



UNIVERSITY OF CENTRAL ASIA  
GRADUATE SCHOOL OF DEVELOPMENT  
Mountain Societies Research Institute



Policy Brief

# The Impact of Climate Change on Central Asian Hydro-Politics

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The findings, interpretations and conclusions expressed in this paper are entirely those of the authors and do not necessary represent the views of the University of Central Asia.

The University of Central Asia Graduate School of Development's Mountain Societies Research Institute (MSRI) applies sound scientific expertise to study complex earth surface and environmental processes and interactions that affect mountain societies. Its interdisciplinary research focuses on improving mountain livelihoods, sustainably managing natural resources, mitigating the effects of natural hazards and climate change, and building community resilience in these challenging environments.

## Table of contents

Key Messages .....	3
Introduction.....	4
Transformation of Regional Water Security Dilemma .....	4
Medium Risk Water Management Framework in Syr Darya River.....	5
Escalation of Threats: Amu Darya Water Management Challenges.....	6
Asymmetric Hydro-Politics: Ili, Irtysh, and Ural River Basins.....	7
Discussion and Conclusion .....	8

## Key Messages:

- The regional picture of hydro-politics reveals three dynamics, each of them differently vulnerable to conflict risks depending on the power relations between riparian states. Water allocation could be challenged by a hydro-hegemon and so the existence of a legal framework is an important element for conflict prevention.
- Recognition of the adverse effects of climate change at the political level and the assessment of future water stress risks have resulted in a shift in the security landscape. While the primary conflict used to be between upstream and downstream countries, a more complex security situation is now emerging. Conflict risks are increasing in regions most susceptible to water stress, particularly in the southern part of Central Asia, as well as in areas dependent on small rivers.
- Recognition of the threat posed by climate change to the region has improved the negotiating positions of the less powerful upstream countries. It is highly likely that new water agreements will be centred around guaranteed volumes of water collection in the reservoirs of the upstream countries (Kyrgyzstan and Tajikistan). Water allocation in the Amu Darya will depend on the success of the riparian countries' negotiations with Afghanistan.
- The challenges posed by climate change, which also play a role in threat perception discourse, have led to new interdependencies beyond the Aral Sea basin. Kyrgyzstan recently formalized an agreement with China pertaining to the development of the Sary-Jaz cascade of hydropower plants. Kazakhstan, in parallel, has reignited discussions (amongst experts) concerning the diversion of Siberian rivers, a project with significant implications for regional water dynamics. In 2004, Iran and Turkmenistan built the "Friendship" reservoir which broke with Soviet era hydro-political efforts to prevent Iran from building facilities in transborder rivers.

### Introduction

Central Asia, housing a population of 65 million individuals, predominantly features a dry landscape, encompassing 75% of its terrain characterized by steppe and arid to semi-arid conditions. This region is geographically enclosed by towering mountain ranges, serving as natural boundaries to its south, east, and northeast. These mountain ranges also play a pivotal role in influencing the agricultural potential of the area. The 2019 report from the Intergovernmental Panel on Climate Change (IPCC) underscores that Central Asia is experiencing a more rapid increase in temperatures compared to the global average. Consequently, the region has witnessed a heightened frequency of extreme natural events (droughts, cold waves, extreme rains) and shifts in climatic conditions. These changes have led to an escalating prevalence of aridity and droughts, the loss of glaciers, and a reduction in agricultural productivity. Furthermore, the variability of snowfall in mountainous regions adds to the environmental and agricultural challenges related to water availability in the area. This complex interplay of factors accentuates the existing pressures on the region's ecosystems and agriculture.

The regional security picture has long failed to include climate change issues as an integral part.<sup>1</sup> Since independence in the 1990s, the countries of the region have been focused on building their sovereignty and the challenges posed by the effects of climate change have not been an overt concern at the political level until recently. For a long time, the regional environmental policy agenda was predominantly driven by efforts to cope with the Aral Sea catastrophe. However, a series of prolonged droughts (2008, 2014, 2017, 2018, 2020, 2021, 2022, 2023), an increase in extreme natural events, the blackout (January 2022) which simultaneously occurred in three countries of the region, along with growing social protests centred on natural resources and issues of environmental justice, call for a reassessment of the region's security picture in the context of climate change.

