

The Increasing Role of Regional Organizations in the Climate Agenda of Central Asia: Challenges and Possible Implications

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This article critically examines the structural and political challenges impeding the efficacy of Central Asian regional organizations in addressing climate change. It identifies the region's acute vulnerabilities – accelerating glacial retreat, intensifying water scarcity, and rising temperatures – that endanger key sectors such as agriculture, energy, and public health, ultimately threatening regional stability. The analysis underscores the detrimental impact of divergent national agendas, fragmented policies, and limited institutional capacities. While over 150 bilateral agreements on water resources exist, their non-binding nature and lack of enforcement hinder meaningful progress. In addition, the region also faces issues such as inadequate regional coordination and the lack of a comprehensive legal framework for climate governance. The absence of unified data systems and insufficient investment in climate adaptation strategies further exacerbate the situation. The study recommends establishing a comprehensive, centralized climate data repository, a regionally financed climate fund, and binding environmental agreements with enforceable mechanisms to ensure compliance and coordination. Additionally, fostering public awareness and local involvement is deemed essential to bolstering support for environmental initiatives. Concluding that regional cohesion and sustained commitment are paramount, the article argues for substantial reforms in climate governance to enable Central Asia's resilience and sustainable development.

Keywords: Central Asia, Climate governance, environmental sustainability, water resource management, regional cooperation, climate policy.



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Introduction

Ensuring environmental safety is crucial for the sustainable development of the Central Asia region. Environmentally sustainable development involves the conservation and sustainable management of natural resources and ecosystems, as well as reducing the impact of human activities on the environment. This includes protecting biodiversity, preserving clean water and air, sustainable management of forest resources, and reducing emissions and greenhouse gases. This certainly requires a more systematic approach.

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The report “The State of the Climate in Asia in 2023”¹ highlights the acceleration of changes in key climate indicators, such as surface air temperature, melting glaciers, and sea level rise. The warming trend has almost doubled compared to that in the period 1961–1990. Particularly high average temperatures were recorded from western Siberia to Central Asia and from eastern China to Japan. According to the Emergency Events Database (EM-DAT), 79 natural disasters related to natural phenomena were registered in Asia in 2023. Of these, more than 80% were related to floods and hurricanes, which killed more than 2,000 people and directly affected nine million individuals.²

Key environmental challenges – water scarcity, intense air and soil pollution, as well as the effects of climate change – not only threaten the natural diversity and environmental stability of the region, but also have an impact on public health, socio-economic development, and political stability and can provoke social and economic crises, leading to conflicts over resources.

This article aims to identify the key challenges for environmental

1 Storymaps.arcgis.com, The State of the Climate in Asia in 2023, 2023, Available at: <https://storymaps.arcgis.com/stories/a64df1437b9e4b3ca8a87ae633d55417> (Accessed: December 31, 2023)

2 Pedroletti B., “Asia most affected by climate-related disasters in 2023”, Le Monde, April 23, 2024, Available at: https://www.lemonde.fr/en/environment/article/2024/04/23/asia-most-affected-by-climate-related-disasters-in-2023_6669252_114.html (Accessed: April 23, 2024)

security in Central Asia and analyse the structural, political, and economic barriers that hinder regional organizations from implementing effective climate change mitigation strategies. It highlights the roles of organizations such as the Shanghai Cooperation Organisation (SCO), Collective Security Treaty Organization (CSTO), and Conference on Interaction and Confidence-Building Measures in Asia (CICA), examining the underlying factors that limit their capacity to address the region's climate crisis, along with key approaches to enhance the effectiveness of these organizations in tackling climate change.

Challenges for Environmental Security in Central Asia

Central Asia occupies a special place on the ecological map of the world. This region, which includes Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan, has unique natural resources and biodiversity, but has been facing increasing environmental problems in recent decades. The area of Central Asia is surrounded by mountains on three sides. The Ural Mountains are to the west, the Tien Shan and Pamir Mountains to the south, and the Sayan Mountains to the east. These mountain systems form the natural boundaries of the region and affect its climate and ecosystem. Central Asia is characterized by a continental arid and semi-arid climate with hot, cloudless, dry summers and humid, relatively warm winters in the south and cold winters with severe frosts in the north. As a result, the average annual temperature increase in this region is higher than in neighbouring regions. This makes it more vulnerable to climate change. Among the main challenges are the reduction of water resources, environmental pollution, land degradation, and climate change.

