

MOUNTAIN ADAPTATION OUTLOOK SERIES

Outlook on climate change adaptation in the Central Asian mountains

EXECUTIVE SUMMARY

This Outlook has been developed by the United Nations Environment Programme (UN Environment) in the context of the inter-regional project “Climate change action in developing countries with fragile mountainous ecosystems from a sub-regional perspective” that is financially co-supported by the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW).

This Outlook builds on the main findings and results available through conducted projects and is based on available literature and latest national and regional documents, such as national communications to the United Nations Framework Convention on Climate Change (UNFCCC). It is based on the review of existing literature and information received during consultations in Almaty, Kazakhstan, 2–3 September 2015, and 19-20 December 2016 with the involvement of designated governmental experts from the Central Asia countries and representatives of the international organisations.

The Outlook has also been supported by the Interstate Commission on Sustainable Development (ICSD) through its Decision 6, April 2014, Dushanbe, Tajikistan; Decision 7, June 2015, Ashgabat, Turkmenistan; Decision 2, May 2016, Ashgabat, Turkmenistan

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Front cover photo: Fedchenko glacier, Tajikistan
Back cover photo: Tajikistan

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Foreword

The five states of Central Asia are already being hit by climate change. Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan are experiencing detrimental changes in water distribution, extreme weather, natural hazards, and unique mountain biodiversity. This report highlights the risks to the region's security and economy and recommends practical ways to increase resilience using ecosystem-based adaptation measures.

Mountain ecosystems enrich the lives of over half the world's population. They provide essential goods and services like water, energy and agriculture. However, rising temperatures and changing weather patterns affect forests, grasslands and lakes. Pollution from mining and agriculture erode their ability to cope with the changes. Dependent populations are increasingly susceptible to the resulting damage, especially when they are isolated from other markets and services. Yet, despite such particular vulnerability to climate change, mountain areas rarely receive appropriate attention from policy makers.

Take the Vanj Valley. It's a remote, mountainous and sparsely populated region in the Western Pamir of Tajikistan. At 1,500–2,500 metres above sea level, local people depend on agriculture for their livelihoods and forests for clean water and protection against erosion, flooding and mudflows. As temperatures increase so do the risks from glacier melt, dam bursts and drought, which can damage infrastructure and those vital forests. But Tajikistan has yet to develop a climate strategy and in such areas, limited access to services and institutional structures makes it difficult to adapt to change.

The practical advice in this report is designed to help with exactly that kind of situation. For example, joint forest and ecosystem management is making the Vanj Valley more resilient to climate change and providing more sustainable natural resources to support livelihoods. A local NGO, CAMP Tabiat, and the German Corporation for International Development are working with government, scientists and the local community to protect and restore forests. They are using drought-resistant crops, microfinance and annual planning to manage the forests. Efforts in other

areas, like flood defences, have not yet been successful because of difficulties in engaging local communities. One of the lessons drawn from the project is that the topic of climate change needs to be carefully introduced and differentiated from non-climate risks. Otherwise it can distract people from existing problems or overload them with too many complex issues.

That's just one of many such examples, because this report is part of the Mountain Adaptation Outlook series for Central Asia, Eastern Africa, Southern Caucasus, (tropical) Andes and Western Balkans. The collection provides a unique and practical companion for local, regional and national policy makers seeking to protect fragile mountain ecosystems and the people who depend on them.

The broad assessments by governments and experts are invaluable, but I would particularly like to thank GRID-Arendal and the Government of Austria for their additional support in bringing the reports to life. I hope the resulting benefits for people in the mountains of Central Asia will show how worthwhile an effort this is.



Erik Solheim
Executive Director
UN Environment

A handwritten signature in black ink that reads "Erik Solheim". The signature is written in a cursive, slightly slanted style.



H.E. Andr  Rupprechter
Austrian Federal Minister of Agriculture, Forestry,
Environment and Water Management

A handwritten signature in black ink that reads "Andr  Rupprechter". The signature is written in a cursive, slanted style.



Executive Summary

Central Asia comprises a vast area stretching from the Western Siberian lowlands to the Tian Shan and Pamir mountain ranges and from the Altai to the Caspian Sea. Its topography is characterised by vast deserts and mountainous regions. In total, 20 per cent of the approximately four million square kilometres that make up Central Asia is covered by mountains. Kyrgyzstan and Tajikistan are mountainous countries, with more than 90 per cent of their respective territories covered by mountains. The mountainous regions of Kazakhstan, Turkmenistan and Uzbekistan make up between 5 and 20 per cent of their total territories.

