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Assessment of ecological priorities

in Central Asia





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Acknowledgements:

The report was co-funded by the Governments of Germany and the United Nations Regular Programme for Technical Cooperation.

This report was co-funded by the German Federal Environment Ministry's Advisory Assistance Programme (AAP) for environmental protection in the countries of Central and Eastern Europe, the Caucasus and Central Asia and other countries neighbouring the European Union. It is supervised by the German Environment Agency (Umweltbundesamt, UBA).

The report was prepared with the support of an ECE consultant, Antoine Nunes.

The following ECE staff contributed to the preparation of the report: Angela Sochirca, David Weihrauch, Karin Fueri and Nicholas Bonvoisin, supported by Oksana Rott. Appreciation is extended to Ms. Anna Soldini, ECE intern, for her support in preparing the report.

The report is translated into Russian thanks to the United Nations Resident Coordinator Office in Kazakhstan.

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United Nations Economic Commission for Europe

Assessment of Ecological Priorities in Central Asia

10 April 2026

United Nations
Geneva, 2026

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Abbreviations

CBD	Convention on Biological Diversity
CMS	Convention of Migratory Species
DALY	disability-adjusted life year
DRR	Disaster Risk Reduction
ECE	United Nations Economic Commission for Europe
EIA	Environmental Impact Assessment
EPR	Environmental Performance Review
ESD	Education for Sustainable Development
FAO	Food and Agriculture Organization
GCF	Green Climate Fund
GHG	greenhouse gas
IWRM	integrated water resources management
LULUCF	land use, land-use change and forestry
MEA	Multilateral environmental agreement
MRV	measurement, reporting and verification
MSW	municipal solid waste
NbS	Nature-based solutions
NDC	nationally determined contribution
PM_{10}	particulate matter with a diameter of 10 µm or less
$PM_{2.5}$	fine particulate matter with a diameter of 2.5 µm or less
RES 2026	Regional Ecological Summit 2026
SDG	Sustainable Development Goal
SEA	Strategic Environmental Assessment
UN DESA	United Nations Department of Economic and Social Affairs
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
WHO	World Health Organization

Executive summary

The report "Assessment of Ecological Priorities in Central Asia" presents an analysis of ecological priorities in Central Asia, examining common environmental challenges, policy responses and opportunities for strengthening regional cooperation among Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan. Prepared for the Regional Ecological Summit 2026, the assessment draws mostly on a comprehensive desk study combining the most recent available data on greenhouse gas emissions, air and water quality and management, biodiversity and ecosystems, land degradation and governance frameworks.

The population of Central Asia was estimated at nearly 84 million in 2025 and is expected to reach 90 million by 2030. The five countries have experienced sustained economic expansion since 2010. This demographic and economic dynamism has resulted in increased pressure on natural resources, infrastructure and the environment, exacerbating the already strong ecological tensions in the region, linked to its geographical aridity and its legacy of shared infrastructure.

Greenhouse gas emissions have increased across the region since 2010, despite notable improvements in emissions intensity per unit of gross domestic product. The Central Asian countries are parties to the Paris Agreement and have submitted nationally determined contributions; however, their levels of ambition vary considerably.

Climate finance mobilization is uneven across the region. Adaptation efforts are progressing through national strategies and sectoral plans, but measurement, reporting and verification systems remain underdeveloped in most countries, making it difficult to assess the effectiveness of measures already implemented. Cooperation on disaster risk reduction is progressing under the Sendai Framework for Disaster Risk Reduction, but responses remain primarily national and reactive rather than coordinated and preventive.

Air quality remains a major public health problem in Central Asia. The regional mortality rate attributable to air pollution decreased from 177 deaths per 100,000 population to 120 deaths per 100,000 population between 2010 and 2023. However, concentrations of fine particulate matters remain on average nearly three times higher than the World Health Organization guideline value of 5 $\mu g/m^3$. Nitrogen dioxide concentrations worsened during this period, increasing from 12.5 $\mu g/m^3$ to 15.7 $\mu g/m^3$ (as a proportion of the population), primarily due to the growth of transportation and industrial activities, while global trends were moving in the opposite direction. Sand and dust storms expose populations throughout the region to additional concentrations of aerosols and salt, with more than 100,000 tons of dust and salt dispersed annually over an estimated area of between 1.5 million km^2 and 2 million km^2.

Biodiversity and ecosystem integrity are under constant pressure. Although Red List scores of the Central Asian countries indicate that biodiversity remains relatively intact in all five countries, a gradual downward trend is observed in most. No country has yet met the Aichi Biodiversity Target 11 of the Convention on Biological Diversity, and as of April 2026 all five countries remain below the targets under the Convention's Kunming-Montreal Global Biodiversity Framework. Protected area networks are often fragmented and poorly aligned with the migration corridors of regional species. Municipal solid waste generation is increasing in all five countries, recycling rates remain low and the management of hazardous waste presents persistent transboundary risks.

Water resources are another concern in Central Asia. Total per capita renewable water resources declined by approximately 20% between 2010 and 2022, as population growth outpaced available supply. Agriculture accounts for over 90% of water consumption in most of the Central Asian countries. Transboundary water cooperation has gradually developed, but the implementation of integrated water resources management remains incomplete and hampered by limited funding across the region.

Land degradation affects more than 20% of the region's total area, driven by salinization from inefficient irrigation, overgrazing, desertification and the ongoing ecological collapse of the Aral Sea basin. Forest cover, while slowly expanding, remains limited and is threatened by climate change, overgrazing and forest fires. The region holds significant global reserves of uranium, lithium, copper and rare earth elements, but national regulatory frameworks for sustainable mining management are often incomplete, leaving contaminated sites and tailings facilities operating without adequate rehabilitation plans.

Many of the region's environmental challenges are linked to systemic governance constraints. Environmental monitoring systems are fragmented: data, collected in silos by multiple agencies, are rarely accessible in a timely manner to researchers, policymakers and the public. In several countries, pollution taxes and associated economic instruments have remained unchanged for years, failing to provide sufficient incentives for cleaner production. The integration of environmental issues across different economic sectors remains limited, and enforcement capacities are constrained by insufficient financial and human resources. At the same time, there are encouraging signs: regional policy dialogue has intensified, and countries have adopted climate strategies and national adaptation plans, as well as sectoral policies that increasingly incorporate environmental protection.

The report identifies climate change and water security as the absolute strategic priorities for regional cooperation, given their cross-sectoral relevance and inherently transboundary nature. Sustainable development, improved air quality, the land-water-agriculture nexus, the circular economy, and disaster risk reduction also offer significant potential for joint action. Strengthening environmental governance institutions, expanding data sharing and harmonizing environmental monitoring, improving economic and financial instruments and investing in sustainable and climate-resilient infrastructure are the main levers for addressing these priorities. The Regional Ecological Summit 2026 offers an opportunity for Central Asian countries to consolidate their shared environmental agenda and translate it into coordinated evidence-based regional policy.

Environmental Performance Reviews (EPRs) conducted under the auspices of ECE have become a key instrument for strengthening environmental governance and advancing sustainable development in Central Asia. All five countries in the region have participated in the EPR process, often repeatedly, demonstrating a sustained commitment to improving environmental management, enhancing transparency and aligning national policies with international commitments, including the 2030 Agenda for Sustainable Development. EPR findings and recommendations have supported reforms in environmental legislation, policy integration across economic sectors, monitoring and reporting systems and the use of economic instruments. Building on this strong national engagement, countries are now advancing a Regional Environmental Performance Review of Central Asia, pursuant to a joint request by Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan to address shared environmental challenges, strengthen regional coherence and support coordinated action on key transboundary priorities, translating assessment into concrete results at both national and regional levels.

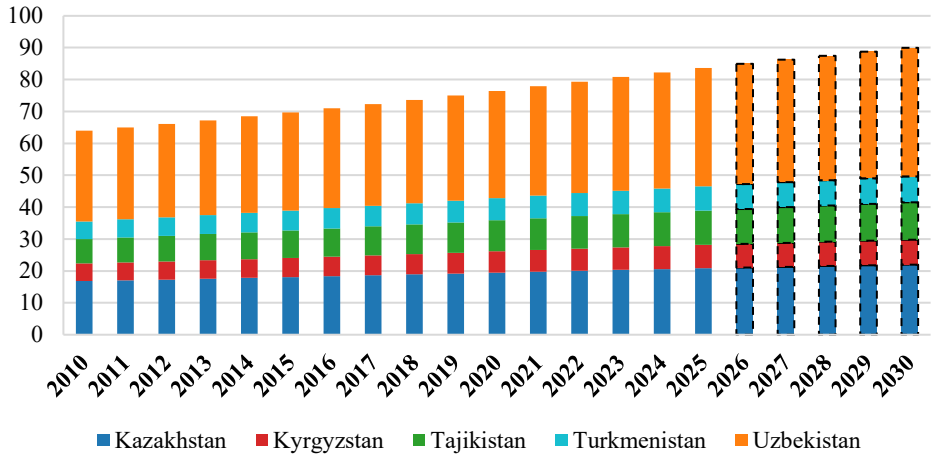
The present Assessment of Ecological Priorities in Central Asia has been informed by the scoping report for the Regional Environmental Performance Review, which identifies areas where regional cooperation can deliver the greatest added value. Initial thematic priorities under consideration for being addressed in the Regional EPR include climate change adaptation from a transboundary perspective; water-related ecosystems and water quality; green development; air quality management; circular economy and waste management; the land–water–agriculture nexus; and disaster risk reduction. These areas reflect shared regional challenges and provide a basis for defining a limited number of integrated themes to guide coordinated regional action.

1. Central Asia context

Demography

The population of Central Asia increased by 30.8% between 2010 and 2025 (Figure 1). It is projected to reach nearly 90 million by 2030, representing a further 7.25% increase compared to 2025 and an overall growth of approximately 41% between 2010 and 2030. In 2025, out of the total population of Central Asia, Kazakhstan accounted for 25%, Kyrgyzstan for 9%, Tajikistan for 13%, Turkmenistan for 9% and Uzbekistan for 44%.

Figure 1: Population trend and projections, 2010–2030, million



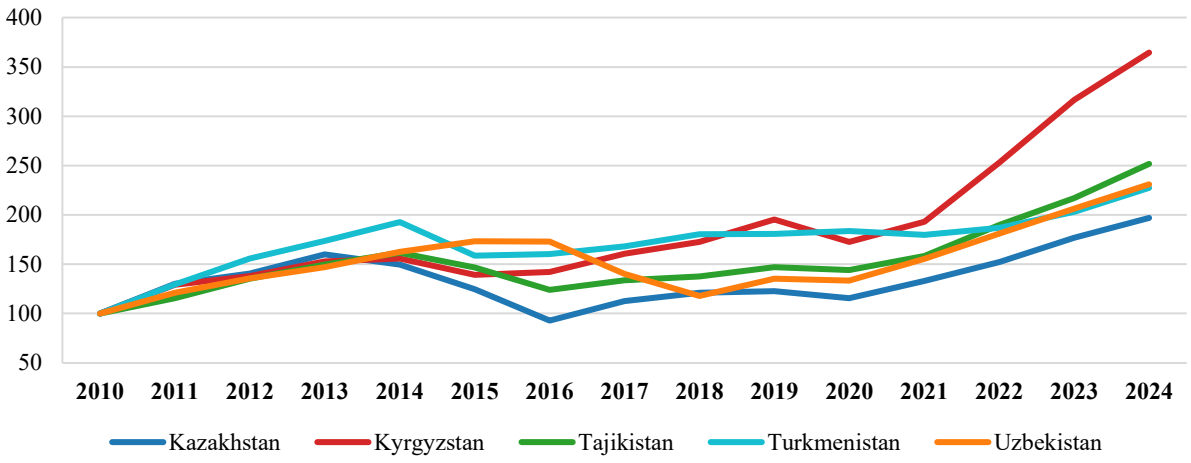
Source: UN DESA (2024).

Population growth in Central Asia may contribute to higher greenhouse gas (GHG) emissions, and place additional pressure on water resources in rivers such as the Amu Darya and Syr Darya. It may also lead to increased waste generation and place further strain on ecosystems. At the same time, rapid urbanization in the region is exposing populations in major urban centres to growing environmental challenges, including air pollution and the intensification of urban heat islands.

Economy

Figure 2 presents a change index in GDP expressed in constant US$ (2010=100) for the five Central Asian countries, from 2010 to 2024. Data show a strong upward trend, although the rate of growth varies considerably among countries and from year to year.

Figure 2: GDP (constant US$), 2010–2024, 2010=100



Source: World Development Indicators, 2026.

Among these countries, GDP of Kyrgyzstan shows the fastest growth with an increase of 264% in the period 2010–2024. Tajikistan and Uzbekistan also show substantial increases, reaching approximately 151% and 131% respectively in 2024. This suggests sustained and accelerated growth in these countries, particularly after 2021. Kazakhstan and Turkmenistan show more moderate growth over the same period, at 97% and 128% respectively.

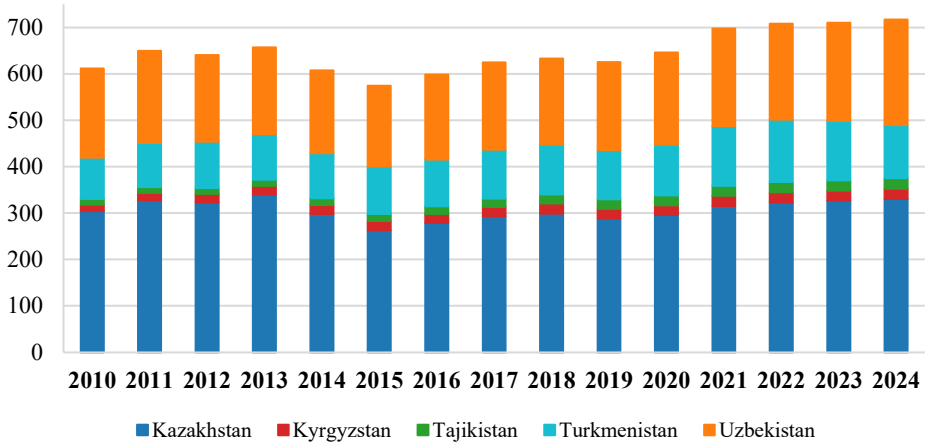
Should this trend continue, pressure on natural resources, infrastructure and the environment, especially in the fastest-growing countries, are expected to increase.

2. Central Asia's shared environment

2.1 Climate action

A divergence in GHG emission trajectories is observed across Central Asian countries, although all exhibit a common pattern of growth since 2010 (Figure 3). Kazakhstan and Uzbekistan account for most regional emissions and continue to show increasing trends over 2010–2024. Turkmenistan also records a steady rise, while Kyrgyzstan and Tajikistan remain low emitters despite gradual increases.

Figure 3: GHG emissions, 2010–2024, Mt CO_2eq



Source: Crippa et al. (2025).

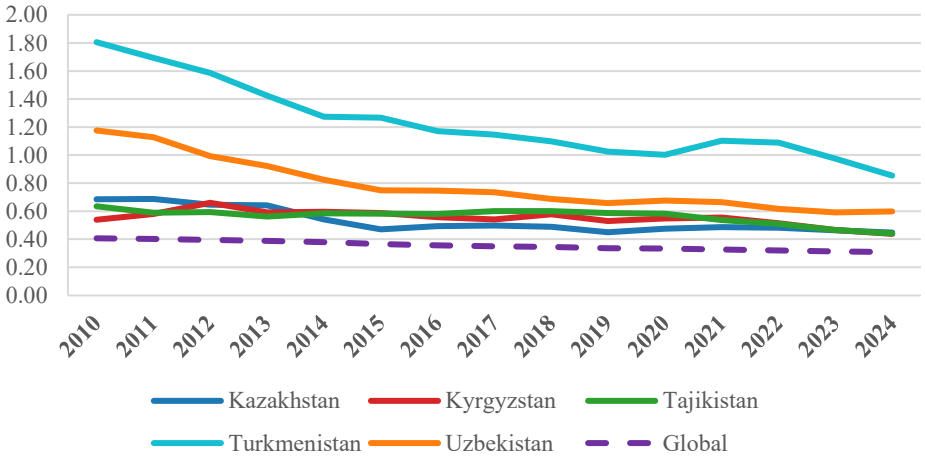
Between 2010 and 2024, the sector of land use, land-use change and forestry (LULUCF) in Central Asia shows an overall increase in net carbon removals, though trends vary by country. Kazakhstan, which drives the regional balance, shifted from a net source to a net sink after 2020 due to greater forest sequestration and lower emissions from other land categories. However, strong year-to-year fluctuations, mainly from wildfires, underscore the vulnerability of these sinks and the need for better forest and fire management. Kyrgyzstan and Tajikistan remain steady net sinks, with low land-use pressures but also limited potential for further mitigation without targeted land or forest interventions. Turkmenistan and Uzbekistan show more variability. Turkmenistan alternates between emissions and removals, influenced largely by fire events, though recent years suggest modest net removals. Uzbekistan has shifted from a net source to a net sink, driven by improved land management, particularly outside forest areas, but sustaining progress will require ongoing policy support.

Regionally, declining emissions from non-forest land and reduced fire impacts, together with stronger forest sinks, indicate progress in land management. However, the durability of these sinks remains uncertain amid rising climate risks.

GHG emissions intensity per unit of GDP has declined across all countries (Figure 4), indicating improvements in energy efficiency and structural economic changes. However, emissions intensity remains above the global average in all five Central Asian countries, reflecting continued dependence on carbon-intensive energy systems.

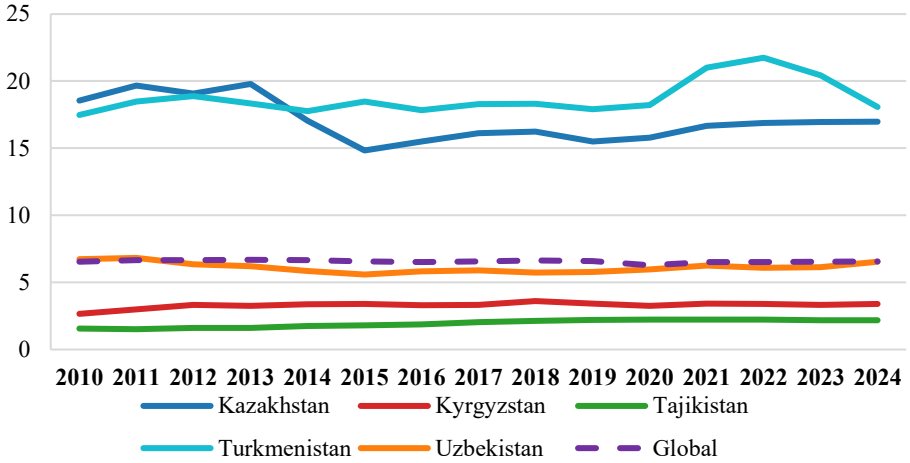
Per capita emissions vary significantly within the region (Figure 5). Kazakhstan and Turkmenistan report levels well above the global average, whereas Kyrgyzstan and Tajikistan remain substantially below it. Uzbekistan occupies an intermediate position, with a slight upward trend in recent years.

