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ANALYSIS OF WATER CONSUMPTION IN UZBEKISTAN



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Abstract: This article examines Uzbekistan's escalating water crisis and its impact on socio-economic development, environmental sustainability, and regional stability. With over 85% of surface water originating from transboundary rivers and agriculture consuming the majority through inefficient irrigation methods, the country faces mounting stress due to climate change and outdated infrastructure. In response, Uzbekistan has introduced key reforms such as the Water Law, the National Water Strategy, and the State Program. Sustainable solutions depend on institutional transformation, regional cooperation, and the adoption of water-saving technologies.

Key words: water stress, irrigation efficiency, transboundary rivers, Aral Sea crisis, Uzbek Water Law, Amu Darya, Syr Darya, Central Asia, water diplomacy, national strategy.

Annotatsiya: Ushbu maqolada O'zbekistonning tobora chuqurlashib borayotgan suv inqirozi va uning ijtimoiy-iqtisodiy rivojlanish, ekologik barqarorlik hamda mintaqaviy barqarorlikka ta'siri tahlil qilinadi. Yuzaki suv resurslarining 85 foizdan ortig'i transc chegaraviy daryolardan kelib chiqib, qishloq xo'jaligida suvning asosiy qismi samarasiz sug'orish usullari orqali sarflanmoqda. Iqlim o'zgarishi va eskirgan infratuzilma sababli mamlakat kuchli suv bosimiga duch kelmoqda. Ushbu muammolarga javoban, O'zbekiston Suv to'g'risidagi qonun, Milliy suv strategiyasi va Davlat dasturi kabi muhim islohotlarni amalga oshirmoqda. Barqaror yechimlar institutsional islohotlar, mintaqaviy hamkorlik va suvni tejavchi texnologiyalarni joriy etishga bog'liq.

Kalit so'zlar: suv tanqisligi, sug'orish samaradorligi, transc chegaraviy daryolar, Orol dengizi inqirozi, O'zbekiston suv qonunchiligi, Amudaryo, Sirdaryo, Markaziy Osiyo, suv diplomatiyasi, milliy strategiya.



Аннотация: В данной статье рассматривается усугубляющийся водный кризис в Узбекистане и его влияние на социально-экономическое развитие, экологическую устойчивость и региональную стабильность. Более 85% поверхностных вод поступает из трансграничных рек, а основная часть потребляется сельским хозяйством через неэффективные методы орошения. В условиях изменения климата и изношенной инфраструктуры страна испытывает нарастающее водное давление. В ответ Узбекистан принял ключевые реформы, включая Закон о воде, Национальную стратегию по водным ресурсам и Государственную программу. Устойчивые решения зависят от институциональных преобразований, регионального сотрудничества и внедрения водосберегающих технологий.

Ключевые слова: водный дефицит, эффективность ирригации, трансграничные реки, кризис Аральского моря, водное законодательство Узбекистана, Амударья, Сырдарья, Центральная Азия, водная дипломатия, национальная стратегия.

INTRODUCTION

Water scarcity in Uzbekistan has become a systemic and intensifying challenge that affects virtually every sector of the national economy and environment. As one of the world's most water-stressed countries, Uzbekistan faces a future where the availability of freshwater may no longer meet growing demands. Ranked 25th among 164 nations in terms of water stress, the country is already experiencing significant shortages, with projections suggesting a national freshwater deficit of 7 billion cubic meters by 2030 and potentially double that by 2050 [1]. These figures underscore not only the scale of the crisis but also the urgency of fundamental reforms in water management. More than 85% of Uzbekistan's water resources come from transboundary rivers—primarily the Amu Darya and Syr Darya—which are shared with neighboring countries pursuing their own water strategies [2].

