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INNOVATIVE PROCESSES IN THE WATER SECTOR AND FACTORS INFLUENCING THEIR DEVELOPMENT

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ABSTRACT

Currently, there are organizational, economic, technical, financial problems and shortcomings in the provision of irrigation services in the country, which are the basis for reclamation, and their increase leads to rising groundwater levels, soil salinity, hindering the growth of land and water resources.

In order to positively address these issues, it is important to improve the planning and organization of water consumption on irrigated lands, improve the use of soil and reclamation conditions, provide qualified specialists in the organization and management of irrigation services, develop technical and financial support of water consumers' associations.

This article examines and analyzes the changes and problems in the water management system of Kashkadarya region. Suggestions and recommendations for troubleshooting are particularly important as they are developed in this article.

KEYWORDS: *Water Management, Water-Saving Technologies, Sprinkler Irrigation, Underground Irrigation, Drip Irrigation Methods, Water Resources Management, Subsidies, Water Scarcity, Land Reclamation, Efficiency Of Water Facilities, Modernization Of Water Facilities.*

INTRODUCTION

In recent years, consistent reforms have been carried out to ensure the efficient use of land and water resources, improve the water management system, modernize and develop water facilities.

Currently, there are organizational, economic, technical, financial problems and shortcomings in the provision of irrigation services in the country, which are the basis for reclamation, and their increase leads to rising groundwater levels, soil salinity, hindering the growth of land and water resources.

In order to positively address these issues, it is important to improve the planning and organization of water consumption on irrigated lands, improve the use of soil and reclamation conditions, provide qualified specialists in the organization and management of irrigation services, develop technical and financial support of water consumers' associations.

In particular, the Concept of Water Resources Development of the Republic of Uzbekistan

for 2020-2030 introduces water-saving technologies on more than 44,000 hectares of land in the country in 2020, including drip irrigation on 24.8 thousand hectares of cotton.

The allocation of subsidies in this area plays an important role in the development of farmers and peasants. So far, water-saving technologies have been introduced on 130,000 hectares of land in the regions, of which drip irrigation technology covers 77.4 thousand hectares. If this work is carried out, it is planned to increase the area of energy-saving technologies to 1 million hectares by 2025.

RESEARCH METHODOLOGY

Comparative analysis and comparative analysis methods were used in the study of the problem.

ANALYSIS AND RESULTS

Today, the problem of water scarcity is growing not only in Uzbekistan, but all over the world. Consistent measures are being taken in our country to radically reform the mechanisms of water resources use, ensure their rational and efficient use, support and encourage the introduction of water-saving technologies in various sectors of the economy, as well as improve the reclamation of irrigated lands.

The Action Strategy for the further development of the Republic of Uzbekistan for 2017-2021 states "... further improvement of reclamation of irrigated lands, development of reclamation and irrigation networks, introduction of intensive methods of agricultural production, first of all, modern agro-technologies that save water and land resources" [1] has been identified as a priority. In the context of economic liberalization, the level of effective use of the existing potential of irrigated agriculture and water resources, as well as the introduction of innovative, modern technologies in this system play an important role in stabilizing the socio-economic development of the country. According to statistics, the total amount of water used in the country in 2019 decreased from 64 billion cubic meters per year to an average of 51 billion cubic meters compared to the 80s of the last century.

The main reasons for achieving this result are the reduction of water consumption in 2019 from 18 thousand to 10.5 thousand per hectare compared to the last century, the improvement of the legal framework for water use, transition from administrative-territorial principle in the management of water resources to the hydrographic basin principle, transfer of part of state powers and responsibilities for water resources management to public organizations in the lower reaches of irrigation systems, diversification of agricultural crops, increase of water efficiency, as a result of measures such as strict water accounting, introduction of water-saving equipment and technologies, attraction of investments aimed at ensuring the reliable operation of water facilities, the annual amount of water used in the country has been reduced.