Temperature Rise

The increase in air temperature mainly occurred after the 1960s. Comparing surface temperatures over two periods, 1942–1972 and 1973–2003, we conclude that the average annual temperature increased by 0.5°C.³ The Intergovernmental Panel on Climate Change (IPCC)

³ Aizen V., Aizen E., Surazakov A., “Climate and Snow/Glacier Water Resources Changes in Central Asia in the last 50 years based on remote sensed and in-situ data”, The Handbook of Environmental Chemistry, Vol.105, No. 1, August 2020. p.98

notes that, over the past century, the average air temperature in Central Asia has increased by 1–2°C.⁴

According to North EurAsia Climate Centre data for 2018, the average annual air temperature in Central Asia is increasing at a rate that varies between 0.18°C per decade (Tajikistan) and 0.35°C per decade (Kazakhstan and Turkmenistan). The greatest temperature increases occur in spring (0.33–0.70°C/decade) and in autumn (0.18–0.34°C/decade).⁵ In winter, the change in air temperature decreases slightly, to between 0.13°C/decade (Kazakhstan) and 0.37°C/decade (Turkmenistan). In summer (with the exception of Turkmenistan), the lowest rate of temperature increase is observed: between 0.03 and 0.06°C/decade for the mountainous republics (Tajikistan and Kyrgyzstan, respectively), 0.19°C/decade for Kazakhstan and 0.26°C/decade for Uzbekistan.⁶ The absolute maximum temperature was observed in Kazakhstan in 2013, when the anomaly was 1.94°C, exceeding the record of 1983 with an anomaly of 1.86°C, which had remained the warmest year in Kazakhstan for the entire 30-year history of instrumental observations. The air temperature anomaly in 2016 was +1.66°C compared to average temperatures in the period 1961 to 1990.⁷

Similarly, global warming poses an immediate threat to Central Asia. The impact of climate change in Central Asia is most evident in mountainous areas, where the area covered by glaciers has decreased by about one-third over the past 100 years.⁸ Glaciers in this region, with an area of 27,677 km² (Tien Shan 15,417 km² and Pamir 12,260 km²),⁹ retain a huge amount of water resources and melt by 0.6–0.8% year-by-year.¹⁰

4 Parry M.L., Canziani O.F., Palutikof J.P. et al., *Climate Change 2007: Impacts, Adaptation and Vulnerability*, Cambridge, Cambridge University Press, 2007. p.976.

5 GIZ, “Regional Climate Change Adaptation Strategy for Central Asia”, Bonn, 2023. p.97.

6 Ibid.

7 United Nations Environment Programme, “Seventh National Communication and Third Biennial Report of the Republic of Kazakhstan to the UN Framework Convention on Climate Change”, Astana, 2017, p.286.

8 United Nations, United Nations Framework Convention on Climate Change, “Second National Communication of the Republic of Uzbekistan under the United Nations Framework Convention on Climate Change”, Tashkent, 2008, p.8.

9 Aizen V., Aizen E., Surazakov A., “Climate and Snow/Glacier Water Resources Changes in Central Asia in the last 50 years based on remote sensed and in-situ data”, *The Handbook of Environmental Chemistry*, Vol.105, No. 1, August 2020. p.9.

10 United Nations, United Nations Development Programme, “The Glaciers of Central Asia: Disappearing Resource”, December 2011, p.19.

The Asian Development Bank estimates that the subcontinent has lost an average of 30% of its glaciers over the past 50–60 years. During this period, Kazakhstan has lost 45% of the glaciers in its mountains. In Kyrgyzstan, about 16% of glaciers have disappeared over the past 70 years. A similar situation exists in Tajikistan. Scientists in Tajikistan attribute this loss to a 15% increase in temperature over the past 70 years.¹¹ Landslides are one of the consequences of melting glaciers. Such climatic phenomena inevitably cause damage to local biodiversity. The Amu Darya and Syr Darya rivers originate from the mountains. With the melting of glaciers, the water level in these rivers increases, affecting the water quality. As a result, the lands irrigated by these waters are saline, and cotton plantations are destroyed by flooding.