This study aims to map the contours of the regional water security picture via exploring the current hydro-political dynamics.

### Transformation of Regional Water Security Dilemma

Historically, regional hydro-politics in Central Asia have focused on the Aral Sea basin and its major rivers, the Amu Darya and Syr Darya (Map 1). Therefore, most analysis has primarily been on the relationships amongst the post-Soviet states, as well as with Afghanistan to the south and, to a very limited degree, Iran. In addition, Kazakhstan also shares rivers with China to the east and Russia to the north, outside the Aral Sea basin. All of these are subject to different transboundary agreements. Kyrgyzstan shares the Sary Jaz river with China which is not a part of the Aral Sea basin and where the biggest cascade of hydroelectric power plants (HPPs) in the region will be built by China according to a 2023 agreement. Similarly, Turkmenistan, while mostly within the Amu Darya basin, also shares other rivers (with limited water resources) with Iran to the south. These are not covered by any formal transboundary agreements which also could be potential risks for regional water security<sup>2</sup>. Based on analysis of the water management practices in the region, we identified three major dynamics of regional hydro-politics.

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1 Vakulchuk, R., Daloz, A. S., Overland, I., Sagbakken, H. F., & Standal, K. (2023). A void in Central Asia research: climate change. *Central Asian Survey*, 42(1), 1-20.

2 Yeganeh, Y., & Bakhshandeh, E. (2022). Iran's model of water diplomacy to promote cooperation and prevent conflict over transboundary rivers in Southwest Asia. *World Affairs*, 185(2), 331-358.

**Map 1. The major rivers watersheds in Central Asia.**

Source: The map created by Eugenii Shibkov MSRI UCA based on open access data.



## Medium Risk Water Management Framework in Syr Darya River

Water allocation and water management in the Syr Darya can be characterized as having a medium conflict risk potential. The countries have a legal framework, there is no power hegemon, but security is decreasing due to growing water stress (poor management factor) and uncertainty of the water availability caused by climate change dynamics. The major risks lie in the increasing competition between downstream countries for increased water withdrawal. Kazakhstan points to a 38% (10.2 km<sup>3</sup>) decrease in flow along the Syr Darya over the past 10 years from Uzbekistan.

The Syr Darya is a heavily regulated river, with existing reservoirs and HPPs in the riparian countries. Kyrgyzstan plans to build a new HPP cascade above the existing reservoir of the Toktogul HPP. After a lengthy search for investors, in 2023, the government of Kyrgyzstan announced the achievement of a trilateral agreement between Kyrgyzstan, Kazakhstan, and Uzbekistan for the construction of the upper Naryn HPP cascade. However, the fate of this agreement raises significant questions, especially concerning the distribution of control shares among the countries. In Kyrgyzstan, there are increasing concerns about the potential loss of sovereignty over water resources, as part of a growing concern about environmental justice.

The construction of these HPPs has conflict potential if the terms of the agreement are not transparent to society. Additionally, there is concern about the lack of an assessment of the impact of new HPPs on the

environment and their potential effects on the ecosystem services of the Naryn River. In the long term, the participation of the three countries in this project has a dual impact. It can reduce the potential for conflict from the Soviet era water-energy model by introducing new generating capacities that will help Kyrgyzstan address its energy crisis and resolve the water and energy dilemma in the Syr Darya. On the other hand, delegating water resources management to neighbouring countries can serve as a trigger for growing protest sentiments in Kyrgyzstan, where political dynamics are closely intertwined with issues of environmental justice.<sup>3</sup>

