

Landscapes of Bakhmal district of Uzbekistan and their territorial differentiation

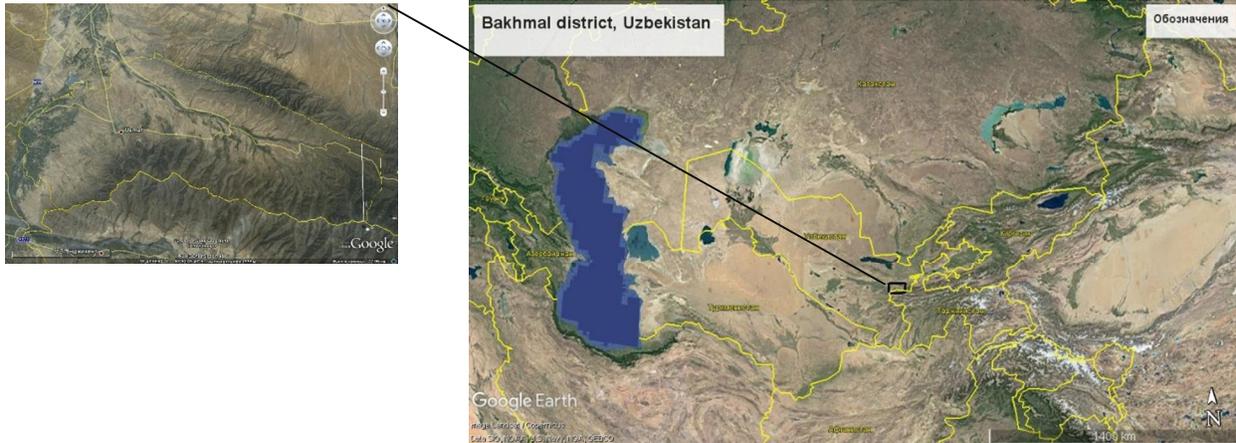
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Abstract: In this article, the landscapes of Bakhmal district of Uzbekistan were defined, their boundaries were divided into **taxonomic** units, mapped and their descriptions were compiled. At the same time, based on the classification scheme of V.A. Nikolayev, the district landscapes on the basis of regional and typological, ie "territorial unity and relative uniformity" were divided into landscape class (1), landscape type (3), landscape subtype (6), landscape subgenus (9), landscape kinds (13). The landscape kinds division was based on the similarity of the dominant urotshistshes. It was established that there are 48 urotshistshes in the territory of the district. Also, a landscape map of the district at a scale of 1:50,000 was made. Descriptions were written for each kinds of landscape and highlighted the features of each urotshistshes.

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Key words: landscape, mountain landscapes, classification of landscapes, subclass, group, type, subtype, genus, subgenus, kinds, urotshistshes, low mountain, middle mountain, high mountain.



1. Introduction

In physico-geographical terms, Bakhmal district is the southernmost district of Jizzakh region and borders with the Republic of Tajikistan to the south along the Turkestan Ridge (81.34 km), to the west with Bulungur district of Samarkand region (30.86 km), to the north with Gallaorol district (24.79 km) and Jizzakh district (31.56 km), and to the east and northeast along the Morguzar Range with Zaamin district (75.77 km). The total length of the district border is 244.32 km, of which 160.27 km falls on the Chumkar and Morguzar

watersheds, and the remaining 84.09 km lie on the hills and high plains.

The territory of Bakhmal district is a unique territory located in the Sangzor Valley, mainly between the Chumkar and Morguzar Mountains, which is a continuation of the Turkestan Mountain Range.

The northernmost point of the land is in the northern latitude 39°53'54.81", where the borders of Bakhmal, Gallaorol and Jizzakh districts meet, and the southernmost point passes through the Chumkar Mountain watershed, that is 39°33'17.67" southern latitude. The distance

between these northern and southern margins is 38,27 km.

The eastern and western margins of the district lie almost at the same latitude. Its easternmost point is located in the north-east of the region, in the part of the Morguzar Mountain separated from the Turkestan Ridge, i.e., 68°20'23.00" east longitude, and the westernmost point on the opposite side passes through the lands near the Zarafshan Valley, 67°22'32.59" west. The distance between these endpoints is 82,80 km. The total land area of Bakhmal district is 1864.37 sq. km, which is second only to Forish, Zaamin and Gallaorol districts.

