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APPLICATION OF SMART WATER MONITORING SYSTEM IN ESTABLISHING CONTROL OF WATER CONSUMPTION IN IRRIGATION SYSTEMS

Sobirov Elmurod Rasul o'g'li
Laboratory Engineer of the Scientific Research Center of Water
Problems under the Cabinet of Ministers of the Republic of Uzbekistan
elmurod.sobirov98@gmail.com

Ruzmetova Muxabbat Xujaniyazovna,
Teacher of the Department of Technological Education of Urganch State University
muxabbat.ruzmetova.74@mail.ru

Matyakubova Yulduz Omonboevna,
Candidate of Agricultural Sciences, Associate Professor of Biology
Department of Urganch State University
yulduz.abdulaziz@gmail.com

ABSTRACT
In this article, one of the problems arising due to the increase in the population in modern times, in order to find a solution to the problems of water shortage for agriculture, it is stated that it is necessary to monitor the water flowing in the canals and achieve the correct distribution.

Keywords: Smart Water, irrigation, water consumption, digital devices, research, hydrosystems, agriculture sector, shortages, results.

Water covers 70% of our planet and it is easy to think that it will always be abundant. However, fresh water - the stuff we drink, wash, water our fields - is very rare. Only 3% of the world's water is fresh water, two-thirds of which is frozen in glaciers or otherwise unavailable to us. As a result, around 1.1 billion people around the world are deprived of water, and a total of 2.7 billion people experience water scarcity at least one month of the year. Poor sanitation is also a problem for 2.4 billion people - exposing them to diseases such as cholera and typhoid fever and other water-borne diseases. Two million people, mostly children, die every year from diarrheal diseases alone. Many water systems that keep ecosystems thriving and feed a growing human population are under stress. Rivers, lakes and aquifers are drying up or too polluted to use.
More than half of the world's wetlands have disappeared. Agriculture consumes more water than any other source and wastes much of it through inefficiency. Climate change is altering weather and water patterns around the world, causing shortages and droughts in some areas and floods in others. At current consumption levels, this situation will only get worse. By 2025, two-thirds of the world's population may face water shortages. Ecosystems around the world will suffer even more. Agriculture uses 70% of the world's available fresh water, but about 60% of it is wasted due to leaking irrigation systems, inefficient application methods, and growing crops that are too thirsty for the environment in which they are grown. Wasteful use of water is drying up rivers, lakes and underground aquifers. Many food-producing countries, including India, China, Australia, Spain, and the United States, have reached or are close to reaching water resource limits. Agriculture of these thirsty crops causes significant pollution of fresh water through both fertilizers and pesticides – all of which affect humans and other species. More than a third of the world's

population lives in countries affected by water, but globally, water appears to be abundant. Freshwater resources are not always available at the right place and time, and they are not always well managed. As climate change alters the nature and severity of weather events, the occurrence and amplitude of water-related stresses will increase. Thus, the importance of good water management also increases.

Picture – 1. Smart Water monitoring device.

The purpose of the work: to create a Smart Water system based on the conditions of the Khorezm region. Selection of this device for testing at water measuring hydropost of Kulobod canal 53, located in Khanka district, belonging to the Amudarya Irrigation Canal Administration. Development of a cheap, compact, modern system for monitoring water consumption.

Research Task:

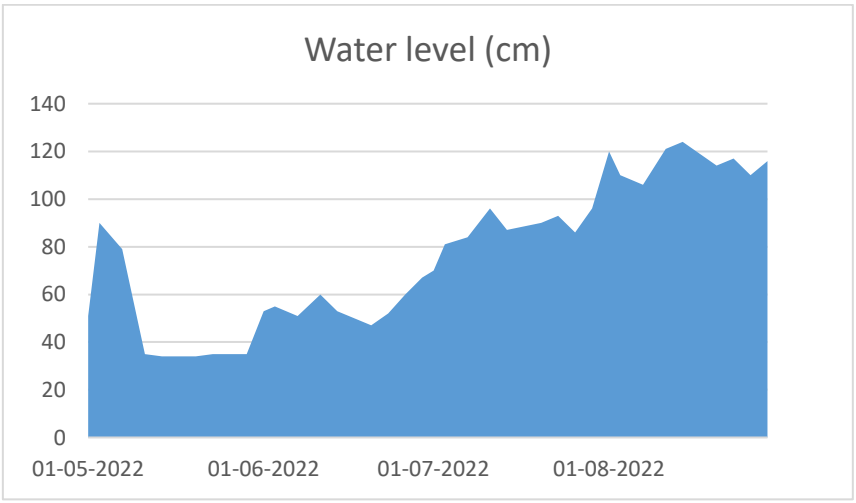
- To avoid excess water consumption, measure the flow of water on special hydrometric bridges with the help of a vertushka and calculate the consumption of this value in relation to the surface of the flow in the table.
- Creating a Smart Water device and at the same time ensuring regular connection to the database by developing an algorithm for the software part of the Smart Water device in accordance with the table obtained in the above paragraph.
- Based on the results of the test, it is necessary to give a thorough justification of the examples of the device that was found to be effective, and at the same time to prepare proposals.

