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CLIMATE DIPLOMACY IN CENTRAL ASIA: CONTEXT, CHALLENGES, AND OPPORTUNITIES

AZEL ALTYNBEKOVA[1*], DANA AKHMEDYANOVA[2]

[1] Master's degree student, L.N. Gumilyov Eurasian National University, Kazakhstan
[2] Candidate of Political Science, Acting Associate Professor, L.N. Gumilyov Eurasian National University, Kazakhstan

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ABSTRACT. *Central Asia is a region that is highly vulnerable to the impacts of climate change, which adversely affects the lives of its inhabitants. Since 2018, the Intergovernmental Panel on Climate Change has expressed concerns about the need to promote regional cooperation and enhance climate resilience to address current challenges and adapt to future climate risks.*

The governments of Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan are developing national legislation and strategies focused on climate issues. They engage in both regional and international cooperation through summits, ministerial meetings, and participation in projects funded by third parties. This article provides a content analysis of these efforts.

Using SWOT analysis, the research findings highlight the current state of regional climate diplomacy, the measures being taken, and the challenges posed by the region's reliance on fossil fuels. It also points out the lack of sufficient research within the regional academic community. However, there are opportunities for improvement, as well as potential negative consequences if necessary measures are not implemented promptly.

The ability of the region's states to turn their plans into actionable steps, in consultation with the expert community, is essential for creating a more prosperous and secure future. Consequently, the article emphasizes the need for a more coordinated approach among the Central Asian Republics and further development of regional climate diplomacy.

KEYWORDS: *Central Asia, climate change, regional cooperation, international institutions.*

INTRODUCTION

The negative effects of climate change are accelerating with each passing year. OSCE's member-states have already acknowledged the connection between environmental cooperation, peaceful inter-state relations, water pollution control, and rational use of natural resources as a crucial aspect of comprehensive security since the ratification of the Helsinki Final Act in 1975 (Krasnai, 2021). Thirty years after the First Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) was published in 1990, remarkable advances in interdisciplinary research have increasingly shown that the climate is changing, with the complex effects of what is felt by both natural and human systems (von Uexkull & Buhaug, 2021). World Economic Forum Global Risks in their 2024 report provide top 10 short-term (2 years) and long-term (10 years) expected

***Correspondence to:** Azel Altynbekova, email: azelaltynbekova@gmail.com

risks, where the negative impact of environmental risks is expected to grow within given time framework: if in 2 years, there are only two climate-related risks (2nd – extreme weather events and 10th – pollution), in 10 years, there are already 5 of them (1st – extreme weather events, 2nd – critical change to Earth systems, 3rd – biodiversity loss and ecosystem collapse, 4th – natural resource shortages, 10th – pollution) (The Global Risks Report, 2024). As a result, climate change began to be presented as a security threat already in 70s, and according to recent data, future projections of global risks represent climate risks as a major one.

Turning to Central Asia, since republics gained independence in the early 1990s, three major issues have characterized interstate relations there: energy, water, and land management. In the Soviet era, a large transboundary water infrastructure was constructed, and water resources in the Aral Sea basin were centrally regulated. However, after the collapse of the USSR, previously existing frameworks covering technical, legal, and economic aspects for sharing energy and water resources needed to be updated. This has led to both regional agreements on transboundary water resource management, but at the same time, tensions among the countries over water resources.

In modern times, regulation of regional resources is becoming more relevant with each passing year, due to the rise of regions' vulnerability and climate change negative impacts, including water scarcity, desertification, and glacial melting. As these risks are shared across the region, they also provide entry points for co-operation and indicate the necessity of the development of regional climate diplomacy. Today, there are already a number of completed and ongoing regional climate projects. However, this work provides an analysis of their effectiveness and the existing drawbacks of regional climate diplomacy, highlighting the importance of cooperation to achieve better results in this field.

This article aims to examine climate change vulnerabilities in Central Asia, to evaluate existing mechanisms of climate change cooperation in the region, and the role of foreign actors in the' implementation. It will also allow assessing the challenges and prospects for enhancing climate diplomacy in Central Asia.

LITERATURE REVIEW

Studies on climate change and cooperation among Central Asian states on this issue have been widely examined in recent years, as reflected in reports from the Intergovernmental Panel on Climate Change, the World Bank, the Eurasian Development Bank, and the Organization for Security and Cooperation in Europe.

Mitigation and adaptation measures of the Central Asian (CA) Republics are incorporated into national legislations, National Determined Contributions, long-term development strategies, and action plans of the CAREC Institute and Deutsche Gesellschaft für Internationale Zusammenarbeit.

In addition, in the course of writing the work, an extensive scientific literature of various researchers and scientists, including Adylbekova, K., Akunova, G., Asakawa, M., Krasnai, M., Mosello, B., Sabyrbekov, R., was studied. This literature contains information on the perspectives of regional cooperation on water issues, especially taking into account the

transboundary nature of water resources, on existing climate change initiatives, focuses on opportunities for regional cooperation in this field, and covers regional climate change policies and states' commitments.