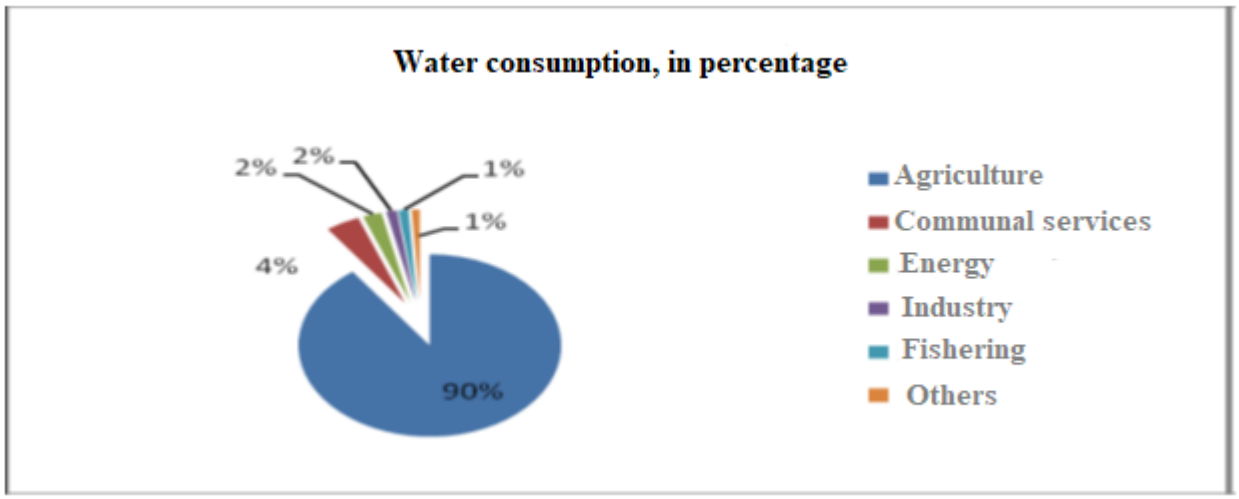

Figure 1 Use of water in the economy of the Republic

Irrigation and domestic use of available water are areas that are most vulnerable to climate change. In 2005, the total water shortage in Uzbekistan was estimated at 2 km3. According to forecasts, by 2030 the water shortage will reach 7 km3 and by 2050 it will increase to 13 km3. At the same time, due to climate change, water consumption for irrigation is projected to increase by 5% by 2030, by 7-10% by 2050, and by 12-16% by 2080.

Today, 46 billion cubic meters of water are used on 3.2 million hectares of land, of which only 60% goes to crops. Because 23 percent of the total 180,000 kilometers of irrigation networks are covered with concrete, which has also not been renewed for 30-35 years. Another reason is that 98% of the arable land is irrigated in the old-fashioned way, and the crops are not planted properly. No organization requires the efficient use of water, accounting, and the use of new water-saving technologies in irrigation networks. This could further exacerbate water shortages that may occur in the water sector.

Mainly promising water-saving methods for irrigating crops today; sprinkler irrigation, underground irrigation, drip irrigation methods, the application of these methods will reduce the amount of water supply to the field by 50-60%. On the other hand, it ensures a high level of use of irrigation water, ie the efficient use of water resources, increasing the efficiency of technical and labor resources.

Today, the use of new water-saving technologies in irrigated areas has expanded, and high-yield, low-water crops have been introduced instead of water-intensive crops. At the same time, water supply for irrigation is complex, but special attention is paid to the targeted use of fertile hilly lands.

The measures taken, as well as state support mechanisms, allowed to ensure the introduction of water-saving irrigation technologies on 33.2 thousand hectares in 2019 alone, which is 44% of the total area of land where such technologies are used. However, the fact that the total area of water-saving irrigation technologies is only 75,000 hectares, or 1.7% of the total irrigated land area, requires further intensification of measures to expand the use of water-saving technologies in agriculture to ensure water efficiency.

Today, due to climate change, population growth and economic growth, their demand for water is growing year by year, the shortage of water resources is growing from year to year. This is an important factor in our implementation of priority reforms for the efficient use of land and water resources, further improvement of water management systems, modernization

and development of water facilities.

The average annual volume of water used in Kashkadarya region is 5 billion 430 million cubic meters, of which:

- 68% of the Amudarya basin, 3 billion 700 million cubic meters;

- 7% from the Zarafshan basin, 400 million cubic meters;

- 25% of the Kashkadarya basin, 1 billion 330 million cubic meters. Of this, 1 billion 129 million cubic meters from rivers; - 89 million cubic meters of groundwater; - 112 million cubic meters of water were collected from the collector network.

Of the 5 billion 430 million cubic meters of water received, 5 billion 87 million cubic meters were used for irrigation, 343 million cubic meters for industrial, communal and other needs.