Figure 4: GHG emissions per GDP, 2010–2024, t CO_2eq/1,000 US$ PPP



Source: Crippa et al. (2025).

Figure 5: GHG emissions per capita, 2010–2024, t CO_2eq/1,000 US$



Source: Crippa et al. (2025).

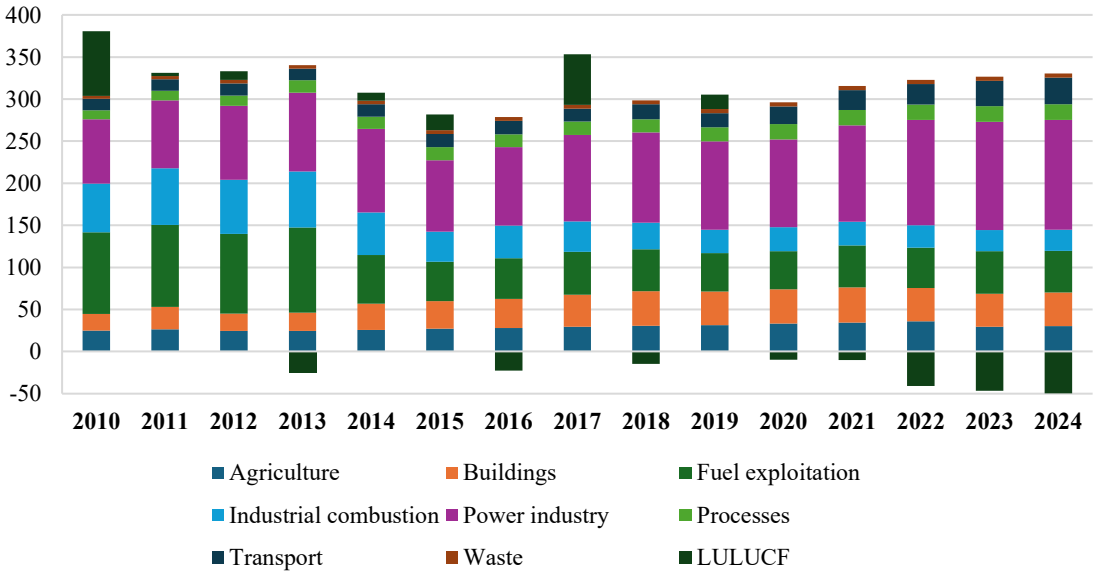
Overall, the region is improving its carbon efficiency. However, absolute emissions continue to increase, driven by economic growth and the persistence of energy-intensive sectors. This trend underscores the need for stronger mitigation policies targeting key emitting sectors, particularly in the largest economies.

All five countries are Parties to the Paris Agreement and submit nationally determined contributions (NDCs), though the ambition and implementation capacity vary considerably. However, measurement, reporting and verification (MRV) capacity is insufficient in most countries to tracking and documenting GHG emissions and emission reductions.

Kazakhstan

In Kazakhstan, GHG emissions declined from 342 Mt CO_2eq in 1990 to 304 Mt CO_2eq in 2010 before rising to 330 Mt CO_2eq in 2024 (Figure 6 and Table 1). Per capita emissions remain high despite gradual efficiency improvements, as reflected in the steady decline in emissions intensity per GDP (Table 1). Sectoral trends show a structural shift: early reductions (1990–2010) across most sectors were followed by renewed growth after 2010. The most recent period (2020–2024) is marked by strong emission increases in power (+25%) and transport (+49%) sectors, indicating renewed fossil-based growth (Table 2). Emissions are dominated by CO_2 (79%), underscoring the central role of energy combustion. Overall, the country shows improving efficiency but rising absolute emissions in recent years.

Figure 6: GHG emissions of Kazakhstan, 2010–2024, Mt CO_2eq



Source: Crippa et al. (2025).

Table 1: Summary of GHG emissions of Kazakhstan, 1990, 2010, 2020, 2024

	GHG emissions (Mt CO_2eq)	GHG emissions per capita (t CO_2eq/cap)	GHG emissions per unit of GDP (t CO_2eq/1,000 US$)
1990	342.27	20.69	1.18
2010	304.02	18.54	0.68
2020	296.35	15.78	0.48
2024	330.39	16.98	0.45

Source: Crippa et al. (2025).

Table 2: Trends in GHG emissions of Kazakhstan, 1990–2024

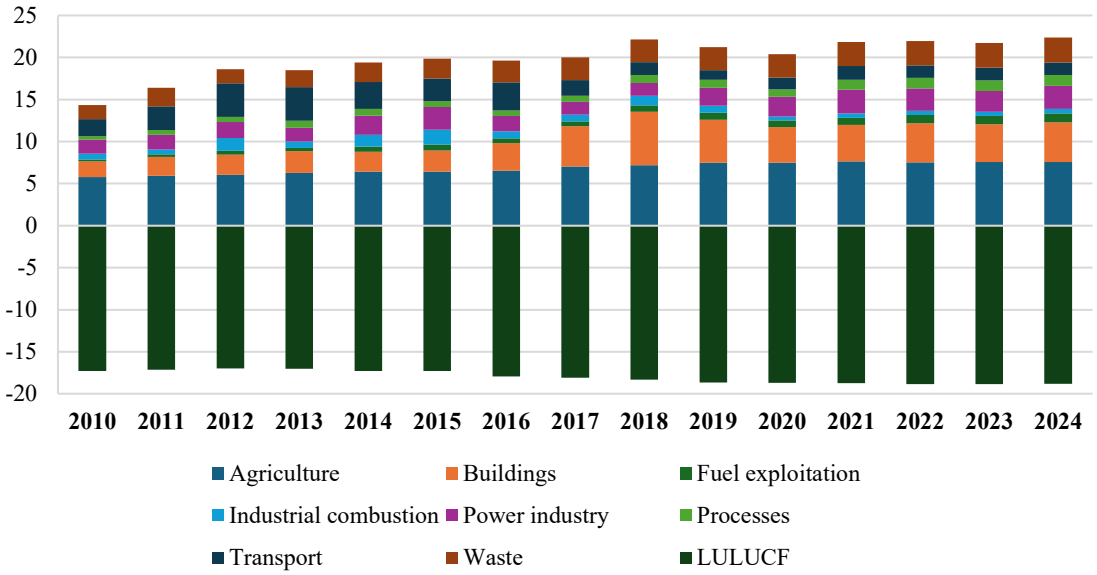
	1990–2010	2010–2020	2020–2024
Agriculture	-45%	+33%	-9%
Buildings	-27%	+106%	-3%
Fuel exploitation	+96%	-53%	+9%
Industrial combustion	-29%	-51%	-12%
Power industry	-30%	+36%	+25%
Processes		+68%	+3%
Transport	-9%	+57%	+49%
Waste	+29%	+34%	0%
All sectors	-11%	-3%	+11%

Source: Crippa et al. (2025).

Kyrgyzstan

Kyrgyzstan experienced a sharp emissions decline after 1990 (–57% by 2010), followed by a gradual increase to 22 Mt CO_2eq in 2024 (Figure 7 and Table 3). Despite this rebound, emissions remain well below 1990 levels, and per capita emissions are comparatively low (Table 3). Emissions intensity has improved significantly, particularly since 2020. Sectoral data reveal strong post-2010 growth in emissions across most sectors, especially fuel exploitation (+214%) and buildings (+126%) (Table 4). Waste emissions also increased substantially over time. The emissions profile is more balanced between CO_2 (48%) and CH_4 (44%). Overall, Kyrgyzstan is transitioning from a low-emissions base toward moderate growth, with increasing diversification of emission sources.

Figure 7: GHG emissions of Kyrgyzstan, 2010–2024, Mt CO_2eq



Source: Crippa et al. (2025).

Table 3: Summary of GHG emissions of Kyrgyzstan, 1990, 2010, 2020, 2024

	GHG emissions (Mt CO_2eq)	GHG emissions per capita (t CO_2eq/cap)	GHG emissions per unit of GDP (t CO_2eq/1,000 US$)
1990	33.37	7.63	1.25
2010	14.36	2.65	0.54
2020	20.40	3.24	0.55
2024	22.37	3.39	0.44

Source: Crippa et al. (2025).

Table 4: Trends in GHG emissions of Kyrgyzstan, 1990–2024

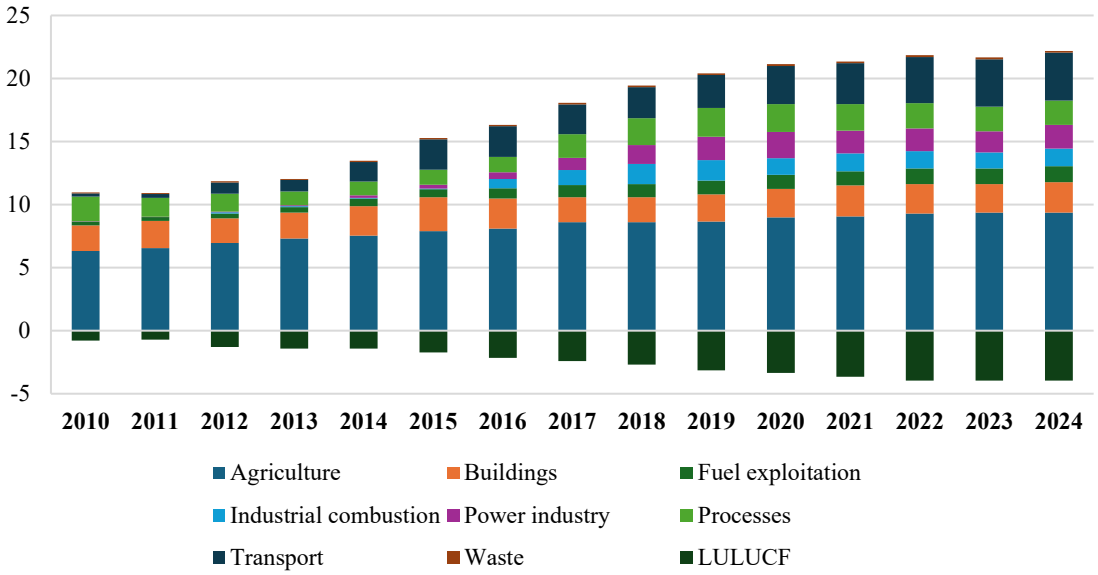
	1990–2010	2010–2020	2020–2024
Agriculture	-26%	30%	1%
Buildings	-58%	126%	12%
Fuel exploitation	-67%	214%	31%
Industrial combustion	-92%	-30%	15%
Power industry	-57%	40%	17%
Processes	-52%	115%	43%
Transport	-67%	-31%	7%
Waste	72%	64%	6%
All sectors	-57%	42%	10%

Source: Crippa et al. (2025).

Tajikistan

In Tajikistan, emissions halved between 1990 and 2010, then nearly doubled by 2020 and stabilized at around 22 Mt CO_2eq in 2024 (Figure 8 and Table 5). Per capita emissions remain low, and emissions intensity has improved significantly (Table 5). The most striking trends are the rapid increases in specific sectors after 2010, particularly power generation (+5,614%) and transport (+1,015%), indicating major structural changes, likely linked to energy system expansion and mobility. Agriculture and waste emissions also show steady growth (Table 6). The emissions mix is relatively balanced between CO_2 (47%) and CH_4 (44%). Overall, Tajikistan is characterized by rapid post-2010 growth from a very low base, with strong sectoral volatility and ongoing structural transformation.

Figure 8: GHG emissions of Tajikistan, 2010–2024, Mt CO_2eq



Source: Crippa et al. (2025).

Table 5: Summary of GHG emissions of Kyrgyzstan, 1990, 2010, 2020, 2024

	GHG emissions (Mt CO2eq)	GHG emissions per capita (t CO2eq/cap)	GHG emissions per unit of GDP (t CO_2eq/1,000 US$)
1990	21.99	4.16	0.98
2010	11.89	1.56	0.63
2020	21.13	2.23	0.58
2024	22.19	2.18	0.44

Source: Crippa et al. (2025).

Table 6: Trends in GHG emissions of Tajikistan, 1990–2024

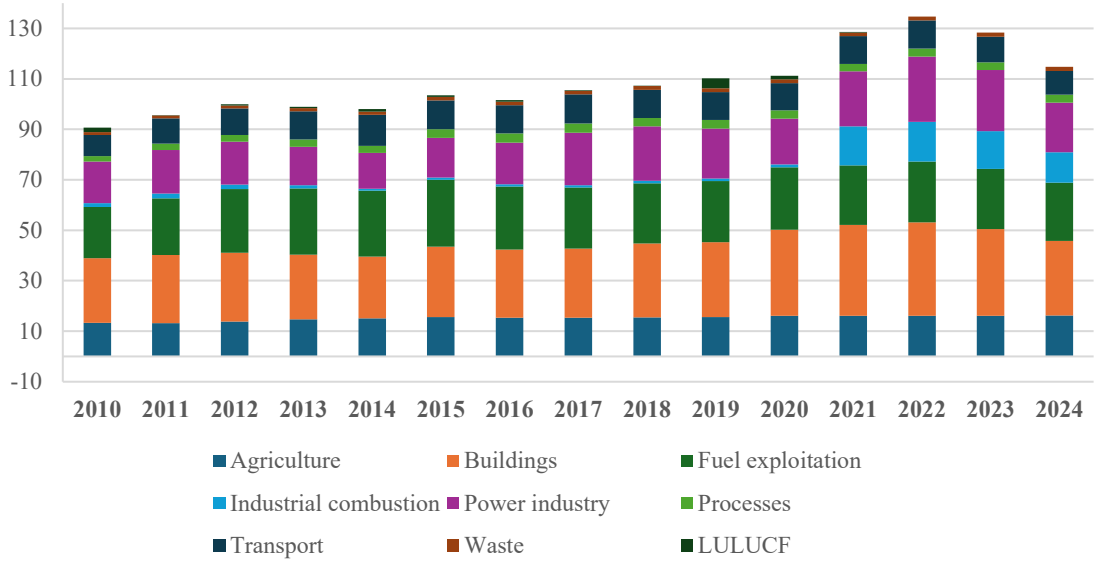
	1990–2010	2010–2020	2020–2024
Agriculture	+24%	+42%	+4%
Buildings	-77%	+11%	+6%
Fuel exploitation	-16	+275%	+14%
Industrial combustion			+6%
Power industry	-98%	+5 614%	-10%
Processes	-56%	+14%	-12%
Transport	-82%	+1 015%	+25%
Waste	+51%	+78%	+10%
All sectors	-50%	+93%	+5%

Source: Crippa et al. (2025).

Turkmenistan

Turkmenistan exhibits a continuous increase in emissions across the entire period, rising from 61 Mt CO_2eq in 1990 to 115 Mt in 2024 (Figure 9 and Table 7). Per capita emissions remain high and stable, while emissions intensity per GDP has improved (Table 7). Growth has been broad-based across sectors, particularly in agriculture, fuel exploitation and processing industries. Notably, industrial combustion shows an extreme increase in the most recent period (+864%), suggesting either rapid industrial expansion or reclassification effects (Table 8). CO_2 dominates the emissions profile (71%), reflecting the country's heavy reliance on fossil fuels. Overall, Turkmenistan demonstrates sustained emissions growth with limited signs of decoupling from economic activity.

Figure 9: GHG emissions of Turkmenistan, 2010–2024, Mt CO_2eq



Source: Crippa et al. (2025).

Table 7: Summary of GHG emissions of Turkmenistan, 1990, 2010, 2020, 2024

	GHG emissions (Mt CO_2eq)	GHG emissions per capita (t CO_2eq/cap)	GHG emissions per unit of GDP (t CO_2eq/1,000 US$)
1990	61.32	16.64	2.06
2010	88.86	17.47	1.81
2020	109.88	18.22	1.00
2024	114.81	18.06	0.85

Source: Crippa et al. (2025).

Table 8: Trends in GHG emissions of Turkmenistan, 1990–2024

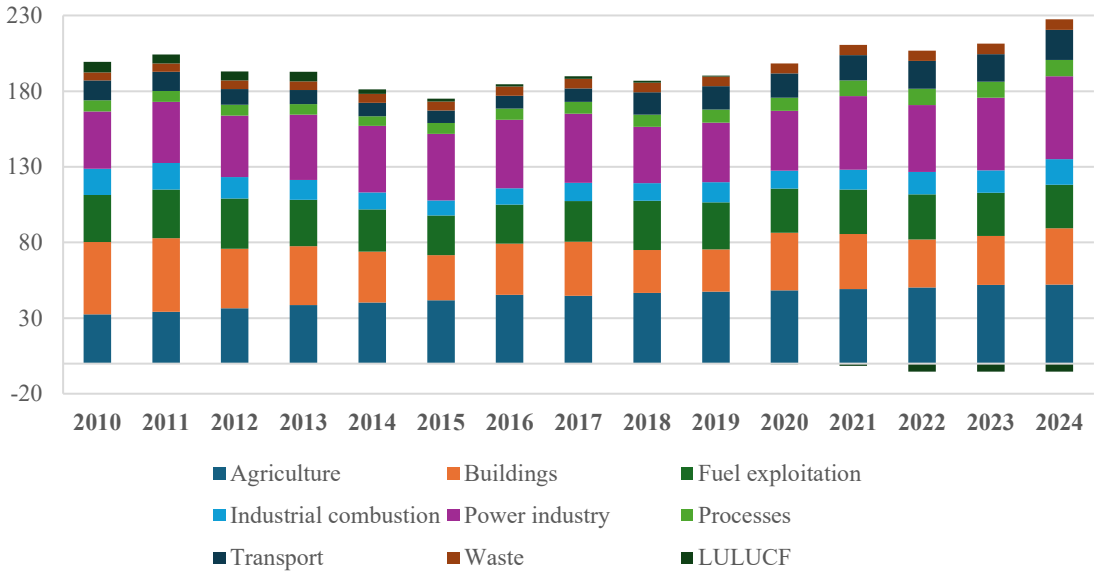
	1990–2010	2010–2020	2020–2024
Agriculture	+134%	+22%	+1%
Buildings	+21%	+33%	-13%
Fuel exploitation	+68%	+21%	-6%
Industrial combustion	+108%	-18%	+864%
Power industry	+64%	+10%	+8%
Processes	+138%	+53%	-3%
Transport	-15%	+29%	-13%
Waste	+55%	+34%	+7%
All sectors	+45%	+24%	+4%

Source: Crippa et al. (2025).

Uzbekistan

In Uzbekistan, GHG emissions rose steadily from 163 Mt CO_2eq in 1990 to 227 Mt in 2024 (Figure 10 and Table 9). Emissions intensity per GDP has improved significantly over time (Table 9). Sectoral trends indicate consistent growth in agriculture, transport and industry emissions, with particularly sharp historical increases in fuel exploitation (+208%) and industrial combustion. The most recent period (2020–2024) shows renewed growth across most sectors, especially power (+38%) and industry (+43%) (Table 10). CO_2 accounts for the majority of emissions (65%), with a significant CH_4 share (28%). Overall, Uzbekistan combines improving efficiency with steadily rising emissions driven by economic and industrial expansion.