Works of Idrisov, T., Aben, D., and Blumstein, S. highlight regional climate change challenges and possible negative consequences if necessary measures are not taken. It is important to note that only in recent years has the issue of climate change become the subject of more extensive research and consequently resulted in rising interest of the academic community and international institutions, which illustrates the relevance of conducting studies in this field.

RESEARCH METHODOLOGY

In order to evaluate the effectiveness of regional climate efforts, it is essential to identify key theoretical frameworks on which the cooperation of Central Asian states is based. To begin with, the definition of climate diplomacy is "encompasses the use of diplomatic tools to support the ambition and functioning of the international climate change regime and to attenuate the negative impacts climate change risks pose for peace, stability and prosperity" (Climate Diplomacy Platform, n.d.). There are also several characteristics and features of climate diplomacy, making it possible to outline a definition on which this work is based. According to Tshering and Craft (2016), there are the following major factors related to climate diplomacy: environmental sustainability as a pillar of development; carbon neutrality and moral authority; multilateralism; and coordination of diplomatic engagement (Zhang et al., 2023). At its core, in the context of global environmental and climate policymaking, climate diplomacy encompasses different policy areas in order to make it more effective, including international,

pluri- and bilateral interaction among parties builds mutual interaction between the large emitters and developing countries (Bremberg et al., 2024).

However, peculiarities related to the differences between developing and developed countries must be clarified. The developed nations and their negotiation blocs practiced climate diplomacy in an effort to shape international negotiations based on their priorities, and in contrast, developing nations, such as least developed countries (LDCs), have often lacked active engagement in climate diplomacy, which results in limited influence in shaping negotiations (Zhang et al., 2023).

Generally, based on existing international practices, different approaches of climate diplomacy can be identified, namely: legal approach that includes initiating and updating of international agreements on climate change, such as the Kyoto Protocol and Paris Agreement; institutional approach, focusing on the role of international institutions in development of climate agenda; economic approach, focusing on transition on reducing dependence on raw materials, increasing green investments, and others. Therefore, in the case of Central Asia, climate diplomacy encompasses the diplomatic engagement in all existing forms mentioned previously, proceeding from the region's characteristics.

This article will focus on legal approach, mainly on the initial legal basis on water sources allocation of Central Asian states and newly adopted and signed concepts and agreements, following recent events, such as COPs or Consultative Meetings of the Heads of Central

Asian States; institutional approach, illustrating the importance of regional interaction in terms of existing mechanisms on the ministerial and heads of state levels and also the role of external aid and financing in terms of newly emerging projects with the participation of third parties; economic approach, underlining the necessity of adopting green practices, reducing dependence on natural resources, developing renewable energy sources and attracting green investments.

The second approach is connected to liberal institutionalism, developed by Robert Keohane, who points out that by exchanging information, establishing joint points of cooperation between states, confidence rises, which contributes to more effective interaction within institutions (1995). Another applicable theory is liberal intergovernmentalism, developed by Andrew Moravcsik and Franks Schimmelfennig, according to which, by passing through initial stages forming national preferences and reaching a substantive bargain for mutual benefit of states, they reach the third stage – design of international institutions to achieve better outcomes (Diez & Wiener, 2019).

In addition, this scientific article uses a problem-chronological approach to examine the security threats posed by current climate change conditions in the region, focusing on water stress, glacier melting, frequent floods, and severe droughts that have severe impacts on the livelihoods of the population and exacerbate resource scarcity in the region.

The study relies on a variety of secondary data sources, including global risks assessments and water stress projections, energy generation indicators provided by international institutions such as the World Bank, OSCE, and research centers. By incorporating these data, the article provides a comprehensive evaluation of current environmental risks, illustrating the necessity of the development of climate diplomacy in order to mitigate negative impacts.

An analytical review of climate projects and situation analysis of regional summits and negotiations was used in order to identify interactions on the ministerial and heads of state level, as well as to provide an overview of action plans and projects funded by third parties. This analysis helps identify the relevance of the climate agenda in negotiations across the region and the efforts of CA Republics in climate change mitigation and adaptation measures.

SWOT analysis was made in order to identify strengths, drawbacks, opportunities, and threats associated with regional climate diplomacy. It helped to cover such aspects as historical environmental legislation, the roots of currently existing problems and ongoing regional dilemmas, launched initiatives and projects that open new perspectives for Central Asia, and the role of further development of scientific activity and innovation in shaping climate policies.

These methods allowed the authors of the article to conduct a comprehensive analysis of regional climate diplomacy and highlight the need for coordinated policies, sustainable resource management strategies, and increased scientific engagement to address the pressing environmental issues.

