



Regional consultation on climate change and security in Central Asia

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Beatrice Mosello, Adrian Foong, Alina Viehoff, and Lukas Rüttinger

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Executive summary

Climate change can impact security in a number of ways in Central Asia. These impacts affect shared natural resources, thereby exacerbating the risks for human security, livelihoods, and economic development. Importantly, these impacts also have a gendered and inter-generational aspect, considering the disproportionate exposure of vulnerable groups. As these risks are shared across the region, they also provide entry points for co-operation.

The OSCE, in partnership with adelphi and in close collaboration with OSCE Field Operations, has embarked in 2020 on the project “Strengthening responses to security risks from climate change in South-Eastern Europe, Eastern Europe, the South Caucasus, and Central Asia” (Project Number: 1102151). The project aims to (1) enhance the understanding of how climate-related security risks impact South-Eastern Europe, South Caucasus, Central Asia, and Eastern Europe; (2) increase co-operation among regional stakeholders to jointly address climate-related security risks; and (3) increase awareness and capacities for an integrated approach on climate change and security among main stakeholders.

This report presents the results of a regional consultation process on climate change and security in Central Asia, which started in 2022 and was organized within the framework of the project. The consultation process was primarily based on a workshop held in Almaty, Kazakhstan on 13-14 July 2022, and was informed by further exchanges with experts and stakeholders from the region as well as desk research.

During the consultation process, four hotspots emerged as priorities where co-operative activities and projects between the countries of Central Asia would be especially required to address climate-related security risks. For each hotspot, the consultation process revealed a number of climate-related security challenges, along with recent initiatives and projects at the national and regional levels that address various aspects related to climate change. It also identified potential measures and activities where regional co-operation can be further strengthened to address shared climate-related security risks.



High mountain areas

Challenges

High mountain areas are a priority hotspot for Central Asia, given that they hold important water resources for the entire region. As a result of climate change, accelerated glacial melting is diminishing the capacity of glaciers to store water, while also posing a number of hazard risks, namely floods, mudflows, landslides, and glacial lake outburst floods (GLOFs). Climate change is also likely to affect the livelihoods of many rural mountain communities that are dependent on agriculture, pastures, and forests, as these sectors are highly sensitive to climate change impacts. The security challenges that communities in high mountain areas face also have an important gendered dimension, given for example the differences in gender roles in climate-sensitive sectors among mountain communities. Mountain areas also suffer from limited availability of climatic and scientific data.

Potential measures and activities

Potential measures could focus on supporting livelihoods that are dependent on agricultural, pastoral, and forestry-related activities. Support could include awareness-raising and capacity-building activities that aim to enhance sustainable and climate resilient mountain development, while also focusing on women and youth. Measures to mainstream disaster risk reduction (DRR) are also needed, given the hazards that could arise from accelerated glacial melting. Efforts to harmonize scientific research and data on mountain-related topics are also warranted. To foster co-operation to tackle the challenges in mountain areas, inter-state co-ordination platforms could also be developed and supported.



Densely populated areas (Ferghana valley)

Challenges

A large share of livelihoods in the Ferghana valley are highly dependent on climate-sensitive activities such as irrigated agriculture and animal husbandry, and are therefore vulnerable to the impacts of climate change on water resources. These impacts can worsen poverty and heighten competition over natural resources in the region. There are also data gaps in terms of socio-economic development and demographic processes in the Ferghana valley, and there is a low level of gender representation in various governance structures for water, energy, and resource management.

Potential measures and activities

There is a need to develop a socio-economic development strategy, which would provide an important basis for ongoing and future work in addressing climate-related security challenges in the hotspot. There is also a need for more capacity-building and awareness-raising activities on sustainable resource management and climate adaptation and mitigation. Moreover, such activities should engage more closely with women and youth. As communities and sectors in the Ferghana valley are highly inter-connected, potential measures could also aim at providing more sectoral support, particularly with regards to the border management, forestry, health, and water sectors.



Amu Darya River Basin

Challenges

Several countries in Central Asia are highly dependent on the Amu Darya River Basin's water resources for irrigation and hydropower. Sedimentation is affecting water supply, quantity, and infrastructure across the river basin, and is likely to be accelerated by climate change, through for example changes in rainfall patterns. Moreover, inter-state disputes over water use and distribution still persist, highlighting the need for further work in improving transboundary water management, allocation, and use. Given the significant size of the river basin, future joint activities would need to be narrowed down to a smaller scale to improve the representativeness, effectiveness, and flexibility of water management-related activities.

Potential measures and activities

Potential measures and activities could focus on jointly addressing sedimentation issues across the basin. Activities could also focus on supporting the establishment of agreements on water distribution, monitoring, and infrastructural development, with a particular emphasis on the smaller sub-basin level. More broadly, there is a need for more awareness-raising among local populations in the river basin on sustainable water use, as well as developing early warning systems to better prepare basin populations for potential hazards.



Central Asia breadbasket

Challenges

The impacts of climate change on breadbasket regions in Central Asia could have a cascading negative impact on agricultural consumers across the region, through for example their influence on grain prices. Projections indicate that agricultural droughts could worsen future crop and livestock productivity in parts of the region. Given the high level of intra-regional trade of agricultural and food products in Central Asia, there is a need to develop a shared understanding of how consumers and agricultural markets may react to agricultural and food price fluctuations driven by global shocks in breadbasket regions. Similarly, the potential social and environmental impacts of domestic agricultural development activities need to be considered.

Potential measures and activities

For the Central Asia breadbasket region, more regional market research is needed. This is because of the high level of intra-regional agricultural and food trade in the region, and the potential impacts of agricultural developments in breadbasket regions to consumers. To address the impacts of climate change on productivity, potential measures could also consider jointly developing more climate-resilient, organic, and sustainable agricultural methods across the region's agricultural sectors. In addition, more support could be provided for early warning systems and agrometeorological approaches within the region's agricultural production systems.

Outlook

The findings of this report will inform the next phases of the project, which will involve developing a scoping study, followed by a joint co-operation strategy and implementation plan for a selected topic or at the hotspot, all of which will be participatory in nature. The scope of stakeholders involved will be broadened to include other experts and relevant national and local governmental stakeholders, civil society, academia, private sector, as well as regional and international stakeholders. This will not only leverage existing knowledge and expertise, but also strengthen ownership of the proposed measures and enhance synergies with other regional initiatives.

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List of Abbreviations

ADB	Asian Development Bank
AKAH	Aga Khan Agency for Habitat
BMU	German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
BMZ	German Federal Ministry for Economic Cooperation and Development
BCRinAW	Building Climate Resilience in Agriculture and Water Sectors of Rural Tajikistan project
BWO	Basin wide organization
CAHMP	Central Asia Hydrometeorology Modernization Project
CAMP4ASB	Climate Adaptation and Mitigation Program for the Aral Sea Basin
CAREC	Regional Environmental Centre for Central Asia
CARGC	Central Asian Regional Glaciological Centre
CAWEP	Central Asia Water and Energy Program
CEPF	Critical Ecosystem Partnership Fund
CESDRR	Center for Emergency Situations and Disaster Risk Reduction
CGIAR	Consultative Group for International Agricultural Research
CICADA	Cryospheric Climate Services for improved Adaptation
CLIENT	Climate and Environment Program
CO₂	Carbon dioxide
COVID-19	Coronavirus disease 2019
DRR	Disaster risk reduction
EbA	Ecosystem-based Adaptation to Climate Change in High Mountainous Regions of Central Asia
EC	European Commission
ENVSEC	Environment and Security Initiative
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
GCF	Green Climate Fund
GEF	Global Environment Facility
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GLOF	Glacial lake outburst flood
GWP	Global Water Partnership
ICAT	Initiative for Climate Action Transparency
ICIMOD	International Centre for Integrated Mountain Development
ICSD	Interstate Commission on Sustainable Development
ICWC	Interstate Commission on Water Co-ordination
IFAS	International Fund for Saving the Aral Sea

IWRM	Integrated water resource management
JICA	Japan International Cooperation Agency
Kazhydromet	National Hydrometeorological Service of Kazakhstan
NDC	Nationally Determined Contribution to the Paris Agreement
OCEEA	Office of the Co-ordinator of OSCE Economic and Environmental Activities
OSCE	Organization for Security and Co-operation in Europe
RCC	Regional Coordination Committee
REC	Regional Environmental Center
RECATH	Regional Climate Action Transparency Hub for Central Asia
RESILAND	Resilient Landscapes in Central Asia
RIAOR	Response to the Implications of Afghanistan for the OSCE Region
SDC	Swiss Agency for Development and Cooperation
SDG	Sustainable Development Goal
SFM	Sustainable Forest Management
SOP	Standard operating procedure
UN	United Nations
UNDP	United Nations Development Programme
UNDRR	United Nations Office for Disaster Risk Reduction
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNGA	United Nations General Assembly
US DOS	United States Department of State
USAID	United States Agency for International Development
WECOOP	European Union – Central Asia Water, Environment and Climate Change Cooperation project
YGPE	Youth Group on Protection of Environment

1 Introduction

1.1 Climate change as a security risk

Climate change can impact security in a number of ways. While it does not directly cause conflict, it interacts with other pressures, including population growth, unequal economic development and resource constraints to influence security landscapes.

In other words, climate change acts as a risk multiplier. For example, it can change the access to or availability of natural resources, which can increase competition both within and across borders. At the same time, reduced efficiency of energy production, caused by both higher temperatures and lower precipitation, as well as threats to energy production and transmission infrastructure from extreme weather events, put supply chains and energy security at risk. Increasing demand for water and an unreliable supply put pressure on existing water governance arrangements and can complicate political relations, particularly in transboundary basins that lack co-operation frameworks.

Climate-induced extreme weather events and disasters, meanwhile, can aggravate political instability and put livelihoods at risk, which can be a push factor for people to migrate or turn to illegal sources of income. Finally, climate change can affect food production and increase food price volatility. Rapidly rising food prices in turn can act as catalysts for social instability, violent protests, and civil unrest.

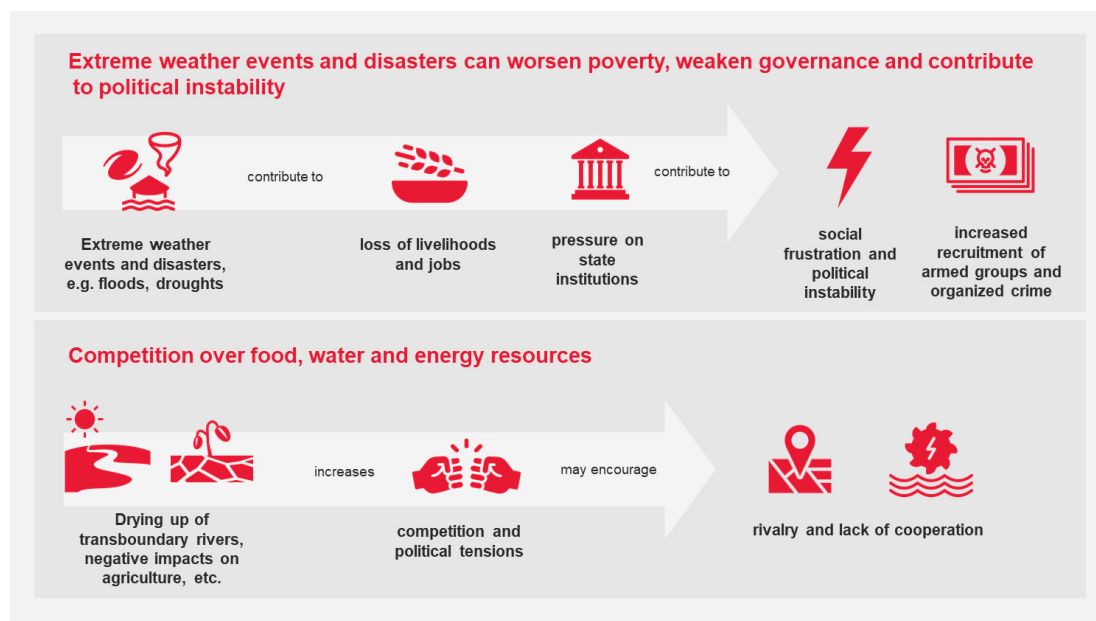


Figure 1: Examples of climate-related security risks. Source: adelphi.

In Central Asia, climate-related security risks can play out in a number of ways. These impacts affect shared natural resources, thereby exacerbating the risks for human security, livelihoods, and economic development. Importantly, these impacts also have a gendered and inter-generational aspect, considering the disproportionate exposure of vulnerable groups. As these risks are shared across the region, they also provide entry points for co-operation.

1.2 Project

Against this backdrop, the OSCE, in partnership with adelphi and in close collaboration with OSCE Field Operations, has embarked since 2020 on the project “Strengthening responses to security risks from climate change in South-Eastern Europe, Eastern Europe, the South Caucasus, and Central Asia” (Project Number: 1102151). The project aims to:

- Enhance the understanding of how climate-related security risks impact South-Eastern Europe, South Caucasus, Central Asia, and Eastern Europe;
- Increase co-operation among regional stakeholders to jointly address climate-related security risks;
- Increase awareness and capacities for an integrated approach on climate change and security among main stakeholders.

This project builds on the results of an earlier (2013-2017) OSCE project “Climate Change and Security in Eastern Europe, Central Asia and the South Caucasus”, which was led by the OSCE, implemented together with the Environment and Security (ENVSEC) Initiative partners (UNEP, UNDP, UNECE and REC) and funded by the European Commission and the Austrian Development Agency.

1.3 Report and process

This report presents the results of a regional consultation process on climate change and security in Central Asia which started in 2022 and was organized within the framework of the project “Strengthening responses to security risks from climate change in South-Eastern Europe, Eastern Europe, the South Caucasus, and Central Asia”.

The regional consultation process was primarily based on a workshop held in Almaty, Kazakhstan on 13-14 July 2022, which was organized by the Office of the Co-ordinator of OSCE Economic and Environmental Activities (OCEEA), in partnership with adelphi and in close collaboration with the OSCE Field Operations in Central Asia.¹

The Regional Consultation Workshop on Climate Change and Security in Central Asia brought together 55 representatives of the government, academia, and civil society groups from Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan, as well as representatives of the OSCE Field Operations in Central Asia and other regional and international organizations (23 female and 32 male). The workshop achieved the following aims:

- Fostered exchanges on and a shared understanding of the links between climate change and security;
- Discussed shared issues and topics related to climate change and security as well as shared hotspots that were identified in the previous OSCE-led ENVSEC study “Climate Change and Security in Central Asia”, published in 2017 and which served as the basis for the workshop’s discussions;²
- Gathered information on relevant existing and planned initiatives in the region;
- Identified regional and transboundary co-operation opportunities to address the security implications of climate change.

