

PROBLEMS OF WATER SCARCITY IN UZBEKISTAN

Madraim Khasanovich Sarikulov

Associate Professor, Almalyk State Technical Institute, Almalyk, Uzbekistan

sarikulov.madraim4@gmail.com

Abstract: This article examines the problems of drinking water scarcity in Uzbekistan. The problems of water scarcity in Uzbekistan are considered in the context of the socio-economic development of the country, energy and food production, ensuring healthy ecosystems and the survival of humanity at the present stage. Issues related to improving the situation of providing clean water to the population were also considered. In addition, the problems of water scarcity are emphasized, taking into account the demographic growth of the population, as a result of which the scale of water consumption will significantly increase. The factors accompanying the water shortage are reflected, which subsequently began to lead to a deterioration in the living conditions of the population.

Keywords: Earth's water resources, drinking water, hydropower, Toktogul reservoir, water-saving technology, solar and wind energy, World Economic Forum, heat wave.

INTRODUCTION

An important milestone in modern history has been the recognition of the human right to water and sanitation. According to the resolution adopted by the UN General Assembly in July 2010, everyone has the right to access sufficient water for personal and household needs (from 50 to 100 liters per day per person). At the same time, the water must be safe, acceptable in quality and price (the cost of water should not exceed three percent of household income), as well as physically accessible (the water source should be located within 1,000 meters from the house and it should take no more than 30 minutes to set).

The water needs on our planet are growing along with population growth and increased industrial production, which worsens the ecological condition and depletes the Earth's water resources. According to the UN report, more than 400 million people live in areas with water scarcity worldwide. More than 1 billion people in the world do not have access to clean drinking water. And due to the shortage of water for watering plants, about 850 million people are starving. According to statistics, 2 million people die every year on the planet from diseases related to the use of contaminated drinking water, most of them children. In developing countries, 75% of all cases of diseases are associated with the use of unsuitable food and drinking water.

LITERARY RESEARCH

According to experts in general, over the past 100 years, water consumption has grown 2 times faster than the number of inhabitants on the planet. Because as the population grows, the need for food increases, and with it the need for water. Agriculture, according to the FAO, uses up to 70% of water and is the world leader in resource consumption, with 20% coming from the industrial sector and about 10% from the municipal sector.

Poor water management of irrigation systems creates many problems that worsen salinization and pollution of groundwater and water sources. Above-ground and underground streams, along the way of their movement, carry out salts from rocks and, in the process of advancing, are enriched with salts of these deposits, changing their chemical composition and mineralization. For example, one of the most serious problems of the Volga region and the

republics of Central Asia was the depletion of water resources, which led to the ecological disaster of the Aral Sea.

According to the source [1], the main sources of fresh water are rivers, lakes and swamps. However, the natural distribution of resources around the world is uneven. For example, Europe is home to 20% of the world's inhabitants and accounts for only 7% of its reserves. The number of people on earth is growing every day, and with it the demand for drinking water is growing. In other words, if the annual population growth is 84 million people, then the necessary increase in water resources should be at least 60 million cubic meters. Improper and irrational use of natural resources leads to their short-term consumption, as groundwater recovery is very slow – 1% per year. In addition, water pollution (industrial wastewater, discharges, and fertilizer flushing from fields) plays an important role in this problem. For example, in the United States, 37% of rivers and lakes are so polluted that you can't even swim in them. If action is not taken, by 2030, almost 5 billion people, or about 67% of the world's population, will still not have satisfactory water treatment. Today, there are about 750 cubic meters per inhabitant of the earth's surface. By 2050, this figure will decrease to 450 cubic meters. According to the United Nations classification, up to 80% of the world's countries will be located in areas below the water scarcity line. They are projected to be affected in Africa, the Middle East, North China, and South Asia.

