



## NATURAL COMPONENTS IN THE FORMATION OF SURKHONDARYO CANCAVE LANDSCAPE - LOCATION OF ROCKS AND RELIEF

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**Annotation.** The formation of the landscapes of the Surkhandarya basin and the stages of its geological development have gone through long periods. In the course of the geological development, the formation of the mountain and sub-mountain topography of the basin and the regional stratification of the landscape complexes took place. The impact of the anthropogenic factor on the landscapes of the Surkhandarya basin has increased, which has caused the landscape to be changed by humans. During the research, the issues of protection of natural landscapes of the basin and careful treatment of them were highlighted.

**Key words:** relief, rocks, geology, geomorphology, tectonic processes, oronim, desert landscape, anthropogenic landscapes.

Enter. The formation of the relief of the Surkhandarya basin has passed through long geological periods. The evolution of the basin in geological periods is related to the development of the tectonic sedimentation of South Tajikistan. Natural components, rocks, relief, biota, microorganisms of the basin were formed and developed during the Oligocene geological periods. Internal and external forces of the earth actively participate in the formation of the relief of the basin. The current relief of the mountain ranges in the basin of the Surkhandarya Basin has become the result of denudation and accumulation of the flat part in the Neogene and Quaternary periods. Formation of mountain systems in the basin occurred during the Hercynian mountain folding. The mountain ranges in the Surkhandarya basin are made of carbonate rocks of the Upper Paleozoic and Mesozoic periods, and the plain part is made of Quaternary deposits. It is explained by the fact that the neotectonic processes in the basin are actively continuing, the mountainous part is rising, and the shallow part is sinking more and more. The basis of the relief is: mountains, sub-mountains and low mountains, plain relief forms. We will consider the role of rocks and relief in the formation of natural landscapes of the basin.

**Purpose and tasks of work.** To study the role of rocks and relief in the formation of landscapes of the Surkhandarya basin, geological-geomorphological development of the basin; The main goal of the work is to apply the characteristics of the formation of the morphological appearance of the basin landscapes, their current state.

**The main part.** The Surkhandarya basin was formed during tectonic subsidence in the southernmost part of our Republic. The formation of basin landscapes took place during its long geological development. The Surkhandarya Basin is filled with deposits of the Neogene and Quaternary periods, is an integral part of the tectonic sedimentation of Southern Tajikistan, and has a large and complex structure. During its geological development, the Surkhandarya basin experienced long-lasting and rhythmic tectonic movements and

mountain formation processes. Proterozoic, Cambrian, Ordovician, Silurian, Devonian, Coal, Permian, Triassic, Jurassic, Cretaceous, Paleogene, Neogene and Quaternary deposits are involved in the geological structure of the depression and the mountain ranges surrounding it. Anthropogenic landscapes formed as a result of human economic activity also take part in the formation of the basin's landscapes. New tectonic movements, denudation-erosion-accumulation-eolian processes and anthropogenic factors take an active part in the formation of the present appearance of the depression (relief types). The geological-geomorphological structure of the basin consists of river banks, barren terraces, upland proluvial plains, conical outcrops, ridged eolian sands and anticlinal elevations. Rock formations and topography are important factors in the formation of basin sediments. Landscapes are a product of natural factors. In the area between the mountain and the mountain, we can find several different types of landforms of the Surkhandarya basin: ravine, desert, lowland, plain, hill-hill, low-mountain, flat mountain, high mountain morphology. Natural components, rocks and relief are the leading factors in the formation of natural and anthropogenic landscapes of the Surkhandarya Basin. In the mountain and sub-mountain plain areas of the basin, there are different types of alluviums, including systems of ravines and ravines. The ravine system as a complex of urochishes, the stream valley and the phenomenon of the ravine consists of a collection of characteristic urochishes of the hilly terrain type, and the conical spread is a characteristic urochishe of the hilly plain terrain type. The mountain systems of the basin belong to the type of mountains of the Hisar-Zarafshan series, combining medium and high mountains. Geological-geomorphological basis of mountain formation and recent tectonics related to processes. Structural-denudation-accumulation forms of the relief are typical for this type of mountain ranges. The main mountain ranges of the basin are the Kohitang Mountains - in the western part, the Hisar and Boysun Mountains - in the north, and the Bobotog Range - in the eastern part. In the central part of the basin, there are Sherabad foothills and Sherabad-Sarigkamish low mountains, Sherabad desert. In these mountains, the height of Kohitang reaches 3137 m, Hisar 4643 m, Boysun 3723 m. The type of hills of medium height is typical for the mountain and sub-mountain parts. Deposits of various periods are involved in the formation of the relief of the basin, including thick limestone, sand and sandstone of the Paleogene, Neogene and Quaternary periods. In the formation of each landscape, relief is its leading component. The physico-chemical properties and characteristics of rocks, geological structures, climate and levels of anthropogenic influence are also the main factors that create relief. Hypsometry forms of the relief can be divided into types depending on their location relative to the sea level: lowlands 0-250 m, plains 200-300 m, high plains 300-500 m, plateaus and hills 1000-2000 m. The heights of hills, low mountains, and plains are not the same. For example, the height of the hills is divided into several categories: low (400-800 m), medium height (700-1000 m), high (up to 1700 m) hills. Z.A. Svarichevskaya (1965), who studied the geomorphology of Central Asia, suggests that the absolute height of low mountains is 1000-2000 m. The process of physical weathering is also important in the formation of the relief of the Surkhandarya basin. Intensive manifestation of physical weathering processes is one of the characteristics of the basin. Natural components, rocks and relief are the leading factors in the formation of the landscape of the basin. Loess and loess-like rocks are involved in the formation of Adir region. The soil of the hills consists of various sizes of stones, sand, gravel mixtures and conglomerate rocks. In the northernmost part of the Surkhandarya basin, there are Hisar mountains belonging to the Kashkadarya