¹ Press release of the workshop is available at: <https://www.osce.org/oceea/522640>.

² Full document is available at: <https://www.osce.org/secretariat/355471>.

In addition to the workshop, the regional consultation process was informed by exchanges with stakeholders from the region, including National Project Focal Points and OSCE Field Operations, as well as further desk research. Considering the broad range of projects and initiatives that address various aspects related to climate change in Central Asia, the consultation process also identified potential measures and activities where regional co-operation can be further strengthened to address shared climate-related security risks.

This report, presenting the results of the consultation process, is structured as follows:

- **Chapter 2** provides a brief overview of the security implications of climate change in Central Asia, based on the 2017 OSCE-led ENVSEC study, along with updates from desk research and stakeholder input during the consultation process.
- **Chapter 3** provides an overview of recent developments that affect climate-related security challenges in Central Asia, along with recent national and regional level initiatives that aim to address challenges and foster regional co-operation.
- **Chapter 4** outlines the four priority hotspots for co-operation in Central Asia, based on findings from the 2017 OSCE-led ENVSEC study and results of the consultation process, supplemented with additional input from project experts and desk research.
- **Chapter 5** concludes the report by providing an outlook of the project's next steps.
- The **Annex** provides more details about the regional workshop in Almaty and consultation process.

2 Climate-related security risks

This chapter provides a brief overview of the potential security implications of climate change in Central Asia. The overview is based on the 2017 OSCE-led ENVSEC study “Climate Change and Security in Central Asia”, which identified eleven regional/transboundary hotspots where climate and security risks intersect. In addition, the overview is supplemented with updates from desk research and stakeholder input during the consultation process.

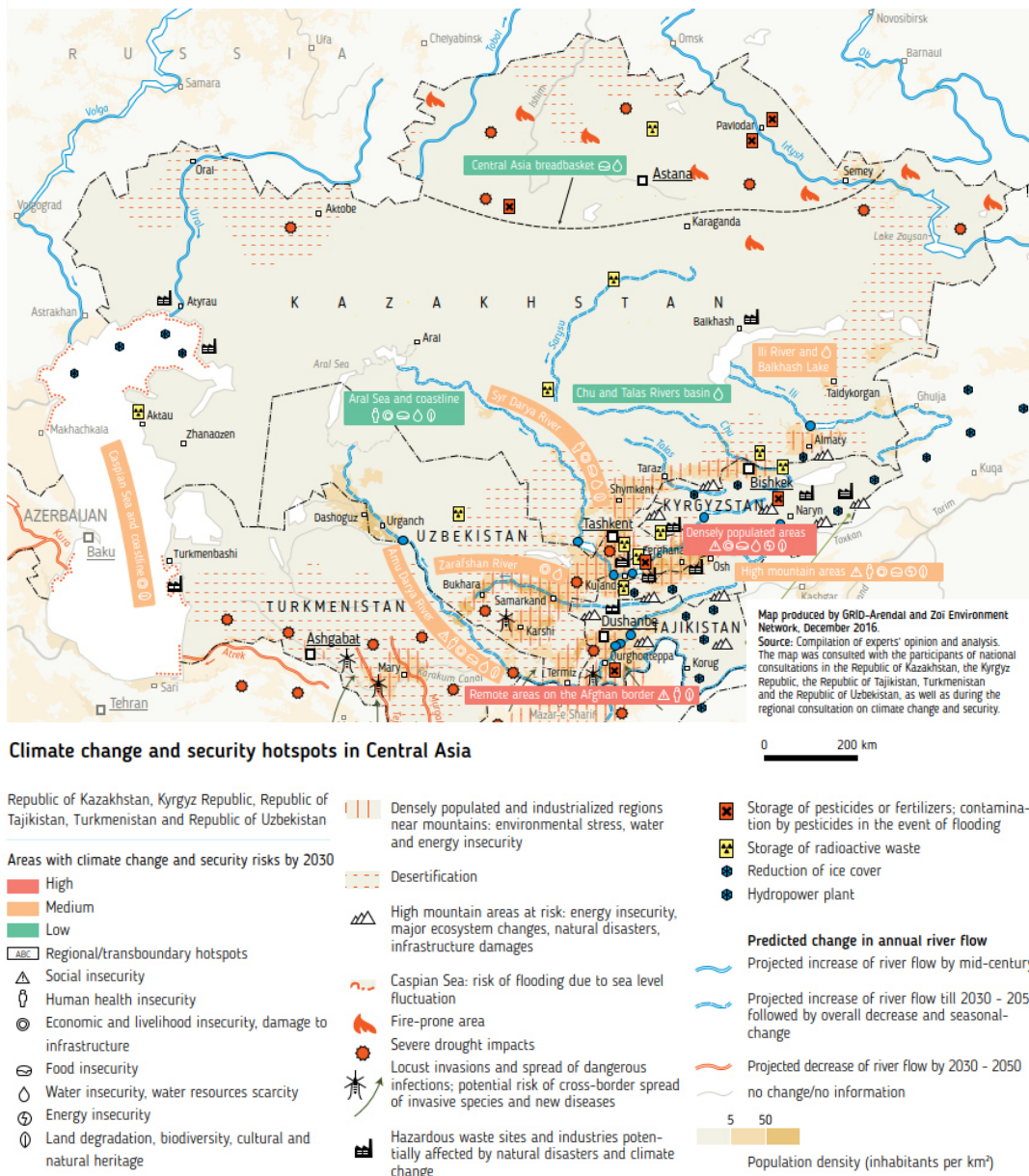


Figure 2: Climate change and security hotspots in Central Asia identified in the 2017 OSCE-led ENVSEC study “Climate Change and Security in Central Asia”.

2.1 Climate trends and projections

Across Central Asia, climate models project temperatures to rise by 2.5-6.5°C by the end of the century compared to the baseline 1961-1990 period (CAREC 2020a). Meanwhile, future precipitation patterns are likely to vary across the region, with north-eastern areas becoming wetter and south-western areas becoming drier – a trend that has been occurring over the past 40-50 years (ibid).

With these projections, Central Asia is likely to experience more heatwaves, fire weather conditions, and droughts, particularly in arid and semi-arid areas (IPCC 2022). Droughts that normally occur at a rate of 1 in 100 years are projected to happen 4-10 times more frequently across the region under various global warming levels (Naumann et al. 2018).

These projections also signal an increase in water scarcity, with major river basins such as the Amu Darya and Syr Darya River Basins facing reductions in river flows (International Alert 2021). By 2050, the annual flow of the Amu Darya River is projected to decrease by as much as 26-35% (Government of the Republic of Tajikistan 2022). Other rivers in the region will likely face similar trends: in Turkmenistan, projections indicate that the Murgab and Tejen Rivers – two of the country's largest rivers after the Amu Darya River – will see a decline in flow volumes as a result of rising temperatures and decreasing rainfall (MNP, Turkmenistan 2015).

For mountain areas, the impacts of these trends are particularly evident. High mountain areas throughout Central Asia will see a decrease in both snow-covered areas and snow volumes during the course of the 21st century, along with a likely shrinking in glacier mass and thawing of permafrost (IPCC 2021). In Uzbekistan, several river basins such as the Pskem, Surkhandarya, Kashkadarya and Chatkal River Basins will likely see a steady decline in glaciation area by 2050 (Uzhydromet 2016). Rising temperatures and precipitation levels can also lead to an increase in glacial lake outburst floods (GLOFs) and landslides over moraine-dammed lakes (IPCC 2021).

Due to its continental climate, Central Asia is also subject to periodic waves of cold spells and blizzards during winter. For instance, in early 2023, adverse winter conditions across Central Asia, including the coldest temperatures ever recorded in the region, had severe impacts on the countries' infrastructure and economy (with gas, electricity, and water supply outages, and major roads blocked by snow), as well as on people's livelihoods and health (as some households resorted to burning waste to fuel their stoves, a practice that causes severe air pollution) (Eurasianet 2023). While climate change is generally believed to exacerbate extreme weather events (Buchholz 2023), the impacts of climate change in increasing the intensity of extreme cold events is debatable (Brown 2022).

2.2 Climate-security pathways

Climate trends outlined in Section 2.1 can affect security and stability in Central Asia in many respects. These climate-security pathways are outlined below.

Agricultural sector

For communities whose livelihoods are directly dependent on agriculture and natural resources, the impacts on ecological systems are of particular concern. Across Central Asia, the range of Italian locusts (*Calliptamus italicus*) are expected to expand, while in Kazakhstan, drought stress is already causing a slowing of tree growth and forest regeneration as well as an increase in tree mortality (IPCC 2022). Changes in river flow regimes could affect irrigation systems in the region (IPCC 2022), compromising food security of lowland areas that are highly dependent on irrigation (Novikov and Kelly 2017).

Furthermore, projections of more heat stress are expected to reduce the extent of suitable cropping areas in Central Asia, which, together with worsening water scarcity, will have negative consequences for the region's agricultural productivity. These impacts, however, vary across the countries in the Central Asia region depending on the type of farm (large-scale vs. small-scale) as well as the agricultural and water-use technology applied (IPCC 2022).

Energy

Security threats could also emerge from the impacts of climate change on the energy sector. Changes in glacial runoff and river flow regimes could affect the operations of hydropower plants (IPCC 2022). For example, 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 (Reyer et al. 2017). Out of Tajikistan's 300 small hydropower plants, less than 20% remain operational (UNECE n.d.). The hydropower sector is also quite vulnerable to floods, and most of the hydraulic structures in the region require maintenance to continue operating safely (OSCE 2022a). This makes especially Kyrgyzstan and Tajikistan's mountain regions vulnerable to climate change, given their reliance on hydropower to meet their energy need (Adler et al. 2022; Novikov and Kelly 2017).

Countries dependent on hydropower have increasingly turned to coal as a short-term solution to address energy insecurity. Kyrgyzstan, for example, depends on coal to meet the additional load during the winter months when reservoir water levels are low and demand for power is high (OSCE 2022a). Coal accounts for 50% of primary energy consumption and 70% of electricity generation in Kazakhstan (IEA 2020). However, continued coal use is also causing severe environmental and health impacts and, if sustained in the long-term, can make current climate targets and sustainability plans increasingly difficult to achieve (OSCE 2022a).

In the case of the Caspian Sea areas of Kazakhstan and Turkmenistan, oil and gas facilities remain vulnerable to sea-level fluctuations, storm surges, and other extreme events (Novikov and Kelly 2017; Tehran Convention Secretariat 2021), with potential implications for the energy security as well as revenue of countries dependent on these resources.

Health sector

The health impacts of climate change are also of growing concern. Across Asia, the increasing frequency and intensity of hazards such as heatwaves, floods and droughts could drive up cases of vector- and water-borne diseases, undernutrition, mental disorders, and allergic diseases (IPCC 2022). In areas in Central Asia with inadequate water supply and sanitation systems, torrential rains can heighten the risk of transmission of water-borne diseases such as typhoid fever, salmonellosis, and dysentery (Novikov and Kelly 2017).

Furthermore, heatwaves and warmer temperatures could lead to more heat-related deaths as well as deaths due to circulatory, respiratory, diabetic and infectious diseases, along with an increase in infant mortality rates (IPCC 2022). For example, in Tajikistan, significant correlations have been observed between temperatures over 37°C and the number of childbirth complications (Reyer et al. 2017). Urban populations and agricultural fieldworkers in Central Asia are especially vulnerable to such conditions (Novikov and Kelly 2017). Moreover, dust storms, which are likely to become more frequent as aridity increases, could further expose populations in Central Asia to more dust and exacerbate respiratory problems as well as skin and eye conditions (Reyer et al. 2017).

Human mobility

Different forms of human mobility, including short-term displacements due to climate-related natural hazards and disasters, as well as seasonal and long-term migration, are increasingly being affected by climate-related impacts. The projected increase in extreme weather events could compound short-term displacements in Central Asia, especially in mountain areas, through rapid onset climate impacts such as floods, mudflows, and landslides (Blondin n.d.). For example, in May 2020, the collapse of a dam wall at the Sardoba reservoir on the Uzbek side of the Syr Darya River caused major floods that killed six people and triggered over 100,000 new displacements in the border regions of Kazakhstan and Uzbekistan (IDMC 2021; Radio Free Europe/Radio Liberty 2021; Xiao et al. 2022).

Seasonal and long-term migration is already a common phenomenon in Central Asia, and is of great socio-economic importance for the places of origins through remittances. Among the various drivers of migration, an important push factor is ecosystem degradation and loss of livelihoods associated with climate-related impacts, particularly on the agricultural sector (Novikov and Kelly 2017; Reyer et al. 2017). For example, in the past, drought and insufficient water resources have led to multiple cycles of migratory movements in the Aral Sea region in the 1990s and early 2000s (Novikov and Kelly 2017).

By exacerbating environmental degradation on vulnerable ecosystems in the Aral Sea, Caspian Sea, Tien Shan and Pamir mountains, and Amu Darya and Syr Darya River Basins, climate change is likely to accelerate and influence migration drivers in the region (IOM 2021). It is estimated that by 2050, 2.4 million people in Central Asia may have to migrate due to climate-related impacts (ICMPD 2022). This trend assumes different forms for different population groups in the region. In rural mountain areas, for example, there is usually a large-scale labor out-migration of men and working-age youth, which increases the stress on the most vulnerable groups, including women, children, and the elderly, who often stay behind and are thus disproportionately exposed to climate-related risks (Novikov and Kelly 2017).

Human safety

Hazards such as floods, storms (snow and dust) and wildfires are direct threats to the safety of individuals and communities, the severity of which depends on their level of preparedness as well as post-disaster access to aid and services. Mountain communities are especially vulnerable to landslides, mudflows, GLOFs and avalanches, the risks of which are amplified by warmer temperatures and melting glaciers (CAREC 2020a), as well as mountain communities' relatively higher levels of poverty and isolation compared to lowland populations (Novikov and Kelly 2017).

Transboundary natural resources

Central Asia has already seen several cases of tensions over transboundary natural resources, most notably over water, and related infrastructure developments such as dam construction.³ Tensions have also arisen as a result of competing access to land and water resources, particularly in border areas such as the Ferghana valley where borders are not fully delineated (Climate Diplomacy n.d.). This situation, coupled with the impacts of climate change, could further constrain the availability and access to these resources (Mirimanova et al. 2018).

³ See for example tensions over the construction of the Rogun dam (<https://climate-diplomacy.org/case-studies/rogun-dam-conflict-between-tajikistan-and-uzbekistan>) and Kambar-Ata-1 dam (<https://climate-diplomacy.org/case-studies/dam-conflict-between-kyrgyzstan-and-uzbekistan>).

