Volume 3, Issue 2, February - 2025 **ISSN (E):** 2938-3811

DEHYDRATION CHALLENGES IN CENTRAL ASIA: A LOOMING CRISIS

Kamola Qudbidinova
3rd Year Student of the University of World Economy and Diplomacy
kamolaqudbidinova@gmail.com

Abstract
Central Asia is confronting a severe water scarcity crisis, exacerbated by climate change, inefficient agricultural practices, and geopolitical tensions over shared river systems. By 2050, projections suggest a 20% decrease in river flows in key basins such as the Amu Darya and Syr Darya, significantly impacting agriculture, which consumes over 90% of regional water resources (World Bank, 2022). This article examines the factors driving the water crisis, including outdated irrigation systems that waste up to 50% of water (FAO, 2022), and explores the socioeconomic consequences, such as potential losses of $25 billion annually by 2030 (World Bank). It also discusses potential solutions, including modern irrigation technologies and regional cooperation frameworks like the International Fund for Saving the Aral Sea (IFAS), which could help mitigate these effects. The article concludes by calling for urgent regional and international collaboration to adopt sustainable water management practices and ensure the region's long-term stability.

Keywords: Soil Salinization, water scarcity, flood irrigation, transboundary rivers, drip irrigation, shared water resources, Food and Agriculture Organization (FAO), sprinkler systems International Fund for Saving the Aral Sea (IFAS), Development Bank (ADB).