Of the 514,000 hectares of irrigated land in the region, 65%, or 336,267 hectares, drink water from the Amudarya basin, 7%, 48,815 hectares from the Zarafshan basin, and the remaining 28% from 129,032 hectares from Kashkadarya and its tributaries. The area of cotton in the region is 135,900 hectares, grain - 141,000 hectares, other crops - 237,200 hectares.

In order to ensure sustainable water supply to the population and all sectors of the economy in 2020-2030, improve the reclamation of irrigated lands, the widespread introduction of market principles and mechanisms and digital technologies in water management, ensuring reliable operation of water facilities and improving land and water resources In order to manage resources online without human intervention, 5 SMART WATER devices were installed in large reservoirs, 68 SMART WATER devices in main and inter-district canals, and 50 Smart Meters were installed at 50 pumping stations owned by water management organizations.

In order to create a system of monitoring and information exchange for the reclamation network of water resources, systematic work is underway to determine the location of groundwater, salinity, soil salinity and reclamation status of irrigated lands online. In particular, in order to determine the reclamation status of irrigated lands in the region online, it is planned to install 256 "Diver" devices in reclamation monitoring wells in 2021.

Also, work is underway to determine the reclamation status of irrigated lands on the basis of the Geoinformation System (ARK GIS), the electronic exchange of information on soil salinity, location of groundwater, their salinity and the creation of digital maps.

Currently, 80-85% of large water facilities, main and inter-farm canals, pumping stations and other water facilities are included in the ArcGIS program.

In 2020, water-saving irrigation technologies were introduced in the cultivation of agricultural crops on 17,170 hectares. Of this, 3,393 hectares were irrigated by drip irrigation, 10,15 hectares were irrigated by portable flexible pipes, and 3,762 hectares were irrigated by film. As a result of these technologies, 5 million 500 thousand cubic meters of water have been saved.

According to the Decree of the President of the Republic of Uzbekistan dated December 11, 2020 "On measures to accelerate the introduction of water-saving technologies in agriculture" in 2021 in Kashkadarya region is planned to introduce water-saving technologies on 50,406 hectares. In particular, it is planned to install drip irrigation on 27,601 hectares, install irrigation technology on 14,105 hectares, and level 8,700 hectares with the help of laser equipment.

To date, 1,268 agricultural producers have signed contracts with construction contractors for the introduction of water-saving technologies on 30,410 hectares. Of this, 26,671 hectares were irrigated by drip irrigation, and 3,739 hectares were irrigated by sprinkler technology.

Improving the reclamation and sustainability of irrigated lands today, helping to increase soil fertility, salinization of soils in saline areas of 232,300 hectares at different levels (including strong - 9,600 hectares, medium - 38,100 hectares, weak - 184,600 hectares) A lot of work is being done to reduce the level and prevent it. In particular, in 2020, on the basis of 8 projects, 117 km of collector and drainage networks were built and reconstructed, and 745 km of collector and drainage networks were systematically repaired.

As a result of this work, the melodic condition of 17,900 hectares has been improved.

Work has also begun on the introduction of public-private partnerships in water management, the provision of individual water facilities for use by farmers, clusters and other organizations, as well as the use of savings to modernize water facilities and pay and encourage staff.

The future of water resources development in Kashkadarya region

A 10-year concept has been developed. In 2021-2023, it is planned to introduce "SMART WATER" and similar digital technologies in 1,503 water facilities. In addition, it is planned to automate and digitally control the Yakkabog hydroelectric power station in Yakkabog district, which is a major water management facility.

The following table 1 shows the introduction of digital technologies in the management of water bodies, water metering and monitoring in the districts of Kashkadarya region for 2020-2023, including 1503 in the region, 13 in 2020, 602 in 2021, 2022 It is planned to build 410 digital devices a year and 478 in 2023. It is planned to install 5 digital devices in reservoirs and canals in the region, one in Guzar and Kamashi districts, 2 in Nishan district and one in Shakhrisabz district.

