Dynamics of Use of Water Resources of Khorezm Region

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ABSTRACT

In the article, water resources, which are important for agriculture, especially in the current conditions, are becoming scarce, and regional problems in their use are considered on the example of Khorezm region. Gradual changes of water resources used for agriculture in the region are described based on the data of the left bank Amudarya Irrigation Systems Basin Administration of the Ministry of Water Management of the Republic of Uzbekistan. Changes in the amount of water used for the irrigated lands of the region in 2010-2021, periodic differences in water supply and its territorial characteristics were scientifically analyzed. In the conclusion, some suggestions and recommendations are given for solving problems related to water resources in the region.

Keywords: water resources, Khorezm region, irrigated lands, salt washing, dynamics, fisheries, gradual changes, index, Khiva district, water use, regional differences

Introduction

Water resources are one of the natural factors that have a great impact on the socio-economic development and food security of countries with an arid climate. Due to the rapid increase of the population and, at the same time, the global warming of the climate, there are serious risks related to water shortage in many countries. This situation, in turn, affects the land resource use system to a certain extent. According to the Food and Agriculture Committee (FAO) of the United Nations, 6-7 mln. more than one hectare of arable land is being abandoned as a result of degradation [6]. This is especially important in the wise use of water resources in countries with arid climate.

Khorezm region, located in the western part of our country, is one of the main regions with a shortage of water resources. However, the population density is very high here, and their main economic activity is agriculture. The region borders the Republic of Karakalpakstan to the north and northwest, the Bukhara region to the south, and the Republic of Turkmenistan to the west and southwest. The main part of its territory is located on the left bank of Amudarya. However, this river played a major role in the fate of Khorezm, which has a rich history and culture. As important as the Nile River was for ancient Egypt, the Amu Darya (Oks) was as important for the Khorezm region [3].

The province is located in the lower part of the Amudarya and has an unfavorable geographical location. The policy of cotton single administration, which began in the 1960s, began to have an impact on this region. Especially during the last 20 years, the water shortage is increasing significantly. As a result of this, a number of changes are taking place in the agricultural specialization of the region. As a result of the observations, a number of changes can be observed in the dynamics of water resources supply of the region.

Purpose and tasks of work

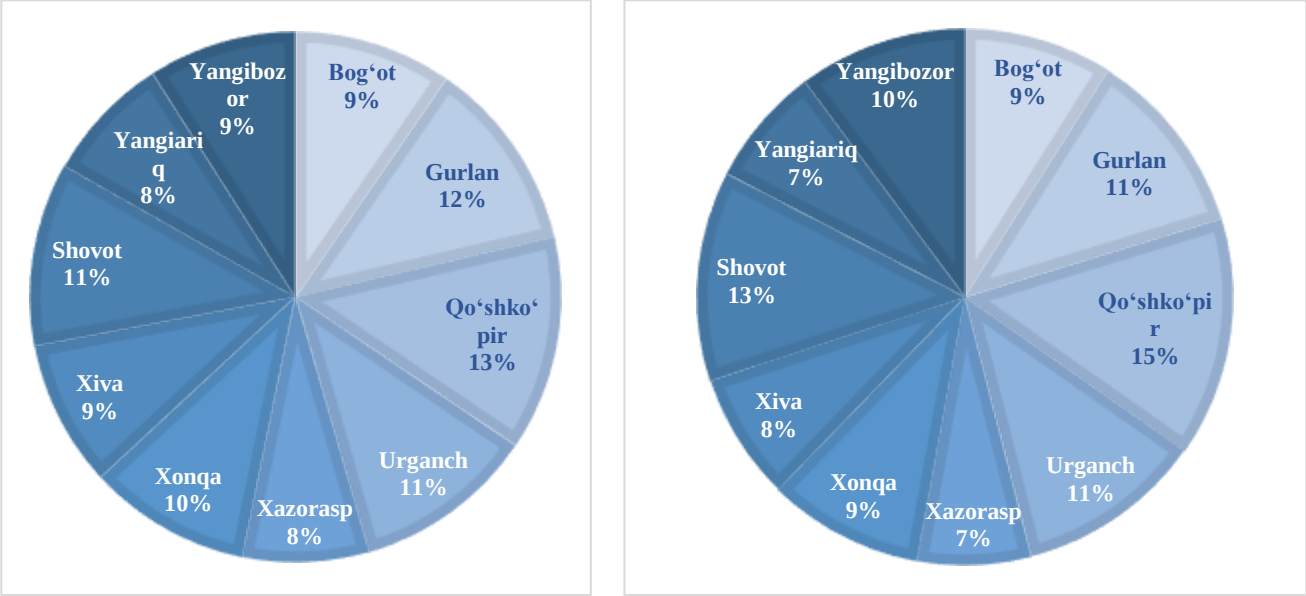
The purpose of this article is to analyze the gradual changes in the water supply of the Khorezm region, an area with high evaporation compared to humidity and a strong shortage of water resources, as well as its territorial characteristics.