Figure 10: GHG emissions for Uzbekistan, 2015–2024, Mt CO_2eq



Source: Crippa et al. (2025).

Table 9: Summary of GHG emissions of Uzbekistan, 1990, 2010, 2020, 2024

	GHG emissions (Mt CO_2eq)	GHG emissions per capita (t CO_2eq/cap)	GHG emissions per unit of GDP (t CO_2eq/1,000 US$)
1990	163.18	7.97	1.89
2010	192.44	6.73	1.18
2020	198.24	5.96	0.68
2024	227.49	6.54	0.60

Source: Crippa et al. (2025).

Table 10: Trends in GHG emissions of Uzbekistan, 1990–2024

	1990–2010	2010–2020	2020–2024
Agriculture	+23%	+49%	+8%
Buildings	-24%	-20%	-3%
Fuel exploitation	+208%	-6%	-1%
Industrial combustion	+4 104%	-31%	+43%
Power industry	-13%	+4%	+38%
Processes	-7%	+21%	+24%
Transport	+68%	+22%	+23%
Waste	+50%	+19%	+10%
All sectors	+18%	+3%	+15%

Source: Crippa et al. (2025).

National commitments

Kazakhstan's Strategy on Achieving Carbon Neutrality by 2060 is accompanied by a detailed roadmap, and its NDC sets an unconditional target of a 17% reduction in emissions below 1990 levels by 2035, rising to 25% with international support. The strategy acknowledges the fairness dimension of the transition but notes the absence of concrete mechanisms to manage social risks, such as retraining programmes and income protection for workers in affected sectors.

Kyrgyzstan's NDC sets an unconditional target of reducing net emissions by 18% relative to the projected 2030 baseline, and by 16% in 2035, with conditional commitments reaching 30% and 39%, respectively. According to the third NDC, approximately 71.4% of adaptation measures outlined in NDC 2.0 have been fully or partially implemented. Specific targets for agricultural emissions are also set. At the same time, government plans to significantly expand domestic coal production represent a contradictory signal, particularly since local coal is of lower quality and higher emissions intensity than the coal currently imported from Kazakhstan.

Tajikistan has set an unconditional emissions cap of 60–70% of 1990 levels through 2030, with a conditional cap of 50–60%. Because its electricity system relies predominantly on hydropower, absolute emissions remain relatively low. However, some sectors consume electricity at very low tariff rates, which undermines incentives for efficiency improvement. Coal production is planned to expand fivefold compared with the 2019–2022 average, and MRV capacity is insufficient to reliably track progress.

Turkmenistan has committed to a 20% reduction in GHG emissions by 2030 relative to 2010 levels. In 2023 the country joined the Global Methane Pledge and established an Interagency Commission on Methane Emissions Reduction, which are significant steps given that Turkmenistan's natural gas sector is among the largest sources of methane leakage globally.

Uzbekistan targets to reduce GHG emissions per unit of GDP by 35% by 2030 relative to 2010. However, in absolute terms, total GHG emissions are projected to continue rising due to population growth, better living standards and industrial development. Uzbekistan has adopted the broadest package of mitigation measures, covering energy, industry, waste, forestry, agriculture and transport. Uzbekistan joined the Global Methane Pledge in 2022 and plans to increase the share of renewables to 26% of electricity generation by 2030.

Advancing climate adaptation and resilience

Kazakhstan has embedded adaptation requirements directly in its Environmental Code, which mandates that vulnerability assessments and adaptation planning be integrated into development programmes across its priority sectors: agriculture, water management, forestry and civil defence.

Kyrgyzstan has embedded climate adaptation in its National Development Strategy 2018–2040 and has prepared a National Adaptation Plan (NAP) with sector-specific objectives. With FAO support, artificial glaciers were created and have accumulated more than 1.5 million m^3 of ice, sufficient to irrigate substantial agricultural areas. This technique is now being piloted in Uzbekistan.

Tajikistan has adopted the National Strategy for Adaptation to Climate Change to 2030, focused on reducing natural hazard risks to agriculture, food security and land use. Water management and storage are emphasised as core resilience components. The country has taken notable international leadership by spearheading the declaration of 2025 as the International Year for Glacier Protection, calling for an international glacier fund, protected glacier zones and strengthened monitoring systems.

Turkmenistan is integrating climate adaptation into national planning, with efforts focused on water-saving technologies, large-scale greening programmes and land management to combat desertification. In the water sector, key activities include the secondary use of collector-drainage water and promotion of modern irrigation efficiency measures.

Uzbekistan is developing five sectoral NAPs, implementation of which is estimated to cost around US$8 billion. Notably, some sectors are not yet incorporated into the adaptation planning framework, leaving significant gaps. Uzbekistan's adaptation priorities include efficient water use, climate-resilient agriculture, ecosystem protection,

resilient infrastructure and targeted responses to the Aral Sea crisis. Adaptation plans have also been prepared for the Aral Sea area (including Republic of Karakalpakstan) and for the Bukhara and Khorezm regions.

Several structural constraints hinder the full implementation of climate adaptation and resilience goals across the Central Asia region. Systems to monitor and evaluate adaptation efforts remain underdeveloped in most countries, making it difficult to assess the effectiveness of measures already underway.

Climate finance

Climate finance access is uneven and constrained. While the Adaptation Fund, Global Environment Facility and Green Climate Fund (GCF) are active in the region, uptake is limited by low institutional capacity in recipient countries, high staff turnover and insufficient understanding of the operational modalities of international financial institutions.

Kazakhstan estimates its total financial commitments to the climate transition at US$71.8 billion, representing an annual investment equivalent to 2.5% of its current GDP. To mobilize this capital, the country aims to leverage domestic public finance and private sector engagement alongside international climate finance through multilateral funds and institutions.[1] Investment in clean energy in Kazakhstan reached approximately US$1.32 billion in 2024, representing an increase of around 213% from US$423.57 million in 2023.[2] The country attracted US$4.6 billion in the Belt and Road Initiative investments in 2024, with a significant portion directed to renewables and electricity production,[3] making it the primary recipient of Chinese clean energy finance in the region.

In the first half of 2025, Kyrgyzstan had to import over 20% of all electricity consumed, and domestic hydropower generation fell 16% between 2018 and 2022 due to glacial retreat and aging infrastructure. In response, Kyrgyzstan embarked on the modernization of the Toktogul hydropower plant, planning to add an additional 240 MW to its current 1,200 MW of installed capacity, while an ambitious US$2 billion 1,900 MW renewable project in the Issyk-Kul region is under consideration.[4]

Tajikistan's financial capacity for domestically financed decarbonization is severely constrained. Tajikistan will require substantial international financial support to establish its MRV system for emissions and may encounter difficulty with data collection for carbon pricing purposes. The few large-scale energy investments underway are externally financed through multilateral development banks rather than domestic public appropriations.[5]

Turkmenistan's public financial commitment to low-carbon technologies is negligible and poorly documented. The country has largely been absent from multilateral climate finance processes, and no reliable data exist on dedicated budget allocations toward climate mitigation measures. Turkmenistan's stated clean energy targets include a 16 MW hybrid solar-wind installation by 2025 and a first 100 MW solar public-private partnership project by 2027.

Uzbekistan has rapidly become the region's most dynamic reformer in energy finance, combining ambitious targets with significant public-private investment mobilization. Clean energy investment in Uzbekistan reached approximately US$2.90 billion in 2024, an increase of around 43% from US$2.03 billion in 2023.[6] This trajectory reflects a concerted government strategy to attract international capital. Greenfield foreign direct investment in renewables increased from US$1.4 billion between 2014 and 2018 to US$11.7 billion between 2019 and 2023, representing 50.1% of total greenfield foreign direct investment.[7] Uzbekistan's climate expenditure has grown from 2.5% to 3.0% of the total budget, amounting to 26,302.4 billion soums in 2022. Approximately 95% of total climate expenditures are concentrated in adaptation measures, particularly water efficiency and irrigation.[8] On the mitigation side, large-scale clean energy infrastructure is primarily financed through public-private

[1] UNEP (2025a).
[2] Climatescope (n.d. a).
[3] Vakulchuk et al. (2025).
[4] The Diplomat (2025).
[5] Sabyrbekov et al. (2023).
[6] Climatescope (n.d. b).
[7] OECD (2025).
[8] Asian Infrastructure Investment Bank (2024).

partnerships rather than direct budget appropriation. Over recent years, Uzbekistan attracted approximately €30 billion to the energy sector, adding 9,000 MW of new capacity since 2017 and raising total electricity generation from 60 billion to 85 billion kWh in 2024.[9]

Disaster risk reduction

Across the region, progress in disaster risk reduction (DRR) has been guided primarily by the Sendai Framework for Disaster Risk Reduction 2015–2030. At the regional level, the Strategy for Development of Cooperation of Countries of Central Asia in Disaster Risk Reduction for 2022–2030, endorsed by heads of emergency authorities, outlines priorities for regional institutional strengthening, improved risk understanding, increased investment in DRR and enhanced preparedness. Hazards are transboundary in nature, but governance responses remain largely national and fragmented. Roles and responsibilities across stakeholder institutions in several countries are insufficiently defined, and high turnover of qualified staff in scientific and operational institutions undermines institutional continuity. DRR efforts remain predominantly reactive rather than prevention oriented.

Concern persists about the safety of more than 100 large dams and water-control facilities across the region, most of them on transboundary rivers. Ageing infrastructure, limited maintenance and growing populations in downstream floodplains all increase shared risks. Transboundary DRR cooperation remains fragile: effective implementation of flood-related water-release agreements and interoperable early warning systems requires further strengthening. The International Atomic Energy Agency has adopted a new strategic master plan extending cooperation with Kyrgyzstan, Tajikistan and Uzbekistan on the remediation of uranium legacy sites through 2030 to prevent significant cross-border risks.

2.2 Biodiversity and ecosystems

Protecting biodiversity and ecosystems

Biodiversity provides vital ecosystem services such as supporting agriculture and pastoralism, regulating water systems and offering cultural and recreational value through ecotourism. However, continued environmental degradation risks undermining these benefits, posing a serious threat to both the region's ecological balance and its long-term sustainable development. The lack of comprehensive national and regional monitoring on species has limited understanding of species trends.

In Central Asia, mining operations, oil and gas extraction, and the construction of roads, pipelines and water reservoirs have contributed significantly to environmental degradation. These activities have resulted in the pollution of air, water and soil; the accumulation of heavy metals and radioactive substances; the destruction of natural habitats; and the spread of invasive species. Additionally, irrigation and drainage infrastructure has altered water regimes, further weakening fragile ecosystems. Deforestation, unsustainable resource use, and the accelerating impacts of climate change compound these pressures on biodiversity and ecosystem stability.

Rapid population growth and continued economic expansion have intensified grassland degradation, overfishing and hunting. Although reforestation initiatives have markedly reduced illegal logging, human demand for natural resources persists at unsustainable levels. Consequently, habitat loss and ecosystem degradation are driving the decline of plant and animal populations, eroding genetic diversity and diminishing species' natural resilience to disease and climate change. These trends collectively threaten regional biodiversity and undermine the ecological balance essential to sustaining both natural systems and human livelihoods.

All five Central Asian countries shown scores close to 1 on the Red List Index, which means biodiversity is relatively well preserved across the region[10] (SDG indicator 15.5.1[11]). In 2019, the lowest biodiversity index score was at 0.886, indicating relatively higher proportions of threatened species. The highest score, approximately 0.989, reflected the lowest level of species threat. For the period 2015–2019, most countries show a very slight decline in their scores, meaning species are gradually becoming more at risk over time. Tajikistan is

[9] Euro new (2025).

[10] Red List Index measures the risk of extinction of species in a country, on a scale from 0 to 1. A score of 1.0 means all species are safe with no extinction risk, while a score of 0.0 means all species have gone extinct.

[11] SDG Target 15.5: Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species.

the exception, showing a marginal improvement. Even though the changes are small, any downward trend is a warning sign for conservation efforts and biodiversity protection in the region.

Protected areas

The extent of protected areas in Central Asian countries varies considerably (Table 11). While absolute protected area size is often larger in geographically extensive countries, proportional coverage provides a more meaningful indicator of progress toward global conservation targets. Only Kazakhstan and Turkmenistan have access to the Caspian Sea, allowing for designated marine or coastal protected areas. However, high percentages of marine protection may reflect the relative ease of designating large offshore zones rather than the effectiveness of conservation management.

Table 11: Protected areas, percentage of the territory as of March 2026

	Terrestrial and inland waters protected areas	Marine and coastal
Kazakhstan	10.05	52.46
Kyrgyzstan	6.77	Not applicable
Tajikistan	22.58	Not applicable
Turkmenistan	4.26	4.21
Uzbekistan	14.11	Not applicable

Source: https://www.protectedplanet.net/en/search-areas?geo_type=country.

Under the Convention on Biological Diversity (CBD), the Aichi Biodiversity Target 11 (2010–2020) called for the protection of at least 17% of terrestrial and inland water areas and 10% of marine areas. Target 11 also requires protected areas to be effectively and equitably managed, ecologically representative and well-connected.[12] The Central Asian countries have not fully met the 2020 Aichi Biodiversity targets. They face significant gaps, such as assessments of management effectiveness are limited and systematic evaluation of ecological representativeness or connectivity is insufficient. More recently, the Kunming-Montreal Global Biodiversity Framework was adopted in 2022. The Framework established, amongst others, a more ambitious target of conserving 30% of land and sea areas by 2030. All five countries remain below the Global Biodiversity Framework target.

Migratory species

Central Asia remains one of the last global strongholds of long-distance terrestrial migrations, supported by vast steppe, desert and mountain ecosystems. These migrations are essential ecological processes that enable species to respond to extreme seasonal variability by accessing food, water and suitable breeding grounds. The Central Asian Mammals Initiative, endorsed in 2014 by the Convention of Migratory Species (CMS), provides a collaborative framework to conserve 15–17 migratory mammal species across 14 countries, including the snow leopard (*Panthera uncia*) and saiga antelope (*Saiga tatarica*).[13]

The conservation status of many migratory species is of concern. Several are classified as endangered or critically endangered, while others are considered vulnerable. Across the region, populations have declined due to a combination of habitat loss, poaching and increasing barriers to movement. These pressures not only reduce population sizes but also disrupt migration patterns and ecological dynamics that are critical for long-term survival.

The current Central Asian networks of protected areas show significant limitations in their effectiveness for conserving migratory species. Protected area networks are often fragmented and do not align with migration routes, which usually extend beyond their boundaries. Animals therefore remain exposed to threats when moving between seasonal habitats. Furthermore, the distribution and management effectiveness of protected areas vary considerably between countries, leading to uneven conservation outcomes. Many of the migration corridors are transboundary and require coordinated management across national borders.

Threats to migratory species include infrastructure such as roads, railways, pipelines and border fences that fragment habitats and obstruct migration routes. Agricultural land reductions, urban expansion and resource

[12] CBD (n.d.).
[13] CMS (2025).

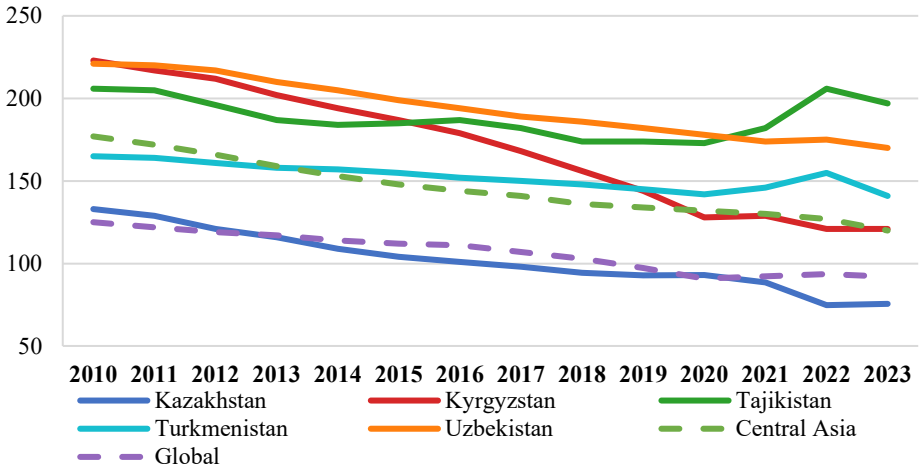
extraction further degrade and fragment ecosystems. Poaching, climate change and disease outbreaks compound these pressures by reducing populations, altering migration patterns and increasing mortality, leaving many species less able to adapt to environmental variability within increasingly fragmented landscapes.

2.3 Environmental pollution

Air pollution

The death rate attributable to air pollution in Central Asia shows a clear overall decline from 2010 to 2023 (Figure 11). At the regional level, the death rate fell steadily from 177 per 100,000 to 120 per 100,000, representing a reduction of about 32%. This indicates substantial progress in reducing premature mortality linked to air pollution. Globally, death rates also declined from 125 per 100,000 to 92 per 100,000 over the same period. Although Central Asia consistently remains above the global average, the gap has narrowed considerably, suggesting that the region is gradually converging toward global levels.

Figure 11: Death rates attributable to air pollution, 2010–2023, per 100,000

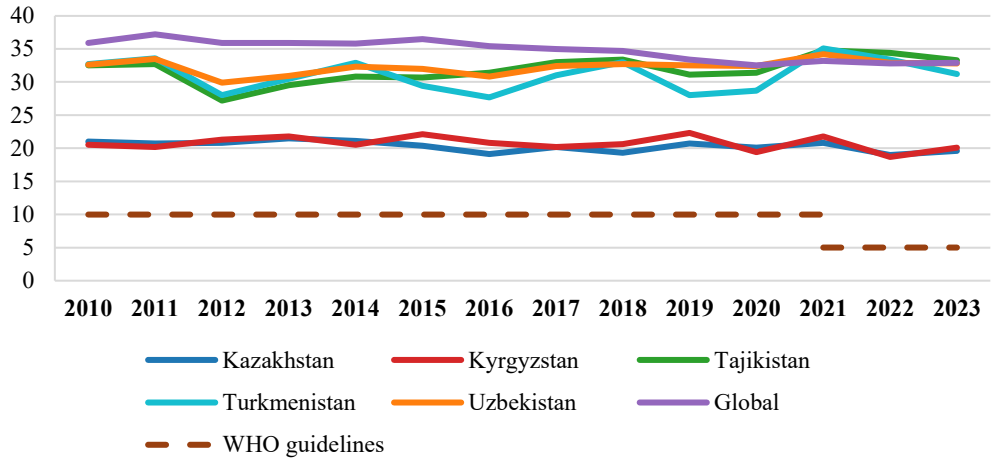


Source: Health Effects Institute (2025).

Ambient particulate matter pollution

Fine particulate matter ($PM_{2.5}$) remains a significant environmental health risk across Central Asia. Average population-weighted $PM_{2.5}$ concentrations in Central Asia declined slightly over the assessment period, from 29 µg/m^3 in 2010 to 27.9 µg/m^3 in 2023 (Figure 12).

