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THE PROBLEM OF WATER SCARCITY IN CENTRAL ASIA

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Abstract

This article examines drinking water shortages in the Central Asian countries. The problems of water scarcity in Central Asian countries are considered in the context of socioeconomic development, energy and food production, ensuring healthy ecosystems, and human survival in the modern world. Issues related to improving the provision of clean water to the population in all Central Asian countries are also considered. Furthermore, the issue of water scarcity is emphasized in light of demographic growth, which will significantly increase water consumption. The factors that contributed to water scarcity and subsequently led to a deterioration in living conditions are discussed.

Keywords

Groundwater salinization and pollution, water resource depletion, water scarcity, water security, land degradation, population growth, extreme drought, strategic resource, land productivity, growing season.

INTRODUCTION

Water is crucial for sustainable development, as well as for socioeconomic development, energy and food production, healthy ecosystems, and human survival. Water also underpins adaptation to climate change, serving as a vital link between society and the environment.

A significant milestone in modern history was the recognition of the human right to water and sanitation. According to a resolution adopted by the UN General Assembly in July 2010, everyone has the right to access sufficient water for personal and domestic use (50 to 100 liters per person per day). Water must be safe, acceptable in quality and affordability (the cost of water should not exceed three percent of household income), and physically accessible (the water source must be within 1,000 meters of the home and collecting it should take no more than 30 minutes).

LITERARY RESEARCH

According to experts, over the past 100 years, water consumption has grown twice as fast as the planet's population. As population growth increases, so does the demand for food, and with it, water. According to the FAO, agriculture uses up to 70% of water and is the world's leading resource consumer, with the industrial sector accounting for 20% and the municipal sector for about 10%.

Poor irrigation water management creates numerous problems that exacerbate the salinization and pollution of groundwater and water sources. Surface and underground watercourses, along their path, remove salts from rocks and, as they move, become enriched with the salts of these deposits, changing their chemical composition and mineralization. For example, one of the most serious problems in the Volga region and the Central Asian republics has been the depletion of water resources, which has led to the Aral Sea ecological disaster.

According to [1], water scarcity is a growing concern in many parts of the world. Population growth, urbanization, increasing demand for irrigated agriculture, and poor water

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management are important factors in water scarcity, exacerbated by the impact of climate change, which leads to an increase in the frequency and severity of droughts. Today, approximately 2 billion people live in areas with water scarcity. By the end of 2025, half the world's population is expected to face this situation. It is projected that every 1°C increase in temperature caused by global warming will reduce renewable water resources by 20%. Water scarcity has serious consequences for society and threatens the sustainability of development. For example, water scarcity can negatively impact the provision of water supply and sanitation services and affect human health. Insufficient safe drinking water can compromise adequate hygiene and increase the risk of diarrhea. Water scarcity can also limit economic growth by reducing agricultural production, impact the environment and biodiversity by reducing environmental flows essential for ecosystem health, and lead to conflicts within and between countries and increased migration flows.

The source [2] notes that the Central Asia Water and Energy Program (CAWEP) is a program funded by the World Bank, the European Union, Switzerland, and the United Kingdom to facilitate joint efforts among Central Asian governments to manage shared water resources through regional organizations such as the International Fund for Saving the Aral Sea (IFAS). The program focuses on three issues: water security, energy security, and the energy-water nexus. Its goal is to promote balanced relationships between Central Asian countries to achieve the regional goal of water and energy security. To achieve this goal, the program works closely with governments, civil society organizations, and national organizations.

According to the source [3], the program most recently helped organize The Global Disruptive Tech Challenge: "Restoring Landscapes in the Aral Sea Region." This competition was created to encourage talented people to find revolutionary solutions to combat land degradation and desertification in the Aral Sea region, once home to one of the world's largest lakes, now almost completely gone. Several winning projects were selected, focusing on agriculture and land management, sustainable forestry, socioeconomic development, and global knowledge and access to information on these issues.

According to the World Bank [4], the current population of the five countries of the Central Asian region exceeds 78 million. By 2050, due to projected demographic growth, the population of Central Asian countries will reach 90-100 million people, with water shortages expected to reach 25-30%. Furthermore, the demand for water used for irrigated agriculture could increase by 30% by 2030.

