

Introduction to Climate Change in Central Asia



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Abstract This chapter provides a broad introduction to the impact of climate change in Central Asia, a region that has been experiencing a greater rise in temperatures than other parts of the world. The chapter shows how climate change represents a significant threat to Central Asia, exacerbating existing economic and environmental challenges and fueling regional tensions over resource management. Inefficient water resource management at the national level and limited regional collaboration on the management of water resources, coupled with state capacities that remain insufficient to tackle climate change impacts, compound water-related tensions between the countries in the region. The chapter also shows how decarbonisation efforts in Central Asia are still in their early stages, with coal remaining a primary source of energy. Although the Central Asian countries have announced decarbonisation targets and adopted green economy strategies and programmes to reduce greenhouse gas emissions, a large-scale clean energy transition remains unlikely in the short term. The chapter concludes by identifying a lack of scholarship on climate change in Central Asia, which limits the development of a coherent approach to climate change mitigation and adaptation and evidence-based decision-making in the region. The chapter argues that a more coordinated approach to tackling climate change across the region is needed, requiring closer collaboration and more effective joint management of natural resources by the five Central Asian states. Finally, the chapter presents the chapters in the rest of the book.

Keywords Climate change · Central Asia · Water resources · Decarbonisation · Knowledge gap

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1 The Impact of Climate Change on Central Asia: What Is at Stake?

Central Asia will be heavily impacted by climate change. In its Sixth Assessment Report, the Intergovernmental Panel on Climate Change (IPCC) concluded that climate change presents a major threat in Central Asia, where temperatures have been rising more than the global average (IPCC 2022). Climate change has the potential to exacerbate existing economic and environmental challenges and fuel regional tensions over common resource management, particularly as Central Asia remains a politically and economically unintegrated region (Vakulchuk and Overland 2019).

Climate change will compound existing water-related tensions between Kyrgyzstan, Tajikistan and Uzbekistan. Central Asia has long suffered from inefficient water resource management at the national level and sluggish regional collaboration in the management of the limited water resources. Individual state capacities are also limited and remain insufficient to tackle climate change impacts. Furthermore, Tajikistan and Kyrgyzstan are highly dependent on agriculture, the sector which is most vulnerable to climate change, while oil and gas exporters Kazakhstan and Turkmenistan may be impacted by looming carbon taxes in export markets and the risk that their fossil fuel could become stranded assets. The countries' energy mix and contribution to the global GHG emissions (see Fig. 1). The Central Asian countries have declared ambitious climate goals but continue to rely heavily on fossil fuels and outdated, crumbling energy infrastructure.

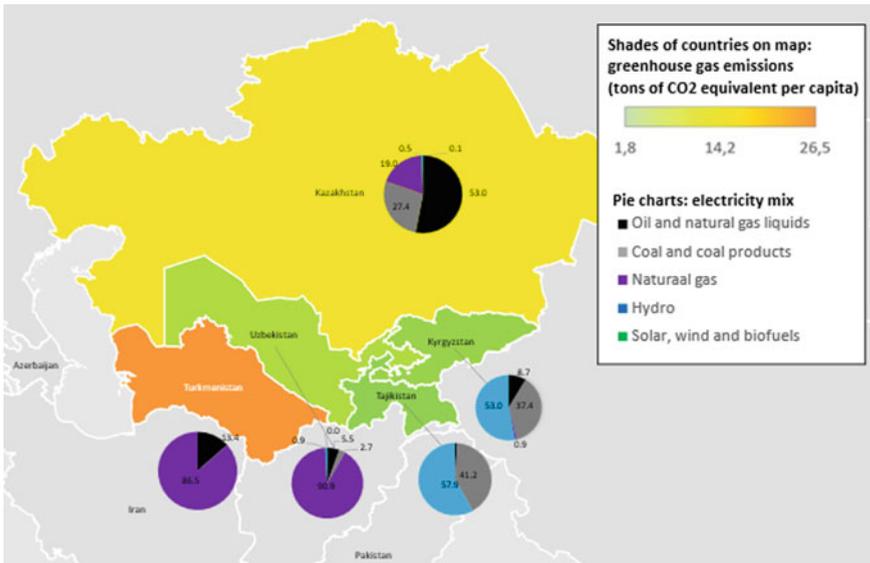


Fig. 1 CO₂ equivalent emissions per capita and energy mix in Central Asia

Effective climate policy will require closer collaboration and more effective joint management of natural resources by the five Central Asian states. The current lack of scholarship on climate change in Central Asia limits efforts to fully understand the issues within each country and across the region, as well as the development of a coherent approach to climate change mitigation and adaptation. This volume represents an attempt to close some of the gaps in the scholarship, stimulate cross-country comparison, and identify both country-specific and shared challenges. We hope this will be a useful first step towards developing a more coordinated approach to tackling climate change across the region.

