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Ecological features of the ornitofauna of the karakalpak part of the usturt plateau

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Abstract
The article presents materials on the ecological features of the avifauna of the Karakalpak part of the Ustyurt Plateau collected in 2005-2019. The authors identified bird species that adapt to altered habitat conditions and the extreme ecological conditions of the Ustyurt Plateau.

Keywords: the ustyurt plateau, birds, ornithological researches, hunting species, migratory, nesting, wintering, settled species, the red book of Uzbekistan

Introduction

Ustyurt is one of the large deserts of Central Asia, which differs from other deserts in the world by its geographical position, relief, flora and fauna, and the specificity of biogeocenoses. The territory of Ustyurt is 21 million hectares, of which 7.1 million hectares fall on the Karakalpak part. Studies of this gypsum desert are of very scientific, theoretical and practical importance for the knowledge of the biodiversity of not only arid zones, but also the biosphere as a whole.

The materials in this article are the result of observations conducted over the period 2005-2019. In the course of the study, we identified bird species that adapted to altered habitat conditions and the extreme environmental conditions of the Ustyurt Plateau.

The results obtained and discussion

The Ustyurt Plateau is an elevated plain composed of Neogene limestones, Paleogene clays and gypsums. The height of the Plateau reaches from 100 to 290 m above sea level. Here there are closed hollows, shrunken lakes, takyrs, sands, salt marshes, sandy areas, hollows, flat ridges. The gentle slopes are riddled with ravines and alternate with takyr hollows. The desert landscape of the main part of Ustyurt is a type of clay wormwood and wormwood-solyanka desert, the southeastern part is a clay-gravel desert.

The climate of the Karakalpak part of Ustyurt is sharply continental, characterized by hot, dry summers (+40+44^{0}C) and rather harsh winters (-32-380C), accompanied by strong winds, little rainfall (70-110 mm / year), unstable snow cover, high volatility and a sharp change in temperature during the seasons of the year and during the day.

The main source of water supply is groundwater, the depth of groundwater depending on the topography is in the range from 3 - 15 to 60 - 90 m, mineralization in the range - 2.6 - 30.0 g / l. For livestock watering, cattle breeders use water from wells. Some of them have fresh water.

The humidification of Ustyurt occurs due to atmospheric precipitation. Here there are no constantly flowing rivers, but there are seasonal surface runoffs that feed on atmospheric precipitation that accumulate in the sais.

In recent decades, technological processes have intensified in Ustyurt in connection with the construction of the transcontinental railway line, random roads (Kungrad – Beyneu), the construction of gas pipelines (Central Asia – Russia), uninterrupted operation of compressor stations, other communication lines, as well as the emergence of small towns, cities and settlements (Abadan, Zhaslyk, Kyrykkyz, Kuanysh, Urga, Bostan, Karakalpakia). At the same time, as a result of deep drilling of wells with the aim of extracting underground wealth - gas, oil, building materials and other precious metals, grazing and their constant movement, the functioning of the large industrial center "Elabad" on the basis of the Soda Plant, compressor station and other activities of Kungrad polyethylene chemical plant in the area of Surgil of settlement Ak-Cholak, all this led to an intensified anthropo-technogenic impact on the natural conditions of ecosystems, a deterioration in the composition of the natural environment (Ayubov *et al*., 2010) [5].

It should be noted that as a result of technogenic impact, anthropogenic wastelands, technogenic takyrs and salt marshes are formed, plant communities of the Karakalpak part of the Ustyurt Plateau are degrading, adversely affecting the state of the food supply, nesting, access to wintering grounds for a number of bird species.

The modern floristic composition of Ustyurt in terms of number and density of vegetation covers about 600 species of higher vascular plants.

The number and distribution of birds in the Ustyurt desert are still not well investigated. Ornithological studies in the Karakalpak part of Ustyurt were carried out by many scientists. So, in 1944, I.I.Kolesnikov (1952) [7] collected material on the fauna of terrestrial vertebrates of the Southern Ustyurt, the data of which were published in his article and where he listed 33 bird species. In 1944-1948 the left-bank part of the Amu Darya delta and the Karakalpak part of Ustyurt were examined by V.P.Kostin, the observations were published by him in 1956. In his article, he gives some data on the biology and distribution of 149 bird species.