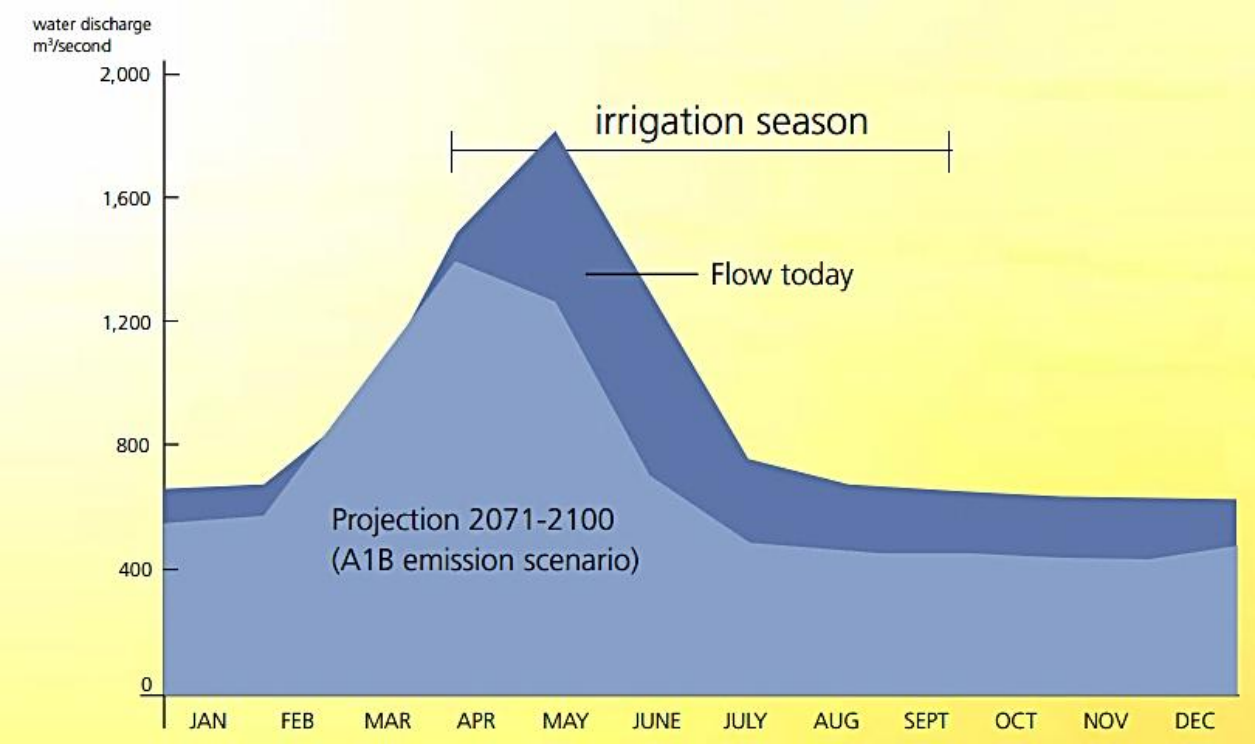
Introduction

As the global climate crisis intensifies, regions across the world are facing unprecedented environmental challenges. Central Asia, a region known for its vast arid landscapes and historical reliance on limited water resources, is particularly vulnerable. With its unique geographical features and socio-economic dynamics, Central Asia is now grappling with an alarming trend: increasing water scarcity. The situation is expected to worsen in the coming decades, with devastating consequences for both local communities and regional economies. In this article, I will explore the causes and impacts of dehydration and water scarcity in Central Asia, highlighting how these issues intersect with climate change, agriculture, and socio-political factors. Furthermore, I will discuss potential solutions that can help mitigate the looming crisis and ensure a sustainable future for the region’s inhabitants.

Central Asia, a vast region encompassing countries such as Kazakhstan, Uzbekistan, Turkmenistan, Kyrgyzstan, and Tajikistan, has long struggled with water scarcity. Historically, the region has relied on two major rivers—the Amu Darya and the Syr Darya—both of which originate in the mountainous regions of Kyrgyzstan and Tajikistan and flow through the arid plains of Kazakhstan, Uzbekistan, and Turkmenistan. However, over time, the exploitation of

these water sources, combined with inadequate management, has exacerbated the region's vulnerability to water shortages.

SEASONAL FLOW OF THE SYR DARYA PROJECTED TO DECREASE?



In the Soviet era, the region's water resources were largely managed through centralized planning, focusing heavily on irrigation for cotton cultivation, a water-intensive crop. This led to the unsustainable use of water, contributing to the **Aral Sea** crisis—a drastic environmental disaster where the once-thriving sea has shrunk by over 90% since the 1960s, severely impacting both the local ecosystem and the communities dependent on it. This historical mismanagement of water resources has left a lasting legacy, with many areas now suffering from **soil salinization** [1](the accumulation of salts in the soil due to excessive irrigation), further depleting the region's agricultural potential.

Today, Central Asia faces a complex water crisis. Climate change has exacerbated the situation, with rising temperatures leading to reduced snowpacks in the region's mountainous areas, which are vital for feeding the rivers. Meanwhile, the growing population and expanding agricultural activities place increasing pressure on already limited water resources. In fact, water per capita in Central Asia is among the lowest in the world, and demand continues to outpace supply.

[1] **Soil Salinization**: The accumulation of soluble salts in the soil, which can lead to reduced agricultural productivity. (Source: **FAO**, "Soil Health in Central Asia," 2021)

A key concept that must be understood in this context is **water scarcity**[2], which can be classified into two types: **physical** and **economic**. Physical water scarcity occurs when the natural water supply is insufficient to meet the demands of the population, while economic water scarcity arises when resources are available but not adequately managed or distributed. Central Asia experiences both forms of water scarcity, making the situation particularly dire.

The urgency of addressing water issues in the region is underscored by the region's dependence on agriculture. The sector employs a significant portion of the population, and crops like cotton and wheat are essential to local economies. However, increasing dehydration, soil degradation, and unreliable water availability threaten not only food security but also the livelihoods of millions. Without urgent intervention, the worsening water crisis could trigger wider socio-political tensions, including regional conflicts over shared water resources between Central Asian nations.

What is the current status of transboundary water [3]cooperation in the region?

The focus of transboundary water cooperation in Central Asia has historically been, and still is, on the Aral Sea basin and its major rivers, the Amu Darya and Syr Darya. The focus, therefore, has primarily been on the relationships amongst the post-Soviet states of the region, as well as with Afghanistan to the south, and to a very limited degree Iran. But Kazakhstan also shares rivers with the Kyrgyz Republic, outside the Aral Sea basin, and river basins with China to the east and Russia to the north. All of these are subject to different transboundary agreements.

Similarly, Turkmenistan, while mostly within the Amu Darya basin, also shares other rivers (with limited water resources) with Iran to the south that either terminate in the desert or the Caspian Sea. These are not covered by any formal transboundary agreements.

