

## **Effective Use of Water Resources for Sustainable Water Security in Uzbekistan**

**Abdushakhidov Nodir Bahromovich, Madhab Rijal**

*Doctoral student of Chang'an University, China*

**Abstract:** This article analyzes existing and potential future problems in the field of water resources in Uzbekistan. The article focuses on the study of the factors that influence policy development in the area of efficient use of water resources use in Uzbekistan. The article also focuses on the issues of rational use of water resources in drinking water supply and irrigated agriculture in Uzbekistan, as well as the advantages of water saving technologies and their solutions. We attempt to outline the state of water resources in the country, chemical and biological analysis of water resources, highlighting the most important issues and some recommendations for the development of water conservation technologies.

**Keywords:** water resources, water policy, water management, drinking water, drip irrigation, irrigation, agrotechnology.

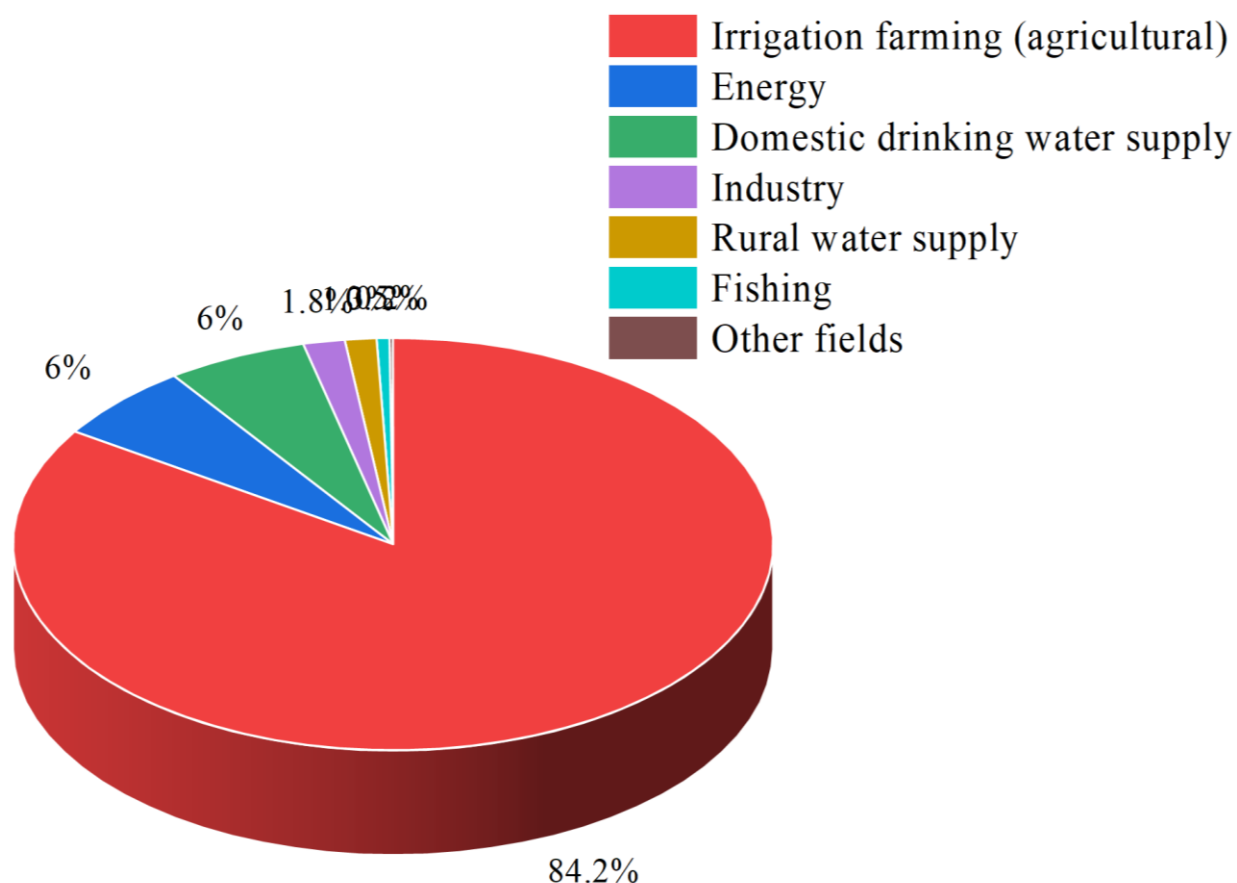
### **INTRODUCTION:**

The social and economic development of the country, in many sides, depends on natural resources, in particular, water resources, as in other regions. Today, rational use of water has become one of the key issues in the sustainable development of our country. Currently, about 40 percent of the world's population lives in areas lacking access to clean drinking water, the total water consumption per capita in Central Asia is about 2,800 cubic meters in Tajikistan, 2,600 cubic meters in Uzbekistan, 1,900 in Kyrgyzstan, 4000 cubic meters in Turkmenistan, and 900 cubic meters in Egypt, 455 cubic meters in Israel and 290 cubic meters in Jordan [1]. As the population grows year by year, the demand for water will increase in our Republic. At present, with an average of 2,600 cubic meters per year, this figure is estimated to be 1,200 cubic meters per capita by 2025. By 2025, six out of every 10 people or 5.5 billion people will have access to an area lacking safe drinking water. It is known that the demand for water in Central Asian countries is mainly met by transboundary rivers - the Amudarya and Syrdarya rivers. These river originates from Tajikistan and Kyrgyzstan, where 30% of 8,000 glacier and 16% of 10000 glacier have melted due to climate change respectively[2].