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Water Shortage

One of the most important problems of the region is the shortage of water resources. The Amu Darya and Syr Darya rivers, which historically provide water for a significant part of Central Asia, face serious challenges. Due to improper use and pollution of water sources, as well as climate change, rivers are gradually becoming shallower, which creates additional risks for agriculture and local communities. One of the main problems of the Central Asian countries is the improper geographical distribution of water resources among the five countries. The economic use of water is primarily directed to cotton and energy production. Thus, water is also the basis of the internal – social and political – stability of the Central Asian states.

Due to the arid climate, many countries are heavily dependent on the Amu Darya and Syr Darya rivers. These rivers originate in the mountains of Kyrgyzstan and Tajikistan and provide water to the countries located downstream – Kazakhstan, Uzbekistan, and Turkmenistan. Two source countries (Kyrgyzstan and Tajikistan) control the beginning of these rivers. The countries downstream (Uzbekistan, Turkmenistan, and partly Kazakhstan) depend on a stable flow of these rivers for their

¹¹ centralasiacimateportal.org, Kyrgyzstan Lost Over 16 Percent of Glaciers in the Last 50 Years: Drought Risk Gets Real to the Whole Region, November 14, 2024, Available at: <https://centralasiacimateportal.org/kyrgyzstan-lost-over-16-per-cent-of-glaciers-in-the-last-50-years-drought-risk-gets-real-to-the-whole-region/> (Accessed: November 14, 2024)

needs. As a result, the region's water-related interests revolve around ensuring sufficient water supply, supporting agriculture, and developing hydropower, leading to conflicting priorities among these nations.

The Amu Darya River (1,415 km) originates in the Pamirs (Tajikistan) and flows through the territories of Afghanistan, Uzbekistan, and Turkmenistan. Its waters ultimately flow into the Aral Sea. The river is of great importance to the region, serving as a source of fresh water, irrigation, and hydropower for several countries.

The Syr Darya river, like the Amu Darya, plays a key role in the lives of Central Asian nations, providing for the needs of agriculture, industry, and water supply. The length and complex hydrological regime of the Syr Darya require close cooperation between the countries of the region to maintain sustainable water use and protect its ecosystem. After the collapse of the Soviet Union in 1991, the management of the Syr Darya's water resources became more complex owing to the lack of coordination between independent states. Competition for water resources between the countries is complicated by differences in priorities: Kyrgyzstan and Tajikistan use water for electricity generation in winter, while Kazakhstan and Uzbekistan are interested in using it for irrigation in summer.

The Caspian Sea, recognized as a critical ecological and economic resource, represents a significant area of focus for regional cooperation. Its unique environmental and geopolitical significance necessitates coordinated efforts to address challenges such as marine pollution, biodiversity conservation, and the sustainable utilization of marine resources. Moreover, an initiative called "The Caspian House: A Platform for Environmental Organizations of Caspian Countries" was officially launched through the signing of a joint cooperation protocol by representatives of public unions from Azerbaijan, Russia, Kazakhstan, and Turkmenistan on November 20 in Baku on the sidelines of the 2024 United Nations Climate Change Conference (29th Conference of the Parties (COP29) of the UNFCCC). The initiative aims to establish an environmental association of non-governmental organizations from the four Caspian nations, focusing on collaborative efforts to address regional environmental challenges.¹² Iran's representatives did not participate in this framework, which highlights ongoing challenges in achieving unified cooperation

12 Caspianpost.com, COP29 Unveils Project to Enhance Environmental Cooperation Among Caspian States, November 20, 2024, Available at: <https://caspianpost.com/en/post/cop29-unveils-project-to-enhance-environmental-cooperation-among-caspian-states>. (Accessed: November 20, 2024)

among all five Caspian littoral states despite shared environmental concerns.

Moreover, the untapped potential of offshore wind energy in the Azerbaijani section of the Caspian Sea offers an opportunity to integrate renewable energy development with marine resource management, reinforcing Azerbaijan's role as a regional leader in environmental and energy innovation. Azerbaijan, Kazakhstan, Turkmenistan, Iran, and Russia, through joint projects, can together develop interconnected wind-power, smart-grid facilities, and transmission networks.¹³ Additionally, Azerbaijan, Russia, Kazakhstan, Turkmenistan, and/or Iran can jointly initiate the establishment of a regional research centre to study the offshore renewable energy opportunities with a focus on addressing environmental challenges, optimizing wind energy technologies, and ensuring minimal ecological impact. These efforts would set a precedent for balancing energy production with marine ecosystem preservation.

