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Landscape of Zarafshan Mountains and Adjacent Plains and Regularities of their Development

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Abstract:
Based on long-term route landscape surveys and observations of the state of the landscape in different seasons of the year, we compiled a large-scale landscape map of the Zarafshan mountains and adjacent plains. In addition, we compiled a geomorphological map of the interfluves of Zarafshan and Kashkadarya. These maps, based on the materials of field work and the results of the analysis and synthesis of literature data, served as the basis for the compilation of a medium-scale landscape-typological map. A characteristic feature of the landscape of the Zarafshashan mountains and adjacent plains is that their development is closely connected to geographical position. According to zonal features, the landscape of the studied area is in the desert zone. The interfluves of Zarafshan and Kashkadarya, like the rest territory of southwestern Uzbekistan, is located in the southern latitudes, separately at a great distance from the oceans, and is located in the vast drainage of Aral-Caspian basin.

Keywords: *Landscape, zoning, orography, altitudinal contrast of the relief, spatial differentiation, arid landscapes, anthropogenic load, erosion-denudation.*

INTRODUCTION

The landscape of the described area from the southeast is closed by high mountains, which impede the penetration of warm and moist air masses. At the same time, the territory of this region, like the rest of South-West Uzbekistan, is open from the north. This facilitates the penetration of cold air masses. As a result of this, an arid, sharply continental climate with hot summers and cold winters is formed within the study area. The amount of precipitation ranges from 100 to 475 mm, of which only 3-10% falls in the summer. The daily and annual amplitudes of fluctuations in air and soil temperature are very high. In the warm half-year, due to the exceptional clarity of the sky, the influx of solar radiation is so great that the circulation of the atmosphere is completely subordinate to this factor. Such climatic conditions contribute to the widespread development of arid (desert and semi-desert) landscapes.The complexity of the orography and the high-altitude contrast of the relief, which create the conditions for the formation of a local climate, determine the species and spatial differentiation of landscapes. Studying them allows you to more objectively reconstruct the history of the development of these landscapes, without knowledge of which is impossible to predict the development of landscape in the future. The study of arid landscape is important for natural related sciences (botany, soil science, zoology, etc.). The results obtained in the study of desert landscapes can be successfully used to solve some environmental issues, soil formation, as well as the formation of individual exogenous minerals genetically related to arid climate conditions.Purpose, tasks: The practical significance of studying desert landscape is due to the fact that arid regions are the only areas producing fine-fibered varieties of cotton, silk cocoon, subtropical stone fruit and fruit crops, as well as astrakhan grass and so on. In arid areas, there is great potential for expanding the ranges of these most valuable crops. In addition, in recent years, the anthropogenic load on the landscape of arid regions has been increasing more and more. Therefore, in recent years, interest in studying the landscapes of arid regions has been increasing sharply. It is by studying the patterns of development of desert

March-April 2020
ISSN: 0193-4120 Page No. 756 - 761

landscapes that we can give scientifically sound recommendations for the rational use of these landscapes. To solve the problem noted above, it is necessary first of all to map the landscape complexes, which gives us the opportunity to consider the spatial and temporal distribution, development of these landscapes and on the basis of this give scientifically sound recommendations for their rational use.A study of the Zarafshanmountains and adjacent plains showed that the landscape of the described area s subordinated to the zone of vertical zonation. This is primarily due to the tectonics and topography of the area. As shown by the study of history, the development of the relief between the Zarafshan and Kashkadarya rivers, here, thanks to the differentiated tectonic movements in the time of neogene-quaternary, the mountain masses acquired a long line relief structure. As a result of neotectonic movements within the described region, erosion-denudation and erosion-accumulative complexes of relief are widely developed. In the erosion-denudation complex of the relief a significant place is occupied by deeply dissected midlands and dissected low mountains. In the erosion-accumulative complex, foothill, foothill-plain, and alluvial-terraced plains stand out. All these complexes are characterized by specific conditions, soils, vegetation and wildlife. So, for example, only 125-177 mm of precipitation falls in the foothills, light gray soils with arid vegetation are developed here. The wetting coefficient is 0.11-0.18 (Table. 1). In the foothill-inclined plain and the alluvial-terraced plain, the amount of precipitation is 250-400 mm. Typical and dark gray soils are developed here. Humidification coefficient - 0.15-0.20. In low mountains, precipitation reaches 400-500 mm. The soils are typical and dark gray soils, gravelly. Wormwood and ephemeral vegetation and shrubs are developed. In the mid-mountain zone, much more precipitation falls than in the low-mountain zone. Steppe vegetation consisting of wheatgrass and fescue is developed here. Juniper forests grow on the slopes of the mountains, brown soils are developed. Humidification coefficient - 0.28-0.35.