According to [2] the World Bank, the loss of drinking water in Uzbekistan in 2018 amounted to 469 million cubic meters, or 32% of the total volume of drinking water produced. Large-scale water losses occur against the background of unfavorable forecasts about the future water supply situation in the Central Asian region, in particular Uzbekistan. By 2050, according to World Bank forecasts, the water flow in the Syrdarya River basin may decrease by 2-5%, and in the Amudarya River basin by 10-15%, which will increase water scarcity. This will affect not only agriculture, but also hydropower, as the productivity of hydroelectric power plants in some parts of the region may decrease by up to 20% by 2050.

As noted in the materials of the website [3], Kyrgyzstan will send water to Kazakhstan and Uzbekistan in exchange for electricity. Kazakhstan, Kyrgyzstan and Uzbekistan have agreed on mutual support in the water and energy sector. At the meeting in Almaty, the parties agreed on the parameters of cooperation for the autumn-winter and next growing season. Due to the low water level in the Toktogul reservoir, Kazakhstan and Uzbekistan are ready to supply Kyrgyzstan with electricity in winter so that it can reduce its own production and accumulate water. In the summer, these water resources will be sent to neighboring countries for stable irrigation of farmlands. It was also decided to take joint energy conservation measures. At the end of the meeting, a trilateral declaration was signed, fixing the volume of electricity supplies and water storage for the 2026 season.

According to the source [4], the Karasuvskoye reservoir in the Samarkand region has completely dried up. The Korasuv reservoir in the Pajariki district had a capacity of 26.9 million cubic meters and allowed to irrigate 8,100 hectares of land. In May 2019, 42.10 million cubic meters of water were collected in this reservoir.

According to the website [5], Uzbekistan's water reserves have decreased by 6.5 billion cubic meters. In 2025, more than 40 billion cubic meters of water were used for agriculture in Uzbekistan, but the total volume of water reserves decreased by 6.5 billion cubic meters compared to last year. The internal reservoirs have accumulated 2.7 billion cubic meters less water. At the same time, water savings have been achieved through water-saving technologies and irrigation modernization. Over the past five years, 60 trillion soums and \$622 million in investments have been allocated for water management reform, and water-saving technologies have been introduced on 60% of irrigated lands.

According to the FAO [6], Uzbekistan uses 169% of its available water resources (Figure 1), one of the highest rates in the world. Agriculture consumes up to 90% of all fresh water, while in most countries of the world it consumes about 70%. At the same time, losses in irrigation systems reach 50%.