2 Decarbonisation in Central Asia

For several decades, Central Asia has been a source of fossil fuels for the world economy, mainly in the form of oil and gas (Palazuelos and Fernández 2012; Vakulchuk 2016). This has made the region highly dependent on revenues from hydrocarbon exports (Vakulchuk and Overland 2021). Oil and gas revenues accounted for 35% of GDP and 75% of exports from Kazakhstan in 2020 (IMF 2021). Natural gas exports to China alone accounted for 25% of Turkmenistan's GDP in 2020 (CIA 2021), while natural gas production made up 15% of Uzbekistan's GDP in 2018. Consumption of fossil fuels by the region itself has also been growing since 2010 (Vakulchuk et al. 2022b). Coal is one of the main energy sources in Central Asia, and its consumption is on the rise in Kyrgyzstan and Tajikistan. Coal heating was one of the main reasons why the Kyrgyz capital, Bishkek, was the world's most polluted city in 2021 (World Air Quality 2021; Sabyrbekov and Overland 2020). Air pollution at this level is a severe health hazard.

All Central Asian countries are signatories to the Paris Agreement and have announced decarbonisation targets. Since 2018, the Central Asian states have also been promoting renewable energy. Most of the region's countries have adopted at least some type of green economy strategy or programme to increase resource use efficiency and reduce greenhouse gas (GHG) emissions. The results of these programmes are mixed. The share of renewables in power generation in Kazakhstan was only 2.5% in 2020, while that of coal was 70% (IEA 2021), and the share of solar and wind power in the energy mix remains negligible in all countries. A serious clean energy transition remains unlikely in the short term (Sabyrbekov and Ukueva 2019; Vakulchuk et al. 2022b).

3 Climate Change in Central Asia: Status of Knowledge

Since the 2010s, the IPCC has expressed concern over the fact that Central Asia is the least studied region with respect to climate change despite the region's vulnerability to its impacts (IPCC 2014). Out of 54 thematic areas critical to the impacts of climate

change, 51 remain underexplored in Central Asia, with severe knowledge gaps or no data available at all in these areas.

In response to the IPCC's observation, Vakulchuk et al. (2022a) conducted a systematic review of the scholarship on climate change in Central Asia in the natural and social sciences over the past thirty years to ascertain the extent to which the academic community has engaged with this increasingly urgent multi-layered issue. The authors found that, out of 1,305 conference panels organised by international Central Asia studies associations between 1991 and 2020, none focused on climate change. Furthermore, out of the 10,249 individual conference presentations, only two (0.02%) were on a topic related to climate change.

There is a particular lack of scholarship on climate change in Central Asia in the social sciences. According to Vakulchuk et al. (2022a), there were half as many publications on climate-related topics in Central Asia in the social sciences as in the natural sciences between 1991 in 2022, and only a handful of researchers have a track record of publishing in both the natural and social sciences (e.g., Kerimray et al. 2015, 2018). Therefore, in terms of research specialisation, funding and institutional infrastructure, the social sciences are lagging behind the natural sciences. Moreover, the existing literature has neglected the political, economic, social, health, security and geopolitical domains. For example, to our knowledge, only two articles have been published on climate change and health in Central Asia (Janes 2010; Bhuiyan and Khan 2011), and only one on climate change and gender (Kim and Standal 2019). No publications cover the issues of climate justice, transportation or climate diplomacy in Central Asia (Vakulchuk et al. 2022a). The recent dates on most of the published works do, however, indicate that social science scholars may finally be starting to take an interest in this field of research.

4 Our Mission

To address the urgent need for scholarship on climate change in Central Asia, and in particular the need for research by social scientists, this book includes contributions from a range of contributors relating to climate change impacts, adaptation and mitigation in the region. Throughout the book, we try to capture the broader societal implications of climate-related issues. The book includes 12 chapters in addition to this introductory chapter. Each chapter makes an important contribution to social science scholarship on climate change and decarbonisation in Central Asia and covers a topic that has received little or no attention in the literature to date. Many of the chapters cover the entirety of the Central Asian region, while some focus on individual countries.

This book is important in three ways. First, taking into consideration the significant gaps in social science scholarship on climate change identified by Vakulchuk et al. (2022a), we aim to provide the first systematic contribution towards filling some of the urgent gaps in the knowledge and data. This can accelerate knowledge-building on climate change in Central Asia. Second, by inviting scholars in the field of Central

Asian studies to explore the nexus between climate change and other societal topics in Central Asia, we aim to raise awareness within the Central Asia studies community about the urgent need to integrate climate-related analysis into social science research. This, in turn, can facilitate more evidence-based decision-making, policies and projects in the areas of climate change adaptation and mitigation in Central Asia on the part of donors and the authorities in the Central Asian states. Third, through the production of new knowledge, we also seek to assist local communities in taking well-informed actions to adapt to climate change impacts.