basin, and a part of it overlooks the Surkhandarya basin. The highest point of the Hisar mountain range is the Hazrat Sultan mountain (4643 m), and it is a direct continuation of the Hisar range. Aksuvdarya mountain of Hazrat Sultan connected with the Zarafshan ridge. Hazrat Sultan Peak is located in the upper reaches of Dixon Daryo (the left tributary of the Topolong River), which originates from this massif. A series of parallel branches branch off from the Hisar ridge to the southwest. These networks are watersheds between the Kashkadarya and Surkhandarya basins. Their bases are the mountains of Chakchar, Boysun, Osmontarosh, and Beshnov. The largest of them is the Chakchar range (the peak of Khurasan is 3744 m). To the south-west of Chachchar mountain, to the south of Osmontarosh mountain, Beshnov mountain is located. In the south-west of Chachchar mountain, branches such as Eshakmaidan, Toydala, Khontakhta Maidanon are separated. Boisun Mountain is located in the east of Chakchar Mountain. It is called Kushtang (3273 m) in the northeast, Ketmonchopti (3168 m) in the middle, and Suvsiztog in the south. To the south of Boisuntog is the Kohitang mountain, where there is a 4 km long cave. Surkhantog (3722 m) is located in the east of Boisun mountain, parallel to it. Kelif-Sherabad (1126 m) is located in the south of Surkhantog, and the low mountains of Sherabad-Sarikqamish (1216 m) are located in the same direction. The Sherabad River flows through these mountain ranges. Gazlafon, Beshqiz, Karabundir, Takasakradi, Yetimkalos mountains are located from southwest to northeast. In the basin of the Surkhandarya basin, the mountains belong to the Hisar-Zarafshan group of mountains. To the east of Boisun mountain there is a series of ridges running parallel to it. Boysun and Kohitang ridges are separated from each other by Boysun, Kofrun, Sayrob depressions. Limestone, conglomerate, shale, sandstone, partially igneous rocks are involved in the formation of the above mountain ranges. The Hisar mountain range consists of large mountain systems surrounding the northern part of the Surkhandarya basin. The mountain range is located in the watershed of Zarafshan, Kashkadarya and Amudarya rivers. The length of the mountain range is 200 km, the average height is 3600 m. The highest place is Dukdon mountain. The soil of the Hisar Mountains is composed of crystalline rocks, granodiorite, shale and sandstone, gypsum, conglomerate, dolomite and other rocks that were broken by granite intrusions of the Paleozoic and Mesozoic periods. The mountain range was formed and re-uplifted during the Hercynian and Alpine folds. The relief of the mountain range has a complex structure, and many places are strongly fragmented. The northern slope is steeper and more rocky, while the southern slope is steeper with extensive plateau and valley systems. A number of mountain massifs and passes also participate in the relief structure of the Hisar Mountains.

The northern slope is steeper and more rocky, while the southern slope is steeper with extensive plateau and valley systems. A number of mountain massifs and passes also participate in the relief structure of the Hisar Mountains. We can see smoothed surfaces on the watershed and slopes, deeply cut by rivers in the form of dense gorges. Karst landforms (quarries, karst funnels, depressions, wells and caves) are found in places where gypsum and limestone are scattered. Mountain landscapes are formed by groups of cultural landscapes that have been re-transformed under the influence of the human factor. Another large mountain range in the Surkhandarya basin is the Kohitang Mountains, formed in the southwestern part of the depression. The highest point Ayriota-3139 m absolute height. The Kohitang Mountains were formed in the Hercynian mountain fold and rejuvenated in the Alpine fold. The mountain floor is covered with different deposits of the Paleozoic and

