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Lower Zarafshan Natural Geographical Location

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ABSTRACT

The article highlights the specific geographical position, boundaries, and relief characteristics of the Lower Zarafshan natural geographical region. The Lower Zarafshan covers the lower reaches of the Zarafshan River (the territories of Navoi and Bukhara regions) and is bordered by the Kyzylkum Desert in the north and the Qarnob and Malik deserts in the south. The study analyzes the geoecological condition of the region, its climatic features, surface and groundwater resources, and its role in the formation of desert landscapes. In addition, the strategic-geographical significance of the area located at the junction of the Amu Darya and Zarafshan river basins is revealed.

Keywords:

Lower Zarafshon, physical-geographic location, relief, Zarafshon river, Bukhara oasis, Navoiy depression, desert landscape, geoecology, hydrography.

The Lower Zarafshan natural geographical region is located in the central part of Uzbekistan and includes the Bukhara and Karakul deltas formed in the lower reaches of the Zarafshan River. In the east, it is separated from the Middle Zarafshan region by the Khazar corridor, which is 2–4 km wide. The region is bordered in the north and west by the Kyzylkum Desert, in the southwest by the Sandykli Sands, and in the south by the Eshakchi Sands. From the east, it is surrounded by the elevated areas of Qiziltepa, Azkamar, Quyimozor, Qaynog'och, Qushtepa, and Qumsulton.

Geologically, the Lower Zarafshan region is situated on a folded Paleozoic basement that has been covered by Mesozoic and Cenozoic sedimentary deposits. The oldest geological formations belong to the Paleozoic era and are located at depths of 1200–1300 meters. These deposits are composed mainly of limestone and shale, overlain by Jurassic and Cretaceous sediments such as marl, clay, and sandstone. The thickness of these Mesozoic deposits reaches 500–1000 meters in some areas. Above them lie Paleogene and Neogene formations,

which are exposed in certain upland areas of the region.

The most widespread deposits in the Lower Zarafshan region are those of the Cenozoic era, particularly Quaternary sediments. These include alluvial, proluvial, alluvial-proluvial, delta-proluvial, lacustrine, aeolian, and anthropogenic-irrigation deposits. Alluvial-delta sediments formed by the Zarafshan River are dominant and consist of gravel, sand, and loam materials. Lacustrine deposits, composed of dark-colored clays and loams, are found around Lake Dengizkul and other small lakes. Aeolian sands are widespread in the Bukhara and Karakul areas, formed under the influence of wind processes. In long-irrigated agricultural zones, cultural layers have developed due to continuous human activity.

The relief of the region is generally flat but varies in structure. From the Khazar corridor, the Zarafshan Valley gradually widens and forms the Bukhara delta near the Abumuslim hill. The Bukhara delta is approximately 102 km in length, with an average width of 50–55 km, reaching up to 70 km in some places. The delta

surface gently slopes toward the southwest and represents a flat plain dissected by irrigation canals. The absolute elevation varies from about 200 m in the west to 250 m in the east. Along irrigation channels, natural embankments (levees) with relative heights of 2–8 m have formed.

Within the Bukhara delta, four ancient river terraces of the Zarafshan River can be distinguished. The first terrace lies closest to the river channel, with a relative height of 1–1.5 m and a width of 1.5–2 km. The second terrace rises 2–5 m above the river level and reaches widths of up to 6 km, and in some areas near Bukhara, up to 50 km. The third terrace is less pronounced and consists of weakly elevated alluvial plains. The fourth and oldest terrace is located on the surrounding plateaus such as Avtobach, Qiziltepa, and Quyimozor. The Lower Zarafshan natural geographical region is characterized by its specific geographical position, complex geological structure, dominance of Quaternary deposits, and deltaic relief formed by the long-term activity of the Zarafshan River. These natural conditions play a significant role in shaping the region's landscapes, soils, water resources, and economic development.

The Lower Zarafshan natural geographical region is a large natural area formed along the lower reaches of the Zarafshan River, encompassing the Bukhara and Karakul deltas. The geographical position of the region is defined by complex relief structures and surrounding desert landscapes. In the east, it is separated from the Middle Zarafshan region by the Khazar corridor, which is 2–4 km wide.

The region is bordered in the north and west by the Kyzylkum Desert, in the southwest by the Sandykli Sands, and in the south by the Eshakchi Sands. Its eastern boundary is formed by the elevated areas of Qiziltepa, Azkamar, Quyimozor, Qaynog'och, Qushtepa, and Qumsulton. These boundaries clearly indicate that the Lower Zarafshan region represents a distinct natural-geographical unit.

