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SPECIES COMPOSITION OF REPTILIA IN FERGANA VALLEY IN NEED OF PROTECTION

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Abstract:

In Uzbekistan 27 out of 57 species (1 turtle, 36 lizards and 20 snakes) of reptiles are found in the Fergana Valley. 8 (30%) of the herpetofauna of the valley are rare species, 5 of them (Teratoscinus rustamowi, Eremias scripta, Phrynocephalus strauchi, Phrinocephaius helioscopus, Alsophylax loricatus) are endemic to the region. They are listed in the Red Book of the Republic of Uzbekistan and the International Red List of Threatened Species. It is necessary to ensure their conservation in their natural habitat.

Keywords: *Teratoscinus rustamowi, Eremias scripta, Phrynocephalus strauchi, Phrinocephaius helioscopus, Alsophylax loricatus, Testudo horsfieldi, Eryx tataricus, Varanus griseus, redlist, Ferghana*

INTRODUCTION

Scientific study of the taxonomy, morphology, and ecology of reptiles in Uzbekistan has long historical roots (Bogdanov, 1960; Bogdanov, 1965; Zakhidov, 1971). The herpetofaunistic list of the country was last published in 2006. According to this publication, the presence of 57 species of reptiles belonging to 14 families (1 turtle, 36 lizards and 20 snakes) in the territory of Uzbekistan were discovered (Showler, 2018). Of the 57 listed species, 27 are found in the Fergana Valley, and 8 of them (30%) are rare species, 5 of which (Teratoscinus rustamowi, Eremias scripta, Phrynocephalus strauchi, Phrinocephaius helioscopus, Alsophylax loricatus) are endemic to the region. (Nazarov et al, 2023).

Among the rare reptiles, the desert tortoise (Testudo horsfieldi Gray, 1844) was found to be widespread in desert landscapes and its distribution area occupies 67% of the territory of the republic (about 300,000 km). However, areas with a density of more than 10 individuals per square kilometer make up only 0.6% of these areas (Bondarenko and Peregontsev, 2017). In the herpetofauna of Fergana, bald-headed shrike (Phrinocephaius helioscopus) from the family of agama is a locally distributed endemic species that is facing extinction (Uzb. Res. Red Book, 2019). Among the lizards distributed in the region, 3 endemic species (Teratoscinus rustamowi, Eremias scripta, Phrynocephalus strauchi) have a high population density, and their occurrence rate is 52% (34%-74%) (Bondarenko, 2020). The shield gecko (Alsophylax loricatus) is distributed in all the sandy massifs of the valley, and like other endemic lizards, it is a species in need of protection (Nazarov et all, 2023). Illegal hunting of the gray lizards (Abduraupov et al, 2023) and the eastern rattlesnakes (Burak et al, 2023) by the local population for unscientific medical purposes leads to a sharp decrease of these species and poses a serious threat to the gene pool of the species.

Therefore, in-depth research of the herpetofauna of the Fergana Valley, formation of a list of species distributed in the area, determination of the status of protected species are considered urgent issues.

MATERIAL AND METHODOLOGY

A number of scientific sources were analyzed to determine the species composition of reptiles found in the Fergana Valley. These sources can be divided into three groups:

1. Books:
   a) "Fauna of the Uzbek SSR" (Bogdanov O.P., 1960)
   b) "Ecology presmykayushchikhsya Sredney Azii" (Bogdanov O.P., 1965)
   c) "Biocenozy pustyni Kyzylkum" (Zakhidov T.Z., 1971).
   d) "Zoologicheskie issledovaniya v Sredney Azii" (Sultanov and Persianova, 1982).
2. Scientific articles:
   a) "A Checklist of the Amphibians and Reptiles of the Republic of Uzbekistan with a review and summary of species distribution" (D. A. Showler., 2023)
   b) "Distribution and conservation status of snakes (Reptilia: Ophidia) in Uzbekistan" (Burak et.all, 2023)

c) "Naselenie presmykayushchikhsya peschanyx mestoobitany Ferganskoy doliny (Uzbekistan) i problema sokhranenia endemicichnyx vidov" (Bondarenko, 2020).
d) "The Ferghana Valley Is an Isolate of biodiversity: A discussion of the endemic herpetofauna and description of two species of Alsophylax (Sauria: Gekkonidae) from Eastern Uzbekistan" (Nazarov et all, 2023).
e) "Distribution of the Central Asian Tortoise Agrionemys horsfieldii (Gray, 1844) in Uzbekistan (Range, Regional and Landscape Distribution, Populations Density)" (Bondarenko and Peregontsev, 2017).
f) "Varanus griseus caspius Eichwald, 1831 - VARANIDAE" (Abduraupov et all, 2023)