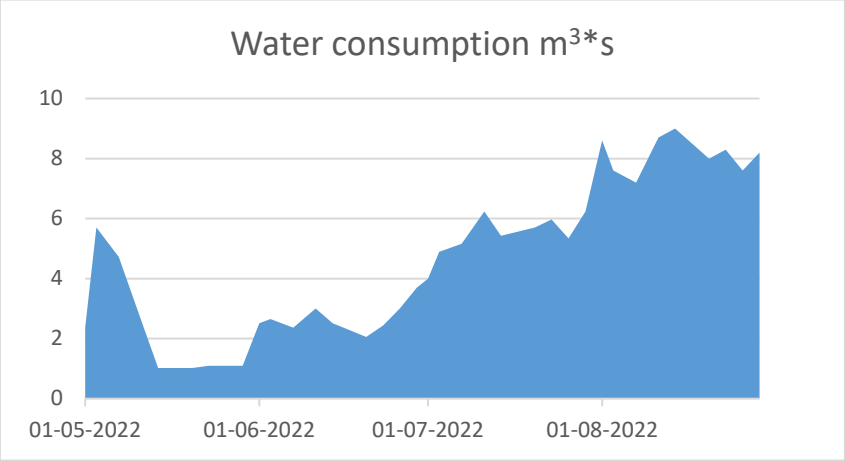
During the implementation of the project, the problems of 14-15 water measuring hydroposts belonging to the Amudarya Irrigation Canal Department were studied. In Galaba village of Khanka district, a small ditch for permanent water level was created with the help of basalt concrete coating on the side of the hydrometry laboratory of our center, a Smart Water device was installed in this ditch, and the working process was tested. Using hydrometric bridges, the result was calculated in the form of a table in excel format after calculating the data obtained with the help of a vertushka. This table was obtained as a result of measurements at the 53rd hydrostation of the Kulobod canal in Khanka district. With the help of verticals, the surface of the flow was 13.05 sq.m, and with the help of the vertushka, the flow speed was determined as 0.387m/s. In the last result, the total consumption was calculated at 5,763 cubic meters per second.

Table - 1. Table for calculating water consumption in the channel.

No. Verticals	The distance between the vertical	Vertical depth	Average depth between verticals	Area between verticals	Depth of measuring points from the bottom	The number of rotations of the rotary blades for receiving	I	II	III	IV	The total number of rotations for the entire observation period	the number of revolutions of the blades per second	Current speed m/s	Average speed in vertical m/s	Average speed between verticals is m/s	Live area between verticals is m2	Q - Water flow between verticals m3 / s
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
left	0,5		0,35	0,175												0,169	0,030
1		0,70							54,1		60	1,11		0,241	0,241		
	2,0		0,95	1,90					27,5		60	2,18		0,473		0,377	0,715
2		1,20							23,6		60	2,54		0,551	0,512		
	2,0		1,20	2,40					26,4		60	2,27		0,493		0,547	1,312
3		1,20							19,4		60	3,09		0,670	0,582		
	2,0		1,20	2,40					18,2		60	3,30		0,714		0,611	1,467
4		1,20							22,9		60	2,62		0,568	0,641		
	2,0		1,275	2,55					21,0		60	2,86		0,619		0,602	1,536
5		1,35							25,7		60	2,34		0,507	0,563		
	2,0		1,325	2,65					25,3		60	2,37		0,514		0,510	1,352
6		1,30							32,5		60	1,85		0,400	0,457		
right	1,5		0,65	0,975												0,320	0,312
	12	1,16													0,499	3,14	6,725

This device (Smart Water) was put into practice throughout the year, updated, foreign technologies were studied. 11 - As you can see in the picture, our device was installed on hydropost 53 - Kulobod channel and the results of the experiment were monitored. On the eve of the arrival of the summer months, the changes were studied on the basis of experience and data were collected. The graph below shows the water level data for the entire period from May to the beginning of July. If you really follow, the water level will increase by 2 times by the beginning of July, as a result of which it will be convenient for irrigation during the season of rice crops.





Graph - 1. Graph of data received from the Smart Water device during a certain period

The data in this Graph-1 is used to find the transverse flow velocity in the channel for every 2 meters from the hydrometric bridges, and at the same time, the cross-sectional surface of the water in the channel is found. So, we have a current, a cross-sectional area, now it's time to calculate them, that is, to find the amount of water flowing per second, we multiply the area by the speed. As a result, results similar to Table-1 are obtained. Based on these results, water consumption is calculated using the data in Graph-1. Graph - 1. Data received from the Smart Water device during a certain period. The results of our experiment show the importance of digital technologies in water accounting. In addition, convenient and reliable reporting is maintained. Due to the fact that developed countries have installed monitoring systems and control of irrigation, a number of reports on irrigation systems are available online without travel costs. In addition, in the 21st century, the local irrigation system, as in the Middle Ages, does not work, one of the reasons for this is the increase in the population and the high need for agriculture for food, the amount of water resources is significantly reduced. In the introduction, the results of international scientific research are mentioned and a number of information about water scarcity are given. Based on the given information, the issues of equal distribution and conservation of water should be considered. Regarding these issues, we are working on the proper distribution of water in the Khorezm oasis and bringing the centuries-old agriculture to the modern stage. Of course, how can we distinguish between modern and local methods. According to the local method, a total of 173 hydroposts in the Khorezm region should be written down. Transportation costs, extra labor required. Almost nothing is required of us in technology. The program itself works on the basis of such an algorithm. He keeps the water account himself.

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