2. Research study

Studies on the territory of the district and its surrounding landscapes were highlighted in the works of L.N. Babushkin, N.A. Kogay (1964), T.D. Jumaboev (1968), L.A. Alibekov and S.A. Nishanov (1978), S.A. Nishanov (1984), N.R. Alimkulov (2009).

In 1964, L.N. Babushkin and N.A. Kogay divided the territory of Uzbekistan into 10 physico-geographical districts, 40 regions and 66 landscape kinds. The territory of Bakhmal district belongs to Sangzor district of Middle Zarafshan district and distinguishes the following 6 kinds of landscapes:

T.D. Jumabayev's (1968) research on "Landscapes of the Sangzor River basin and types of agricultural lands" divides the landscapes into 5 zones (stratums) according to the altitude zones. The research analyses changes in landscape characteristics as a function of exposition and inclination of slopes in each landscape zone and, within these, reveals the natural and economic opportunities of farmland types.

L.A. Alibekov and S.A. Nishanov (1978) had divided the territory of Jizzakh region into 13 districts. The territory of Bakhmal district corresponds to the Chumkartag, the Southern Morguzar and the Sangzor intermountain depressions. There are also 7 altitudinal landscape zones, of which 5 are directly relevant to the study area.

Analyzing the above studies, they were mainly performed on a medium and small scale (1: 500,000 and smaller) and within the taxonomic unit of landscape type or landscape kind. This does not ensure the effectiveness of the work in landscape planning research.

3. The main part.

The landscape structure of Bakhmal district was studied and described on the basis of the following taxonomic units of V.A. Nikolayev (1979): Section → part → subpart → family → class → subclass → group → type → subtype → genus → subgenus → kind → subkind.

District landscapes are not divided from section to class of taxonomic level. The area belongs to **the class of mountain landscapes** as it consists entirely of mountain and foothill parts according to the shape of the relief. There is no class of plain landscapes in the district. According to the orographic structure, the Chumkar and Morguzar Mountains and the depressions between them consist of piedmont plains.

At the subclass level, relief was divided into low (1-8 kinds of landscape) middle (9-12 kinds of landscape), and high mountain landscapes (13 kinds of landscape) based on stratification of relief. The boundary between low mountain (54.8%) and middle (40.3%) mountain landscapes was drawn at an average altitude of 1400-1600 m above sea level based on geological, geomorphological and orographic structure, characteristics of altitude zones, basic soil types. Taking into account the fact that in some places the eastern slopes have the features of the Adyr belts, separated K. Zokirov, and the absence of features of middle mountains (orographic structure, inclination, vegetation), the boundaries were drawn at an altitude of 1700 m.

The low mountain landscapes consist of mainly the piedmont plains, adyrs, smooth slopes of the Chumkar and Morguzar Mountains and the Sangzor intermountain depressions.

The middle mountain landscapes occupy the slopes of the Chumkar Mountain with an average height of 1400-1600 m to 2800 m and the Morguzar Mountain with an average height of 1500 m to the watershed (2600 m). The boundary between middle and high mountain landscapes (4.9%) was drawn on the basis of stratification of relief and altitude zones (formation of a nival zone).

In the **group** taxonomic unit, landscapes are combined into automorphic, semi-hydromorphic and hydromorphic landscapes according to water and geochemical order, humidification. The landscapes of the area were not analyzed separately as they consisted of mainly an automorphic group.

Considering that the allocation of taxonomic unit **types** is based on zonal features of landscapes, there are 3 types of landscapes – low mountain, foothill and mountain-valley-steppe (adyr), middle mountain forest-meadow-steppe (mountain) landscapes, high mountain meadow-steppe (jailau) landscapes.

