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Factors Affecting the Efficiency of Using the Water System

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Abstract

This article contains proposals and recommendations for radical improvement of water resources management in the economy, further development of water-saving technologies to increase water efficiency, positive attitudes to water resources, adaptation to water shortages and the provision of guaranteed water to consumers.

Keywords: water shortage, new water-saving technologies, sprinkler irrigation, underground irrigation, drip irrigation methods, low pressure drip irrigation system, irrigated agriculture, river water regulation, use of energy resources.

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Introduction. 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" 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 Republic 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 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, the transition from administrative-territorial principle to hydrographic basin principle in water management. transfer of part of state powers and responsibilities to public organizations at the lower level of irrigation systems, diversification of agricultural crops, increase of efficiency of water facilities, strict accounting of water, introduction of water-saving equipment and technologies, investments aimed at ensuring reliable operation of water facilities As a result of the implementation of such measures as the involvement of water, the amount of water used annually in the country has been reduced. 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.

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

Analysis and results. 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% of the total 180,000 km of irrigation networks are covered with concrete, they have also been almost not 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 placed incorrectly. No organization requires the efficient use of water, accounting, 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, the water supply for irrigation was complicated, but special attention was paid to the targeted use of fertile hilly lands. The measures taken, as well as state support

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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 ensure the efficiency of water use to expand the use of water-saving technologies in agriculture.

The fact that 1.7% of irrigated land is used to expand the use of water-saving technologies in agriculture requires further intensification of measures to ensure the efficiency of water resources.

Resolution of the President of the Republic of Uzbekistan dated October 25, 2019 No PP-4499 "On measures to further expand the mechanisms to encourage the introduction of water-saving irrigation technologies in agriculture" 8 million soums per hectare for the introduction of drip irrigation technologies to improve the productivity of lands, 8 million soums per hectare for the introduction of drip irrigation technologies to create new vineyards, new gardens and subsidies in the amount of not more than 6 million soums per hectare of arable land for the introduction of water-saving irrigation technologies for the creation of greenhouses.

At a time when opportunities and benefits are being created, the irrigated area in the country is 4.3 million hectares. The area under crops is 3.2 million hectares. About 1.1 million hectares of land have fallen into disuse. However, the location of these areas, their connection to the irrigation network, and the reclamation status of the lands vary. Studies show that water is delivered to some areas naturally and to others artificially, i.e. through irrigation canals, pumping stations and special pipes. There are areas of land where the soil is fertile, but the irrigation networks in the area are outdated or out of reach. With an outdated irrigation network, these areas cannot be fully irrigated. The use of other water sources (reservoirs, irrigation wells) is more efficient in supplying water to these areas.

Effective management of water resources, in times of need for water

Irrigation wells are also important in meeting crop demand for water. Currently, there are 4,000 irrigation wells at the disposal of water management organizations. One well serves an area of 30 hectares and costs 40-50 million soums a year. Due to the normal use of well water for irrigation, groundwater is declining. A number of measures are being taken to improve this situation. The large-scale work carried out includes measures to automate groundwater monitoring, efficient use of groundwater, their protection, assessment of groundwater resources, mathematical modeling, prevention and mitigation of negative processes. However, with these practical measures, saving groundwater, preventing waste, calculating the level of groundwater use is a somewhat difficult process. Therefore, it is important to control the level of groundwater use, attract modern equipment and technologies for continuous analysis of the mineral status of groundwater and create an organizational, legal and economic framework for the use of water-saving technologies by farms, enterprises and organizations using these water sources. is calculated.

Today, the application of modern, innovative technologies in agriculture can not only save water resources, but also achieve additional economic benefits. According to the Ministry of Agriculture of the Republic of Uzbekistan, the average water consumption per hectare for conventional irrigation of cotton is 5500 m3, and for drip irrigation - 2750 m3, which reduces water consumption by 2 times and fuel and lubricants by 2.7 times. Estimates show that the cost

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of introducing water-saving technologies on 10 hectares is about 133 million soums. With the introduction of drip irrigation technology on the farm, cotton yield will increase from 27 quintals to 35-45 quintals. In addition, savings in water consumption (30-50%), electricity (10-15%), diesel fuel (25-30%), mineral fertilizers (20%) are achieved. The saved resources will increase the level of efficiency due to the increase in productivity, and the cost of implementing a water-saving system will be covered, and additional economic benefits can be achieved in 5-6 years.

Water resources are also used for many other purposes in many sectors of the economy, so a comprehensive approach to solving water management measures is taken into account. The integrated use of water resources is considered in relation to the economic region or river basin. At the same time, water resources, which are an integral part of the natural environment, condition the territorial organization of economic sectors on the basis of rational specialization of material and natural resources and their rational use..

The main task of the Water Management Complex (WMC) is to develop recommendations on a regional scale to meet water needs in the context of emerging water resources shortages.