FINDINGS AND DISCUSSION

According to IPCC, the region is extremely vulnerable to climate change, and the five nations that comprise this region are seeing faster temperature increases than the world as a whole (IPCC, 2018).

Firstly, excessive water diversion from the rivers Amu Darya and Syr Darya has caused the Aral Sea to lose more than three-quarters of its surface area between 1960 and 1990. From 2030 to 2050, population growth and economic development are likely to increase demand for water and land resources in Central Asia (Climate Diplomacy Platform, n.d.).

Second, over the past 50-60 years, there was already a 30% decrease in the surface area of glaciers in Central Asia (Aziatskii Bank Razvitiya, 2022). Glacial melting in the mountain ranges of Tajikistan and Kyrgyzstan, which feed the Aral Sea, ultimately increases the occurrence of flooding and contributes to overall soil degradation and long-term water scarcity.

Third, the threat of agricultural water stress is increasing as well. In Central Asia, a major part of the population lives in rural areas and is dependent on agriculture and irrigation. According to the statistics of 2022, the share of agriculture in Central Asian states' GDPs varied from 5% to 27% (Halyk Research, 2023).

Furthermore, greater temperatures, extreme weather events like heatwaves, floods, and droughts can have disastrous effects on crop yields, which clearly have an impact on food security. In Kazakhstan, droughts are already a serious issue, which affects 66% of the state's territory. Up to half of the Kyrgyz Republic's territory could be affected by desertification by the turn of the century, compared with the 2000s, when it was 15%. According to the IPCC 2022 report, small-scale farms in arid zones of Tajikistan will experience a negative impact, with likely effects on farm income security. Impacts on farmers' income in western Uzbekistan will also significantly vary and could be as much as 25% depending on the extent of temperature increase and water-use efficiency (IPCC, 2022).

Fourth, security threats could also emerge from the impacts of climate change on the energy sector. The hydropower sector is quite vulnerable to floods, and most of the hydraulic structures in the region require maintenance to continue operating safely. Projections indicate that the potential of small hydropower plants is likely to decrease by 13% in Turkmenistan and 19% in Kyrgyzstan by 2050 under a 2°C warming. Already today, out of Tajikistan's 300 small hydropower plants, less than 20% remain operational (Mosello et al., 2023).

Fifth, a sizable portion of the population lives in the areas exposed to heightened water stress because of climate change. Natural disasters in the region cause both temporary and long-term relocation. By 2050, up to 2.4 million internal migrants may arrive in Central Asia due to climate change, according to data from the World Bank (Idrisov, 2023).

National level commitments

On the national level, all of the Central Asian states are parties to the Paris Agreement and set their goals in terms of National Determined Contributions, with unconditional and conditional contributions, depending on the international funding and technology

transfer. In addition, national legislation also includes laws related to climate change and long-term strategies. A general overview is provided in the following table:

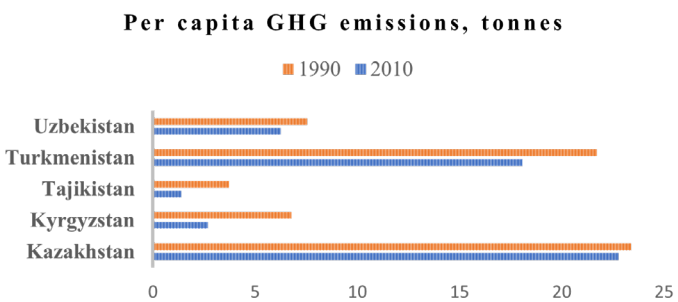
Table 1. NDCs of Central Asian states and the legal framework on climate change

State	Emission reduction target (NDC)	National legislation and strategies that include aspects related to climate security
Kazakhstan	By 15% - unconditionally, by 25% - conditionally from 1990 level by 2030	• "Kazakhstan-2050" Strategy • Ecological Code of the Republic of Kazakhstan • The Strategy for Achieving Carbon Neutrality by 2060
Kyrgyzstan	By 16% - unconditionally, by 44% - conditionally by 2030	• National Development Strategy of the Kyrgyz Republic for 2018-2040
Tajikistan	Unconditionally - not to exceed 60-70%, conditionally - not to exceed 50-60% of GHG emissions as of 1990 by 2030.	• A National Strategy of Turkmenistan on Climate Change
Turkmenistan	By 20% from 2010 level by 2030	Higher education modernization, digital learning, and teacher preparation
Uzbekistan	By 35% from 2010 level by 2030	• Program and a Plan of Action for Transitioning to a Green Economy and Ensuring Green Growth until 2030 • Concept of Environmental Protection of the Republic of Uzbekistan until 2030 • The Development Strategy for the New Uzbekistan for 2022-2026

Compiled by the authors based on sources Adilet (2021); Adilet (2023), Ministry of Ecology and Natural Resources of the Republic of Kazakhstan (2023); Government of the Republic of Tajikistan (2016); Government of Turkmenistan (2022); UNFCCC (2021a), UNFCCC (2021b), World Bank Group (2023)

Nevertheless, several disadvantages of national climate policies can be noted. Firstly, Kazakhstan and Tajikistan refer to 1990 as the base year of emissions reduction, while the other two countries, Uzbekistan and Turkmenistan, refer to 2010, and Kyrgyzstan focuses on the business-as-usual scenario. As a result, due to the higher GHG emissions in 1990, it is easier to achieve emissions reduction goals for those states that have chosen it as a reference year.