Water scarcity, along with the great economic hardship, causes public health and social problems. Due to water pollution, allergic diseases such as gastrointestinal tract, kidneys, liver, and allergic diseases in blood occur in the life. Water security can be viewed not only in terms of man, society and state, but also in terms of nature and its elements. Because ecology studies not only human beings but all living organisms and their relationship with the environment. Secondly, security can be caused not only by the degree to which organisms are protected from man-made or natural disasters and processes, but also can appear by invisible and indirect effects. For example, there is a high probability that inefficient use of water resources and the resulting water shortage problem will occur. Of course, such a problem is an environmental

threat, but it can also have social, economic, political, cultural and educational implications. Therefore, the concept of 'security' does not apply to a particular subject or sector. As noted by Gazinazarova, "Ecological safety is a state of protection of the natural environment and vital interests of the person from the possible adverse effects of economic and other activities, from the possible effects of natural and emergency situations of man-made character, and the protection from their consequences" [3]. More than 80% of infectious diseases are associated with poor quality of drinking water and violation of sanitary and hygienic rules in water supply. Today, about 3 billion of the world's population consume contaminated water, resulting in nearly 2 billion of them being ill [4].

According to observations, by 2030, climate change and global warming are expected to reduce the glaciated reserves of these rivers by 15–20%. The fact that mountain glaciers shrink by 0.2–1% per year, and snow reserves in mountain river basins are steadily decreasing. Due to climate change, the summer period in our region will be prolonged. In turn, the rate of irrigation of crops will increase by 5% by 2030, by 7-10% by 2050 and by 12-16% by 2080. Consequently, one of the most important issues is the attitude towards nature, including the rational and rational use of water resources. the status of water resource use in economic networks in Uzbekistan is shown in figure 1.



**Figure 1. State of use of water resources in economic networks in Uzbekistan (2020)**

This article aimed to perform following tasks:

- Analysis of water quality reports and environmental water problems;
- Analysis of water policy in the country and recommendation for efficient water use equipments

#### **MATERIALS AND METHODS:**

On April 20, 2017 a resolution of the President of the Republic of Uzbekistan Sh. Mirziyoev “On the Program of comprehensive development and modernization of drinking water supply and