The main parts of the water management complex have different requirements for water resources. For hydropower, water is thought of as an energy source that can be generated from artificially constructed or natural waterfalls. The main thing in the use of water for water transport is to provide the necessary depth during navigation. In fish farming, not only ponds but also in many cases rivers need a certain order of water flow to grow and fertilize fish.

The water problem can be solved in 3 ways:

- First, the river water must be fully regulated. Reservoirs are regulated by construction. The construction of reservoirs serves many purposes. It is necessary to establish water supply, regulate river water, ensure the use of energy resources, develop irrigation and drainage, create transport highways, develop fisheries and prevent floods;
- secondly, this construction will carry out water re-supply between river basins;
- Third, organizational and economic measures will be taken to save water in each basin. These measures include the reconstruction of water management systems, reuse of wastewater, the introduction of new equipment, the introduction of economic accounting relations between water management organizations and water consumers.

Integrated use of water resources will significantly increase the efficiency of irrigation and mediation services. In this case, the narrow bureaucratic approach to water management measures will be limited, and their economic significance will be fully taken into account. The requirements for protection of water from pollution and depletion must be complied with.

In ensuring the efficient use of water resources, the main focus should be on the efficient use of water facilities and increasing the efficiency of primary water users in delivering water to consumers. Studies show that, given that agricultural products are produced primarily by secondary water users, we consider it appropriate to apply the technical, economic, administrative, organizational and environmental measures we propose for this link.

As a result of the **application of technical measures,** water loss due to connection in canals will be reduced, wasteful water losses in crop fields will be limited. We know that the efficiency of the irrigation system in Kashkadarya region is 0.74, which is not yet high. In addition, capital leveling of arable lands, as well as timely completion of current leveling works before planting and placement of crops depending on the type will lead to a reduction in water consumption**.**

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Figure 1. Measures to increase the efficiency of water use

As a result of **economic measures**, the introduction of market principles of water use leads to the determination of the net value of water. However, so far these calculations have not been tested in practice. Because water is a national asset, secondary water users continue to pay for water in the form of fees.

If water is determined taking into account the operating costs, then the cost of the product grown for farmers will increase. Our farmers are not yet able to cover these costs. Therefore, the goal will be achieved if SIUs and farms will be able to use water efficiently and economically and keep accurate water bills, install water meters at water intake points and purchase modern equipment for leasing.

The application of administrative measures is mainly to control the use and distribution of water, ie from the main water distribution system of water basins to the delivery of water to the planted area. However, irrigation system administrations and SIUs are responsible for imposing and enforcing fines for inefficient water use, and for providing incentives for water efficient consumers.

The application of organizational measures will ensure, firstly, the legal basis for contractual relations with irrigation water suppliers, secondly, the modernization of land use within farms, ie hydraulic equipment for water management, water metering devices, thirdly, land in the organization of production, water, and technical means complement each other, helping to increase the productivity of agricultural crops. 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.

As a result of environmental measures, soil salinization will be prevented, and measures will be taken to prevent soil and water erosion. Consequently, in irrigated agriculture, irrigation water has a certain effect on soil, vegetation, agronomic practices, and macroclimate. When irrigation methods are chosen correctly and irrigation times are optimal, as well as when the irrigation technique is implemented correctly, the positive effect of irrigation water increases, and when the irrigation regime and technique is violated, the type and amount of adverse events increase.

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In particular, there are a number of negative consequences, such as rising salinity, secondary salinization, swamping, soil compaction, soil compaction, deterioration of its water-nutrient regimes and ecological environment of zoofauna and microflora, as well as erosion of fertile layer due to irrigation erosion. For example, irrigation erosion has a devastating effect on soil fertility. Therefore, all agronomic and irrigation erosion control measures used in irrigated agriculture should be ameliorative in content and they should be focused on soil protection. Studies show that there are several ways to protect soil from erosion when irrigating plants, including:

Proper organization of irrigation techniques. When arranging irrigation, it is initially determined by the slope of the land, the water permeability of the soil, the length of the furrows and the amount of water flowing into them. The water should be distributed to the fields in such a way that the amount of water poured into them is less than the level of waterlogging of the soil. Then the moisture inside the branches goes in front, and the flow goes back, and the erosion of the soil decreases sharply.

Application of optimal standards in irrigation. According to observations, in most cases, attention is not paid to irrigation at optimal rates. For example, when irrigating cotton on a large scale, aquaculturists prefer to irrigate sparingly, and as a result, a large amount (30-40% or more) of water is discharged into the sewer. Tons of muddy particles of soil are also washed away by the water coming out of the sewer. Therefore, arranging irrigation of cotton at optimal rates, without draining the water, is an effective way to eliminate irrigation erosion.

Application of progressive methods in irrigation. At present, there is a wide range of methods of underground irrigation, irrigation, especially drip irrigation, which does not allow any soil erosion..

Today, 159,766 hectares (about 30%) of irrigated lands in Kashkadarya region are subject to irrigation erosion, of which 88.3% - weak, 10.0% - moderate and 1.7% - are heavily washed away. It is advisable to take measures to stay.