Figure 12: Average annual population-weighted $PM_{2.5}$, 2010–2023, µg/m^3



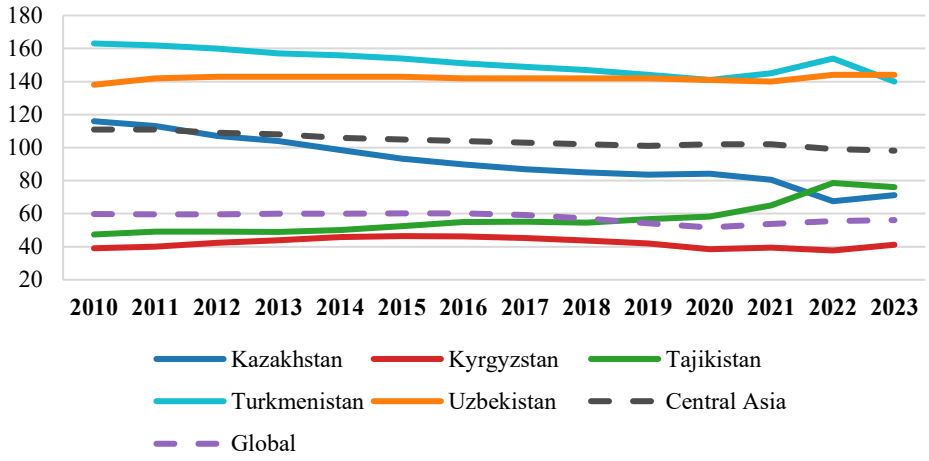
Source: Health Effects Institute (2025).

Despite this modest improvement, concentrations remain nearly three times higher than the current World Health Organization (WHO) guideline value of 5 µg/m^3. Country-level data show relatively lower and stable concentrations in Kazakhstan and Kyrgyzstan (around 19–21 µg/m^3), while Tajikistan, Turkmenistan and Uzbekistan consistently record higher levels, generally in the range of 30–35 µg/m^3. Pollution trends are not uniform, with several countries experiencing fluctuations and temporary increases, particularly after 2020.

Health outcomes attributable to $PM_{2.5}$ exposure have improved more markedly than pollution levels. The regional death rate declined from 111 per 100,000 to 98.1 per 100,000 population between 2010 and 2023 (Figure 13). This trend suggests progress in reducing the health burden of air pollution, potentially reflecting improvements in healthcare systems, public health interventions and environmental policies. Nevertheless, mortality in Central Asia remain substantially higher than global averages, which stood at 56.1 per 100,000 in 2023.

The analysis indicates that the relationship between $PM_{2.5}$ exposure and health outcomes is influenced by additional factors beyond pollution levels alone. Differences in population vulnerability, healthcare access, underlying health conditions and the composition of air pollutants likely contribute to the observed variations.

Figure 13: Death rates attributable to $PM_{2.5}$, 2010–2023, per 100,000



Source: Health Effects Institute (2025).

Ambient ozone pollution

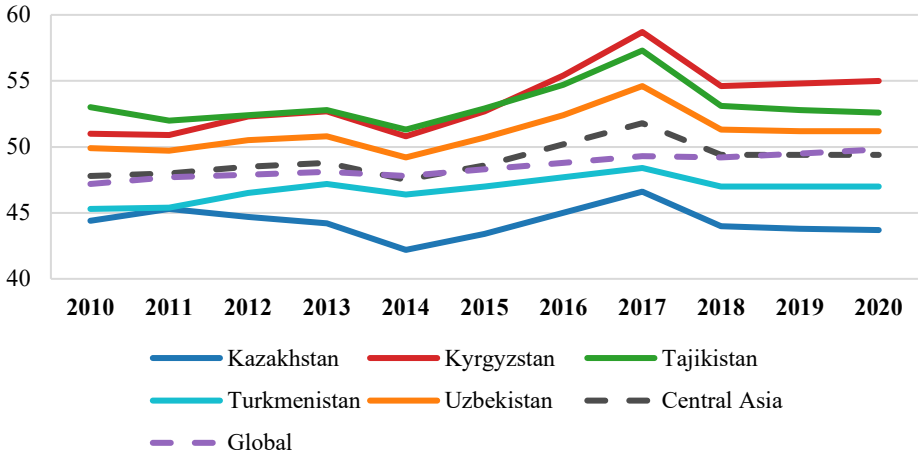
Ground-level ozone is an important air pollutant with adverse effects on respiratory health. An assessment of trends in Central Asia from 2010 to 2023 shows relatively stable exposure levels over time, accompanied by moderate reductions in associated mortality and disease burden. Compared with $PM_{2.5}$, ozone contributes a smaller but still significant share of the overall health burden from air pollution.

Average seasonal population-weighted ozone concentrations in Central Asia remained broadly stable over the period, increasing slightly from 47.8 parts per billion (ppb) in 2010 to around 49.4 ppb in 2020 (Figure 14). The regional trend closely follows the global pattern, where ozone levels also remained relatively constant. Country-level differences are evident. Kyrgyzstan and Tajikistan consistently record the highest concentrations, exceeding 50 ppb and reaching peaks above 55 ppb in some years. Uzbekistan also shows elevated levels, while Kazakhstan and Turkmenistan maintain comparatively lower concentrations, generally in the mid-40s. A regional peak is observed around 2016–2017, followed by a slight decline and stabilization.

Despite relatively stable exposure levels, health impacts attributable to ozone have generally decreased. The death rate in Central Asia rose from 2.16 per 100,000 in 2010 to a peak of 3.64 per 100,000 in 2017, before declining steadily to 2.55 per 100,000 by 2023 (Figure 15). This pattern suggests a delayed or non-linear relationship between exposure and mortality, potentially influenced by lag effects, improvements in healthcare, or changes in population vulnerability. Importantly, ozone-attributable mortality in Central Asia remains consistently lower than the global average, which stood at 5.24 per 100,000 in 2023.

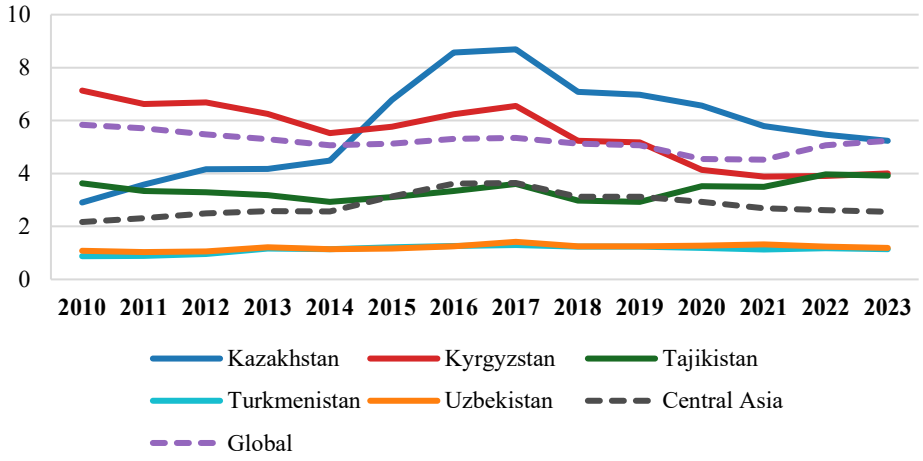
Overall, ozone exposure in Central Asia has remained relatively stable, associated health impacts have declined in recent years. The weaker and less direct relationship between ozone concentrations and health outcomes, compared with $PM_{2.5}$, may reflect differences in pollutant characteristics, exposure patterns and underlying health conditions.

Figure 14: Average seasonal population-weighted ozone, 2010–2020, ppb



Source: Health Effects Institute (2025).

Figure 15: Death rates attributable to ozone, 2010–2023, per 100,000



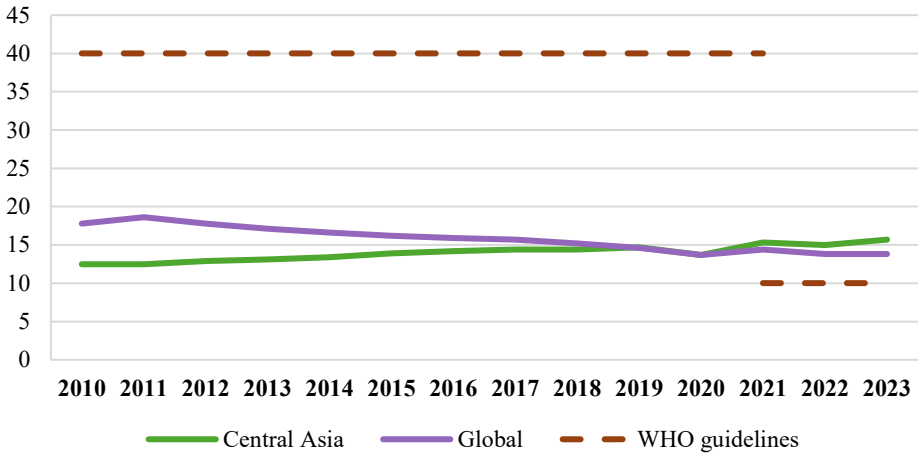
Source: Health Effects Institute (2025).

Nitrogen dioxide pollution

Average population-weighted nitrogen dioxide (NO_2) concentrations in Central Asia increased from 12.5 µg/m^3 to 15.7 µg/m^3 over the period, indicating a deterioration in air quality (Figure 16). A temporary decline in 2020, linked to reduced activity during the COVID-19 pandemic, was followed by a rebound. In contrast, global NO_2 levels declined from 17.8 µg/m^3 to 13.8 µg/m^3, narrowing the gap between the region and global averages.

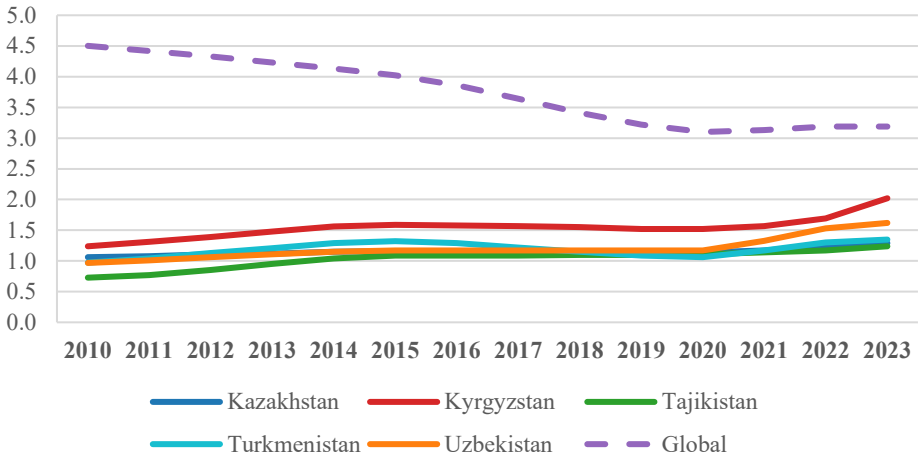
The health burden attributable to NO_2, measured in disability life-adjusted years (DALYs) per 100,000 population, rose in Central Asia from 1.05 per 100,000 to 1.52 per 100,000, while declining globally from 4.5 per 100,000 to around 3.19 per 100,000 (Figure 17). Kyrgyzstan and Uzbekistan show the most pronounced increases in both exposure and health impacts, while trends in Kazakhstan, Tajikistan and Turkmenistan are more moderate but consistently upward. Overall, data indicate worsening air quality and increasing health risks, including both premature mortality and morbidity, in Central Asia, in contrast to global improvements.

Figure 16: Average annual population-weighted NO_2, 2010–2023, µg/m^3



Source: Health Effects Institute (2025).

Figure 17: DALYs rates attributable to NO_2, 2010–2023, per 100,000



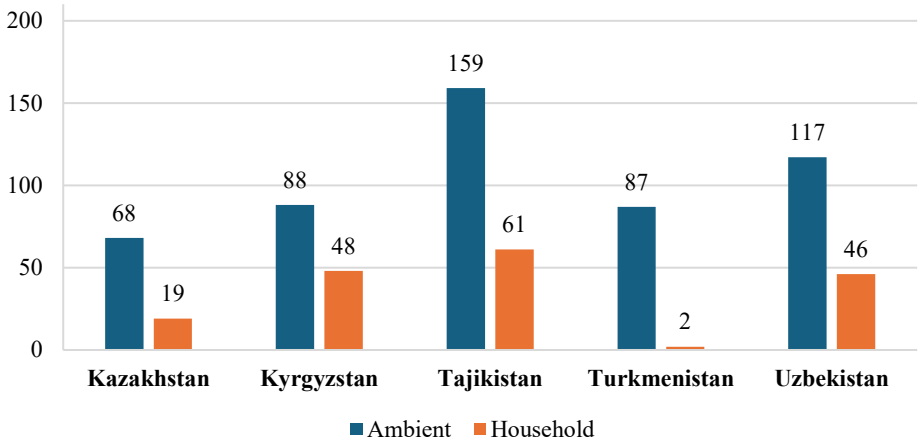
Source: Health Effects Institute (2025).

SDG indicators 3.9.1 and 11.6.2

The age-standardized mortality rate attributed to household and ambient air pollution (SDG indicator 3.9.1[14]). in Central Asia in 2019 reveals clear differences in the scale and sources of health risks across countries, while also highlighting a shared regional burden (Figure 18). Across all countries, urban and city populations are systematically more exposed than rural populations, and town/semi-dense areas fall between urban and rural values. In the period 2010–2019, the annual mean levels of fine particulate matter (e.g. $PM_{2.5}$ and PM_{10}) by location (population weighted) (SDG indicator 11.6.2[15]) show gradual declines, indicating improvements in air quality, though disparities between urban and rural populations persist, especially in Tajikistan, Kazakhstan and Uzbekistan (Figure 19).

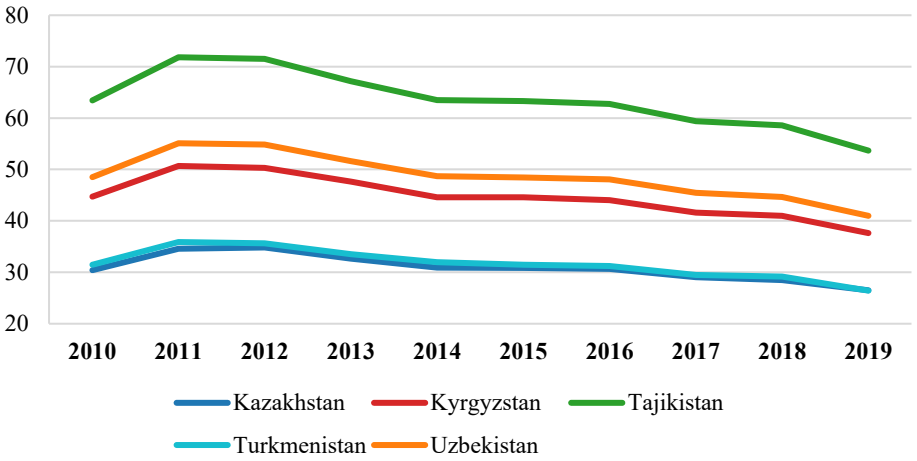
[14] SDG Target 3.9: By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination.
[15] SDG Target 11.6: By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management.

Figure 18: Age-standardized mortality rate attributed to air pollution, 2019, deaths per 100,000



Source: Global Health Observatory, 2026.

Figure 19: Annual mean levels of $PM_{2.5}$ (population-weighted) in all areas, 2010–2019, µg/m³



Source: WHO, 2026.

Promoting integrated waste management

Between 2015 and 2025, municipal solid waste (MSW) generation per capita increased in all five Central Asian countries, driven by rising consumption, urban expansion and broader service coverage. By 2025, per-capita MSW levels ranged roughly 0.6–0.9 kg/day across the region. Data are not harmonized at the regional level, which limits cross-country comparability and implies that regional MSW trends should be interpreted with caution and anchored to documented data limitations. Central Asia waste-disposal policy is shaped by aging infrastructure, low recycling rates and insufficient collection capacity. Despite government initiatives, most waste still ends up in illegal or authorized dumpsites.[16] Overall, the upward trajectory in per-capita MSW generation across Central Asia aligns with broader global trends, where rising incomes and urbanization contribute to higher waste outputs, a pattern well-documented in global assessments of waste generation dynamics.[17]

The Central Asian countries have experienced a gradual transformation in hazardous waste management between 2015 and 2025, driven largely by the rapid growth of hazardous industrial and electronic waste streams. E-waste has become one of the fastest-growing hazardous waste categories in the region.[18] Since 2022 these countries

[16] UNEP (2017).
[17] World Bank (n.d.).
[18] UNITAR (2023).

have been developing national e-waste datasets, quantitative projections up to 2050, and national roadmaps aimed at improving collection and recycling due to the lack of sufficient treatment infrastructure in earlier years.[19]

Furthermore, regional cooperation has intensified, as the five countries have coordinated policies through multilateral environmental agreements (MEAs), to strengthen hazardous chemical and waste governance, reduce pollution and harmonize regulatory frameworks, signalling clearer institutional alignment and a shared approach to safer hazardous waste treatment compared to the fragmented systems that dominated a decade earlier.[20] However, it was not possible to examine country-specific data, as such information is currently unavailable.

Waste recycling is directly linked to SDG 12 (Responsible Consumption and Production), particularly target 12.5, which calls on countries to substantially reduce waste generation through prevention, reduction, recycling and reuse by 2030. Limited data available on waste recycling do not allow for an assessment of trends at the regional level.

2.4 Natural resources management

Water

Water resources

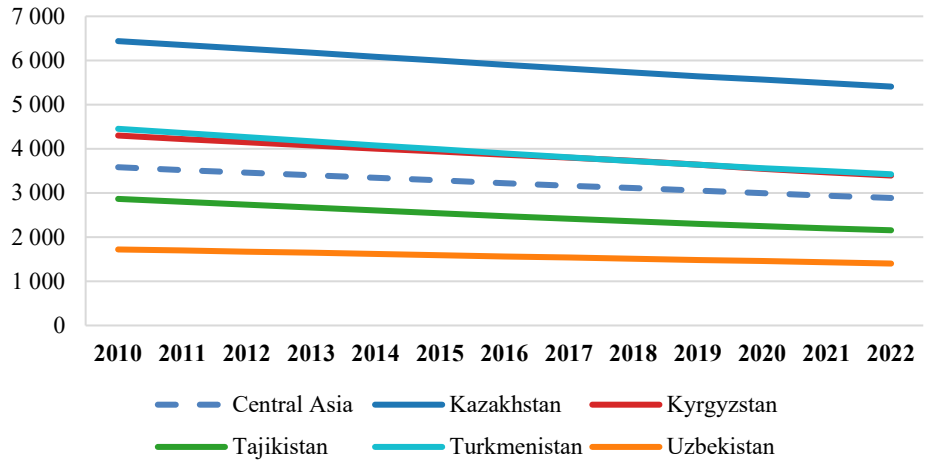
The total renewable water resources in Central Asia are estimated at approximately 228.75 billion m^3. Table 12 shows the distribution among Central Asian countries. Over the period 2010–2022, renewable water resources per capita declined across the region by approximately 20%, reflecting demographic growth and increasing pressure on available resources (Figure 20).

