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Improving the efficiency of reclamation activities in the Khorezm region

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Abstract: The article provides data on the existing state of irrigation canals, reclamation indicators of irrigated lands in the Khorezm region, as well as their technical condition, factors affecting them and measures to improve the efficiency of reclamation measures.

Keywords: Irrigation, irrigated area, irrigation canal, meliorative measures, saline lands.

The Khorezm region is located in the lower reaches of the Amu Darya River, and therefore experiences a periodic shortage of water resources.

The main source of irrigation is the Amu Darya River. The level of salinity of groundwater in the old irrigated areas of the region ranges from 1.0 - 3.0 g/l to 3.0 - 5.0 g/l. Chemicals contain sodium sulfate and sometimes sodium chloride. In newly opened irrigated areas, the salinity of groundwater reaches 5.0-10.0 g/l. The chemical composition is sulfate and chloride-sulfate.

The salinity of groundwater increases in relation to the consumption of irrigation sources, that is, it increases from the Amu Darya to the southwest. In the lower part of the groundwater layer, salinity is high, and in the upper part of the soil it changes from fresh to acidic depending on the irrigation conditions.

The area of irrigated land is 265773 hectares, of which 23.4 thousand hectares

went out of agricultural use due to the failure of the irrigation network, high levels of groundwater and severe salinization of the land.

Lands that have been abandoned from agricultural production are scattered throughout almost the entire territory of the region. The contour areas are small and range from 1-3 hectares to 5-10 hectares. The total number of contours (sites), retired from agricultural production is 9302 pcs.

The main source of irrigation is the Amu Darya River. The need for irrigation water with the existing composition of agricultural crops (with an efficiency of irrigation systems of 0.56) is 5465.7 million m³/year.

As of today, the total length of inter-farm canals is -2562.3 km, of the on-farm irrigation network - 14194.7 km, of which the following are in unsatisfactory technical condition:

- inter-farm canals - 637.1 km or 25%;
- on-farm irrigation networks - 6948.2 km or 48.9%.

According to expert assessment of specialists in the field, the efficiency of irrigation systems in the Khorezm region is: 0.56. Due to the constant failure of trough channels and channels in the concrete lining, filtration losses increase with unacceptable intensity.

The total length of collectors and collector-drainage network in the Khorezm region is 10473.45 km.

The following are in unsatisfactory technical condition:

- off-farm collectors - 1411.0 km (38.0%)
- open collector and drainage network - 1624.6 km (26.0%)
- closed horizontal drainage - 455.8 km (28.0%)

The total specific length of off-farm collectors and a collector-drainage network as a whole in the region: including by districts: - 40.0 m/ha.

The volume of the annual drainage runoff varies from 1559.2 to 3199.7 million m³, or as a percentage of the water intake 45-60%.

When analyzing the ratios of the salinity of irrigation water, groundwater and collector discharges, it turns out that in collector drains, surface water is from 45 to 60%, which is unacceptable. In this case, the channels of collectors and drains are deformed (with unorganized discharges of water into them from irrigated areas); there is a rise in water levels in the collectors, which makes it difficult for the free outflow of drainage water; the drainage capacity of drains decreases.

On the other hand, in conditions of a shortage of water resources, such an attitude towards irrigation water is all the more unacceptable. The dynamics of the ameliorative state of irrigated lands is characterized by the following indicators table No. 1.

From the given data it follows:

- the area of land in an unsatisfactory reclamation state decreased from 29.650 to 19.785 thousand hectares, i.e. 0.67 times;
- the area with high GWL decreased from 5.92 thousand hectares to 1.742 thousand hectares;
- the area of saline lands increased from 3.010 to 4.687 thousand hectares.

Table 1. Dynamics of the reclamation state of irrigated lands in the Khorem region (thousand hectares).

Years	Total area of irrigated land	Including as		
		Good	Satisfactory	Unsatisfactory
2001	275.270	-	246.298	29.650
2006	277.357	-	250.736	28.605
2011	266.111	-	239.397	26.786
2015	266.249	-	245.434	20.815
2019	265.773	-	246.002	19.785

The dynamics of land salinization are shown in Table 2.

Table 2. Saline lands of the Khorezm region (thousand hectares).

Years	Total observed area, thousand ha	Including the degree of salinity		
		Slightly salted	Medium salted	Highly salted
2017	265,278	125,07	80,66	33,25
2018	263,756	127,19	79,92	31,87
2019	265,773	127,79	78,75	30,44

From the above indicators it follows:

- the area of lands with medium salinity decreased from 80.66 to 78.75 thousand hectares;
- according to HGME data, the area of highly saline lands decreased from 33.25 thousand hectares to 30.44 thousand hectares. However, at the same time, out of 24.3 thousand hectares that left the agricultural turnover, 5.075 thousand hectares came out due to strong salinity. Consequently, areas of high salinity require radical improvement measures.

One of the main reasons for the unsatisfactory state of irrigated lands in terms of salinity, and, accordingly, low productivity is the unsatisfactory situation with leaching irrigation.

Out of 263.6 thousand hectares of irrigated land, leaching irrigation is planned (2019) on an area of 134,232 hectares (25% of the total area).

The main reasons for the unsatisfactory state of irrigated land are:

- the existing irrigation regimes applied in practice and the hydromodular zoning of agricultural crops require revision in connection with changes in the composition and location of grown crops in recent years, including changes in the unit of water use;
- applied surface irrigation with high irrigation rates as well as non-observance of the optimal elements of equipment and irrigation technology, which contributes to a critical rise in the level of groundwater;
- incomplete application of water-saving irrigation technologies;
- 25% or 637.1 km of inter-farm canals are in unsatisfactory technical condition; 48.9% or 1252.9 km of the on-farm irrigation network require repairs, reconstruction and restoration;
- 38.0% or 1411.0 km of inter-farm collectors, 26.0% or 1624.6 km of open collector-drainage network and 28.0% or 455.8 km of closed horizontal drainage are in unsatisfactory technical

condition. Off-farm collectors are cleaned 1 time in 5-6 years, and on-farm collector-drainage network 1 time in 3-4 years.;

- existing washing norms and terms (schedules) require revision;

- Unacceptably large and unorganized discharge of irrigation water into collectors and drains.

To improve the reclamation state of the irrigated lands of the Khorezm region, it is necessary to carry out the following measures in the following areas:

1. Reconstruction and repair of inter-farm irrigation canals.

2. Reconstruction and restoration of the on-farm irrigation network.

3. Repair and restoration work and reconstruction of inter-farm collectors and collector-drainage network.

4. Repair and restoration of closed horizontal drainage

5. In connection with the change in the composition of the distribution, as well as the unit of water use of crops, it is necessary to revise and develop scientifically grounded irrigation regimes and hydro-modular areas of agricultural crops.

6. To adapt the mode of operation of irrigation systems with the applied water-saving irrigation technologies.

7. Rehabilitation of land plots left from agricultural production.

8. Development and strict adherence to the terms and volumes of washing norms.

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