These measures are implemented through the use of the necessary economic mechanisms. It should be noted that the modernization of production within farms is carried out in order to create an organizational framework for the application of market relations in the use of water. Deepening economic reforms in agriculture will require a transition to a payment system for water use.

As a result of scientific experiments carried out by scientists of our country on drip irrigation in different climatic and soil conditions of the Republic, it is determined that the saving of irrigation water is up to 35-50%. From the above considerations, it can be seen that a large-scale work is being carried out in the country on the creation, application and expansion of water-saving irrigation technologies. According to the project "Low-pressure drip irrigation system" developed by scientists of the Tashkent Institute of Irrigation and Land Reclamation Professor U.Umirzakov, Professor F.Baraev, Candidate of Technical Sciences B.Usmonaliev, it allows to save up to 40-60% of water during irrigation. When the proposed technology is applied to orchards, productivity increases by 5-7 quintals and labor costs are halved. It is advisable to use a low-pressure irrigation system in the territory of the Republic of Karakalpakstan. The reason is that the water coming from the Amudarya contains a lot of different amounts of turbidity, especially in May, June, July, 1.5-2.0 kg per 1 cubic meter of water. will be up to. During the use of surface water, sedimentation and treatment of mud in the water is required. For this you will

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need to build water tanks. If the sediment in the water is not cleaned, then the droplets can break down quickly and become filled with mud. The low-pressure drip irrigation system makes it very convenient to irrigate gardens and vineyards as well as backyard lands. The reason is that in the central and northern regions of the Republic of Karakalpakstan, water shortages are more common during the growing season, as water, along with agricultural crops, is not fully available to farmers. Groundwater reserves in these areas are sufficient for use, the amount of salt content is suitable for irrigation, and their location at a depth of 8-15 meters above ground level. During the use of groundwater, there will be no sediment in the water because the water is filtered from the well. However, when transferring the temperature of the obtained water to agricultural crops, it is advisable to raise it to 15-20 g in the open basin or in gears. The use of low-pressure drip irrigation system in gardens, vineyards, as well as in the irrigation of farmland, certainly saves water and allows to obtain high yields in agricultural crops.

The scale of the area currently irrigated by modern methods in the leading countries of the world is given in Table 1 below.

Table 1

In modern styles in the leading countries of the world the size of the irrigated area

States	Irrigation (mln. ha)	Drip irrigation (mln. ha)	The scale of the area irrigated in modern methods (mln. ha)	Relative to total irrigation area. as a percentage
China	1,20	0,27	1,47	2,8
Cyprus	0,002	0,025	0,027	49
France	1,40	0,05	1,45	90
Germany	0,53	0,002	0,532	100
Israel	0,07	0,16	0,23	100
India	0,66	0,26	0,92	1,6
Italy	0,35	0,08	0,43	16
Jordan	0,005	0,038	0,043	62
Republic of South Africa	0,26	0,22	0,48	37
USA	3,38	1,05	4,43	21

The most important and urgent task in our country is the use of water-saving technologies in the production of high quality crops in the conditions of shortage of irrigation water.

Conclusions and suggestions. The effective use of intellectual potential in the modernization of the water sector is directly related to the improvement of the system of financing research for the development of the sector. The innovative potential of the industry represents all its aspects, namely the ability to create innovation and use it in practice. Therefore, it is expedient to take into account the specifics of the system in the modernization of enterprises and the introduction of innovations in the water management system:

selection of the optimal method of irrigation, taking into account the type of crop, natural climatic conditions, soil composition, conditions of application of agro-technical measures and other factors in the use of water-saving technologies in agriculture;

technical and economic calculation of the level of efficiency before the introduction of water-saving irrigation systems in the fields;

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depending on the type of crop, the use of state subsidies for the area of land on which the water-saving irrigation system is introduced,

use of (local) opportunities for manufacturers of technologies required for the installation of these systems;

introduction and further improvement of the activities of all organizations involved in the provision of water resources to consumers, the introduction of techniques and technologies that increase the efficiency of existing canals, pumping stations and irrigation networks with low efficiency;

water pricing policy. Increases the efficiency of water conservation and use, promotes the distribution of income and the formation of additional income of farms, as well as the creation of new water projects, the implementation and maintenance of existing ones;

construction of other water sources, ie reservoirs, irrigation wells, use of water resources in agriculture, which do not have access to water resources in agriculture, but strictly define the introduction of water-saving systems in the areas planned to be irrigated using these water sources; and leads to savings, increased productivity and cost-effectiveness through the use of alternative power sources in the operation of water-saving systems.

In conclusion, it can be said that the era of old technology for water management has passed. Thus, radical improvement of water resources management in the economy, further development of water-saving technologies to increase water use efficiency, a positive attitude to water resources requires adaptation to water shortages and the implementation of measures to ensure guaranteed water supply to consumers. The widespread introduction of modern technologies in water management in our country, the use of facilities created by the state for this purpose will serve to develop production and further improve the welfare of our people.

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