The Aral Sea, once one of the largest inland bodies of water in the world, today represents a tragic symbol of an environmental disaster. During the 20th century, this unique sea, located on the border of Kazakhstan and Uzbekistan, practically disappeared due to the intensive exploitation of the Amu Darya and Syr Darya rivers feeding its waters. The main reason for the shallowing of the Aral Sea was the massive use of the waters of the Amu Darya and Syr Darya for the irrigation of agricultural crops, in particular cotton, in the former USSR. As part of projects to transform the deserts of Central Asia into agricultural zones, river waters were redirected for irrigation.¹⁴ This led to a sharp reduction in water inflow into the Aral Sea, and with each decade its area and depth decreased. According to data from the United Nations Multi-Partner Trust Fund for Human Security for the Aral Sea Region in Uzbekistan, the salinity level of the Aral Sea has increased by more than 13–25 times and exceeds the average ocean mineral level by a factor of 7 to 11.¹⁵

Moreover, the untapped potential of offshore wind energy in the Azerbaijani section of the Caspian Sea offers an opportunity to integrate renewable energy development with marine resource management, reinforcing Azerbaijan's role as a regional leader in environmental and energy innovation.

13 News.az, Offshore wind farm in the Caspian Sea: a new frontier of green energy, May 30, 2024, Available at: <https://news.az/news/--offshore-wind-farm-in-the-caspian-sea--a-new-frontier-of-green-energy-> (Accessed: May 30, 2024)

14 Britannica.com, Aral Sea. Environmental consequences, November 2, 2024, Available at: <https://www.britannica.com/place/Aral-Sea> (Accessed: November 2, 2024)

15 The UN Multi-Partner Human Security Trust Fund for the Aral Sea Region in Uzbekistan, "Annual

Due to the decrease in water resources and the deterioration of land quality, crop yields are decreasing, which leads to a decrease in rural incomes and an increase in poverty and unemployment. As a result, food security suffers, which contributes to the growth of social tension. Deterioration of water and air quality, along with climate change, has a direct impact on public health, increasing morbidity and mortality, and healthcare costs. Agriculture, which plays a key role in the region's economy, will suffer economically. Declining agricultural productivity can lead to increased poverty and unemployment, which further undermines social stability. Collectively, environmental problems have a negative impact on all aspects of life and hinder sustainable economic growth.

To address these issues, regional cooperation between Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan is extremely important. The lack of a unified policy to regulate hydropower will also only exacerbate the situation with water resources in the region.

Obstacles to Regional Cooperation

After gaining independence, the five Central Asian republics encountered a new challenge: the management and distribution of natural resources. Following the dissolution of the USSR in 1991, each state began prioritizing its national interests over regional collaboration, asserting control over its resources. For instance, Kyrgyzstan and Tajikistan, located upstream and controlling significant water sources, adopted policies favouring their energy needs, such as releasing water in winter for hydropower generation. This approach often conflicted with the needs of downstream countries such as Uzbekistan and Turkmenistan, which depend on water for summer irrigation to sustain agriculture.

In the 15 years from 1992 to 2007, there were about 150 interstate agreements between Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan on water resources. However, these agreements were only partially respected, if at all. One of the reasons for non-compliance with the agreements and the lack of political interest within the Central Asian States in resolving the water problem is the lack of common institutions. In the process of writing this paper, the present author analysed 28 bilateral agreements, covering the period from 1996 to 2023,

Fund-Level Report", Uzbekistan, 2023, p.38.

between Central Asian countries on water resources management. The agreements emphasize the importance of collaborative management of transboundary water bodies, with clearly defined goals focused on environmental protection, conflict prevention, and sustainable water usage. Key provisions include joint decision-making, the establishment of working groups to coordinate efforts and monitor water resources, and adaptation strategies for climate change.

Effective fulfilment of these conditions would lead to solving the problems of water use and ensuring sustainable development of the region. But in the process of implementing the terms of the agreements, the parties face a number of challenges.