While Tajikistan, Turkmenistan and Uzbekistan all share borders with Afghanistan along the Amu Darya River or its tributaries, Afghanistan is not part of the Soviet legacy of water management in the Aral Sea basin and is excluded from the regional water management agreements.

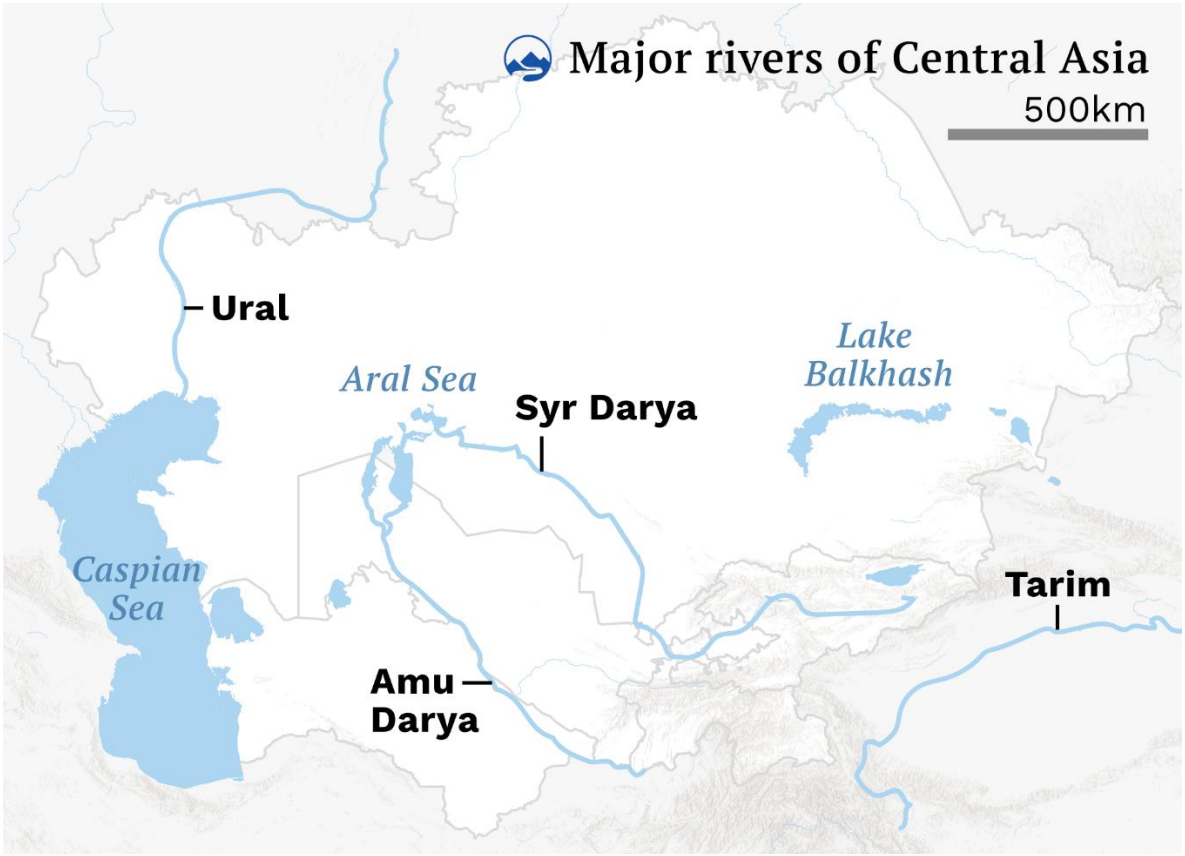
However, even where the Aral Sea basin is concerned, it is widely accepted that while there is reasonable stability in some aspects of transboundary water cooperation in the region – in water allocation agreements and the key regional institutions – as a whole it is neither fully effective nor efficient. Not all countries in the region view the current water sharing arrangements as equitable or optimal and the capacity of regional institutions and the financing of these institutions are both inadequate.

