

LANDSCAPE-ECOLOGICAL DISTRIBUTION OF VERTEBRATES IN THE REPUBLIC OF KARAKALPAKSTAN AND MAIN DIRECTIONS OF THEIR RESEARCH

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QORAQALPOG'ISTON RESPUBLIKASI UMURTQALI HAYVONLARINING LANDSHAFT-EKOLOGIK TARQALISHI VA ULARNI TADQIQ ETISHNING ASOSIY YO'NALISHLARI

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ЛАНДШАФТНО-ЭКОЛОГИЧЕСКОЕ РАСПРОСТРАНЕНИЕ ПОЗВОНОЧНЫХ ЖИВОТНЫХ В РЕСПУБЛИКЕ КАРАКАЛПАКСТАН И ОСНОВНЫЕ НАПРАВЛЕНИЯ ИХ ИССЛЕДОВАНИЙ

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Tayanch so'zlar: Qoraqalpog'iston Respublikasi, umurtqali hayvonlar, fauna, landshaft, ekologik tarqalish, Qizilqum, Ustyurt, Amudaryo deltasi, Orol dengizi, monitoring.

Rezyume. Maqolada Qoraqalpog'iston Respublikasi umurtqali hayvonlarining Qizilqum, Ustyurt, Amudaryo deltasi, voha hamda Orol dengizining qurigan tubi landshaftlarida tarqalish xususiyatlari ko'rib chiqilgan. Hayvonlarning tur tarkibi, yashash muhitiga moslashuvi va ularning tarqalishiga tabiiy hamda antropogen omillarning ta'siri haqida ma'lumotlar berilgan. Shuningdek, hududdagi umurtqali hayvonlarni o'rganish, monitoring qilish va muhofaza etishning asosiy yo'nalishlari belgilangan.

Ключевые слова: Республика Каракалпакстан, позвоночные животные, фауна, ландшафт, экологическое распространение, Кызылкум, Устюрт, дельта Амударьи, Аральское море, мониторинг.

Резюме. В статье рассмотрены особенности распространения позвоночных животных Республики Каракалпакстан в ландшафтах Кызылкума, плато Устюрт, дельты Амударьи, оазисной зоны и осушенного дна Аральского моря. Приведены сведения о видовом составе животных, их адаптации к условиям обитания, а также о влиянии природных и антропогенных факторов на их распространение. Определены основные направления изучения, мониторинга и охраны позвоночных животных региона.

Key words: Republic of Karakalpakstan, vertebrate animals, fauna, landscape, ecological distribution, Kyzylkum Desert, Ustyurt Plateau, Amu Darya Delta, Aral Sea, monitoring.

Summary. The article examines the distribution patterns of vertebrate animals in the main landscapes of the Republic of Karakalpakstan, including the Kyzylkum Desert, the Ustyurt Plateau, the Amu Darya Delta, the oasis zone, and the dried seabed of the Aral Sea. Information is provided on the species composition of vertebrates, their adaptations to habitat conditions, and the effects of natural and anthropogenic factors on their distribution. The main directions for the study, monitoring, and conservation of vertebrate animals in the region are identified.

Introduction. The Republic of Karakalpakstan is located in the northwestern part of Uzbekistan, in the lower reaches of the Amu Darya and the Aral Sea region, with a total area of 166.6 thousand km². The territory includes the Ustyurt Plateau, the northwestern part of the Kyzylkum Desert, the Amu Darya Delta, oasis territories, remnant mountains, and the dried bed of the Aral Sea. The natural-geographical conditions, climate, soil and vegetation cover, and water resources of these landscapes differ significantly from one another [2].

The diversity of the region's landscapes determines the species composition, distribution, population size, and habitat adaptation characteristics of the vertebrate fauna. While animal species adapted to arid conditions are widespread in the Kyzylkum and Ustyurt deserts, fauna complexes dependent on moisture have formed in the Amu Darya delta, tugai forests, reed beds, and water bodies.

As a result of the drying up of the Aral Sea, changes in the water regime in the Amu Darya delta, the intensification of desertification processes, and anthropogenic impacts, serious changes are occurring in the region's ecosystems. These processes lead to a reduction in the habitat of certain animal species, changes in their distribution areas, and a decrease in the number of populations. Therefore, assessing the current state of vertebrates in Karakalpakstan, studying their distribution across landscapes, and determining

priority areas for their protection are of great scientific and practical importance.