Table 1.Some climatic indicators for characteristic points between Zarafshan and Kashkadarya rivers

№	Weather Station	Height n.m. in m	Amount temperatures above 10^0	Average annual rainfall in mm	Humidification coefficient
1	Kagan	222	5000	125	0,11
2	Karmana	347	4906	177	0,18
3	Kattakurgan	485	4606	262	0,21
4	Kitab	658	5006	545	0,54
5	Samarkand	695	4900	328	0,35
6	Urgut	995	4106	459	0,40
7	Amankutan	1213	3820	900	0,84
8	Hazratbashir	1108	3850	600	0,70

Thus, it is obvious that the vertical differentiation of the relief due to tectonics led to a change in climatic conditions, soil cover and vegetation. It follows from this that the landscape complexes of the studied area are subject to the laws of vertical zonal features of the relief.Studies have shown that

within the Zarafshan and Kashkadarya basins, the vertical differentiation of landscapes occurred as a result of a long history of development. Studies have clarified that at the end of the Paleozoic and at the beginning of the Mesozoic, a warm subtropical climate was characteristic of Central Asia, and it also survived during the Paleogene transgression (Fedorovich, 1946).At the end of the Paleogene, in connection with the general uplift of the territory of Central Asia, the retreat of the epicontinental seas began. As the sea area decreased, the climate became drier and more continental. As a result, in the Paleogene and the beginning of the Neogene, the northern part of Central Asia (north of 43 ° N) was covered with Turgai flora, and the southern part, which includes the Zarafshan and Kashkadarya interfluves, with low-growing subtropical forests with xerophilous undergrowth shrubs that resemble hard-leaved forests of the modern Mediterranean (Korovin, 1962).A rather sharp change in natural conditions occurred again in the Neogene, in connection with the resumption of intense mountain-building processes. Two large phases of tectonic movements are established in the Neogene. The first began in the middle of the Pliocene. During that time the Chakylkalyan and Karatepe ridges rose significantly above the environment - more than 1000 m. Since that time, the process of differentiation of natural conditions began to occur, as a result of which various landscapes began to form. At the same time, accumulation of proluvial-alluvial deposits continued in the foothills. Thus, we attribute the origin of modern mountain landscapes to the mid-mountain ranges Chakylkalyan and Karatepa to the middle of the Pliocene.In the Pliocene, the territory of Central Asia was finally freed from sea waters, due to which a continental climate began to form here with hot summers and cold winters (Fedorovich, 1946). Such climatic conditions favored increased physical weathering. In the mountains, denudation intensified, as a result of which at the exits of various rocks a set of sculptural relief forms was formed. In the second phase of tectonic movements that took place in the middle of the Pliocene, together with the ridge, the foothills were partially involved in the uplift. This gives reason to believe that the formation of foothill landscapes in places began with the Pliocene. As a result of intensified tectonic movements at the beginning of the Quaternary period, they developed as areas of maximum elevation of the Zirabulak-Ziadinskymountains. Therefore, the beginning of the formation of low-mountain landscapes can be attributed to the lower Quaternary time. In the mid-Quaternary, a thick stratum of loess rocks formed on the foothill plain and upper (3-4) terraces of the Zarafshan and Kashkadarya rivers. The beginning of the formation of landscapes of these plains can also be attributed to the mid-Quaternary time.In the modern (Holocene) era, lower (1-2) terraces and floodplains of the Zarafshan and Kashkadarya rivers with tugai vegetation were formed. It should be noted that the era of glaciation in the Tien Shan mountains in general and the related changes in climatic conditions in particular were reflected in the landscape components. According to E.P. Korovin (1962), at the end of each epoch of glaciation, plant communities resembling the savannah developed in the areas of accumulation. Therefore, it must be assumed that at that time the vegetation between the Zarafshan and Kashkadarya rivers was much richer than now. Climate change towards aridization led to the disappearance of representatives of the mesophilic flora and the spread of xerophytes. Since that time, steppe, dry-steppe, and semi-desert vegetation has begun to form within the ridge.E.P. Korovin (1962) notes that in connection with climate change in the Quaternary, there was an ecological resettlement in the composition of forest vegetation. At the same time, he establishes two rows of ecological resettlement. The first includes trees and shrubs that require optimal wet conditions. These include some broad-leaved species - maple (Acer), ash (Fraxinus), poplar (Populus), apple (Malus), pear (Pyrus), birch (Betula), and walnut (Juglans). The second row includes much more xerophytic forms of shrubs and trees, such as, for example, some small-leaved species of maple (Acer semenavi, A.