3 Recent developments

3.1 Regional and global challenges

Afghanistan

The political situation in Afghanistan is of particular concern for Central Asia. It has implications for co-operation and stability not only to the southern border areas of Tajikistan, Turkmenistan, and Uzbekistan, but also to the wider Central Asia region, including in the context of natural resource management, forced displacement, and gender-related issues.

While the situation in Afghanistan poses challenges, it could also provide opportunities for co-operation in the region. On 27-29 June 2022, for example, senior representatives of the border services from Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan met during a three-day regional meeting to discuss border-related issues and common security threats, with the aim of strengthening co-operation and security in light of regional developments, including in Afghanistan (OSCE 2022d).⁴ The need for enhanced cross-border co-operation, particularly with regards to addressing shared security concerns and in light of developments in Afghanistan, was further emphasized during the 17th Central Asian Border Management Initiative Conference in Tashkent in December 2022 (OSCE 2022b).

Within the framework of “Response to the Implications of Afghanistan for the OSCE Region’ (RIAOR)”, the OSCE is developing and implementing activities and projects that respond to the security implications of the situation in Afghanistan across the OSCE region, with a focus on Central Asia. These activities focus on mitigating risks, addressing vulnerabilities, and pursuing opportunities that will strengthen resilience, invest in regional approaches and support further co-operation amongst countries in Central Asia (OSCE 2022f).

Countries in Central Asia are also taking initiatives to foster regional stability and development through engaging with Afghanistan. For example, in March 2023, representatives from countries neighboring Afghanistan, including Tajikistan, Turkmenistan, and Uzbekistan, met in Tashkent at the first meeting of Special Representatives of states neighboring Afghanistan. During the meeting, representatives emphasized the need for regional support to provide Afghanistan with humanitarian assistance (MFA, Uzbekistan 2023).

The war against Ukraine

The war against Ukraine that broke out in late February 2022 aggravates the climate-related security risks faced by the countries in Central Asia. Disruptions to agricultural and food trade, as well as sanctions imposed by members of the international community, have contributed to grain price spikes and are leading to the introduction of export bans and quotas on grains in several countries, including in Kazakhstan (Burna-Asefi 2022). Consequently, other countries in the region that are heavily dependent on grain imports from both Kazakhstan and the Russian Federation could face food security risks (Najibullah 2022).

In the energy sector, the rise in oil and gas prices in the international energy market has increased the revenue of major producers in Central Asia, such as Kazakhstan (Sharifli et al. 2022). However, at the micro-level, the rise in gas prices has negatively affected household well-being and purchasing power across the region (Sharifli et al. 2022).

⁴ The event was organized jointly by the Border Service of the State Committee for National Security of the Kyrgyz Republic and the OSCE Programme Office in Bishkek, in co-ordination and with support of the OSCE Programme Office in Dushanbe, OSCE programme Office in Nur-Sultan, and the OSCE Project Co-ordinator in Uzbekistan. See press release: <https://www.osce.org/programme-office-in-bishkek/521785>.

The war has also brought major shifts and disruptions to mobility and remittance flows in the region. While the large exodus of citizens of the Russian Federation to Central Asia, most notably to Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan, could spur economic growth and provide a pool of much-needed skilled labor (Pikulicka-Wilczewska 2022), it has also contributed to fresh spikes in living costs (Radio Free Europe/Radio Liberty 2022a). Furthermore, economic disruptions and sanctions imposed on the Russian Federation in response to the war could trigger high volatility and affect remittance flows in some countries in Central Asia. This is particularly relevant for remittance-dependent Kyrgyzstan and Tajikistan where remittances are likely to decline by as much as 33% and 22%, respectively (Ratha and Kim 2022). On the contrary, Uzbekistan received nearly double the amount of remittances in the first eight months of 2022 compared to the same period in 2021, with remittances from the Russian Federation accounting for 54% and 80% of total remittances in 2021 and 2022, respectively (Ratha et al. 2022).

Taken together, the impacts of the war on food and energy prices, together with the decline in remittances, could increase poverty rates across Central Asia, especially in Kyrgyzstan and Tajikistan (Hlayhel et al. 2022). Considering the growing impacts of climate change on livelihoods and human security in the region, the war could further aggravate people's vulnerabilities and hinder their resilience to withstand shocks.

COVID-19 pandemic

The COVID-19 pandemic has led to severe disruptions to trade and connectivity across Central Asia (Laruelle 2021). The health crisis has also severely disrupted incomes and revenues in the informal sector, drove up food prices, and in some countries, affected remittance flows (UNDP 2020). Following the pandemic, the economies of Central Asia have since returned to growth, albeit at different recovery rates (World Bank 2023).

3.2 National level initiatives

All countries in Central Asia have taken a number of national level initiatives to step up their climate commitments and response mechanisms since the release of the 2017 OSCE-led ENVSEC study.

- Kazakhstan has taken several initiatives to decarbonize its economy and strengthen climate action. For example, in January 2021, Kazakhstan adopted a new environmental code which covers most items included in the EU environmental acquis and adds further elements such as forest and soil protection (WECOOP Consortium 2021). Moreover, Kazakhstan approved its first low-carbon strategy in February 2023, which is to be adopted by the end of this year, and reaffirmed its goal to achieve net zero emissions by 2060 (ILS Adilet 2023; WECOOP Consortium 2023).
- In October 2021, Kyrgyzstan started the process of developing its national climate change adaptation planning (UNDP 2021b). This effort is supported by the project 'Advancing the development of a National Adaptation Plan (NAP) process for medium and long-term adaptation planning and implementation in the Kyrgyz Republic', funded by the Green Climate Fund (GCF) and implemented by UNDP. The project aims to strengthen Kyrgyzstan's institutions and vertical and horizontal co-ordination for climate change adaptation planning, focusing on four priority sectors: (1) Disaster risk reduction (DRR), (2) health, (3) biodiversity conservation, and (4) agriculture and irrigation (UNDP n.d.a).
- In 2019, Tajikistan published its 'National Strategy for Adaptation to Climate Change of the Republic of Tajikistan for the period up to 2030', which assesses the risks of climate change that are applicable to agriculture, land tenure, and food security, while also outlining adaptation options for each sector (UNEP 2019). With the support of the UNDP, Tajikistan

is also advancing its climate adaptation and implementation approaches by developing its National Adaptation Plan process (UNDP 2022a).

- In May 2021, Turkmenistan updated its 'National Strategy of Turkmenistan on Climate Change', with support of the UNDP and the OSCE Center in Ashgabat.⁵ The strategy outlines Turkmenistan's ambitions in climate change adaptation and mitigation through the promotion of renewable energy, sustainable land management practices, and modernization of agricultural systems (Progres 2023). In December 2021, Turkmenistan signed a Memorandum of Understanding (MoU) with the UN on co-operation in the areas of climate change mitigation and adaptation (UN 2022). The MoU includes, among other things, support for Turkmenistan in developing its national strategies and action plans on low emission development, the Aral Sea, and the country's NDCs (Shlapachenko 2022). It also entails the development of annual action plans to implement the MoU (UN 2022).
- Through a series of policy dialogues held from August 2021 to February 2022, Uzbekistan has developed a blueprint for its Green Growth Strategic Framework, which seeks to implement its Strategy on Transition to a Green Economy for 2019-2030. The policy dialogues also examined Uzbekistan's progress in meeting its climate commitments as outlined in the country's draft Climate Change Strategy for 2021-2023 (Kholbadalov et al. 2022). Furthermore, Uzbekistan is taking decisive action to tackle the problems associated with the Aral Sea crisis by planting more than 1.7 million hectares of forest, a figure that is expected to be up to 2.5 million hectares (or almost 80% of the territory) by 2026 (WECOOP Consortium 2023).

Nationally Determined Contributions (NDCs)

In October 2021, Kyrgyzstan, Tajikistan, and Uzbekistan submitted their updated NDC plans, all of which include a strengthening of climate policies and actions from their previous submissions.⁶ Turkmenistan has also submitted its updated NDC plan in January 2023 (UNFCCC n.d.). With the support of UNDP, Kazakhstan is updating its NDC from the initial 2016 submission. The updated NDC will seek to strengthen inclusiveness and institutional capacities of key stakeholders, while also enhancing transparency and mainstreaming climate actions in national programs and projects (UNDP n.d.e).

3.3 Regional level initiatives

In addition to national level initiatives, the governments of the countries in Central Asia have taken steps towards enhancing regional co-operation in various areas that are related to climate change.

- In July 2019, the Regional Working Group of the Interstate Commission on Sustainable Development (ICSD) finalized the '**Regional Environmental Programme for Sustainable Development in Central Asia**'. The document aims to integrate national priorities with the implementation of the SDGs, together with major international obligations in the fields of environmental protection and sustainable development (landuse-ca.org 2023).
- During the fourth **Consultative Meeting of the Heads of States of Central Asia** in July 2022, all five countries adopted the 'roadmap for the development of regional cooperation for 2022-2024'. The roadmap aims to establish a number of inter-agency co-operation mechanisms focusing on environmental protection, energy, education, and culture.

⁵ The National Strategy of Turkmenistan on Climate Change is available at: <https://www.undp.org/turkmenistan/publications/national-strategy-turkmenistan-climate-change>.

⁶ See overview by Climate Watch for Kyrgyzstan (https://www.climatewatchdata.org/ndcs/country/KGZ/?document=revised_first_ndc); Tajikistan (https://www.climatewatchdata.org/ndcs/country/TJK/?document=revised_first_ndc); and Uzbekistan (https://www.climatewatchdata.org/ndcs/country/UZB/overview?document=revised_first_ndc).

- Furthermore, during the meeting, the **Regional Program “Green Agenda” for Central Asia** was adopted, which aims to enhance co-operation on green economic growth and sustainable development through the implementation of joint projects, technology transfer, and knowledge exchange (MFA, Kyrgyzstan 2022).

Together with international partners, governments in Central Asia are also implementing a number of regional level projects and initiatives that seek to address various challenges related to climate change, as well as foster regional co-operation in addressing these challenges (Box 1).

Box 1: List of ongoing and recent internationally funded projects and initiatives in Central Asia.

Central Asia Hydrometeorology Modernization Project (CAHMP)

Funded by the World Bank, the project aims to “improve the accuracy and timeliness of hydromet services in Central Asia,” with a focus on Kyrgyzstan and Tajikistan. The project also aims to support countries in improving climate archives and data services, enhancing early warning capabilities, and improving the accuracy of forecasts through modern numerical methods (World Bank n.d.a).

Central Asia Nexus Dialogue Project: Fostering Water, Energy and Food Security Nexus and Multi-Sector Investment

Funded by the EU, the project’s overall objective is to “create a multi-sectoral enabling environment to facilitate sustainable and climate-resilient investments for increased water, energy, food security and ecosystems” across all five countries in Central Asia (CAREC n.d.b). In its second phase (2020-2023), the project aims to institutionalize the water-energy-food nexus approach in national and regional governance structures, as well as in investment decisions (CAREC n.d.a).

Climate Adaptation and Mitigation Program for the Aral Sea Basin (CAMP4ASB)

Funded by the World Bank, the project aims to “enhance regionally coordinated access to improved climate change knowledge services for key stakeholders in participating [...] countries, as well as to increase investments and capacity building that, combined, will address climate challenges common to these countries.” The project’s first component specifically looks at providing technical assistance and training on regional climate knowledge services, while the second component focuses on regional climate investment, involving Tajikistan and Uzbekistan. The third component involves regional and national co-ordination activities (World Bank n.d.b).

Climate and Environment (CLIENT) Program

Funded by the World Bank, the CLIENT Program supports countries of Central Asia to achieve sustainable, resilient, and inclusive economic growth with a focus on climate resilience, resilient landscape restoration, urban air pollution management and circular economy, and green, resilient, and inclusive COVID-19 recovery (World Bank 2021). Among its three pillars of work, Pillar 1 on Resilient Landscapes in Central Asia (RESILAND CA+) supports rural communities in landscape restoration and building resilience to desertification, landscape degradation and climate change, while also promoting transboundary collaboration (ibid).

European Union – Central Asia Water, Environment and Climate Change Cooperation (WECOOP)

Renewed in October 2019, the project aims to “enhance environment, climate change and water policies in Central Asia through approximation to EU standards and to promote green investments in relevant sectors with the aim of contributing to measurable reductions in man-made pollution, including CO₂ emissions.” Priority areas include, among others, environmental governance, climate change adaptation and mitigation, and water resource management (WECOOP Consortium 2022).

Green Central Asia Initiative

Launched by the German Federal Foreign Office in 2019, the initiative aims to improve access to information and risk analyses to enable countries to assess climate change impacts and take preventive measures. Furthermore, it foresees a number of dialogues and workshops aimed at enhancing countries' resilience and decision-makers' ability to address climate-related security risks both at the national and regional levels (Green Central Asia n.d.).

The initiative also includes a number of projects and activities that work towards achieving its objectives. The project '**Transboundary dialogue on climate, environment and security in Central Asia and Afghanistan**' (2020-2024), for example, aims to strengthen conflict prevention and cross-border co-operation on climate-related impacts in Central Asia (GIZ 2022c). Specifically, the project organizes regional dialogues on climate and security in the Aral Sea Basin, as well as on topical issues related to glaciers, water management, protected area management, and energy (see for example Section 4.1.2). The project also envisions the drafting of a regional climate change adaptation strategy to develop a mechanism for co-operation between countries in Central Asia to address climate-related impacts and implement adaptation measures (GIZ 2021, 2022a).

To support these initiatives, a joint **Regional Action Plan** has been produced. In particular, the Action Plan acts as a roadmap to guide political dialogue on addressing the Aral Sea crisis, as well as on topics related to water, energy, glacier protection, forestry, agriculture, and land management (GIZ 2021).

Regional Climate Action Transparency Hub for Central Asia (RECATH)

Hosted by CAREC, the project is part of the Initiative for Climate Action Transparency (ICAT). RECATH provides support in capacity-building and networking in Central Asia to help countries in the region develop and improve their respective climate action transparency systems. Specifically, the project aims to equip countries with capacity to effectively assess the impacts of their climate policies and actions, to reach out to investors and other stakeholders in the implementation of climate change mitigation and adaptation measures, and to meet their reporting commitments under international frameworks, in particular the Enhanced Transparency Framework of the Paris Agreement (CAREC n.d.).

Regional Constructive Dialogue on Climate Change in Central Asia

Conducted by International Alert for the period April 2022 to September 2023, the project aims to "reduce intra- and inter-community tensions related to natural resource management at the local and transboundary level, to promote greater understanding of and resilience to the impacts of climate change, and to foster stronger, self-sustained cooperation, mutual trust and dialogue on peace-promoting climate change adaptation." The dialogue includes stakeholders from Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan (International Alert 2022).