3. International search-engine databases:
a) The Reptile Database (access date: 12.04.2024)
b) Global Biodiversity Information Facility (date of application: 15.04.2024)
c) International Union for the Conservation of Nature - IUCN. (date of application: 19.004.2024)

Based on the conclusions, a list of rare and protected reptiles found in the Fergana Valley was formed. The most recent systematic names were used in the composition of the species. The formation of the list was carried out in the following sequence:

- Scientific and local name of the species.
- Synonyms.
- Distribution on Earth.
- Distribution in Uzbekistan.
- Place of residence.
- Subspecies.
- Red list category.
- Threats.
- Protective measures.

Distribution of species: While forming the composition of species, we paid special attention to the distribution of reptiles endemic to the valley in zoogeographic sections (Fig. 1).

Figure 1.
Zoogeographic sections of the Fergana Valley.
14.1 The right bank of the Valley foothills;
14.2 The left bank of the Valley foothills;
14.3 Sand island Yozyovon;
Source: National Atlas of Uzbekistan (2020).

RESULTS

The analysis showed that out of 27 species of reptiles registered in the Fergana Valley, 8 species belonging to 7 families and 7 genera are protected species (Table 1). They are included in the Red Book of the Republic of Uzbekistan (Uzb. Res. Kizil Kitob, 2019) and the International Red List (IUCN), requiring careful treatment and constant monitoring. In addition, 5 of these 8 species (Teratoscinus rustamowi, Eremias scripta, Phrynocephalus strauchi, Phrinocephaius helioscopus, Alsophylax loricatus) are endemic species and have a special place in the faunistic gene pool of the valley.

Table 1
Systematics of protected reptiles distributed in the Fergana Valley

N.	Order	Family	Genus	Species
1.	Testudines Batsch, 1788	Testudinidae Batsch, 1788	*Testudo* Linnaeus, 1758	Testudo horsfieldi Gray, 1844
2.	Squamata Oppel, 1811	Agamidae Gray, 1827	*Phrynocephalus* Kaup, 1825	*Phrynocephalus strauchi* Nikolskiy, 1899
3.				*Phrynocephalus helioscopus* Pallas, 1771
4.		Sphaerodactylidae Underwood, 1954	*Teratoscincus* Strauch, 1863.	*Teratoscinus rustamowi* Szczerbak, 1979
5.		Gekkonidae Gray, 1825	*Alsophylax* Fitzinger, 1843	*Alsophylax loricatus* Strauch, 1887

6.	Lacertidae Oppel, 1811	*Eremias* Fitzinger, 1834	*Eremias scripta* Strauch, 1867
7.	Varanidae Merrem, 1820	*Varanus* Merrem, 1820	*Varanus griseus* Daudin, 1803
8.	Boidae Gray, 1825	*Eryx* Daudin, 1803	*Eryx tataricus* Lichtenstein, 1823

Testudo horsfieldi Gray, 1844

(19.05.2023. photo author: Alexey Katz, Navoi)
https://inaturalist-open-data.s3.amazonaws.com/photos/285297795/original.jpeg