The Bukhara delta gradually narrows and descends toward the southwest. Near the village of Chandir, the Zarafshan Valley becomes significantly narrower, where the Karakul

Plateau approaches from both sides. In this area, the plateau reaches relative elevations of up to 15 meters. The Zarafshan River cuts through the plateau, forming a narrow passage known as the Karakul corridor, with a width of 0.5–1.0 km. This corridor serves as a natural geomorphological divider between the Bukhara and Karakul deltas.

In the southwestern part of the Bukhara delta, ancient hydrological systems have formed complex relief features. Near the village of Oghor, the ancient channel of the Zarafshan River—known as the Makhandarya—branches off and extends approximately 80 km to Lake Lukli. Within this old riverbed system, several depressions such as Chukurköl, Makhanköl, O'rtako'l, and Chandirköl have formed, which are mainly fed by drainage waters. From the Makhandarya system, another channel called Gujayli branches off near Makhanköl and extends westward, crossing the Karakul Plateau and reaching Lake Zamonbobo. These ancient river channels now also function as drainage systems.

In the eastern part of the Bukhara delta, several depressions have been transformed into large water reservoirs due to water accumulation processes. Among them, the Tudakul and Quyimozor reservoirs are formed as a result of both natural relief conditions and anthropogenic influence.

After passing through the Karakul corridor, the Zarafshan Valley widens again, forming the Karakul delta. This delta is bordered by the Kimirek Sands in the west, the Sandykli Sands in the southwest, the Eshakchi Sands in the south, and the Karakul Plateau in the northeast. The Karakul delta is 48–50 km long, with an average width of 26–27 km, expanding to 35–36 km in some areas. The surface is relatively flat and gently slopes toward the southwest, in the direction of the Amu Darya Valley.

Compared to the Bukhara delta, the Karakul delta is characterized by a greater number of saline depressions and small salt lakes. The region is also surrounded by extensive aeolian formations, including mobile sand dunes (barchans) and stabilized sandy ridges. Within these sandy areas, remnants of ancient

Zarafshan river channels, such as the Toqir channel, are preserved.

Two ancient river terraces of the Zarafshan are identified within the Karakul delta. The first terrace is located close to the riverbed, with a relative height of 0.5–1.0 meters. The second terrace is wider (2–3 km) and elevated by 2–3 meters. Due to intensive agricultural activity, the boundaries of these terraces have been significantly modified and are now difficult to distinguish. The Lower Zarafshan natural geographical region is characterized by a complex geomorphological structure shaped by the ancient and modern activity of the Zarafshan River, aeolian processes, desert landscapes, and human impact. The distinction between the Bukhara and Karakul deltas, the presence of ancient river systems, and the interaction of desert and delta environments make this region one of the most important natural-geographical areas of Uzbekistan.

The Lower Zarafshan natural geographical region is located in the central part of Uzbekistan and holds significant scientific, geographical, and practical importance due to its unique location, complex geomorphological structure, and rich natural conditions. Formed in the lower reaches of the Zarafshan River, the region includes the Bukhara and Karakul deltas and represents one of the major transitional zones between desert and delta landscapes in the country.

From a geographical perspective, one of the most important features of this region is its role as a natural transitional area. Here, fluvial-deltaic, desert, and plateau landscapes interact, forming complex and diverse natural systems. Features such as the Khazar corridor, the Karakul passage, and ancient river channels reflect the long-term geomorphological evolution of the territory and serve as key indicators of its natural development.

Climatically, the region is characterized by an extremely arid environment, high heat resources, and a long vegetation period, which create favorable conditions for agriculture. However, the scarcity of precipitation and frequent droughts necessitate the development of irrigation-based farming. Therefore, the use of water resources from the Zarafshan and Amu

Darya rivers and the formation of large irrigation systems significantly increase the economic and geographical importance of the region.

Geomorphologically, the formation of the Bukhara and Karakul deltas, along with ancient riverbeds, alluvial plains, and aeolian processes, contributes to the landscape diversity of the region. This makes the area highly important for studying soil formation processes, land use patterns, and reclamation conditions.

In addition, the presence of saline depressions, sandy deserts, and artificial reservoirs demonstrates the strong interaction between natural and anthropogenic processes. Reservoirs such as Tudakul and Quyimozor play an important role not only in irrigation but also in maintaining ecological balance in the region. In conclusion, the Lower Zarafshan natural geographical region:

has a complex natural-geographical structure; represents a transition zone between desert and delta landscapes;

is of strategic importance for irrigated agriculture and water management;

serves as an important natural laboratory for studying geological, geomorphological, and climatic processes.

Overall, this region is considered one of the most important areas of Uzbekistan from both natural-geographical and economic-ecological perspectives.

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