

**ON THE HISTORY OF GEOLOGICAL AND ENGINEERING STUDY OF THE  
KASHKADARYA REGION**

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**Abstract:** Geological and engineering-geological studies of the Kashkadarya region are considered important and are of great importance for the national economy, irrigation facilities and housing construction, as well as for irrigation works in agriculture.

**Keywords:** soils, loess and loess-like rocks, geological and tectonic structure, Quaternary sediments, denudation cycles, stratigraphic and genetic schemes

**Introduction**

Kashkadarya region is one of the most economically important regions of Uzbekistan, and its development prospects until 2030 are reflected in a number of decrees and resolutions of the President of the country. These documents aim at the sustainable and consistent development of the region in the industrial, energy, geological, agricultural, infrastructure and social spheres. If Kashkadarya has become the center of economic activity today, this is directly the result of strategic decisions taken by the President. Based on the above, industry, irrigation facilities and housing construction related to the further development of the region's national economy are developing here on a wide scale. Solving the problem of rational land development, placing and ensuring the safety of constructed structures, especially on sedimentary loess soils, is impossible without a deep and comprehensive study of the properties of soils and engineering and geological conditions of a particular area.

In this regard, the authors of this article briefly analyzed the history of the study of the Kaskadar region:

In 1875, the founder of Turkestan geology, I. V. Mushketov, along with describing the geological structure of the territory of Uzbekistan, dwelled on the main laws of geological development of its tectonics, in particular, on the geological and tectonic structure of the Kungirtag and other mountains.

Although he did not pay much attention to the Quaternary sediments in describing the geological structure of these mountains, he fully presented geological sections of sediments of the pre-Quaternary period.

The second major geologist, G.D. Romanovsky, for the first time created a scheme of stratigraphic divisions of Central Asian sedimentary layers. Although the diagram contains some weakly based conclusions, it forms the basis of the modern stratigraphy of sedimentary formations in the Asian environment.

In 1926, in connection with the establishment of a geological committee in Tashkent, M. M. Reshetkin, V.M. Zdorin, M. A. Schmidt, N.I. Shevchenko, O.V. Shvets, V.L. Dmitriev and L.V. Popov conducted hydrogeological studies in the lower and middle reaches of the Kashkadarya. The study of their geomorphology, geological structure, hydrogeology, as well as engineering geology (sedimentation properties of loess) provided information. They identified four stages of development in the geological history of the Quaternary sediments of the Kashkadarya basin. They noted that the modern Kashkadarya valley is located in the proluvial sedimentary layers of the foothill undulating plain. When studying the hydrogeological conditions of the region, they came to the conclusion that one main flow of groundwater is considered to be the correct one in the alluvial deposits of the river valley. They said that these sandy-gravel deposits can be divided into a number of independent water horizons due to the presence of clay layers.

Based on a critical generalization of the available material, M. A. Schmidt developed stratigraphic and genetic schemes of Quaternary sediments. Although M.A. Schmidt's work has shortcomings in the genetic scheme of Quaternary sediments, it plays a significant role in the study of alluvial deposits and hydrogeological conditions in the upper reaches of the Kashkadarya.

### **Analysis and results**

The first geological surveys in the Kashkadarya depression in terms of oil and gas exploration were carried out in 1931 under the general supervision of S. Ilin. Describing a number of sections of Cretaceous and Tertiary sediments, he expressed additional ideas about the paleogeography and tectonic structure of the area and highly appreciated the ideas about the tectonic structure and the prospects for its oil content.

In 1935, N.A. Bilalov and S.I. Ilin continued their research, conducting geological exploration for oil within western Uzbekistan. He compiled a geological map for the areas

between Kogan and Karshi, Maymanaktog and Kasantog, which played an important role in the placement of a wider scope of oil geological exploration within this area.

In 1937, a team of employees of the Hydrogeological Department of the Central Asian Geological Trust described the hydrogeological conditions of 18 cities of Central Asia. Information was provided on the current state of water supply and the possibilities of using groundwater for this purpose. The hydrogeological conditions of the city of Bekbudi (now the city of Karshi) were described by L.F. Kalnitskaya. The studies were conducted to determine the state of water supply of cities and the possibilities of water supply of the city. The studies noted that the groundwater of the regions was of relatively low quality in terms of chemical composition, but very valuable in terms of bacteriology. In 1941, the Uzvodproizstroy exploration trust in the Kashkadarya basin conducted engineering and geological surveys of mountain streams to determine the possibility of building reservoirs. As a result of the studies, L.A. Reyer briefly analyzed the geological and hydrogeological conditions of each study area and developed a program for a detailed study of engineering and geological conditions. However, the report did not consider the groundwater basin associated with the Quaternary rocks of the desert part of the basin.