### Escalation of Threats: Amu Darya Water Management Challenges

In March 2022, the self-declared Islamic Emirate of Afghanistan initiated a large-scale construction project for the Qosh Tepa irrigation canal on the Amu Darya River. Afghanistan's assertion of its right to a portion of the river's flow will have varying impacts on the riparian countries involved. Given that the primary flow of the Amu Darya originates from Tajikistan, accounting for 80% of its discharge, Tajikistan is expected to experience relatively minor consequences from the commissioning of the Qosh Tepa canal. In contrast, Uzbekistan and Turkmenistan are projected to face a reduction in water resources along the Amu Darya, estimated at 10-15%.<sup>4</sup>

Drawing from Scenario A2 as defined by the Intergovernmental Panel on Climate Change (IPCC), the riparian countries had not foreseen significant alterations in the condition of the Amu Darya's water resources until 2030.<sup>5</sup> However, there exists a possibility of a 10-15% reduction in the water resources of the Amu Darya basin by 2050. Moreover, during periods of severe water scarcity, particularly during extremely hot and dry years, the volume of water resources in the basin could diminish by 25-50%.<sup>6</sup> The anticipated increase in aridity and evapotranspiration in the region is expected to elevate irrigation demands, significantly impacting the Amu Darya's overall state.

Water allocation along the Amu Darya carries substantial conflict potential, especially in light of Afghanistan's construction of the new canal. The dynamics of power in this context are often characterized as "quiet diplomacy". Although Tajikistan, Turkmenistan, and Uzbekistan all share borders with Afghanistan along the Amu Darya River or its tributaries, Afghanistan is not part of the Soviet-era legacy of water management in the Aral Sea basin and is excluded from regional water management agreements. Efforts have been made by riparian states to initiate negotiations with the Taliban, but as of yet, no significant progress has been achieved.

The current system of transboundary water allocation in the Amu Darya demonstrates an adaptive capacity to water stress. Allocation is set as a percentage and adjusted proportionally based on actual water availability and hydrological conditions, providing a degree of water supply security for riparian coun-

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3 Amanda E. Wooden (2013) Another way of saying enough: environmental concern and popular mobilization in Kyrgyzstan, *Post-Soviet Affairs*, 29:4, 314-353, DOI: 10.1080/1060586X.2013.797165

4 Rickleton, Chris 'Not A Problem But A Disaster': Afghan Canal A Test For Taliban Ties In Water-Stressed Central Asia, accessed:01.09.2023. Available: <https://www.rferl.org/a/afghanistan-taliban-canal-water-central-asia/32350996.html>

5 Third National Communication of the Republic of Uzbekistan under the United Nations Framework Convention on Climate Change. Tashkent, 2016.

6 Ibid.

tries<sup>7</sup>. However, the construction of the new canal introduces a direct risk to the stability of this existing water allocation system by challenging the guaranteed water limits allocated to each country. This raises water justice issues and equity concerns, potentially triggering a new era of water competition in this highly vulnerable basin, susceptible to anthropogenic harm.

## Asymmetric Hydro-Politics: Ili, Irtysh, and Ural River Basins

Water allocation and management in the transboundary basins between China-Kazakhstan and Russia-Kazakhstan have a low potential for interstate conflict, but the unresolved water problems lead to internal social discontent and environmental degradation. The management of the Ural River is characterized by the presence of a regulatory framework and the dominance of a power hegemon. In the case of the Ili and Irtysh Rivers, there is the presence of a hegemon but an absence of a regulatory framework. Since both basins have power hegemony controlling the upper reaches of the rivers, we can observe an asymmetric principle in hydro-politics.