5 Overview of Chapters

5.1 Part I: Climate Research on Central Asia: State of the Art

In her chapter ‘[Climate Change: A Growing Threat for Central Asia](#)’, Anne Sophie Daloz takes stock of the major physical impacts of climate change in Central Asia based on the most recent literature, including the Sixth Assessment Report of the IPCC published in 2022. She identifies climate change-related risks and sectoral vulnerabilities across the region, and her analysis serves as a starting point for the other chapters of the book. Daloz explains how climate impact-drivers are expected to change over time, thus amplifying the vulnerability of the agriculture, health, energy, and transportation sectors. She also argues that, without adequate adaptation measures, Central Asia could face severe water scarcity, which will have detrimental knock-on effects on energy and food security in the region.

In the second chapter in this part of the book, ‘[Climate Change Research and Policy in Central Asia: Current Situation and Future Perspectives](#)’, Alisher Mirzabaev conducts a bibliometric analysis to explore the state of scientific research related to climate change adaptation and mitigation. He assesses key trends and discusses investment priorities for research. Similarly to Vakulchuk et al. (2022a), Mirzabaev argues that, although the scientific literature on climate change in Central Asia has started growing, it remains too small and underdeveloped to grasp the complexity of climate impacts. He calls for open access to data, more investment in climate change research, the development of local climate modelling capacities, and support for regional knowledge and scientific exchange on climate change topics.

5.2 Part II: Central Asian Decarbonisation Pathways and Carbon Pricing

In the chapter ‘[Central Asian Climate Policy Pledges Under Paris Agreement: Can They Be Fulfilled?](#)’ we explore the region’s preparedness to meet its climate policy goals under the Paris Agreement. We compare the countries’ Nationally Determined

Contributions (NDCs) with their national strategic programmes and development trajectories. Our findings indicate that the Central Asian countries vary in their ability to meet their declared climate goals, and that successful implementation will require structural changes in energy systems, substantial investment in infrastructure and, most importantly, the alignment of development plans with climate goals.

In ‘[Decarbonisation Opportunities and Emerging Carbon Pricing Instruments in Central Asia](#)’, Gulim Abdi, Nurkhat Zhakiyev and Shynar Toilybayev discuss the region’s heavy dependence on fossil fuels and its vulnerability to climate change. They identify and discuss existing and potential carbon pricing instruments in Central Asia, including emissions trading measures. The authors demonstrate that different carbon pricing mechanisms and decarbonisation strategies are being considered across the entire region. They conclude by proposing mid- and long-term activities that could strengthen regional cooperation on decarbonisation.

5.3 Part III: Energy Transition in Central Asia

In their chapter ‘[Energy Transition in Central Asia: A Systematic Literature Review](#)’, Burulcha Sulaimanova, Indra Overland, Rahat Sabyrbekov and Roman Vakulchuk provide a comprehensive bibliometric overview of the profile and trajectory of the research on energy in Central Asia. The authors find that research shifted from fossil fuel towards clean energy topics between 1991 and 2022. However, despite recent growth in this area, research on energy transition and the importance of renewables in Central Asia is still sparse. The chapter reveals that US and European researchers initially published most of the energy research on the region but, starting from 2016, were overtaken by scholars from China, Japan, Kazakhstan and Russia.

Morena Skalamera in her chapter ‘[A “Steppe” into the Void: Central Asia in the Post-oil World](#)’ delves into the nexus between the effects of energy transition, regime stability in Central Asia’s fossil-fuel-dominated economies and international stability. She raises concerns about the unpreparedness of Central Asian petrostates to shift to clean energy and decarbonise their economies, as well as the risks this poses internally and to external partners.

In the chapter ‘[Towards a Geoeconomics of Energy Transition in Central Asia’s Hydrocarbon-Producing Countries](#)’, Yana Zabanova analyses the implications of energy transition for Kazakhstan, Uzbekistan and Turkmenistan. She finds that Kazakhstan remains the region’s renewable energy frontrunner, that late starter Uzbekistan has attracted major industry players, and that Turkmenistan has yet to take its first steps. Overall, the chapter finds that the three countries do not plan a fossil-fuel phaseout. Rather, they seek to add renewables to the energy mix to bolster energy security and help decarbonise their economies.

5.4 Part IV: Local Climate Change Impacts and Adaptation in Central Asia

In ‘[The Dual Relationship Between Human Mobility and Climate Change in Central Asia: Tackling the Vulnerability of the Mobility Infrastructure and Transport-Related Environmental Issues](#)’, Suzy Blondin addresses the impact of transportation on the region’s climate through the concept of ‘climate mobilities’. Old vehicles and a lack of public transport contribute to severe air pollution in Central Asian cities. Drawing on Blondin’s fieldwork in Tajikistan, the chapter highlights the adverse impacts of mobility disruptions for the populations of Central Asia. After discussing the complex relationship between mobilities and climate change, Blondin addresses the interconnection between climate justice and mobility justice and concludes with policy recommendations to promote sustainable mobilities in the region.

