

Ecological groups of reptiles found in Bukhara region

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Abstract. Any environmental problems observed around the world, especially, anthropogenic factors have an impact on nature, including the number and bioecological characteristics of reptiles. In particular, the expansion of the types and scale of human economic activity and its increasing impact on environment require the organization of in-depth scientific research of the diversity of reptile species, the ecology of their distribution and the organization of protection. Since the second half of the last century, issues related to environmental protection and conservation of biodiversity have become of universal importance in terms of their scale and relevance. Key words: *Gymnodactylus fedtscheukoi*, *Agama Lehmanni*, *Ophisaurus apodus*, *Eryx miliaris*, *Echis carinatus*, *Testudo horsfieldi*, *Phrynocephalus mustaceus*, *Gymnodactylus caspius*, *Natrix tessellata*, *Vipera ursini*, *Phrynocephalus interscapularis* *Eremias velox*, *Eremias grammica*.

1 Introduction

Analysis of statistical data shows that today all over the world, including in our republic, most of the problems related to the decrease in number of species that make up biodiversity are directly or indirectly resulted by anthropogenic factors. The form, scale and consequences of anthropogenic impacts are manifested in different ways in different natural and geographical regions. From this point of view, an approach to biodiversity conservation is also needed, taking into account the specific environmental characteristics of each territory. A number of works on nature protection and rational use of natural resources are being carried out in our country. In particular, evidence of this is that there are more than 20 laws and a number of international conventions regulating all sort of activities in this field.

2 The material and methodology

The represented data was collected to study bioecological characteristics, distribution, biotope occurrence, abundance and conservation of reptiles found in Bukhara region from 2000 to 2023. The ecological analysis of the data was carried out with methods of G.A.Novikov (1947) and G. Kolya (1979) [1;2]. There were 64 field experiments in total

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where we observed various natural biotopes - deserts, semi-deserts, foothills, natural reservoirs, partially dwelled territories, agricultural landscapes and developed urban zones and collected samples at different times of the year (spring, summer, autumn and winter) [3;4;10]. Most of the studied area consists of clay soils, rocky desert, salt marshes and sand dunes[5;9].

The captured reptiles were fixated with 5% formalin. Plants in the desert with brackish soil include *Climacoptera ferganica*, *Chenopodium Album*, *Ceratocarpus utriculosus*; in the sandy desert there are *Tamarix*, *Haloxylon persicum*, *Haloxylon aphyllum*, *Descurainia Sophia*, *Alhagi pseudalhagi*, *Ammodendron conollyioccur*; in the desert with gypsum soil there are *Artemisia diffusa*, *Anabasis eriopoda* and similar ephemera, as well as ephemerooids [6;7;8]. In recent years, increasing construction and transport facilities in these areas, as well as the construction of railways and the laying of gas pipelines all have had their impact on the biodiversity of the territory [11;12].

3 Result and discussion

Reptiles live in more diverse environments than amphibians. Reptiles are considered to be true terrestrial vertebrates. Their internal and external structure has also become more complicated due to adaptation to land. Covering the skin of reptiles with a horny layer and loss of skin respiration function allow them to live even in places with low humidity. The internal structure of reptiles has also become more complicated, in which, instead of breathing with the larynx, it was decided to breathe with the movement of the chest. The reptiles found in the Bukhara region, depending on the habitat conditions, are divided into 2 ecological groups, xerophiles – drought-resistant species which live in terrestrial habitats and mesophiles – species that are drought-resistant however stick to a moderately moist habitats. We divided the terrestrial ecological group into 3 biotopes: the biotope of sandy soil, the biotope of saline soil, and of stony (gravel, gypsum) soil (Table 1).

Table 1. Ecological groups of reptiles living in Bukhara region, depending on the habitat biotope

№	Species	Terrestrial biotope			Moist biotope
		Biotope of saline soil	Biotope of sandy soil	Stony biotope	
Kingdom. Chordata					
Subkingdom. Craniata					
Phylum. Anamnia					
Subphylum. <i>Gnathos-tomata</i>					
Class. <i>Tetrapoda</i>					
Subclass. <i>Reptilia</i>					
Order. <i>Squamata</i>					
Suborder. <i>Sauria</i>					
Family. <i>Gekkonidae</i>					
1	<i>Crossobamon eversmanni</i>		+		
2	<i>Tenuidactylus caspius</i>		+		
3	<i>Tenuidactylus fedtschenkoi</i>		+		
4	<i>Mediodactylus russowi</i>		+		
5	<i>Teratoscincus scincus</i>		+		
Family. <i>Agamidae</i>					
6	<i>Phrynocephalus helioscopus</i>	+	+	+	
7	<i>Phrynocephalus interscapularis</i>		+		
8	<i>Phrynocephalus mystaceus</i>		+		