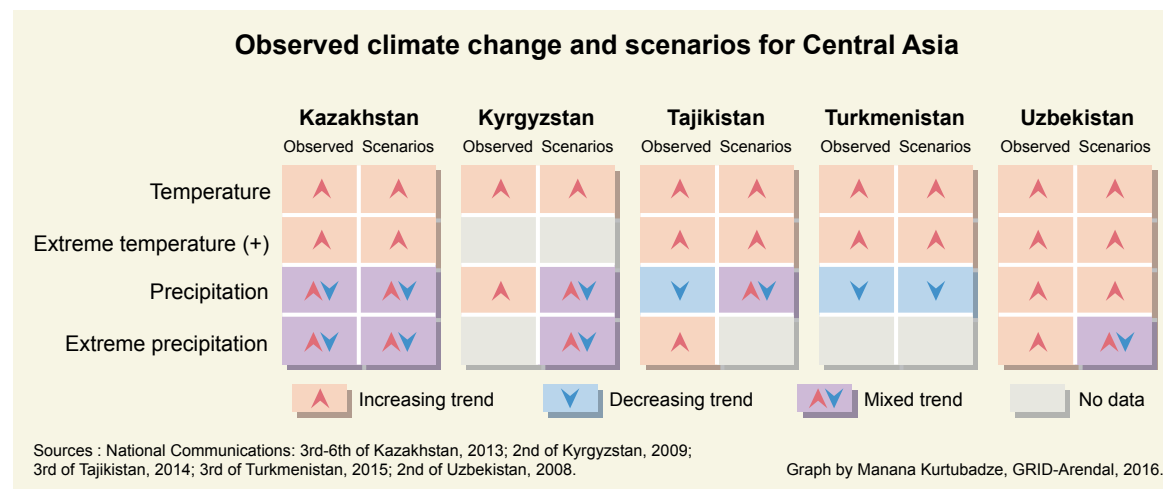
The region's location in the centre of the Eurasian landmass, far from humid ocean currents, determines its arid climate and results in a rich diversity of landscapes, with more than twenty different ecosystems. Because of these specific features, the countries of Central Asia – Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan – are among those most vulnerable

to climate change, which manifests in a rising annual average temperature. Such rise in temperature will have a mainly negative impact on the region.

According to the research conducted by the World Bank in 2009 in 28 countries in Europe, the Caucasus and Central Asia, Tajikistan and Kyrgyzstan have the highest degree of vulnerability to climate change. This is an alarming trend, highlighting the particular vulnerability of the mountain ecosystems of Central Asia to climate change in comparison to other mountainous regions of the Eurasian continent.

National and regional research conducted in Central Asia suggests that the region is experiencing an overall warming in climate, with a 0.5°C increase in the annual average temperature over the past 30 years. Precipitation records show greater disparities than temperature data, with significant variations across the region, including in mountainous areas.

Global climate change influences glaciers and water resources in the region's mountain areas. It presents an acute and urgent need to research and analyse the impact of climate change on humans, ecosystems and economies of countries in the region, and to consider what climate change related policies these countries should adopt.



Purpose and methodology of the Outlook

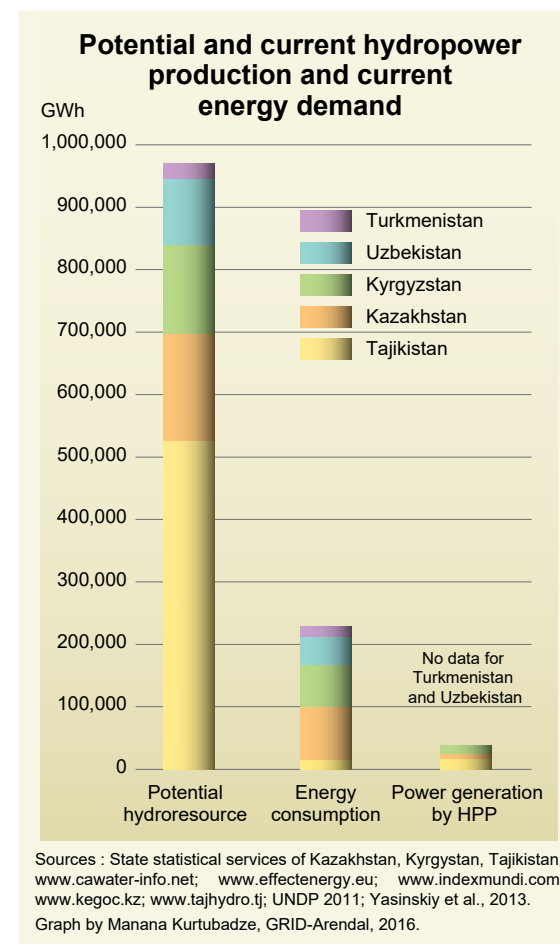
The Outlook focuses on the impacts of climate change on people, ecosystems and the economies of the Central Asian countries and proposes that a development of climate change policies in these countries is essential. The Outlook synthesizes the existing information on current trends and challenges in terms of climate change adaptation in mountain regions of Central Asia, based on the most recent