Different interests and priorities, the need for significant funding, technical difficulties, and the impact of climate change require serious analysis and an effective approach for the successful implementation of all initiatives. Table 1 shows a comparative analysis of the strategic interests and priorities of the five states, and Table 2 indicates the conflicts and challenges they face.

Table 1. Strategic interests and priorities

Country	Strategic interests	Main priorities
Kazakhstan	Maintaining the water level in the Syr Darya for agriculture and water supply in the south of the country	Improvement of water infrastructure and cooperation to regulate the flow of the Syr Darya
Kyrgyzstan	Development of hydropower at the expense of Syr Darya's water resources	Construction and operation of hydroelectric power plants for energy independence and electricity export
Turkmenistan	Ensuring a steady supply of water from the Amu Darya for irrigation, especially for cotton cultivation	Development of irrigation systems, maintenance of water levels in the Amu Darya during the growing season
Tajikistan	Development of hydropower, especially large hydropower plants for energy supply and export	Construction of hydroelectric power plants to improve energy security
Uzbekistan	Stable water supply for the needs of cotton growing and agriculture in general, maintaining the level of the Syr Darya and Amu Darya	Modernization of the irrigation system and water resources management in cooperation with Kyrgyzstan and Tajikistan

Table 2. Conflicts and challenges

Country	Major conflicts and challenges
Kazakhstan	Lack of water in the Syr Darya in summer, environmental problems of the Aral Sea
Kyrgyzstan	Dependence on seasonal accumulation of water for hydropower, possible conflicts with Uzbekistan and Kazakhstan in summer
Turkmenistan	Decrease in the flow of the Amu Darya due to Tajikistan’s hydroelectric power plant construction projects
Tajikistan	Concern of downstream countries due to the construction of large hydroelectric power plants
Uzbekistan	Unstable flow of the Amu Darya and Syr Darya, dependence on upstream countries for water resources

The Role of Regional Organizations in the Climate Agenda of Central Asia

Regional organizations are playing an increasingly important role in advancing climate initiatives within Central Asia, a region highly susceptible to ecological challenges. Through initiatives such as the SCO’s “Green Belt Program”, “Aral Sea Rehabilitation Program”, “Water Resource Cooperation Framework”, and “Syr Darya Water Management Project”, the CSTO’s “Disaster Response Program”, “Combat Brotherhood”, and “Shield”, and CICA’s Ministerial Conference on Environmental Issues, which promote resource management, disaster preparedness, and collaborative environmental governance, these organizations are proactively addressing the ecological challenges facing Central Asia, enhancing resilience, and ensuring long-term stability in a region particularly vulnerable to the impacts of climate change.

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The SCO has demonstrated an expanding commitment to environmental protection and climate resilience, leveraging regional cooperation to address the environmental challenges facing Central Asia. Initially established as a platform for security and economic collaboration, the SCO has progressively recognized that environmental degradation and resource scarcity can destabilize its member states and hinder regional

development. To address these pressing issues, the organization has launched a series of focused initiatives that foster collaboration on renewable energy, water management, and pollution control across its member states.

One significant example is the SCO's Green Belt Program, which strengthens cooperation on sustainable land use and reforestation, with an emphasis on combating desertification. Through this initiative, Kazakhstan and Uzbekistan have invested in large-scale afforestation projects designed to mitigate desert expansion and alleviate the severe dust and sandstorms that periodically afflict Central Asia. By encouraging biodiversity protection and the regeneration of sensitive ecological areas, the Green Belt Program contributes directly to building environmental resilience across the region.

The Aral Sea Rehabilitation Program is another key environmental effort supported under the SCO's framework, although it is primarily funded by the International Fund for Saving the Aral Sea (IFAS). This programme addresses the long-standing environmental crisis posed by the desiccation of the Aral Sea and seeks to rehabilitate the region through reforestation, sustainable agriculture, and improved irrigation. Under the SCO's Water Resource Cooperation Framework, countries such as Uzbekistan, Tajikistan, and Kyrgyzstan have engaged in projects to optimize water usage, improve irrigation efficiency, and enhance data sharing on hydrological conditions. A prominent initiative within this framework is the Syr Darya Water Management Project, which aims to coordinate dam releases and water allocations among participating states, thus preventing resource conflicts and reducing waste.