The new data on zoogeography and avifauna of Southern Ustyurt were studied in detail by A.K.Rustamov (1951) [12], where he conducted research on the border and neighboring regions of Ustyurt with the Karakalpakstan territory.

In subsequent years, ornithological studies were carried out by Salikhbaev (1959) [13], Mambetzhumaev, Abdreymov (1972), Zaletaev (1976) [6], Ametov (1981) [3], Mambetzhumaev (1993) [10], Ametov *et al*. (2007, 2020) [4], Aymuratov *et al*. (2009, 2012) [1, 2], Matekova *et al*. (2017) [9].

The fauna of birds of Ustyurt is rather small. Despite the fact that more than 200 species of birds can be found here in different seasons, no more than 52 species nest. The most characteristic inhabitants of the clay desert on a flat plain are hunting species like Jack *Chlamydotis undulata*, Black-Bellied Sandgrouse *Pterocles orientalis* and Pallas's Sandgrouse *Syrrhaptes paradoxus*. In gravelly places Horned Lark *Eremophila alpestris* and Tawny *Anthus campestris* are found, and in the more mesophilic steppe depressions - Larks *Alaudidae*, Stone-Curlew *Burhinus oedicnemus*, European Nightjar *Caprimulgadae*, Hoopoe *Upupa epops*, Isabelline Wheatear *Oenanthe isabellina* - the common species for deserts and steppes are found. Where there are desert shrubs, Desert Warbler *Sylvia nana* and Great Shrike *Lanius excubitor* nest, and in the areas with dissected relief - Little Owl *Athene noctua*, Eagle Owl *Bubo bubo*, Brown-Necked Raven *Corvus ruficollis* and Pied Wheatear *Oenanthe pleschanka*.

According to literature data and according to our observations, 142 bird species belonging to 14 orders and 35 families were recorded on the territory of the Ustyurt Plateau. (Table 1)

Table 1: The species composition and nature of the stay of birds of the fauna of the Ustyurt Plateau

Order	number of species		settled		nesting		passing		wintering	
	abs.	%	abs.	%	abs.	%	abs.	%	abs.	%
Ciconiformes	2	1,4	-	-	1	1,6	2	1,9	1	2,9
Anseriformes	2	1,4	-	-	2	3,2	2	1,9	1	2,9
Falconiformes	23	16,2	3	13,0	11	17,8	16	15,0	11	31,4
Galliformes	2	1,4	1	4,4	-	-	1	0,9	1	2,9
Gruiformes	4	2,8	-	-	1	1,6	4	3,7	-	-
Charadriformes	18	12,7	-	-	7	11,3	18	16,8	-	-
Columbiformes	6	4,3	2	8,7	4	6,5	3	2,8	1	2,9
Cuculiformes	1	0,7	-	-	1	1,6	1	0,9	-	-
Strigiformes	3	2,1	2	8,7	1	1,6	1	0,9	1	2,9
Caprimulgiformes	2	1,4	-	-	2	3,2	2	1,9	-	-
Apodiformes	2	1,4	-	-	2	3,2	2	1,9	-	-
Coraciiformes	2	1,4	-	-	2	3,2	2	1,9	-	-
Upupiformes	1	0,7	-	-	1	1,6	1	0,9	-	-
Passeriformes	74	52,1	15	65,2	27	43,6	52	48,6	19	54,1
Total	142	100	23	100	62	100	107	100	35	100

Note. The total number of species grouped by the nature of their presence is greater than the species in the Ustyurt fauna due to the fact that many nesting species are also migratory for more northern geographic populations.

These tables show an assessment of the systematic composition and stay status of the avifauna of the Ustyurt plateau. The predominance of migratory species (75.3%) over nesting (43.6%), wintering (24.6%) and settled birds (16.2%) is characteristic.