academic literature as well as on consultations with various governmental and non-governmental experts from the Central Asian region and beyond. It identifies gaps and concrete needs in terms of climate change adaptation and provides a set of recommendations for concrete policy action.

The Outlook is intended for a broad audience of experts and specialists, civil society representatives and donor organisations as well as decision-makers

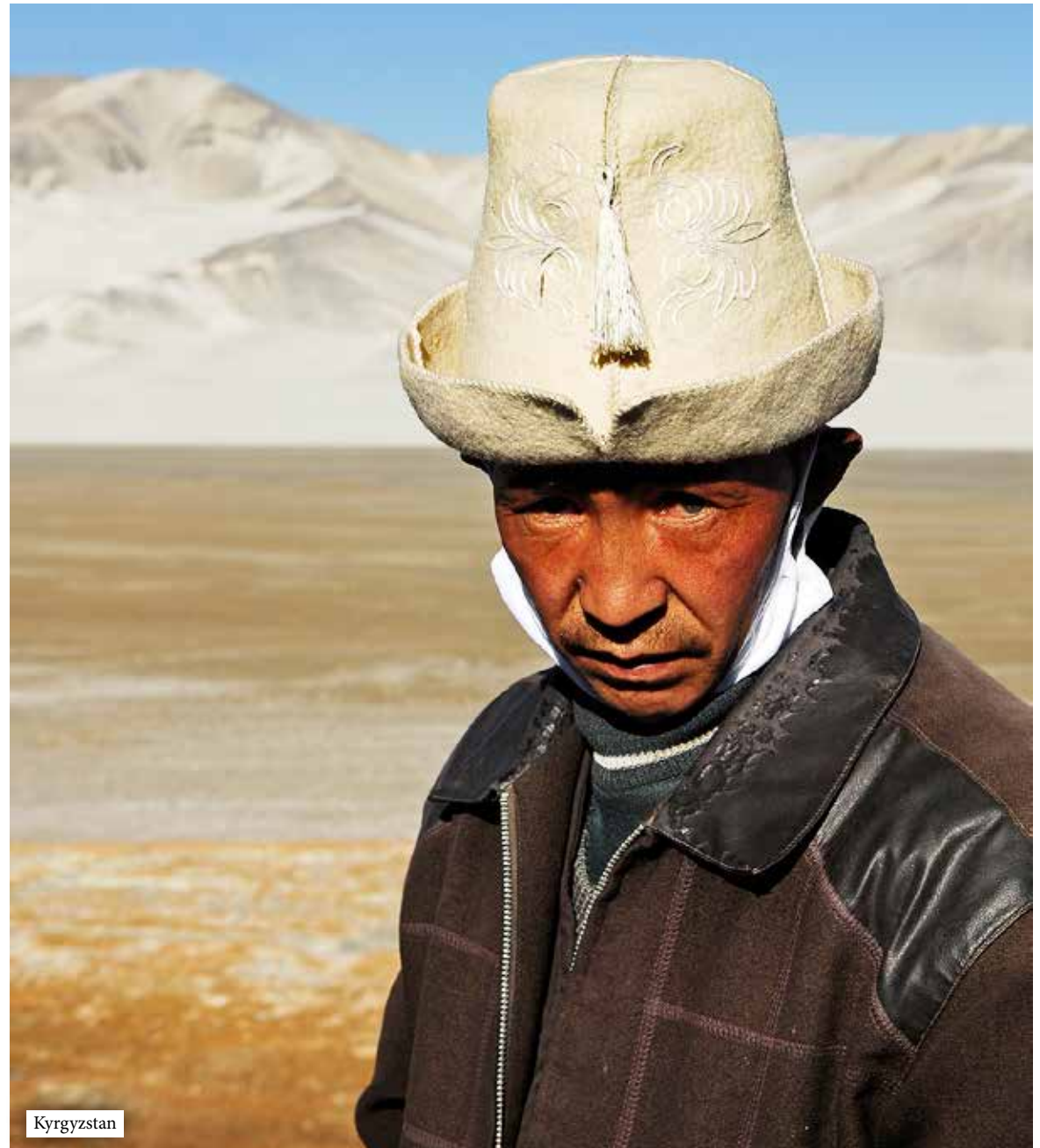
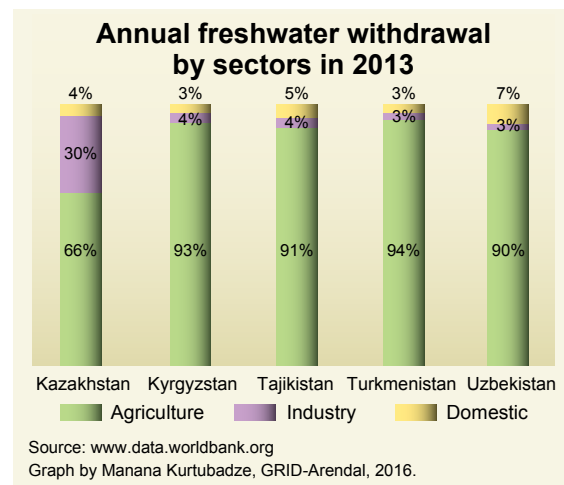
from various sectors. It seeks to encourage cross-sectoral dialogue on climate change adaptation.