Figure 1. Comparative governance radar (C1-C7). Ratings are qualitative (1-5) across seven criteria for six country cases and Central Asia.



Source: Our World in Data (2024);

Secondly, submitting NDCs is already a significant step in taking climate responsibility, but it is also important to create working mechanisms for the evaluation of national policies, adaptation to recent changes of ongoing strategies and programmes, and to provide reports with the results of taken measures.

Regional and international cooperation on climate change

Assessment of the effectiveness of climate diplomacy of Central Asia on regional and international levels will be conducted by the SWOT analysis, which will help to provide a framework for the internal and external elements influencing the intensity of regional cooperation. Effectiveness will thus be evaluated by analyzing which opportunities can become the region's strengths and contribute to the elaboration of cooperative mechanisms leading to tangible results. Therefore, SWOT analysis serves not only as a diagnostic tool but also acts as a guide for determining which aspects of Central Asian climate diplomacy need to be strengthened, especially when shifting from declarative promises to results-oriented cooperation.

Here is the SWOT analysis on climate diplomacy that includes diplomatic efforts made by Central Asian states, with the orientation towards deepening regional cooperation and increased international support:

Among the main advantages are:

1. *Constantly elaborated and updated regional cooperation frameworks.*

- In 2023, UNFCCC COP-28 began with the presentation of the most important document, the Regional Strategy for Adaptation to Climate Change in Central Asia, which contains a mechanism for cooperation to overcome the negative effects of climate change and implement adaptation measures in the region until 2030 (The Regional Environmental Centre for Central Asia, 2023).
- During the COP29, a Declaration on Cooperation between Central and West Asia in the field of climate change among Azerbaijan, Kyrgyzstan, Tajikistan, and Uzbekistan was signed, focusing on cross-border climate cooperation (Ministry of Ecology, Environmental Protection and Climate Change of the Republic of Uzbekistan, 2024).
- The Climate and Sustainability Project Preparatory Fund was formed, and the CAREC Climate Change Action Plan (2025–2027) was endorsed by participants at the CAREC Ministerial Conference in Astana in November 2024 (Asakawa, 2024). The Action Plan aims to prioritize regional climate adaptation and mitigation projects and initiatives across CAREC sectors, coordinate regional climate actions in the CAREC clusters and working groups, and improve coordination among development partners to maximize and increase resources supporting regional climate actions. Finding gaps in regional climate action and securing funding to create and carry out regional investment projects are the goals of the CCAP (CAREC, 2024).

2. *High-level political engagement.* States meet regularly in terms of Consultative Meetings of Central Asian states, with Kazakhstan in 2018, Uzbekistan in 2019, Turkmenistan in 2021, Kyrgyzstan in 2022, Tajikistan in 2023, and Kazakhstan in 2024, which illustrates their constant engagement (Tolipov, 2024).

- The 6th Consultative Meeting of the Heads of Central Asian States took place in Astana on 9 August 2024, during which the concept of development of regional

cooperation "Central Asia – 2040" was signed, and it aims to improve economic logistic potential, to elaborate common policies on water, energy, and food security. During the meeting, heads of states highlighted the necessity of regulation of natural resources´ use, elaborating a water-regulating strategy with mutual obligations, and Bishkek proposed to create a regional hub focusing on the creation of technologies that save water and energy resources (Muratbekova, 2024).

- Through the C5+1 diplomatic forum, the five Central Asian nations have also been working with the US administration to address shared problems related to energy, environment, and security. During the 78th session of the United Nations General Assembly, the presidents of the United States and the CA Republics met at the C5+1 Presidential Summit. In their joint statement, such important aspects as the development of sustainable hydropower, efficient energy use, increasing energy production, and identifying new energy export routes were mentioned (U.S. Mission in Kazakhstan, 2023).

3. *Opening of the UN Regional Centre for Sustainable Development Goals for Central Asia and Afghanistan.* Adoption of the resolution on the Centre's establishment at the UN General Assembly became an important milestone for Central Asia and Afghanistan. This initiative fully reflects the growing role of middle powers in the climate agenda, showing the ambitions towards a more secure and prosperous future of the region (MFA Kazakhstan, 2025).