Strengthening disaster resilience and accelerating the implementation of Sendai Framework for Disaster Risk Reduction in Central Asia

Funded by the EU, the project was implemented by the UNDRR for the period 2019 to 2022. It supported the efforts of all five countries in Central Asia in strengthening regional co-ordination and capacities on DRR at the local, urban, regional, and national levels. The project also strengthened the role of the Center for Emergency Situations and Disaster Risk Reduction (CESDRR), based in Almaty, as the regional secretariat for co-ordination, and a source of expertise, information, and capacity-building on DRR (UNDRR 2022). Among its key achievements, the project oversaw the development of the 'Strategy for Development of Cooperation of Countries of Central Asia in Disaster Risk Reduction for 2022-2030', along with subsequent annual action plans for its implementation (UNDRR 2023).

Under the **Team Europe Initiative**, the EU has a number of initiatives and joint programming processes with countries in Central Asia that focus on aspects related to climate change and sustainable development.⁷ In November 2022, the EU launched the 'Team Europe Initiative on water, energy and climate change', which focuses on supporting all five countries in Central Asia to develop an integrated regional power market, enhance transboundary water governance, and include climate change in regional political dialogues on water, energy, and environment (EC 2022).

Furthermore, the United States Agency for International Department (USAID) has a number of initiatives and projects in Central Asia that focus on environmental and water-related challenges. For example, its **Environmental Restoration of the Aral Sea Activity** (2021-2024) aims to improve soil conditions and vegetation in parts of the Aral Sea through afforestation activities, which will enhance the resilience of landscapes and people (USAID 2021a). Moreover, USAID's work in Central Asia for the period 2020-2025 is guided by its **Regional Development Cooperation Strategy**, which includes climate change as a cross-cutting topic in its objective to strengthen regional connectivity and resilience to regional vulnerabilities (USAID 2022).

The five countries in Central Asia have also been engaged with the government of the United States on co-operation to address common challenges related to economy, energy, environment, and security through the **C5+1 diplomatic platform**, with working groups set up for each topic (US DOS 2023a). In a Joint Statement on the C5+1 Ministerial in 2021, the governments of Central Asia affirmed the need for regional co-operation to address climate-related risks, including through joint efforts in emissions reductions, water management, DRR, and biodiversity conservation (US DOS 2021). The need for collective action was reiterated in the C5+1 Ministerial held in March 2023 in Astana (US DOS 2023b).

Gender-related aspects have also been gaining traction in a number of water and energy-related initiatives across Central Asia. Since 2014, the OSCE has been fostering the incorporation of gender aspects in water governance and the participation of women in conflict resolution and water management, through for example the flagship project "**Women, Water Management and Conflict Prevention – Phase II**" (2017-2022) (OSCE n.d.b). In the energy sector, the OSCE project "**Empowering Central Asian Women in the Energy Sector**" (2021-2024) aims to support women in building and advancing their careers in the renewable energy sector, while also helping governments and companies integrate gender-equality targets into their policies (OSCE n.d.a).

Furthermore, in the context of the 66th session of the UN Commission on the Status of Women that was held in March 2022, the Government of Turkmenistan and the UN Women Regional Office for Europe and Central Asia organized a side event that explored how gender considerations are being incorporated in the implementation of climate change, environmental protection, and disaster preparedness commitments in the region (UN Women 2022).

⁷ For more information on the Team Europe Initiative, see: https://international-partnerships.ec.europa.eu/policies/team-europe-initiatives_en.

4 Co-operation opportunities

The 2017 OSCE-led ENVSEC study identified a total of eleven regional/transboundary hotspots in Central Asia where climate and security risks intersect. In these hotspots, climate change is exacerbating socio-economic stability, threatening infrastructure, and increasing livelihood insecurity. As a result, it has the potential to increase political or social tensions, with areas lacking effective institutional capacities or mechanisms for transboundary co-operation being especially at risk.⁸

Out of these eleven regional/transboundary hotspots, this study identified four priority ones where co-operative activities and projects between the countries of Central Asia would be especially required to address climate-related security risks. These are: **'high mountain areas'**, **'densely populated areas (Ferghana valley)'**, **'Amu Darya River Basin'**, and **'Central Asia breadbasket'**.⁹ The selection of these hotspots was based on the prioritization made by participants in the Regional Consultation Workshop on Climate Change and Security in Central Asia on 13-14 July 2022 in Almaty, supplemented by exchanges with experts and stakeholders from the region and targeted desk research.

For each of these hotspots, unilateral actions will be insufficient to address climate-related security risks; a co-ordinated approach involving all countries in Central Asia, together with countries and international partners outside the region, would be required instead. In particular, co-operation opportunities should aim to achieve the following:

- **Improve livelihoods, human security and resilience**, while also reinforcing co-operation, trust and good neighborly relations;
- **Ensure a balanced representation of gender and youth**, as they bring unique and important perspectives to addressing climate-related security risks;
- **Involve the financial and private sectors**, given the need to ensure that co-operation activities are financially sustainable and effective in achieving the Sustainable Development Goals (SDGs).

The following section provides an overview of the main challenges concerning each of the four hotspots, along with recent initiatives and co-operation opportunities to address them. This analysis was based on participants' inputs during the Almaty workshop in 2022, as well as inputs from regional experts and desk research throughout the consultation process.



4.1 High mountain areas

Climate-related security risks are especially high in the mountain areas of Central Asia, including those in Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan, as well as in the border areas of Afghanistan and China. This is due to a number of factors, including frequent natural hazard-induced disasters, visible climate change effects (e.g., variability in rainfall and snow), the high levels of poverty among mountain communities, and the presence of mining and waste storage sites in some areas. Adding to these risks are projections of an increase in glacial and permafrost melting, which could further disrupt hydrological cycles in mountain areas (Novikov and Kelly 2017).

⁸ For more information on each of the eleven hotspots, see Section 5.1 in the Annex.

⁹ This order does not imply any prioritization.

High mountain areas are a priority hotspot for Central Asia, given that they hold important water resources for the entire region. Mountain areas in Kyrgyzstan and Tajikistan contribute around 30% and 40% of the region's water resources, respectively. Moreover, mountain areas cover a significant share of the land area of some countries in Central Asia – for example, approximately 90% of Kyrgyzstan and 93% of Tajikistan's land areas are covered by mountains (Zoï Environment Network 2012).

4.1.1 Challenges

Glacial melting

As a consequence of climate change, glaciers in Central Asia are experiencing significant and accelerating area loss, leading to their diminished capacity to store water (Hijoka et al. 2014; Murakami 2020). The current volume of glaciers in Tajikistan is only around 30% of the volume in 1930, when instrumental measurements first began (State Administration for Hydrometeorology of the Committee of Environmental Protection of the Republic of Tajikistan 2014). In Kyrgyzstan, continuous annual measurements of the mass balance of glaciers have revealed that the degradation of glaciers is increasing, leading to their gradual retreat (Hoelzle et al. 2017; Usubaliev 2021).¹⁰ These trends are expected to continue: the Vakhsh river basin in the Pamir Mountains of Tajikistan, for example, is likely to see a 53% reduction in glacial volume by 2050 compared to 2003 (Government of the Republic of Tajikistan 2022).

Glacial melting is also associated with a number of hazards and natural disasters, namely floods, mudflows, landslides, and GLOFs (Taylor et al. 2023). High mountain areas in Central Asia face an especially high exposure and vulnerability to GLOFs – for Kazakhstan, Kyrgyzstan, and Tajikistan, the share of their national populations that are exposed to GLOFs are approximately 3%, 16%, and 2%, respectively (Taylor et al. 2023). Glacial melt also poses a threat to the stability of other types of lakes, including those formed by landslide debris, such as Lake Sarez in the Pamir Mountains (Mergili et al. 2013). Moreover, landslides and permafrost degradation present major hazards to mining waste facilities and hazardous waste storage sites in mountain areas (Novikov and Kelly 2017). Projections also indicate that communities and infrastructure in mountain areas in Central Asia are likely to face an increase in damage and disruptions caused by floods and GLOFs (Adler et al. 2022).

Hence, measures that aim to address the security risks faced by mountain communities would need to incorporate elements of DRR in their planning and implementation. The growing importance of DRR considerations is reflected in a number of recent internationally funded projects in mountain areas that are focusing specifically on glaciers and GLOFs (see Section 4.1.2).

Agriculture, pastures, and forests

In Central Asia's high mountain areas, it is important to also consider the climate-related security risks on agriculture, pastures and forests, as local communities depend on them for their livelihoods (Kerven et al. 2011; Xenarios et al. 2019). According to a household survey conducted in Tajikistan's mountain areas (Oriol 2017), local communities faced issues with existing irrigation systems (and, in some cases, the lack thereof), and threats to their harvests, especially for potato and wheat. In the same survey, respondents described the need for new technological infrastructure to support harvesting work (e.g. tractors, equipment), new climate-

¹⁰ However, continuous annual measurements of the mass balance of glaciers have only been carried out on a small number of glaciers in Kyrgyzstan. They include Kara-Batkak, Glubina, Abramova, Western Seuk, and No. 354.

resilient seed varieties, as well as training, particularly on marketing their harvests (i.e. how to sell more efficiently) and to address salination issues on croplands. Similarly, in Kyrgyzstan, studies show that livestock production methods in highland pastures in the Naryn Oblast suffer from high mortality rates and low market prices for animals, highlighting the need for interventions to improve crop and animal productivity and sustainable pasture use (Uzbekova 2020).

Given that these sectors are especially sensitive to the impacts of climate change, measures to improve and safeguard livelihoods are urgently needed. There are already a number of projects that support efforts to provide communities with alternative and sustainable livelihood opportunities (see Section 4.1.2). However, more efforts need to be channeled towards fostering regional co-operation in supporting livelihoods, while also taking into account the different context-specific environmental and socio-economic conditions in mountain areas across Central Asia.

Gendered impacts

When describing the climate-related security challenges impacting mountain communities, it is important to consider their gender dimension. For example, the observed trend of mostly young, working-age men leaving rural and mountain areas increases the stress put on the most vulnerable groups, including women who normally stay behind and are thus disproportionately exposed to climate-related risks (Novikov and Kelly 2017). At the same time, women are often the primary actors in terms of agriculture, animal husbandry, and other small-scale economic activities, and in mountain communities they are the keepers of traditional knowledge, medicine, and local culture. However, these differences in gender roles are often not taken into account in policies and programs to address climate-related risks, including security risks. As a result, women often remain invisible and unheard, particularly in mountain areas (Mountain Partnership n.d.).

Limited data availability

Since the break-up of the Soviet Union, climate data for Central Asia has been relatively sparse, introducing a high degree of uncertainty into both current assessments and future projections (Blondin 2019). This seems to be especially the case for high mountain areas. For example, there is still a limited understanding of the spatial distribution and temporal development of high mountain lakes in the Pamir mountains (Mergili et al. 2013).

There have been several initiatives to address this gap. For example, the National Hydrometeorological Service of Kazakhstan (Kazhydromet) has conducted research studies in mountain regions¹¹. Likewise, the Ministry for Emergency Situations of Kazakhstan has produced data on mountain lakes and moraines: the Ministry's Department of Emergency Situations of Almaty region, for example, conducted an aerial survey in June 2021 to determine the state of moraine-glacial complexes and mudflow-prone riverbeds (Department of Emergency Situations of Almaty region 2021). Improvements in data collection and monitoring can also be found in Kyrgyzstan and Uzbekistan, where the re-establishment of glacial monitoring programs since 2010 has greatly improved the network of glaciological and geodetic measurements in the Tien Shan Mountains (Hoelzle et al. 2017). However, these tend to remain small-scale initiatives, and it continues to be difficult to make data available to a broader range of stakeholders and to share them between countries.

¹¹ For example, Kazhydromet monitors snow cover in mountain areas (Regional Environmental Centre for Central Asia (CAREC) 2020c), and has produced hydrological forecasts for mountain rivers during the growing season (National Hydrometeorological Service of Kazakhstan (Kazhydromet) 2022). Kazhydromet also conducts surveillance of areas exposed to mudflows and landslides (ME, Kazakhstan 2017).

4.1.2 Recent initiatives and projects

National and regional initiatives

- At the initiative of Kyrgyzstan, the UN declared 2022 as the “**International Year of Sustainable Mountain Development**”, with the aim of increasing awareness of the importance of sustainable mountain development, as well as to promote conservation and sustainable use of mountain ecosystems (UNGA 2021).
- Kyrgyzstan declared 2022 as the “**Year of Mountain Ecosystems Protection and Climate Sustainability**” and launched a tree-planting program across the country, with a focus on mountain areas (Osmonalieva 2022).
- In September 2022, the Mountain Partnership, which is a UN voluntary alliance of partners dedicated to mountain communities and environments, including the governments of Kyrgyzstan and Tajikistan, endorsed the **Aspen Declaration**. The declaration promotes co-operation among mountain countries to address topics related to mountain environments and sustainable development (Mountain Partnership 2022a).
- Tajikistan initiated a resolution to declare 2025 as “**International Year of Glaciers’ Preservation**”, which was adopted by the UN General Assembly (UNGA) in December 2022 and calls for raising awareness and improving international co-operation on glaciers’ preservation (UNGA 2022b).
- In December 2022, the UNGA adopted a resolution to declare the period 2023-2027 as ‘**Five Years of Action for the Development of Mountain Regions**’, at the initiative of Kyrgyzstan. The resolution invites countries to participate in the initiative to build support for sustainable mountain development and to raise international awareness of the problems faced by mountain countries. It also calls for Member States to strengthen co-operation in glacial research, improve basic infrastructure, and develop and improve DRR strategies in mountain areas (Mountain Partnership 2022b; UNGA 2022a). To implement this initiative, Kyrgyzstan is developing a roadmap document which aims to prioritize, among other topics, climate change impacts in mountain areas, glacial melting, and improving access to basic services for mountain communities.
- In December 2022, the OSCE Secretary General hosted a Ministerial side event dedicated to “**Climate Change and Security in Mountain Regions**” at the OSCE Ministerial Council in Łódź, Poland. The side event brought together Ministers and Deputy Ministers of Foreign Affairs from Albania, Andorra, Finland, Germany, Kyrgyzstan, North Macedonia, and Tajikistan to discuss the specific impact of climate change on mountain regions, the security implications that could derive from it, and ways forward to ensure sustainable and climate-resilient mountain development (OSCE 2022e).
- In November 2022, UNESCO, in co-operation with the International Centre for Integrated Mountain Development (ICIMOD), Aga Khan Agency for Habitat (AKAH), and the Central Asian Regional Glaciological Centre (CARGC), and supported by the Government of the Republic of Kazakhstan, organized the conference “**Cryosphere and related hazards in High Mountain Asia in a changing climate**” in Almaty. The event brought together about 150 researchers, practitioners, and policy makers, as well as representatives of governments at various levels, youth, and development partners from Central Asia, South Asia, and around the world working in the fields of climate, cryosphere, and DRR. The conference provided a platform for participants to share knowledge and best practices for sustainable development of societies in high mountain areas in the context of climate change, while also providing opportunities for networking and partnerships between stakeholders in the region (ICIMOD 2022).