This geographical reality places Uzbekistan in a vulnerable position, particularly in light of new projects such as Afghanistan's Kushtepa Canal, which threatens to further disrupt the regional water balance. Internally, the overreliance on agriculture—which consumes over 90% of the water supply—and inefficient irrigation practices have led to excessive losses through evaporation and seepage, with over 60% of canal infrastructure in deteriorated condition [3]. The combination of outdated systems, fragmented institutional oversight, and the accelerating impacts of climate change—including glacier melt and increased desertification—is pushing the country toward a critical threshold.

The President of Uzbekistan has repeatedly called for coordinated regional action, citing the need to modernize the International Fund for Saving the Aral Sea (IFAS), develop basin-specific strategies for the Amu Darya and Syr Darya, and introduce an integrated approach linking water, energy, and food security. On the domestic front, Uzbekistan is undertaking comprehensive reforms: the updated Law "On Water and Water Use," the National Water Strategy, and the State Program for Rational Water Use lay the groundwork for improving efficiency, accountability, and sustainability in the sector [4].

However, policy alone is not enough. Solving the water problem in Uzbekistan requires large-scale investments in infrastructure, a shift in agricultural practices, enhanced cross-border diplomacy, and—perhaps most importantly—the fostering of a national culture of water conservation. Without decisive and sustained action, the gap between supply and demand will continue to widen, leading to ecological degradation, economic loss, and social instability [5].

REVIEW OF RELEVANT LITERATURE

Water scarcity in Uzbekistan has been the focus of numerous regional and international studies. Akhmedov highlights that over 85% of Uzbekistan's water originates from transboundary rivers, placing the country in a vulnerable geopolitical position [3]. Dukhovny and Dzhurabekov discuss historical inefficiencies in Uzbekistan's irrigation system, noting that outdated flood irrigation remains a key factor in water loss [4]. More recent research by Umirzakov evaluates the legal and diplomatic dimensions of transboundary water use, especially in relation to Afghanistan's Kushtepa Canal [6].

While these works provide a solid understanding of the political, technical, and ecological challenges, they often overlook data-driven trends in national consumption by sector. Furthermore, few studies provide updated quantitative comparisons in the post-2020 reform period. This research aims to fill this gap by analyzing recent sectoral water use statistics and evaluating policy outcomes based on empirical trends from 2019–2023 [5].

In addition, international research from institutions such as the World Bank, UNDP, and IWMI (International Water Management Institute) emphasizes the importance of institutional coordination, tariff policy, and

Table 1. Annual Water Consumption in Uzbekistan by Sector (2019–2023, in km³)[10].

Year	Agriculture	Industry	Domestic Use	Total Water Consumption
2019	48.5	1.7	3.1	53.3
2020	49.0	1.8	3.3	54.1
2021	50.2	1.9	3.4	55.5
2022	51.3	2.0	3.5	56.8
2023	51.0	2.1	3.7	56.8

The comparative analysis over the five-year period leads to the following conclusions: agricultural water use remains inefficient and resistant to policy-driven reductions; urban water demand is rising, requiring infrastructure expansion and leak prevention; industrial sectors are growing, but their water footprint remains relatively low; and while total water use has plateaued, structural inefficiencies persist.

If current usage patterns continue, pressure on natural water reserves will intensify, potentially pushing Uzbekistan beyond safe operational thresholds by 2030. Without a paradigm shift toward Integrated Water Resource Management (IWRM) and full implementation of the National Water Strategy, the country risks facing escalating ecological degradation and economic consequences [10].