Mesozoic periods. The topography of the Kohitang Mountains includes mountains of medium height, steep cliffs and ravines, hills and depressions. The karst process was formed in the gypsum and limestone layers of the mountain range. It consists of flat surfaces and river valley systems. Zarabog and Poshhurt depressions are located between the mountain ranges. Sherabad-Sarikkamish mountains pass from the south-west to the north-east. In the landscape of the Kohitang Mountains, low, medium-altitude mountain landscapes are found. In the eastern part of the Surkhondarya basin, between the Surkhondarya and Kafirnihan rivers, between the Surkhondarya and Kafirnihan rivers, there is a medium-height mountain range of the Bobotog Mountains. The mountain is 125 km long and 30-40 km wide. At its highest point, the height reaches 2290 m. The mountain was formed in the Hersian fold, and its geological-geomorphological base consists of Paleogene and Jurassic limestones, clay, siltstone and sandstone. The eastern slope is steep and narrow, the mountain plains are located on the Kafirnihan river terraces. The western slope is flat and wide, the main part consists of low mountains. The slopes of the Bobotog mountains are broken by many dry streams. The wide distribution of the karst process is characteristic. Kafirnikhan, Varzob, Khanaka, Lyubach, Karatogdarya, Shirkent, Topolongdarya and other river branches formed deep gorges. The influence of the anthropogenic factor on mountain landscapes is significant. In the mountains of Besharcha and Zarkosa, there are thick spruce groves, and at 800-900 m altitude, there are pine trees, zirk, almond and pistachio groves. Irrigated agriculture is developed in the Kafirnihan valley. Erosion and pasture degradation occurred in the mountain under the influence of human economic activities. There are specially protected landscape types in the area. In the central part of the basin, the Boysuntog mountains, one of the main southwestern branches of the Hisar mountain range, are located. The mountain stretches for 150 km from northeast to southwest. The height of the highest peak is 4425 m on Khojayipiryokh mountain. The average height is 2500-3000 m. The southwestern part of the mountain is called Kushtang, Ketmonchopti, Sarimas, Suvsiztog. Boisuntog is the suvayirg of Surkhondarya and Sheroboddarya. Belovti - 3712 m, Gaza - 3018 m passes were formed above 3000 m in Boysuntog mountains. The mountain range was folded during the Hercynian and Alpine orogenies. The soil is composed of granite, granodiorite, gneiss, shale rocks of the Paleozoic era. The slopes are divided by streambeds, tectonic forms of denudation are widespread. Karst phenomenon is widely developed. The south-eastern slopes of Boisuntog are characterized by steep and low slopes, and the north-western part is steep. Desert-type landforms are also involved in the formation of landscapes of the Surkhondarya basin. We can clearly see this type of landscape types in the example of Kattakum massif, Sherabad desert and Kyzyriqdara desert. In the southwestern part of the Surkhondarya basin, there is the Kyzyriqdara desert, which consists of sandy and flat plains. This desert is connected to Sherabad desert in the south. The soil is sandy loam to a depth of 25 cm, and the bottom layer is a mixture of clay and sand. In the Kyzyriqdara desert, syzot waters are very close to the surface and are mineralized (located at a depth of 40 m in the north and 5 m in the south). Barren soils with medium and strong salinity are mainly distributed in the desert. The desert is used as steppe pasture. This desert is characterized by favorable conditions for irrigation, and desert landscapes have been reshaped by human influence. Sherabad deserts are located in the southwestern part of the Surkhondarya basin. This desert is located in the territory of Sherabad district, and is connected with the mountains and hills. The reshaping of the relief is a result of neotectonic processes that took place in the Quaternary period. The sandy surface



of the Sherabad desert is occupied by various sand dunes and ridges, as well as shifting sands and barrens. Sherabad oasis is one of the areas that have been developed since ancient times, and the landscapes of the area are cultural landscapes that have been changed by man. It is characterized by the fact that the use of the Sherabad desert as desert-pasture cattle breeding has been widely established and this process continues organically. The morphostructural stratification of the landscapes of the Surkhondarya basin is formed depending on the geological-geomorphological basis of the area, the genetic basis of bedrock. During the geological development of the basin, it is explained by the accumulation of rocks of different thicknesses of the Paleogene, Neogene and Quaternary periods and lying on the ground surface in the mountainous part of the depression.

In short, the formation of the landscape of the Surkhondarya basin and its current appearance is a natural result of tectonic processes that took place during long geological periods. The morphological appearance of the Surkhondarya Basin is characterized by the fact that it has a valley-spread character, mountain and sub-mountain landscape complexes are formed depending on the height regions and geological-geomorphological features of the terrain

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