

DEVELOPMENT PROCESSES OF IRRIGATION SYSTEMS IN NEW UZBEKISTAN

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Abstract: This article analyzes the processes of modernization of irrigation systems, increasing their efficiency, rational use of water resources and introduction of water-saving technologies implemented during the period of New Uzbekistan. The content of state programs and projects aimed at the development of water infrastructure, in particular, the reforms carried out in the agrarian sector in the country, are highlighted. It also considers the current aspects of ensuring the sustainability of the irrigation system, maintaining ecological balance and using resources based on a scientific approach. The study also analyzes the prospects of national irrigation policy based on comparison with advanced foreign experiences.

Keywords: New Uzbekistan, irrigation systems, water resources management, water saving technologies, modern irrigation systems, environmental sustainability

Introduction: The large-scale reforms implemented in Uzbekistan's irrigation sector during the period of independence played a significant role in increasing the efficiency of the country's agriculture. Strategic measures to effectively manage water resources, save them, and ensure environmental sustainability have significantly strengthened the role and importance of Uzbekistan not only at the national level, but also in the water policy and water supply of the Central Asian region.

The “Concept of Water Management Development of the Republic of Uzbekistan for 2020–2030”, approved by President Shavkat Mirziyoyev on July 10, 2020, sets as its main goal the modernization of the country's water management system, the widespread introduction of modern technologies, and the continuous improvement of the skills of specialists in the field. This concept includes measures aimed at ensuring the economically and environmentally efficient use of water resources, as well as reducing the negative impact of global climate change.

Main part: The global depletion of water resources and the intensification of climate change, which poses a serious threat, especially to arid regions, make the issues of water conservation and its rational management even more urgent for Uzbekistan. Therefore, the country is actively implementing advanced innovative solutions aimed at ensuring the stability of water supply in agriculture, including modern irrigation technologies, digital monitoring systems, and water consumption accounting and management systems.

In addition, the optimization of irrigation systems and the equitable organization of water distribution are proving to be an important factor in increasing agricultural productivity, preventing soil erosion and salinization, and maintaining regional ecological balance. In this regard, Uzbekistan's water management reforms serve not only to increase economic efficiency, but also to protect the environment and ensure social stability.

Overall, Uzbekistan's irrigation reforms are an important foundation for advancing the country's strategy to make agriculture more competitive, conserve water resources, and develop sustainably. At the same time, the practical implementation of the water management

development concept is also creating a foundation for strengthening regional cooperation and ensuring water security.

The Concept of Water Management Development for 2020–2030, adopted by the President of the Republic of Uzbekistan, is an important strategic document in the field of effective management of the country's water resources and water conservation. This concept includes a wide range of measures aimed at the large-scale introduction of water-saving technologies, modernization of irrigation systems, and ensuring rational, sustainable use of water resources.

One of the main objectives of the concept is to increase the efficiency of management through the digitalization of water management systems. In this direction, advanced innovative technologies are being widely introduced, such as automated water distribution systems, modern irrigation equipment, and sensor-based monitoring and control systems. These technologies create the opportunity to reduce water waste, optimize the irrigation process, and maintain soil health.

At the same time, ensuring environmental sustainability is one of the priority areas of the concept. To combat the risks arising from the depletion of water resources and climate change, environmental measures are being implemented to introduce water-saving technologies and prevent soil salinization and erosion.

Results and Discussion: The importance of Uzbekistan's irrigation sector in the national economy is very great, especially for agriculture, the area irrigated is expanding. According to 2019 data, about two million hectares of land in the country are under irrigation, and this area is planned to be increased to 2.5 million hectares by 2030. This creates the necessary conditions for increasing the productivity of agricultural products and ensuring food security.

This document also envisages achieving the following indicators by 2030:

- reduce the area of irrigated land with low water supply from 560 thousand hectares to 190 thousand hectares;
- reduce the area of saline irrigated land by 226 thousand hectares; • reduce the annual electricity consumption of pumping stations in the system of the Ministry of Water Resources by 25 percent;
- install “Smart Water” water metering and control devices at all irrigation system facilities and introduce digital technologies in water accounting;
- automate water management processes at 100 large water management facilities;
- increase the total area of land covered by water-saving technologies for irrigation of agricultural crops to 2 million hectares, including drip irrigation technology to 600 thousand hectares;
- modernization and development of water management facilities (except for drinking and wastewater systems), automation of management of large water management facilities based on digital technologies, widespread introduction of modern technologies that save electricity and other resources, widespread attraction of foreign investments in the sector and targeted and effective use of allocated funds;
- ensuring the safety and reliable operation of reservoirs, flood reservoirs and other water management facilities;

- improvement of the water resources management system, introduction of “Smart Water” and similar digital technologies in water use and water consumption accounting;
- further expansion and state encouragement of the introduction of water-saving irrigation technologies in the cultivation of agricultural crops, attraction of foreign investments and grants in this sector;
- improving the reclamation status of irrigated lands and ensuring their sustainability, helping to increase land fertility, and using effective technologies to reduce and prevent soil salinity;
- introduction of the principles of integrated water resources management, guaranteed water supply to the population, sustainable water supply to economic sectors, improvement of water quality and preservation of the ecological balance of the environment;
- development of interstate relations on issues of use of transboundary water resources, development and promotion of mutually acceptable mechanisms for joint management of water resources and programs for efficient water use that ensure a balance between the interests of the Central Asian countries;
- training of qualified personnel for the water sector, improvement of the system of advanced training of personnel, development of interaction between the spheres of education, science and production, and introduction of scientific achievements and know-how into production.