9	<i>Phrynocephalus reticulatus</i>	+	+	+	
10	<i>Paralaudakia lehmanni</i>				
11	<i>Trapelus agilis</i>	+	+	+	
Family. Anguillidae					
12	<i>Pseudopus apodus</i>		+		
Family. Varanidale					
13	<i>Varanus griseus</i>	+	+	+	
Family. Lacertidae					
14	<i>Eremias velox</i>	+	+	+	
15	<i>Eremias scripta</i>	+	+	+	
16	<i>Eremias lineolata</i>	+	+	+	
17	<i>Eremias intermedia</i>	+	+	+	
18	<i>Eremias grammica</i>		+		
Family. Scincidae					
19	<i>Ablepharus deserti</i>				
Suborder. Ophidia					
Family. Boidae					
20	<i>Eryx tataricus</i>	+	+	+	
21	<i>Eryx miliaris</i>		+		
Family. Colubridae					
22	<i>Boiga trigonata</i>		+		
23	<i>Platycephalus karelinii</i>	+	+	+	
24	<i>Hemorrhois ravergieri</i>				
25	<i>Lytorhynchus ridgewayi</i>				
26	<i>Spalerosophis diadema</i>	+	+	+	+
27	<i>Psammophis lineolatus</i>	+	+	+	
28	<i>Platycephalus rhodorhachis</i>		+		
29	<i>Natrix tessellata</i>				+
30	<i>Elaphe dione</i>				+
Family. Elapidae					
31	<i>Naja oxiana</i>		+		
Family. Viperidae					
32	<i>Echis carinatus</i>		+		
33	<i>Vipera lebetina</i>		+		
Order. Testudines					
Suborder. Cryptodira					
Family. Testudinidae					
34	<i>Agrionemys horsfieldii</i>	+	+	+	

In the Bukhara region and adjacent areas, reptiles living in the biotope of sandy soils is relatively rich compared to the rest of the ecological groups of reptiles. This indicator is primarily due to the geographical location of the territory, 85-90% of the studied territory is a zone of sandy deserts.

13 reptile species belonging to 3 suborders: Sauria, Serpentes, Cryptodira and 6 families (Agamidae, Varanidale, Lacertidae, Boidae, Colubridae, Testudinidae) have been identified in the saline soil biotope in Bukhara region. (Table 1). Soil moisture and salt content have little effect on the life of reptiles. This condition is explained by the breadth of the reptilian food spectrum.

On the territory of Bukhara region there are 26 species belonging to 3 suborders (Sauria, Serpentes, Cryptodira), 10 families (Gekkonidae, Agamidae, Anguillidae, Varanidale, Lacertidae, Boidae, Colubridae, Elapidae, Viperidae, Testudinidae) of the ecological group of reptiles found in the biotope of sandy soils (1 – Table). When *Phrynocephalus interscapularis* runs away from an enemy, it quickly burrows into the sand, clinging strongly to the ground and turning its body left and right.

13 species belonging to 3 suborders (Sauria, Serpentes, Cryptodira), 6 families (Agamidae, Varanidale Lacertidae, Boidae, Colubridae, Testudinidae) of the ecological

group of reptiles found in rocky, gravel, gypsum soil biotopes of the region have been identified. Species composition of reptiles found in this biotope varies depending on the seasonal and daily activity of the species, the duration of reproduction, changes in existing conditions in habitats, the duration of vegetation and food supply. It has been found out that the ecological group of reptiles found in the aquatic and moist biotope in the territory of Bukhara region includes 3 species. The fact that such species are at a low level of diversity is explained by the fact that aquatic biotope area is small as well as surrounded by anthropogenic influences.