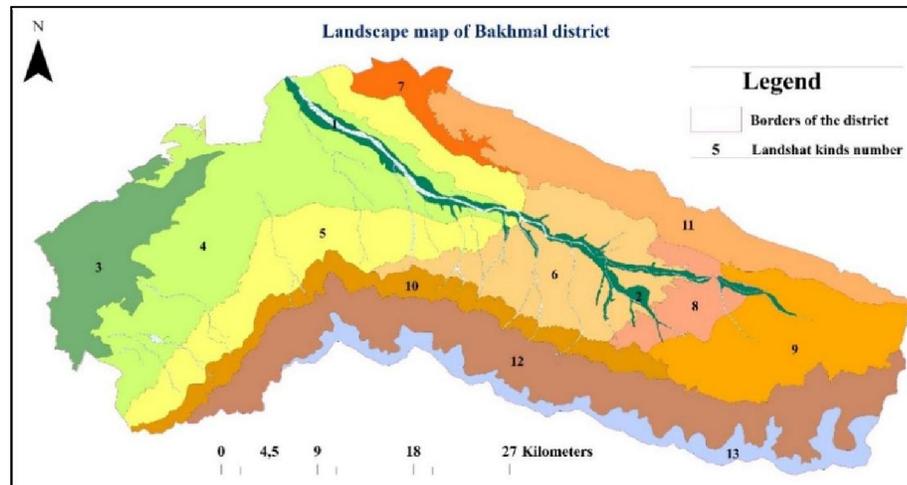
Based on soil and bioclimatic (on the scale of soil subtypes and plant formations under classes) landscape subtypes of the taxonomic hierarchy were divided into the following 6 landscape subtypes: Tugai (3.58%, 1st-2nd kinds of landscape), ephemeral and ephemeroïd semi-desert steppes (24.06%, 3rd-4th kinds of landscape), Turanian mixed grass dry steppes (23.86%, 5th-7th

kinds of landscape), ephemeral grass and shrubby steppes (3.29%, 8th kind of landscape), tall grass steppes with shrub and juniper stands (39.97%, 9th-12th kinds of landscape), high-mountain tall grass meadow-steppes (5.21%, 13th kind of landscape).

The subgenus of taxonomic units has been generalised and highlighted together with the genus features. These taxonomic units, together with the genesis and morphology of relief (genetic types of relief), have been defined on the basis of the

genesis and lithology of the deposits covering the Earth's surface.

Kind of landscape. According to this taxonomic scheme, the smallest taxonomic unit is a **kind** of landscape. It is a unit that represents a set of individual landscapes whose genesis and internal structure are the same. The main distinguishing feature of landscape kinds is the similarity of the dominant urotshistshes in the landscape (V.A. Nikolaev, 1979).



Map 1. Landscape map of the Bakhmal district. There are 13 landscape kinds on the map.

The similarity of soil, vegetation, relief, and deposits was taken into account in the landscape kind separation. A total of 13 landscape kinds were allocated in the area. The description of these landscape kinds is as follows (Map 1):

1st kind. Sandy-pebble riverbeds, floodplains and islands with poorly developed alluvial loamy soils with tugai vegetation. This landscape consists of the riverbed and floodplain of the Sangzor River and its tributaries, which are very narrow and stretched out. Its area is 20.00 sq km, which occupies about 1.07% of the district's territory. The width in the headwater is very narrow at 20-30 m, widening considerably to the west, i.e. downstream, and in places up to 500-600 m wide. The riverbed and floodplains of the Sangzor River consist of gravel, fine-gravel, stony and sandy deposits of the Syrdarya Complex of the Quaternary Period (Q_4). The crushed rocks are well polished and often have an ovoid appearance. And the Paleozoic rocks are found at great depths here.

Tugai vegetation is found in the adyrs and highlands, as well as in large tributaries of the Sangzor River. The riverbed in the middle and lower reaches is much wider due to its low gradient and slow flow. Therefore, many areas are composed of gravel, sand, clayey rocks, and mud. The conditions for the formation of groundwater here are very favorable. This is due to the thickness of the porous rocks, the good water permeability of

the horizons, and their low position relative to the surrounding mountains (T.D. Jumabaev, 1968). In such places, tugai, consisting of communities of willows, shrubs and grasses, forms a large area. In tugai brushwood of the Sangzor River and its large tributaries, floodplain stands are mainly composed of *Salix pcnostachysi*, *Hippophae rhamnoides*, *Elaeagnus angustifolia*, from floodplain shrubs: *Salix olgae*, *Tamarix arceuthoides*, from floodplain plants: *Alhagieta pseudalhagi*, *Cynodon dactylon*, *Phragmites australis*[8].