The CSTO, although initially dedicated to conventional military and security concerns, has adapted to the multifaceted threats that climate change poses to regional stability. This shift acknowledges that climate change, as a 'threat multiplier', can exacerbate existing vulnerabilities by intensifying natural disasters, increasing resource scarcity, and triggering potential social upheaval.

A significant manifestation of this expanded scope is the CSTO's Disaster Response Program, which has incorporated a range of joint training exercises designed to simulate various environmental crises. One of the primary exercises, "Combat Brotherhood", serves as a platform in which CSTO member states collaborate in simulations of

disaster scenarios, including those directly linked to climate-related hazards such as floods, wildfires, and extreme weather events. Combat Brotherhood enables participants to develop and refine coordinated responses to crises, with a specific focus on addressing the unique environmental challenges of Central Asia and Eurasia. This exercise not only strengthens operational coordination across member states, but also reinforces their capacity to address environmental disasters, which are increasingly seen as critical to the organization's stability mandate. The CSTO's commitment to environmental preparedness is further illustrated by its "Shield" initiative, which focuses on equipping member states for rapid response to ecological crises. The Shield initiative incorporates climate resilience into the CSTO's training protocols and readiness assessments, explicitly recognizing that changes in the environment can disrupt social and political order.¹⁶ This integration of climate resilience into the CSTO's agenda reflects a sophisticated response to the changing nature of security in the region, positioning the CSTO as a proactive agent in managing the compounded risks of climate change and in safeguarding long-term stability in Eurasia.¹⁷

The CICA, a multi-state forum focused on fostering peace and stability in Asia, has expanded its agenda to include climate change as a critical issue for regional cooperation. One major initiative under CICA's environmental dimension is the recent establishment of the Ministerial Conference on Environmental Issues, held in August 2024 in Astana, Kazakhstan. This forum provided member states an opportunity to discuss pressing environmental challenges, including climate adaptation, water management, biodiversity conservation, and pollution control.¹⁸

On November 12, speaking at the COP29 in Azerbaijan's capital city of Baku, CICA's current Secretary General, Kairat Sarybay, highlighted the conference's dedication to a regional, collective approach to climate issues, recognizing environmental risks as integral to security. CICA also addressed climate-induced challenges, such as water scarcity, by

16 Mühr A., Sorbello P., Weiffen B., *Securitization and Democracy in Eurasia Transformation and Development in the OSCE Region*, (Switzerland: Springer Cham, 2023), p.411.

17 Press.un.org, *With Climate Crisis Generating Growing Threats to Global Peace, Security Council Must Ramp Up Efforts, Lessen Risk of Conflicts, Speakers Stress in Open Debate*, June 13, 2023, Available at: <https://press.un.org/en/2023/sc15318.doc.htm> (Accessed: June 13, 2023)

18 Aninews.in, *First CICA Ministerial Conference on environmental issues held in Astana, October 21, 2024*, Available at: <https://www.aninews.in/news/world/asia/first-cica-ministerial-conference-on-environmental-issues-held-in-astana20241021184012/> (Accessed: October 21, 2024)

hosting panels on the effects of resource depletion on the sideline of COP29. On November 13, in response to recent severe flooding across Southeast Asia, Sarybay emphasized the importance of unified water management strategies for enhancing resilience. CICA's approach to managing shared resources such as water underscores the connection between environmental security and broader regional stability.¹⁹ These actions exemplify CICA's role in fostering climate resilience and sustainability across Asia, aiming to bolster cooperation among its members in the face of growing environmental risks.

Azerbaijan's Chairmanship of CICA for the term 2024–2026 presents an opportunity to enhance regional climate action, backed up by the country's recent experience as the host of the COP29 in Baku

Azerbaijan's Chairmanship of CICA for the term 2024–2026 presents an opportunity to enhance regional climate action, backed up by the country's recent experience as the host of the COP29 in Baku from November 11 to 24, 2024. As CICA's chair, and drawing from its COP29 experience, Azerbaijan has an opportunity to foster multilateral discussions on climate risks with a stronger focus on environmental issues and to promote water resources management among CICA countries through closer cooperation.