Among the mentioned orders of birds registered on the territory of Ustyurt, the order of Passeriformes is the most widely represented - 74 species or (52.1%), Falconiformes are represented by 23 species (16.2%), Charadriiformes by 18 species (12.7%) and Columbiformes by 6 species (4.3%). Together, these 4 orders make up 85.3% of all bird species.

After them, Gruiformes - 4 (2.8%), Strigiformes - 3 (2.1%), Ciconiformes - 2 (1.4%), Anseriformes - 2 (1.4%), Alliformes - 2 (1, 4%), Caprimulgiformes - 2 (1.4%), Apodiformes - 2 (1.4%), Coraciformes - 2 (1.4%). The share of each of the other 2 orders is less than one percent.

The Red Book of Uzbekistan (2019) and the IUCN Red List (2019) include globally threatened species that live within the territory of Ustyurt: - Short-Toed Snake-Eagle *(Circaetus gallicus)*, Pallid Harrier *(Circus macrourus)*, Tawny Eagle *(Aquila rapax)*, Spotted Eagle *(Aquila clanga)*, Imperial Eagle *(Aquila heliaca)*, Golden Eagle *(Aquila chrysaetos)*, White-Tailed Sea-Eagle *(Haliaetus albicilla)*, Black Vulture *(Aegupius monachus)*, Saker Falcon *(Falco cherrug)*, Peregrine Falcon *(Falco peregrinus)*, Lesser Kestrel *(Falco naumanni)*, Great Bustard *(Otis tarda)*, Jack or Houbara Bustard *(Chlamydotis undulata)*, Pin-Tailed Sandgrouse *(Pterocles alchata)*.

The analysis of the seasonal movements of birds, including wintering, reveals patterns associated with the distribution of species composition in various biotopes of the desert zone of Ustyurt.

During the study on the territory of the Ustyurt Plateau, the Ustyurt chinks play the important role in ornithological terms.

The region of the chink of the Eastern and Southern Ustyurt is characterized by deep gorges, cracks, steep slopes - they sharply decrease and become flatting – steeping or stepped, ravines, and also have canyon-shaped character which is of particular importance for nesting of various species of birds in pairs and colonies. At the chinks of Ustyurt, we examined colonies of nesting birds of Common Swift *Apus apus*, Alpine Swift *Apus melba* and Jackdaws *Corvus monedula*. There are also nests of White-Tailed Sea-Eagle *Haliaetus albicilla*, Saker Falcon *Falco cherrug*, Common Kestrel *Falco tinnunculus*, Eagle Owl *Bubo bubo*, Little Owl *Athene noctua*.

The vegetation cover of the Churuk Hollow is rather rich in black-saxaul *Haloxylon ammodendron* communities, which respectively differ in a favorable natural environment for the habitat of numerous and diverse species of birds. In this area, the habitat and nesting of European Nightjar *Caprimulgus europacus*, Indian House Sparrow *Passer*

indicus, Rufous Scrub Robin *Erythropygia galactotes* and Great Shrike *Lanius excubitor* were found.

On the territory of the Beleuli fortress, the coordinates include the ruins of the caravan - shed fortress (XIV century), burial grounds made of stones of the fortress. In the cracks of the ancient burial grounds, the nests of Pied Wheatear *Oenanthe pleschanka*, Eagle Owl of *Bubo bubo*, Little Owl *Athene noctua* were found. The neighborhood of the ruins of the fortress and burial grounds contributed to nesting and other species of birds.

At the Zhauryn-Kuduk tract, we noted a peculiarity of behavior between the predatory *Falconiformes* and passerine *Passeriformes*. In the high scattered thickets of saxaul *Haloxylon ammodendron*, a nest of Long-Legged Buzzard *Buteo rufinus* was found, and 2 newly built inhabited nests of House Sparrow *Passer domesticus* were noted under the nest of the Long-Legged Buzzard. Closer to these nests, two nests of Great Shrike *Lanius excubitor* are marked in saxaul forests - this suggests that there is no struggle for nesting sites between the predatory *Falconiformes* and passerine *Passeriformes*.