Internationally funded projects

- Within the project '**Transboundary dialogue on climate, environment and security in Central Asia and Afghanistan**' under the **Green Central Asia initiative**, GIZ organized a series of working group meetings between September and December 2022 specifically on mountains and glaciers. The meetings brought together experts from the geoscience, glaciological, and hydrometeorological centers of Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan to enhance co-ordination and co-operation on glacier monitoring and modelling, through for example joint expeditions (for e.g., a joint scientific expedition to the Tuyuksu Glacier in Kazakhstan is planned for August 2023), scientific conferences, workshops, round tables, and other events at the national and regional levels (GIZ 2022a). In March 2023, together with heads of relevant authorities in Central Asia, members of the working group signed a joint memorandum of co-operation to develop a common approach for glacier monitoring, assessment, and forecasting (Green Central Asia 2023). The memorandum thus contributes towards supporting Tajikistan's initiative to declare 2025 as "International Year of Glaciers' Preservation."
- The GEF-funded project '**Strengthening the Resilience of Central Asian Countries by Enabling Regional Cooperation to Assess High Altitude Glacio-nival Systems to Develop Integrated Methods for Sustainable Development and Adaptation to Climate Change**' (2022-2026) aims at "strengthening the adaptation capacity of Central Asian countries to climate change impacts on glacio-nival systems through assessment, promotion of regional cooperation, and stakeholder engagement." Implemented by UNDP and UNESCO, the project involves consolidating knowledge, fostering regional co-operation, building capacities, implementing demonstration projects, and raising awareness on glacio-nival systems and permafrost (GEF 2020).
- The project "**Ecosystem-based Adaptation to Climate Change in High Mountainous Regions of Central Asia (EbA)**" (2015-2020) aimed to support national and local efforts in implementing ecosystem-based adaptation approaches into climate adaptation strategies. Funded by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU), the project worked with partner organizations in pilot villages in the Naryn region of Kyrgyzstan and Gorno-Badakhshan Autonomous Oblast of Tajikistan. (GIZ 2019).
- Within the framework of the World Bank-funded **CAMP4ASB project**, Kazhydromet has received technical support and training to enhance its remote sensing technologies, which will enable the agency to better monitor mountain snow cover and forecast mountain river flow. Such information and projections would subsequently be very useful to other relevant ministries and agencies in Kazakhstan working on early warning systems and DRR, particularly in the context of avalanches and other disasters (CAREC 2020c).
- The **Critical Ecosystem Partnership Fund (CEPF)** has a number of projects and activities that work on biodiversity conservation in the mountains of Central Asia, which it categorizes as a biodiversity hotspot (CEPF n.d.b). Among its priorities, CEPF aims to enhance civil society capacity for effective conservation action, and has a number of projects that facilitate transboundary co-operation and networking among civil society organizations on biodiversity conservation.¹² Moreover, CEPF is funding a grant program for projects that support biodiversity conservation in Central Asia.¹³

¹² Two projects that focus on civil society capacity-building and transboundary networking include: (1) [Strengthening Conservation of Key Biodiversity Areas in Kazakhstan, Kyrgyzstan and Tajikistan](#); and (2) [Supporting Effective Safeguards at Corridor-Level in the Era of Infrastructure Boom in Kazakhstan, Kyrgyzstan and Uzbekistan](#).

¹³ For more information, see <https://www.mca.earth/en/about-program/>.

- The **RESILAND CA+ pillar of the World Bank-funded CLIENT Program**, includes a number of projects that provide technical assistance to strengthen the capacity of countries in Central Asia in identifying and implementing landscape management and restoration approaches for mountain areas (World Bank 2021). For example, the project “Economic Valuation of Landscape Restoration in the Mountains of Tajikistan” evaluates the economic costs of environmental degradation in Tajikistan’s mountain areas.¹⁴
- The GEF-FAO project “**Sustainable Management of Forests in Mountain and Valley Areas**” (2018-2023) aims to “introduce Sustainable Forest Management (SFM) in Uzbekistan, thereby sequestering carbon and improving the quality of forests and tree resources.” Among its activities, the project is developing an operational forest inventory and monitoring system, and is operationalizing sustainable forest management across four demonstration sites in Uzbekistan¹⁵ (FAO n.d.; FAO and GEF 2022).
- Funded by Adaptation Fund and implemented by UNESCO, the project “**Reducing vulnerabilities of populations in the Central Asia region from glacier lake outburst floods in a changing climate**” (2021-2025) aims to reduce societal risks and vulnerabilities associated with GLOFs. It aims to do so by conducting risk and vulnerability assessments, strengthening early warning systems and DRR capacities, and providing community- and gender-sensitive training and awareness-raising (Adaptation Fund n.d.).
- The SDC- and University of Fribourg-funded project “**Cryospheric Climate Services for improved Adaptation (CICADA)**” (2017-2021) aimed to develop high-quality cryosphere data and to utilize the data for improving water resource management and DRR in pilot regions in Central Asia. The project also aimed to increase capacity, co-operation, and awareness on the topic (University of Fribourg n.d.).
- In co-operation with international organizations, the Government of Japan and the Japan International Development Agency (JICA) are funding a number of projects that address aspects of DRR in mountain areas in Kyrgyzstan. For example, JICA has implemented projects to enhance the protection of road infrastructure between Bishkek and Osh from ground blizzards and avalanches (JICA 2022). The Government of Japan is also funding a project under the UNDP Climate Promise initiative¹⁶ that aims to improve national disaster monitoring and forecasting systems in Kyrgyzstan, and to strengthen communities’ adaptive capacities to GLOF and mudslide risks.

4.1.3 Potential measures and activities



Livelihood improvements



Joint measures and activities are needed for improving and safeguarding the livelihoods of mountain communities, as well as providing them with alternative and sustainable livelihood opportunities. This would help reduce mountain communities’ vulnerability to climate change, and hence alleviate their stress levels.

Technical support could be provided for agricultural and pastoral communities in mountain areas to help them address the challenges they face as illustrated in Section 4.1.1. Support could include awareness-raising and capacity-building activities that aim to enhance sustainable and climate resilient mountain development. A focus should be given to women and the youth, given the gendered impacts of climate-related security challenges faced by mountain communities.

¹⁴ A study on this is available at: <http://hdl.handle.net/10986/34986>.

¹⁵ Demonstration sites include the Dekhkanabad, Kitab, Syrdarya, and Pop forestry organizations.

¹⁶ For more information about the UNDP Climate Promise initiative and its work in Kyrgyzstan, see <https://climatepromise.undp.org/what-we-do/where-we-work/kyrgyz-republic>.

In addition, livelihood improvement measures could focus on forestry in mountain areas – the efforts conducted under the GEF/FAO project ‘Sustainable Management of Forests in Mountain and Valley Areas in Uzbekistan’ could serve as a basis for future activities in this regard. Measures could also build on recent efforts by the BMU in promoting ecosystem-based adaptation in mountain areas through the EbA project.

Small-scale hydropower and irrigation facilities on small rivers in mountain areas could also be a way to help local communities earn additional income. In turn, such projects could play a role in alleviating issues with energy access in remote areas, while also having minimal negative environmental impacts compared to large-scale hydropower projects (Azimov and Avezova 2022). However, it is important that these small-scale facilities work within a standardized framework to monitor and assess their social and environmental impacts (ibid). A first step could be the development of common documents that cover the legalities and technicalities of such infrastructural activities in mountain areas.



Mainstreaming DRR

Joint measures and activities in high mountain areas should incorporate elements of DRR, particularly with regards to landslides, avalanches, mudflows, floods, and GLOFs. Particular attention should also be given to mining waste dumpsites, including uranium mining legacy sites, as landslides pose major health and safety threats in these areas.

Measures to mainstream DRR could build on efforts by regional and international organizations to strengthen hydro-meteorological and glacial data collection, monitoring, and exchange, such as those under the Green Central Asia initiative (see Section 4.1.2). In particular, one area that could benefit from DRR mainstreaming is infrastructure development. For example, activities could aim at installing and/or upgrading existing infrastructure to contain landslides and floods, as well as improving modulation and automatization of monitoring systems.



Inter-state co-ordination platforms on mountains

One way to foster co-operation to tackle the challenges of high mountain areas in Central Asia could be through the establishment of an inter-state, inter-ministerial body or platform dedicated to mountain areas. Such a body could bring together ministries and national agencies of agriculture, emergency services, foreign affairs, forestry, and water, as well as representatives of the private sector and civil society. Its primary function should be to enable information exchange (for example, through regular meetings and a dedicated website) between different sectors and actors in mountain areas to identify common challenges and plan for joint solutions.

Efforts to build an inter-state body or platform could build on and complement the ongoing activities within the Green Central Asia initiative in fostering regional co-ordination and co-operation on glacial monitoring (GIZ 2022a). Moreover, existing experiences to improve co-operation in the region, such as that of the Chu-Talas Commission¹⁷ between Kazakhstan and Kyrgyzstan, and the International Fund for Saving the Aral Sea (IFAS), could serve as examples of how such platform could function.



Data harmonization on mountains

There is also a need to harmonize scientific research and data on mountain-related topics, such as on temperature projections, weather forecasts, and food security impacts on mountain communities. The ongoing efforts of the Green Central Asia initiative in fostering regional co-ordination and co-operation on glacial monitoring and joint scientific activities could serve as an important example of how data harmonization can be expanded

¹⁷ The Chu-Talas Commission was established in 2006 to provide for the efficient allocation of water resources in the Chu and Talas river basins between Kazakhstan and Kyrgyzstan. For an overview of past projects and achievements in the Chu and Talas River Basins, see <https://unece.org/environment-policy/water/areas-work-convention/transboundary-cooperation-chu-and-talas-river-basin>.

to other mountain-related topics (GIZ 2022a). Moreover, the experiences of the Chu and Talas River Basin could be looked at. Efforts to harmonize mountain-related data could also be conducted in close collaboration with universities.



4.2 Densely populated areas (Ferghana valley)

This hotspot includes areas with high population densities in the Ferghana valley, large irrigated oases along the Amu Darya and Syr Darya Rivers (such as the delta shared by Turkmenistan and Uzbekistan, and the Kashkadarya oasis, located in Uzbekistan but heavily dependent on water from Turkmenistan), and piedmont metropolitan areas throughout Central Asia where there are relatively scarce water and land resources shared across borders. These areas have been partly affected by tensions over trade and access to roads, pastures, land, and water. Instability and security risks could intensify if livelihoods, water, energy and food insecurities increase due to climate change (Novikov and Kelly 2017).

In the consultation process, the Ferghana valley, shared by Kyrgyzstan, Tajikistan and Uzbekistan, emerged as a particularly significant hotspot, along with topical issues related to livelihood risks, gender, and inclusivity of civil society groups.

4.2.1 Challenges

Vulnerable livelihoods and disaster risks

Livelihoods in the Ferghana valley are traditionally highly dependent on irrigated agriculture, particularly of climate-sensitive crops such as cotton and wheat, as well as on animal husbandry (UNDP 2021a). A large share of the Ferghana valley's population is therefore vulnerable to the impacts of climate change on water resources, the risks of which are compounded by inefficient irrigation and fragmented cross-border water use (UNDP 2021a).

Consequently, the risks on vulnerable livelihoods can worsen poverty rates in the Ferghana valley, which are especially high in remote areas where many communities fall outside of social safety nets (UNDP 2021a). The high dependence on agriculture and livestock activities also heightens competition over natural resources – in the past, access to and distribution of water resources and pastures have been among the various factors that have led to border incidents and tensions in the region (Mamatova 2018).

The Ferghana valley is prone to natural disasters and hazards. As much of its water resources are fed by glaciers, accelerated glacial melting can increase the short-term risk of floods, thus posing a direct risk to human safety. Floods and other natural hazards also threaten the integrity of major energy and transport-related infrastructure, particularly as the Ferghana valley is home to some of Central Asia's largest oil refineries and industries, as well as important transport networks (UNDP 2021a). Moreover, accelerated glacial melt and floods can create health risks through contamination by Soviet-era uranium tailings waste (UNDP 2021a).

Data gaps

One important issue that needs to be considered is the lack of specific data, especially on socio-economic development and demographic processes in the Ferghana valley (e.g. on inter-ethnic relations) (Nizamitdinovna 2022). Data gaps on internal displacement in the Ferghana valley, particularly on the drivers of displacement such as those associated with drought and adverse climate conditions, also need to be addressed (IDMC 2022). Such data gaps are important to fill so as to provide a more solid evidence-base for climate-related and environmental studies and planning (e.g. on emissions accounting) in this hotspot.

Gender representation in resource governance

In the Ferghana valley, there is a low level of gender representation in various governance structures for water, energy, and resource management. For example, women's participation in basin councils in the region remains low (OSCE 2022g).

Gender under-representation in governance structures is an important gap to address. As women are the primary users and managers of water and energy resources at the household level, gender mainstreaming in governance structures can help improve the effectiveness of resource management policies and reduce social imbalance and tensions in the hotspot (OSCE 2020, 2022c).

Political and security developments

Ongoing tensions, including those related to the 2022 border clashes between Kyrgyzstan and Tajikistan (Eurasianet 2022), could impede future regional co-operation opportunities to address shared climate-related security challenges in the Ferghana valley. This and similar incidents in the border areas of the Ferghana valley have also triggered waves of internal displacement. For example, clashes in April 2021 in Kyrgyzstan's Batken region and Tajikistan's Sughd region caused 56,000 internal displacements, and while those displaced have since returned home, the incident resulted in casualties and a lasting impact on mental health (IDMC 2022).

However, given that some of the historical disputes and communal tensions have been linked to resource access and use (The Third Pole 2021),¹⁸ joint activities that specifically address natural resource management could provide an entry point to foster inter-state as well as inter-community co-operation and relations. Regional co-operation on water management could, for example, have the dual benefit of mitigating climate-related impacts on water scarcity while also helping to resolve disputes and displacements (IDMC 2022).

Moreover, significant improvements in inter-state relations in the region could boost co-operation opportunities in the Ferghana valley (Zhunisbek n.d.). In particular, Kyrgyzstan and Uzbekistan have recently made progress in working together to resolve a number of long-standing bilateral challenges. For example, between November 2022 and January 2023, Kyrgyzstan and Uzbekistan reached several agreements in resolving the border delimitation process between the two countries, as well as in jointly managing water resources in the Ferghana valley (Imanaliyeva 2023; Radio Free Europe/Radio Liberty 2022b). Both countries also signed agreements that entail strengthening co-operation on customs protocols on energy, agriculture, and industry, as well as deepening dialogue among local government representatives (Imanaliyeva 2023).