2nd kind. Lower fluvial terrace above floodplain, composed of clay-loam-gravel, on irrigated meadow soils with cultural vegetation. This landscape kind, like the first is narrow and elongated, comprising the 1-2nd fluvial terrace above floodplain of the Sangzor River and its large tributaries. Its area is 46.65 sq km, which occupies about 2.5% of the district's territory.

The surface of the landscape is covered by flat alluvial rocks. The most common alluvial deposits are shingle beds, sands and a clay loam mixture. Their thickness ranges from 35 meters to 45 meters. Groundwater depths range from 2-3 m to 5-6 m. The main source of feeding of groundwater is riverbeds and aryks, groundwater runoff from the surrounding foothills and mountains. The groundwater table, their regime is directly dependent on the amount of river discharge, with the maximum rise in the water table

occurring in April. Total groundwater flow is mainly directed towards the centre and downstream of the river valley. It is chemically hydrocarbonate and fresh (T.D. Jumabaev, 1968).

As a result of continuous irrigation of the territory with the waters of the Sangzor River, the thickness of the cultural and agricultural-irrigation deposits increases. Their thickness ranges from a few centimeters to 2 meters.

Soils are irrigated meadow with a humus content of 1.30-1.90% and a humus layer thickness of 48-50 cm. The steepness is 2-5°.

90% of the landscape is occupied by residential areas.

3rd kind. Slightly undulating plains with very poorly dissected slopes, consisting of irrigated typical sierozem on loess-like rocks, mostly with cultivated irrigated vegetation. This landscape consists of plains composed mainly of proluvial deposits covered with loess-like rocks in between the Chumkartog and Gubdintog mountains separating the Sangzor and Zarafshan rivers. The base of the landscape is a tectonic downfold between two mountains, filled with thick proluvial deposits brought in from the Sangzor River and lateral sais from the Chumkartag. They are 40-50 metres thick (A.Raxmatillaev, 2018). The total landscape area is 133.17 sq km, or 7.14% of the district.

A.A.Yuriev (1967) believes that before the mid-Quaternary Period (Tashkent Complex) the Sangzor River was a tributary of the Zarafshan River. Later the Sangzor River turned towards the Syr Darya Basin due to the severe lowering of the neighbouring Mirzachul district. For this reason, this landscape is geomorphologically included in the Tashkent Complex.

The landscape surface descends from the Tuyatortar Canal (850 m) to the Bulungur Canal (765 m). The lowest parts of the area above sea level correspond to this landscape. The surface of the landscape is slightly inclined and undulating, and it is covered with thick loess and loess-like rocks.

The annual precipitation in the landscape is 350-360 mm. 94.7% of the landscape is irrigated land, the rest consists of rainfed land (4.5%) and jailau (0.8%).

4th kind. Undulating hilly surfaces consisting of typical sierozem on loess-like bedrock with a predominance of cultivated spring vegetation. This landscape is distinguished by the fact that it occupies the largest area of all other landscapes (315.25 sq km, 16.92% of the district's territory) and that its basement is proluvial, covered above with thick loess and loess-like rocks. Its surface consists mainly of undulating uplands, and these are cut by temporary sais forming long dry valleys with mixed gravel and pebbles.

K.M. Kasimov (1960) determined that the thickness of loess in the watershed between the Zarafshan and Sangzor Rivers is 60-80 metres. Therefore, the large brick factories of the district are also located in these landscapes. Beneath the loess are conglomerates, small pebble rocks of the Tashkent Complex. Gravity water can be found in the fissures and pores of these rocks.

In winter, cold air masses linger there for a long time. The average temperature in January is -1°, -3° C and in July around +26° C (www.meteoblue.com).

5th kind. Undulating hilly surfaces consisting of dark sierozem on proluvial loess-like sediments dominated by cultivated spring vegetation, partly with mixed herbs and bulbous bluegrass. This kind of landscape includes lower slopes, foothills and talus cones (areas with an average altitude of 1000-1100 m to 1300-1400 m) of the western part of the Chumkar and Morguzar Mountains. Large towns and villages of the district (Osmat, Novqa, Mogol, Oqtosh, Mollabuloq, Sovuqbuloq, Boston, Zafarobod, Madaniyat settlements) are located in this kind of landscape. The landscape area is 227.21 sq km, which is 12.19% of the district's area.