Table 12: Water resources in Central Asian countries, billion m^3

	Kazakhstan	Kyrgyzstan	Tajikistan	Turkmenistan	Uzbekistan
Groundwater	33.85	13.69	6.00	0.41	8.80
Surface water	100.56	21.148	18.91	24.36	42.07
Overlap	26.00	11.22	3.00	-	2.00
Total	**108.41**	**23.618**	**21.91**	**24.77**	**48.87**

Source: FAO AQUASTAT Dissemination System, 2026.
Note: Overlap between surface water and groundwater represents the volume of water common to both systems, such as base flow (groundwater discharging into rivers)

Figure 20: Total renewable water resources per capita, 2010–2022, m^3/capita



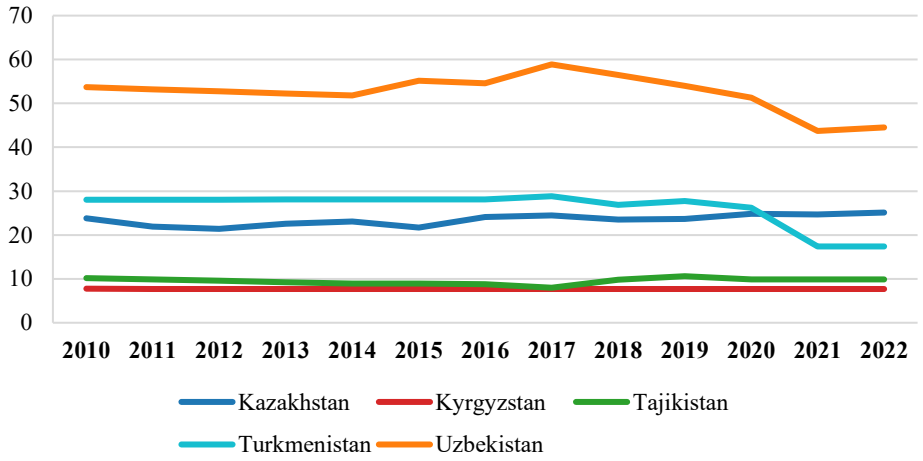
Source: FAO AQUASTAT Dissemination System, 2026.

[19] Umwelt Bundesamt (2023).
[20] UNEP (2025).

Water abstraction

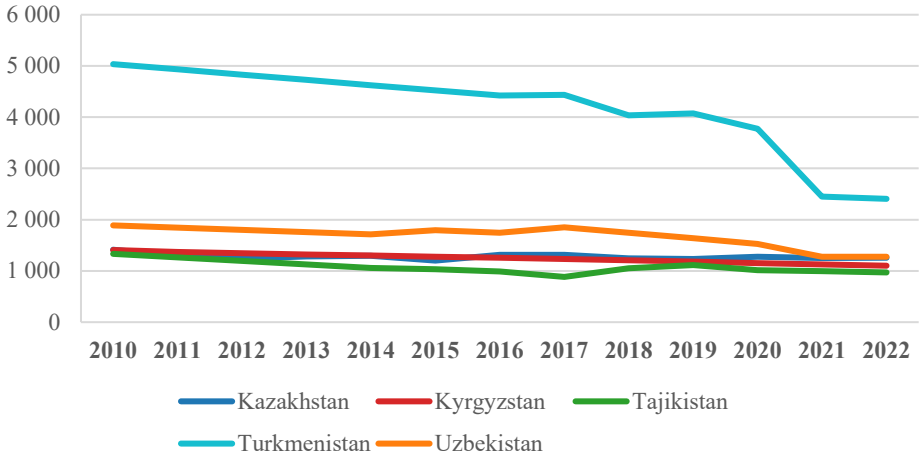
In the period 2010–2022, total water abstraction in the region declined from 53% to 46% of available renewable water resources, indicating a gradual reduction in overall water abstraction pressure (Figure 21). Water abstraction per capita also decreased in all countries, suggesting improvements in water use efficiency and/or reduced demand (Figure 22).

Figure 21: Total water abstraction, 2010–2022, billion m^3



Source: FAO AQUASTAT Dissemination System, 2026.

Figure 22: Total water abstraction per capita, 2010–2022, m^3/capita

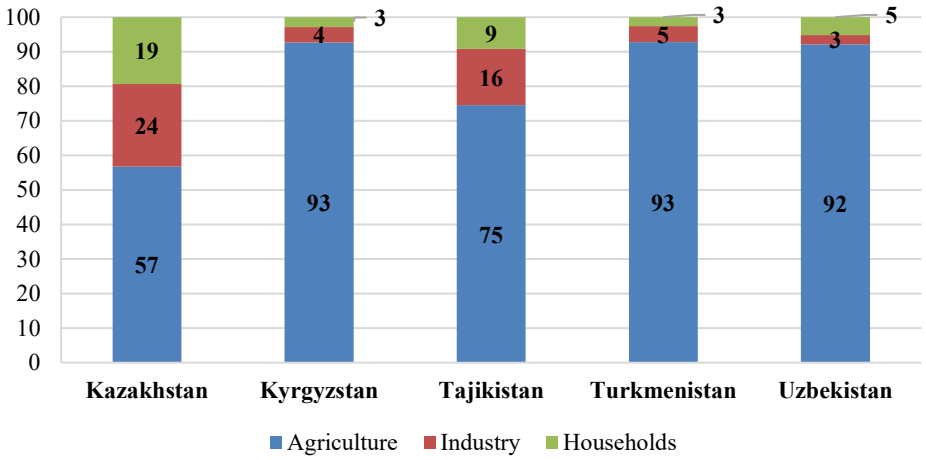


Source: FAO AQUASTAT Dissemination System, 2026.

Water use

In 2022, agriculture accounted for the largest share of water use in all Central Asian countries, exceeding 90% in Kyrgyzstan, Turkmenistan and Uzbekistan, compared with 7% in Tajikistan and 57% in Kazakhstan (Figure 23).

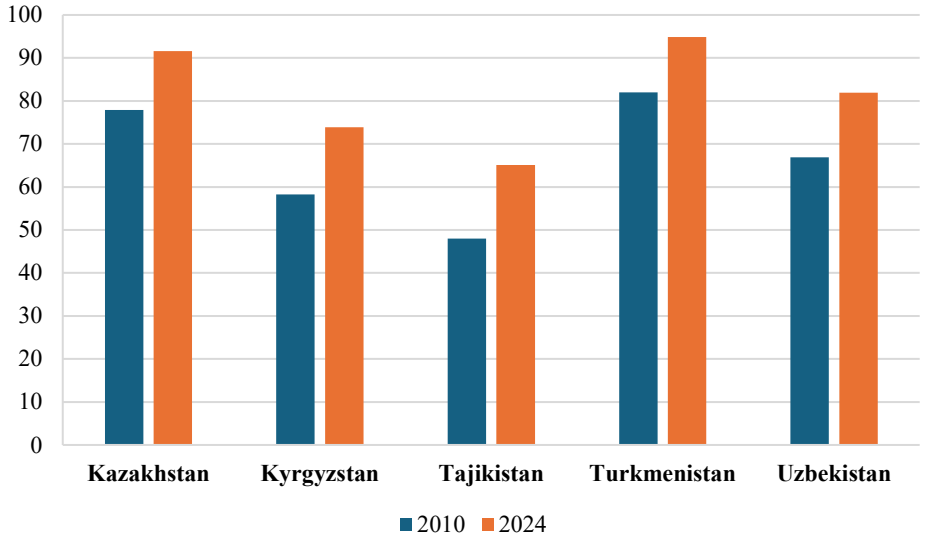
Figure 23: Water use, 2022, percentage



Source: FAO AQUASTAT Dissemination System, 2026.

Between 2010 and 2024, the five Central Asian countries improved their populations' access to safely managed drinking water (SDG indicator 6.1.1[21]) as shown in Figure 24. The region made steady progress over these 14 years. The countries that initially had the lowest access rates, namely Tajikistan and Kyrgyzstan, recorded the greatest gains. Rural areas were the main driver of this progress: in Uzbekistan and Kyrgyzstan in particular, rural populations benefited far more from access to drinking water than urban populations, thus significantly reducing the gap between urban and rural areas. Turkmenistan and Kazakhstan remain the top performers in the group, with access rates exceeding 90% across all areas. Tajikistan, on the other hand, is lagging behind with a rate of 65.11% in 2024, making it the only country in the region whose rate remains below 70%.

Figure 24: Population using safely managed drinking water in all areas, 2010 vs 2024, percentage



Source: WHO/UNICEF Joint Monitoring Programme for Water Supply, Sanitation and Hygiene (2025).

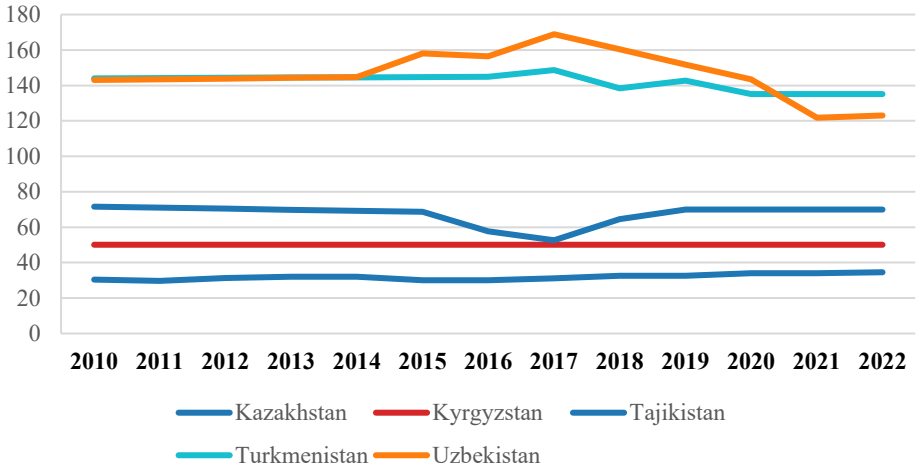
Water stress

Water stress represents the ratio of total freshwater withdrawn to total available renewable freshwater resources (SDG indicator 6.4.2[22]). Levels in Central Asia remain high, with varying trends across countries over the period

[21] SDG Target 6.1: By 2030, achieve universal and equitable access to safe and affordable drinking water for all.
[22] SDG Target 6.4: By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity.

2010–2022, reflecting significant pressure on available water resources (Figure 25). In 2022, water stress in Kazakhstan and Kyrgyzstan is low, respectively, 35% and 50%. Water stress in Tajikistan is high at about 70%. However, in Turkmenistan and Uzbekistan, water stress level is more than 100% and therefore critical, respectively, 135% and 123%.

Figure 25: Level of water stress, 2010–2022,

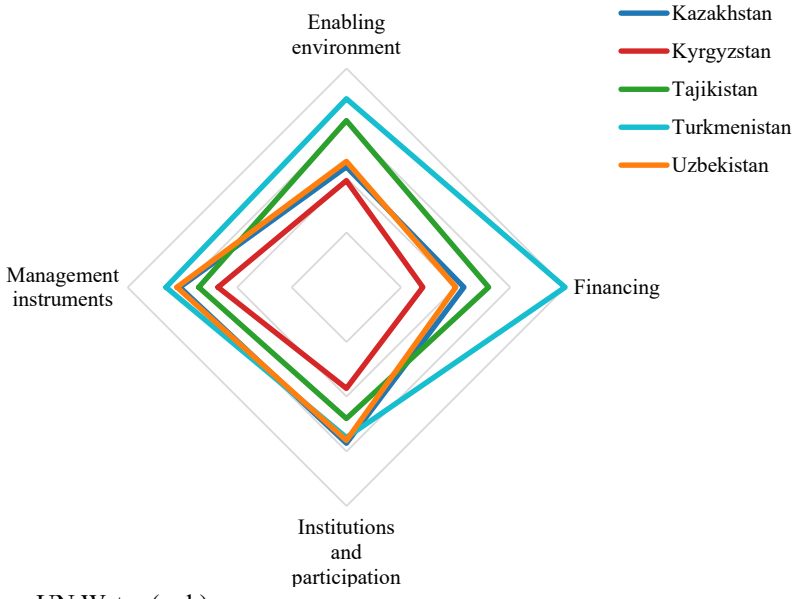


Source: FAO AQUASTAT Dissemination System, 2026.

Water management

Implementation of integrated water resources management (IWRM) in Central Asia shows gradual but uneven progress over the period 2020–2023 (SDG indicator 6.5.1 [23]) (Figure 26). All five countries recorded improvements in their overall IWRM implementation scores. Nevertheless, the level of implementation across the region remains moderate, with most countries falling within the range indicating partial implementation. Across the region, progress has been most evident in strengthening policy and regulatory frameworks and in the development of management instruments. In contrast, financing remains a common constraint, with limited improvement observed in several countries.

Figure 26: Status of IWRM implementation across four key dimensions, 2023



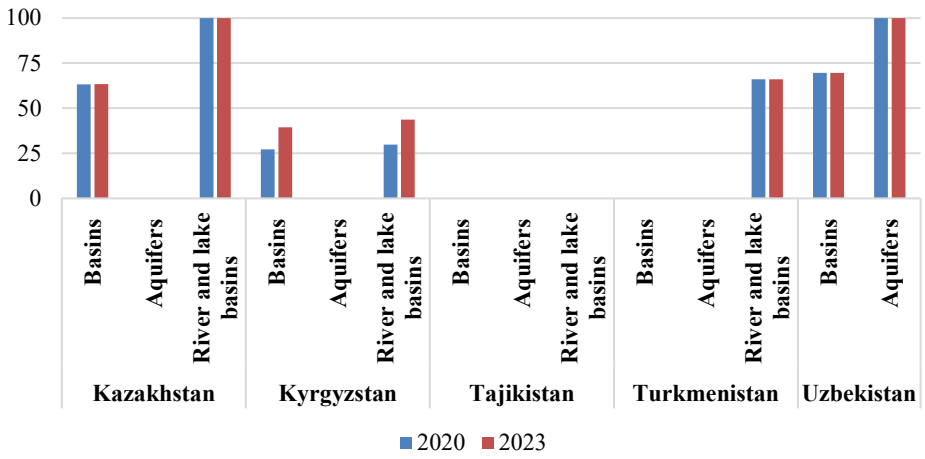
Source: UN Water (n.d.).

[23] SDG Target 6.5: By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate.

Transboundary water

SDG indicator 6.5.2 measures the proportion of transboundary basin area within a country that is covered by operational arrangements for water cooperation. Figure 27 shows trends in Central Asian countries, including the lack of operational arrangements for water cooperation in Tajikistan.

Figure 27: Proportion of transboundary basins (river and lake basins and aquifers) with an operational arrangement for water cooperation, 2020, 2023, percentage



Source: ECE and UNESCO as co-custodians, 2026.

Land degradation

Land degradation remains a widespread and deeply concerning challenge across Central Asia. More than 20% of the region's total land area is already affected by degradation, with conditions potentially impacting up to 30% of the region's population. The principal drivers include land-use change and abandonment, the long-running Aral Sea crisis, water scarcity and the accelerating effects of climate change. The declining water level of the Caspian Sea presents an additional and growing challenge.

Agriculture is a major contributor to desertification. Outdated irrigation systems and overgrazing have pushed land well beyond its sustainable carrying capacity. Climate change has further accelerated the expansion of sandy deserts and wind erosion. Prolonged drought and strong winds strip topsoil of its nutrients, degrade soil quality, reduce agricultural productivity and aggravate desertification in a self-reinforcing cycle. Salinization compounds these pressures: saline soils are significantly less fertile, with salinity originating partly from inefficient irrigation water and partly from dust storms. High groundwater levels, caused by ineffective irrigation practices, can trigger upward capillary movement of saline water into the root zone, a problem that is commonly managed by "flushing" soils in spring, which in turn increases water salinity and overall water use.

Industrial activities, mining and fossil fuel exploitation add further contamination through heavy metals, petroleum residues and pesticides, particularly in cotton-growing regions.

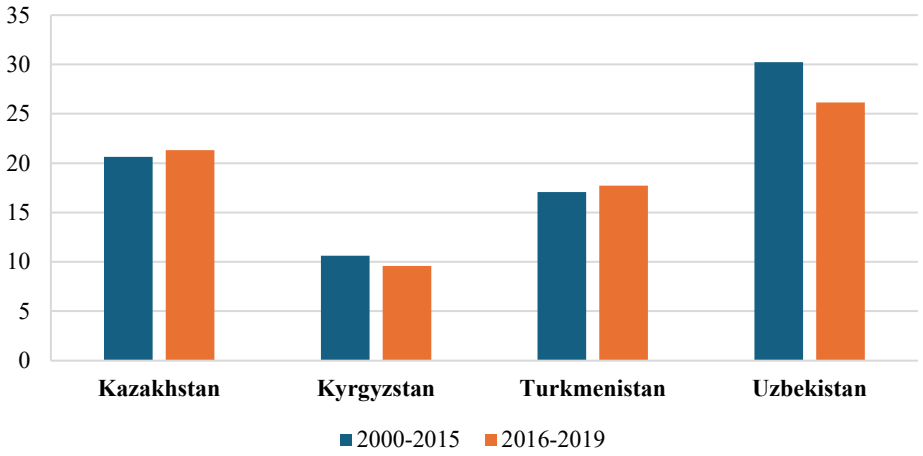
Gaps in soil data and information constrain evidence-based policymaking and hinder effective decisions to support and maintain soil quality. Monitoring systems remain incomplete, with large areas not yet covered by consistent assessments. Figure 28 provides data on the proportion of land that is degraded over total land area (SDG indicator 15.3.1[24]).

Land restoration is inherently slow. Soil responds gradually to interventions, making improvement a long-term process. A regional landscape approach that takes into account ecosystem functions and services as a whole has

[24] SDG Target 15.3: By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world

not yet been established. Soil erosion, for example, often results from degraded vegetation in upland areas, with downstream consequences, yet cross-boundary management of these dynamics remains underdeveloped.

Figure 28: Proportion of land that is degraded over total land area, 2000–2015 and 2016–2019, percentage



Source: Ministry of Agriculture of Kazakhstan, Ministry of Agriculture of Kyrgyzstan, Ministry of Agriculture and Environment Protection of Turkmenistan, State Committee on Forestry of Uzbekistan.
Note: No data for Tajikistan.

A worrying regional trend is the expansion of agricultural land into ecologically fragile areas, heightening degradation risks even as restoration efforts proceed elsewhere. Agricultural practices remain unsustainable in large areas: outdated irrigation systems, overgrazing on degraded pastures and insufficient use of water-saving technologies continue to drive salinization and erosion.

