncommon	+	+
Family Boidae			
16. Russell's boa (*Eryx conicus*)			+
Family Colubridae			
17. Banded Kukri (*Oligodon arnensis*)			+
18. Streaked Kukri (*Oligodon taeniolatus*)			+
19. Oriental Rat Snake (*Ptyas mucosus*)			+
20. Diadem Snake (*Spalerosophis diadema*)			+
Family Elapidae			
21. Common Krait (*Bungarus caeruleus*)			+
Family Viperidae			
22. Russell's Viper (*Daboia russelii*)			+
23. Saw-scaled Viper (*Echis carinatus*)			+

Pakistan (Khan, 2006). The species are well adapted to rocky areas and mountain peaks (Khan, 2006). The garden lizard is reported as common from areas with shrubs and trees (Khan, 2006). Brilliant ground agama is restricted to the lowland and semi desert regions of the country. Yellow-bellied house gecko is the most common house gecko of Pakistan (Khan, 2006). Indian spiny-tailed lizard is reported from areas with desolate hard soil, areas with sparse vegetation. Indian monitor occupies variety of habitats including dry deserts, cultivated areas, barren lands and human habitations (Kumar, 1992). Our findings are consistent with aforementioned studies. Despite low direct

sightings and encounter of snake species during the study period, we believe that the national park supports a fairly good richness and abundance of snake species. Oriental rat snake and common krait are reported from throughout Punjab, KP, Azad Jammu and Kashmir (AJ&K), Sindh and Southern Balochistan (Khan, 1991). We identified common leopard gecko as the flagship reptilian species of the national park. The species has also been reported from AJ&K, KP, northern Punjab, Balochistan and lower Sindh (Khan, 2006).

The major threats to the herpetofauna of the national park include habitat degradation, fuel wood cutting, human encroachment, grazing, cement factory and stone quarries. The main reasons of habitat degradation are human settlements inside the boundary of the national park and visitors from surrounding villages for recreational purpose. Local community depends on natural vegetation for fuel and fodder. The livestock is allowed to graze freely in the national park. The barren mountain, which was recorded as the most suitable habitat for reptiles, is threatened due to stone quarries and extraction for the nearby cement factory.

Acknowledgements

We owe a deep sense of gratitude to Khyber Pakhtunkhwa Wildlife Department for funding the study (ADP No. 410 2015-16 Scheme Code: 150596 titled 'Development and Management of National Parks in Khyber Pakhtunkhwa' and PMAS-Arid Agriculture University, Rawalpindi for providing equipment and supplies. We appreciate cooperation of Sheikh Buddin National Park Staff, Deputy Ranger Faizan Habib, Saqib Javaid and Wildlife Watchers.

Statement of conflict of interest

The authors declare no conflict of interest.

References

Ali, W., Javid, A., Hussain, S.M., Azmat, H. and Jabeen, G., 2016. *Pakistan J. Zool*., **48**: 1201-1204

Baig, K.J., Awan, M.R. and Ashraf, N., 2006. *Pakistan J. Zool*., **38**: 145.

Balouch, S., Rais, M., Hussain, I. and Akram, A., 2016. *J. King Saud Univ. Sci*., **28**: 255-260. https://doi.org/10.1016/j.jksus.2016.01.003

Bibi, F., Ali, Z., Qaisrani, S., Shelly, S. and Andleeb, S., 2013. *J. Anim. Pl. Sci*., **23**: 174-181.

Graeter, G., Buhlmann, K., Wilkinson, L. and Gibbons, J.W., 2008. *Inventory and monitoring: recommended techniques for reptiles and amphibians, with application to the US and Canada*. PARC Tech. Rep. Aiken, SC.

Khan, M.S., 1986. *The Snake*, **18**: 118-125. https://doi.org/10.1007/978-94-009-4646-0_6

Khan, F.K., 1991. *A geography of Pakistan: Environment, people and economy*. Oxford University Press.

Khan, R.U., 2000. *Facts about AZRI*. Pakistan Agricultural Research Council, Arid Zone Research Institute, Ratta Kulachi, D. I. Khan, pp. 2-4.

Khan, M.S., 2006. *Amphibians and reptiles of Pakistan*. Krieger Publishing Company, Malabar, Florida, USA.

Kumar, S., 1992. *Hamadryad*, **17**: 48. https://doi.org/10.1002/j.2048-7940.1992.tb01262.x

Marwat, S.K., Usman, K., Khan, E.A., Ghulam, S., Baloch, J., Tauqeer, A.M. and Rehman, F.U., 2012. *Am. J. Pl. Sci*., **3**: 1162. https://doi.org/10.4236/ajps.2012.38141

Masroor, R., 2011. *Pakistan J. Zool*., **43**: 1041-1048. https://doi.org/10.1038/ng.996

Pratihar, S., Clark, H.O., Dutta, S., Khan, M.S., Patra, B.C., Ukuwela, K.D.B., Das, A., Pipeng, L., Jianping, J., Lewis, J.P. and Pandey, B.N., 2014. *Saur (Berlin)*, **36**: 9-59.

Petrov, B., 2004. *Biodiv. Bulgaria*, **2**: 863-879.

Rais, M., Baloch, S., Rehman, J., Anwar, M., Hussain, I. and Mahmood, T., 2012. *Herpetol. Bull*., **122**: 16-20.

Rais, M., Khan, M.Z., Abbass, D., Akber, G. and Nawaz, R., 2011. *Pakistan J. Zool*., **43**: 237-247.

Sheikh, K., Gachal, G., Yusuf, S., Nabi, G., Qadri, A. and Afghan, A., 2014. *Sindh Univ. Res. J*., **46**: 159-162.

Younas, S., Rehman, H.U., Gul, S., Gul, R. and Khattak, B., 2017. *J. Ent. Zool. Stud*., **5**: 1126-1134.