Reptiles of the Southwestern Tajikistan desert plains: Spatial distribution, population density and communities structure

D. A. Bondarenko [1]✉, U. H. Ergashev [2]

[1] Head Center of Hygiene and Epidemiology, Federal Medical and Biological Agency
6 1st Pekhotny Pereulok, Moscow 123182, Russia
[2] S. Aini Tajik State Pedagogical University
121 Rudaki Avenue, Dushanbe 734003, Tajikistan

Article info

Original Article
https://doi.org/10.18500/1814-6090-2022-22-1-2-17-39

Received 24 January 2022,
revised 26 February 2022,
accepted 11 Mart 2022

Abstract. Population density of reptiles in four desert areas of southwestern Tajikistan was estimated in spring 2018–2019. The structure of reptile communities in seven typical landscapes was described. The highest species diversity and population density were observed in sandy landscapes. Seven species of psammobionts formed the basis of these reptile communities. Among them *Phrynocephalus interscapularis* (56.4), *Crossobamon eversmanni* (27.8), *Eremias lineolata* (15.6), *Eremias scripta* (13.0) had the highest distribution and high population density (individuals/hectare). The relationship of cohabitating species was considered. The highest total population density of reptiles (89.0 ind./ha) was discovered on sandy ridges along the Amu Darya. On the loamy plain the population density of four species was 8.4 ind./ha, and on the foothill plain 2.4 ind./ha. *Eremias nigrocellata* (2.0 ind./ha) dominated in reptile communities on solid ground. In total, 25 species of reptiles inhabit the desert plains of Southwestern Tajikistan. 17 out of 25 (68%) species are included in the national Red Data Book. The level of endemism and similarity of reptile fauna in desert areas were high. Fauna similarity indices calculated according to Sørensen were 0.9–0.8. These values indicate close contact and connection between desert communities. The formation of the reptile fauna in southwestern Tajikistan occurred as a result of dispersal of Turanian species across the left bank of the Amu Darya River from Turkmenistan. They moved to the right bank due to the changes in the riverbed at the Pleistocene Epoch. The absence of some reptile species (*Teratoscincus scincus*, *C. eversmanni*, *Phrynocephalus mystaceus*, *E. lineolata*, *Eremias grammica*, *E. scripta*, etc.) in Northern Afghanistan along the border with Tajikistan is explained by the lack of herpetological study of this territory. Their habitat in the area is highly probable. Isolation and autonomy of desert areas in the Amu Darya valley create the opportunity for formation of new taxonomic forms. Examples are lizards *E. scripta ladzinni* and *P. interscapularis sogdianus*. The desert plains of Southwest Tajikistan have a small area and are subjected to significant anthropogenic pressure. Protection of small species, including lizards (*Phrynocephalus raddei*, *P. mystaceus*, *Varanus griseus*) and snakes (*Eryx tataricus*, *Spalerosophis diadema*, *Boiga trigonatum*, *Naja oxiana*, *Echis carinatus*) is needed. For widespread and numerous psammobiont species (*P. interscapularis*, *E. lineolata*, *E. grammica*, *E. scripta*, *C. eversmanni*) there is no threat of extermination at the moment.

Keywords: reptiles, spatial distribution, population density, protection, Afghanistan, Southwestern Tajikistan

Acknowledgements: The research was based on the bilateral agreement on scientific and technical cooperation between the E. N. Pavlovsky Institute of Zoology and Parasitology of the Academy of Sciences of Tajikistan and M. V. Lomonosov Moscow State University.

For citation: Bondarenko D. A., Ergashev U. H. Reptiles of the Southwestern Tajikistan desert plains: Spatial distribution, population density and communities structure. *Current Studies in Herpetology*, 2022, vol. 22, iss. 1–2, pp. 17–39 (in Russian). https://doi.org/10.18500/1814-6090-2022-22-1-2-17-39

REFERENCES

Bannikov A. G., Darevsky I. S., Ishchenko V. G., Rustamov A. K., Shcherbak N. N. *Opredelitel' zemnovodnykh i presmykayushchikhsya fauny SSSR* [A Guide of Amphibians and Reptiles of Fauna of USSR]. Moscow, Prosveshchenie Publ., 1977. 414 p. (in Russian).