Synonyms: *Agrionemys horsfieldi.*
Distribution on Earth: Afghanistan; Armenia; Azerbaijan; China; Uzbekistan; Islamic Republic of Iran; Kazakhstan; Kyrgyzstan; Pakistan; Tajikistan; Turkmenistan; Russia
Distribution in Uzbekistan: Kashkadarya (39.6N,65.6E; 38.9N,64.7E;); Bukhara (40.3N, 63.3E); Surkhandarya (38.0N, 68.2E; 38.3N, 66.3E); Namangan (41.1N, 71.7E); Jizzakh (40.6N, 66.8E; 40.7N, 67.7E; 40.7N, 67.2E); Samarkand (39.5N, 65.4E); Navoi (41.3N, 63.0E; 41.2N, 66.4E; 40.5N, 64.7E; 40.3N, 65.5E;); Tashkent (41.2N; 69.3E).
Habitat: Lives in sandy and clay deserts up to 1200 m above sea level. Sometimes it is found in agricultural lands - fields, rice fields, gardens.
Subspecies:
Testudo horsfieldi subsp.*bogdanovi* Chkhikvadze, 2008;
Testudo horsfieldi subsp. *horsfieldi* Gray, 1844;
Testudo horsfieldi subsp. *kazachstanica* Chkhikvadze, 1988;
Testudo horsfieldi subsp. *rustamowi* Chkhikvadze, 1990;
Red List Category: Vulnerable VU (IUCN 2023; last assessed 1996). In Uzbekistan, it is included in the Red Book of Uzbekistan as a vulnerable species [Vulnerable VU]. (Red Book of Uzbekistan, 2019)
Threats: Exploitation of deserts, destruction of the natural ecosystem.
Protective measures: Habitat protection, constant monitoring.

Phrynocephalus strauchi Nikolskiy, 1899

(October 25, 2018. Photo author: Vyacheslav Yusupov, Fergana)
https://inaturalist-open-data.s3.amazonaws.com/photos/28055996/original.jpg

Synonyms: *Phrynocephalus reticulatus* ssp. *strauchi* Nikolskiy, 1899
Distribution on Earth: Uzbekistan; Kyrgyzstan; Tajikistan
Distribution in Uzbekistan: Namangan (40.8N, 71.2E; 40.8N, 71.5E); Andijan (40.7N; 71.9E); Ferghana (40.6N, 71.5E; 40.7N, 71.5E; 40.8N, 71.7E).
Habitat: shrubland, meadow, desert.
Subspecies: Not available.
Red List Category: Vulnerable VU (IUCN 2023; Year last assessed: 2014). Listed in the Red Book of Uzbekistan as an endangered species. (Red Book of Uzbekistan, 2019)
Threats: exploitation of deserts, destruction of the natural ecosystem.

Protective measures: habitat protection, constant monitoring.

Phrynocephalus helioscopus Pallas, 1771

(22.08.2012. Photo author: Grigory Evtukh, Karakalpakstan)
https://inaturalist-open-data.s3.amazonaws.com/photos/252998448/original.jpg

Synonyms: *Lacerta helioscopus* Pallas, 1771
Distribution on Earth: Uzbekistan; Kazakhstan, Turkmenistan, Mongolia, Russia, China
Distribution in Uzbekistan: Bukhara (40.5N, 64.7E; 40.4N, 65.1E; 39.6N, 64.7E); Namangan (41.0N, 71.1E; 40.9N, 70.9E); Samarkand (39.7N, 65.5 E); Ferghana (40.2N, 70.6E); Karakalpakstan (43.4N; 57.6E); Jizzakh (40.5N, 64.7E); Surkhandarya (37.6N; 66.7E).
Habitat: shrubland, desert.
Subspecies: *Phrynocephalus helioscopus subsp. saidalievi* Satorov, 1907
Red List Category: Least Concern [LC] (IUCN 2023; Year last assessed: 2018). Listed in the Red Book of Uzbekistan as an endangered species [EN]. (Own Res. Red Book, 2019)
Threats: exploitation of deserts, destruction of the natural ecosystem.
Protective measures: habitat protection.

Teratoscinus rustamowi Szczerbak, 1979

(22.09.2023. Photo author: Vyacheslav Yusupov, Namangan)
https://inaturalist-open-data.s3.amazonaws.com/photos/321917601/original.jpg
Synonyms: not available.
Distribution: Uzbekistan and Tajikistan
Distribution in Uzbekistan: Ferghana (40.6N, 71.4E); Namangan (40.8N, 71.3E; 40.7N, 71.3E)
Habitat: Desert, barren desert, foothills.
Subspecies: Teratoscinus scincus subsp. rustamowi Szczerbak, 1979
Red List Category: Mosaic, which is disappearing in Uzbekistan, is included in the Red Book of Uzbekistan as a widespread endemic species [EN]. (Own Res. Red Book, 2019)
Threats: habitat destruction.
Protection measures: monitoring and establishment of micro-reserves.

