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Procedure For Use of Groundwater for Irrigation of Agricultural Crops

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Abstract: Systematic use of surface and underground water along with surface water is one of the important resources for increasing the production of agricultural products, obtaining a high yield and dramatically improving the melioration of irrigated lands.

Keywords: underground water, surface water, change of soil melioration status, types of crops.

As a result of population growth and rapid economic development in our republic, the demand for water resources and agricultural products is increasing year by year.

The limitation of land and water resources and the shortage of water resources, in turn, require the rational and economical use of available water resources and the improvement of land reclamation and productivity by improving the productivity of crops.

Further improvement of the system of underground water use and well drilling in the republic, strengthening of state and public control over the protection of underground water resources, widespread promotion of the culture of rational use of water among the population, prevention of their reduction in quantity and pollution, as well as long-term protection of the population In order to provide high-quality drinking water in the future, the decision of the President of the Republic of Uzbekistan No. 439 of December 7, 2022 "On additional measures to protect underground water resources and regulate their rational use" was adopted.

Irrigation development in the republic is in two directions: in the zone of regular irrigation (agriculture) for the cultivation of technical crops and food products, and irrigation of the oasis in the pasture zone is used to create a solid fodder base for the development of livestock.

According to the results of the study of the regional underground water reserves of the republic for irrigation (as an internal reserve), it is possible to recommend the full satisfaction of the rest of their economic-drinking and partially technical water supply needs, taking into account their development prospects. It should be remembered that groundwater can be considered as a local and additional source of water. In the first case, the use of groundwater increases the water supply of a given local area, regardless of the possible reduction of surface water flow during exploitation. In the second case, that is, when the use of groundwater should lead to an increase in general irrigation water resources, the recommended part of their reserves is determined taking into account the reduction of surface flow.

When determining the amount of groundwater required for use as an additional source of irrigation water, the following conditions should be taken into account. Groundwater, used for large-scale domestic drinking and technical water supply, is available almost everywhere in the area affected by water flows. Accordingly, up to 90% of the groundwater reserves used (for water supply) are formed at the expense of surface waters or their extraction reduces the underground supply of the latter.

Taking into account the above observations and the laws of formation, placement and use of underground water reserves in the irrigated agricultural areas of the republic, it will not be difficult to be sure of the prospects of many oases of water obtained from underground water as a source of local and additional irrigation. Except for the oases of Khorezm, Karakalpakstan, Karshi and Karakol, where groundwater suitable for irrigation is limited and aquifers are characterized by low productivity, and therefore irrigation is not of great interest.

However, not all oases have groundwater reserves that can be recommended as an additional source of irrigation water. Prospective areas where the use of groundwater will lead to an increase in total irrigation water resources are the valley of the Chirchik River, the Dalvarzin desert, the northeastern part of the

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Holodnaya Steppe, the Fergana and Zarafshan depressions, and the northeastern part of the Bukhara oasis. The increase of irrigation water due to the use of underground water in the regions of the irrigated zone of Uzbekistan is about 5000 million per year. m3/year, which is enough to irrigate up to 0.6 million hectares of land. In the rest of the irrigated oases of the republic (Kitob-Shahrisabz, Surkhondarya, etc.), groundwater can be used as a local (but not additional) source of water to compensate for the lack of irrigation water in low-water years. Despite the existence of such opportunities for the selection of groundwater for irrigation, their development lags behind today's requirements. Thus, in 1964, 400 mln. Up to m3/year, 1 year or less than 10% of the possible amount of this reserve was supplied by extracting groundwater from more than 1000 wells for irrigation.

The general scheme of comprehensive use and protection of water resources of Uzbekistan (1965) except for the availability of underground water for irrigation is only 284 million per year. It envisages selection in the amount of m3/year, of which 158 m3/year in Syrdarya region and 126 million m3/year in Fergana region. m3/year of water was obtained (Gangart, 1967).

Large dynamic reserves of underground water, which may be necessary for irrigation in the irrigation zone of Uzbekistan, are mainly formed in river valleys and depressions of the Quaternary intermountain range. At the same time, surface and underground waters are closely related to each other: the main reserves of groundwater flows in question are formed due to filtration losses from surface flow, which in turn are replenished during the gradual erosion and drainage of groundwater (under certain conditions). It follows that the intensive use of groundwater is accompanied by the redistribution of not only the underground flow, but also the surface flow. In particular, the withdrawal of large volumes of water from underground streams in many cases leads to a decrease in the consumption of surface water streams due to a decrease in the underground supply and, possibly, additional losses from them. In some cases, during the use of groundwater, the nutritional conditions of the plant root system may change (deteriorate) due to shallow fresh and slightly mineralized groundwater (subirrigation conditions).

These rules prevent the development of groundwater irrigation in the irrigation zone of the republic. Nevertheless, we believe that under these conditions, the use of groundwater for irrigation can be recommended as an event of great economic importance. At the same time, we are based on the following rules:

a) reduction of surface runoff is always less than the amount of groundwater withdrawal, because in many places significant evaporation losses are excluded from the cost part of the groundwater balance;

b) with intensive extraction of underground water, the efficiency of the useful work coefficient of irrigation systems increases sharply;

v) the use of underground water opens wide opportunities for seasonal and long-term regulation of water supply of irrigation systems without building surface water reservoirs, which require a lot of money, because underground water reservoirs are large-scale accumulations of underground water;

d) plays the role of vertical drainage in the intensive use of underground water in areas that need soil reclamation. As a result, the multi-year costs for the construction and operation of the collector and drainage network, as well as for the washing of saline soils, are reduced;

e) the use of groundwater for irrigation helps to protect against the deterioration of surface water quality due to the inflow of inefficient and drainage waste through the collector-drainage network.

The discharge of these waters into rivers (especially the Fergana Valley, the vicinity of the Tashkent region, Golonaya Steppe, etc.) due to heavy pollution with pesticides, organic and mineral fertilizers almost all lead to pollution and mineralization of surface runoff. Maximizing the use of groundwater in irrigation minimizes the runoff of excess contaminated water and greatly facilitates the maintenance of sanitary conditions of surface watercourses.

It is possible to successfully develop agricultural holdings irrigated on the basis of local underground water reserves in the described area. Taking them as the main source of irrigation water simultaneously solves the reclamation task, and then there is no need to build and maintain the collector-drainage network, and as a result, there is no need to drain water through it, which leads to pollution of the river flow. When using groundwater, the consumption of surface water is also reduced, but by a much smaller amount than in irrigation with these waters alone, because in this case, a large amount of water, which is consumed useless in evaporation, participates in the cycle.

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Irrigation development in the republic occurs only through the construction of surface water reservoirs, which require large investments, to regulate the surface water flow of rivers, increase ineffective water losses due to long construction periods, evaporation and flooding of large land masses. At the same time, groundwater, which can be obtained with relatively small investments and pays for itself in a short time, is also neglected. The collected hydrogeological material confirms the possibility of replacing a part of the surface water reservoirs for irrigation with underground water reservoirs while carrying out a small amount of work on the regulation of water supply.

Based on the above, it can be concluded that in the conditions of Uzbekistan, one of the important resources for increasing the production of agricultural products, obtaining a high yield and dramatically improving the meliorization of irrigated lands is the complex systematic use of surface and underground water along with surface water.

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