Currently, there is no Ili Integrated River Basin Management Plan between Kazakhstan and China; the same situation applies for the Irtysh River where Russia also has an interest as a riparian state. Both rivers are core freshwater resources for Kazakhstan's capital, Astana. The planned increase in water withdrawal by China already exerts additional pressure on the vulnerable ecosystem of the Ili Delta, Lake Balkhash and Irtysh River basin. Recent studies on water allocation between these countries have concluded that Kazakhstan has given up trying to prevent China from using excessive water upstream on transboundary rivers.<sup>8</sup> In the 2000s, water consumption from the Ili River was 38% China and 62% Kazakhstan. By 2014, these figures had changed significantly to 43% China and 57% Kazakhstan.<sup>9</sup>

Starting in 1997, China initiated a significant extraction of water from the Black Irtysh river to irrigate arid regions. This shift was triggered by the construction of the 300-kilometer Black Irtysh-Karamay irrigation canal. The primary purpose of this canal was to facilitate the irrigation of land, expand cotton and grain cultivation areas in the Xinjiang Uygur Autonomous Region (XUAR), and cater to the demands of the oil industry. As the canal reached its intended capacity, the volume of water extracted from the Irtysh River surged dramatically, increasing by nearly fivefold, reaching an annual total of 5 cubic kilometres.<sup>10</sup> In Kazakhstan, there is growing concern about the reduction of water flow on transboundary rivers; according to data given in the country's water management concept, over the past 10 years the flow from China along the Irtysh has decreased by 21.5% (2.1 k3).<sup>11</sup>

The second case of asymmetric hydro-politics is the Ural River. This is the third-longest river in Europe, supplying five regions of Russia and Kazakhstan from Bashkortostan to the Caspian Sea. There is an

7 Ziganshina, Dinara "Lessons for adaptation policies from 30 years of transboundary water allocation Amudarya" Presentation in CAWAMNET Workshop, Tashkent, 2023.

8 Brassett, J., Akmadi, M., & Sternberg, T. (2023). Seeing beyond negotiations: the impacts of the Belt and Road on Sino-Kazakh transboundary water management. *International Journal of Water Resources Development*, 39(3), 361-381.

9 Pueppke, S. G., Zhang, Q., & Nurtazin, S. T. (2018). Irrigation in the Ili River basin of Central Asia: From ditches to dams and diversion. *Water*, 10(11), 1650.

10 Muratshina, Kseniya Irtysh in the hydro politics of Russia, China and Kazakhstan. Available: <https://russiancouncil.ru/analytics-and-comments/analytics/irtysh-v-gidropolitike-rossii-kazakhstan-i-kitaya/>

11 The concept of development of the water management system Republic of Kazakhstan for 2023-2029.



agreement between Kazakhstan and Russia on the minimum necessary water supply for the Urals. However, in practice, Russia does not take into consideration Kazakhstan's interests. One of the main reasons for the shallowing of the river, according to Kazakh eco-activists, is the insufficient discharge of water by the Russian side from the Iriklin'sky reservoir,<sup>12</sup> while Russian scientists attribute the shallowing to natural and climatic factors.<sup>13</sup> Due to the river's shallowing, floodplain forests in western Kazakhstan have started to dry out<sup>14</sup>. According to the authorities of the West Kazakhstan region, the water level in the river began to decline in 2005 and reached a historic low in 2019. Pollution levels have also been deemed extreme. According to the data provided by Kazakhstan, the runoff in the Ural River has decreased over the past 10 years by 15% (1.3km<sup>3</sup>).<sup>15</sup>

## Discussion and Conclusion

The complex topography and lack of localised climate change data and localised drought models for Central Asia produce a very uncertain and unclear picture of when and where exactly climate change-driven water shortages will occur in Central Asia. According to the global water stress index, the southern part of the Central Asian region is included in the group of countries with the highest water stress forecast by 2040, and the rest of the region is projected to have a high level of water stress in the indicated time frame (Map 2).

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12 Altynbaev Kanat Russia's control of the Ural River threatens Kazakhstan with ecological disaster. Available: [https://central.asia-news.com/ru/articles/cnmi\\_ca/features/2022/11/18/feature-02](https://central.asia-news.com/ru/articles/cnmi_ca/features/2022/11/18/feature-02)