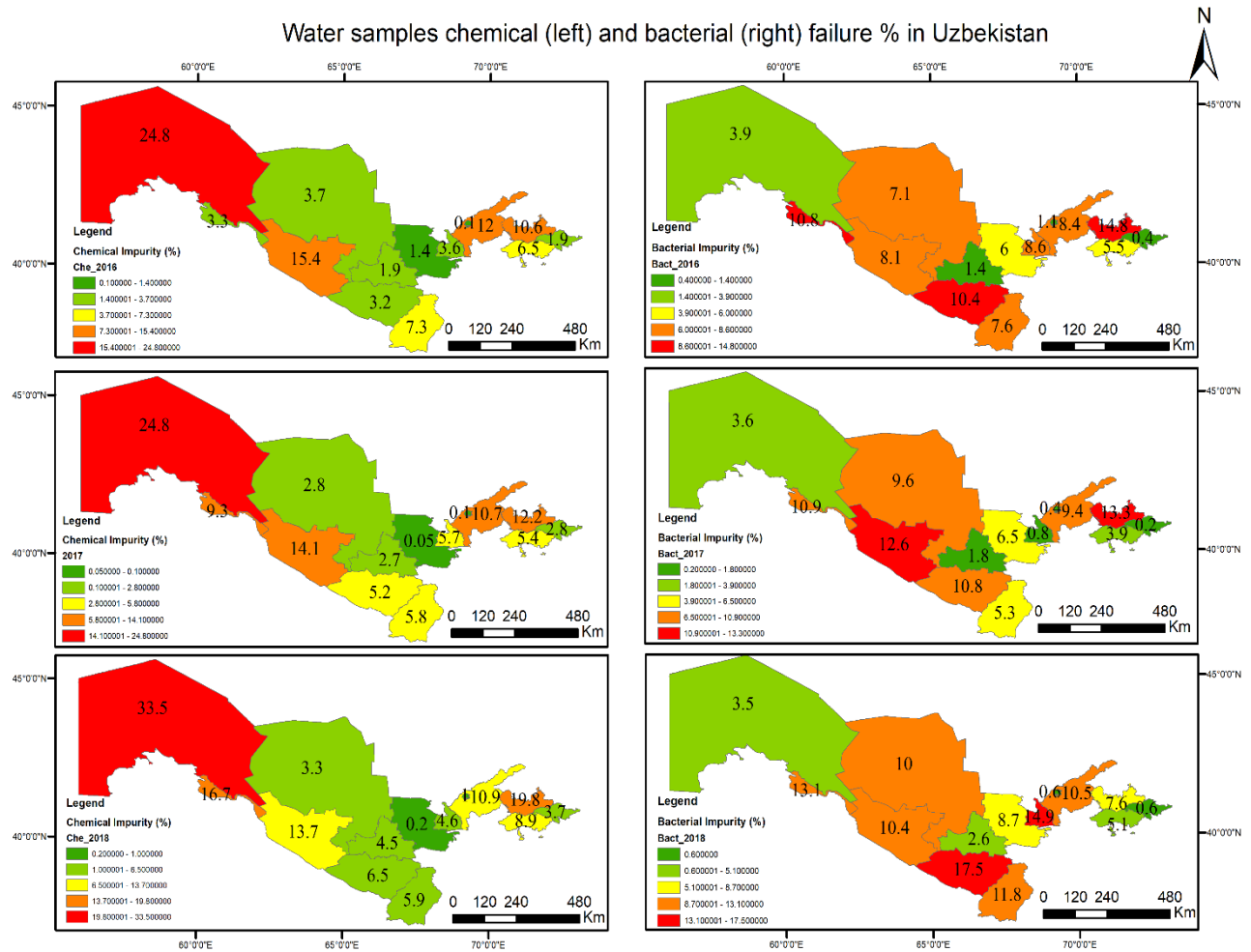
sewerage systems for 2017-2021” was adopted [5], for the further development and modernization of drinking water supply and sewerage systems, and the introduction of modern information and communication technologies in the water supply sector over the years. On May 4, 2017 the Decree of the President of the Republic of Uzbekistan “On Measures for Regulation of Control and Accounting for Rational Use of Ground Water Resources for 2017-2021” was adopted [6]. It focuses on the rational use of water resources, the proper accounting of the volume of water received, and the prevention of pollution and depletion. The Ministry of Agriculture and Water Resources of the Republic of Uzbekistan is directly responsible for the rational use of water resources and regular monitoring of water management bodies. The Decree number PF-5134 of the President of the Republic of Uzbekistan "On Measures for the Radical Improvement of the Activities of the Ministry of Agriculture and Water Resources of the Republic of Uzbekistan" was adopted on August 4, 2018 [7]. In accordance with the Decree number PF-5883 of the President of the Republic of Uzbekistan dated November 26, 2019 "About measures for improving the management of water resources of the Republic of Uzbekistan to improve the quality and improve the quality of drinking water" attraction of foreign investments and development of the country's drinking water supply and sewage infrastructure is the main purpose of the decree.