Its base is proluvial, covered by loess and loess-like rocks. Proluvial deposits consist mainly of gravel, boulders and conglomerates brought in by temporary watercourses and small tributaries flowing into the Sangzor River (X.T.Tulyaganov, B.V. Yaskovich, 1980). In the course of our research (based on the opinions of hydrogeologists) it was found that the thickness of loess and loess-like rocks here is on average 15-25 m.

There are 7208 households in the landscape with a total area of 30.33 sq km (1.62%).

6th kind. Undulating-upland surfaces consisting of dark sierozem on gravel and cobble proluvial-deluvial, loess-like deposits with a predominance of cultivated spring vegetation, partial herbaceous and shrub mixed thickets.

This kind of landscape is located in the middle part of the valley, on the right and left banks of the Sangzor River, and covers 176.52 sq km and 9.47% of the district's area. The landscape is entirely covered by the Quaternary deposits of various ages. Lateral tributaries of the Sangzor River cut through them and mix them with modern sediments.

The soil is a dark sierozem, composed of a gravel-stone mixture of loess-like loam. The soil texture is medium to heavy loamy. The thickness of the humus layer is 37-55 cm and its concentration varies from 1.097% to 1.646%. Of the mobile useful elements in the soil, the concentration of phosphorus is 8-22 mg/kg and of potassium-216.7-325.1 mg/kg. The dry residue averaged 0.060%. Soil bonitet ranges from 29 to 38 (State Committee for Land Resources, Geodesy, Cartography and

State Cadastre, Center for Soil Composition and Repository, Quality Analysis, 2020).

69.36% of this landscape is arable land with rain-fed agriculture, and 30.64% are small valleys, riverbeds, dry sai, ravines and their surroundings, where *Cynodon dactylon*, *Poa bulbosa*, *Eremurus olgae*, *Perovskia angustifolia*, *Tamarix*, *Elytrigia trichophora* and bushes grow among the crop fields.

The fifth kind of landscape is characterised by a cool climate and an abundance of shrub vegetation.

7th kind. Gentle slopes composed of shales, mudstones, siltstones, sandstones, marbles and marbled limestone rocks, covered by deluvial and eluvial deposits on top, on which light brown soils with a mixed wormwood-fescue-wheat grass formation (*Elytrigia trichophora*, *Festuca valesiaca*, *Phlomis salicifolia*, *Centaurea squarrosa*, *Artemisia tenuisecta*, *Matricaria disciformis*, *Cousinia microcarpa*, *Hypericum perforatum*) are common.

This kind of landscape covers the territories in the southwestern part of the Morguzar Mountains with an absolute height from 1200 to 1450 m. Its area is 40.98 sq km, which occupies 2.2% of the district's territory.

In relief, it consists of a mountainous watershed and adjoining moderately steep, very steep and steep slopes. Although the absolute altitude of the landscape is low, it differs from previous landscapes in the widespread occurrence of Paleozoic metamorphic rocks and their outcrop. The area is composed of the Ordovician and Silurian shales, sandstones, limestones, conglomerates, mudstones, alleurolites and marble and marbled limestones of the Carboniferous Period. They lie beneath loess-like rocks mixed with gravel and small boulders on moderately steep slopes.

Soils are incompletely formed everywhere, and 8.6% of the area has exposed bedrock. The common soil type consists of poorly leached medium to heavy loam and clayey, thin, slightly carbonate light cinnamonic soils.

The vegetation mainly consists of mixed herbs of *Artemisia* L., *Festuca* L., *Agropyron* Gaertn., *Phlomis salicifolia* Regel, *Centaurea virgata* subsp. *squarrosa* (Boiss.) Gugler (*Centaurea squarrosa* Willd.), *Centaurea squarrosa* Willd., *Cousinia microcarpa* Boiss., *Hypericum* L., *Tripleurospermum disciforme* (C.A. Mey.) Bip., etc.

8th kind. Strongly and moderately deeply dissected gentle slopes, consisting of weakly carbonated brown soils on small-stony boulders, gravel, conglomerate, loess-like deposits, mainly with cultivated spring vegetation.