Within the scope of the goal, the following tasks are planned:

- ❖ Clarification of seasonal and regional differences in the provision of water resources of the region;
- ❖ scientific analysis of dynamic processes in water use;
- ❖ Calculate the amount of water resources per 1 land;
- ❖ expressing the share of districts in indices compared to the regional average;
- ❖ development of some suggestions and recommendations for water use.

The main part. In 2010, Khorezm region consumed 4275.8 million m3 of water (Figure 1). If we take this indicator as 100 percent, then 97.3 percent was spent on irrigation. The rest was used for washing saline lands, fisheries and communal economy. A year later, this indicator decreased significantly, the amount of water decreased to 2629.9 million m3, that is, it decreased by 1.5 times. In the following year, water resources increased significantly, and its total amount reached 4192.2 million m3. The share allocated to agriculture decreased slightly (4136.93 million m3) in 2013, and significantly (3988.66 million m3) in 2014. In general, with the exception of 2011, there was no significant change in the first five years (2010-2014).

The year 2015 was very successful in the regional agro-economy, and the highest indicator of recent years was recorded (4496.6 million m3). In 2016, it was 4176 million m3, and by 2017 this indicator was 4038.8 million m3. Although there was no significant decrease in the amount of water in these years, as a result of the increase in the population's need for water, there were certain shortages in the amount of water needed for irrigation, communal economy and other purposes. The reason for this can be attributed to the fact that snow and ice are less formed in the mountains and the Amudarya water has decreased.



2010 year 2021 year

Picture 1. Territorial characteristics of water resources of Khorezm region (2010 and 2021)

Source: *Information from the "Chap qirgok Amudarya" Irrigation Systems Basin Administration*

In 2018, the annual water consumption decreased even more (3595.34 million m3), and the salinity level of agricultural land also increased. In 2019, due to the increase in the amount of precipitation, the volume of water increased significantly, i.e. it reached 4171.4 million m3. Due to the water problem, shortages of water resources have arisen in the region's irrigated lands, fisheries, communal economy and other sectors. The amount of water used for

irrigation was 3705.165 million m3 in 2020, and 3113.7 million m3 in 2021, and the water shortage in the region increased in the last two years. In general, in 2011, 2014, 2020 and 2021, there was a water shortage in the agro-economy of the region, while in 2015 and 2019, the amount of water was relatively more [5]. It can be shown that, along with the decrease in the amount of water, the need for it is increasing.

When we divide this indicator by districts, regional differences in the state of water resources provision of the regions are noticeable. If there are favorable conditions for irrigation and other sectors near the river, on the contrary, the water shortage is much higher in the districts far from the river. In particular, in Koshkopir, Shavot, Gurlan districts, the conditions for farming are relatively good. However, it is very difficult for water to reach Pitnak areas. The supply of water resources of the region has decreased by 27.5% compared to 2010, and there is no significant difference in its territorial characteristics. The largest change is observed in Khiva district (37% decrease), a relatively smaller decrease is observed in Yangibozor district (23.7%). This is directly related to the reduction of water resources.