Literature review. The study of the species composition, distribution, and ecological characteristics of vertebrates related to landscapes in Karakalpakstan and adjacent territories began in the second half of the 19th century. N.A.Severtsov analyzed the vertical and horizontal distribution patterns of Turkestan animals, while M.N.Bogdanov provided preliminary faunistic data on the natural conditions and fauna of the Khiva oasis and the Kyzylkum desert. These studies served as an important scientific basis for studying the geographical distribution of animals in the region.

T.Z.Zakhidov thoroughly studied the ecological and faunistic characteristics of the fauna of the Kyzylkum Desert, analyzing the composition of desert biocenoses, the relationship of animal species with their habitat, and their ecological adaptations. The works of G.A.Novikov, dedicated to the methods of ecological research of terrestrial vertebrates in field conditions, are of methodological importance for faunistic observations, accounting for species numbers, and assessing their habitat.

N.A.Bobrinsky, B.A.Kuznetsov and A.P.Kuzyakin's manual on mammal identification is an important source for determining the systematic composition of the region's theriofauna. Species composition and distribution of vertebrates of Uzbekistan E.Sh.Shernazarov et al., which

allows for a comparison of the fauna of Karakalpakstan with other regions of the country.

The impact of ecological changes in the Aral Sea and the Amu Darya delta on the animal world is highlighted in the research of R.R.Reymov. The author analyzed long-term changes in the fauna of the Aral Sea basin and showed the impact of water regime disturbances, habitat reduction, and desertification processes on the distribution of animals. The problems of biodiversity conservation in the tugai ecosystems of the lower reaches of the Amu Darya were studied by G.A.Asenov and co-authors, and the necessity of protecting the tugai fauna was substantiated.

The species composition and territorial distribution of vertebrates in Karakalpakstan are summarized in the monographic works of G.A.Asenov, M.A.Jumanov, Z.O.Bekbergenova and other local scientists. They contain faunistic information about fish, amphibians, reptiles, birds, and mammals found in the area. In subsequent studies by M.A.Jumanov and co-authors, information regarding the fauna of Karakalpakstan was expanded.

Although existing scientific sources provide important information on the fauna of the Kyzylkum, Ustyurt, and Amu Darya deltas, the issue of conducting a comparative analysis of the distribution of vertebrates across all major landscape-ecological regions based on a unified system has not been sufficiently addressed. Particularly, new fauna complexes forming on the dried bed of the Aral Sea, modern changes in animal habitats, and regular monitoring of the state of populations require separate research.

Methodology. The fauna of vertebrates distributed in the Kyzylkum, Ustyurt, Amu Darya delta, oasis regions, and the dried bed of the Aral Sea of the Republic of Karakalpakstan was selected as the object of study.

In the course of the study, scientific literature, monographs, faunistic data, and existing research results on the fauna of Karakalpakstan and the Aral Sea region were analyzed. In studying the species composition, habitat, territorial distribution, and ecological adaptation characteristics of vertebrates, literature analysis, comparative-faunistic, landscape-ecological, systematic, and generalization methods were used.

Based on comparative-faunistic analysis, similarities and differences in the distribution of animal species in the landscapes of the Kyzylkum, Ustyurt, the Amu Darya delta, and the oasis were identified. Through a landscape-ecological approach, the influence of climate, soil and vegetation cover, water resources, food base, and anthropogenic factors on the distribution of vertebrates was assessed. The obtained data were systematized, and priority areas for the further study, monitoring, and protection of the region's fauna were identified.

Results and discussion. The natural-geographical conditions of the Republic of Karakalpakstan consist of the Ustyurt Plateau, the Kyzylkum Desert, the Amu Darya Delta, tugai and reed beds, various water bodies, as well as residual mountains and hills. Differences in the relief, climate, soil and vegetation cover, and water availability of these landscapes led to an uneven distribution of vertebrates across the territory. Therefore, a unique fauna complex has been formed in each landscape, adapted to specific ecological conditions [2].

43 species of fish, 2 species of amphibians, 33 species of reptiles, 307 species of birds, and 69 species of mammals have been identified in the fauna of Karakalpakstan. According to these indicators, a total of 454 species of

vertebrates were recorded in the republic. Birds occupy a leading position in terms of the number of species within the fauna. This situation is explained by the fact that the territory of Karakalpakstan is located on bird migration routes, as well as the concentration of desert, tugai, lake, and river ecosystems in one area [1].

