NOVATEUR PUBLICATIONS
JournalNX- A Multidisciplinary Peer Reviewed Journal
ISSN No: 2581 - 4230
VOLUME 10, ISSUE 7, July - 2024

COMPLEX APPROACHES AND STRATEGIC DIRECTIONS IN DIGITALIZATION OF THE WATER MANAGEMENT SYSTEM

Akbarova Shakhnoza Yakubovna
Qarshi University of Economics and Pedagogy
Independent Researcher

Abstract
This article develops proposals in areas such as monitoring and management of water resources, precision technologies in irrigated agriculture, irrigation forecasting and optimization, development of intelligent farm management systems, and the use of data and analysis in decision-making in determining an integrated approach and strategic direction in digitalization of the water resources management system

Keywords: water resources, water distribution, water shortage, water management, water monitoring, reservoirs, water-saving technologies, irrigation forecasting, irrigation optimization.

Introdution

Water accounting - it allows to control the use of water resources and provides a basis for the dispatching management of water distribution and water supply in irrigation systems. All distribution points, diverting and distribution nodes in inter-farm and intra-farm networks must be equipped with water measuring devices that allow distribution of water in certain consumptions (volumes) in accordance with water use plans .

It is known that over the last 40 years, global water use has increased by approximately 1% per year . Until 2050, as a result of the growth of the population, the impact of socio - economic factors , the development of consumption production and its increase This figure is predicted to increase.

Agricultural water use in increasingly water-scarce regions in increasing efficiency digitalization of the water management system is important. Digitalization of the water management system requires a comprehensive approach and setting strategic directions . These strategic directions include :

1. Monitoring and management of water resources . The development and implementation of sensor technologies and monitoring systems will allow agricultural entities to fully determine the need for water based on evidence , as well as to optimize its distribution and use. Some key aspects of water monitoring and management include :

– Water Quality Monitoring : Monitoring systems monitor water quality in rivers, lakes, reservoirs, and groundwater . This allows to control the toxic level of water and ensure compliance with quality standards.

– Water level monitoring : Measuring water levels in rivers, lakes and groundwater is important for understanding and predicting water resources. It helps in planning water use, identifying reserves and making decisions about water distribution.

– Reservoir management and flow regulation : Monitoring of reservoirs and hydroelectric stations helps regulate water levels and flow, which is important for flood prevention, ensuring access to water during droughts, and maintaining ecosystems.

– Agriculture and Irrigation : Monitoring and management of water resources is important in agriculture , including irrigation management , efficient use of irrigation water, and control of agricultural wastewater pollution .
– Wastewater Management: Wastewater treatment systems and monitoring the release of waste water into the environment can help reduce water pollution and preserve aquatic ecosystems.
– Protection and restoration of aquatic ecosystems: includes measures to maintain aquatic biodiversity, treat water and restore wetlands and natural filters that help maintain healthy aquatic ecosystems.
– Education and public awareness: Education and public awareness about the importance of sustainable water management and water conservation technology play an important role in promoting and maintaining awareness of water conservation.
Monitoring and management of water resources often requires an interdisciplinary approach that includes hydrology, ecology, engineering, policy, and society . The use of modern technologies, such as remote sensing, sensors and information systems, can significantly increase the efficiency of monitoring and management of water resources .

2. Specific technologies in irrigated farming . In agriculture such as micro-irrigation and soil moisture management systems the use of water-saving technologies allows for more efficient use of water , minimizing evaporation and maintaining optimal moisture conditions for plants . Here are some agricultural irrigation methods :
– Micro-irrigation systems : These systems deliver water directly to the roots of plants in the optimal amount and at the right time . This reduces water loss through evaporation and allows more efficient use of water resources.
– Soil moisture management: Optimum conditions for plants can be ensured by monitoring soil moisture and using automatic irrigation systems that prevent both drought and waterlogging .
– Correct application of fertilizers and pesticides: Using GPS and drone technology, fertilizers and pesticides are applied only when needed , reducing chemical overuse and environmental impact.
– Data monitoring and analysis: Analyzing water user activity based on data on soil, weather, crop yield and other factors helps farmers make more informed decisions and optimize field and crop management.
– Proper planning and control: the use of modern software systems and information technologies allows for proper planning of agricultural work, coordination of machine work, and optimization of efficient use of resources.
water-efficient irrigation technologies in agriculture can help agricultural producers improve production efficiency, reduce costs, and minimize negative environmental impacts.

3. Predict and optimize irrigation : Based on information about soil moisture, weather conditions and plant needs econometric models are created and it is possible to develop optimal irrigation strategies based on the characteristics of each region .
Irrigation forecasting and optimization using econometric modeling is a promising area of water management where new levels of efficiency and resource savings can be achieved . This approach

combines data collection and analytical processing to create more accurate and flexible irrigation systems and shows how it can work in practice : For example,

Soil moisture: installation of soil moisture sensors at different depths and areas of the field allows obtaining accurate information about the current moisture status.

Weather conditions: Uses data from weather stations and satellite images to monitor air temperature, precipitation, humidity, and other factors .