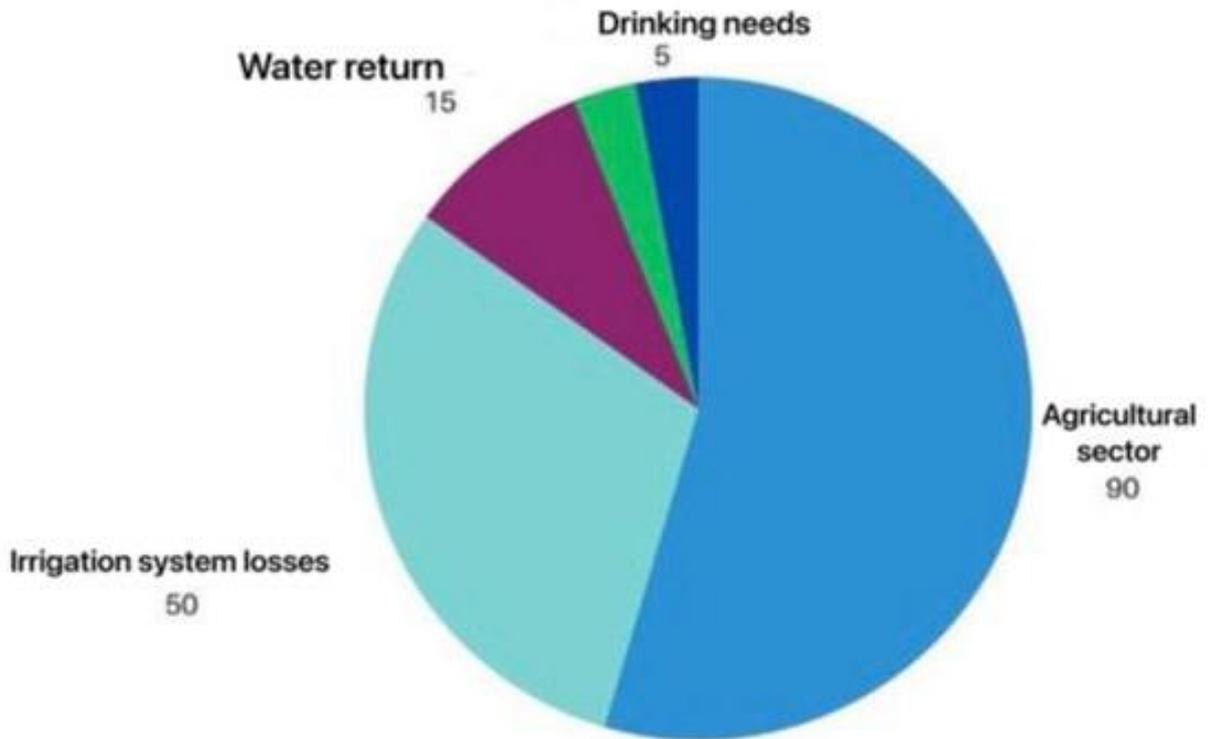


Figure 1. Illustration of the distribution of water resources in Uzbekistan.

Based on the materials of the website [7], it can be stated that due to water shortages, electricity production at HPPs decreased in 2025. In Uzbekistan, electricity generation from hydroelectric power plants has decreased due to a 35% decrease in water inflow compared to last year. The commissioning of small and micro-hydroelectric power plants has allowed for the production of 140 million kWh, but this volume remains insignificant. Due to the dependence of hydropower on water resources, the country relies on the development of solar and wind energy, as well as energy storage systems. In the short term, green energy is the most affordable solution for sustainable energy supply.

Methodology

According to experts, the problem of limited access to fresh water is faced not only by residents of the Middle East and North Africa, but also by residents of Central Asia, India, Korea, Australia, Romania, Moldova, Hungary and even the northern regions of the United States. However, even in countries that do not lack fresh water, the problem of its pollution is acute due to the inefficient use of available water resources and the degradation of water supply and sanitation systems.

Experts at the World Economic Forum believe that the increasing shortage of fresh water is becoming one of the most threatening challenges to humanity and the 21st century may become the century of "water wars." Thus, the availability of freshwater resources per capita is decreasing dangerously. According to the World Water Resources Development Report, the number of people who will live in areas with water scarcity will grow from 3.6 billion today to 4.8 - 5.7 billion people out of the 9 billion population of the Earth in 2050.

More than 6,000 km³ per year is spent on domestic, industrial and agricultural water supply worldwide. The largest consumer of water is agriculture (64%), followed by the population (20.5%) and industry (10.65%). The total volume of water consumption has already reached 10% of the world's fresh water and the trend towards steady growth continues.

According to experts, over the past twenty years, Uzbekistan has been facing an acute shortage of water resources, which will only worsen every year. The observed extreme drought and abnormal heat in the summer cause shortages of drinking and irrigation water, which lead to a significant reduction in agricultural crops, lower yields, and rising food prices. All these factors endanger the country's food security. It should be noted that global warming and increased competition are putting pressure on the country's water resources.

Due to its historical and geographical features, the Republic of Uzbekistan is a major consumer of water in the Central Asian region – 39.3% of the total intake from the largest rivers in the region – the Syr Darya and Amu Darya (Turkmenistan – 22.87%; Tajikistan – 13.05%; Kazakhstan – 11.07%; Kyrgyzstan - no more than 0.8%;). At the same time, only 9.6% of the total runoff of the Aral Sea basin is formed on the territory of Uzbekistan. (in Kyrgyzstan – 25.1%, Tajikistan – 43.4%).