Afforestation on the bed of the Aral Sea faces major technical difficulties, with survival rates for newly planted vegetation expected to be only 20% to 25% due to harsh environmental conditions. The broader problem of the Aral Sea's collapse has no quick fix; the exposed seabed continues to generate salt and dust aerosols at massive scale.

Sand and dust storms

Sand and dust storms affect wide areas of Central Asia, drawing dust and sediments from the Kyzyl Kum and Kara Kum deserts as well as from many drought-affected areas across the region. These storms contribute to long-range dust transport that crosses national boundaries and affects human health and agriculture far from the source areas.

The most severe single source is the dry bottom of the Aral Sea, now referred to as the Aralkum Desert. Approximately 5.5 million hectares of exposed former seabed are subject to severe wind erosion, generating more than 100,000 tons of dust and salt annually. Given the extensive use of pesticides during the Soviet period, residues of these substances may be present in the transported dust. It is estimated that this material spreads over an area of 1.5 to 2 million km^2.

Storms occur most frequently from autumn to spring, reducing visibility, damaging crops and infrastructure, and posing serious respiratory health risks through sharp rises in $PM_{2.5}$ and PM_{10} concentrations. Significant volumes of salt dust also settle on agricultural crops and soils, contributing to soil salinization and reduced agricultural productivity.

Promoting responsible mining

Central Asian countries possess significant reserves of both hydrocarbons and critical minerals. Extraction of fossil fuels continues to generate environmental impacts including land degradation, air and water pollution, GHG emissions, soil contamination and biodiversity loss.

At the same time, the region holds substantial reserves of uranium, lithium, copper and rare earth elements, resources that are increasingly vital to the global clean energy transition. Responsible development of these resources could strengthen national and regional economic resilience, create jobs and integrate Central Asia into global clean technology supply chains. However, mineral extraction and processing carry serious environmental and health risks that can only be mitigated through robust regulatory frameworks, strong environmental standards and long-term remediation requirements. Central Asian countries' national legal and regulatory frameworks for the sustainable management of the mining sector are often incomplete and lack adequate enforcement.

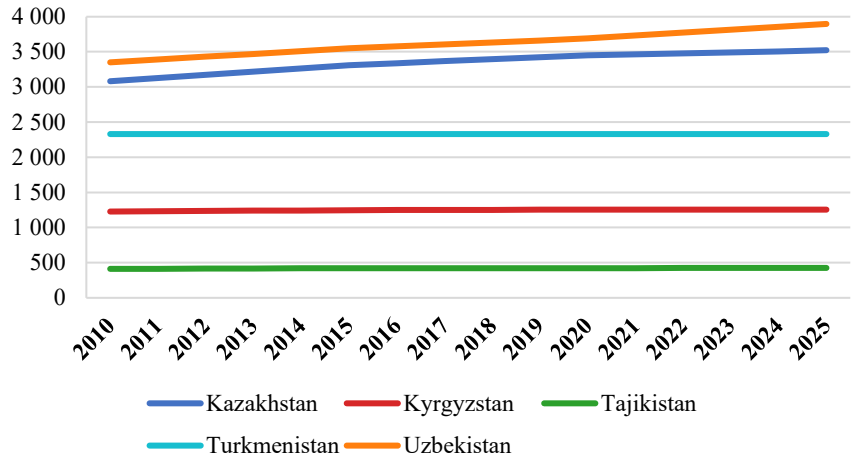
Besides the environmental impacts during the extraction of minerals, waste rock and tailings management facilities can remain potentially dangerous sites of environmental contamination for decades, and even centuries, after mining ceases. The legacy of Soviet-era mining has left significant numbers of poorly maintained non-operational mine sites and legacy pollution in Central Asian countries, without clear paths for rehabilitation. Some tailings management facilities pose significant transboundary risks, particularly near shared watersheds or in areas prone to natural hazards.

Beyond reducing the impact of mining on the environment and local communities, sustainability is increasingly an asset for the competitiveness of Central Asia. By shifting mining towards more sustainable practices, existing cross-border linkages within the region could be environmentally strengthened, while new cooperative relationships could emerge. This includes acting as a conduit for new technologies, such as automation and digitalisation. It also means becoming a driver for environmental service providers, renewable energy and green infrastructure.

Forest management

Forest cover in the countries of Central Asia ranges from 3% of the territory area in Tajikistan to 9% in Turkmenistan. Forest cover in Central Asia is increasing slowly (Figure 29).

Figure 29: Forest area, 2010–2025, 1,000 ha



Source: FAOSTAT Land Use domain, 2026.

Updated forest-related information is not always available. Forest inventories are often outdated, or forest information systems are inexistant. [25] Not all forest areas are within legally established protected areas. In some of the Central Asian countries, the proportion of forest area with a long-term management plan is above 89%. No

[25] ECE (2023).

forest area in Central Asian countries is certified under an independently verified certification scheme (SDG indicator 15.2.1). [26, 27]

In Central Asia, current forest ecosystems are vulnerable to the dry and sharply continental climate, desertification, wildfires, pests and diseases, uncontrolled grazing and overgrazing, and abiotic and biotic factors. Climate change effects worsen the situation in this highly sensitive environment.

Mass tree planting in Central Asia often fails due to the use of inappropriate and water-intensive monocultures in arid areas, resulting in high mortality rates, soil degradation and disruption of native steppe ecosystems. Deforestation and forest degradation are widespread, mainly because of overgrazing and illegal harvesting.

3. Policy levers for sustainable development in the region

3.1 Strengthening environmental governance

Environmental monitoring

Across Central Asia, environmental monitoring systems are undergoing gradual but uneven modernization. Kazakhstan and Uzbekistan have made notable progress by investing in digitalized monitoring networks, expanding air quality monitoring stations and initiating alignment with the Shared Environmental Information System principles. In Kyrgyzstan, Tajikistan and Turkmenistan, monitoring networks remain more limited in coverage and geographical distribution, which affects their ability to provide fully representative national data. In addition, shortages of reagents, spare parts and specialized equipment continue to pose operational challenges in some countries.

A common issue across the region is the fragmentation of environmental data management. Environmental data are collected by multiple institutions with limited coordination and systematic data sharing. As a result, information is often stored in separate systems, difficult to aggregate, and not consistently made available to the public or the research community in a timely manner. In some cases, administrative procedures or institutional arrangements further constrain data exchange among domestic agencies or with international partners.

Investment in equipment renewal, staff training and the use of advanced tools such as remote sensing and satellite-based monitoring remains uneven. These gaps can limit the use of monitoring data to inform policy development and enforcement. Regional cooperation on harmonized methodologies, common standards, data protocols and joint monitoring of transboundary resources is developing but remains limited and would benefit from stronger political support.

Enforcement and compliance

Environmental legislation is in place in all Central Asian countries, although some legal standards and norms have not yet been updated to fully reflect current technologies and industrial practices. Pollution charges and other economic instruments vary considerably and, in some cases, have not been regularly adjusted, which can reduce their effectiveness as incentives for cleaner production. Regulatory responsibilities are often shared among several institutions, requiring sustained inter-agency coordination to ensure clarity, consistency and effective implementation.

Inspection systems and compliance mechanisms differ across countries and are being further developed. In several cases, inspection practices are not yet fully risk-based, and institutional mandates and responsibilities could be more clearly delineated. At the regional level, differences in core standards and enforcement approaches can create challenges for transboundary environmental protection and suggest potential benefits from increased harmonization and cooperation.

[26] SDG Target 15.2: By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally.
[27] FAO (2020).

Environmental impact assessment and strategic environmental assessment

Environmental impact assessment (EIA) frameworks are formally established in all five Central Asian countries; however, their application and quality vary. Procedures and guidance for public participation in EIA processes are in place but could be further clarified and strengthened to ensure meaningful and effective engagement. In practice, transboundary EIAs are not consistently applied to infrastructure projects with potential cross-border impacts, and a common regional methodology for such assessments has not yet been adopted.

Capacity development for EIA practitioners and supervisory authorities takes place but is not systematic across the region. Strengthening professional skills and institutional oversight would help improve the quality and consistency of assessments.

Strategic environmental assessment (SEA) remains less developed overall. Kazakhstan has introduced SEA into its legislative framework, although implementation is still at an early stage, while other countries are considering steps to further develop SEA practice.

Principles of the Aarhus Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters

Implementation of the Aarhus Convention principles varies across the region. Access to environmental information has improved in several countries, particularly through online publication of monitoring data and environmental permits. Nonetheless, challenges remain related to data completeness, consistency and user-friendly presentation for non-specialist audiences.

Public participation in decision-making processes, including EIAs, SEAs and permitting procedures, is formally provided for in most countries, but has little practical effect, as comments submitted by the public are not systematically considered or responded to by decision-makers. Thus, opportunities exist to strengthen feedback mechanisms and the systematic consideration of public input.

Access to justice remains the least developed pillar in many contexts. Legal standing, procedural requirements and judicial expertise in environmental matters differ across countries, influencing the effectiveness of legal remedies. Aarhus Centres operate in all five countries and provide an important platform for awareness-raising and capacity-building, although their mandates and resources limit the scale of support they can provide. Additional judicial training and institutional strengthening could further support the effective implementation of environmental rights.

Education for Sustainable Development

Education for Sustainable Development (ESD) is increasingly reflected in national education systems across Central Asia, particularly at the primary and secondary levels, often with support from international partners. The scope and depth of integration vary by country, education level and subject area. Environmental and sustainability themes are present in curricula, but these themes are not always fully integrated across disciplines.

Important gaps remain, particularly in vocational and technical education, where systematic preparation for green economy skills is still limited. In higher education, sustainability content is often introduced through individual courses rather than embedded across programmes.

ESD initiatives rely to a significant extent on external funding, highlighting the importance of institutionalization to ensure long-term sustainability. Digital technologies and artificial intelligence are increasingly recognized as tools to expand ESD delivery, although infrastructure and human capacities to fully leverage these tools remain uneven.

Regional cooperation mechanisms for ESD, such as common platforms for mainstreaming ESD into curriculum development, teacher training in ESD or centres of excellence on ESD, have not yet been established, suggesting opportunities for enhanced collaboration.

Gender

Gender aspects of environmental governance are receiving increasing attention across Central Asia, although their integration into policy design and implementation remains uneven. Gender considerations are not yet systematically embedded in environmental assessment, planning or monitoring processes, and gender-disaggregated indicators are not commonly used in strategic environmental documents. Capacity-building and training initiatives in environmental fields could further strengthen the participation of women, particularly in technical and leadership roles. Some of the most tangible progress in gender mainstreaming has been observed in the water sector.

Women remain underrepresented in environmental decision-making structures at national and local levels. Rural women, who often bear a disproportionate share of responsibilities related to water, fuelwood and subsistence agriculture, are particularly exposed to environmental and climate-related risks. While legal frameworks for gender equality have been strengthened in several countries, their translation into environmental policies and programmes is still developing. Limited availability of gender-disaggregated data on environmental exposure and vulnerability continues to constrain evidence-based policy formulation in this area.

3.2 Mobilizing incentives, finance and skills for the green transition

The five Central Asian countries share a legacy of carbon-intensive development shaped by Soviet-era industrial structures, subsidized energy systems and a natural resource base historically oriented toward extraction. Emissions intensity in all five countries remains above the global average, reflecting energy-intensive production patterns, low energy prices and incentive structures that are still evolving to support cleaner and more efficient alternatives.

Energy systems across the region display diverse profiles. Kazakhstan's energy mix remains dominated by coal, while Turkmenistan and Uzbekistan rely primarily on natural gas. Kyrgyzstan and Tajikistan generate most of their electricity from hydropower but continue to import fossil fuels for heating and industrial use. Across the region, the share of solar, wind and other modern renewable energy sources in the primary energy supply remains limited, underscoring both exposure to climate and energy risks and the scope for further development. Electricity demand is increasing, while low tariff levels constrain investment in generation capacity and limit incentives for demand-side efficiency improvements.

Transition to a low carbon economy

Kazakhstan is the only country in the region to have introduced an emissions trading system, covering approximately half of national emissions in the energy, mining and manufacturing sectors. The system has contributed to institutional learning on carbon pricing, although its effectiveness is influenced by low market liquidity, a high share of freely allocated allowances and relatively low carbon prices. Kazakhstan is also developing a national measurement, reporting and verification (MRV) framework, which remains under consolidation.

Kyrgyzstan relies primarily on fuel excise taxes as an implicit carbon-pricing mechanism, alongside continued fossil fuel subsidies. While the country has adopted a Green Taxonomy and a climate finance roadmap, implementation frameworks are still being developed, with challenges related to long-term finance, MRV systems and institutional coordination.[28]

Tajikistan benefits from a low-carbon electricity mix dominated by hydropower and has adopted policies to expand renewable energy. At the same time, broader decarbonization efforts are shaped by structural features of the power sector, including tariff structures, financial performance of utilities and the pace of regulatory reforms.[29]

In Turkmenistan, energy pricing remains characterized by extensive subsidies, including provision of electricity, heat and gas within specified limits. Government announcements on gradual subsidy reform from 2030 indicate recognition of the issue, while detailed implementation pathways are still under development.

[28] OECD (2024), Ministry of Economy and Commerce of the Kyrgyz Republic (n.d.), Government of the Kyrgyz Republic (2025).
[29] International Energy Agency (2022), Government of the Republic of Tajikistan (n.d.).

Uzbekistan has taken steps to promote cleaner fuels through excise duties on petroleum products and has mobilized green finance, including the issuance of its first green sovereign Eurobonds in 2023, raising approximately US$350 million for supporting investments in water efficiency, transport infrastructure and afforestation.

Energy transition: tariffs and subsidies

Energy efficiency is widely recognized across the region as a critical pillar of the low-carbon transition. However, progress is influenced by pricing structures that do not yet fully reflect actual costs. Low electricity tariffs, fossil fuel subsidies and limited cost-recovery pricing in district heating affect investment signals and weaken incentives for efficiency improvements.

Industrial decarbonization presents additional challenges. Energy-intensive industries, coal-based district heating systems and transport fleets with high emissions profiles require sustained investment, technology upgrading and regulatory incentives. These elements are still under development across the region.

Kazakhstan has adopted long-term energy targets for 2030, 2040 and 2050, covering energy intensity reduction, renewable energy deployment and a gradual coal phase-down in electricity generation. District heating tariff reform is being implemented in phases. The target of 15% renewable electricity by 2030 is considered relatively modest by international standards.

In Kyrgyzstan, reliance on hydropower results in a relatively low-carbon electricity system in hydrologically favourable years, while drought conditions expose supply vulnerabilities and influence household energy choices. Financial pressures in the electricity sector are linked in part to tariff levels below cost-recovery. The electricity sector's financial deficit was projected to reach 2.2% of GDP by 2023, partly driven by tariffs far below cost-recovery levels.

In Tajikistan, fossil fuel subsidies have increased in recent years, reflecting social and economic considerations, with reform progressing gradually. Fossil fuel subsidies rose from 2.0% of GDP in 2010 to 6.7% in 2022.

Turkmenistan's energy transition is constrained by extensive fossil fuel subsidies and administratively set energy tariffs that remain far below cost-recovery levels. These pricing distortions weaken incentives for energy efficiency, undermine the financial sustainability of the energy sector and discourage investment in renewable energy, despite the country's substantial solar and wind potential.[30]

Uzbekistan has advanced a range of energy efficiency measures, including green building standards, urban planning reforms under the Tashkent Master Plan, and plans to phase out fuel oil in power and heat generation by 2030. Industrial efficiency measures are also being pursued, including links to air quality management and urban heat mitigation.

Access to green finance

Access to green finance remains a key enabling factor for the transition. Kyrgyzstan and Tajikistan rely largely on concessional finance and development assistance, which, while essential, do not fully meet long-term investment needs. Kazakhstan and Uzbekistan benefit from more diversified financial markets but have yet to fully integrate green criteria into domestic public finance systems. Green bond markets remain at an early stage, and the application of national taxonomies is still evolving. In Turkmenistan, limited domestic financial market depth, institutional coordination challenges and low private sector participation constrain access to green finance. Engagement with international partners has focused primarily on capacity-building, with limited mechanisms in place to mobilize larger-scale concessional or market-based financing.[31]

Industrial decarbonisation does not receive sufficient policy attention. Major emissions sources, such as coal-based district heating systems, energy-intensive metallurgy and high-carbon transport fleets, cannot be effectively addressed without long-term investment frameworks, technology transfer and adequate regulatory incentives.

[30] Green Fiscal Policy Network: Turkmenistan, The World Bank: The World Bank in Turkmenistan, ECE (2024).
[31] GCF (2023), GCF and UNDP (2024).

Green skills

The development of green and digital skills remains at an early stage across Central Asia. Capacity gaps in technical expertise affect the ability of institutions and industries to implement ambitious climate and environmental policies. Regional centres of excellence for green technologies and digital water management have yet to be established, and a comprehensive green and digital skills roadmap aligned with labour-market needs is yet to be developed. Strengthening education, training and regional cooperation in this area would support both the energy transition and broader sustainable development objectives.

3.3 Deepening regional and transboundary cooperation

Central Asian countries share interconnected river basins, energy and transport networks and ecosystems, making regional cooperation a critical component of sustainable development. The Amu Darya and Syr Darya rivers form the backbone of agriculture, energy production and ecosystem services across the region. Growing pressures linked to water scarcity, climate change, ageing infrastructure and differing upstream and downstream priorities highlight the importance of coherent institutional frameworks, effective legal instruments and joint initiatives.

Since independence, the countries of Central Asia have developed a regional cooperation architecture based on shared institutions and multilateral commitments. Environmental cooperation has advanced particularly in the areas of water management, climate change adaptation and biodiversity protection. While meaningful progress has been achieved, further efforts are needed to strengthen implementation, data sharing and cross sectoral coordination in response to evolving regional challenges.

High-level political commitments

High-level political dialogue has intensified in recent years. In 2025, the Presidents of the five Central Asian countries convened in Tashkent for their seventh formal consultative meeting, with joint statements increasingly reflecting commitments related to environmental protection and sustainable development. At the 2024 Astana Summit, the Presidents adopted the Concept for the Development of Regional Cooperation Central Asia 2040, identifying water resource management, climate change adaptation and the energy transition as shared priorities. This was accompanied by the approval of the Roadmap for Regional Cooperation 2025–2027, providing a framework to operationalize these commitments.

Regional institutions

Regional institutions play a central role in facilitating cooperation. The International Fund for Saving the Aral Sea (IFAS), established in 1993, coordinates the mobilisation of resources and implementation of environmental and socio-economic projects in the Aral Sea basin.[32] Its Executive Committee, staffed by representatives of member States and hosted by the country holding the IFAS chairmanship, supports programme development and coordination.

Under the IFAS framework, the Interstate Commission on Sustainable Development acts as a coordinating platform for regional cooperation on environmental protection and sustainable development, while the Interstate Commission for Water Coordination of Central Asia oversees the management of shared water resources in the Amu Darya and Syr Darya basins. Water managers from all five countries meet on a quarterly basis to agree on seasonal water allocations, primarily for irrigation purposes. Basin Water Organizations for the Amu Darya and Syr Darya provide technical and operational support, alongside the Scientific Information Centre, which develops management tools, conducts research and prepares training and educational materials. While national decision-making authority on water use is retained, these institutions provide an important basis for dialogue and coordination.

