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PROBLEMS OF IMPROVING THE RECLAMATION STATE OF IRRIGATED LAND DURING THE OPERATION OF OPEN COLLECTORS OF THE SYRDARYA REGION

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Annotatsiya: Maqolada Sirdaryo viloyati kollektor-zovur tarmog'i va uning bugungi holati, shuningdek, Sho'ro'zak ochiq kollektorining sug'oriladigan yerlarning meliorativ holatiga ta'siri haqida qisqacha ma'lumot berilgan. Maqolada ochiq kollektorning qurilishi va undan foydalanish bo'yicha tahlil materiallari keltirilgan. Ishning maqsadi Sho'ro'zak kollektori yaqinidagi vaziyatni yaxshilashga qaratilgan bo'lib, yer osti suvlari sathini pasaytirishga, shuningdek texnik jihatdan zamonaviy gidromeliorativ tizimlarini yaratishga imkon beradi.

Kalit so'zlar: Kollektor, tahlil materiallari, ta'mirlash-tiklash ishlari, Sho'ro'zak, namuna olish, tajriba maydonlarini tashkil qilish.

Аннотация: В статье приводится краткая информация коллекторно-дренажной сети Сырдарьинской области и ее состояние на сегодняшний день, а также влияние открытого коллектора Шурузяк на мелиоративное состояние орошаемых земель. Статья содержит материалы анализа строительства и эксплуатации открытого коллектора. Цель данной работы направлена на улучшение обстановки окрестности коллектора Шурузяк, позволяющее понижение уровня грунтовых вод, а также создать гидромелиоративные системы технически современного уровня.

Ключевые слова: Коллектор, материалы анализов, ремонтно-восстановительные работы, Шурузяк, отбор проб, организация опытных участков.

Abstract: The article provides brief information on the collector-drainage network of the Syrdarya region and its state today, as well as the impact of the open collector Shuruzyak on the reclamation state of irrigated lands. The article contains materials for the analysis of the construction and operation of the open collector. The purpose of this work is aimed at improving the situation in the vicinity of the Shuruzyak collector, which allows lowering the groundwater level, as well as creating technically modern irrigation and drainage systems.

Key words: collector, analysis materials, repair and restoration work, Shuruzyak, sampling, organization of experimental sites.

Introduction. The specificity of the hydrodynamic and hydrochemical regime requires a local approach to the placement of drainage systems. In small areas, closed water circulation systems are created to regulate the volume and quality of drainage water used for irrigation or for other needs [1].

In the world, the development of obtaining high yields of agricultural crops in various climatic conditions is of particular importance, taking into account the land

reclamation state, the level of groundwater and their mineralization, as well as conducting targeted research works aimed at developing methods to improve the reliability of the collector operation [2]. In this regard, one of the most important tasks is to improve the methods of increasing the stability of collector slopes.

The research objectives are to develop an integrated approach to operation and planning of repair and restoration work on collector and drainage systems, taking into account the mandatory implementation of alternative measures, not opposing them to each other, but finding their rational combination.

Material And Methods. The Shuruzyak collector was built in 1912-1915. The collector depth was shallow - 1.5-2.0 m. As new lands were developed, the collector was reconstructed several times. According to the survey in 1926, its depth was 1.5-4.0 m. In 1957, after another reconstruction, the average collector depth reached 4.5 m, in the upper part 2.0-3.5 m, in the lower - 5-8 m. In 1970, its depth was brought to 2.5 - 9.0 m. The total length of the CDS was 1,033.9 km [3].

Deepening of collectors and drains was carried out gradually. It was not possible to carry out the reconstruction with deepening immediately to the required depths due to the fact that the soils of the upper cover fine earth on the Shuruzyak massif are close to quicksand soils in their water-physical properties. When the pressure gradient of a certain value is exceeded, the slopes of collectors and drains begin to float, causing deformation and flooding of the channel. In this regard, the channel of the Shuruzyak collector was deepened by approximately 1.0 m during the next reconstruction. Then the entire collector-drainage network was buried. As a result, groundwater levels dropped - conditions were created for the next reconstruction.

By the mid-1960s, the construction of the collector-drainage network according to the estimated length was almost completed. However, reaching the design depth of the collectors and drains in the difficult hydrogeological conditions of the old irrigation zone of the Hungry Steppe with pressurized groundwater in the underlying layers and the instability of slopes turned out to be very difficult, and in some places it was practically impossible. It became necessary to find other ways to solve the problem of combating secondary land salinization.