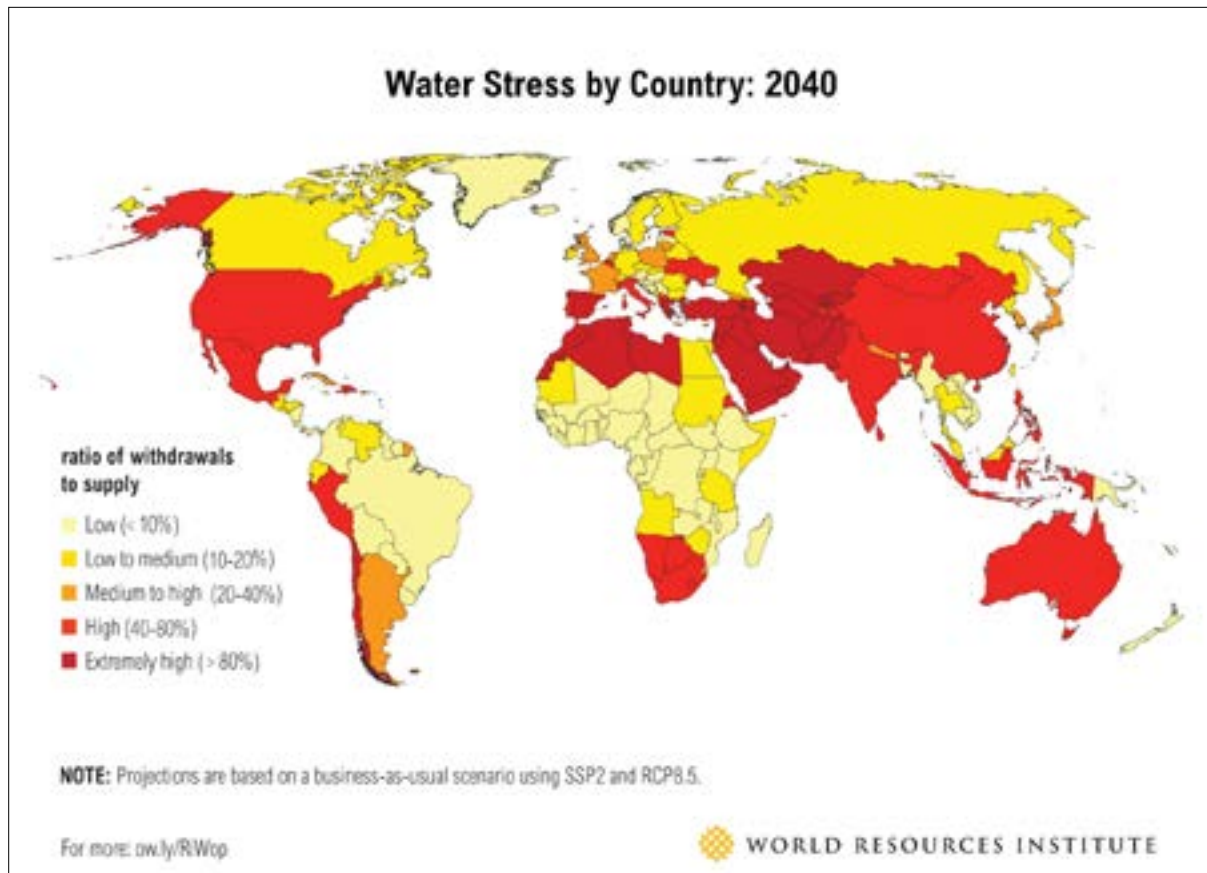
13 The Ural are not the Aral: Neighbours will not let artery shallow. Informational Analytical Center Moscow State University. Available: <https://ia-centr.ru/experts/lyudmila-kalashnikova/ural-ne-aral-sosedi-ne-dadut-arterii-obmelet/>

14 Uralskaya nedelya. The area of forest land in West Kazakhstan has catastrophically decreased. Available: <https://www.uralskweek.kz/2022/04/01/meleet-ural-ischezayut-lesa/>

15 The concept of development of the water management system Republic of Kazakhstan for 2023-2029.

**Map 2. Water Stress by Country based on the projection's scenario SSP2 and RCP 8.5 for 2040.**

Source: World Resources Institute, Available: <https://reliefweb.int/map/world/water-stress-country-2040>.