This kind of landscape includes gently sloping slopes with absolute heights of 1500-1700 m above sea level in the upper part of the Sangzor River valley. Its area is 61.39 sq km, which occupies 3.29% of the district's territory. Landscape kind representing an area with strongly dissected tectonic and erosion-denudation landforms, consisting of foothill slightly undulating surfaces composed mainly of mixed loess-like and proluvial rocks on thin proluvial-deluvial rocks.

38.65 sq km of the landscape, i.e. 62.9%, is arable land. The rest is steep slopes, as well as the ravine, sai and its surroundings.

In this kind of landscape, the average temperature in January is -2.4 °C, the average temperature in July is 21.2 °C, the average temperature in the cold half-year is 2.4 °C, the average temperature in the warm half-year is 16.9 °C, the average annual temperature is 9.5 °C, and the annual precipitation is 524 mm.

9th kind. Slightly sloping slopes composed of sandstones, mudstones, conglomerates, siltstones and in places marls, gravel, loess-like deposits, on which light brown soils with formations of mixed thinly dissected wormwood, granary, Zarafshan juniper, fescue thickets (*Festuca valesiaca*, *Elytrigia trichophora*, *Phlomis olgae*, *Geranium collinum*, *Matricaria disciformis*, *Heteropappus canescens*, *Plantago lanceolata*, *Artemisia tenuisecta*) and partially cultivated vegetation are common

This kind of landscape occupies the easternmost part of the Sangzor Valley, i.e. the nodal part of the Turkestan Range, where the Chumkar and Morguzar Mountains diverge. It should be noted that Mount Morguzor is separated from Mount Turkestan at an angle of 27 °, bounding the valley of the Sangzor River from the east and northeast. The area is composed of tectonic and erosion and denudation forms of mountainous relief with average heights from 1700 to 2400 m, as well as thick and deeply dissected middle slopes. Its area is 175.27 sq km, which occupies 9.4% of the district's territory.

The Paleogene, Neogene and Quaternary deposits are widespread in the landscape. The soils consist of slightly leached medium to heavy loamy and clayey, slightly carbonated brown soils. 22.44 sq km of the landscape, i.e. 12.8%, is occupied by arable land and agriculture. The rest consists of pastures. The vegetation consists mainly of high steppe vegetation, shrubs and juniper forests. Also common are such plants as fescue, wheatgrass, thinly dissected wormwood, Zarafshan juniper, upland crane, tripleurosperm discoid, Altai kalimeris, plantain, cheat grass, brome grass, Turkestan safflower.

10th kind. Strongly dissected slopes covered with eluvial and deluvial deposits, the base of which is composed of shales, sandstones,

limestones, alleurolites, conglomerates, marble and marbled limestone rocks, in some places exposed, with a predominance of light brown soils of mixed grass-brush and juniper formations

In this kind of landscape, tectonic and erosive-denudation, erosive relief forms of middle mountains are widespread, the deeply dissected slopes of which are composed of deposits of the Cambrian (€3), Ordovician (O2-3, O1t), Silurian (S1, S2, S1ln), Carboniferous (C1, C2) periods. It forms a long strip along the slope adjacent to the lower foot of Mount Chumkar. Its area is 104.89 sq km, which occupies 5.63% of the district's territory.

As the landscape occupies the lower slope of the mountain and its footings, dealluvial deposits, i.e. unsorted clastic rocks of various sizes, loess-like clays, predominate here.

11th kind. Strongly dissected gently sloping slopes covered with eluvial and deluvial deposits, the base of which consists of shales, limestones, siltstones, conglomerates, marble rocks, exposed in places, with widespread light brown soils with formations of herbaceous vegetation, fescue, bluegrass, eremurus and couch grass (*Elytrigia trichophora*, *Eremurus olgae*, *Poa bulbosa*, *Cousinia microcarpa*, *Phlomis salicifolia*, *Festuca valesiaca*, *Centaurea squarrosa*) as well as herbaceous vegetation, cereals, fescue, wormwood finely divided, semiglobular and Zarafshan juniper (*Juniperus sarawschanica*, *J. semiglobosa*, *Festuca valesiaca*, *Poa bulbosa*, *P. angustifolia*, *Phleum phleoides*, *Cousinia microcarpa*, *C. dzhisakensis*, *Scabiosa songorica*).