It should be noted that Bimaculated Lark *Melanocorypha bimaculata* and Caspian Plover *Charadrius asiaticus* are not found on the routes of the southern part of Ustyurt, but their numbers increase to the north of the plateau.

During the observation period, the orders of passerine *Passeriformes* and falconine *Falconiformes* were numerous, and numerous species of birds were found and nested everywhere in all the studied territories: Long-Legged Buzzard *Buteo rufinus*, Caspian Plover *Charadrius asiaticus*, Eagle Owl *Bubo bubo*, Little Owl *Athene noctua*, European Nightjar *Caprimulgus europacus*, Red-Capped Lark *Calandrella cinerea*, Lesser Short-Toed Lark *Calandrella rufescens*, Bimaculated Lark *Melanocorypha bimaculata*, Tawny *Anthus campestris*, Great Shrike *Lanius excubitor*, Southern Booted Warbler *Hippolais rama*, Desert Warbler *Sylvia nana*, Isabelline Wheatear *Oenanthe isabellina*, Pied Wheatear *Oenanthe pleschanka*, Rufous Scrub Robin *Erythropygia galactotes*.

In the settlements on the Ustyurt Plateau, in particular on the roofs, attics of residential buildings, nesting species are noted: Rock Dove *Columba livia*, Collared Dove *Streptopelis decaocto*, Indian Myna *Acridotheres tristis*, Magpie *Pica pica*, Carrion Crow *Corvus corone*, House Sparrow *Passer domesticus* and Tree Sparrow *Passer montanus* and etc.

During the period of our observations, we noted the effect, in the presence or absence of industrial developments, on the avifauna in the gas production impact zone, and the sensitivity of some species of birds in the studied region to adverse technogenic influences. Studying the factors negatively and positively affecting the birds, their habitat was found that in the areas of gas production anthropogenic load does not always have a negative effect: for example, abandoned areas around wells, the remains of old drilling rigs, abandoned tanks, pipes, poles, remains of building materials, the remains of military vehicles, bunkers from former military purposes, the ruins of residential buildings, the ruins of burial grounds on the territory of Ustyurt (Karabauyr, Dzharynkuduk, Churuk, Beleuli, Baiterek, Cape Aktumsyk) create non-nesting territories where favorable conditions arise, i.e. nesting and breeding sites are being created for both settled bird species and migratory nesting birds (*Aquila chrysaetos, Buteo rufinus, Bubo bubo, Athene noctua, Coracias garrulus*, etc.).

Thus, based on studies on the territory of the Ustyurt Plateau, we obtained information that helps to determine the species composition and number of birds in various biotopes which are characteristic of the given area.

Conclusions

To protect rare and endangered species of birds of Ustyurt, we consider it necessary:

- coordinated research by ornithologists and botanists and forestry employees, which will serve as the basis for the creation of small areas in the degraded areas of the Ustyurt Plateau (Churuk, Beleuli, Shakhpakty) with the laying of experimental plots to create natural habitats and an environmentally friendly "green corridor" from key habitat sites that positively affect the habitat of rare and endangered species of birds (Short-Toed Snake-Eagle, Tawny Eagle, Imperial Eagle, Golden Eagle, Saker Falcon, Lesser Kestrel, Jack or Houbara Bustard).
- carrying out phyto-reclamation and biotechnological works, i.e. the creation of natural habitats, as well as to maintain the number of birds, further expansion of the area of plants as fodder objects of birds is necessary;
- conduct educational work among the local population about the need for the rational use of biodiversity resources, introduce them to the list of bird species prohibited for production, penalties, strengthen control over poaching and grazing, etc.
- creation of an ornithological reserve in the territory with the division into the regions of the eastern and southern chinks of Ustyurt with the holding of security measures;
- during a harsh winter (thick snow cover), due to difficulties in obtaining food, it is advisable and necessary to feed, create optimal conditions for nesting, during the mass hatching of chicks it is advisable to organize an artificial "watering place" in remote areas, i.e. create temporary small ponds or organize special containers with water;

  The proposed measures require further additional examination of the study area in different seasons of the year, with clarification of the status and number of key bird species.

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