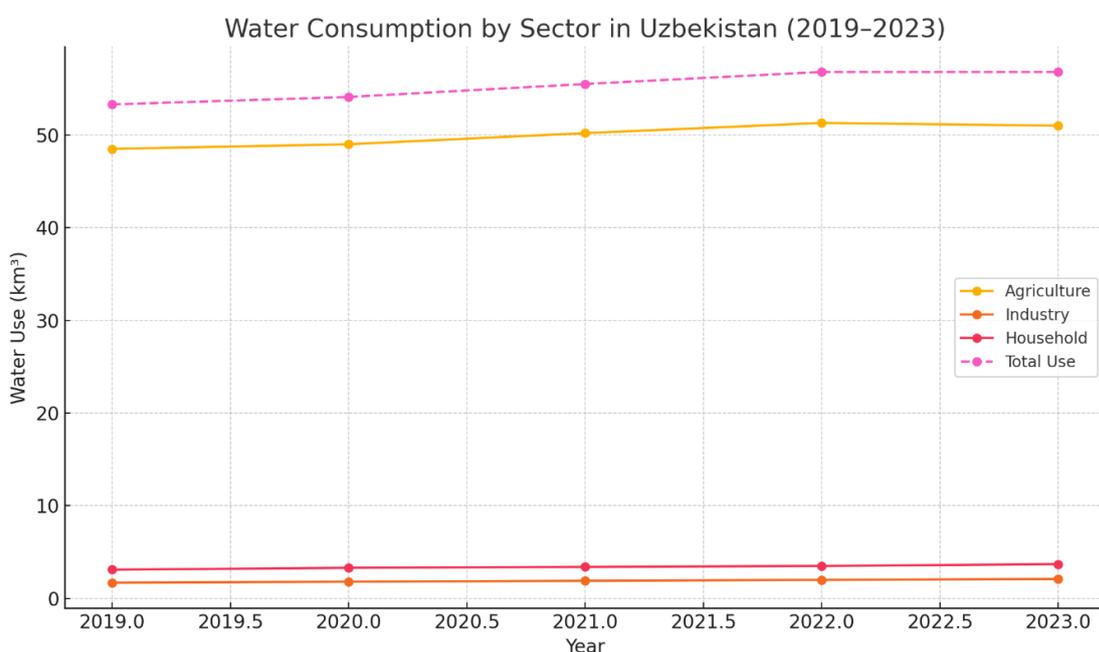


Figure 1. Trends in Water Consumption by Sector in Uzbekistan (2019–2023)[10].

Figure 1 demonstrates that agriculture remains the dominant water consumer in Uzbekistan, with usage consistently exceeding 48 km³ annually and peaking at 51.3 km³ in 2022. In contrast, industrial and domestic consumption have shown gradual increases—from 1.7 to 2.1 km³ and from 3.1 to 3.7 km³, respectively. Total national water use grew from 53.3 km³ in 2019 to 56.8 km³ in 2023, reflecting rising demand across all sectors and highlighting the urgent need for efficiency-focused reforms [8].

CONCLUSION AND RECOMMENDATIONS

The comprehensive analysis clearly indicates that Uzbekistan is experiencing persistent and intensifying pressure on its water resources. This growing strain is primarily driven by outdated and inefficient agricultural practices—particularly the widespread use of traditional flood irrigation methods—as well as the rapid expansion of domestic consumption and industrial demand. Agriculture alone accounts for more than 90% of the country's water usage, much of which is lost due to evaporation, leakage, and poor management of irrigation systems.

Moreover, demographic growth, urbanization, and the increasing needs of industrial sectors are compounding the challenge, contributing to a steady rise in overall water demand. These pressures are further



exacerbated by the impacts of climate change, including declining precipitation, rising temperatures, and the retreat of glaciers in the upstream regions that feed Uzbekistan's major rivers, such as the Amu Darya and Syr Darya.

Without the implementation of urgent and large-scale reforms—specifically the modernization of irrigation infrastructure, the widespread adoption of water-saving technologies, and enhanced coordination among Central Asian states on transboundary water management—Uzbekistan is at serious risk of facing a severe and chronic water deficit.

Such a deficit could have far-reaching consequences: it may undermine the country's economic stability by disrupting the agriculture and energy sectors; threaten food security by reducing crop yields and shrinking arable land; and erode environmental resilience by accelerating desertification, biodiversity loss, and soil degradation. If left unaddressed, these risks could culminate in a full-scale water crisis by 2030—and persist well beyond—with profound implications for public well-being, national development, and regional cooperation.

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