Results And Discussion. The Shuruzyak collector, 65,17 km long, has construction parameters designed to pass the design flow rate of 38,0 m^3/s. It was accepted into permanent operation in 1912 and recently it does not allow flow rates exceeding 10 m^3/s [4].

The collector is a water intake for the main collectors of the Gulistan region Kuibotgan, VSh-X, VSh-5, VSh-9, VSh-11, VSh-11a, from the side of the Saykhunabad region Ovrazhny, Kendik, Syrdarya region of the Eastern VZhD, VSh-25, VSh-19, VSh-30, VSh-34, Malek, Chegara, VOV, Sharkiy.

The gross drained area is more than 27,54 thousand hectares. The collector is designed to pass a maximum flow rate of 38,0 m^3/s, has a cross-section along the bottom b=3,0-4,0 m, h=5,0-9,0 m, bottom slope i=0,00009-0,00012, current velocity V=0,9-1,2 m/s, roughness n=0,033, and slope placement before the berm m=2,0, and above the berm m=1,5. Throughout the collector H_{buil}=5,0 m.

The depth of the groundwater, depending on the relief marks, ranges from 0 to 3,5 m. The groundwater level from the beginning of the year to April, due to the infiltration of atmospheric precipitation, rises by 0,5-1,0 m, reaching a maximum value, then until November it decreases to the initial level.

The zone of influence of the collector covers the irrigated lands of the Shuruzyaksky depression with an area of 27,54 thousand hectares, mainly occupied by cotton, grain and rice. Also, along the collector there are a large number of fish farms [5].

Fig. 1. Scheme of the main collector Shuruzyak.

The Shuruzyak collector ensures the drainage of a part of the collector-drainage runoff from the "old" irrigation zone of the Hungry Steppe, where the open horizontal drainage, built in the 50s, does not give the required effect today.

The reasons are:

- swelling of the slopes of open drains and collectors due to the layered structure of loamy and fine quicksand sands of the soil profile;
- in this zone there is a significant underground inflow from the Chirchik-Angren basin under the bed of the Syrdarya river, which determines sub-confined waters in the territory of the Bayaut, Shuruzyak, Sardoba depressions;
- irrigation canals of various levels in the earthen bed have a slightly low efficiency, which causes a large load on drainage;
- vertical drainage well systems built in the 60-70s gave an effect, but now their statute of limitations has expired, the flow rates of wells built with metal casing pipes have low efficiency due to a drop in flow rate and a lack of submersible pumps for operation;

- in view of the unsatisfactory condition, manifested in the form of germination by vegetation (reeds, etc.) of the coastline and the bottom of the collector, a decrease in the transporting speed of water in the collector is observed, causing an accelerated process of siltation and backwater;

- areas with hydraulic structures and structures that do not meet modern standards and operational requirements (pillars, bridge piles, etc.), creating an artificial backwater, leading to an increase in the normal water level in the collector;

- silting of supply channels to pumping stations that take water from the Shuruzyak collector. For water intake by pumping stations, the channel of the collector is partially blocked by non-engineering structures named "tugan";

- the water level of the collector in the end part for the period of floods (early spring, February-April) is lower than the water level of the middle course of the Syrdarya river, in view of this, there is also a backwater, leading to negative consequences for the adjacent territory;

- outbuildings that do not meet the requirements - Provisions "On water protection zones of reservoirs and other reservoirs, rivers, main canals and collectors, as well as sources of drinking and domestic water supply, medical and cultural and recreational purposes in the Republic of Uzbekistan" № 174 dated April 7, 1992 and the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan "On approval of the regulation on the procedure for establishing water protection zones and zones of sanitary protection of water bodies in the territory of the Republic of Uzbekistan" № 981 dated December 11, 2019;

- the lack of access for maintenance services to the mouth of the existing reservoir is due to waterlogging and dense vegetation growth due to the close proximity of the old reservoir channel.

A radical direction for improving the situation is the reorganization of irrigation and drainage systems, which allows to sharply reduce the specific water intake for irrigation and lower the groundwater level, as well as to create technically modern irrigation and drainage systems.

Conclusions. As a result of many years of research, the following conclusions were made:

1. The constructed collector and drainage network gave a positive effect on desalinization of soil and ground and desalination of groundwater. However, there was no global desalinization of lands.

2. For further desalinization of lands, it is necessary to remove the pressure of groundwater. Horizontal drainage can only slightly weaken the pressure of groundwater, but cannot completely remove it. The pressure of groundwater enhances the sinking of the slopes of open collectors and drains.

3. The final solution to the problem can be achieved when vertical and horizontal drains work together. Vertical drainage should completely remove the groundwater pressure, and horizontal drainage should ensure a decrease in groundwater levels.

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