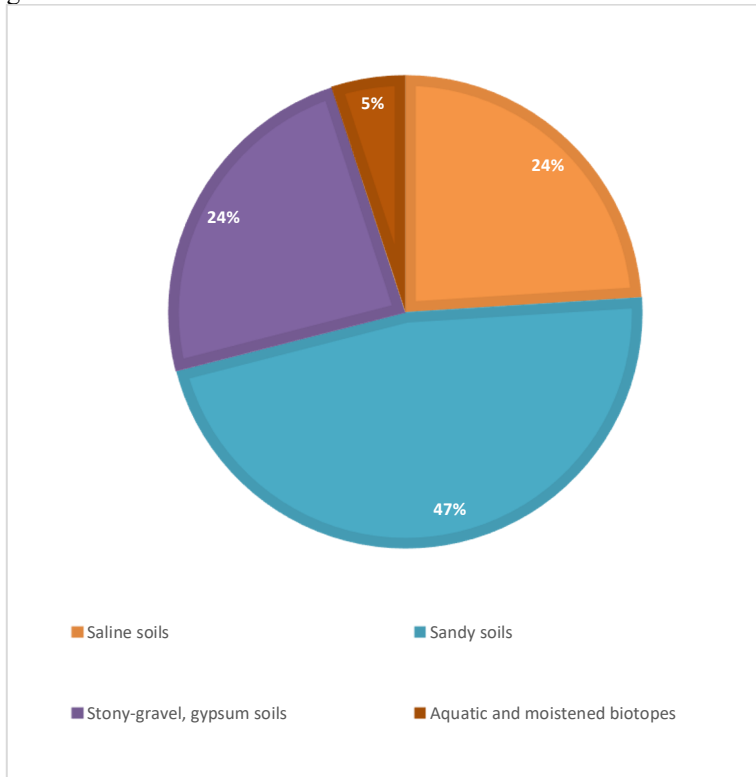


Fig.1. Distribution of reptiles living in Bukhara region by ecological groups depending on the habitat biotope

It was found that in the territory of Bukhara region, 13 (24%) reptile species are found in biotopes with saline soils, 26 (47%) species in biotopes with sandy soils, 13 (24%) species in biotopes with stony-gravel, gypsum soils, 3 (5%) in aquatic and moistened biotopes of the type.

Reptiles living in Bukhara are divided into groups of phytophages, zoophages and polyphages, depending on the type of food. The group of zoophages, in turn, is divided into insectivorous, predatory (Table 2).

Table 2. Ecological groups of reptiles found in Bukhara region depending on the type of feed.

№	Species	Phytophages	Zoophages		Polyphages
			Insectivorous	Predatory	
Class. <i>Tetrapoda</i>					
Subclass. <i>Reptilia</i>					
Order. <i>Squamata</i>					
Suborder. <i>Sauria</i>					
Family. <i>Gekkonidae</i>					
1	<i>Crossobamon eversmanni</i>		+		
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9	<i>Phrynocephalus reticulatus</i>		+		
10	<i>Paralaudakia lehmanni</i>		+		
11	<i>Trapelus agilis</i>			+	
Family. <i>Anguidae</i>					
12	<i>Pseudopus apodus</i>				+
Family. <i>Varanidale</i>					
13	<i>Varanus griseus</i>			+	
Family. <i>Lacertidae</i>					
14	<i>Eremias velox</i>		+		
15	<i>Eremias scripta</i>		+		
16	<i>Eremias lineolata</i>		+		
17	<i>Eremias intermedia</i>		+		
18	<i>Eremias grammica</i>		+		
Family. <i>Scincidae</i>					
19	<i>Ablepharus deserti</i>		+		
Suborder. <i>Ophidia</i>					
Family. <i>Boidae</i>					
20	<i>Eryx tataricus</i>				+
21	<i>Eryx miliaris</i>				+
Family. <i>Colubridae</i>					
22	<i>Boiga trigonata</i>				+
23	<i>Platyceps karelinii</i>				+
24	<i>Hemorrhois ravergieri</i>				+
25	<i>Lytorhynchus ridgewayi</i>				+
26	<i>Spalerosophis diadema</i>				+
27	<i>Psammophis lineolatus</i>				+
28	<i>Platyceps rhodorhachis</i>				+
29	<i>Natrix tessellata</i>			+	
30	<i>Elaphe dione</i>				+
Family. <i>Elapidae</i>					
31	<i>Naja oxiana</i>				+
Family. <i>Viperidae</i>					
32	<i>Echis carinatus</i>				+
33	<i>Vipera lebetina</i>				+
Order. <i>Testudines</i>					
Suborder. <i>Cryptodira</i>					
Family. <i>Testudinidae</i>					
34	<i>Agrionemys horsfieldii</i>	+			
	Total	1	16	3	14

The group of insectivorous reptiles found in Bukhara region and adjacent areas is numerous compared to the other groups. In the group of insectivorous reptiles, there are 16 species of insectivorous reptiles, 3 species of predatory reptiles, and 14 species of polyphages. The group of phytophagous reptiles includes 1 species. (Table 2).

The grouping of reptiles in this composition is conditional and varies depending on the geographical distribution of animals, age, and seasons. The characteristic features of phytophages are a long caecum and intestines. The group of zoophages includes most Geckonids and Agamids. Polyphages include Boidae, Colubridae, Viperidae. Many zoophages also feed on plants.