Another key focus could be the development of a renewable energy infrastructure perspective through the establishment of a "Renewable Energy Innovation Hub" encouraging collaboration on clean energy technologies among the 28 member states of CICA, with active contributions from Azerbaijan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan.²⁰ To facilitate the implementation of these initiatives, Azerbaijan could propose the establishment, within the framework of CICA, of a new funding mechanism aimed at securing international financial support for sustainable development projects.²¹ By pursuing such actions, Azerbaijan could solidify CICA's role as a central platform for enhancing regional climate resilience and promoting sustainable development.

19 S-cica.org, Address by CICA Secretary General Kairat Sarybay at COP29 on adverse impacts of climate change on the decline of water basins, November 13, 2024, Available at: <https://www.s-cica.org/index.php?view=page&t=speeches&id=284> (Accessed: November 13, 2024)

20 S-cica.org, Conference on Development of Green Technologies and Renewable Energy Sources in the Context of Low Carbon Development, November 25, 2021, Available at: <https://www.s-cica.org/index.php?view=page&t=promotion-of-green-technologies-was-discussed-by-experts-of-cica-member-states> (Accessed: November 25, 2021)

21 Caliber.az, Azerbaijan Joins Green Finance Movement, October 19, 2024, Available at: <https://caliber.az/en/post/azerbaijan-joins-green-finance-movement> (Accessed: October 19, 2024)

Possible Implications

The lack of a unified climate database creates a major obstacle to effective climate change adaptation and decision-making. Socio-economic research on climate change impacts, vulnerabilities, and distribution of effects, and the evaluation of adaptation strategies and policies, are essential for effective climate adaptation. To expand research on climate change, meteorological and statistical agencies across Central Asian countries need to provide easy and open access to long-term weather and hydrological data; detailed statistics on agricultural, environmental, and land-use impacts (e.g. at district level); and the results of agricultural and other domestic surveys, as is done in other countries and regions.²²

Since the environmental sphere is quite extensive, it is impossible to monitor all changes. To track climate change in Central Asia, we propose a number of indicators:

- The Heat Wave Duration Index (HWDI) is a critical measure for understanding and quantifying the frequency and intensity of heat waves. The methodology for calculating HWDI involves several key steps, each designed to ensure that the index accurately reflects the severity of heat waves for a given period and location.²³ By comparing HWDI difference maps across different duration thresholds, researchers can gain insights into the frequency and intensity of heat waves and how they may change. A persistent period of unusually hot days is referred to as an extreme heat event or a heat wave. Heat waves are more than just uncomfortable: they can lead to illness and death, particularly among older adults, the very young, and other vulnerable populations. Prolonged exposure to excessive heat can lead to other impacts as well – for example, crop damage, livestock injuries or deaths, and increased risk of wildfires. Prolonged periods of extreme heat can lead to power outages as heavy demand for air

22 Mirzabaev A., “Climate Change Science and Policy in Central Asia: Current Situation and Future Perspectives”, in Rahat Sabyrbekov, Indra Overland, and Roman Vakulchuk (eds.), *Climate Change in Central Asia. Decarbonization, Energy Transition and Climate Policy* (Switzerland: Springer Cham, 2023), p.170.

23 Fallah, B. and Rostami, M., “Exploring the Impact of the Recent Global Warming on Extreme Weather Events in Central Asia Using the Counterfactual Climate Data”, *Climatic Change*, Vol. 177, No. 5, May, 2024, p.20.

conditioning strains the power grid.²⁴

- The Palmer Drought Severity Index uses readily available temperature and precipitation data to estimate relative dryness. It is a standardized index that generally spans -10 (dry) to $+10$ (wet). The PDSI has been reasonably successful at quantifying long-term drought. As it uses temperature data and a physical water balance model, it can capture the basic effect of global warming on drought through changes in potential evapotranspiration.²⁵
- Measuring glacial activity: This is an important indicator of climate change, especially for mountainous areas of Central Asia such as Tien Shan, Pamir, and the Hindu Kush, where glaciers are key sources of water. This implies establishing the following indicators:
 1. Changes in the area of glaciers (reduction or increase) as a result of warming or changes in precipitation
 2. Changes in the position of the fronts (edges) of glaciers, where melting is most active. The retreat of fronts often indicates the acceleration of melting.
 3. The appearance on and around the surface of glaciers of lakes, which accelerate their melting. The formation of such lakes is associated with thermal processes and surface drainage
 4. Monitoring of flora and fauna living on and around glaciers, as their populations are sensitive to temperature changes and melting of glaciers.