4. *Access to international support and climate finance.* Together with international partners, governments in Central Asia are also implementing several regional-level projects and initiatives that seek to address various challenges related to climate change, as well as foster regional experience-sharing and co-operation in addressing these challenges:

- Central Asian Capacity Building for Methane Emission Reduction (CA CBMER), funded by Global Methane Hub, 2025-2027;
- The Regional Task Force on Education for Inclusive Energy Transition in Central Asia (RTEET), a joint initiative of the CAREC and OSCE, 2025-2026;
- "Land management, Environment & SoLId-WastE: inside education and business in Central Asia (LESLIE)", funded by European Education and Culture Executive Agency (EACEA) and ERASMUS, 2024-2027 (Central Asia Regional Economic Cooperation Program, 2025);
- The flagship Team Europe Initiative on Water, Energy and Climate Change, funded by the EU (European Union External Action, 2025);
- Green Central Asia II: Transboundary dialogue on Climate, Environment and Security in Central Asia - Bridging borders to enhance regional adaptation and mitigation, commissioned by German Federal Foreign Office, 2024-2028 (GIZ, 2024).

5. *Support of international organizations and institutions.* MDBs play a crucial role in providing financial assistance in carrying out development projects initiated by states. For instance, during the COVID-19 pandemic and the efforts to minimize its adverse impact, MDBs continued financing the water and energy complex of Central Asia: a total of $1.8 billion in financing for 24 water and energy projects in the region

was allocated in 2020 (EDB, 2022). Asian Development Bank's Energy Transition Mechanism (ETM), launched in 2021, focuses on the transition from fossil fuel power plants to renewable energy sources. Currently, from Central Asian countries, only Kazakhstan has become a pilot country of this project, after receiving $225,000 grant for studying the current state of coal-fired and heat-power plants, the regulatory framework, and possible options for the realization of this energy transition (ADB, 2023c). Another example is a $200 million loan that was provided to Uzbekistan for the improvement of energy efficiency and with the aim of realizing long-term energy transition in terms of ADB's Distribution Network Digital Transformation and Resiliency Project (ADB, 2023a). Hence, if such climate-related projects funded by banks or organizations are extended for a whole region, it would be another climate diplomacy opportunity for a gradual climate transition in Central Asia.

6. *Significant bilateral cooperation on water facilities.* The countries co-finance the maintenance and operation of water facilities of interstate importance on a bilateral basis. Such bilateral arrangements include water facilities on the Chu and Talas rivers between Kazakhstan and Kyrgyzstan, and in the AmuDarya lower reaches between Turkmenistan and Uzbekistan as well as Orto-Tokoiskoye/Kasansai reservoir between Kyrgyzstan and Uzbekistan, Andizhan/Kempirabad reservoir between Kyrgyzstan and Uzbekistan, and Farkhad dam between Tajikistan and Uzbekistan. These workable arrangements could be further strengthened by elaborations of technical and financial guidelines and calculations on cost-sharing (Ziganshina et al., 2023).

Among the weaknesses:

1. Prioritizing national interests over regional interests. Some countries want to use water in an irrigation regime, others in an energy regime. In the irrigation regime, water must be used in summer, and in the energy regime, in winter. For instance, agriculture is one of the main sectors of the economy of Tajikistan, Turkmenistan, and Uzbekistan, and most of the population of these countries directly or indirectly depends on irrigated agriculture. Hydropower is important for Kyrgyzstan and Tajikistan; energy production meets more than 90 percent of the total demand in the upper countries and is also an export commodity. Competing sectors of agriculture in the downstream countries and hydropower in the upstream countries are fueling serious disputes in the region, where each republic, first of all, takes into account its national interests (Global Water Partnership, 2014).

2. The governments of the Central Asian states are unable to implement the necessary adjustments to adequately adapt to the changing climate and minimize its effects. The financial support provided by foreign donors may provide an impetus for taking actions, but they also have to develop the potential that is necessary for the effective implementation of these measures.

3. The declared national development plans are soiled by sectors and often ignore the findings of climate change impact research. The best example is plans to invest significantly in hydro energy despite the mounting research on looming water stress in the region. Despite the increasing climate change-induced water-related

risks, the two upstream countries — Kyrgyzstan and Tajikistan — in their national development plans are still heavily focused on the development of new hydropower plants, including both large national dams and small hydro stations. National energy strategies repeatedly mention the underutilized hydro energy potential and neglect the latest climate change science warnings on water disruptions (Sabyrbekov et al., 2023). If the region aims to use its full energy potential and position itself as a regional energy hub, it is crucial to follow the recommendations applicable to the region. Here, the climate diplomacy can help to improve interregional interactions and to take actions aiming at profitable usage of energy sources.