Source materials [5] note that the Food and Agriculture Organization of the United Nations (FAO) notes in its reports that Central Asian countries are among the top ten water consumers (Fig. 1) in the world. Furthermore, to produce a unit of agricultural output, Central Asian countries consume almost three times more water than developed countries. Half of the irrigation water is wasted. Continued urbanization, global warming, and the demands of economic growth will only increase the pressure on the region's limited water resources. Inefficient water use in agriculture is a major concern. Much of Central Asia is rich in high-quality soils suitable for growing horticultural products for export. However, the majority of agriculture is devoted to low-value, water-intensive crops, and inefficient water use limits economic productivity. Approximately 50% of irrigated lands are subject to salinization and waterlogging due to inadequate irrigation and drainage systems. All these combined factors will have profound consequences. Warming in Central Asia is expected to exceed global averages. The region is projected to reach a peak in water availability around 2050, after which runoff will significantly decrease. Extreme floods and droughts will intensify, leading to increased water scarcity.

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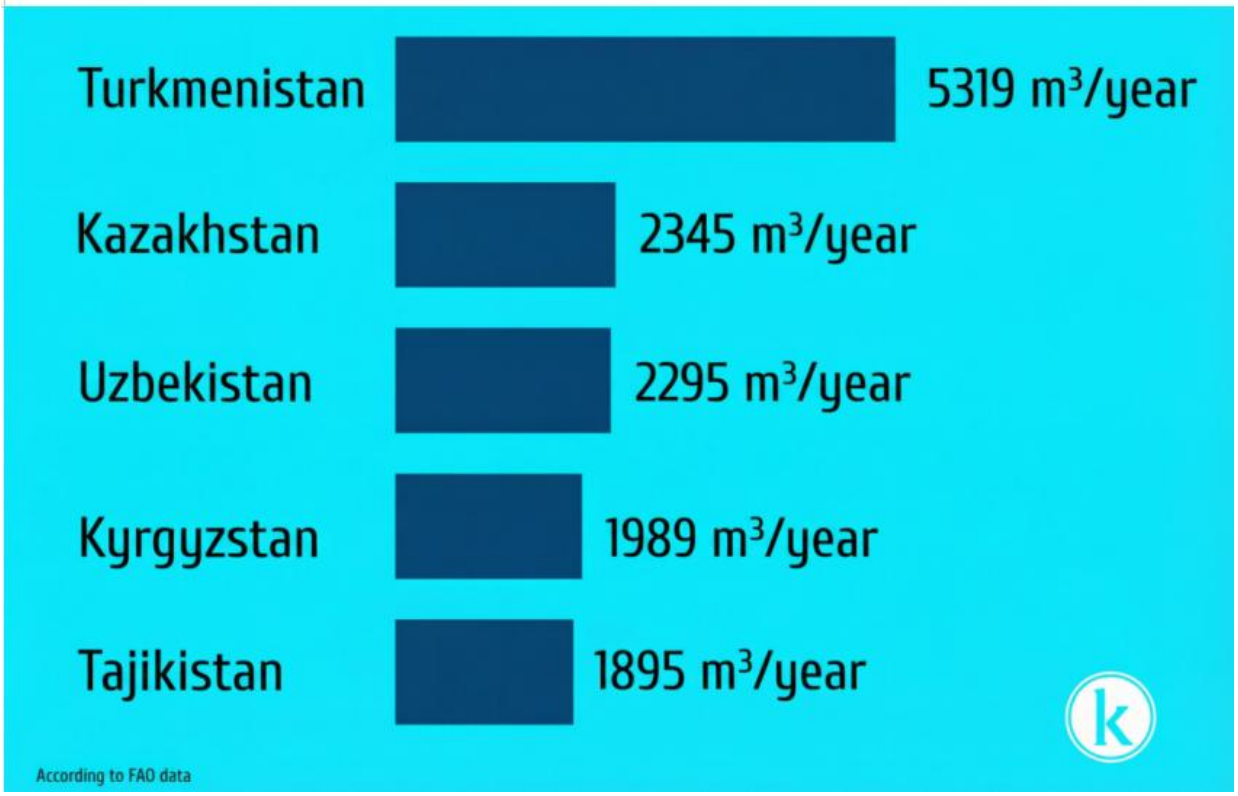


Figure 1. Illustration of water consumption in Central Asian countries.