The Regional Environmental Centre for Central Asia complements these arrangements as an independent international organization promoting regional environmental cooperation. Its work focuses on technical

[32] Kyrgyzstan 'froze' its participation in IFAS in 2016. An ongoing reform process aims to modernize IFAS and create conditions for Kyrgyzstan to consider returning as a full member.

assistance, academic and research networks and education for sustainable development programmes, largely supported through project-based funding from development partners.

Regional cooperation

The principal legal framework governing transboundary water management in the Amu Darya and Syr Darya basins remains the 1992 Almaty Agreement. While it continues to provide a formal basis for cooperation, the agreement reflects allocation arrangements from the Soviet period and does not fully address the evolving interests and priorities of independent States, particularly regarding the energy–water nexus. Discussions on how to adapt cooperative frameworks to current regional realities remain ongoing.

Cooperation is more developed in quantitative water allocation than in areas such as water pollution control, water quality management and the protection of water-dependent ecosystems. All five countries participate in the informal Regional Working Group on Water Quality, which serves as a platform for technical exchange with the support of international partners.

Beyond the water sector, regional cooperation has expanded through broader economic and environmental initiatives. In 2024, member countries of the Central Asia Regional Economic Cooperation Programme endorsed a Climate Change Action Plan[33] and long-term strategic priorities for 2030, alongside the establishment of the Climate and Sustainability Project Preparatory Fund,[34] administered by the Asian Development Bank, with initial contributions from the Republic of Korea (US$3 million) and China (US$2 million).[35] In 2025, the Samarkand Declaration and Action Plan (2025–2032) further reinforced commitments to protecting nature, combating illegal wildlife trafficking and promoting sustainable livelihoods through coordinated national and regional action.[36]

Multilateral environmental agreements

Multilateral environmental agreements (MEAs) provide an important framework for regional cooperation and policy alignment. All Central Asian countries are Parties to the Paris Agreement and the three Rio Conventions, and they participate in a wide range of global and regional MEAs. Since 2020, progress in accession to additional agreements has continued, although at varying pace across countries.

Three ECE conventions are of particular relevance for strengthening transboundary cooperation in Central Asia:

- Convention on Environmental Impact Assessment in a Transboundary Context, which facilitates cooperation on projects with potential cross-border environmental impacts;
- Convention on the Transboundary Effects of Industrial Accidents, which supports information exchange and mutual assistance in the event of industrial accidents with transboundary effects; and
- Convention on the Protection and Use of Transboundary Watercourses and International Lakes, which provides a legal and institutional framework for the sustainable management of shared water resources.

Strengthened engagement with these instruments offers further opportunities to enhance regional cooperation, address transboundary environmental risks and support sustainable development across Central Asia.

3.4 Modernizing infrastructure for sustainable and resilient development

Expansion of renewable energy

Central Asian countries have begun to set renewable energy targets and have taken initial steps to expand renewable energy generation. Nevertheless, the regional energy mix remains heavily reliant on fossil fuels, reflecting long-standing structural and economic factors. Across the region, the expansion of off-grid and small-scale renewable energy is influenced by limited financial incentives, gaps in technical capacity, evolving institutional frameworks and varying levels of public awareness. Electricity tariffs that remain below cost-recovery levels constrain investment in new renewable capacity and weaken incentives for energy efficiency.

[33] Central Asia Regional Economic Cooperation Program (2024).
[34] The Times of Central Asia (2024).
[35] Asian Development Bank (2024).
[36] Traffic (2025).

In addition, the integration of renewable energy into existing power systems, particularly variable solar and wind generation, continues to pose technical and institutional challenges.

A comprehensive regional roadmap for renewable energy integration—linking grid planning, cross-border electricity trade and storage solutions—has not yet been developed. Mechanisms to anticipate and mitigate potential social impacts of the energy transition are still emerging and are not yet fully operational in all countries. Limited coordination in grid planning and renewable deployment contributes to policy fragmentation and reduces the efficiency with which new renewable energy sources can be integrated into national and regional energy systems.

Modernization of hydropower plants

Much of the existing hydropower infrastructure in Central Asia was designed and constructed during the Soviet period, based on hydrological assumptions that did not fully account for future climate variability. As a result, parts of the system face challenges associated with declining river flows and more frequent extreme weather events. Both the modernization of existing hydropower facilities and the development of new projects are under way across the region. These developments, however, can entail environmental trade-offs, as hydropower cascades and reservoirs affect riverine ecosystems, habitats and biodiversity.

Climate risk assessment and resilience planning are not yet systematically incorporated into hydropower project design and broader energy strategies. The interlinkages between water management and energy production, particularly between upstream and downstream countries, remain complex and continue to require coordinated solutions. In addition, electricity tariff structures in some countries affect the financial performance of power utilities, limiting incentives and available resources for infrastructure modernisation and long-term investment.

Electricity transmission

Energy systems in Central Asia are undergoing a gradual transition toward more modern and resilient configurations, building on a foundational interconnected network inherited from the Soviet period. While the Unified Energy System of Central Asia continues to provide a basis for regional interconnection, it is currently fragmented and faces infrastructure and operational constraints that limit efficient, real-time electricity trading. Efforts to restore and strengthen a regional electricity network are under way, although the reintegration of national power grids remains incomplete.

Cross-border electricity trade among Central Asian countries has increased in recent years, reflecting growing interest in regional energy cooperation. At the same time, low electricity tariffs across the region constrain the financial capacity of utilities to invest in grid modernization and the expansion of transmission infrastructure. The integration of variable renewable energy sources into existing grids presents technical and institutional challenges, and in some cases grid development is progressing more slowly than renewable energy deployment. Ageing transmission infrastructure also contributes to relatively high technical losses, underscoring the need for sustained investment, coordinated planning and regulatory reform to support a more reliable, flexible and interconnected regional power system.

Transport

Rapid urbanization is increasing pressure on transport systems across Central Asia. By 2021, nearly half of the region's population was living in urban areas. Rail transport for both freight and passenger services remains at a relatively early stage of development in much of the region, and progress on expanding regional rail corridors has been gradual. At the same time, there are encouraging developments toward more sustainable transport. At the regional level, an action plan has been adopted for six transport corridors connecting Central Asia to global markets under the Central Asia Regional Economic Cooperation framework.

In many cities, public and collective transport systems continue to rely on ageing vehicle fleets, which raises operating costs, affects service quality and constrains progress toward sustainable mobility. Urban planning practices, transport management systems and institutional capacities are evolving but are not yet fully adequate to address the environmental impacts of transport growth. The share of electric vehicles remains limited, and

relatively low tariff structures constrain the ability of public transport operators to mobilize investment for system upgrades and expansion.

Vehicle emission standards vary across countries, and the roll-out of electric mobility infrastructure remains uneven. Coordination of fuel quality standards and public transport policies at the regional level is limited. In addition, cities have only begun to develop comprehensive approaches to cleaner air that combine transport planning with broader urban measures, such as low-emission zones, sustainable land-use planning and targeted action to address winter pollution peaks.

Active mobility options, including walking and cycling, are not yet systematically integrated into urban master plans. Cycling infrastructure remains limited in many cities, and cycling is still a marginal mode of transport due to safety concerns and prevailing social perceptions. Nevertheless, targeted initiatives in some local contexts suggest growing interest in active mobility and point to opportunities for broader shifts in urban transport patterns over time.

Waste modernization

Central Asian countries are pursuing the modernization and expansion of waste management infrastructure as part of broader environmental reform efforts. At the same time, waste management remains a significant challenge across the region. Municipal solid waste is still predominantly disposed of in landfills and dumpsites, many of which do not yet meet modern environmental protection standards. Recycling rates remain low and circular economy approaches are at an early stage of development in all five countries. Industrial waste, including waste from mining activities, poses additional pressures, given its volume, complexity and potential environmental risks. At the regional level, common procedures for monitoring, emergency preparedness and remediation of mining tailings and hazardous waste have not yet been established.

Differences in national standards and the absence of shared monitoring systems limit the development of regional recycling markets and cross-border cooperation. Extended producer responsibility schemes are under development in several countries but are not yet fully operational. Collection systems for e-waste, batteries and plastics remain limited, while waste prevention and recycling practices compete with emerging incineration solutions in some countries, prompting discussion on long-term circularity objectives. Waste collection services are not uniformly reliable, and coverage in rural areas remains uneven. In addition, statistical data on waste generation, treatment and disposal are fragmented, constraining comprehensive assessment and planning.

A region-wide circular economy and waste risk-reduction programme, supported by harmonized standards for waste collection, recycling and hazardous waste management, has yet to be developed. The absence of a common regional waste data and monitoring framework limits the ability to track waste flows, assess environmental and health risks and ensure compliance, highlighting the potential value of strengthened regional coordination and information sharing.

Water and wastewater infrastructure

Water infrastructure in Central Asia is characterized by ageing assets and significant modernization needs. The region faces an estimated funding gap of more than US$12 billion to achieve Sustainable Development Goal 6 on universal access to safe drinking water and sanitation. In several countries, the expansion of modern irrigation systems has become a key policy priority. However, joint investments in areas such as canal rehabilitation, digital water accounting and groundwater monitoring remain limited. A dedicated regional water-efficiency initiative to reduce losses in irrigation systems and safeguard ecological flows has not yet been established. While the importance of strengthening water resource protection is widely recognized, implementation remains uneven across the region.

Municipal wastewater continues to contribute to surface water pollution, particularly in areas where treatment infrastructure is ageing or insufficient. The effectiveness of wastewater management is constrained by limited maintenance resources and capacity gaps in existing treatment facilities. In locations with inadequate wastewater systems, heavy rainfall can lead to untreated discharges into receiving waters. Water losses in distribution networks remain significant, further exacerbated by ageing infrastructure. Despite the close interdependence of

water quantity and water quality, these dimensions are still largely addressed through separate policy and institutional arrangements at the regional level.

Efforts to close the financing gap for wastewater treatment and sanitation infrastructure remain at an early stage in many countries. In several cases, the expansion of wastewater treatment capacity has not kept pace with rapid population growth and urbanization. Low-income and rural communities are not consistently prioritized within water and sanitation investment programmes, contributing to persistent disparities in access to services.

Nature-based solutions

Nature-based solutions (NbS) are an emerging policy area in Central Asia and hold considerable potential, particularly in the context of infrastructure planning, land restoration and climate adaptation. While countries increasingly apply individual NbS-related measures, the definition of nature-based solutions adopted by the Fifth United Nations Environment Assembly[37] has not yet been systematically used as a basis for regional or national NbS frameworks.

All five Central Asian countries are implementing national afforestation initiatives, supported by targets for expanding forested areas or increasing annual tree planting. These efforts contribute to land restoration, climate mitigation and ecosystem services, although their design and implementation approaches vary across countries and ecological contexts.

Along river systems, green corridors, which could play an important role in combating desertification, supporting biodiversity and enhancing ecosystem services, are not yet widely established. Existing practices include reforestation with native floodplain species, controlled flooding to help restore natural water regimes, the removal of invasive species, and the designation of biosphere reserves or protected corridors. Urban green spaces are also increasingly recognized for their role in mitigating urban heat islands, improving air quality and reducing the impacts of sand and dust storms.

In several countries, financial resources remain a constraint for scaling up land restoration and ecosystem protection measures. Nature-based solutions are not yet explicitly integrated into environmental impact assessment processes or major infrastructure strategies. In addition, gaps in data availability and analytical capacity limit the strength of the science–policy interface, affecting the systematic development of NbS-informed policies.

Pilot projects supported by international organizations are testing nature-based approaches for sustainable land management and resilience building. However, their application remains largely project-based, and wider scaling and mainstreaming of NbS into national and regional planning frameworks is still at an early stage.

Housing and urban development

Urbanization is accelerating across Central Asia. By 2021, nearly half of the region's population lived in urban areas. Rapid urban expansion is increasing pressure on housing, transport systems, water supply and wastewater infrastructure. Air quality challenges are most pronounced in cities located near industrial zones and in urban centres where coal remains a common heating source.

Urban systems and planning frameworks are at varying stages of development across the region, which constrains the capacity of cities to manage rapid growth effectively. Low utility tariffs, while supporting affordability objectives, limit available financial resources for the maintenance and upgrading of housing and urban infrastructure. Cities continue to face financing gaps for water supply and sanitation systems, while service coverage in rural areas remains uneven. A significant share of the housing stock is ageing, and energy-efficiency retrofitting is progressing at different speeds across countries.

To date, Central Asian countries have not adopted a coordinated regional approach to housing and urban development that fully integrates green building standards, energy-efficiency requirements, sustainable water and sanitation systems and urban greening objectives. At the national level, urban planning frameworks do not yet

[37] NbS are defined as actions aimed at protecting, conserving, restoring and sustainably managing natural or modified ecosystems, addressing social, economic and environmental challenges while providing biodiversity and resilience benefits.

systematically incorporate nature-based solutions, such as green belts, green corridors and urban forests. While smart city initiatives have emerged in several cities, their application remains largely project-based and has yet to be scaled up across municipal governance systems. Climate and environmental risks are increasingly recognized but are not yet systematically embedded in urban master planning processes.

4. Key thematic directions of the Regional Ecological Summit 2026

Central Asian countries share interconnected river basins, landscapes and, to a certain extent, fossil fuel-based economic structures. Addressing the region's climate and environmental challenges therefore requires effective and sustained regional cooperation. Climate change, water scarcity, soil degradation, air pollution and biodiversity loss are intensifying and pose growing risks to employment, economic growth, public health and social stability across the five countries. In recognition of the scale and complexity of these challenges, Governments have strengthened regional dialogue and launched a range of regional strategies and cooperation frameworks.

The Regional Ecological Summit 2026 (RES 2026) provides a platform to further focus collective efforts on climate action, resilience, food security, natural resource management and social dimensions of sustainable development. It offers an opportunity to enhance coherence and coordination among existing initiatives and to move from fragmented activities toward a more integrated regional approach. Water security and climate change remain the region's most pressing shared concerns, while air pollution, waste management, biodiversity conservation and the transition to a green economy present additional areas where strengthened regional cooperation could generate added value.

At the same time, a number of structural and institutional factors influence the pace and effectiveness of the transition. Environmental authorities often operate with more limited mandates and resources than economic ministries. Legal frameworks, economic instruments and enforcement practices vary across countries, and systems for environmental monitoring, data sharing and the science–policy interface remain unevenly developed at the regional level. Climate impacts, natural hazards and pollution affect all countries, with particularly pronounced effects in rural areas and among women, children and vulnerable groups. Advancing a transition toward a healthy environment for all will therefore require a just and inclusive approach, combining technological solutions with social protection, education and meaningful public participation.

Supporting the climate transition

The climate transition in Central Asia is inherently regional in nature. Average temperatures have risen across the region and are projected to continue increasing, contributing to glacial retreat, changing precipitation patterns and more frequent droughts. At the same time, greenhouse gas emissions have continued to grow, particularly in fossil fuel-producing economies, and methane emissions remain an important contributor to global warming. These trends highlight the importance of coordinated mitigation strategies, common standards and regional monitoring and reporting systems.

Across the region, emissions intensity remains above the global average, reflecting energy-intensive production structures and legacy technologies. While national climate strategies are advancing, opportunities remain to strengthen coordination on carbon market readiness, renewable energy integration and industrial decarbonization, with a view to reducing costs, avoiding policy fragmentation and accelerating progress toward both national and regional climate objectives.

Adaptation and economic resilience to environmental and natural risks

Central Asia is among the regions most exposed to climate-related risks. Climate change is intensifying floods, droughts, mudslides and extreme weather events, while glacial melt poses long-term risks to water availability. Ageing dams and hydraulic infrastructure increase exposure to potential failures, particularly in seismically active and mountainous areas. Given the transboundary nature of these risks, regional coordination is essential for early warning systems, emergency preparedness and long-term adaptation planning.

Economic resilience is closely linked to effective risk management. Ageing infrastructure and limited remediation of legacy sites heighten the risk of environmental accidents, including those linked to mining tailings and hazardous waste that may have transboundary implications. At the regional level, the Strategy for Development

of Cooperation of Countries of Central Asia in Disaster Risk Reduction for 2022–2030 provides a framework for strengthening institutions, improving risk understanding, mobilising investment and enhancing preparedness. This is complemented by ongoing cooperation through the Meeting of the Heads of Emergency Authorities of Central Asian Countries[38] and broader engagement supported by UNDRR under the Europe and Central Asia Regional Platform for Disaster Risk Reduction.[39]

Food security and the region's ecosystem

Food security in Central Asia is closely linked to the health of ecosystems and the reliability of water resources. Agriculture is the region's largest water user, and irrigation infrastructure in many areas would benefit from modernization to improve efficiency and reduce land degradation. A significant share of land is affected by degradation processes, with implications for agricultural productivity and rural livelihoods. Further scope exists to strengthen coordinated regional approaches to sustainable irrigation, climate-resilient crops and land restoration.

Ecosystems across the region are under increasing pressure from reduced river flows, deforestation and long-standing environmental stresses, including those linked to the Aral Sea crisis. While national and transboundary monitoring systems are being developed, integrated biodiversity management and ecological connectivity remain areas for further cooperation. Strengthening ecological resilience through transboundary biodiversity corridors, shared restoration programmes and integrated water–food–energy approaches could support both ecosystem conservation and long-term food security.

Sustainable management of natural resources

Central Asia's natural resources constitute a shared asset that should benefit from shared management approaches. Transboundary rivers such as the Amu Darya and Syr Darya underpin agriculture, energy production and ecosystems across the region. High water losses in irrigation systems and limited groundwater monitoring indicate opportunities for efficiency gains. Increased joint investment in modern infrastructure, digital water accounting and nature-based solutions could contribute significantly to more sustainable resource use.

Land and forest resources also face increasing pressures from desertification, salinization and erosion, particularly in areas affected by the Aral Sea legacy. Forest cover remains limited, and mountain forests are exposed to multiple stressors. Enhanced coordination on land restoration, forest management and sustainable resource use has the potential to strengthen resilience and reduce long-term environmental and economic risks.

Combating air pollution

Air pollution remains a major environmental and public health concern across Central Asia. Fine particulate matter concentrations frequently exceed international guideline values in urban areas, especially during winter, due to a combination of heating practices, industrial activity, transport emissions and sand and dust storms. These pressures have measurable impacts on public health and productivity. Given the transboundary nature of air pollution and dust transport, regional cooperation offers important opportunities for more effective prevention and response.

Environmental degradation and climate change further influence air quality, particularly through the expansion of desertified areas and the drying of the Aral Sea. Urbanization and industrial growth are increasing emissions pressures, while air quality monitoring systems differ in coverage and capacity across countries. Strengthening regional coordination on cleaner heating, harmonized standards, shared monitoring and joint responses to dust storms could help reduce health risks and support broader climate and air-quality objectives.