Tajikistan and Uzbekistan have also made progress in demarcating the borders between the two countries. For example, in January 2023, both countries discussed joint plans to create technological demarcation maps as well as to carry out field inspections in various sections of the border (Babayeva 2023).

4.2.2 Recent initiatives and projects

Internationally funded projects

- The EU-funded project “**Climate change and resilience in Central Asia**” (2021-2024), implemented by UNDP, aims to promote stability and climate-resilient development in the Ferghana valley (CAREC n.d.c). Covering Kyrgyzstan, Tajikistan, and Uzbekistan, the project is expected to (1) enhance the knowledge base and capacities to identify and assess climate-driven resilience risks in trans-border areas, (2) provide technical assistance on the

¹⁸ For example, the violent clashes between Kyrgyzstan and Tajikistan in April 2021 near the Tajik enclave of Vorukh allegedly took place over a water distribution station.

introduction of climate fragility risks into national policies, climate change adaptation, and development strategies and plans, (3) promote regional co-operation and awareness-raising activities on climate-fragility risks; and (4) enhance early warning and prevention measures at pilot sites in the Ferghana valley (UNDP n.d.b). Among its activities in 2022, the project organized a series of workshops in Uzbekistan to enhance early warning and sustainable resource management capacities of local communities in small river basins, namely the Mailsai, Shakhimardonsay, and Padshata river basins (UNDP 2022b). The project also provides opportunities to promote regional exchange and awareness on climate resilience between the three countries that share the Ferghana valley, for example through high-level regional conferences, information meetings, and a regional knowledge management platform (UNDP 2021a).

- Under the CEPF, the project “**Conservation of Key Natural Complexes in Uzbekistan's Fergana Valley**” (2021-2023) is conducting ecosystem studies in the Ferghana valley, which will feed into efforts to improve the system of protected areas in the area (CEPF n.d.a).

4.2.3 Potential measures and activities



Socio-economic development strategy

As socio-economic development strategies specific to the Ferghana valley are currently lacking, expert support could be brought in to help fill this gap. A socio-economic development strategy for the Ferghana valley, spanning over five-year periods, could include program budgeting (i.e., how much resources and funds are allocated to different sectors), and focus on the municipal level. It could draw on the OSCE's past experiences in providing support on such processes elsewhere. The ongoing work of the EU-funded UNDP project “Climate change and resilience in Central Asia”, which focuses on providing technical assistance to introduce climate resilience into national policies and climate adaptation and development strategies in Kyrgyzstan, Tajikistan and Uzbekistan, as well as supporting the development of water policies and river basin management plans in the Ferghana valley, could also contribute to the strategy (UNDP 2021a).

Once developed, the socio-economic development strategy can provide an important basis for ongoing and future work in addressing climate-related security challenges in the Ferghana valley, especially those pertaining to climate-sensitive livelihoods and transboundary resource management.



Capacity-building and awareness-raising

Capacity-building activities could focus on the agricultural sector, for example on the use of pesticides and fertilizers. Awareness-raising activities on topics related to sustainable resource management and climate adaptation and mitigation measures are also needed, and could involve technical trainings, joint forums, and exchange visits. Experiences and best practices on such activities can be drawn from a number of projects working on water and agricultural information services. One example is the USAID project ‘Promotion of the conservation of water resources and innovative solutions on the rational use of water in the Ferghana valley’, implemented in Kyrgyzstan, Tajikistan, and Uzbekistan, which aims to promote advanced and effective water use and farming practices in rural communities in the Ferghana valley, and works closely with local NGOs, schools, and the youth (USAID 2021c). Another example is the UNDP project “Climate Resilient Livelihoods of Horticultural Producers in Fergana Valley in Uzbekistan” (2022-2023), funded by the Government of Japan and which aims to improve access to agro-meteorological information services for agricultural communities in the region (UNDP n.d.c).

Measures to build capacity and raise awareness on sustainable resource management could also include activities that build trust and social cohesion between and among local communities. Lessons can be drawn from the OSCE's work in fostering cross-border dialogue

in the Ferghana valley through various thematic projects (UNEP et al. 2005). This includes, for example, joint training and capacity-building activities on DRR for local communities and authorities in the border areas between Kyrgyzstan and Tajikistan (OSCE 2017). Synergies can be made with the work of other partner organizations in improving community security more broadly in the Ferghana valley. Saferworld has, for example, conducted community level consultations and focus group discussions, which not only helped identify security concerns of local communities, but also built trust and social connections between communities across borders (Saferworld n.d.).

It is important that capacity-building and awareness-raising activities effectively involve women and youth. This could be achieved by engaging closely with various civil society groups in the region. One example is the Youth Group on Protection of Environment (YGPE), which is actively involved in promoting environmental education and water conservation awareness through trainings and engagements with schoolchildren in the Ferghana valley (Sattorova 2022). Future capacity-building and awareness-raising activities could thus seek to extend these efforts to the broader regional level, by ensuring participation and involvement of stakeholders from each of the countries concerned.



Sectoral support

A focus on co-operation measures towards specific sectors in the Ferghana valley is needed. Given that many local communities in the area depend on cross-border trade and mobility to access economic opportunities, there is a need to provide support for border management and customs services to enable such forms of livelihood practices. Support measures could include improving border management strategies and reforming border management institutional frameworks, training structures, standard operating procedures (SOPs), information management and relevant infrastructure (IOM 2021; Mamatova 2018). This would allow communities to maintain their sources of livelihoods derived from cross-border trade and economic activities, thus improving their resilience to shocks such as those related to climate vulnerability and hazards.

Support measures could also focus on the forestry sector, in particular tugay forests which are endemic to Central Asia. Tugay forests have suffered from degradation in recent years as a result of human activities, most notably irrigation, hydroelectricity and overgrazing (Cornelis et al. 2021; FAO and UNECE 2019). Support measures could aim at conserving tugay forests and biodiversity in the Ferghana valley, which would also help safeguard the livelihoods of communities dependent on forest-related ecosystem services. Measures could build on the work of the CEPF project 'Protecting Tugay Forests and Threatened Species of the Kayrakkum Wetlands' in Tajikistan (2022-2024), which involves the youth as well as local hunters' and fishers' associations in ecosystem restoration activities such as the restoration of tugay forests and removal of silt from floodplain channels (CEPF 2022).

Support could also be provided to the health and water sectors in the Ferghana valley, for example by focusing on improving co-ordination on decision-making and monitoring processes, as well as exchanging information and experiences within and between sectors. For the health sector, experiences can be drawn from the COVID-19 pandemic, which highlighted the importance of cross-border health management through enhanced response capacity and inter-sectoral and cross-border co-operation (IOM 2021). For the water sector, lessons can be drawn from the adoption of integrated water resource management (IWRM) at the lower levels in the Ferghana valley through the SDC-funded "IWRM-Fergana" project (2001-2012).¹⁹ The project included main canal, water user associations, and farmers, and helped improve water distribution among all end users (GWP 2014; OSCE 2020).

¹⁹ For more information on the project, see http://iwrn.icwc-aral.uz/index_en.htm.

In all sectoral support measures, it is essential for civil society groups and local communities to be involved in decision-making processes. The establishment of forums for vulnerable groups is one such example in strengthening grassroots involvement and inclusivity. By engaging more strongly with civil society groups, sectoral support measures can have the dual benefit of addressing sector-related issues and strengthening cross-border inter-community relations.



4.3 Amu Darya River Basin

From a hydrological point of view, the catchment area of the Amu Darya River Basin is shared by Afghanistan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan (although socio-economic and geographic definitions of the basin tend to vary depending on the source). These countries are highly dependent on the Amu Darya River Basin's water resources for irrigation and hydropower. At the same time, disagreements on water usage exist, and the river basin is suffering from ecosystem degradation, particularly in the delta area, which is further exacerbated by climate change (Novikov and Kelly 2017).

In the consultation process, the Amu Darya River Basin emerged as one of the priority hotspots.

4.3.1 Challenges

Sedimentation

Among the various forms of environmental degradation faced by the Amu Darya River Basin, sedimentation is a particular challenge affecting infrastructure across the river basin. Sedimentation is an issue that stems from high sediment formation and silt loading of rivers due to increased soil erosion. In turn, high sediment loads can have significant impacts on the lifetime and effectiveness of reservoirs and irrigation canals as well as the operation of hydroelectric turbines (ENVSEC 2011).

It is likely that climate change will accelerate sedimentation problems, through for example, changes in rainfall patterns (Honek et al. 2020). A case in point is the Tyamuyun Hydroelectric Complex, a water-energy facility located along the Amu Darya River in Turkmenistan which supplies over five million people with drinking water, electricity, and irrigation water (Kushanova 2022). After four decades of operation, one of its reservoirs, the Ruslovoe reservoir, has lost nearly 70% of its capacity due to sedimentation, and by 2040 it is projected to be completely silted under a business-as-usual scenario (ibid).

Ongoing water disputes

In the Amu Darya River Basin, there are ongoing disputes regarding hydropower energy production and water use. The Interstate Commission on Water Co-ordination (ICWC) plays an important role to address disputes. Established in 1992, the ICWC is a regional body of the IFAS that works on joint solutions for issues related to the management, rational use, and protection of water resources in the Aral Sea basin (IFAS n.d.). In particular, it makes binding decisions related to water allocation and use (ICWC n.d.b), and implements measures and procedures on "equitable and reasonable water distribution" through its two executive bodies – the Amu Darya and Syr Darya basin wide organizations (BWOs) (ICWC n.d.a).²⁰

While all five countries in Central Asia are members of the ICWC, inter-state disputes over water use and distribution still persist, highlighting the need for further work in improving transboundary water management, allocation, and use (Novikov and Kelly 2017; Peña-Ramos et al. 2021).

²⁰ The Amu Darya BWO is directly subordinating to the ICWC and is in charge of operational water management in accordance with limits approved by ICWC member states (ICWC n.d.).

Focus on the smaller scale

Given the significant size of the Amu Darya River Basin, it would be advisable for future joint activities to be narrowed down to a smaller scale, for example to the level of small sub-basin councils. This would allow to better focus and address the diverse range of interests and needs of local communities and water users, thus improving the representativeness, effectiveness, and flexibility of water management-related activities (CAREC 2020b). Moreover, funding and support from international organizations often overlook smaller transboundary basins, hence the need to give more attention to them. At the same time, existing legal and policy frameworks would need to be revisited to allow adequate recognition, institutionalization and empowerment of small-scale basin council schemes (CAREC 2020b).

4.3.2 Recent initiatives and projects

Internationally funded projects

- Within the framework of the EU-funded **Central Asia Nexus Dialogue Project**, a transboundary demonstration project is being carried out at the Tyamuyun Hydroelectric Complex along the Amu Darya River in Turkmenistan. The project has brought together experts from both Turkmenistan and Uzbekistan as well as international partners to develop joint technical solutions and investment opportunities to address sedimentation issues in one of the Complex's reservoirs (Kushanova 2022).
- The **Blue Peace Central Asia project “Strengthening of the Regional Institutional Framework for Integrated Water Resources Management in Central Asia”** (2014-2023), funded by the SDC, aims to facilitate transboundary water resource co-operation across the region through the establishment of a High-Level Dialogue Platform, the promotion of sustainable water practices (including the adoption of smart water practices at selected transboundary water basins), as well as capacity-building for stakeholders in the water sector (SDC n.d.a).
- USAID has a number of projects focusing on regional co-operation on transboundary water resource management in Central Asia. The **Regional Water and Vulnerable Environment Activity** (2020-2025) aims to “strengthen regional capacity to manage shared water resources and mitigate environmental risks in the Syr Darya and Amu Darya River Basins” (USAID 2021b). It has, among its other achievements, supported the approval of small basin councils at the Padshaata and Isfara rivers between Tajikistan and Uzbekistan, as well as the establishment of a Regional Coordination Committee (RCC) to foster regional dialogue and co-operation for effective and sustainable transboundary water resources management (ibid).
- The **RESILAND CA+ pillar of the World Bank-funded CLIENT Program** includes a number of projects that focus on hydropower development in selected countries in Central Asia. One project evaluates the economic costs of environmental degradation associated with hydroelectric dams along the Vaksh River in Tajikistan, while another evaluates potential measures for integrated landscape restoration and catchment area management to reduce sediment inflows into the Toktogul dam and reservoir in Kyrgyzstan (World Bank 2021).
- The World Bank’s **Central Asia Water and Energy Program (CAWEP)** aims to “strengthen the enabling environment to promote energy and water security” across Central Asia, with a focus on regional co-operation between the beneficiary countries. In its third financing phase (2018-2023), the program is financed by the EU, Switzerland, and the United Kingdom (SDC n.d.b; World Bank 2022).

4.3.3 Potential measures and activities



Sedimentation

Joint activities to address sedimentation in the Amu Darya River Basin are needed, given its growing impact on water supply, quantity, and the functioning of reservoirs and water infrastructure (Ikramova 2016). These could include:

- Conducting joint research to understand the root causes of sedimentation. Such joint research could build on a number of studies that have explored sediment loads and movements specifically, for instance, in and around the Tyamuyun Hydroelectric Complex (Ikramova 2016; Majidov and Ikramov 2021).
- Developing biological approaches and technologies to tackle sedimentation and waste issues (e.g. using aquatic animals to reduce sludging).
- Developing specific measures to reduce sedimentation through, for example, recycling of waste water from factories located on river banks, as well as joint cleaning activities of river channels from sediments and pollution (particularly relevant for Turkmenistan and Uzbekistan).
- Utilizing silt and sludge for other (commercial) uses for small businesses, which could create additional jobs – in other words, view sedimentation as a benefit rather than an issue.

Experiences and best practices can be drawn from the EU-funded Central Asia Nexus Dialogue Project. The project has, for example, identified technical solutions for cleaning and recycling sediments in the Ruslovoe reservoir, and is envisaged to also include cost-benefit analyses and investment proposals for technical solutions (Kushanova 2022).



Operational agreements

It would be important to establish operational agreements on water distribution, standards for constructions along river banks, and integrated automatic water control systems. Additionally, agreements should be made on a joint water quality monitoring system, including as a way to check the activities of companies located along river banks. Agreements could also entail establishing intergovernmental tools or mechanisms to create an expert platform so that all suggestions can be evaluated and implemented. Emphasis should be given to the smaller sub-basin level.