If we analyze the annual amount of water used for land irrigation, fish farming and communal farms by year, in 2011 the total amount of water used for irrigation was 4160.3 million m3, i.e. total 97.3 percent of the used water, 0.8 percent goes to the fish industry, 1.9 percent to the communal economy, 2.7 percent to other industries. This indicator was 2544.3 million m3 in 2011, 96.7% of the indicator of this year, 0.5% for the fish industry, 2.8% for the utility industry, and 3.3% for other industries. The indicator of this year is much lower than other years, the reason was mentioned above [5]. This has a significant impact on the amount of water resources corresponding to the irrigated lands of the region.

Figure 1

Gradual changes in the amount of water falling on the irrigated lands of Khorezm region

№	Districts	2010		Water per 1 land (m^3)	Index	2021		Water per 1 land (m^3)	Index	The difference between 2010 and 2021
		Water resourses (thou. m^3)	Irrigated land (ha)			Water resourses (thou. m^3)	Irrigated land (ha)			
1	Bogot	386536	23879	16187	1.04	276334	23879	11572	1.02	71,5
2	Gurlan	470909	30132	15628	1.00	322686	30132	10709	0.95	68,5
3	Koshkopir	525607	31148	16875	1.08	399434	31148	12824	1.13	76,0
4	Urganch	444902	28422	15653	1.00	317933	28422	11186	0.99	71,5
5	Khazorasp	308590	33742	9146	0.59	224176	33742	6644	0.59	72,6
6	Khanga	397473	27542	14432	0.92	288036	27542	10458	0.92	72,5
7	Khiva	357715	19832	18037	1.15	225347	19832	11363	1.00	63,0

8	Shovat	448801	29015	15468	0.99	348167	29015	12000	1.06	77,6
9	Yangiarik	310290	17860	17373	1.11	204803	17860	11467	1.01	66,0
10	Yangibazar	363471	23772	15290	0.98	277181	23772	11660	1.03	76,3
By region total		4160385	266178	15630	1.00	3014127	266178	11324	1.00	72,5

Source: *Prepared by the authors based on the data of the Cadastre Agency under the State Tax Committee and the Basin Administration of the Left Bank Amudarya Irrigation Systems*

Currently, irrigated land in Khorezm region exceeds 266,000 hectares. Khazorasp, Koshkopir and Gurlan districts are better supplied with irrigated land (more than 30 thousand hectares). In this regard, Yangariq district is far behind (17.86 thousand ha). In general, there is not much difference in the provision of land resources of the region by districts.

There is not much difference in the amount of water resources corresponding to 1 hectare of land. Only Khazorasp district is far behind in this regard (a little more than 9 thousand in 2010, 6644 m3 in 2021). Khiva district uses almost twice as much water as Khazorasp. A similar situation is observed at the end of the analyzed years. In 2021, a large limit was allocated to the irrigated lands of Shavat and Koshkopir districts. Compared to 2010, the amount of water used for 1 hectare of land has decreased by 72.5% in the region. A relatively greater decrease is due to the Khiva district (63%), a smaller change corresponds to the Shavat region (77.6%). The reason is that the share of fresh water is decreasing year by year, and the level of shortage is increasing as a result of the increase in demand for water. As a result, the amount of moisture in the soil is lost, the level of salinity increases, the land reclamation condition changes, and the area of land unsuitable for agriculture is expanding.

Summary. Due to the scarcity of water resources, irrigation of land causes several inconveniences, especially for districts located far from the river. For example, the conditions for farming are relatively good in Koshkopir, Shavot, Gurlan districts, but the situation is very difficult in Khiva and Yangariq districts. A number of economic and social problems may arise as a result of water shortage in the region. These are mainly the following:

- sharp decrease in agricultural production. This situation can pose a serious threat to food safety.

- decrease in the amount of underground water. In order to eliminate the water shortage, the population irrigates the land with ground water, and as a result, the level of underground water is changing. This may lead to further water scarcity in the future.

- increase in population migration due to the above. The migration of people from the western regions of our country to its central and eastern parts began long ago. However, water shortages can have irreversible consequences.

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