In the chapter ‘[A Gendered Approach to Understanding Climate Change Impacts in Rural Kyrgyzstan](#)’, Karina Standal, Anne Sophie Daloz and Elena Kim address the lack of research on the intersectional dynamics of climate impacts and gender. The authors empirically examine the effects of climate change in rural Kyrgyzstan and chart the experiences and realities of local women, applying a contextual vulnerability lens. Standal et al. combine analysis of existing research on the physical impacts of climate change with ethnographic accounts of local people’s farming and energy-use practices. This approach allows them to better understand the interlinkages between the material, social and cultural realities of local communities. The authors conclude that social differentiation both enables and limits the varied capabilities of people to cope with climate change impacts and engage in adaptation practices.

5.5 Part V: Climate Change Awareness, Norms and Stakeholders in Central Asia

In the chapter ‘[The Institutionalisation of Environmentalism in Central Asia](#)’, Filippo Costa Buranelli explores how the notion of environmentalism has been internalised and institutionalised in Central Asia. The chapter is a case study of the Central Asian republics taking part in the 26th Conference of the Parties to the United Framework Convention on Climate Change (COP 26) as a single entity advocating for a shared approach to climate change. Buranelli considers whether, how, and to what extent the Central Asian governments have institutionalised environmentalism in the context of climate change, focusing on state-based and people-based discourses, initiatives and campaigns at the global, regional and local levels. He concludes that the institutionalisation of environmentalism is strongest at the regional level and weakest domestically, with cooperation at the regional level developing but still dependent on international organisations and donors.

Fabienne Bossuyt's chapter, '[The Importance of Boosting Societal Resilience in the Fight Against Climate Change in Central Asia](#)', underlines the urgent need for societies in Central Asia to learn how to adapt to the effects of climate change. Bossuyt argues that resilience strategies involving the sharing of responsibilities among individuals and communities will increase the ability of these countries to withstand the impacts of climate change. She observes that Central Asian societies have a strong tradition of home-grown solidarity movements and locally embedded self-reliance practices. The Central Asian governments and international donors could therefore help boost societal resilience to climate change in Central Asia by supporting the ability of local social actors to self-organise and utilise local strengths and knowledge of available resources and infrastructure.

In her chapter, '[The Culture of Recycling, Re-use and Reduction: Eco-Activism and Entrepreneurship in Central Asia](#)', Aliya Tskhay focuses on the role of the private sector in addressing climate challenges by changing people's behaviour and attitudes towards the environment. She explores the benefits and challenges of private eco-activism and entrepreneurship at the micro level. Tskhay looks at private companies in Almaty that have launched initiatives to encourage the reduction of consumption and associated retail waste, along with social awareness programmes. Her chapter demonstrates how entrepreneurs and activists are filling the gap in sustainability promotion, while also revealing more profound issues with commitments to carbon reduction and other environmental projects, as well as barriers to societal readiness to embrace changes in entrenched behaviours.

6 Concluding Remarks

Clearly, climate change will have negative consequences throughout the Central Asian region, particularly given the region's exposure and vulnerability to climate change. These impacts will be felt at different levels. At the household level, the most vulnerable groups, such as women and the poor, are most exposed to climate-induced risks. At the macroeconomic level, agriculture, infrastructure and the energy supply will be heavily disrupted and will require large investments. At the regional level, some have argued that the ongoing global transition to clean energy may destabilise the political regimes of the Central Asian petrostates. Perhaps seeing this potential, the petrostates were the first among the region's countries to embrace renewable energy projects. Despite this, no phaseout of fossil fuels has thus far been planned.

The Central Asian countries vary in terms of their adaptation and mitigation plans as laid out in their climate pledges under the Paris Agreement, but what they have pledged is generally not ambitious. Decarbonisation initiatives remain in the early stages and are not aligned with the national development strategies of the countries. Furthermore, all of the Central Asian countries have made their most ambitious climate pledges conditional upon substantial financial and technical support from donors.

Despite the common threats and shared resources, the countries have been slow to take a regional approach to climate change adaptation and mitigation. Moreover, heedless of the looming threat of climate change, research has been sluggish, with those publications that are produced dominated by scholars from China, Kazakhstan and Russia. Further and broader research in the area is much needed to facilitate informed policy decisions by governments and local communities. The region's success in meeting present and future climate challenges is dependent on greater effort in terms of regional cooperation, integration of climate policy into sector programmes and the active involvement of local stakeholders at all levels.

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