On the positive side, the broad agreement on these deficiencies means that regional institutions and all their member states have committed to well-structured consultation processes to

[2] **Water Scarcity**: A condition where the available water resources are insufficient to meet the demands of the population. (Source: **World Bank**, "Water Scarcity and Its Impacts," 2022)

[3] **Transboundary Rivers**: Rivers that flow through more than one country or political entity. (Source: **United Nations Environment Programme**, "Shared Water Resources: Challenges and Opportunities," 2021)

identify opportunities for institutional reform and strengthening. The World Bank and other development partners are actively supporting these reform efforts.[4]



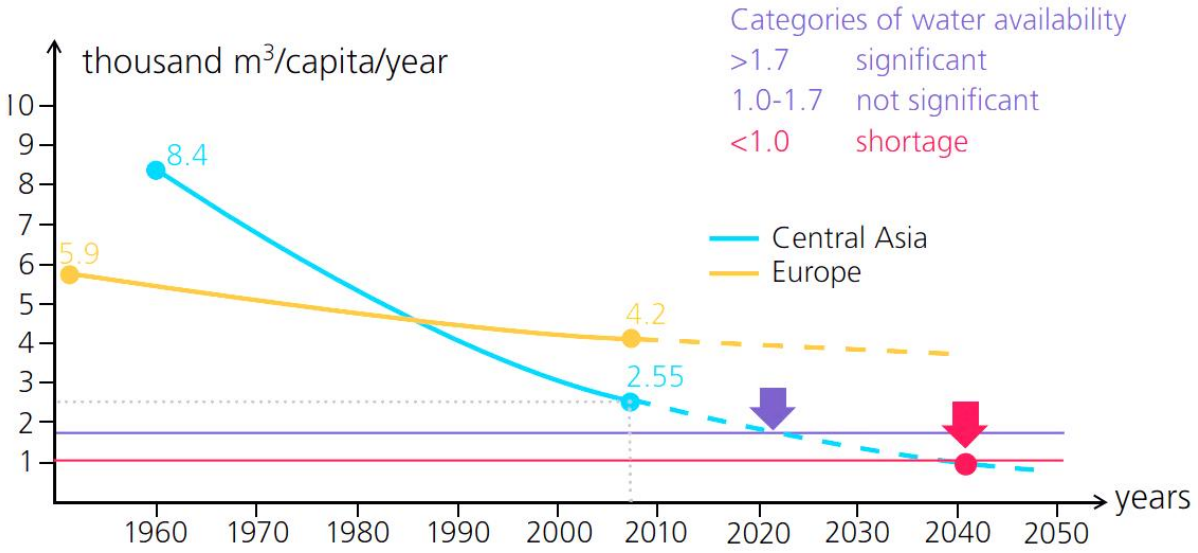
Climate change is intensifying water scarcity in Central Asia by affecting both the supply of water and its seasonal patterns. Research indicates that rising temperatures are causing earlier snowmelt in the region's mountains, which feed major rivers like the Amu Darya and Syr Darya. According to a study by the **International Water Management Institute (IWMI)**, by 2050, the region could see up to a 20% decrease in the annual flow of these rivers due to diminished glacial storage and altered precipitation patterns. Moreover, a report by the **United Nations Environment Programme (UNEP)** notes that the shift in precipitation, combined with higher temperatures, could lead to more intense droughts and greater evaporation from water sources.

The impact of these changes is twofold. First, the decrease in river flow directly affects the availability of water for agricultural irrigation, drinking, and industrial use. Second, erratic rainfall patterns make it difficult to predict water availability, which disrupts agricultural planning and overall water management. The shift in water supply further compounds the issue of **water scarcity** and exacerbates tensions over limited resources, making it harder for the region's countries to ensure sustainable water use. As climate change accelerates the depletion

[4]https://dialogue.earth/en/water/global-regional-action-crucial-avoid-central-asia-water-crisis-world-bank-experts/

of water resources, the role of agriculture in exacerbating water scarcity becomes even more pronounced.