The development of industry and agriculture in the last 40-50 years has had a negative impact on the status of fresh groundwater, which resulted in a 35% reduction in water resources due to the construction of unauthorized water intake structures and uncontrolled water withdrawal [8]. Currently, systematic works are being carried out to improve the quality of drinking water in the country, in rural areas, and in cities, including in the lower reaches of the Amudarya river. At the same time, in some parts of the country, groundwater is the only source of water supply to the population. In general, 80% of the demand for drinking water in Uzbekistan is met by fresh groundwater, and the remaining 20% by land sources. Currently, the needs of the population of 69 cities, 335 villages and 2902 settlements are met by the use of underground water resources. It is planned to improve and develop the State Water Resources Monitoring System nationwide in order to organize regular monitoring of groundwater and surface water throughout the Republic. At the same time, it is necessary to pay special attention to the technical condition of sewage treatment plants and sewerage sectors, which do not meet modern sanitary and hygienic requirements of cities and settlements.

Data of water quality samples and their failure percentage has been collected from Agency of Sanitary Epidemiology of the Republic of Uzbekistan from 2016 to 2018. Data was presented in ArcGIS to visualize the failure percentage of water samples in chemical analysis and bacterial analysis. Dark green color indicates lower percentage of water quality failure i.e. higher percentage of confirming water quality and dark red indicates high percentage of water quality failure.

Currently, the irrigation system of 4.3 million hectares of land consists of 1,600 pumping stations and 140,000 km of collectors with a capacity of 1 to 300 m<sup>3</sup>/s, and requires an average of 57 km<sup>3</sup> of water per year. Improper and inefficient use of water is the main factor limiting the development of irrigated agriculture. Today, the state of Uzbekistan's irrigation systems is 0.70%, and the efficiency of water use methods is 0.65% on average.

## Results:



**Figure 2. Water samples chemical (left) and bacterial (right) failure % in Uzbekistan.**

As shown in Figure 3, chemical and bacteriological analyzes of drinking water were carried out by the Agency of Sanitary Epidemiology of the Republic of Uzbekistan from 2016 to 2018. As a result of these analyzes, a high percentage of non-compliant drinking water in terms of chemical and bacteriological indicators was noted in Bukhara, Namangan, Surkhandarya, Kashkadarya, Tashkent, Khorazm regions and the Republic of Karakalpakstan.

## Discussion

Therefore, a well-thought-out water policy is needed to prevent future water shortages in the country. First of all, we need to solve the problem of water saving in irrigated agriculture, which is currently demands a lot of water. This issue is directly related to water-saving technologies. In this regard, it is advisable to allocate subsidies in the following order for government rainfall and drip irrigation system implementer in irrigated agriculture, as well as to expand this system.

Exemption of land tax for rainwater irrigation system implementer and also exemption from customs duties by January 1, 2025, of components and raw materials required for the production and replenishment of the sprinkler irrigation and drinking water supply systems. Establishment of regional enterprises specializing in the water efficient devices such as sprinkler irrigation system, as well as for drinking water supply (pipes, hoses, fittings, automatic equipment, water supply equipment, etc.) and exempting them from all types of taxes for a period of three years. .

To improve the mechanism of subsidizing establishment of a water saving technologies construction department in the Republic to coordinate the processes, taking into account the rapid introduction of drip and rainfall irrigation technologies in the country is proposed. The main task of the Directorate is to form forecasts for the implementation of, drip, sprinkler, and

other water-saving technologies. Submission and registration of conclusions on the legality of the contractual agreements concluded between agricultural producers and enterprises producing these technologies. Monitoring of construction works. Granting subsidies from the state budget in the prescribed manner. Acceptance of construction objects for service and organization of services. Establishment of the mechanism of transfer of the state budget subsidy to the account of the pre-construction contractor and not to the agricultural producers' accounts directly after the introduction of the technology. At the same time, contractors are allocated on the basis of land projects, examinations and letters of guarantee on which drip irrigation technology will be applied. These contractors are also recommended by the newly formed Directorate.

The implementation of the above measures will serve as a basis for preventing future water shortages in the country. If Uzbekistan irrigates 2-2.5 million hectares of its irrigated land at its own expense, the risks of climate change and other water shortages can be prevented.