This landscape covers an area from 1,400 metres to 2,350 metres on the southern slope of Mount Morguzar. Its area is 162.68 sq km, which occupies 8.73% of the district's territory. Because the landscape is on a southern slope, it receives a lot of solar radiation.

12th kind. Steep slopes containing mixed shale, argillite, allurolite, sandstone, conglomerate, limestone sediments, sometimes protruding to the surface, with widespread common brown (weakly skeletonised) soils of herb-shrub and juniper formation (*Juniperus sarawschanica*, *Juniperus semiglobosa*, *Juniperus turkestanica*, *Rosa*, *Lonicera*, *Eremurus regelii*, *Ziziphora pedicellata*, *Astragalus bactrianus*, *Cotoneaster songorica*, *Festuca valesiaca*, *Poa bulbosa*).

This kind of landscape covers parts of the northern slope of Mount Chumkar with absolute altitudes between 2,000 and 2,800 metres. Its area is 301.91 sq km, which occupies 16.2% of the district's territory.

This slope of Mount Chumkar is marked by tectonic activity and a large number of faults

compared to other areas of the district. The Paleozoic sediments here are dominated by shale, mudstone, siltstone, sandstone, conglomerate and limestone rocks of the Silurian and Cambrian periods. The total thickness of the Silurian deposits averages around 3000 m (X.T.Tulyaganov, B.V. Yaskovich, 1980; M.M. Posoxova, A.N. Golikov, 1968-1970). The bedrock surface is covered by deluvial and partly eluvial deposits.

The area of this landscape consists of steep anticlinal folded wings of mountains, transverse deep canyons and sairs. The steep, medium-height slopes are very steep, heavily and deeply dissected. The process of destruction occurred especially during the period of activation of tectonic movements.

13th kind. Steep slopes and watersheds, with intense erosion, in places strongly and deeply dissected, bedrock, skeletally loamy, where light brown meadow-steppe soils with formations of fescue, esparcet, acantholimon (*Festuca valesiaca*, *Onobrychis echidna*, *Acantholimon erythraeum*) and round forms of Turkestan juniper-low-growing herbaceous-vegetative meadows (*Juniperus turkestanica*, *Allium kaufmanii*, *Taraxacum minutilobum*, *Anemone protracta*, *Carex melanantha*, *C.orbicularis*) and mixed meadows, thorny-branched salsify-low-growing herbaceous-vegetative meadows (*Scorzonera acanthoclada*, *Arenaria griffithi*, *Cousinia verticillaris*, *Polygonum biaristatum*) are common.

This kind of landscape includes the Chumkartog watershed with an absolute height of 2,800 m to 3,300 m and the adjacent steep slopes, cliffs. Its area is 97.17 sq km, which occupies 5.21% of the district's territory. Its surface consists of a chain of separate tors, and in some places extensive passes and ancient denudation surfaces are preserved.

Typical and dark sierozem soils are common at the foothills of the middle mountains and are replaced by light, typical and dark-brown soils as the altitude rises. The distribution of vegetation in the mountains also depends on height. The foothill plains are mostly covered with semi-desert vegetation, which alternates with dry steppe vegetation at elevations of 1100-1300 m (A.Raxmatillaev, 2018).

Conclusion.

Based on the aims and objectives of the work, landscapes were identified within the morphological parts of urotshistshes. The classification and description of landscapes is based on a multi-level structural and genetic classification scheme proposed by V.A. Nikolayev (1999). As a result, 3 landscape types, 6 landscape sub-types, 9 landscape subgenus and 13 landscape kinds were identified. Landscape kinds have been

distinguished on the basis of the similarity of soils, vegetation and sediments covering the land surface and their location within a single genetic landform type (M.R. Gudalov, 2019). In other words, they were divided by the method of combining similar urotshistshes. 48 urotshistshes were identified and described in the study area based on field research, foundation materials, NDVI and SRTM algorithms. The main regularities and factors outlined in the specialist literature (A.A.Vidina, 1974; V.K. Juchkova, 1974) were taken into account when compiling the large-scale landscape map and dividing them into typological units.

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