CHANGE OF WATER AVAILABILITY IN CENTRAL ASIA



Over the past 40 years, water supply in Central Asia declined from 8.4 th. m3/person/year to 2.5 th. m3 /person/year. By 2030, at the current rate of population growth in Central Asia, this reduction will reach a critical value of less than 1.7 th. m3 /year. And it is still necessary to annually provide an additional 500-700 million m3 of water to sustain the population of Central Asia even at very low levels of consumption.[5]

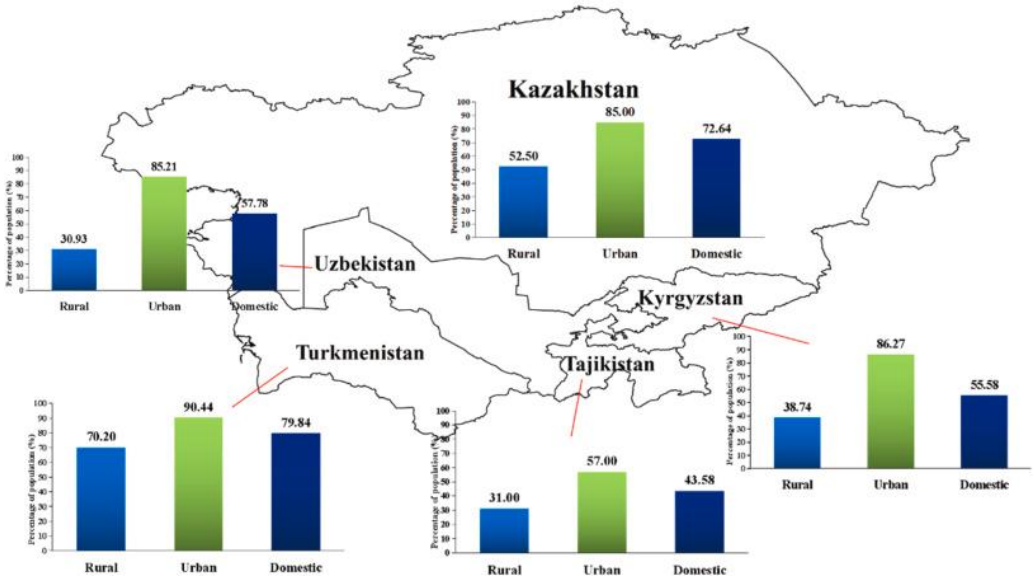
Agriculture is the largest consumer of water in Central Asia, but much of this water is wasted due to inefficient irrigation practices.According to the **World Bank**, around 90% of water in Central Asia is used for agriculture, with the majority of this water being allocated to irrigation. However, the region largely relies on outdated and inefficient irrigation methods, such as **flood irrigation**. Studies show that flood irrigation wastes up to 50% of water due to evaporation and runoff. A 2022 report by the **Food and Agriculture Organization (FAO)** highlights that only 30% of irrigation systems in Central Asia are modernized, leaving vast areas of farmland reliant on inefficient techniques.

The inefficiency of irrigation systems means that the water used for agriculture often does not reach crops in optimal conditions, contributing to crop stress and reduced yields. Additionally, the overuse of water exacerbates the problem of **soil salinization** (footnote: soil degradation caused by excess salt buildup from over-irrigation), making the land less fertile and further depleting the already strained water resources. Efficient irrigation systems, such as **drip**

[5]https://documents1.worldbank.org/curated/zh/141991567780869624/pdf/Central-Asia-Water-and-Energy-Program-Working-for-Energy-and-Water-Security.pdf

irrigation[6], could significantly reduce water waste, but they are still not widely implemented due to financial and infrastructural barriers. Beyond agricultural inefficiencies, the broader socioeconomic and political challenges of the region also hinder effective water management and contribute to the crisis.

The water crisis in Central Asia is not only an environmental issue but also a deeply political and economic one, with significant implications for the region's stability. The region's political landscape is shaped by the **shared water resources** [7]of countries like Uzbekistan, Kazakhstan, and Tajikistan, all of which depend on the same rivers. Tensions over water allocation have been a source of conflict, as evidenced by the ongoing disputes over the **Naryn River**, which flows through Kyrgyzstan and Tajikistan. A report from the **Crisis Group** warns that future water shortages could exacerbate these tensions, potentially leading to conflicts between countries over access to vital resources. Moreover, the **World Bank** estimates that the economic losses from water scarcity in Central Asia could reach up to $25 billion annually by 2030.