Water-saving technologies play an important role in increasing the efficiency of irrigation systems and rational use of water resources. New innovative technologies are expanding the possibilities for more effective management of water resources, reducing water consumption in crop irrigation, and increasing productivity. In particular, drip irrigation, automated irrigation systems, as well as waterless agricultural technologies are widely used.

Drip irrigation technology is a system that delivers water directly to plant roots, significantly reducing water waste and helping to maintain optimal soil moisture levels. In Uzbekistan, this technology was introduced on an area of about 150,000 hectares in 2022, increasing water saving efficiency to about 30 percent. This has paved the way for the cost-effective use of water resources in agriculture and the expansion of irrigation areas.

At the same time, it is planned to attract investments in water-saving technologies in the amount of 500 million US dollars in 2020-2025, which will be directed to modern irrigation equipment, monitoring systems and training of qualified personnel. These measures will serve to sustainably manage water resources and increase the competitiveness of agricultural products.

Automated irrigation systems, on the other hand, reduce water consumption while providing precise control over the irrigation process. Sensor monitoring systems monitor soil and plant moisture levels in real time, allowing for precise and efficient irrigation.

In order to prevent water shortages in desert and arid regions, along with drip irrigation, disk irrigation technologies are also widely used. The disk method provides a fine spray of water on the soil surface, helping to maintain a stable soil moisture level. As a result of these



technologies, not only water consumption is reduced, but also productivity is significantly increased.

The widespread introduction of these innovative irrigation systems in Uzbek farms is improving the land reclamation situation. Soil salinization and erosion are decreasing, and productivity is steadily increasing. Thus, the implementation of water-saving technologies is making a significant contribution to the sustainable development of agriculture and maintaining ecological balance.

Drip irrigation technology is very effective in saving water compared to traditional irrigation methods, allowing you to save up to 30-50 percent of water resources. With this method, water is delivered directly only to the root zone and necessary areas of the plant, which significantly reduces water loss through evaporation and infiltration. As a result, water consumption is economically efficient and an optimal irrigation regime is ensured.

In addition, sprinkler irrigation technology is also being widely implemented in our country. This technology allows saving water by 20-30 percent compared to traditional canal irrigation methods. In sprinkler irrigation, water droplets are evenly distributed over the leaves and roots of plants, ensuring effective hydration. This is an important factor in plant development and increasing productivity.

The need to train highly qualified specialists for the further development and modernization of the water management system is of urgent importance. Therefore, the decrees adopted by the President pay great attention to the improvement of the education system, in particular, the introduction of a dual education system. Through the dual education system, industry workers will have the opportunity to improve their professional skills while continuing their work.

By 2023, more than 300 specialists will have successfully completed advanced training courses within this system. In addition, retraining and advanced training processes will be expanded, and it is planned to train more than 5,000 new specialists by 2030. For example, as a result of an initiative organized by Dangara Polytechnic No. 3, more than 200 water management specialists were admitted to dual education. This ensured that specialists could receive training without being separated from their work activities, significantly increasing their professional level.

At the same time, great attention is paid to scientific-practical integration in the process of training qualified personnel. The personnel training system is constantly being improved based on industry requirements and modern technologies. This will not only increase the efficiency of irrigation systems, but also successfully implement the country's policy of sustainable water resources management.

Conclusion: Reforms aimed at developing Uzbekistan's water management system are recognized as the most important strategic steps towards the effective management of the country's water resources. The decree adopted by the President and the concept developed on its basis are of great importance for the widespread introduction of water-saving technologies, improving the skills of industry personnel, as well as the implementation of innovative solutions for irrigation systems.



The expansion of water-saving technologies and the prospects for introducing innovations in the field serve to ensure socio-economic and environmental sustainability. Especially against the backdrop of global climate change, natural depletion of water resources and the intensification of the impact of natural disasters, establishing more effective and flexible management of the water management system is becoming an urgent task. In this regard, the water management system of Uzbekistan must be ready for constant change in order to adapt to climate change and ensure sustainable development. This is done not only through the introduction of new technologies and management methods, but also through improving the skills of personnel and strengthening scientific and research work.

As a result, Uzbekistan's water management reforms will significantly contribute to ensuring the stability and food security of the national economy, as well as strengthening water security and ecological balance in the Central Asian region.

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