Most geckos and agamas feed on insects. Lacertidae catch and eat beetles, spiders and mollusks. The griseus monitor lizard catches and eats insects, mouse-like rodents and chicks from bird nests nesting on the ground or in bushes. *Natrix tessellata* and some others feed on snakes, amphibians, fish, rodents, and bird eggs. *Natrix tessellata* devours frogs alive. The composition of reptiles' food can also determine whether they lead a nocturnal or daytime lifestyle. The type of food intake also varies depending on the abundance or vigilance of prey. Boidae also attack rodents and other large animals, which surround their prey in a ring and strangle it to death. On the other hand, venomous snakes suddenly rush at their prey, poisoning it, biting it with venomous teeth, and then swallowing it whole.

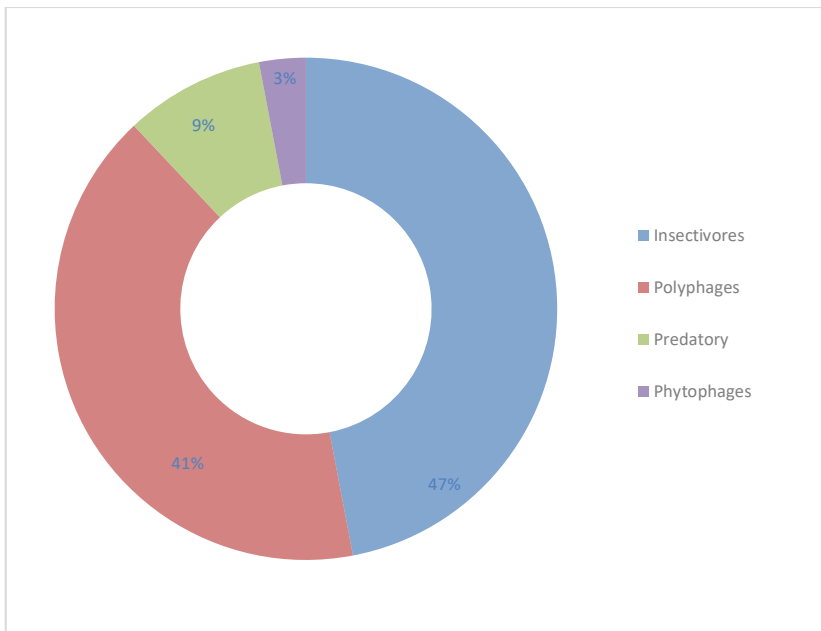


Fig. 2. Distribution of reptiles living in Bukhara region by ecological groups depending on the type of food

During our observations, among the reptiles found in Bukhara, depending on the composition of the feed, insectivores with 16 species (47%) and polyphages with 14 species (41%) hold a clear leadership, representatives of predatory reptiles includes 3 species (9%), phytophages only one *Agrionemys horsfieldii* species (3%). Fluctuations in the number of reptiles found in the Bukhara region over the years, although characteristic of all genera, occur differently in different groups. In the territory where observations were carried out,

the composition of the biocenosis changes depending on several biotic and abiotic factors. That is, if winter and especially spring precipitation falls less than normal, thinning of vegetation leads to a decrease in the number of rodents (finches, muskrats, voles). There is a change in the habitat conditions of this biotope species. During our observations, we observed a similar situation in 2014, 2017, and 2021 in the Mulloxol district near Lake Karakir and Sarmishsay. This situation causes animals to migrate from one biotope to another in search of food, and sometimes shelter. This, in turn, leads to the relocation to a new biotope along with rodents of its enemies, including reptiles (goats and snakes). In other words, it is observed that the influence of one environmental factor changes the species composition of the entire biocenosis in the territory. Also, the presence of a number of small and rare animals in the composition of representatives of the animal world of the studied territory indicates the relevance of environmental protection issues in the territory.

Also, the physical and geographical position of the region, the fact that it is located in the steppe zone and wasteful usage of natural resources in the territory, the construction of oil and gas pipelines through the desert zone, the diversion of highways and railways, the unplanned use of pastures for cattle grazing leads to a reduction in the number and range of reptile species in the territory.

4 Conclusion

Based on the data reviewed, the presence of some reptile species listed in the “Red Book” of Uzbekistan and the international community, requires special attention for the protection of species in the territory. In particular, it requires the establishment of breeding in special nurseries of such species as *Varanus griseus*, *Lytorhynchus ridgewayi*, *Naja oxiana*, *Agrionemys horsfieldii*. But so far, nothing practical has been done in this area on such events. Given this, we believe that for species whose numbers have been declining in the region in recent years, it is necessary to expand the nurseries and sanctuaries. When using species of hunting significance, it is essential to achieve strict compliance with the rules and deadlines of “hunting”, and regularly monitor the number of hunting animals. Then we will be able to pass our nature on to the future generation as a whole.

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