Bogdanov O. P. *The Fauna of the Uzbek SSR. Vol. 1. Amphibians and Reptiles*. Tashkent, Izdatel'stvo AN UzSSR, 1960. 260 p. (in Russian).

✉ Corresponding author. Epidemiology Department of the Head Center of Hygiene and Epidemiology, Federal Medical and Biological Agency, Russia.

ORCID and e-mail addresses: Dmitry A. Bondarenko: https://orcid.org/0000-0001-6377-6816, dmbonda@list.ru; Usmonali H. Ergashev: usmonalie@mail.ru.

Bogdanov O. P. *Reptiles of Turkmenistan*. Ashkhabad, Izdatel'stvo AN Turkmenskoi SSR, 1962. 236 p. (in Russian).

Bondarenko D. A. *Spatial Structure of the Reptile Population in the Karshi Steppe and its Changes under the Development Impact*. Thesis Diss. Cand. Sci. (Biol.). Moscow, 1994. 20 p. (in Russian).

Bondarenko D. A. A Ways to improve the accuracy of quantitative censuses of reptiles. *Proceedings of the First Conference of the Ukrainian Herpeological Society*. Kiev, Zoomuzei NNPM NAN Ukraïni Publ., 2005, pp. 18–22 (in Russian).

Bondarenko D. A. Characteristics of the Reptiles' Populations Cosmodrome "Baikonur" (Kazakhstan) and Adjoining Deserts Area. *Bulletin of Moscow Society of Naturalists*, *Biological series*, 2007, vol. 112, iss. 2, pp. 67–71 (in Russian).

Bondarenko D. A., Chelintsev N. G. A Comparative Estimation of Different Methods of the Line Transect Census of Desert Reptiles. *Bulletin of Moscow Society of Naturalists*, *Biological series*, 1996, vol. 101, iss. 3, pp. 26–35 (in Russian).

Bondarenko D. A., Ergashev U. H. Distribution and Density of Reptile Population in the Desert Landscapes of the Northern Tajikistan. *Bulletin of Moscow Society of Naturalists*, *Biological series*, 2018, vol. 123, iss. 1, pp. 23–33 (in Russian).

Brushko Z. K. *Lizards of Kazakhstan Deserts*. Almaty, Konjik Publ., 1995. 232 p. (in Russian).

Kitobi surkhi Chumҳurii ToChikiston: *Olami nobotot va ҳaivonot*. Red. Sh. Kurbonov, A. Toshev [Sh. Kurbonov, A. Toshev, eds. The Red Book of the Republic of Tajikistan: Fauna]. Dushanbe, Donish Publ., 2015. 535 p. (in Tajik).

Kuzyakin A. P. Zoogeography of the USSR. *Proceedings Moscow Regional Pedagogical Institute named after N. K. Krupskaya*, 1962, vol. 109, iss. 1, pp. 3–182 (in Russian).

Lyubishchev A. A. *K metodike kolichestvennogo ucheta i rajonirovaniya nasekomyh* [On the Methodology of Quantitative Accounting and Zoning of Insects]. Frunze, AN Kirgizkoi SSR Publ., 1958. 167 p. (in Russian).

Ecosystem Profile Mountains of Central Asia Biodiversity Hotspot. 2017. Available at: https://www.cepf.net/sites/default/files/mountains-central-asia-ecosystem-profile-eng.pdf (accessed 25 November 2021).

Rall Yu. M. Some Methods of Environmental Accounting of Rodents. *Voprosy ekologii i biotsenologii*, 1936, iss. 3, pp. 140–157 (in Russian).

Said-Aliev S. A. *Zemnovodnye i presmykayuschiesya Tadzhikistana*. [Amphibians and Reptiles of Tajikistan]. Dushanbe, Donish Publ., 1979. 147 p. (in Russian).

Sattorov T. Herpetofauna of the Beshkent valley. In: *Tezisy dokladov respublikanskoi konferentsii molodykh uchenykh i spetsialistov Tadzhikskoi SSR* [Abstracts of Reports of the Republican Conference of Young Scientists and Specialists of the Tajik SSR]. Dushanbe, Donish Publ., 1987, pp. 41–43 (in Russian).