4. Reliance on fossil fuels. Gas accounts for over half of the region's total power generation, with Turkmenistan (99%) and Uzbekistan (94%) generating most of their electricity from gas. Coal, on the other hand, plays a major role primarily in Kazakhstan, where it meets 57% of electricity demand, while gas contributes 29%. Hydropower is the only significant renewable source in the region, supplying between 76% and 88% of electricity in Tajikistan, Kyrgyzstan, and Georgia. As a result, the power sector in Central Asia and the South Caucasus produces 239 million tonnes of CO2 per year, that are 62% higher than Türkiye's, a coal-dependent G20 country, even though Türkiye has 8% higher electricity demand (Alparslan, 2024). In this case, climate diplomacy is mostly constrained by the fear of economic losses from decarbonisation. Consequently, regional climate commitments are less ambitious than they could be, therefore, leading to not full realization of the region's potential in climate mitigation and adaptation measures.

5. Lack of research on the assessment of climate adaptation measures in the region. According to the IPCC 2022 report, there is no evidence on the assessment of behavioral aspects of adaptation, which illustrates the existing knowledge gaps. Furthermore, despite Central Asia's vulnerability to the effects of climate change, the IPCC has raised worries since the 2010s about the region's lack of research on the subject. 51 of the 54 theme areas that are crucial to understanding the effects of climate change have not been thoroughly studied in Central Asia, with either very little or no data available (IPCC, 2022). For more effective climate diplomacy, it is essential to improve academic engagement and research based not only on national peculiarities, but also on the region's capacity, which joint measures can be implemented, what projects can be elaborated, and how to make plans realizable.

Among the opportunities:

1. More benefits that regional cooperation can bring. Regional cooperation can be useful for reducing costs and improving resource efficiency, replicating and scaling up best practices, knowledge, technology, and capacity building, attracting innovative financing and private sector participation. By strengthening collective action to mitigate climate change risks, it can also unlock the potential of the region for accelerated integration into achieving sustainable economic growth. Planning for these efforts, however, requires a full understanding of the potential challenges and prospects in all countries of the region and a continued commitment to regional and intersectoral cooperation. To support the implementation of NDCs, national green economies, and sustainable development strategies, governments in Central Asia

should mobilize political will among themselves for the introduction of cutting-edge climate policy tools and develop technological regulations for the GHG emission inventory.

2. Central Asia possesses significant capabilities for producing electricity through wind, solar, and hydropower. Kazakhstan, with its expansive territory, has the highest potential for onshore wind energy in the region, capable of generating around 929 TWh each year—equivalent to three times the region's power consumption. Regarding solar energy, the southern areas of the region show particularly great promise. Turkmenistan's solar capacity is estimated at 655 GW, which is eight times greater than the current total installed capacity of the region. Tajikistan and Kyrgyzstan depend largely on hydropower but still have a wealth of untapped resources. Additionally, Kazakhstan offers 62 TWh of technical potential for hydropower. Although hydropower development may take longer than solar and wind, the region could benefit from increasing hydro resources concurrently while reducing possible social and environmental challenges (Alparslan, 2024).

   Integrating various energy sources into unified power generation systems across nations may result in increased efficiency, grid stability, and RE penetration. The strengths and seasonal dynamics of electricity generation vary among the Central Asian countries. For example, Uzbekistan and southern Kazakhstan have significant thermal electricity potential in the winter, whereas Tajikistan and Kyrgyzstan have strong hydropower potential in the summer. Optimizing power transmission between states will maximize the utilization of water resources, especially in the summer, while cross-border electricity exchanges in the region could lessen the demand for peak and backup capacity reserves within the different national systems (Sabyrbekov et al., 2023). It is also essential to take into account the necessity of balancing the renewable energy sources, due to the fact that, for instance, renewable energy sources, such as solar and wind energy, are not always available, depending on weather conditions.

   In Soviet times, there was a unified energy system, and now there is the Central Asia Transmission Cooperation Association, formed in 2022 by CAREC with the aim of developing regional energy projects with shared standards and investing in common transmission lines. CASA-1000 project between Central and South Asia, TUTAP project, which includes Turkmenistan, Uzbekistan, Tajikistan, Afghanistan, and Pakistan, are examples of such energy-related initiatives, and there are still prospects for the development of new transmission and distribution networks, cooperating with other countries (ADB, 2023b).

3. Close communication between professional, academic, expert, and business communities, as well as non-governmental organizations, should be pursued in addition to official interstate interactions. During the implementation of the projects, it should be planned to collect scientific and methodological approaches, principles, and practices of assessment, the existing regulatory framework for assessing the environmental flow of transboundary water bodies, and the sustainable distribution of water resources of the region, with the active participation of experts from Central Asian countries. These activities will provide an opportunity to assess the situation

in the region on this issue and jointly explore the relevance and potential value of international best practices. The results of the work can be used in the development of diverse strategically important documents (Akhmetkal, 2019).

4. For the effective implementation of climate initiatives in Central Asia, experts recommend strengthening climate business processes. This includes building a management, monitoring, and reporting system in accordance with international standards, as well as active interaction with the private sector. For instance, understanding the factors that make it difficult to attract investment to address climate change issues will help governments find solutions to improve the investment climate.