Climate change scenarios for the region have important consequences for water availability. The rate of ice melt, which depends on different projections of temperature increase and the evolution of the amount of snowfall, will affect the flow of major rivers in the region, along with precipitation. All climate change scenarios agree that ice melt dynamics will shift the seasonal availability of water, from two (spring with snowmelt and late summer with glacier melt) to one season (early summer). For example, Hagg et al.<sup>16</sup> project a mean runoff reduction of 25% during July and August for the main tributary of the Amu Darya, which would cause major water supply issues for riparian states. The agricultural sector is at the highest risk. Shifts in the intra-annual runoff regime are projected for major rivers in the region, with a potential advance in the annual peak runoff by up to a month, increasing spring flows but significantly reducing summer flows.<sup>17</sup>

The risks and threats associated with the consequences of climate change in the region have had a significant impact on hydro-politics. Tension was replaced by the search for guarantees. After 2016, it

16 Hagg, W., Hoelzle, M., Wagner, S., Mayr, E., and Klose, Z. (2013). Glacier and runoff changes in the Rukhk catchment, upper Amu-Darya basin until 2050. *Global and Planetary Change*. DOI: <https://doi.org/10.1016/j.gloplacha.2013.05.005>

17 See details in: Umirbekov, A., Akhmetov, A., & Gafurov, Z. (2022). Water-Agriculture-Energy Nexus in Central Asia through the Lens of Climate Change. CAREC Research Report.

was evident that the *water war* discourse,<sup>18</sup> which had cast a shadow over the region, had begun to be resolved and was gradually being replaced by a more complex picture. In this evolving scenario, the main tensions and potential risks are not between the upstream and downstream countries but rather between regions situated in river basins that are most vulnerable to anthropogenic water stress and fed by small rivers (like Isfara River where the biggest regional armed conflict, of recent times, occurred in September 2022).

Long term conflict between the upstream and downstream countries over the construction of new hydroelectric stations has been resolved, Uzbekistan now participating in the construction of new water infrastructure in the territory of upstream countries, a move they had previously opposed.<sup>19</sup> The obvious conclusion is that the recognition of the threat posed by climate change to the region has improved the negotiating positions of the upstream countries. It is highly likely that the new water agreements will be centred around guaranteed volumes of water collection in the reservoirs of the upstream countries, namely Kyrgyzstan and Tajikistan.

While climatic factors have played a role, particularly the occurrence of drought and increased rates of evaporation, other human development pressures, such as the expansion of irrigation, poor water governance, wastage of water, and water loss due to worn-out infrastructure, have often been the primary drivers of water stress in Central Asia. The situation in the two basins between Kazakhstan and China clearly demonstrates that the anthropogenic impact on the rivers is much more detrimental than the current effects of climate change, and this impact is occurring much earlier than the most pessimistic climate change forecasts predict.

For the past 30 years, countries have managed to avoid reforming the water politics of the region. Today, it is crucial to consider the price that the region pays for being under the shadow of the discourse of water wars in practice and suffering from water stress caused by human actions. While there is no consensus on updating existing agreements and signing new ones (including with Afghanistan), there is a consensus that water management will become an even greater challenge as Central Asia experiences the effects of climate change.

As global experience has shown, limited cooperation in the water sector can have unforeseen and destabilizing consequences, which can undermine the legitimacy of authorities and push states toward a new round of confrontation, ultimately limiting regional development for all.

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18 The threat of water wars articulated by Islam Karimov, the first president of Uzbekistan, voiced in Astana in 2012, for more details see: Islam Karimov warned that water issues could lead to war. Available: <https://centralasia.media/news:979177>

19 Uzbekistan President Press Service. Uzbekistan will build HPP in Tajikistan. Available: <https://president.uz/ru/lists/view/4415>; Gazeta. UZ Uzbekistan, Kyrgyzstan and Kazakhstan signed a roadmap for Kambarata HPP-1. Available: <https://www.gazeta.uz/ru/2023/01/07/ges/>