TABLE 1 INDICATORS OF INTRODUCTION OF DIGITAL TECHNOLOGIES IN WATER MANAGEMENT, WATER METERING AND MONITORING IN KASHKADARYA REGION

serial number	**Districts name**	**The number of digital devices planned for 2020-2023**	**Devices to be installed (pieces), hence**				**Installed in reservoirs and canals dona**
			2020 year	**2021year**	**2022year**	**2023year**	
1	G'uzor	224	2	102	69	51	1
2	Dehqonobod	14		3	5	6	
3	Qarshi	91		39	25	27	
4	Koson	30		8	8	14	
5	Qamashi	133	5	65	36	27	1
6	Kitob	61		28	18	15	
7	Mirishkor	53		12	19	22	

8	Muborak	31		8	10	13	
9	Nishon	38	4	9	11	14	2
10	Kasbi	298		68	51	179	
11	Chiroqchi	235	1	111	70	53	
12	Shahrisabz	145	1	72	43	29	1
13	Yakkabog’	150		77	45	28	
Total by region:		**1503**	**13**	**602**	**410**	**478**	**5**

It is also included in the State Program to improve the reclamation of irrigated lands in 2021 - 95.1 km on the basis of a total of 9 projects. Construction and reconstruction of long open collectors and closed-bed drainage networks are planned, including:

- on 4 objects passing from year to year - 22,13 km. Open collectors, 10.42 km. construction of closed-bed drainage networks;

- on 5 newly started facilities - 44,725 km. Open collectors (including 22,662 km. new collector construction, 22,063 km. reconstruction), 10,537 km. It is planned to build closed drainage networks, build 51 GTIs, and reconstruct 10 observation wells.

According to the implementation of the statement of the Cabinet of Ministers No. 03 / 1-4100 of December 2, 2020 on the systematic repair and restoration of reclamation facilities in 2021 on the basis of a total of 20 projects 1,392.4 km. length of open collector cleaning, 124.7 km. it is planned to carry out flushing of long closed-bed drainage networks.

Studies show that the distribution of water from the region's water sources by sectors of the economy in 2020 compared to 2010 indicates a decrease in the volume of water from sources or a decrease in water from the sources themselves (Table 2).

Efficient water supply to agricultural enterprises is one of the most pressing issues for the further development of irrigated agriculture.According to the results of scientific research and analysis, today irrigated agriculture accounts for 95-97% of the total amount of water obtained from water sources for the needs of the economy.

In Kashkadarya region in 2020, 4008.1 million m3 of water was taken from sources for water supply of the economy, of which 97.2% for irrigation of agricultural crops, ie 3895.3 million m3, 13.7 million m3 for industry (0.34 %), 91.6 million m3 (2.3%) for utilities, 448.0 million m3 (11.2%) for energy, 2.6 million for fisheries. m3 (0.006%) of water was consumed. When we compare these figures with 2010, we can see that the amount of water taken from sources has decreased by 39%, and the amount of water used for irrigation has decreased by 31.3%.

TABLE 2 DISTRIBUTION OF WATER FROM SOURCES BY SECTORS OF THE ECONOMY (MLN.M^3)[1]

serial number	**Indicators**	**Measurement unit**	**Years**				**In 2020 For 2010 % of relative change**	**In 2020 For 2018 % of relative change**
			2010	**2018**	**2019**	**2020**		

1	Total from sources	mln.m^3	**6367,0**	**3331,5**	**3797,1**	**4008,1**	**63,0**	**120,3**
	weight	%	100	100	100	100	-	-
2	Irrigation	mln.m^3	5671,3	3191,1	3600,8	3895,3	68,7	122,1
	weight	%	89,0	95,8	94,8	97,2	1,1 p. increased	1,01 p. increased
3	To industry	mln.m^3	24,5	14,5	8,4	13,7	56,0	94,5
	weight	%	0,4	0,43	0,22	0,34	1,17 p. decreased	1,26 p. decreased
4	Communal to the farm	mln.m^3	256,6	89,2	159,1	91,6	35,7	102,7
	weight	%	4,0	2,7	4,2	2,3	1,74 p. decreased	1,17 p. decreased
5	Energetics	mln.m^3	409,4	558,3	558,3	448,0	109,4	80,2
	weight	%	6,4	16,7	14,7	11,2	1,75 p. increased	1,49 p. decreased
6	Fishing	mln.m^3	5,2	6,5	7,8	2,6	50,0	40,0
	weight	%	0,08	0,2	0,21	0,006	13,3 p. decreased	33,3 p. decreased

At present, the main task for agriculture is to produce enough grain, cotton, vegetables, melons, fruits and livestock products and to fully meet the demand of the population for food and industry for raw materials. This is to achieve micro and macroeconomic stability by eliminating the negative aspects of the agricultural production process and the sustainable development of production in the future.