5. Promoting the Debt-for-Nature Swap theme. It is a financial arrangement in which a portion of a developing country's foreign debt is forgiven or restructured in exchange for the country committing to invest in conservation and environmental protection efforts. Experts emphasize the importance of promoting this theme by providing an inspiring example of successful implementation in Belize. This experience, which reduced the country's external debt by 10% of GDP and contributed to the preservation of the coral reef, can become a model for the countries of Central Asia (Adylbekova, 2023).

6. Necessity of improving the already existing institutions that aim to manage and coordinate the water and energy sectors. It would be worth considering improving and combining the functions of the existing institutions on water and energy in Central Asia, including IFAS bodies, with new mechanisms to better represent such varying interests, rather than creating another new institution (Ziganshina et al., 2023). Because generally, these institutions have demonstrated their effectiveness in operational management and coordination, while also showing certain needs for adopting new elements, their interlinkages and mechanisms for further coordination, harmonization, and provision of services.

7. Development of regional hydromet services, namely focused on gathering data on weather and climate, to forecast on the basis of this data, which can help to avoid urgent situations in the region and improve water management and agricultural productivity. Also, it is necessary to develop common early warning systems, because usually climate disasters spread across the region. There are already several such initiatives, for instance:

- Strengthening Financial Resilience and Accelerating Risk Reduction in Central Asia program funded by Global Facility for Disaster Reduction and Recovery (GFDRR) and the World Bank, which works on risk analysis and management;
- The Central Asia Flood Early Warning System (CAFEWS), supported by the World Bank and the WMO, addresses flood risks in Afghanistan and the five Central Asian republics;
- The Center for Emergency Situations and Disaster Risk Reduction (CESDRR) was established by Kazakhstan and the Kyrgyz Republic for disaster preparedness and response.

Taking into account the unpredictability of adverse weather events, it is essential to improve risk management on a regional level in order to avoid unfavorable consequences, the economic costs of which are much higher than investing in the prevention of such disasters (ADB, 2023b).

Among the threats:

1. The future development of Central Asia is highly vulnerable to adverse ecological and socioeconomic implications if there is no greater regional collaboration in resolving or mitigating these environmental issues. Natural or man-made disasters or other events could have a severe impact on the environment, economy, and public health of the entire region (Aben, 2019).

2. Dependence on external financing. Although there are many sub-regional platforms and information portals on climate-related issues, they are created within the framework of regional projects, are completely dependent on project financing, and cannot continue working after the completion of projects.

3. Higher costs of inaction. Even though it would be challenging to quantify the advantages of cooperation at this point, the cost of non-cooperation at this point, the cost of non-cooperation is simpler to measure. According to Adelphi's Climate diplomacy project, the insufficient cooperation costs of agricultural losses, inefficient electricity trade, and lack of access to finance can reach 4.5 billion US$ annually. According to a 2016 World Bank global level study, by 2050, sufficient water governance could account for almost 20% of Central Asia's GDP, or more than 60 billion US dollars annually (Blumstein & Pohl, 2018).

4. The Presidents of the Central Asian republics have been unable to reach a consensus on the water issue in the region throughout the period after gaining independence. It should be noted that an increasing population, an expanding economy, increasing environmental pressure, and the practice of irrational consumption will continue to put pressure on the common resources of Central Asia (Akunova, 2021).

5. Periodic demarches in relations between the countries of the region remain an alarming phenomenon, indicating a continuing high degree of conflict and lack of trust between the Central Asian states. Ferghana Valley is a source of tensions between Kyrgyzstan, Tajikistan, and Uzbekistan (Adelphi, n.d.). Kyrgyz-Tajik border conflicts in April 2021 and September 2022 have signaled an escalation in scale, with the use of heavy weapons on both sides resulting in mass casualties (Gabdulhakov et al., 2023). The roots of the unclear border definitions and disputes over natural resources, mostly water and land resources, are linked to the collapse of the USSR, as a result of which violent clashes and ethnic tensions continue to arise.

   As a result, it can be concluded that there is an active cooperation of CA Republics through regional platforms that are financed by diverse international organizations and other governments that help to progress in the climate change dimension and to mitigate the negative impacts of it. They facilitate knowledge sharing, capacity building, and joint projects in such areas as water management, renewable energy, and disaster risk reduction; support countries in developing robust systems for

monitoring, reporting, and verifying their GHG emissions and climate actions. Through collaboration and targeted action, Central Asia countries are striving to build resilience, adapt to changing climate conditions, and secure a sustainable future for the region. Nevertheless, some challenges related to prioritization of national interests over the regional, fear of economic losses of decarbonisation that consequently results in not full realization of the region's energy capacity, impede climate diplomacy. Based on the conducted SWOT analysis, the following recommendations for improvement of regional climate diplomacy can be highlighted:

- Ensuring that during the high-level political interaction between the Central Asian leaders, especially through such platforms as C5+1, states position themselves and act as a region, pursuing the common interests and goals. The region's representation as a responsible actor with a single voice and position aimed at joint efforts and practical results is essential for the effective implementation of adaptation and mitigation measures that can be supported by third parties.