As countries in the region rely on **transboundary rivers**, coordinated management of water resources becomes critical. The lack of a unified, cooperative water governance system has led to fragmented efforts to address the issue. Additionally, the economic impacts of water scarcity are profound, affecting not just agricultural livelihoods but also broader sectors like energy, trade, and manufacturing. Without effective management and conflict resolution mechanisms, the scarcity of water could lead to further instability and regional fragmentation. Despite the challenges, there are promising solutions and strategies that could mitigate the

[6] **Drip Irrigation**: A highly efficient form of irrigation where water is delivered directly to plant roots through a system of tubes or hoses. (Source: **FAO**, "Improved Irrigation Techniques in Central Asia," 2022)

[7] **Shared Water Resources**: Water bodies, such as rivers or lakes, that cross or are located between political boundaries, requiring cooperation between nations for management. (Source: **International Water Management Institute**, "Water and Conflict in Central Asia," 2023)

crisis and help secure a more sustainable water future for Central Asia. While the water crisis in Central Asia is daunting, a combination of technological, political, and policy-driven solutions could offer a path forward. The adoption of modern irrigation technologies, such as **drip irrigation** and **sprinkler systems**, has already demonstrated water savings of up to 40% in pilot projects in Uzbekistan. Furthermore, regional cooperation has shown potential, with initiatives like the **International Fund for Saving the Aral Sea** (IFAS), which aims to enhance collaborative water management. A joint report by the **Asian Development Bank (ADB)** and **UNEP** also suggests that investment in water storage infrastructure, like reservoirs and improved pipeline systems, could provide more reliable water access and buffer against seasonal variations.

These solutions demonstrate that with the right investments and political will, the water crisis can be mitigated. However, the region must overcome significant barriers, including political rivalries and insufficient financial resources, to fully implement these strategies. Effective governance structures and strong regional cooperation will be key to ensuring that solutions are sustainable and equitable. With the right mix of innovation and collaboration, Central Asia can begin to address its growing water crisis—but time is of the essence.

Central Asia is facing a pressing water crisis, exacerbated by climate change, inefficient agricultural practices, and complex political dynamics. The region's reliance on shared water resources, compounded by diminishing river flows and outdated irrigation techniques, has led to severe water scarcity that threatens both local livelihoods and regional stability. With millions dependent on agriculture for their sustenance, the challenges of water mismanagement, soil degradation, and geopolitical tensions only heighten the urgency of addressing the issue.

However, the crisis is not insurmountable. Technological innovations such as modern irrigation systems, combined with a collaborative approach to water management, hold the potential to mitigate the worst effects of the crisis. Regional cooperation through organizations like the International Fund for Saving the Aral Sea (IFAS) and greater investment in water infrastructure can pave the way toward a more sustainable and equitable water future for the region.

Yet, time is running out. Central Asia must act swiftly and decisively to manage its water resources in a manner that ensures both environmental sustainability and socio-economic stability. By embracing modern solutions and fostering collaboration, the region can navigate its way out of this looming crisis—one that, if left unchecked, could have devastating consequences for generations to come

As the situation in Central Asia continues to evolve, it is crucial that both local and international stakeholders work together to address the growing water crisis. Governments, regional organizations, and the global community must prioritize water conservation, invest in sustainable agricultural practices, and establish effective frameworks for transboundary water management. The urgency of this issue demands swift action to ensure the long-term health and stability of the region. By engaging in collaborative efforts, investing in innovative

technologies, and fostering shared responsibility, Central Asia can navigate its water challenges and secure a sustainable future for generations to come. The time to act is now.

References

1. World Bank. (2022). Water Scarcity and Its Impacts: Global Trends and Regional Solutions. Retrieved from www.worldbank.org
2. FAO. (2021). Soil Health in Central Asia: An Urgent Challenge for Agriculture. Food and Agriculture Organization. Retrieved from www.fao.org
3. International Water Management Institute. (2023). Water and Conflict in Central Asia: Navigating Shared Resources. Retrieved from www.iwmi.org
4. United Nations Environment Programme. (2021). Shared Water Resources: Challenges and Opportunities in Central Asia. Retrieved from www.unep.org
5. Asian Development Bank. & United Nations Environment Programme. (2022). Regional Water Management and Investment in Central Asia: A Path Toward Sustainability. Retrieved from www.adb.org
6. Crisis Group. (2023). Water Politics in Central Asia: An Impending Conflict? International Crisis Group. Retrieved from www.crisisgroup.org.