The solution to this problem must be taken into account in the current water shortage and the deterioration of the composition of soils and the increase in salinity. Due to these conditions, due to the effective organization and management of chemical-biological and physical processes in the farms of the region, irrigated lands are one of the most intensive types of agricultural production, providing high, guaranteed, consistent yields of agricultural crops. The distribution of water from total sources in the region to irrigated areas, ie cotton and grain crops, can be seen in Table 3 below.

The results of the study show that in 2010 the water from the Amudarya basin was used for 335.9 thousand hectares, in 2020 - 336.3 thousand hectares, an increase of 0.1%, in 2019 - 336.8 thousand hectares, and in 2018 - 336.8 thousand. gaga spent. However, water from Zarafshan water sources in 2020 decreased by 97.8% compared to 2010, or 2.8%. 129,000 hectares of land were irrigated due to the water taken from the Kashkadarya River, while in 2010 this figure was 129.0 thousand hectares. This means that in 2010-2020, the irrigated area across the Kashkadarya River remained unchanged.

TABLE 3 DISTRIBUTION OF WATER RESOURCES FROM SOURCES TO CROP TYPES[2]

Sources / **Indicators**			**Measurement unit**	**Amudaryo + TSO**	**Zarafshon**	**Qashqadaryo**
2010 year	**Irrigated area**		**thousand hectares**	**335,9**	**49,8**	**129,0**
	this sentence	cotton	thousand hectares	124,0	17,2	33,0
		grain	thousand hectares	98,7	13,8	32,5
2018 year	**Irrigated area**		**thousand hectares**	**336,8**	**50,9**	**127,4**
	this sentence andжумла	cotton	thousand hectares	104,1	13,3	22,5
		grain	thousand hectares	98,0	13,9	31,1
2019 year	**Irrigated area**		**thousand hectares**	**336,8**	**49,2**	**128,5**
	this sentence	cotton	thousand hectares	100,8	12,2	22,9
		grain	thousand hectares	96,9	13,6	31,2
2020 year	**Irrigated area**		**thousand hectares**	**336,3**	**48,7**	**129,0**
	this sentence	cotton	thousand hectares	100,3	11,6	24,0
		grain	thousand hectares	98,1	13,2	29,7
Change in 2020 to compared 2010	**Irrigated area**		**%**	**100,1**	**97,8**	**100**
	this sentence	cotton	%	80,9	67,4	72,7
		grain	%	99,4	95,6	91,4

When analyzing the scale of agricultural production, it is necessary to take into account the shortage of water resources, which has become a major problem in recent years. Because today the irrigated area of the republic is 4.3 million hectares. hectares, and the population is estimated at 35 million. If we take into account the number of people, it can be seen that these figures have increased 4.5 times compared to the 1990s, and the population's demand for agricultural products is also growing year by year.

In other countries, such as Russia, the population has only doubled in the last 100 years, while in the Aral Sea region it has increased 13 times. This means that today's demand is to grow more crops, gain income and profit in return for efficient and rational use of water per hectare in agriculture.

Hence, it can be seen from the table analysis that water resources are becoming scarce from year to year. It should be noted that the region has limited sources of internal and external water resources. Therefore, their economical use is very important not only in years of water scarcity, but also in years of abundance of water.

CONCLUSIONS AND SUGGESTIONS

It is known that land and water resources are a national treasure, each unit of which can be developed in another area or by other subjects of the country, to grow another product of social significance for the country. In particular, at the expense of water saved from each hectare of land, it will be possible to grow agricultural products that are necessary for society.

In general, as a result of work on improving the reclamation of irrigated lands:

– Groundwater levels and salinity in irrigated lands are declining, reclamation of arable lands is improving;

–The water supply system for farms is improving;

–The productivity of agricultural crops is increasing and the incomes of farms are rising.

In conclusion, we consider it expedient to implement the following proposals on further deepening economic reforms in the water management system, improving property relations and forms of management:

– In order to improve the water management system, to further improve the reclamation of lands, to update the material and spiritual obsolete irrigation and reclamation system in the water management system, increase its efficiency, introduce new irrigation technologies and water use mechanisms, improve land reclamation, construction and repair of drainage;

– Improving the financial-credit, tax and insurance systems in agriculture, in particular, improving the mechanism of state support for cotton and grain farms for low-yielding areas, as well as for state needs in pump-irrigated areas;

– Introduction of scientific achievements into production, in particular, the development and improvement of existing methods and techniques for the processing of environmentally friendly equipment and raw materials and raw materials; extensive use of innovative projects in solving practical problems of agriculture and the introduction of a system of bank lending to finance innovative projects.

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