- Ensuring that the controlling mechanisms of existing and future agreements or declarations function appropriately. It is a great advantage that CA states update not only national strategic documents, but also adopt new regional climate legal frameworks, where provisions on climate change and actions needed to be implemented are highlighted. Expanding climate monitoring networks are essential components for the implementation of strategic documents, ensuring transparency and inclusiveness in regional development. For instance, the monitoring mechanism mentioned in the Regional Climate Change Adaptation Strategy for Central Asia is the evaluation through Climate Resilience, Vulnerability, and Readiness Indexes ND-GAIN, based on the independent assessment, which will be useful for measuring the progress, if reliable data is provided on a constant basis.

- In addition, it is crucial to enhance the responsibility of intergovernmental and interministerial commissions and working groups for steps taken towards climate resilience, making their reports transparent and available for experts and academics. Open dialogue can contribute to higher accountability of bodies responsible for this question.

- Strengthening transparency and accountability is an essential prerequisite to increasing donor confidence. Due to the fact that it is challenging for the region to cover climate spending on its own, attracting international donors and investors is essential. There are already existing financial mechanisms, grants provided by foreign banks and partners; however, the development of robust monitoring, reporting, and verification systems, publishing of climate finance reports with spending made, and involvement of independent auditors will raise the confidence of third parties, improving and increasing external financing, and making it more accessible.

- Strengthening research and data-sharing. On the basis of the mentioned UN Regional Center on Sustainable Development, sharing best practices, conducting regular consultative meetings on the topics of climate change and food security grounded in shared priorities and solutions will serve as an important catalyst for joint research

and expertise. Establishment of data centers for monitoring regional water flows, glaciers, and emissions, in collaboration with leading universities, think-tanks, and NGOs, will improve coordination among states.

- Preparing specialists in the field of climate security and green technologies. Taking into account growing climate vulnerabilities, exchange programs, for instance, with European countries, which position themselves as leaders in the environmental field and show good planning and adaptation readiness, elaborating strong climate policies will be useful for regional specialists, who can study best practices, evaluate their applicability in the region, and consequently improve knowledge-sharing.

CONCLUSION

To sum up, climate change has become a pressing issue in the modern world, and the Central Asian region is no exception. As the region continues to experience rapid economic growth, the impact on its fragile ecosystems becomes increasingly apparent. With melting glaciers, deteriorating water quality, and extreme weather events becoming more frequent, it is clear that urgent action is needed.

Through the SWOT analysis, it is seen that states are not implementing their full potential to combat climate change problems. The future rise in water and energy stress, as population and economies grow and resource availability and access shift, will make cooperation around resource management between the upstream water-rich and downstream fossil fuel-rich states necessary. More research is needed across the disciplines on, for example, extreme events and their multiple societal and sectoral impacts. Progressive policy frameworks and the strong political will of regional leaders are also essential. Additionally, without proper management of shared resources, conflicts may arise between neighboring countries. Therefore, diplomacy must be utilized not only for environmental protection but also for promoting peace and stability in the region.

States are implementing national projects and strategies in order to fulfill their objectives under the Paris Agreement; international institutions and foreign states play a crucial role in facilitating dialogue and promoting cooperative agreements between these nations; regular meetings of the leaders from Central Asian countries promote collaboration and encourage the adoption of sustainable practices. Despite these positive facts, financial resources and third parties' investments are limited, and it is necessary to boost interregional cooperation.

Great potential for the development of alternative energy sources, wind and solar power, improving the consistency in climate diplomacy through better coordination among the relevant ministries responsible for foreign relations, environment, energy, development, economy and finance; investing in the experts, engineers, and other specialists who can carry out the large-scale climate initiatives being considered now and in the future is equally crucial. Engaging in a broad, multi-stakeholder dialogue is essential for developing policy-level recommendations on how to effectively mobilize resources and invest them in a systemic and strategic manner. Strengthened confidence and the capacity to manage future installations cooperatively, in the best interests of all parties,

are essential prerequisites for the realization of cooperative climate projects, which will ensure timely water releases and the delivery of energy.

As a result, it can be concluded that the strengthening of climate diplomacy coordination between countries could help drive more ambitious action, especially in order to reduce exacerbating risks to human security, livelihoods, and economic development in Central Asia. It is a shared responsibility to work together in order to empower the countries of the region to effectively address mounting challenges.

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AUTHORS' CONTRIBUTIONS

AA: conceptualization, methodology, data curation, visualization, writing – original draft preparation; DA: supervision, formal analysis, project administration, writing – review and editing.

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