The existing co-operation structures established by the ICWC and its BWO could support this process. Moreover, recent efforts by UNECE and GIZ in fostering information-sharing and inter-governmental exchange on best practices in monitoring and assessing transboundary waters could serve as the basis to inform future developments of such agreements (UNECE 2023).



Awareness-raising activities

Local populations in the Amu Darya River Basin need to be informed on the importance of rational water use, for example through campaigns and tours involving students and young professionals.

As a reference point from which to build on, awareness-raising activities could look at USAID's efforts in both the Amu Darya and Syr Darya river basins in building human capital and strengthening education institutions on IWRM. For example, under the Regional Water and Vulnerable Environment Activity, USAID is organizing a series of lectures for water specialists, academia, and youth network members from across Central Asia to enhance their understanding of IWRM and the water-energy-food-environment nexus (USAID 2021b). Efforts by youth organizations such as YGPE in promoting sustainable water use among the youth and schoolchildren in the Ferghana valley could also be looked into (Sattorova 2022).



Early warning systems

Due to the high and increasing risk of natural hazards in the Amu Darya River Basin, such as droughts, avalanches and floods related to glacier lake outbursts, rapid snow melting and torrential rain (ENVSEC 2011), the establishment of early warning systems is important to provide emergency forecasts and alert local basin populations in advance of changes in river flows and other hazards.

Lessons can be drawn, for example, from ongoing and recently completed projects that focus on DRR in specific river basins within the wider Amu Darya River Basin. One example is the project “Building Climate Resilience in the Pyanj River Basin”, funded by the Asian Development Bank (ADB). Among its four outputs, the project aims to upgrade flood protection infrastructure in the Pyanj River Basin (a tributary of the Amu Darya River Basin), including establishing early warning communication systems and DRR management committees in the basin (ADB n.d.).



4.4 Central Asia breadbasket

This hotspot includes the major grain-producing areas of northern Kazakhstan, and is vulnerable to changes in rainfall patterns and water cycle disruption. Although its security risks are relatively low in the national context due to the area’s stable economic policies, it is considered a regional hotspot owing to the risks of grain price spikes and crop deficits, which threaten food security at the regional level (Novikov and Kelly 2017).

This was considered as a priority especially in the context of Kazakhstan, given that it is here that grain production is primarily located. Nevertheless, the hotspot also emerged as a priority for the other countries in Central Asia which are major agricultural consumers. For example, the impacts of climate change in breadbasket regions would have a cascading negative impact on Uzbekistan’s food security through its influence on prices.

4.4.1 Challenges

Declining agricultural production

In the past, adverse climate events have severely impacted agricultural and livestock production across Central Asia. Droughts in 2021 caused mass livestock deaths in Kazakhstan, and affected livestock feed production in Turkmenistan due to low harvests in pasture fields. In Uzbekistan, the 2021 droughts led to losses in harvest and higher prices for seasonal vegetables (Gafurov et al. 2022).

Agricultural droughts are projected to worsen in southern Central Asia, with direct impacts on future crop and livestock productivity (Jiang and Zhou 2023). Current projections already indicate a decline in the yields of certain crops in Kazakhstan under changing temperature and precipitation patterns. For example, increased temperatures could adversely impact the yield of potatoes and spring crops such as wheat and barley in Kazakhstan, with wheat being one of the country’s most important agricultural exports and potatoes being an important food source for domestic consumption (Islami et al. 2020).

Consumer considerations

There is a high level of intra-regional trade of agricultural and food products in Central Asia. In the first quarter of 2022, more than half of Kazakhstan's wheat production were exported to other countries in Central Asia, largely to Uzbekistan (EnergyProm 2022). The high dependency on trade thus exposes consumers in importing countries in Central Asia to fluctuations and spikes in agricultural and food prices. It follows that consumers are vulnerable to events and developments in breadbasket regions that could affect prices. An example can be seen from the war against Ukraine. The economic sanctions imposed by members of the international community as a response to the war resulted in the banning of grain exports by the Russian Federation, which resulted in soaring food staple prices across the region (Talant 2022).

Hence, there is a need for countries in Central Asia to develop common approaches to prepare for and respond to global shocks in breadbasket regions and the corresponding changes in prices. To achieve this, it is important for countries of the region to have a shared understanding of how consumers and domestic agricultural markets may react to agricultural and food price fluctuations.

Impacts of agricultural development

For agricultural producers in Central Asia, the potential impacts of agricultural development for any future activities need to be borne in mind. As an example, the Government of Kazakhstan plans to develop sugar beet production in the Jambyl region, which is part of the Chu and Talas River Basins. This is part of the government's plan to ramp up domestic sugar production in light of recent events that have caused a national shortage of sugar supply, namely the war against Ukraine and the subsequent sugar export ban from the Russian Federation (Lillis 2022). As sugar beet is a water-intensive crop, the potential consequences of its expanded cultivation for the limited water resources of the Chu and Talas River Basins need to be taken into consideration.

In Uzbekistan, the government is implementing its 'Concept of water sector development in the Republic of Uzbekistan for 2020-2030',²¹ which includes plans to develop water-saving technologies on at least 50% of the country's irrigated land. The plan, which involves the expansion of drip irrigation systems, is part of the government's effort to address water scarcity issues faced by the agricultural sector (CGIAR 2020; Suyunov 2023). Despite the general consensus on the need to improve water use efficiency in the country, there is also growing evidence of potential rebound effects arising from the roll out of water-saving technologies (Hamidov et al. 2022). The social impact of and behavioral changes resulting from water-saving technologies thus need to be considered. Similarly, access to water-saving technologies for all population groups is crucial, particularly for women who often face difficulties in gaining access to new agricultural technologies (Kim 2019).

4.4.2 Recent initiatives and projects

National and regional initiatives

- In February 2023, Uzbekistan in partnership with FAO organized the 'Sixth Meeting of the Ministers of Agriculture in Central Asia', which aimed to discuss and share ideas and best practices for sustainable pathways to increase agricultural productivity (FAO 2023). In particular, participants of the meeting exchanged information on public investment approaches to boost agricultural productivity, which include investments in infrastructure (roads, irrigation), agricultural research, tax schemes, and subsidies (Tashkent Times 2023).

²¹ The 'Concept of water sector development in the Republic of Uzbekistan for 2020-2030' can be found here: <https://www.greencentralasia.org/en/doc/1546094482/1629177378>.

- In March 2023, Turkmenistan in partnership with FAO organized an international conference titled “Partnership in the field of food security in the face of climate change”. The conference provided a platform for representatives of the governments of the countries in Central Asia and regional and international organizations to discuss climate-related impacts on agricultural systems and food security in the region. Country representatives also shared an overview of their respective policies and measures to address climate-related impacts on food systems, and discussed co-operation opportunities to address them (MFA, Turkmenistan 2023a). Turkmenistan also discussed other co-operation opportunities with FAO, including for example jointly developing a digital land cadaster and resource management in arid and saline agricultural lands (MFA, Turkmenistan 2023b; TDH 2023).

Internationally funded projects

- The project “**Regional Programme for Integrative and Climate-sensitive Land Use in Central Asia**” (2021-2024), funded by the German Federal Ministry for Economic Cooperation and Development (BMZ), aims to improve forest and pasture management in the region. Activities include providing support for revising and implementing policies, strategies, and laws on integrative land use, as well as facilitating exchange of experiences and best practices on relevant topics (GIZ 2022b).
- The project “**Technology-based Adaptation to Climate Change in Rural Areas of Tajikistan and Kyrgyzstan**” (2019-2023), funded by BMZ, aims to support climate adaptation and risk analyses in rural areas through the use of state-of-the-art information technology and geodata management. Climate adaptation measures are targeted towards erosion control, pasture management, and waste (GIZ 2022d).
- The **RESILAND CA+ pillar of the World Bank-funded CLIENT Program** includes a number of projects working on landscape restoration. The Kazakhstan Resilient Landscapes Restoration Project, for example, aims to address land degradation, desertification, and deforestation in dryland ecosystems in Kazakhstan through sustainable forest management, afforestation, and agroforestry activities (World Bank 2021).
- The **FAO** has a number of projects that address agricultural productivity on drought-prone and salt-affected landscapes in Central Asia. For example, a GEF-funded FAO project focused on the application of various adaptation and mitigation measures using drought mitigation and salinity management technologies in Turkmenistan. In Kazakhstan, a GCF-funded FAO project produced up-to-date soil salinity maps which has helped farmers, scientists, and decision-makers understand the country’s state of natural resources and environment (FAO 2022).
- The project “**Building Climate Resilience in Agriculture and Water Sectors of Rural Tajikistan (BCRinAW)**” (2019-2022), implemented by UNDP, aimed to scale up adaptation practices and technologies in rural communities in Tajikistan, including in mountain areas. The project also facilitated access of local farming communities, including those in the Zeravshan Valley, to funding opportunities through green credit programs (UNDP 2021c).

4.4.3 Potential measures and activities



More regional market research

In general, more joint market research is needed to understand agricultural demand and supply patterns, to study the market of distribution and allocation, and to identify countries' specific agricultural needs. Such research could complement and fill the gap in the literature on the agricultural impacts of climate change in Central Asia, which to date has largely focused on crop yields, irrigation systems, land degradation, and pastoralism (Vakulchuk et al. 2022). Moreover, joint efforts should be dedicated to conduct agricultural market research as an integral element of agricultural development plans, such as the plan to develop sugar beet production in the Jambyl region of Kazakhstan, as well as plans to expand water-saving technologies in Uzbekistan.

Regional market research can build on the efforts by the FAO in fostering political dialogues and a shared understanding among governments in Central Asia of agricultural development plans and financing strategies. This includes, for example, high-level meetings organized with Uzbekistan and Turkmenistan in February and March 2023 on topics related to agricultural investment and evidence-based approaches to address food insecurity (see Section 4.4.2).



Climate-resilient, organic agriculture

One measure to address climate risks in this hotspot could consist in jointly developing sustainable agricultural methods that include agricultural zoning approaches (particularly with regards to water management), organic farming, green agronomy and technology, pesticide regulations, re-cultivation of abandoned agricultural lands, and the introduction of new cultures. Such joint efforts could help address the general lack of legislative and regulatory frameworks across all countries in Central Asia that support the development of organic agriculture and that are aligned with international standards and markets (FAO 2020). These measures should be evidence-based, and could be supported by the development of a platform to enable information exchange on best practices in climate-resilient organic agriculture.



Early warning systems

Early warning systems and agrometeorological approaches could be integrated into agricultural production systems to minimize risks and improve agricultural productivity, particularly with regards to droughts. A case in point is presented by Uzbekistan's efforts in using early warning systems to warn farmers of droughts through the GCF-UNDP project "Enhancing Multi-Hazard Early Warning System to Increase Resilience of Uzbekistan Communities to Climate Change Induced Hazards" (2021-2027) – an experience that could be shared with other countries in the region (UNDP n.d.d). Lessons could also be drawn from the UNDP project "Climate Resilient Livelihoods of Horticultural Producers in Fergana Valley in Uzbekistan" (2022-2023), funded by the Government of Japan, particularly its efforts in improving access to agro-meteorological information services for agricultural communities in the Ferghana valley (UNDP n.d.c). To complement these efforts, a farmer support system could be established, focusing on providing farmers with fuel and crop procurement subsidies and other economic support tools to improve their general well-being. Additionally, a platform for information exchange on experiences and best practices in developing and integrating early warning systems could be developed.

5 Conclusions

Climate change can impact security in a number of ways in Central Asia. These impacts affect shared natural resources, thereby exacerbating the risks for human security, livelihoods, and economic development. Importantly, these impacts also have a gendered and inter-generational aspect, considering the disproportionate exposure of vulnerable groups. However, as these risks are shared across the region, they also provide entry points for co-operation.

The regional consultation process that has been conducted in the context of this project has shown that there is great interest and potential for transboundary co-operation to address climate-related security risks in Central Asia. In this context, four regional/transboundary hotspots where climate and security risks intersect have been prioritized, namely 'high mountain areas', 'densely populated areas (Ferghana valley)', 'Amu Darya River Basin', and 'Central Asia breadbasket.'

For each hotspot, the regional consultation process revealed a number of climate-related security challenges, along with recent initiatives and projects at the national and regional levels that address various aspects related to climate change. Considering that the range of projects and initiatives is broad, the consultation process also identified several potential measures and activities where regional co-operation can be further strengthened to address shared security risks stemming from climate change.



In **high mountain areas**, potential measures could focus on supporting livelihoods that are dependent on agricultural, pastoral, and forestry-related activities, as these sectors are both highly sensitive to climate change impacts and important for many rural livelihoods in mountain areas. Support could include awareness-raising and capacity-building activities that aim to enhance sustainable and climate resilient mountain development, while also focusing on women and the youth, given the gendered impacts of climate-related security challenges faced by mountain communities. Measures to mainstream DRR are also needed, given the hazards that could arise from accelerated glacial melting. Efforts to harmonize scientific research and data on mountain-related topics are also warranted, as data availability in mountain areas remains limited. To foster co-operation to tackle the challenges in mountain areas, inter-state co-ordination platforms could also be developed and supported.



For **densely populated areas**, in particular the Ferghana valley, there is a need to develop a socio-economic development strategy, which would provide an important basis for ongoing and future work in addressing climate-related security challenges in the hotspot. There is also a need for more capacity-building and awareness-raising activities on sustainable resource management and climate adaptation and mitigation – moreover, such activities should engage more closely with women and youth. As communities and sectors in the Ferghana valley are highly inter-connected, potential measures could also aim at providing more sectoral support, particularly with regards to the border management, forestry, health, and water sectors.



With regards to the **Amu Darya River Basin**, potential measures and activities could focus on jointly addressing sedimentation issues across the basin, given its growing impact on water supply, quantity, and infrastructure. Activities could also focus on supporting the establishment of agreements on water distribution, monitoring, and infrastructural development, with a particular emphasis on the smaller sub-basin level. More broadly, there is a need for more awareness-raising among local populations in the river basin on sustainable water use, as well as developing early warning systems to better prepare basin populations for potential hazards.



For the **Central Asia breadbasket**, more regional market research is needed. This is because of the high level of intra-regional agricultural and food trade in Central Asia, and the potential impacts of agricultural developments in breadbasket regions to consumers. To address the impacts of climate change on productivity, potential measures could also consider jointly developing more climate-resilient, organic, and sustainable agricultural methods across the region's agricultural sectors. In addition, more support could be provided for early warning systems and agrometeorological approaches within the region's agricultural production systems.

All in all, the findings of this report will inform the next phase of the project, which will involve developing a scoping study, followed by a joint co-operation strategy and implementation plan for a selected topic or at the hotspot, all of which will be participatory in nature. The joint co-operation strategy and implementation plan will serve to propose a shared vision as well as to narrow down and refine co-operation activities. At a later stage, a pilot project will be implemented together with local partners and actors.