Later, in 1944-1946, Y.A. Skvortsov and G.F. Tetyukhin studied the Quaternary layers of the Jama, Karnabchul and Karshi deserts. According to them, the formation of thick deposits of loess-like soils (loess) is associated with the alluvial-proluvial activity of the Zarafshan River and the Kashkadarya River. Taking into account geomorphological features, they divided the sediments into four complexes (azkamar, karnab, sukaytin, and zarafshan). They belong to denudation cycles of different ages, and taking into account the local names of these complexes, they formed the basis for the modern division (stratigraphy) of the Quaternary deposits of Uzbekistan.

In 1936-1947, K.Y. Oprishko conducted engineering and geological studies on the schematic project of the construction of canals on the right banks of the Kashkadarya and Zarafshan rivers from the Uzvodpraizstroy trust. In the presented reports, the author describes in detail the composition, lithological structure and engineering and geological properties of the Quaternary deposits developed along the route of the designed canals. In the lower part of the Kashkadarya basin, within the framework of the topographic sheet j41-XII, K.Y. Oprishko and B.I. Sigalov conducted complex hydrogeological and engineering geological studies, thanks to the work performed, they clarified the geomorphology, stratigraphy and hydrogeology of the district, the Quaternary layers Y.A. Skvortsov's stratigraphic scheme was divided, a

hydrogeological and land reclamation assessment was performed, existing and new irrigation areas were analyzed, and groundwater was analyzed as a possible future source for water supply.

In 1949, similar mapping work was carried out in this district by a team of researchers: A. B. Vasyutinskaya, O.K. Inzhevatova and O. M. Sveshnikov. According to the mapping data, they carried out hydrogeological zoning. They characterized the pre-Quaternary and especially Quaternary sediments. The second time is characterized by the above-mentioned four-complex stratigraphic scheme. The work carried out mainly consisted of geological and hydrogeological maps of a certain scale, as well as sections of Paleogene and Neogene deposits in the slopes of mountains such as Dugaba, Dongiz-Syrt Alaudintog and their annotations.

R.I. Nadirshin's research (1959-1960) showed that the ancient Kashkadarya basin, consisting only of alluvial sediments (gravel, sand, silt), flows here. Detailed geological studies include a geological logical study of the Kason area. Outside the Kason section, A.G. Babayev studied sections of the Cretaceous and Paleogene strata in the Kungirtog and Maymanaktog mountains. According to the results of drilling in the Kason area, a large fault crosses it in the northeast direction. This fault divides the fold anticline into two parts, and the north-western part is lowered (the displacement amplitude is about 800 m).

Since 1945, G. A. Manjiro and A. I. Shevchenko, A. A. Schmidt conducted extensive hydrological evidence studies in the Kashkadarya basin. Based on the collected material, the authors described the seasonal and perennial patterns of the groundwater basin and outlined the prospects for further regime observations.

These works were continued by a group of researchers (14,25,33,70,93) in 1946-1949. A number of reports were compiled based on the research results, in the last works the authors give a stratigraphic correlation of Quaternary sediments according to the scheme of four members of denudation cycles. The main attention is paid to hydrogeological conditions, where groundwater generally represents a single stream moving from the mountains to the Kashkadarya valley towards the Bukhara-Karshi steppes.

Engineering and geological studies in the Kashkadarya basin in the 1950s and early 1960s were mainly associated with the activities of the “Sredaziprovod-khlopok”, “Uzgiprovodkhoz”, “Uz-davlat proyezd and Uzgiti research institutes”. The employees studied the general geological, hydrogeological and engineering-geological conditions of reservoirs, dams, water intakes and canal routes, as well as areas where construction of structures is possible. G.A. Mavlonov studied the southern and central parts of Central Asia, and, in his opinion, loess-like

genetic types are present in the composition of the loess cover of the region. On the maps of the Karshi oasis, he showed the proluvial and proluvial-deluvial loess and loess-like siltstones of the Tashkent complex ( $Q_2^{\text{th}}$ ) and provided information on the alluvial-proluvial loess-like rocks of the Syrdarya complex ( $Q_3^{\text{gl}}$ ), their thickness, and sedimentation characteristics.

Based on the results of the work carried out in 1962, G.F. Tetyukhin and other workers studied the Quaternary deposits of the plain and foothill basins of the Zarafshan and Kashkadarya rivers. Although the research did not completely cover the entire region, they fully studied the geological structure of the plain part of the Kashkadarya basin, its Quaternary deposits and geomorphology.

1960-1962 - A.I. Witte reports and summarizes a series of engineering geological surveys conducted by A.I. Witte on irrigation and civil construction facilities (canals, collector network, etc.) in the middle and lower reaches of the Kashkadarya. In the reports, A.I. Witte provides information about the Quaternary period and describes in detail the groundwater, as well as the possibilities of using it for irrigation.

In 1964, a geological map compiled by V.E. Melnik was published, which clarified the understanding of the Neogene and Quaternary sediments in the central part of the Karshi steppe. M. Malikov conducted hydrogeological studies of the Kashkadarya to the east of the railway bridge within the current Kashkadarya valley and gave the contours of the distribution of new groundwater lenses. According to calculations, the reserves of the "A+B" category are 8640 m<sup>3</sup> per day or 100 l/s. M. Malikov's studies show that the newly identified groundwater lens is of low capacity and does not have large reserves. The identified reserves satisfy only 10% of the total water needs of the city of Karshi.

