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"SMART WATER" Is an Innovative Method of Water Measurement and Control

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Abstract: Finding a solution to the problems that have arisen and are arising due to the flow of natural resources is a major issue of today. The ecological landscape of the planet Earth was changing in an unprecedented way. Water, which has become a global problem in recent years, has been observed in the countries of the world for many years. This requires saving water and using it efficiently. Reasonable use is not sufficient for this requirement alone. As the problem is global, innovative solutions are needed.

Keywords: Smart Water, Irrigation, Water shortage, Water resources, Water wastage.

Due to the growth of the population and economic sectors, their demand for water is increasing year by year, the shortage of water resources is increasing year by year, which requires a more responsible approach to the issue. Improper use of water resources, allowing wastage leads to reduced productivity or crop failure. Prevention of such situations creates the need for constant and accurate monitoring of the amount of water used in agriculture with the help of electronic devices. In the decree of the President of July 10, 2020 "On approval of the concept of development of the water industry of the Republic of Uzbekistan for 2020-2030", a number of priority directions of the development of the water industry are listed. A significant aspect was the direction of "improving the water resources management system, introducing "Smart Water" ("Smart Water") and similar digital technologies in water use and water consumption accounting." Therefore, we conducted research within the project "Production of electronic equipment for measuring water level and consumption". The concept includes the improvement of the water resources management system, the use of "Smart Water" and similar digital technologies in environmental accounting, the promotion of the introduction of water-saving technologies in crop cultivation, the improvement of the reclamation of irrigated lands, the promotion of productivity, the reduction of soil salinity and its prevention. Many tasks have been set, such as the use of effective technologies. The goal is to increase the efficiency of irrigation systems from 0.63 to 0.73, to reduce irrigated areas with low water supply from 560 thousand hectares to 190 thousand hectares, and to reduce saline land by 226 thousand hectares. In addition, installation of "Smart Water" water measurement and control devices in all irrigation system facilities and bringing the total area of land covered by economical technologies to 2 million hectares is also considered one of the main tasks. It's not for nothing. As a result of global climate change and other anthropogenic influences, river water is decreasing. Reliable accounting of water consumption helps to achieve savings. "Smart" computing tools, which allow for real-time, digital control, have a higher level of accuracy. This minimizes the human factor and its participation in the stage of cost measurement, data collection and processing. The decision of the Cabinet of Ministers dated April 19, 2022 stipulated that water accounting and reporting should be carried out through automated systems with a minimum dependence on the human factor. The water level and consumption measurement equipment was developed and tested by the Water Problems Research Center. Electronic equipment allows to measure the water level and consumption at water intake points in rivers and canals, as well as to reduce operating costs as it facilitates the maintenance and management of water accounts in real time. It will also help in the process of making quick important decisions for agriculture and water management in water resources management. "Intelligent" device was tested in the Amudarya Irrigation Canal Department of Khanka district in order to monitor the volume of irrigation water in Khorezm region. Farming in this region is done by full irrigation. There is no dry land. Water reserves are also not the same every year.

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Picture 1. Image taken from Research time

Therefore, this area was chosen as a test area. When water-demanding crops are planted in one area and water-demanding crops in another, it would be easier to monitor the amount of water used to irrigate them. Crops such as cotton, rice, and wheat, which require different amounts of water, are grown in the region. This factor also means how important water monitoring is. According to information, water makes up 70% of the territory of our planet. At first glance, it may seem like a huge amount. But only 3% of this amount is fresh water, that is, suitable for drinking. In addition, most of the water reserves are located in glaciers, so it is difficult to use them. If irrigation water is not strictly controlled, there is a high probability that freshwater will mix with groundwater in years of high water. If we use traditional methods in this process, a large amount of manpower is required. The use of electronic devices in the constant monitoring of changes in the amount of water in irrigation networks creates the possibility of obtaining accurate information and saving water. Ultrasonic transmitters (sensors) are installed on the "smart" device, which monitors the consumption of water in irrigation networks during the flow. That is, the decrease of water determines how much water goes to the end of the channel. Sensors are placed in the middle of the channel, high above the water. After that, the distance between the water levels is determined, and a conclusion is made about how much the amount of water in the channel is decreasing.

The demand for this device in Khorezm region is 187. It differs from its alternatives in terms of compactness, the fact that the program is in Uzbek, dispatching service, monitoring features and low cost. In his speech at the 78th session of the UN General Assembly, the head of state emphasized that in the next 30 years, due to the increase in air temperature in our region by one and a half degrees, almost one third of the total area of glaciers disappeared. It was also stated that if this trend continues, the flow of two large rivers in our region - Amudarya and Syrdarya - may decrease by 15 percent in the next twenty years. This causes the yield of agricultural crops to decrease by 40 percent. If we make a comparative calculation of water consumption in the cultivation of certain crops, one and a half tons of water is used to grow one ton of wheat, and 4-5 thousand tons of water are used to grow one ton of rice. So, in this regard, cost-effective equipment is of great importance. If each of us improves ecological culture and finds solutions to problems through scientific approaches, we will fulfill the responsibility of preserving the gifts of nature and passing them on to future generations.

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