In the next phases of the project, the scope of stakeholders involved will be broadened to include other experts and relevant national and local governmental stakeholders, civil society, academia, private sector, as well as regional and international stakeholders. This will not only leverage existing knowledge and expertise, but also strengthen ownership of the proposed measures and enhance synergies with other regional initiatives.

6 Annex: Consultation process and methodology

6.1 Initial selection of topics and hotspots

The following list outlines the eleven regional/transboundary hotspots that were identified in the 2017 OSCE-led study, which served as the basis for the Regional Consultation Workshop on Climate Change and Security in Central Asia on 13-14 July 2022 in Almaty.

- **Densely populated areas:** This includes areas with high population densities in the Ferghana valley (shared by Kyrgyzstan, Tajikistan, and Uzbekistan), large irrigated oases along the Amu Darya and Syr Darya Rivers (such as the delta shared by Turkmenistan and Uzbekistan, and the Kashkadarya oasis, located in Uzbekistan but is heavily dependent on water from Turkmenistan), and piedmont metropolitan areas throughout Central Asia where there are relatively scarce water and land resources shared across borders. These areas have been partly affected by tensions over trade and access to roads, pastures, land, and water. Instability and security risks could intensify if livelihoods, water, energy and food insecurities increase due to climate change.
- **Remote areas on the Afghan border:** Both the Tajik-Afghan and Turkmen-Afghan borders have been identified as hotspots due to the combination of extreme weather events intensified by climate change as well as instability and security risks posed by the situation in Afghanistan.
- **High mountain areas:** Climate-related security risks are considered high in mountain areas, including those in Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan, as well as in the border areas of Afghanistan and China. This is due to a number of factors such as the high levels of poverty and isolation endured by mountain communities, frequent naturally induced disasters, visible climate change effects (e.g., variability in rainfall and snow), sporadic discontent and unrest, and the presence of mining and waste storage sites in some areas. Adding to these risks are projections of an increase in glacial and permafrost melting, which could further disrupt hydrological cycles in mountain areas.
- **Central Asia breadbasket:** This hotspot includes the major grain-producing areas of northern Kazakhstan, and is vulnerable to changes in rainfall patterns and water cycle disruption. Although its security risks are relatively low in the national context due to the area's stable economic policies, it is considered a regional hotspot owing to the risks of grain price spikes and crop deficits which threaten food security at the regional level.
- **The Amu Darya River Basin:** While socio-economic and geographic definitions vary depending on the source, from a hydrological point of view, the catchment area of the river basin is shared by Afghanistan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan. There is a high dependency on the river basin's water resources for irrigation and hydropower. At the same time, disagreements on water usage exist, and the river basin is suffering from ecosystem degradation, particularly in the delta area which is further exacerbated by climate change.
- **The Syr Darya River Basin:** The river basin is shared by Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan. Water use in the river basin is highly regulated for irrigation and hydropower purposes, and is exposed to risks from toxic and radioactive waste. Its current water allocation regime might come under threat from changing water availability due to climate change.

- **The Zarafshan River Basin:** Shared by Tajikistan and Uzbekistan, the river basin suffers the risk of upstream pollution due to growing industrial and mining activities, as well as downstream pollution stemming from agriculture. Water insecurity is further threatened by climate change impacts.
- **The Ili River and Balkhash Lake:** Located in south-eastern Kazakhstan, Lake Balkhash is the largest lake in Central Asia and is fed largely by the Ili River which originates in China. The lake's fragile ecological balance is threatened by a number of factors related to human and economic activities as well as climate change impacts, all of which threaten the livelihoods and water security of the basin's population.
- **The Chu and Talas River Basins:** Shared by Kazakhstan and Kyrgyzstan, both river basins constitute an important economic area for agriculture, hydropower, and mining, along with a growing population. While climate change may decrease water availability, there are efficient co-operation mechanisms in place that could provide the basis for joint solutions to minimize security risks. One example is the Intergovernmental Chu-Talas Water Commission, established in 2006 with support of the OSCE, UNECE, and UN Economic and Social Commission for Asia and the Pacific. The Commission promotes bilateral co-operation between Kazakhstan and Kyrgyzstan, and aims to improve access to information by involving stakeholders in the process of river management and by promoting activities for the protection of water ecosystems.
- **The Caspian Sea and coastline:** Bordered by Kazakhstan and Turkmenistan in Central Asia, as well as by Azerbaijan, Iran, and the Russian Federation, this hotspot is economically important due to its rich oil and gas resources but is vulnerable to water level fluctuations and climate change impacts. Specifically, climate change can affect the area's marine biodiversity, economic activity, and livelihood security.
- **The Aral Sea and coastline:** With its coastline spanning both Kazakhstan and Uzbekistan, this hotspot has suffered from significant economic, environmental and social challenges due to the impacts of human activities over the past five decades. While the situation in the northern part has improved, the Aral Sea remains vulnerable to anthropogenic pressures. Climate change impacts such as higher temperatures and lower run-off could worsen water security and land degradation, while coastal areas are at risk to extreme weather events such as droughts and storms.

6.2 Results of the Regional Consultation Workshop on Climate Change and Security in Central Asia, Almaty, Kazakhstan (13-14 July 2022)

6.2.1 Initial discussions and hotspot mapping

During the workshop's initial round of discussion on the current state of affairs regarding climate change adaptation in Central Asia, participants outlined their respective organization/institute's ongoing work on the topic. The discussions saw input from international and regional organizations, financial institutions, academia, and civil society organizations, include those representing the youth.

In the subsequent round of discussions, participants were divided into groups based on the countries in which they were working. The purpose of this exercise was to provide an update on the hotspots that were identified in the 2017 OSCE-led study, and to discuss their relevance as well as other topics and potential hotspots that should be considered. The results of the discussions are summarized below:

- In general, participants agreed with the relevance and data provided in the 2017 OSCE-led study.
- Some participants mentioned that the ‘Chu and Talas River Basins’ should no longer be considered as a hotspot. This is because the Intergovernmental Chu-Talas Water Commission has, since the publication of the 2017 OSCE-led study, made progress in addressing water-related issues, and in advancing co-operation in the river basins.²² Nevertheless, participants re-iterated that the impacts of climate change on the Chu and Talas River Basins should not be completely dismissed and should still be given adequate attention.
- Participants noted that there have already been a number of studies conducted in the ‘Chu and Talas River Basins’ as well as in the ‘Ili River and Balkhash Lake’, but there is a need to do more research on agricultural productivity, particularly for wheat and for the agricultural regions of northern Kazakhstan.
- With regards to hotspots involving river basins and large water bodies (e.g. Amu Darya River Basin, Syr Darya River Basin, and Caspian Sea and coastline), participants suggested that future projects and activities should be narrowed down to the smaller scale, for example, to the level of small transboundary basins.
- Regarding the hotspot ‘Aral Sea and coastline’, participants acknowledged the breadth of work that has already been conducted to restore the Aral Sea’s environment. Participants from Uzbekistan, for example, mentioned an afforestation program that involves planting one billion trees and shrubs across the country, with the aim of improving air and soil quality, increase climate resilience, and address desertification and dust storms (Dimovska 2022). Nonetheless, participants cautioned that the Aral Sea remains vulnerable to the impacts of climate change.
- In relation to the hotspot ‘Remote areas on the Afghan border’, participants from Uzbekistan suggested that the Afghan-Uzbek border should be included as part of the hotspot, given the current political situation in Afghanistan, as well as the potential security risks that could arise from a possible surge in water demand in the region. The relevance of the Afghan-Uzbek border as a hotspot may also have increased with worsening climate change impacts such as droughts and heatwaves.
- Several participants also highlighted the issue of sedimentation and siltation, which are issues that can affect all river basins in the region, particularly the Amu Darya River Basin. Sedimentation can disrupt the operations of water infrastructure such as hydropower stations. Subsequently, this would compromise various aspects of security, including for water, energy, and food.

6.2.2 Prioritization of hotspots and topics

Following the initial rounds of discussions, participants were then requested to vote for the hotspots and topics they thought should be prioritized as part of future joint projects and activities in Central Asia, and where they saw the biggest gaps in terms of action. From this voting exercise, ‘high mountain areas’ emerged as the top priority, followed by ‘Amu Darya River Basin’, ‘Central Asia breadbasket’, and ‘Densely populated areas (Ferghana valley)’ (for further details, see Section 3).

²² For an overview of past projects and achievements in the Chu and Talas River Basins, see <https://unece.org/environment-policy/water/areas-work-convention/transboundary-cooperation-chu-and-talas-river-basin>.

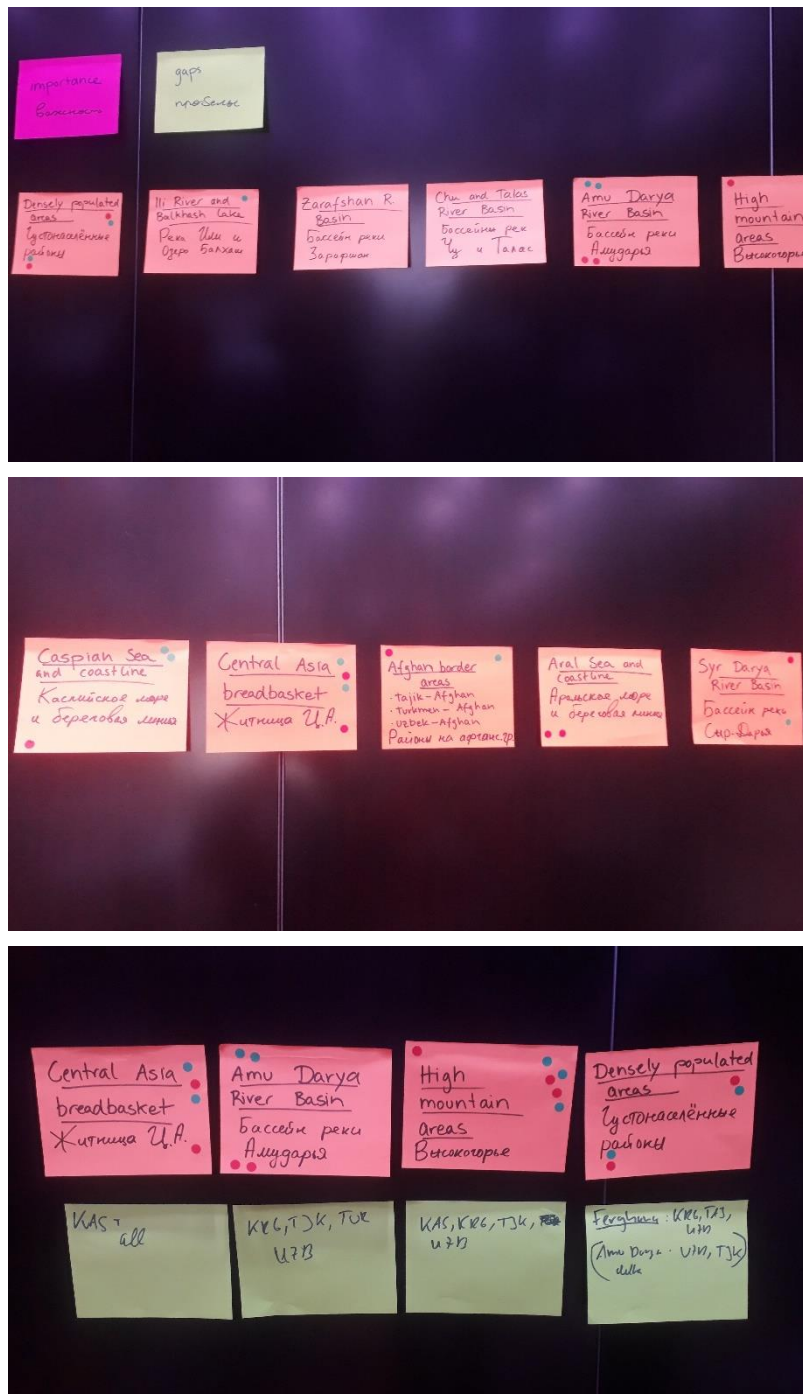


Figure 3: Results of the workshop voting exercise in which participants were requested to prioritize hotspots and topics.

In addition to hotspots, a number of cross-cutting topics also emerged from the discussions. These are listed below, in alphabetical order unless stated otherwise:

- **Drinking water** (highest priority): Participants noted that this topic, particularly with regards to the quality of water supplies, was not covered in sufficient depth in any of the regional hotspots identified in the 2017 OSCE-led study, and that it should be given more priority, given its importance in certain regions, such as in northern Kazakhstan.

- **Dust storms:** Participants described how this topic poses a risk for many important economic sectors, such as for crop production, energy, and water supply, and as such, should be given more attention. Participants from Uzbekistan, for example, mentioned a recent dust storm incident that occurred in Tashkent in November 2021 – the worst since the past century due to abnormal weather conditions (Dimovska 2022).
- **Glacial melting:** Participants emphasized the importance of glacial melting, and in particular the need to address and/or consider its impacts, as part of any future co-operation opportunities in the region, particularly in mountain areas. This is because of its relevance with regards to current and future water availability for agriculture, as well as the flood hazards that could arise due to increased glacial melting.
- **Groundwater:** Participants remarked that this topic was largely missing in the hotspots covered in the 2017 OSCE-led study, and that more attention should be given to this very important water resource. This is because of its transboundary nature (for example, in southern Kazakhstan where it is shared with Uzbekistan), as well as its importance for providing drinking water and ensuring water quality, as well as its use in agriculture.
- **New data on temperatures:** Participants mentioned the need for more clarity and co-ordination in temperature projections, which would help set the criteria for projecting climate hazards and defining what is meant by a ‘hotspot’. More scientific research on temperature projections would also help in projecting agricultural yields and thereby be useful for addressing food insecurity.
- **Regional markets:** This is a topic that participants agreed is important as part of any future co-operation activity, particularly for the hotspot ‘Central Asia breadbasket’. In particular, market considerations are important for understanding demand and supply trends, as well as distribution and allocation of resources.

6.2.3 Collecting ideas for entry points for co-operation

In mixed groups, participants discussed possible joint measures and activities that could provide important entry points for future co-operation, based on the four hotspots that were prioritized previously. The discussions were centered on the question ‘what would be feasible and impactful transboundary co-operation opportunities to address climate-related security risks?’ Results of the discussions are integrated into Section 3.

To round up the discussions, a final intervention was provided by a representative of the CESDRR. The intervention provided an opportunity to share and discuss CESDRR’s work in improving early warning systems in Central Asia based on the Sendai Framework, as well as its awareness-raising activities and initiatives involving regional co-operation on the topic.

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