Experts believe that Uzbekistan's cross-border dependency ratio is extremely high – 77% (in Kazakhstan - 42%). Groundwater is also an important part of water resources, which reserves in the Republic have decreased by 35% over 50 years of intensive use. At the same time, the share of fresh water consumption in agriculture remains high – 89-92% compared to the global level of 64%. The volume of irrigation water is significantly higher than the global average – 10 000 -12 000 m³ per hectare (about 9.5 thousand m³ in the world).

Conclusions

As can be seen from the above, the problem of water scarcity in Uzbekistan is becoming more and more problematic and can be considered one of the negative factors of our time. The process of reducing water consumption is no longer possible, since for this it will be necessary to reduce the production of material assets and abandon many benefits of civilization. Some skeptics believe that water reserves are inexhaustible. It should be noted that fresh water is, and will remain in the next few centuries, one of the most important resources in the whole world.

Thus, we can conclude that drinking water may become a strategic resource in the near future. Experts are seriously talking about the likelihood of water wars and conflicts. In addition, lack of drinking water can lead to famine, disease, political instability, and armed conflict. To ensure that the next generations do not experience a shortage of fresh water, we should all strive to save and clean water resources. In this regard, everyone needs to realize that without water it will be difficult for living beings to exist, as well as to carry out any economic activity. In this regard, we recommend radically changing attitudes towards the country's available water resources.

REFERENCE

1. <https://waterservice.kz/blog/art29.html>
2. Economic review. No. 10 (238). 2019. p. 21.
3. Tashkent - News of Uzbekistan (<https://t.me/+mgj931rovZc3Mzcy>)
4. Channel @SHOPIRLAR (09 2025).
5. Tashkent - News of Uzbekistan (<https://t.me/+mgj931rovZc3Mzcy>)
6. K. Fayzieva. The ecological disaster of Uzbekistan's drinking water sources: what solutions are there.
7. (<https://t.me/+mgj931rovZc3Mzcy>) 3553 30 Dec 2025
8. Toshov J., Baratov B., Sherov K., Mussayev M., Baymirzaev B., Esirkepov A., Ismailov G., Abdugaliyeva G., Burieva J. Ways to optimize the kinetic parameters of tricone drill bits // Material and Mechanical Engineering Technology, Kazakhstan, 2024, No. 1, pp. 35-45.
9. Toshov, Javokhir & Toshov, B.R. & Baratov, Bakhtiyor & Haqberdiyev, A.L.. (2022). Designing new generation drill bits with optimal axial eccentricity. Mining informational and analytical bulletin. 133-142. 10.25018/0236_1493_2022_9_0_133.
10. Baratov B. N., Umarov F. Ya., Toshov Zh. B. Assessment of the performance of tricone drill bits / Mining Journal - Moscow, 2021. - No. 12. – P.60-63.
11. O.V. Tuyboyov, N.F. Raxmanova, B.N.Baratov. Investigation into sustainable innovations in mining engineering for resource optimization and environmental efficiency// “Kon mashinalari va texnologilar” Ilmiy-technik magazine, Toshkent, 2024, No. 1(7), pp.51-58.
12. Toshov, Z.B., Rahutin, M.G., Toshov, B.R., Baratov B.N. Tracking prevention in roller cone bit drilling // Eurasian Mining, 2024, 41(1), pages 62–66. DOI:10.17580/em.2024.01.15
13. Toshov, Javokhir & Baratov, Bakhtiyor & Baynazov, Umid. (2020). Method of calculating the gear ratios of the cones of tricone drill bits. E3S Web of Conferences. 201.01012.10.1051/e3sconf/202020101012.
14. Toshov, B. & Toshov, Javokhir & Akhmedova, L. & Baratov, Bakhtiyor. (2023). The new design scheme of drilling rock cutting tools, working in rotation mode pairs. E3S Web of Conferences. 383. 1-6. 10.1051/e3sconf/202338304069.