turcomanicum), wild cherry (Cerrasusverrucosa), cotoneaster (Cotoneaster racemiflora), almonds (Amygdalussninosema, A. buch) and others.The interfluve of Zarafshan and Kashkadarya has been inhabited by humans since ancient times. Traces of primitive man were found in the area of the lake park in the center of Samarkand and in the area of the Amankutan cave. These ancient people D.L. Leo (1960) refers to the Paleolithic. Of course, those days, the population was small and could not have any noticeable effect on the surrounding nature. Naturally, from time immemorial, the local population cut down trees and shrubs for their household needs, as well as grazing cattle on pastures. Despite the primitive forms of economy, the population was constantly growing, as a result of which the role of the anthropogenic factor in the development of landscapes in the western part of the Zarafshan ridge became more and more noticeable. Judging by certain facts, until relatively recently, the mountain and piedmont parts of Uzbekistan were covered with rather rich tree-shrub vegetation. According to P. Skvarsky's description, in the 30-50s of the last century in the northern foothills of the Turkestan ridge there were still significant thickets of almonds, pistachios, etc.Based on a study of the vegetation of the Zarafshan River basin, the geobotanist K.Z. Zakirov (1958) also came to the conclusion that natural small plantations were still widespread not only in the mountains, but also in the foothills of Central Asia. From the above it can be concluded that not so long ago the foothills of the interfluve of Zarafshan and Kashkadarya were also covered with thickets of bushes and trees. According to eyewitnesses, back in the 30s, the slopes of Chupanata were covered with shrubbery more than at present.The most powerful economic impact people have on landscapes in recent years. In the foothills and valleys of the described area as a result of field irrigation, entire irrigated fields arose. Part of the foothill plains is used for rain fed farming. In the low mountains, as a result of cutting down shrubs, they remained only in small areas. However, they mercilessly continue to be cut down. In addition to felling, unsystematic cattle grazing also has a great influence on the change in natural vegetation. At present, about 70% of the area of mountain systems in the studied area, as well as a significant part of the foothill plains, are under grazing. In these areas, natural vegetation is degraded to varying degrees.Deforestation of trees and shrubs, unsystematic grazing and plowing have led to the fact that now about 90% of the region's lands are undergoing soil erosion. The consequence of this was a decrease in the water in the mountain streams and the complete drying out of the springs, as well as the watercourses that had been operating earlier. This phenomenon is especially clearly visible in the low-mountain landscapes of the Zirabulak-Ziadinsky mountains.Thus, the modern appearance of both mountainous and foothill landscapes between the Zarafshan and Kashkadarya interfluves is largely a product of the historical period, which is associated with the formation of such features as low forest cover, degradation of natural grassy vegetation, increased development of planar and linear erosion, and reduction of wastewater in mountain streams, drying of individual springs, mountain streams and so on.It should be noted that in the interfluve of the Zarafshan and Kashkadarya basins, as a result of tectonic movements, altitudinal differentiation of the relief began, followed by other landscape components (climate, soil, vegetation, and wildlife). As a result, vertical differentiation of landscapes was formed. A great influence on the differentiation of the mountain landscapes of the described area is exerted by the exposure of the slopes. Due to latitudinal strike, the main slopes of the ridges between the Zarafshan and Kashkadarya rivers are oriented north and south. According to the totality of natural conditions, the greatest differences are observed on the main slopes of the ridge - on the southern and northern. The huge impact of exposure on landscape differentiation was noted by many researchers who worked in the mountainous regions of Central Asia (I.S. Shchukin and O.E. Shchukin, 1959; Gvozdetsky, 1963; Mirzaev, 1964; Stepanov, 1967, etc.).Information on the stationary study of