Since 1964, the Chim Hydrogeological Organization has been conducting studies in the middle reaches of the Kashkadarya to determine the possibility of providing the city with water.

By 1967, this organization had solved the problem. E.V. Mavlonov, K. Pulatov, I. Usmanov, B. Burkhonov and Yu. Irgashev conducted engineering and geological research in the southeastern regions of the Karshi steppe in 1961-1967, in its central parts. For the first time in this area, they studied in detail the stratigraphic interaction of Quaternary sediments. The characteristics of these sediments were assessed in terms of their age and genetic characteristics.

1964-1968 included the work of V.P. Semyonov, S. Pinhusovich, Y.F. Dolzhenko and other researchers, who conducted hydrogeological and engineering geological research in the northeastern part of the Karshi steppe. They compiled a hydrogeological and schematic engineering geological map of the area. Similar work continued in 1967-1970.

It should be noted that the main hydrogeological and engineering geological studies in 1961-1974 were carried out by the Karshi hydrogeological expedition led by M. I. Ismoilov (1961-1964) and M. B. Abubakirov (1964-1974).

However, all the geological, hydrogeological and engineering-geological studies conducted were partly based on data from geological funds and literature and did not sufficiently cover the design task of the development area. In general, special work devoted to a detailed study of the engineering geological conditions of the Kashkadarya oasis has not been fully implemented. From the above review of the study of the Kashkadarya oasis, it can be seen that the composition and properties of the Quaternary sediments were studied by different organizations for different purposes, by different methods for the corresponding areas of individual areas. This monograph presents the central part of the Kashkadarya oasis based on an analysis of engineering geological conditions and the processing of extensive research materials.

### **Conclusion**

After analyzing the above studies, the following conclusions were drawn:

1. The geological structure of the area under consideration is dominated by rocks of Paleozoic and Mesozoic ages.
2. Quaternary deposits are widespread and are represented by almost all genetic types, including anthropogenic accumulations.
3. Loess and loess-like rocks predominate among Quaternary deposits in terms of area and thickness.

### **References:**

1. Isomatov Yu.P. Engineering and geological conditions of the Karshi desert. Monograph. T. Firdavs-Shokh publishing house 2025
2. Zurnadzi V.A., Ananov V.P., Gilman Ya.D., Dezhin Yu.V. Osnovaniya i fundamenti na lessovix prosadochnix gruntax. Izd. True. flour, 1988
3. Isamatov Yu.P., Mavlyanov GA, Pulatov K., Irgashev Yu. The formation of various genetic and ancient types of lysos-cold-born Karshinskoy steppe. Uzb, geological journal, No. 6, T. 1971
4. Isamatov Yu.P., Pulatov K., Abubakirov MB, Irgashev Yu. Zasolennost lyossovikh porod Karshinskoy steppe, Uzb.geol.journal #3, Tashkent, 1972.

5. Isomatov Yu.P., Islalov A.I., Pulatov K. Analiz dannix granulometricheskogo sostava zlichnih tipov porod Karshinskoy stepi methodom matematicheskoy statistiki. Sat. "Voprosi regionalnoy inj.-geol.". Izd., Tashkent, 1974.

6. Irgashev Yu.I., Isomatov Yu.P., Mustafaev B.N. Pulatov K.K. Modern engineering-geological processes and phenomena in Kashkadarya and Surkhandarya depresses IJARS ET (International Journal of Addvaced Ressearch in Science, Engineering and Technology) 1 – son yanvar 2020-yil

7. Irgashev Yu.I. Isomatov Yu.P., Axmedov M.K. Underground waters of Kashkadarya and surkhandarya oil and gas-bearing artesian pools "International Engineering Journal for Research Development" www.iejrd.com, Vol. 5, Issue 5, June 2020. Pp. 1-5. <https://doi.org/10.17605/OSF.IO/NH5RC>

8. Irgashev Yu.I. Isomatov Yu.P., Axmedov M.K. Influence of technogenic impact on changes in engineering-geological and hydrogeological conditions of the Kashkadarya depress and its assessment. Academicia: An International Multidisciplinary Research Journal <https://saarj.com> Vol 10, Issue 10, October 2020. Page 409-416 Article <https://doi.org/10.5958/2249-7137.2020.01116.7>

9. Isomatov Yu.P., Axmedov M.K. Study of properties indicators loess soils of Kashkadarya by method of mathematical statistics. Arxitektura, muhandislik va zamonaviy Texnologiya-lar jurnali ISSN:218-3469 Jild:02 Nashr:11.2023-yil 18-21 bet.

10. Isomatov Yu.P., Akhmedov M.K. On the formation of spatial variability of the composition and properties of Kashkadarya loess and loess-like rocks in their formation. International journal of scientific researchers Volume12, issue1, June2025 <https://worldlyjournals.com/index.php/IJSR/article/view/12819>