Alsophylax loricatus Strauch, 1887

(**Source:** http://www.zoogeo365.ru/taxon /664/pancernyj_gekkonchik/full/)

Synonyms: not available.
Distribution: Uzbekistan and Tajikistan
Distribution in Uzbekistan: Fergana (40.3N, 71.0E)
Habitat: oases, old ruins, riverbanks. It has disappeared in natural biotopes
Subspecies: Not available.
Red List Category: Vulnerable VU (IUCN 2023; last assessment year: 2016). The endangered species in Uzbekistan is included in the Red Book of Uzbekistan as a relict endemic species [EN]. (Own Res. Red Book, 2019)
Threats: Habitat destruction.
Protective measures: land and water protection.

Eremias scripta Strauch, 1867

(29.05.2013. Photo author: D. Showler, Bukhara)
https://inaturalist-open-data.s3.amazonaws.com/photos/3315986/original.jpg
Synonyms: *Podarces scripta* Strauch, 1867
Distribution on Earth: Afghanistan, Kazakhstan, Uzbekistan, Turkmenistan and Tajikistan
Distribution in Uzbekistan: Navoi (41.5N, 63.2E; 41.9N, 63.8E); Kashkadarya (38.9N, 65.8E); Andijan (40.8N, 71.6E); Surkhandarya (37.4N, 67.2E); Ferghana (40.7N, 71.5E; 40.7N, 71.9E); Khorezm (40.3N, 63.9E)
Habitat: shrubland, meadow, desert.
Subspecies: *Eremias scripta subsp. lasdini* Tsarevsky, 1918;
Eremias scripta subsp. pherganensis Scherbak and Washetko, 1973
Red List Category: Least Concern [LC] (IUCN 2023; last assessment year: 2016). Listed in the Red Book of Uzbekistan as a locally distributed species that is disappearing in Uzbekistan [EN]. (Own Res. Red Book, 2019)
Threats: Exploitation of protected lands of the desert region.
Conservation measures: identification of preserved local populations and protection measures

Varanus griseus Daudin, 1803

(18.05.2019. Photo author: Vyacheslav Yusupov, Jizzakh)
https://inaturalist-open-data.s3.amazonaws.com/photos/40548267/original.jpg
Synonyms: *Psammosaurus arabicus* Hemprich and Ehrenberg, 1899
Distribution on Earth: Afghanistan, Kazakhstan, Uzbekistan, Turkmenistan and Tajikistan, Iran, India, Iraq, Israel, Qatar, Pakistan, Oman, Libya, Mali, Morocco.

Distribution in Uzbekistan: regions from Southern Orolboi to Fergana Valley
Habitat: shrubland, desert.
Subspecies: Varanus griseus subsp. caspius Eichwald, 1831
Red List Category: Least Concern [LC] (IUCN 2023; last assessment year: 2016). It is included in the Red Book of Uzbekistan as a vulnerable, declining species [VU:D]. (Own Res. Red Book, 2019)
Threats: Exploitation of protected lands of the desert region.
Protective measures: protection of sandy massifs of the Fergana Valley, taking measures for breeding in captivity.

Eryx tataricus Lichtenstein, 1823

(19.10.2023. Photo author: Yuldashev Sh, Fergana; original)
Synonyms: *Boa tatarica* Lichtenstein, 1823
Distribution on Earth: Afghanistan, Kazakhstan, Kyrgyzstan, Uzbekistan, Turkmenistan and Tajikistan, Iran, China
Distribution in Uzbekistan: Southern Arolboi, Fergana Valley, Surkhandarya, Ustyurt Plateau.
Habitat: Meadow, desert, rocky areas.
Subspecies: *Eryx tataricus subsp. tataricus* Lichtenstein, 1823
Red List Category: Least Concern [LC] (IUCN 2023; Year last assessed: 2016). In Uzbekistan, it is included in the Red Book of Uzbekistan as a subspecies [NT] with almost weak mosaic distribution. (Own Res. Red Book, 2019)
Threats: Exploitation of protected lands of the desert area, poaching
Protective measures: Monitoring and public education
Based on the information of the above sources and international search databases, the number of species in need of protection found in the Fergana Valley is 8, and these species are distributed in different zoogeographic sections of the valley (Table 2).