Plant needs: Optimum irrigation volumes are determined by plant species, their growth stages, and scientifically based water requirements .

Therefore, it is necessary to take into account the following directions in forecasting and forecasting of irrigation:

1. Data analysis . Collected data is studied, compiled , and analyzed using econometric algorithms to determine trends and relationships .

2. Develops models that can predict future irrigation needs based on current and expected conditions .

3. creates algorithms to determine optimal irrigation parameters (when, how much and where to irrigate) taking into account all collected data and forecasts .

The use of irrigation optimization algorithms not only improves the conditions for the growth and development of plants, but also greatly contributes to saving water resources and reducing irrigation costs. It plays an important role as a key element in creating sustainable and efficient agricultural systems .

4. Development of intelligent farm management systems : Digitization of agriculture involves the development of integrated farm management systems that can automatically adapt to changing conditions, including changes in soil moisture and weather conditions, to optimize the use of water resources.

Development of intelligent farm management systems plays an important role in the modern digitization of agriculture. These systems allow farmers to effectively manage resources, increase productivity, reduce costs and reduce environmental impact .

The main aspects of the development of intelligent farm management systems can be explained by the following factors:

Sensors and IoT : Installing sensors in the fields to collect data on soil moisture , productivity, weather conditions and other factors is the basis for the development of intelligent systems . This data is transmitted to cloud systems for analysis.

Data analysis : Collected data is analyzed using artificial intelligence algorithms. This allows predicting the optimal time interval for planting, optimizing the use of fertilizers and pesticides , and adapting the irrigation system to current conditions.

Automation: Automatically make decisions based on data analysis and prediction , i.e. controlling equipment such as drones and more in the fields to apply irrigation systems, fertilizers or pesticides . will be done .

Integration with other systems : Intelligent farm management systems can be integrated with other digital systems, such as weather forecasting systems, to improve forecasting accuracy and *adaptability* .

Feedback and management : Systems provide farmers with information on the current state of their fields and recommendations to optimize resource management . This enables farmers to respond quickly to changes and make more informed decisions.
is to create a more sustainable and efficient agriculture that makes efficient use of resources and minimizes negative impacts on the environment .

5. Using data and analytics for decision-making : Analyzing data on water use, crop yields, soil properties and other factors allows us to identify patterns and trends, optimize processes and develop strategies based on the efficient use of water resources.
The use of data and analytics in agricultural decision-making plays an important role in optimizing processes and efficient use of water resources. How to use data analysis for this purpose :
1) Monitoring of water use: Collecting data on water consumption and distribution on farms allows for the analysis of the efficiency of its use. This includes information on irrigation, water sources, irrigation systems, and more.
2) Analysis of crop yield and soil quality: Using data on crop yield and soil properties can determine the impact of water resources on plant growth and development. This helps to determine the optimal irrigation conditions for different crops and soil types.
3) Weather and climate forecasting: Analyzing weather and climate data can predict changes in soil moisture, precipitation, and temperature conditions, which can help optimize irrigation schedules and water use.
4) Identify continuities and trends : Data analysis reveals continuities and trends in water use and crop yields , which can help develop strategies to optimize processes and improve agricultural production efficiency.
5) Process optimization and strategy development: Based on data and analysis, strategies and action plans are developed to optimize the use of water resources. This includes determining optimal irrigation systems, managing water resources depending on weather conditions, and more.
The use of data and analytics enables farmers to make better decisions based on evidence and analysis, which helps to increase the efficiency and sustainability of agriculture and optimize the use of water resources .
In conclusion, the digitalization of agriculture creates great opportunities for improving the efficiency of water use, which not only increases the yield and income of agricultural products , but also helps to improve environmental sustainability and, most importantly, save water.

References

1. Z.S.Shokho'jaeva, Sh.Ya.Akbarova. Investment efficiency and economy of Kashkadarin region . Proceedings of the conference " Financial, legal and innovative aspects of investing in the regional economy " , 2020. pp. 203 - 208.
2. S. Z. Safovna , SM Mirjamilovich . Development of entrepreneurship and improvement of organizational and economic bases of its state regulation . ACADEMICIA: An International Multidisciplinary Research Journal, 2021 . Str. 1186 -1193.

3. SZSafoevna, MN Utkirovna. Organizational and economic basis for the development of cotton and textile clusters . ACADEMICIA: An International Multidisciplinary Research Journal , 2021. No. 2, pp. 1289-1296.
4. ZSShoho'jayeva, NJMamanazarova, HNMirjamilova. "Ways to improve the management of water systems in the conditions of digitalization of agriculture." ISSN: 0253-7214 Journal of Advanced Zoology Q4 quartile October 28, 2023. Vol 44(S-2), 2493-2498.
5. ZSShoho'jayeva, NJMamanazarova, HNMirjamilova. "Ways of efficient use of water in conditions of water resources shortage." E3S Web of Conferences 463, 02035 (2023) EESTE2023 https:// doi.org/ 10.1051/e3sconf/202346302035
6. Z.S. Shokhojaeva. Prospects for the development of the agrarian sector in the conditions of modernization of the economy . Monograph. Tashkent, 2020.