The Outlook is the result of an extensive assessment process which included surveys and a broad literature review encompassing latest research and existing policy documents on the impact of climate change in Central Asia. The assessment was based on a ranking of current climate vulnerability and the potential impact of natural disasters (e.g. drought, flooding), which



could impede sustainable development, in particular when combating poverty, developing infrastructure, energy and agriculture and ensuring food security. The Outlook was discussed at two regional consultation meetings held in Almaty, Kazakhstan, in 2015 and 2016. The development of the Outlook was reviewed and acknowledged by the Interstate Commission on Sustainable Development (ICSD).

The Outlook is one of the outcomes of the “Climate change action in developing countries with fragile mountainous ecosystems from a sub-regional perspective” project, which is being implemented by the United Nations Environment Programme (UN Environment) with support from the Government of Austria. This project seeks to support mountainous countries in five sub-regions (Central Asia, East Africa, South Caucasus, Tropical Andes and Western Balkans) to integrate climate change adaptation issues into their development strategies, plans and programmes. The partners of UN Environment in preparing the Outlook for Central Asia were: Regional Mountain Centre for Central Asia (RMCCA) and GRID-Arendal.



Kyrgyzstan

Key findings of the Outlook

Consequences of climate change

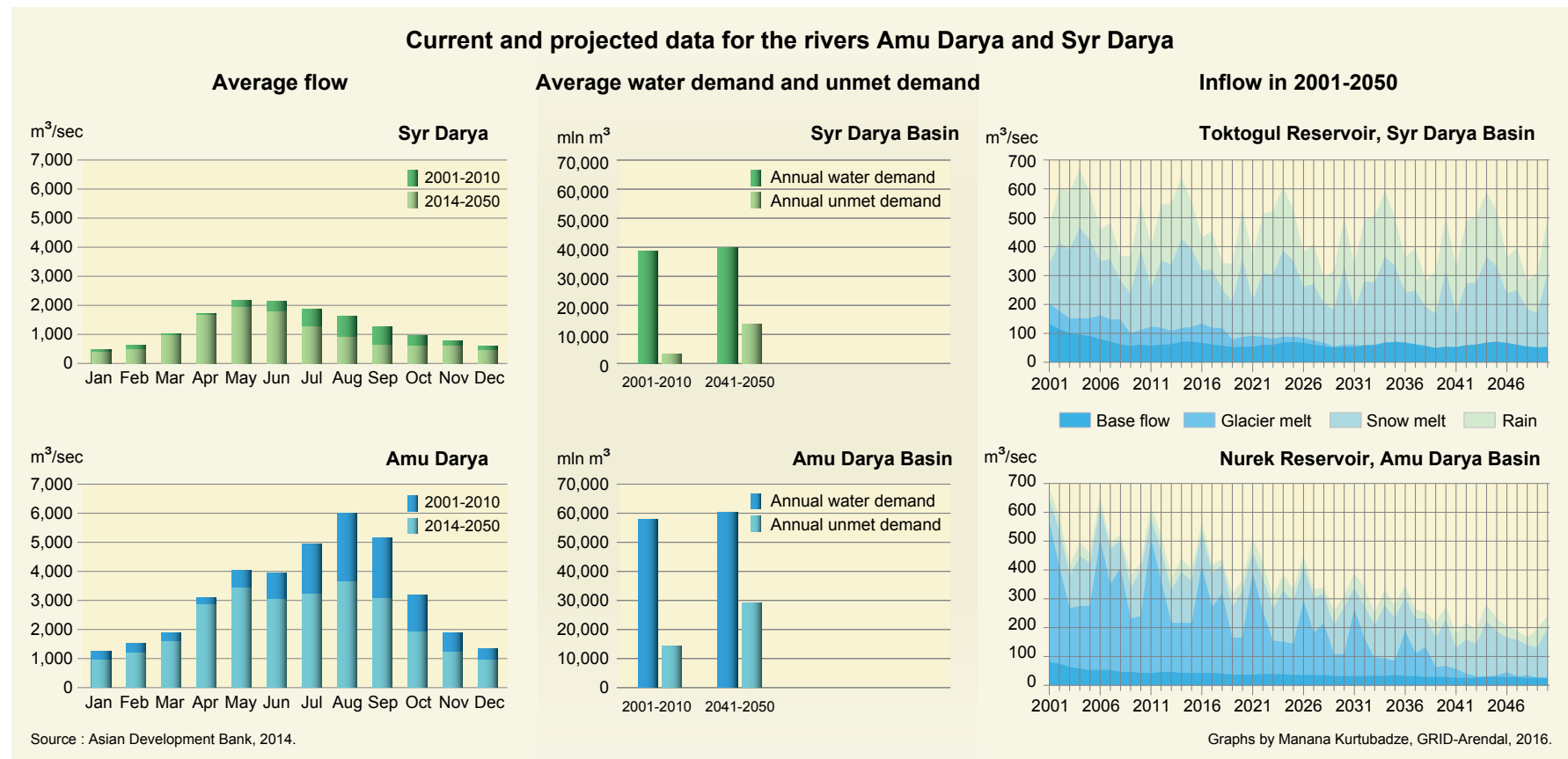
One of the consequences of climate change is that ecosystem zones (forests, pastures, etc.) move vertically upwards in mountainous regions. At the same time, there is displacement, and changes in composition, abundance and distribution of animal and plant species, which can impact agricultural

activity in mountain regions, resulting in changes in pasture and crop rotation practices.

The increase in temperature and changes of precipitation patterns lead to changes in the hydrological regime and a reduction in water resources. The projected reduction in water resources is aggravated by rising demand due to population growth. The importance of mountain

ecosystems as 'water towers' in Central Asia is growing, particularly in the context of climate change. However, the decline in glacial and snow reserves is also taking its toll on the accessibility of water resources which are essential to energy production and agriculture. This significantly impacts not only mountain communities but also the ones downstream, on the plains - in the steppe semi-desert and desert areas.