Creating a central database is crucial to attract funding. The lack of funding is a major barrier to effective cooperation among regional organizations in Central Asia when it comes to tackling climate change issues. Addressing climate change requires significant investment in infrastructure, technology, and human resources, yet Central Asian countries often face financial constraints that hinder their ability to make these investments. Consequently, regional organizations struggle to implement and sustain climate-related initiatives, resulting in slow

24 Epa.gov, Climate Change Impacts on Health, October 19, 2022, Available at: <https://www.epa.gov/climateimpacts/climate-change-impacts-health> (Accessed: October 19, 2022)

25 Climatedataguide.ucar.edu, Palmer Drought Severity Index, August 19, 2023, Available at: <https://climatedataguide.ucar.edu/climate-data/palmer-drought-severity-index-pdsi> (Accessed: August 19, 2023)

progress and limited impact. To overcome this funding gap, Central Asian countries and their regional organizations may need to diversify funding sources, strengthen regional ownership, and enhance financial mechanisms.

Without addressing these funding challenges, Central Asia will struggle to develop the coordinated, sustained climate responses needed to protect the region's ecosystems, economies, and communities from the growing impacts of climate change.

Conclusion

This article sought to respond to the question: *“How can regional organizations in Central Asia enhance their role in addressing the pressing issue of climate change?”*. The region's vulnerability to climate impacts requires a coordinated response that goes beyond bilateral efforts. A supranational institution with a unified legal framework is crucial for effectively managing climate risks. Strengthening regional organizations such as the SCO, CSTO, and CICA through structural, financial, and strategic reforms will improve their capacity to tackle climate change.

The SCO, CSTO, and CICA are increasingly prioritizing climate resilience in Central Asia, recognizing the critical link between environmental sustainability and regional stability. Their proactive efforts, including joint training exercises and the establishment of dedicated environmental councils, aim to enhance resilience and long-term stability in a region vulnerable to climate change.

There are a few key approaches necessary to enhance the effectiveness of the SCO, CSTO, and CICA in tackling climate change:

- Enhance data sharing and joint climate monitoring systems. Effective climate action requires accurate, up-to-date data, yet Central Asia lacks comprehensive data-sharing systems for monitoring climate impacts such as glacial melt, river flow changes, and extreme weather events. A centralized climate observatory with satellite monitoring, weather stations, and glaciological observation points should be established. This observatory would be jointly

funded and managed by regional organizations, with a mandate to regularly share data on climate trends and vulnerabilities. Reliable data will improve regional understanding of climate risks, allowing for more targeted and scientifically informed adaptation strategies. Joint data collection also fosters trust among countries, reinforcing collaboration.

- Increase public awareness of and community involvement in climate action. Public support for climate initiatives is limited, which can hinder implementation and weaken regional cooperation. Public awareness can create grassroots support for climate action, encouraging communities to participate in adaptation projects and influencing governments to prioritize environmental policies. Increased community involvement also enhances the resilience of local populations.
- Establish a dedicated regional climate fund. Funding limitations restrict the capacity of regional organizations to implement and sustain climate-related initiatives. A regional fund would provide consistent financial resources for climate projects, reducing reliance on unstable external funding and enabling the long-term planning necessary for impactful climate action.
- Develop binding environmental agreements with enforcement mechanisms. Many current agreements are non-binding, limiting their effectiveness and allowing countries to prioritize national interests over regional goals. Develop binding agreements focused on specific climate issues, such as water management, renewable energy targets, and emissions reduction. These agreements should include enforcement mechanisms, such as financial penalties or incentives, to encourage compliance. Binding agreements would enhance accountability, encouraging countries to adhere to regional climate objectives and ensuring more consistent participation in climate programmes.

To effectively address the climate crisis in Central Asia, regional organizations must establish clear governance frameworks with defined roles and responsibilities to ensure coordinated action. Stability can be achieved by fostering long-term political commitment and building trust among member states through consistent policies. Adequate resources,

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including sustainable funding and skilled human capital, are essential for implementing and monitoring effective climate strategies across the region. A collective, well-supported effort will not only protect Central Asia's ecosystems but also ensure sustainable development and long-term regional stability in the face of a changing climate.