In the landscapes of the Kyzylkum and Ustyurt, there are animal species adapted to a dry and sharply continental climate. The habitat of animals in the sandy areas of the Kyzylkum is associated with high air temperatures, limited water resources, and the seasonality of vegetation cover. In reptiles and mammals living in such conditions, adaptation features such as burrowing, nocturnal activity, and the satisfaction of water needs through moisture content in food have been formed.

The Ustyurt Plateau differs from the Kyzylkum by its hard, stony, gypsiferous, and takyr soils, sparse vegetation cover, and the predominance of open plains. The distribution of animals and the number of populations in this area depend on the amount of precipitation, the seasonal development of plants, the availability of a food base, and natural water sources. The source indicates that rare or endangered animals such as the sand cat, sand cat, karakul, saiga, and gazelle are distributed in Ustyurt and the Kyzylkum. The presence of these species determines the importance of these desert landscapes from a conservation perspective.

The Amu Darya delta, tugai forests, reed beds, and water bodies form a humid habitat that differs from desert ecosystems. Wild boar, reed cat, ondatra, and other species related to aquatic and tugai biotopes inhabit these areas. The dense vegetation cover of tugai and reed thickets serves as food, shelter, and breeding ground for animals. Furthermore, the lakes in the Amu Darya delta are of great importance for the feeding, breeding, and seasonal migration of waterfowl and waterfowl [2].

Analysis of the data shows that changes in the hydrological regime are one of the main factors affecting the fauna of Karakalpakstan. The lowering of the Aral Sea level, the reduction of the Amu Darya water flow, and the reduction of lakes, tugai forests, and reed beds have changed the natural habitats of animals. As a result, the range of species dependent on aquatic ecosystems has decreased, the number of certain species has decreased, and the importance of species adapted to desert conditions in the fauna has increased.

The impact of ecological changes is particularly pronounced in the fish fauna. As a result of river flow regulation, increasing the salinity of the Aral Sea water, and the reduction of natural spawning grounds, the distribution area of certain local fish species has sharply decreased. Specifically, the source notes the disappearance of the sturgeon in the Aral Sea, while the small and large shovelnose sturgeons of the Amu Darya are listed as endemic relict species under threat of extinction. This situation indicates that hydrological changes have had a significant impact not only on species numbers but also on the endemic biological diversity of the region.

Along with natural factors, anthropogenic impacts also exert a significant influence on the fauna. The construction of roads and railways, the development of oil and gas fields, the excessive use of pastures, the diversion of water resources for economic purposes, and poaching lead to the reduction of animal habitats and the fragmentation of populations. Large migratory mammals and rare species

that are demanding of their habitats are particularly sensitive to such changes.

The results of the analysis showed that the distribution of vertebrates in Karakalpakstan is formed based on the interaction of natural landscape features, water regime, vegetation cover, food resources, and anthropogenic pressure. Desert fauna predominates in Ustyurt and the Kyzylkum, while fauna complexes dependent on water and moisture prevail in the Amu Darya delta and tugai forests. As a result of the drying up of the Aral Sea, significant changes have occurred in the composition and distribution boundaries of fauna complexes in the region.

In this regard, it is necessary to regularly conduct faunistic inventories in the main landscape-ecological zones of Karakalpakstan, monitor populations of rare and endemic species, identify animal migration routes, and develop comprehensive measures aimed at protecting tugai, desert, and aquatic ecosystems. The study of new fauna complexes forming on the dried bed of the Aral Sea is one of the important directions for assessing modern ecological processes in the region.

Research results. As a result of systematizing the faunistic data presented in the source, it was determined that the fauna of vertebrates in the Republic of Karakalpakstan consists of 43 species of fish, 2 species of amphibians, 33 species of reptiles, 307 species of birds, and 69 species of mammals. The total number of vertebrate species is 454. Birds occupy a leading position in the number of species. This is due to the presence of desert, tugai, reed, lake, river, and oasis ecosystems in the area, as well as the location along the migratory bird routes of Karakalpakstan [1].

Analyses have shown that the territorial distribution of vertebrates depends on the natural and ecological characteristics of the landscapes. In the Ustyurt Plateau and the Kyzylkum Desert, species adapted to drought, water scarcity, and sparse vegetation predominate. In these areas, rare and declining mammals are found, such as saigas, gazelles, blackbirds, sand cats, and jackals. In the Amu Darya delta, tugai forests, and reed beds, wild boar, reed cat, ondatra, and various waterfowl are found, which depend on water and moisture.