Sattorov T. S. *Presmykayushchiesya Severnogo Tadzhikistana* [Reptiles of Northern Tajikistan]. Dushanbe, Donish Publ., 1993. 276 p. (in Russian).

The Problems of Herpetology: *Abstracts of Fourth Herpetological Conference*. Leningrad, Nauka Publ., 1977, pp. 193–194 (in Russian).

Sattorov T. S., Said-Aliyev S. A. On new findings of two rare species of snakes in Tajikistan. *The Problems of Herpetology*: *Abstracts of Fifth Herpetological Conference*. Leningrad, Nauka Publ., 1981, pp. 121 (in Russian).

Sattorov T., Domulloeva Z., Mirzobahodurova Sh., Zohidov B. The Current State of Herpetofuna in the Deserts of Tajikistan. *Ecological Features of Biological Diversity*: *Proceedings of the Sixth International Scientific Conference*. Dushanbe, Donish Publ., 2015, pp. 63–65 (in Russian).

Sattorov T., Ergashev U., Shahzoda A. Features of Ecology, Distribution and Measures of Protection of the Herpetofauna of Tajikistan. *Ecological Features of Biological Diversity*: *Proceedings of the Seventh International Scientific Conference*. Dushanbe, Donish Publ., 2017, pp. 79–80 (in Russian).

Sattorov T., Ergashev U., Shahzoda A., Babadzhonova M. Features of the Herpetofauna of Tajikistan. *Bulletin of the Pedagogical University*, *Dushanbe*, 2013, no. 5 (54), pp. 183–189 (in Russian).

Solovyeva E. N. *The Structure of Genetic Variability and Phylogeny of the Genus Phrynocephalus* (*Reptilia*: *Agamidae*). Thesis Diss. Cand. Sci. (Biol.). Moscow, 2013. 23 p. (in Russian).

Solovyeva E. N., Kvartalnov P. V., Najmudinov T. A., Pankratov V. V. Herpetofauna of Kurdjalakum Sands (Southwest Tajikistan). *News of the National Academy of Sciences of Tajikistan*, *Department of Biological and Medical Sciences*, 2013, no. 2 (183). pp. 32–40 (in Russian).

Chernov S. A. Reptiles. Fauna of the Tajik SSR. *Proceedings of the Institute of Zoology and Parasitology of the Academy of Sciences of the Tajik SSR*, 1959, vol. 98, pp. 1–205 (in Russian).

Shammakov S. *Presmykayushchiesya ravninnogo Turkmenistana* [Reptiles of the Turkmenistan Plane]. Ashkhabad, Ylym Publ., 1981. 312 p. (in Russian).

Shcherbak N. N. *Yashchurki Palearktiki* [Racerunners of the Palaearctic]. Kiev, *Naukova Dumka* Publ., 1974. 296 p. (in Russian).

Shcherbak N. N. Quantitative accounting. In: *Rukovodstvo po izucheniyu zemnovodnyh i presmykayushchihsya* [A Guide to the Study of Amphibians and Reptiles]. Kiev, Institut zoologii im. I. I. Shmal'gauzena Publ., 1989, pp. 121–125 (in Russian).

Shchetkin Y. L. *Vysshie cheshuekrylye peskov Vahshskoj doliny* (Lepidoptera: Rhopalocera i Heterocera) [Higher Lepidoptera of the Vakhsh Valley Sands (Lepidoptera: Rhopalocera and Heterocera)]. Dushanbe, Izdatel'stvo AN Tadzhikskoi SSR, 1965. 194 p. (in Russian).

Sørensen T. A. A Method of Establishing Groups of Equal Amplitude in Plant Sociology Based on Similarity of a Species Content and Its Application to Analysis of the Vegetation on Danish Commons. *Kongelige Danske Videnskabernes Selskab*. *Biologiske Skrifter*, 1948, vol. 5, no. 4, pp. 1–34.

Wagner P., Bauer A. M., Leviton A. E., Wilms T. M., Bhome W. A. Checklist of the amphibians and reptiles of Afghanistan – Exploring herpetodiversity using biodiversity archives. *Proceedings of the California Academy of Sciences*, *Ser. 4*, 2016, vol. 63, no. 13, pp. 457–565.