Current and projected data for the rivers Amu Darya and Syr Darya

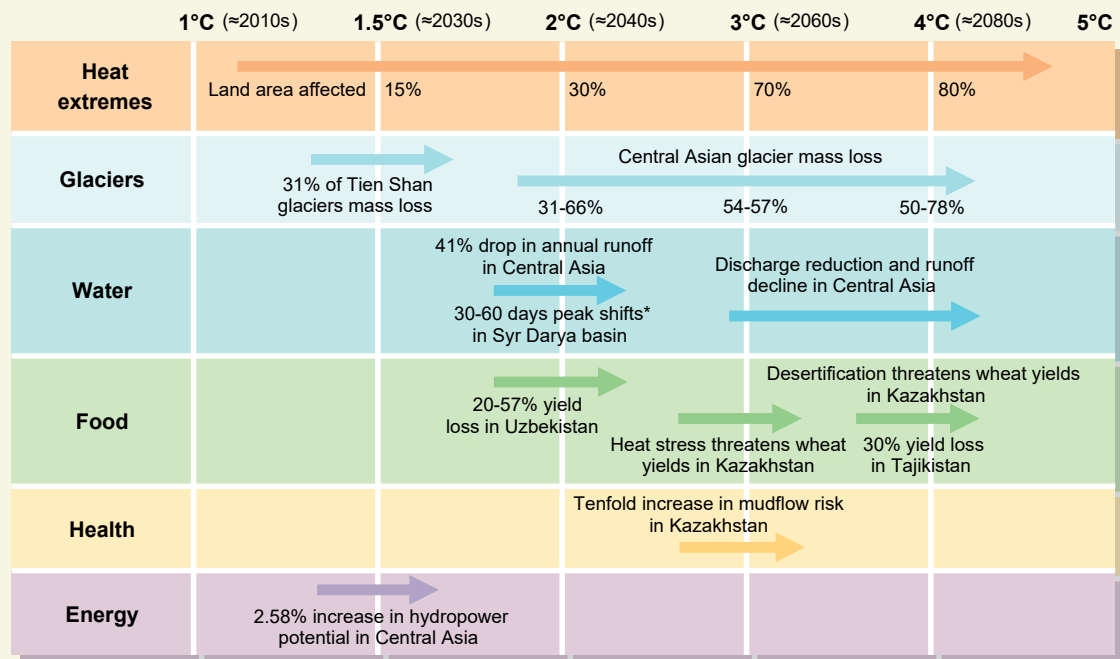


Ecoregions of Central Asia



Source: Central Asia Atlas of Natural Resources, ADB, 2010.
 Map by Manana Kurtubadze, GRID-Arendal, 2016.

Projected impact of climate change in key sectors of Central Asia across different global warming levels*



* Warming levels are relative to pre-industrial temperatures.

Source : Reyer et al., 2015.

** From the current spring/early summer towards a late winter/early spring runoff regime.

Table by Manana Kurtubadze, GRID-Arendal, 2016.

In addition, all five Central Asian countries are experiencing an increased number of extreme weather events and natural disasters affecting human safety and national economies. Every year these disasters inflict significant damage on settlements, agricultural land and infrastructure.

Opportunities associated with climate change

This Outlook recognizes that in some cases climate change also creates new opportunities in certain economic sectors. One of the few examples is

agroforestry, which may become more feasible in certain areas due to shifts in climate zones or changes in amount of precipitation. Climate change can also play a catalysing role for the development of adaptation practices designed towards more effective use of natural resources and improved management practices in various spheres of human activity.

Dealing with climate change at the political level

The countries of Central Asia have recognised climate change as a significant threat to ecosystems and

populations, and have demonstrated commitment at the national level to address global climate change. All five countries are members of the United Nations Framework Convention on Climate Change (UNFCCC), they have ratified the Kyoto Protocol and have signed the Paris Agreement. The latter, however, has only been ratified and entered into force in Kazakhstan, Tajikistan and Turkmenistan. Climate change is also a priority in the context of other international legal mechanisms, such as the Convention on Biological Diversity and the Convention to Combat Desertification, to which the countries of Central Asia are parties. The majority of countries have undertaken commitments to mitigate the consequences of climate change and adapt to them through the Intended Nationally Determined Contributions (INDC) they have submitted to the UNFCCC.

At the regional level, three Central Asian countries with alpine ecosystems – Kazakhstan, Kyrgyzstan and Tajikistan – adopted the Bishkek Mountain Platform at the Bishkek Global Mountain Summit in 2002. The Platform provides a framework for further action towards strengthened management of mountain regions and creates an environment for resolving climate change related problems.

The pivotal moment was, however, the 2009 Summit of the International Fund for saving the Aral Sea (IFAS). This is when the importance of climate change issues was recognized at the regional level. Prior to 2010 the main focus of IFAS and its subsidiary bodies (the Interstate Commission for Water Coordination [ICWC] and ICSD) was the use of water resources and environmental protection without taking into account climate change issues. Today in Central Asia, the negative consequences of climate change have been recognised to affect the water sector, agriculture, human health, the health of natural ecosystems,

Impact of climate change on wheat productivity at different sites in Central Asia

Agro-ecological zones

- Arid
- Semi-arid
- Sub-humid
- No data
- Salt lake

Sites

- Rainfed
- Rainfed and irrigated
- Irrigated

Note: The names of sites (experimental stations) do not correspond to the names of settlements.
 KyrNIIZ - the experimental station of Kyrgyz Research Institute of Crop Husbandry;
 Uchkhovz - the experimental station of the Kyrgyz Agrarian Academy.