Table 2
The status of reptiles in the zoogeographic sections of the valley requires discussion

Species	Zoogeographic sections
***Testudo horsfieldi* Gray, 1844**	The right and left banks of the foothills of the valley; Sand island Yozyovon
***Phrynocephalus strauchi* Nikolskiy, 1899**	The right and left banks of the foothills of the valley
***Phrynocephalus helioscopus* Pallas, 1771**	The left bank of the foothills of the valley
***Teratoscinus rustamowi* Szczerbak, 1979**	The right bank of the foothills of the valley and the sand island of Yozyovon
***Eremias scripta* Strauch, 1867**	Sand island Yozyovon
***Alsophylax loricatus* Strauch, 1887**	The left bank of the foothills of the valley
***Varanus griseus* Daudin, 1803**	The right and left banks of the foothills of the valley; Sand island Yozyovon
***Eryx tataricus* Lichtenstein, 1823**	Sand island Yozyovon

DISCUSSION

The study of the herpetological diversity of Central Asia has a long history and constitutes an independent field of research. Several stages can be detected in the development of this field. The periodization and a detailed description of the stages are well documented in the works of G.S. Sultanov and L.A. Persianova (Sultanov i Persianova, 1982).

If we divide the history of herpetological research in Central Asia into three periods, these periods are associated with the names of the following scientists: Eversman and Karelin, 1820-1857 (the first period); N.A. Severtsov, 1857-1884 (the second period); and N.A. Zarudny, 1884-1919 (the third period).

Two great zoologists, T.Z. Zohidov and O.P. Bogdanov, are responsible for the unique researches devoted to the study of the fauna of our republic. In the book "Biocenozy pustny Kyzylkum" by T.Z. Zohidov, 27 species of reptiles and 1 species of amphibians were found in Kyzylkum herpetofauna. O.P. Bogdanov's monographs "Fauna of Uzbek SSR" (*Fauna Uzbekskoy SSR*) (1960) and "Ecology of reptiles of Central Asia" (*Ekologiya presmykayushchihsya Sredney Azii*) provide information on 2 species of amphibians and 56 species of reptiles.

David A. Showler reported the existence of four amphibians (three toads and one frog types) and 57 types of reptiles (1 turtle, 36 lizards and 20 snakes) found in the territory of the Republic of Uzbekistan, and formed their taxonomy and systematic list (Showler, 2018).

Burak Aktag, Balkan Mega, Kerim Cicek developed the classification and species composition of snakes distributed in Uzbekistan. According to them, the most common snakes are Natrix tessellata and Psammophis lineolatus, while Elaphe sauromates and Vipera renardi are recorded in the most limited areas. At the moment, 18 snakes in Uzbekistan have been identified as Least Concern (LC) and 2 endangered (NT) species on the IUCN Red List. This scientific research work noted that biodiversity of snakes in Kashkadarya region is the highest in the republic with 18 species, and Andijan region has the lowest rate, only 5 species. In particular, in this research, 6 species of snakes were recorded in Fergana region.

Of the 57 registered species, 27 are found in the Fergana Valley, and 8 of them (30%) are rare species and are listed in the Red Book of the Republic of Uzbekistan, while 5 species (18.5%) are listed in the IUCN Red List, and 3 (11%) are protected by CITES (Nazarov et all, 2023).

D. A. Bondarenko reports that the area of the Yozyovon Nature Reserve is insufficient to preserve the natural biodiversity of the desert complexes of the Fergana Valley and that it is appropriate to create a network of protected areas (Bondarenko, 2020).

In short, the range of species and population density are decreasing due to the lack of protected areas in the region, lack of systematic monitoring and development of territories. These dramatically increase the risk of extinction of protected species. It is necessary to study the effects of such natural and anthropogenic factors and analyze their consequences. Because it is the duty of all of us to preserve and pass natural biodiversity on to future generations.

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