Methodology

According to experts, drinking water supplies are considered limited and are already running low. According to data from the Washington-based World Resources Institute, approximately one-third of the planet's population – approximately 2.6 billion people – live in countries with "severe water stress," while 1.7 billion people in 17 countries face "extreme water stress." About a dozen countries in the arid Middle East are experiencing severe shortages of drinking water, and in India, drinking water shortages have reached critical levels. This could lead to dire consequences across all sectors of the national economy, from economic development to deteriorating public health. Countries such as Pakistan, Botswana, Turkmenistan, and Eritrea are also experiencing extreme water shortages.

Water resources, both qualitatively and quantitatively, are already at a critical point, particularly in the Middle East and North Africa, Central Asia, and parts of Australia. By 2025, according to the FAO, the intergovernmental organization that addresses hunger issues under the auspices of the UN, almost two billion people will live in countries, or even regions, with absolute water scarcity.

Limited access to fresh water is a problem 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 United States. However, even in countries with abundant fresh water supplies, water pollution is a pressing issue due to the inefficient use of available water resources and the degradation of water supply and sanitation systems.

Experts say that Central Asia has been facing acute water shortages for the past two decades, a problem that will only worsen with each passing year. Extreme droughts and

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abnormal summer heatwaves are causing shortages of drinking and irrigation water, leading to significant reductions in agricultural crops, reduced yields, and rising food prices. All these factors threaten the region's food security. It is important to note that global warming and increased competition are putting pressure on water resources in the region.

Central Asia is a typical inland arid region with a dry climate, where desert occupies over 25% of the land area and water is a valuable strategic resource. Climate change and rising global temperatures are negatively impacting the disappearance of water resources. This has already resulted in a reduction in the number and volume of glaciers in the Tien Shan and Pamir mountains, which are the main sources of replenishment for Central Asian river basins. In addition to climate change, the rate of glacier melt is also affected by dust and salt carried by winds from the drying bed of the Aral Sea. Every year, tons of dust and salt settle on the glaciers of the Pamir and Tien Shan mountains, thereby affecting the rate and extent of melting.

Water resources in Central Asia are primarily transboundary in nature. A significant portion of the region's river runoff is formed in the mountains of Kyrgyzstan, Tajikistan, and Afghanistan, which then flows through the two main waterways of the Amu Darya and Syr Darya, which are part of the Aral Sea basin, to the downstream countries of Uzbekistan, Turkmenistan, and Kazakhstan.

In the upper reaches of Kyrgyzstan and Tajikistan, hydroelectricity is a vital energy resource and an export commodity. Meanwhile, for the downstream countries of Uzbekistan and Turkmenistan, river water irrigates cotton fields, as the majority of the populations of Tajikistan, Turkmenistan, and Uzbekistan directly or indirectly depend on irrigated agriculture. However, intensive water use, particularly in agriculture, threatens the population's water supply.

It's worth noting that the situation in Kyrgyzstan and Tajikistan is also bleak: glaciers are melting, and forest cover isn't recovering to the extent necessary to stem the decline of the few productive lands. Experts say a significant water shortage in Kyrgyzstan began in 2021. According to the Water Resources Service of the Ministry of Water Resources, Agriculture, and Processing Industry, measures have been taken since then to address low water levels, including concrete installation, repair, and cleaning of water structures. This work is being carried out in stages, with at least 700 km of canals being concreted, cleaned, and repaired annually. Extensive work is also underway to replace pumping units, which operate continuously during the growing season when water is supplied.

Conclusions

As can be seen from the above, water shortages in Central Asian countries are becoming increasingly problematic and can be considered one of the negative factors of our time. Reducing water consumption is no longer feasible, as this would require curtailing material production and foregoing many of the benefits of civilization. Some skeptics believe that water reserves are inexhaustible. It must be acknowledged that fresh water is, and will remain, one of the most important resources worldwide for the next several centuries.

Therefore, we can conclude that drinking water may soon become a strategic resource. Experts are seriously discussing the possibility of water wars and conflicts. Furthermore, a shortage of drinking water can lead to famine, disease, political instability, and armed conflict. To ensure that future generations do not experience fresh water shortages, we must urgently strive to conserve and maintain clean water resources. Each of us can play a role in solving this problem.

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