Average temperature during vegetative growth for four periods (t°C)

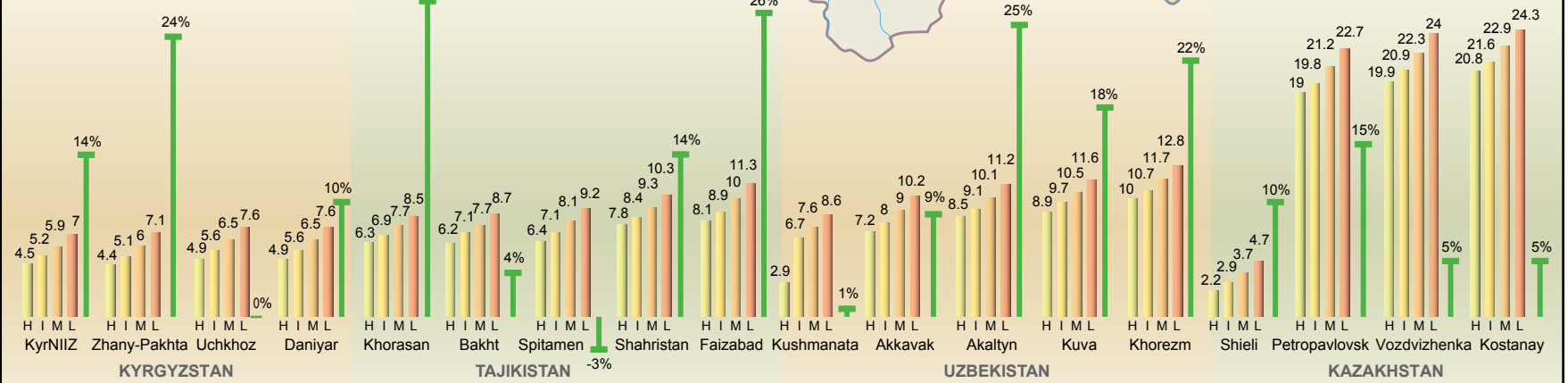
- H Historic, 1961-1990
- I Immediate future, 2011-2040
- M Medium-term future, 2041-2070
- L Long-term future, 2071-2100

Change of wheat yield (%)

- ↑ 4%
- ↑ 27%
- ↑ 26%
- ↑ 25%
- ↑ 18%
- ↑ 22%
- ↑ 10%
- ↑ 15%
- ↑ 24
- ↑ 22.3
- ↑ 24
- ↑ 22.9
- ↑ 24.3
- ↑ 5%
- ↑ 5%



0 200 km



Sources : Bobojanov et al., 2014; Sommer et al., 2012, 2013.

Map by Manana Kurtubadze, GRID-Arendal, 2016.

Some animal species areas in Central Asia included in the IUCN Red List



Source : IUCN Red List.
Maps by Manana Kurtubadze, GRID-Arendal, 2016.

energy, transport and disaster risk management. However, over the last decade, increasing priority has been given to mitigation measures of climate change. This thematic focus continues to be reflected in the greater number of realised mitigation projects compared to adaptation initiatives.

Challenges at the institutional level

Adaptation to climate change is not only of concern to ecologists, it touches upon all aspects of human activity and will therefore have an impact on every economic sector in the region. This report highlights the close interrelationship between ecosystems and sectors of the economy (energy, agriculture, mining, tourism) which are vulnerable to climate change, as well as health issues in the context of the impact of climate change.

Some countries in the region are attempting to develop sectoral programmes and action plans to mitigate and adapt to climate change. The implementation of such programmes and plans however, remains at an early stage. Specific strategies and programmes with concrete recommendations and practical measures for adaptation have emerged only in the last few years. However, they still face the problem of integration into national and sectoral development programmes.

