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Hydrogeological Regime of the Bukhara Oasis

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Abstract: *Information about the formation of the Bukhara oasis, its hydrogeological regime, climate, soils is given. In this state, the author discloses information about the hydrogeological regime of the origin of the Bukhara oasis, the soil climate. Its hydrological regime is the birth of the Bukhara oasis, the soil provides information about the climate.*

Keywords: Bukhara oasis, Zarafshan river, desert, climate, soil, salinity, canal.

Introduction. Ancient manuscripts and monuments of history and culture development of the agricultural culture of South-West Asia in the valleys and oases of Central Asia, including the Bukhara oasis. According to V.G. Saakov, in the lower reaches of the Maosif (Zarafshan) River at the end of the 2nd - beginning of the 1st centuries. BC. due to the construction of irrigation facilities, new lands were developed. As a result of these works, the Bukhara oasis was formed, from where a beautiful view opens.

According to the famous historian Muhammad Narshakhi, the main reason that the Bukhara oasis has become such a fertile land is the fact that the Maosif (Zarafshan) river originates in high mountains and contains many muddy streams. Academician Gulyamov (1974), as a result of archaeological research, scientifically substantiated the fact that the city of Bukhara is located in the middle reaches of the Shokhrud channel, which was formed in the middle of the first millennium BC.

Despite the fact that the irrigated lands of the Bukhara oasis have been used for agriculture for centuries, the problem of changes in the physicochemical and mineralogical composition of soils under the influence of the Shokhrud, Vobkentdarya and Shafirkan canals is one of the least studied areas. The irrigated lands of the Bukhara oasis are located in the desert and occupy the central part of the Kyzyl Kum. Due to its distance from the ocean and the open sea for thousands of kilometers, Bukhara is one of the typical arid countries.

Material and method. Bukhara region is one of the countries included in the inner basin and is located on the border of the transition from a temperate climate to a subtropical one. This geographical position of the region has a significant impact on the climate. That is, the regional atmosphere in the summer is formed under the influence dry tropical air, and in winter - under the influence of cool air coming from the north, temperate latitudes.

The average annual air temperature is 150C. The hottest month - July - 28.6 ° C - 32.6 ° C, and the coldest month - January - 0.4-1.5 ° C. In sandy and rocky deserts on some summer days, the temperature rises to 66-74 ° C .

Annual precipitation is 125.5 mm, falling mainly in winter and spring. High temperature and dry air lead to strong evaporation. Evaporation from the water surface is 2057 mm per year. The bulk of moisture is observed during the growing season (until September), which corresponds to 1648 mm. During this period, it is very important to maintain soil moisture. Because during the growing season, the total temperature is 4500-5600oC.

Differences are observed when comparing air temperature with soil surface temperature. If the surface temperature of the soil is higher than the air temperature for 10 months (in the Bukhara oasis), then in the remaining two months (November and December) it will decrease. However, in the Karakul oasis, the soil surface temperature is high all year round.

The beginning of freezing of the soil surface occurs on average in November. The last frost is in April.

A small difference in vibration between the soil surface and air temperature occurs in December at 0.20 C, and a large difference is observed in July at 70 ° C. In autumn and winter, the difference between the soil surface and air temperature is small. The drop in soil surface temperature per night reaches 20-250 C.

As a result of observations, it was found that the climate of the Bukhara oasis is adapted for the care of irrigated crops, but has some drawbacks. A small amount of precipitation and nighttime temperature fluctuations lead to salinization of the surface soil layer and the occurrence of waterlogging processes. These processes, in turn, interfere with the normal development of crops.

In the 50-60s of the last century, due to the complexity of irrigation of the lands of the Bukhara oasis by the Zarafshan River, the construction of the Amu-Bukhara machine channel (ABMK) began in 1959.

Its length is 197 km, the flow rate is 100 m3 / sec. Up to 50 km. In other words, the ABMK flows to the Dengizkul plateau. Then, with the help of the Khamza-1 pumping station, the water of the canal rises by 45 m and is collected in the Tudakol and Kuyimazor reservoirs through the Kumsultan lowland, located in the western part of the Saritosh Dzhargok plateau.

The Kuyimazar reservoir was built in 1957, the basin area is 16.3 km2, the depth is 18-44 m. The Tudakol reservoir is located in the southeast of the Kuyimazor reservoir and occupies an erosion-tectonic depth with a total water area of 1250 million m3 and an annual evaporation rate of 400 million m3. It contains up to 40 million m3 of salts, of which 20 million tons of rapidly dissolving chloride compounds.

Discussion. Currently, the Shokhrud canal starts from the Kuimazor reservoir, the distribution of water in it, turbidity, the mechanical and micro-aggregate composition of suspended watercourses, the amount of chemical compounds are directly related to the Amu Darya current. The average annual consumption of ABMK is currently 69.5-135.8 m3 / s, and in the summer months - 308.6 m3 / s. and 80% of irrigated water in Bukhara region.

An increase in turbidity in the lower reaches of the Shokhrud canal up to 3.27 g / l can be associated with an increase in construction work in Bukhara and the discharge of various secondary substances, compounds, sediments and debris into the canal. Thus, 16-22% of silt in the water will settle from the upper reaches of the Shokhrud canal to the lower reaches. In addition, the level of turbidity in the upper, middle and lower reaches of the Shokhrud canal is decreasing as a result of a gradual decrease in the flow rate from the canal to irrigated fields and fields. Examples include the New Bukhara basin in the middle reaches of the Shokhrud channel and the Gulistan basin. In the basin of New Bukhara, the turbidity of water is 2.92 g / l, in the Gulistan basin, its content decreases to 0.72 g / l, or the level of turbidity decreases by almost 4 times. Similar changes are observed in other branches and tributaries of the Shokhrud channel.

Conclusion. The hydrogeological regime of the irrigated lands of the Bukhara oasis can be divided into two parts in terms of character and structure. The flow of groundwater in the upper reaches of the delta of the Zarafshan River, a semi-arid hydrogeological region, is more difficult, in the rest of the delta, the flow of groundwater is more difficult.

Sources of balance of groundwater inflow: 1) precipitation; 2) groundwater flowing through gravel from the nearby proluvial-diluvial uplands and the Zarafshan valley; 3) groundwater close to the surface. This is the sum of the waters formed as a result of infiltration under the influence of irrigation in Zarafshan.

The first source is a small amount of precipitation, which is practically insignificant for the formation of groundwater.

The role of the second source is much greater. This is due to the fact that groundwater comes out of gravel in the lower part of the Zarafshan Valley, which increases the area of groundwater at a depth of 2-4 meters.

According to the Regional Department of Agriculture and Water Resources, 50% of the water irrigated from the surface soil layers is wasted through filtration and evaporation. Groundwater discharge balance routes: 1) runoff from the oasis territory through the collector-drainage; 2) is consumed during evaporation and transpiration.

Alluvial and agro-irrigation deposits serve as suitable groundwater rocks. The formation, accumulation and drainage of groundwater in irrigated areas, their proximity to the surface leads to the development of salinization and salinization of soils as a result of excessively slow water discharge, large-scale evaporation. As the groundwater approaches the upper soil layers, the level of mineralization increases and the runoff decreases. For the reasons indicated above, the presence of highly saline and saline areas was found on the southern and southeastern sides of the area studied by us.

Despite the fact that the irrigated lands of the Bukhara oasis have been used for agriculture for centuries, the problem of changes in the physicochemical and mineralogical composition of soils under the influence of the Shokhrud, Vobkentdarya and Shafirkan canals is one of the least studied areas. By further focusing on these areas, the problems will be solved.

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