Representatives of the Kyzylkum fauna exhibit ecological adaptations such as sandy body color, burrowing habits, nocturnal activity, and the use of moisture in their diet. The distribution of Ustyurt animals depends on the amount of precipitation, the seasonal development of

ephemeral plants, natural water sources, and food reserves. In delta and tugai ecosystems, the water regime and the state of vegetation cover are the primary factors determining the composition of the fauna.

Source data indicate that changes in the hydrological regime, the drying up of the Aral Sea, and the reduction of water bodies, tugai forests, and reed beds have had a negative impact on the animals' habitat. These processes have led to a reduction in the range of certain species, a decrease in population numbers, and the disappearance of species dependent on aquatic ecosystems. In particular, some local, endemic, and relict fish species have sharply decreased under the influence of the ecological crisis or disappeared from the fauna of the Aral Sea.

Additionally, the construction of highways and railways, the development of oil and gas fields, the excessive use of natural resources, habitat fragmentation, and poaching have been identified as the primary anthropogenic factors affecting wildlife. Consequently, the distribution of Karakalpakstan's vertebrates is shaped not only by natural landscape features but also by hydrological and anthropogenic changes.

Conclusion. Various landscapes of the Republic of Karakalpakstan, such as Ustyurt, Kyzylkum, the Amu Darya delta, oases, tugai forests, and water basins, have formed the basis for the formation of a unique complex of vertebrates. According to the source, a total of 454 species of vertebrates have been recorded in the region, and their distribution is inextricably linked to climate, relief, soil and vegetation cover, water, and food resources.

The drying up of the Aral Sea, changes in the hydrological regime of the Amu Darya delta, desertification, and the reduction of tugai and reed forests have led to significant changes in the fauna composition and species range. The degradation of natural habitats and anthropogenic pressure increase the risk of population decline for certain rare, endemic, and relict species.

In this regard, it is important to conduct the following research in the main landscape-ecological regions of Karakalpakstan: updating faunistic lists based on modern data, identifying species distribution areas, regularly monitoring populations of rare and protected species, studying migration routes, and developing comprehensive measures aimed at preserving natural habitats. The separate study of fauna complexes forming on the dried bed of the Aral Sea is considered one of the promising directions for assessing ecological changes in the region.

References

1. Бекбергенова З.О., Асенов Г.А., Жуманов М.А., Тлеуов Р.Т., Қошанов Д.Е., Утениязов А.К. Каракалпакстанның хайуанат дүнясы: ўқув кўлланма. – Тошкент: «Selena-Print» МЧЖ босмахонаси, 2008.
2. Асенов Г.А., Сейтназаров С.К., Есимбетов Р.М., Матрасулов Г.Ж., Абдигаппаров Ж.Ж. Проблемы сохранения биоразнообразия тугайной экосистемы низовьев реки Амударьи. // Жанубий Оролбўйи табиий ресурсларидан оқилона фойдаланиш: VIII Республика илмий-амалий конференцияси материаллари. – Нукус, 2019. 18-21-б.
3. Бобринский Н.А., Кузнецов Б.А., Кузякин А.П. Определитель млекопитающих СССР. – Москва: 1965.
4. Богданов М.Н. Очерки природы Хивинского оазиса и пустыни Кызылкум. – Ташкент: 1882. – С. 56-61.
5. Зоҳидов Т.З. Биоценозы пустыни Кызылкум: опыт эколога-фаунистического анализа и синтеза. – Ташкент: «Фан», 1971.
6. Новиков Г.А. Полевые исследования по экологии наземных позвоночных животных. – Москва: 1953.
7. Реймов Р.Р. Изменения состояния фауны Аральского бассейна за последние 30 лет. Диагностический материал по проблемам Аральского бассейна. – Москва: 1991. – С. 144-149.
8. Северцов Н.А. Вертикальное и горизонтальное распределение туркестанских животных. / Известия Общества любителей естествознания, антропологии и этнографии. 1872. Т. VIII. Вып. 2. – С. 104-109.
9. Шерназаров Э.Ш., Вашетко Э.В., Крейцберг Е.А., Быкова Е.А., Хуршут Э.Э. Позвоночные животные Узбекистана. – Ташкент: «Фан», 2006.