Moreover, some Central Asian countries do not have effective cross-sectoral coordinating bodies to provide general guiding principles for policy, determine the priority areas for action, allocate sufficient resources and monitor the coordinated and systematic implementation of policies,



Grape field in Ashgabat, Turkmenistan

programmes and investment as part of climate change adaptation and mitigation work. Moreover, the low coordination and synergy between existing institutional structures pose a serious challenge for national and regional cooperation in the area of climate change adaptation.

Although climate change issues concern a wide range of relevant ministries and agencies of the Central Asian countries, decisions on climate change adaptation and mitigation most often fall under the remit and responsibility of state environmental protection authorities. Taking into account the limited influence that these authorities have on overall development policy compared with other state bodies, climate change issues do not receive sufficient attention from decision-makers involved

in development matters. Another important issue identified in the Outlook is the lack of specialised climate change laws in environmental legislation and the failure of bylaws to cover climate change issues, particularly those concerning adaptation.

Challenges for climate change adaptation at the local level

This Outlook reveals a low level of awareness among local communities and farmers with regards to both climate change and adaptation. Awareness raising initiatives often prove insufficient to convey fully to rural communities the significance of climate change issues and the need to introduce agricultural practices which are better adapted to a changing climate, particularly in mountain regions.

The report also points out the inadequate attention paid by governments to supporting rural populations in adapting to climate change. Rural communities need new methods, technologies and investment to have access to agricultural crops suited to local conditions and capable of increasing returns even when water supply is less dependable and consistent. In addition, mechanisms for crop insurance are needed to protect farmers from the devastating economic losses caused by adverse climate conditions.

The main burden of maintaining households in rural areas most often falls on women. This is due to the outmigration of the working population, primarily men, in order to earn money in other cities and countries. Consequently, rural women in the region have to take on an active role as smallholder farmers. This role helps to ensure food security for their households. As a rule, however, these women do not have the right to a voice in the decision-making process. At this point, it is essential to recognise, support and increase women's role in decision-making, and include them when defining the priorities for agricultural research and development.

Challenges with monitoring, data collection and scientific research

A substantial amount of information about the environment is being collected in Central Asian countries. Nevertheless, there is no single, coordinated database to facilitate access to accurate environmental data, particularly on the impact of climate change in mountain ecosystems. The Outlook also notes the lack of extensive scientific research and monitoring of surface and ground water, or the impact of climate change on water management and agriculture. This speaks to the need to develop tools for assessing climate change vulnerability, with a focus on evaluating economic losses.



Hissar Range, Uzbekistan

Recommended measures for adaptation in the mountain regions of Central Asia

The proposed recommendations aim to strengthen adaptation to climate change in various sectors of the economy and include issues related to the policy and legislation frameworks, and institutional organisation. The development and strengthening of climate change adaptation measures in both mountain and plain regions will contribute to the sustainable development of Central Asia, provided there is coordination at local, national and regional levels.

Institutional framework

Strengthen institutional capacity to support or create a well-functioning structure for adaptation to climate change, notably through consolidating existing bodies, or creating new bodies in the field of climate change and by supporting cross-sectoral integration of climate change adaptation at the national level;

Establish specialized cross-sectoral bodies (for example, commissions, working groups) that will facilitate increased coordination of activities and synergies between various institutions.

Policy and legislation

Introduce long-term, cross-sectoral policies (involving civil society in its development process), taking into account climate change trends and the prevention of key risks as well as ensure the development, integration and proper implementation of a legal and regulatory framework related to climate change adaptation;

Promote implementation of climate change adaptation policy and develop climate change adaptation measures, with special focus on Ecosystem based Adaptation (EbA), including within mountain ecosystems, and targeting the most vulnerable society groups;

Develop or integrate mechanisms for policy assessments into the monitoring process (integration of targeted policies, evaluation indicators, etc.).

Awareness raising and capacity building

Provide access to information at the local community level and to the general public, to increase public awareness;

Develop measures to build capacity at various levels and for various partners to ensure that they have the up to date information and research results, and use communication tools to reach out to a wider audience.

Regional level

Promote a regional approach for climate change adaptation, coordinated with other environmental frameworks and development processes, including the exchange of data and information, methodologies for assessments, climate monitoring, and coordination of actions on the ground in Central Asian countries;

Support in particular the EbA approach to climate change adaptation, informed by the outcomes and successes of other relevant initiatives and projects;

Improve the institutional capacity of regional bodies on climate change adaptation issues.



Agriculture, Alatau Mountains, Kazakhstan



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