Improving waste management

Waste management continues to pose challenges across the region. Municipal solid waste is largely disposed of in landfills and dumpsites, many of which would benefit from upgraded environmental safeguards. Recycling

[38] Center for Emergency Situations and Disaster Risk Reduction (n.d.).
[39] UNDRR Europe and Central Asia Regional Platform for Disaster Risk Reduction.

rates remain modest, and circular economy approaches are still emerging. Progress is influenced by differences in standards, limited shared monitoring systems and the absence of fully developed regional recycling markets.

Greater regional cooperation through harmonized approaches to waste management, shared data systems and coordinated market development could support risk reduction and resource efficiency. Strengthening these elements would also contribute to broader environmental and public health objectives.

Mechanisms to deliver environmental ambition

Environmental governance systems in Central Asia face common structural challenges related to coordination, enforcement capacity and institutional continuity. Differences in standards, permitting systems and economic instruments create inefficiencies and limit opportunities for harmonized regional action. Increased alignment of governance mechanisms could enhance effectiveness and reduce duplication.

Access to environmental information remains an area for improvement across the region. While progress is being made, the absence of a shared regional environmental information space constrains transparency, evidence-based policymaking and the effective implementation of multilateral environmental agreements.

A just and inclusive transition

The transition toward low-carbon and resource-efficient economies is expected to have important social implications. Many communities depend on carbon-intensive industries, water-intensive agriculture or ecosystems under stress. Ensuring that environmental reforms are accompanied by adequate financial resources, capacity-building and social protection measures will be critical. Regional guidance on skills development, retraining and community engagement could support a more just and inclusive transition.

Public participation, access to environmental information and environmental justice are gradually expanding but remain uneven across countries. Strengthening participation mechanisms, gender mainstreaming and youth engagement can help build trust, improve policy outcomes and ensure that environmental decision-making reflects the needs of diverse social groups.

Environmental and digital competencies

Developing environmental and technical expertise is a key enabling factor for effective environmental governance in Central Asia. Capacity constraints in specialist skills and employment conditions affect institutional performance. Investment in regional centres of excellence, harmonized training programmes and green and digital skills development could help address these gaps.

Digitalization plays an increasingly important role in modern environmental management. Enhancing regional cooperation on digital tools, such as remote sensing, geographic information systems, measurement, reporting and verification systems and interoperable databases, would support improved transparency, decision-making and coordinated environmental action across the region.

5. From assessment to action: environmental performance reviews supporting national and regional action for sustainable development

The ECE Environmental Performance Reviews (EPRs) have been a central instrument for supporting countries of Central Asia in strengthening environmental governance, improving environmental performance and addressing complex, interlinked environmental challenges. Conducted at the request of Governments, EPRs provide an independent, structured and evidence-based assessment of national environmental policies, institutional frameworks and implementation capacities. Through a comprehensive review process, the Programme identifies priority gaps, highlights good practices and formulates targeted recommendations to support policy reform, enhanced coordination across sectors and more effective enforcement.

All five Central Asian countries have participated in the EPR process, demonstrating a strong and sustained commitment to continuous improvement in environmental management. Turkmenistan underwent its first Review in 2012. Kazakhstan and Kyrgyzstan have each completed three Reviews, with their most recent Reviews

conducted in 2019 and 2024, respectively. Tajikistan and Uzbekistan have shown particularly high levels of engagement, each completing Fourth Reviews, finalized in 2025 and 2026, respectively. Repeated participation reflects not only continuity of engagement but also a clear determination to raise environmental ambition, modernize governance frameworks and align national policies with international commitments, including the 2030 Agenda for Sustainable Development and multilateral environmental agreements.

ECE EPRs have played an important role in strengthening environmental governance across the region. EPR recommendations have contributed to improvements in environmental legislation, the integration of environmental considerations into economic planning, the development of monitoring and reporting systems, and the application of economic instruments for pollution control and resource efficiency. Importantly, EPRs promote transparency and accountability by encouraging public access to environmental information and interministerial coordination, while also supporting progress in areas such as environmental impact assessment and compliance with multilateral environmental agreements.

Building on strong national engagement, Central Asian countries are now advancing a new phase of cooperation through a Regional Environmental Performance Review of Central Asia. Initiated by Uzbekistan and joined by Kazakhstan, Kyrgyzstan and Tajikistan, this innovative process aims to complement national Reviews by addressing shared challenges, identifying common policy gaps and strengthening regional coherence. The Regional EPR process will provide a platform to align national reform efforts, foster peer learning and support coordinated action on transboundary issues such as water management, air pollution, climate change adaptation and ecosystem protection. It will support countries in unlocking multilateral financing and investment to tackle environmental priorities in the region. Turkmenistan is encouraged to join this regional process and would stand to benefit from enhanced dialogue and shared insights.

The Scoping Report for the Regional EPR of Central Asia provides comprehensive analysis to inform the selection of themes to be addressed in the Regional EPR.[40] It takes into account, *inter alia*, the findings of the Assessment of Ecological Priorities for Kazakhstan.[41] Identifying thematic priorities for the Regional EPR requires careful consideration of where regional cooperation can generate the greatest added value. While significant initiatives are already under way to strengthen collaboration on environmental protection and sustainable development, it remains essential to identify areas where the Regional EPR can provide a distinct and complementary contribution. National perspectives will ultimately guide the selection of themes, making early and open dialogue with countries a critical step in shaping the scope of the regional review.

Initial suggestions for possible thematic content of the Regional EPR include climate change adaptation from a transboundary perspective; water-related ecosystems and water quality; green development; air quality management; circular economy and waste management; the land-water-agriculture nexus; and disaster risk reduction. Three to four integrated themes will be defined at a regional workshop to be held in Astana on 20–21 April 2026 by the national focal points designated for the Regional EPR, in cooperation with representatives of international organizations.

Overall, the ECE EPRs represent a powerful policy lever for sustainable development in Central Asia. By combining rigorous analysis with practical, forward-looking recommendations, it supports countries in translating political commitments into concrete action, strengthening institutions and progressively improving environmental performance at both national and regional levels.

[40] ECE (2026).
[41] United Nations Kazakhstan (2026).

References

Documents

Asian Development Bank (2024). Central Asia Regional Economic Cooperation (CAREC) Climate and Sustainability Project Preparatory Fund. Available at https://www.adb.org/what-we-do/funds/carec-climate-sustainability-project-preparatory-fund.

Asian Infrastructure Investment Bank (2024). The Republic of Uzbekistan: Accelerating the Uzbekistan Climate Transition for Green, Inclusive, and Resilient Economic Growth (Subprogram 1). Available at https://www.aiib.org/en/projects/details/2024/_download/Uzbekistan/AIIB-APD_P000927_Accelerating-the-Uzbekistan-Climate-Transition-for-Green-Inclusive-and-Resilient-Economic-Growth-Subprogram-1-BoardApproved.pdf

AKIPress News Agency (2025). 1.6 million tons of household waste removed in Kyrgyzstan in 2024. Available at https://akipress.com/news:842661.

Asia-Plus (2026). Tajikistan's plastic footprint: 9 million tons of waste each year. Available at https://asiaplus.news/en/2026/01/19/tajikistans-plastic-footprint-9-million-tons-of-waste-each-year/.

Agency for Strategic Planning and Reforms of Kazakhstan (2007–2024). Indicator I-3 Waste Reuse and Recycling. Available at https://stat.gov.kz/en/ecologic-indicators/28434/waste_reuse/.

CBD (n.d.). Quick guide to the Aichi Biodiversity Targets. Available at https://www.cbd.int/doc/strategic-plan/targets/t11-quick-guide-en.pdf.

Center for Emergency Situations and Disaster Risk Reduction (n.d.). Presentation. Available at https://cesdrr.org/uploads/docs/2024/01/19.01.2024%20-%20CESDRR%20Presentation.pdf.

Central Asia Regional Economic Cooperation Program (2024). Climate Change Action Plan 2025–2027. Available at https://www.carecprogram.org/uploads/CAREC-Climate-Change-Action-Plan-2025-2027-Final-MC-2024-Document-ENG.pdf.

Climatescope (n.d. a). Kazakhstan Available at https://www.global-climatescope.org/markets/kazakhstan.

_____ (n.d. b). Uzbekistan. Available at https://www.global-climatescope.org/markets/uzbekistan.

CMS (2025). Central Asian Mammals Migration and Linear Infrastructure Atlas - CMS Technical Series No. 41. Available at https://www.cms.int/sites/default/files/publication/CAMI%20Migration%20Atlas%20Final_OPT.pdf.

Crippa M., Guizzardi D., Pagani F., Banja M., Muntean M. et al. (2025). GHG emissions of all world countries. Publications Office of the European Union, Luxembourg, 2025, doi:10.2760/9816914, JRC143227. Available at https://edgar.jrc.ec.europa.eu/report_2025.

ECE (2023). Reporting on Forests and Sustainable Forest Management in the Caucasus and Central Asia Focus on Criteria and Indicators. Available at https://unece.org/sites/default/files/2023-04/2228065_E_web.pdf.

_____ (2024). Turkmenistan Policy Brief. Available at https://unece.org/sites/default/files/2024-07/turkmenistan-policy-brief%20%283%29.pdf.

_____ (2026). Scoping report: Regional Environmental Performance Review of Central Asia. Available at: https://unece.org/info/Environment-Policy/Environmental-Performance-Reviews/pub/412635.

_____ (n.d.). Hazardous waste generated, per capita (Kg). Available at https://w3.unece.org/SDG/en/Indicator?id=217.

Economy.kz (2025). Impacts of Fuel Subsidies on Kazakhstan's Energy Pricing. Available at https://economykz.org/?p=14241&lang=en.

Euro news (2025). Uzbekistan launches €9.46 billion green energy push, covering nation's power needs. Available at https://www.euronews.com/business/2025/12/05/uzbekistan-launches-946-billion-green-energy-push-covering-nations-power-needs

FAO (2020). Global Forest Resources Assessment 2020. Available at https://www.fao.org/interactive/forest-resources-assessment/2020/en/.

_____ (2024). Central Asia Water and Land Nexus (CAWLN) for ecosystem restoration, improved natural resource management and increased resilience. Available at https://openknowledge.fao.org/server/api/core/bitstreams/f25ae3cf-6238-45a6-9d8b-582ab1eac246/content.

GCF (2023). Improving the capacity of Turkmenistan to access climate finance through capacity building and strategic frameworks. Available at https://www.greenclimate.fund/document/improving-capacity-turkmenistan-access-climate-finance-through-capacity-building-and.

GCF and UNDP (2024). Priorities for the Development of Climate Finance in Turkmenistan and Opportunities for Expanding International Cooperation in the Field of Financing Climate Projects. Available at https://www.undp.org/turkmenistan/publications/priorities-development-climate-finance-turkmenistan-and-opportunities-expanding-international-cooperation-field-financing.

Government of the Kyrgyz Republic (2025). Nationally Determined Contribution of the Kyrgyz Republic: NDC3.0. Available at https://unfccc.int/sites/default/files/2025-10/NDC3.0_Kyrgyzstan_English_30-09-2025%20%282%29.pdf.

Government of the Republic of Tajikistan (n.d.). The Updated NDC of the Republic of Tajikistan. Available at https://unfccc.int/sites/default/files/NDC/2022-06/NDC_TAJIKISTAN_ENG.pdf.

Health Effects Institute (2025). State of Global Air 2025. Available at www.stateofglobalair.org.

International Energy Agency (2022). Tajikistan 2022: Energy Sector Review. Available at https://www.oecd.org/content/dam/oecd/en/publications/reports/2022/10/tajikistan-2022-energy-sector-review_d97f3297/13412889-en.pdf.

Linnenkoper K. (2024). Kyrgzstan breaks ground on major recycling hub. Recycling International. Available at https://recyclinginternational.com/business/business-news/kyrgyzstan-breaks-ground-on-major-recycling-hub/59358/.

Ministry of Ecology and Natural Resources of the Republic of Kazakhstan (2025). The Ministry of Ecology summed up the results. Available at https://www.gov.kz/memleket/entities/ecogeo/press/news/details/1128859?lang=ru.

Ministry of Economy and Commerce of the Kyrgyz Republic (n.d.). Green Taxonomy of the Kyrgyz Republic: draft. Available at https://mineconom.gov.kg/froala/uploads/file/8f3849028e81dcb2de6c72dd29527eed9ee97e43.pdf.

National Committee on ecology and climate change of the Republic of Uzbekistan (2025). Waste recycling in Uzbekistan: a step towards a "Green" Economy. Available at https://gov.uz/en/eco/news/view/38417.

OECD (2024). Pricing greenhouse gas emissions: Carbon pricing in Kyrgyzstan. Available at https://www.oecd.org/tax/tax-policy/carbon-pricing-kyrgyzstan.pdf.

_____ (2025). Roadmap for Sustainable Investment Policy Reforms in Uzbekistan. Available at https://www.oecd.org/en/publications/roadmap-for-sustainable-investment-policy-reforms-in-uzbekistan_20865f29-en/full-report/promoting-green-investment-in-uzbekistan_021bd5e8.html.

Our World in Data. (2022). Hazardous waste generated per capita. Available at https://ourworldindata.org/grapher/hazardous-waste-generated-per-capita?mapSelect=KGZ~KAZ~TKM~TJK&globe=1&globeRotation=45.33%2C66.91&globeZoom=4.31.

Regueiro-Ferreira R. M., Fernández P- A. (2022). Ecological elasticity, decoupling, and dematerialization: Available at https://doi.org/10.1016/j.ecolind.2022.109010 .

Schulz D. (2020). Outdated waste management practices underscore the need to modernize facilities in Central Asia. Caspian Policy Center. Available at https://www.caspianpolicy.com/research/central-asia/outdated-waste-management-practices-underscore-the-need-to-modernize-facilities-in-central-asia.

Sabyrbekov R., Overland I., Vakulchuk R. (2023). Central Asian Climate Policy Pledges Under the Paris Agreement: Can They Be Fulfilled? Available at https://link.springer.com/chapter/10.1007/978-3-031-29831-8_4.

TRAFFIC (2025). Central Asian nations unite to protect nature: the Samarkand Declaration and Action Plan. Available at https://www.traffic.org/news/launch-of-samarkand-declaration-and-action-plan/.

The Diplomat. (2025). Is this Central Asia's Green Energy Reckoning? Available at https://thediplomat.com/2025/11/is-this-central-asias-green-energy-reckoning/.

The Times of Central Asia (2024). CAREC Ministers Approve Climate Action Plan and Launch Regional Climate Fund. Available at https://timesca.com/carec-ministers-approve-climate-action-plan-and-launch-regional-climate-fund/.

Umwelt Bundesamt (2023). PROJECT INFORMATION National E-waste Monitors: Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan. Available at https://www.umweltbundesamt.de/system/files/medien/1411/beratungshilfe/info_51-85_en_1.pdf.

UNEP (2017). Central Asia Waste Management Outlook. https://www.unep.org/ietc/resources/publication/central-asia-waste-management-outlook.

_____ (2025). Central Asia countries join forces to tackle pollution and protect the right to healthy environment, https://www.unep.org/technical-highlight/central-asia-countries-join-forces-tackle-pollution-and-protect-right-healthy.

_____ (2025a). Climate promise. Available at https://climatepromise.undp.org/what-we-do/where-we-work/kazakhstan

UNITAR (2023). E-waste monitors in Central Asia and Western Balkan. Available at https://unece.org/sites/default/files/2023-10/S5_10_Balde-2023-%2010%2019%20UNECE.pdf.

United Nations Kazakhstan (2026). Assessment of Ecological Priorities for Kazakhstan. Available at: https://kazakhstan.un.org/en/309716-assessment-ecological-priorities-kazakhstan.

United Nations Population Division (2024). World Population Prospects 2024. Available at https://population.un.org/wpp.

UN Water (n.d.). Progress on Integrated Water Resources Management (SDG target 6.5). Available at https://sdg6data.org/en/indicator/6.5.1.

Vakulchuk R., Beishembaeva K. (2025). How China and the Gulf states are shaping Central Asia's energy transition. Available at https://eastasiaforum.org/2025/12/23/how-china-and-the-gulf-states-are-shaping-central-asias-energy-transition/.

WHO (2021). WHO global air quality guidelines: particulate matter (PM2.5 and PM10), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide. Available at https://www.who.int/publications/i/item/9789240034228.

World Bank (2024). International Energy Investment Forum – Unlocking the investment potential for a greener future. Available at https://www.worldbank.org/content/dam/infographics/780xany/2023/apr/presentations/KREF-Energy-Sector-Reforms.pdf

_____ (2025). Environment Program in Central Asia. Available at https://www.worldbank.org/en/topic/environment/brief/climate-and-environment-program-in-central-asia

_____ (n.d.). What a waste 2.0: Trends in solid waste management, https://datatopics.worldbank.org/what-a-waste/trends_in_solid_waste_management.html.

Zoï Environment Network (2011). Biodiversity in Central Asia: A Visual Synthesis. Available at https://zoinet.org/wp-content/uploads/2018/02/Biodiversity-CA-EN.pdf.

Links

CBD https://www.cbd.int/

Central Asian Mammals Initiative https://cami.cms.int/atlas-central-asian-mammals-initiative

Green Fiscal Policy Network: Turkmenistan https://greenfiscalpolicy.org/turkmenistan

The World Bank: The World Bank in Turkmenistan https://www.worldbank.org/en/country/turkmenistan/overview

UNDRR Europe and Central Asia Regional Platform for Disaster Risk Reduction https://efdrr.undrr.org/

World Development Indicators https://databank.worldbank.org/source/world-development-indicators

The United Nations Economic Commission for Europe (ECE) Environmental Performance Review Programme assesses progress made by individual countries in reconciling their economic and social development with environmental protection, as well as in meeting international commitments on environment and sustainable development.

A Regional EPR of Central Asia is being prepared in response to a request by Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan. Building on more than 30 years of experience with national EPRs, the Regional EPR introduces an innovative approach focused on shared environmental challenges, transboundary dynamics and opportunities for strengthened regional cooperation among the countries of Central Asia.

The present report is explicitly framed within the ECE EPR Programme and the broader Environment for Europe process. The Ninth Environment for Europe Ministerial Conference (Nicosia, 2022) provided a key reference framework for this process. The Nicosia outcomes called for accelerated action on climate change, biodiversity, clean air, sustainable water management and a just transition, with particular emphasis on strengthening regional cooperation and implementation of existing agreements. These priorities are directly reflected in the eight thematic pillars of the Regional Ecological Summit 2026, which this report is designed to inform:

- Support for the climate transition
- Adaptation and economic resilience to environmental and natural risks
- Food security and the region’s ecosystem
- Sustainable management of natural resources
- Combating air pollution and waste management
- Mechanisms for achieving environmental ambitions
- A just and inclusive regional transition
- Environmental and digital skills for a sustainable future

The report also advances a regional approach to sustainable energy development and a just and inclusive energy transition in direct continuity with the commitments made at Nicosia and within the wider Environment for Europe framework. Renewable energy integration roadmaps, harmonized emission standards and regional circular economy frameworks all reflect this institutional lineage.