### **Conclusion and Recommendations**

About 84.2% of the total water volume is used for irrigation in Uzbekistan, which is 38.6–59.5 km<sup>3</sup> per year (2002–2018), depending on the available water reserves. Given the importance of agriculture for the country's economy, the fact that the livelihood, income and well-being of 16 million 579 thousand people living in rural areas directly depend on water, it is important to provide this sector with sufficient water. It is known that the demand for water in Central Asia is mainly met by transboundary rivers - the Amudarya and Syrdarya. According to observations, by 2050, due to climate change and rising global temperatures, the reserves of glaciers that supply water to these rivers are expected to decrease by 15-20%. Failure to prevent such water problems in Uzbekistan could lead to water shortages in the country

As a result of not meeting the demand for drinking water, human health is at risk. At the same time, water scarcity as a result of freshwater pollution can also lead to increased competition between sectors. For example, in the Bukhara region in 2016-2018, 8 thousand 256 drinking water samples were analyzed for chemical parameters, and the level of non-compliance was 15.4% to 13.7%. Analysis of bacteriological indicators of drinking water in this region was 13,281 during these 3 years, and the indicator of non-compliance changed from 8.1 to 10.4 percent.

Based on above conclusions, in the development of policy in the field of management and use of water resources in Uzbekistan, it is expedient to implement the following:

- 1) Development of cooperation in interstate relations on the use of transboundary water resources;
- 2) Adopt an interstate water conservation program to prevent future water shortages in the Central Asian region;
- 3) Improving water policy and water management mechanisms to ensure access to safe drinking water for the population and efficient water use mechanism in irrigation systems.
- 4) Introduction of market principles, improvement of mechanisms for regulation and financing of water resources;
- 5) Improving the legal framework of water management by developing and implementing of principles of integrated water resources management and improving the current system of state management of water resources
- 6) Creation of flexible mechanisms for water distribution between sectors of the economy and in irrigated agriculture;
- 7) Infrastructure modernization and development of water services including water metering and accounting;
- 8) Improving the reclamation of irrigated lands

- 9) Capacity building of project organizations and improvement of project quality;
- 10) Carrying out expertise with the involvement of international experts on the construction of reservoirs and their safety in the country;
- 11) Development of human resources, scientific and innovative potential of water economy;
- 12) Strengthening research in the field of water management and the widespread introduction of scientific achievements such as introduction of information and communication technologies (ICT) in the water sector;

The implementation of the above measures and tasks will ensure the development of water policy in the country and will serve as an important basis for preventing future water shortages.

**List of references:**

1. Z. Hudaiberganov Text of lectures on "Economic Problems of Efficient Use of Water Resources" T. 2004
2. Chathuranika, I., Khaniya, B., Neupane, K. et al. Implementation of water-saving agro-technologies and irrigation methods in agriculture of Uzbekistan on a large scale as an urgent issue. *Sustain. Water Resour. Manag.* 8, 155 (2022). <https://doi.org/10.1007/s40899-022-00746-6>
3. Gazinazarova, I. Ahmedov, B. Muhamedgaliev, A. Khojiev, *Environmental safety.*-Tashkent: 2010-142 p.
4. A brochure dedicated to the International Decade for the Water of Life, 2010
5. Resolution of the President of the Republic of Uzbekistan "On the Program of comprehensive development and modernization of drinking water supply and sewerage systems for 2017-2021" // newspaper "Xalq so'zi", April 22, 2017
6. Resolution of the President of the Republic of Uzbekistan "On Measures for Regulation of Control and Accounting for Rational Use of Ground Water Resources in 2017-2021" // May 6, 2017
7. Decree of the President of the Republic of Uzbekistan "On measures to radically improve the activities of the Ministry of Agriculture and Water Resources of the Republic of Uzbekistan" // Collection of Legislation of the Republic of Uzbekistan. August 14, 2017.-32 (792), Article 793-Tashkent: "Adolat" publication,) 2017.-p.5-9.
8. B.B Alikhanov, S.V Samoylov. Water resources: factor blagopoluchiya and ustoychivogo razvitiya // International Conference on "Joint action to mitigate the effects of the Aral Sea disaster: new approaches, innovative solutions and investments". 2018.