soils of the northern and southern slopes is available only in the work of I.N. Stepanov (1967). According to him, the natural differences between the northern and southern slopes are very large. For example, the humus content in the 0-10 cm layer on the slope of the northern exposure (at an altitude of 1800 m above sea level) is 10%, at the same height, but on the opposite slope - 4.5%. The difference in soil moisture of these slopes at an absolute height of 800-1700 m is 3-5%, and even higher than 8-27%. The differences in temperature on the surface of soils of the northern and southern slopes in the middle mountains are 8-11 °, in the highlands even higher. The average projective cover on the slopes of the northern exposure is 70-90%, on the opposite -30-60%. In the mountains of the western part of the Zarafshan ridge, such stationary observation was not carried out. But we can note that the landscapes in the mid-mountain zone on the southern slopes are higher than on the northern ones. Landscapes on the southern slopes are more arid in nature. The vegetation is sparse in nature.In addition, in the interfluve of Zarafshan and Kashkadarya in the formation and development of individual landscapes, the barrier role of mountain landscapes is enormous. The role of barrier slopes in the formation of landscapes was shown by the example of the Urals and Altai by Milkov (1967), V.S. Preobrazhensky (1964), in the conditions of Central Asia A.A. Abdulkasimov (1983, 1990). Within the interfluve of Zarafshan and Kashkadarya, the role of the barrier relief in the formation of landscapes can be seen on the example of the Kashkadarya valley. This valley is fenced from the north by the Karatepa and Chakylkalyan ranges. These mountains, fencing from the north of the valley, impede the penetration of cold air masses. As a result, the Kashkadarya Valley is warmer than the Zarafshan. So, for example, if the average annual temperature in the middle of the Zarafshan valley is 13.4° (Samarkand), then in the Kashkadarya valley it is 14.8° (Kitab). The sum of positive temperatures above 10 ° in Samarkand is 4300 °, and in Kitab it is much higher - 4700°. The transition date for daily average temperatures above 10° in Samarkand corresponds to March 27, while in Kitab it corresponds to March 14. Due to the high thermal resources in the Kashkadarya Valley, fine-fiber varieties of cotton are grown, in Samarkand - medium-fiber varieties.

CONCLUSION

Based on this, it can be noted that the territorial and altitudinal differentiation of landscapes between the Zarafshan and Kashkadarya rivers is a product of the impact of the relief on the basis of which various economic conditions developed, that is, the local hydrothermal regime, lithogenesis, and soil formation. The development of the relief and morphogenesis processes depended on the nature of the geological structure, the latest tectonic movements and lithology of the rocks.The high-altitude zones of the relief, which were formed against the backdrop of the arid situation from the early Pliocene, contributed to the formation of vertical landscape zones with clearly defined and naturally determined boundaries (upper and lower). Due to the exposure, steepness and ruggedness of the slopes, the boundaries of individual landscape zones change, and one landscape structure is replaced by another. But all this did not introduce fundamental changes in the structure and structure of naturally determined vertical landscape zones.The above confirms the correct point of view of N. A. Gvozdetsky (1963) that “The zoning is climatic, biographical and soil, caused by a change in the height ratio of heat and moisture, must be combined with the geomorphological zoning”. In this case, by high-altitude landscape zones we mean a part of mountain slopes that differ in the age of the relief, its height and structure, hydrothermal regime, the nature of vegetation, and soil. The same interpretation of high-altitude landscape zones is given in subsequent works by N.A. Gvozdetsky on mountain regions of Central Asia and the Caucasus.

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