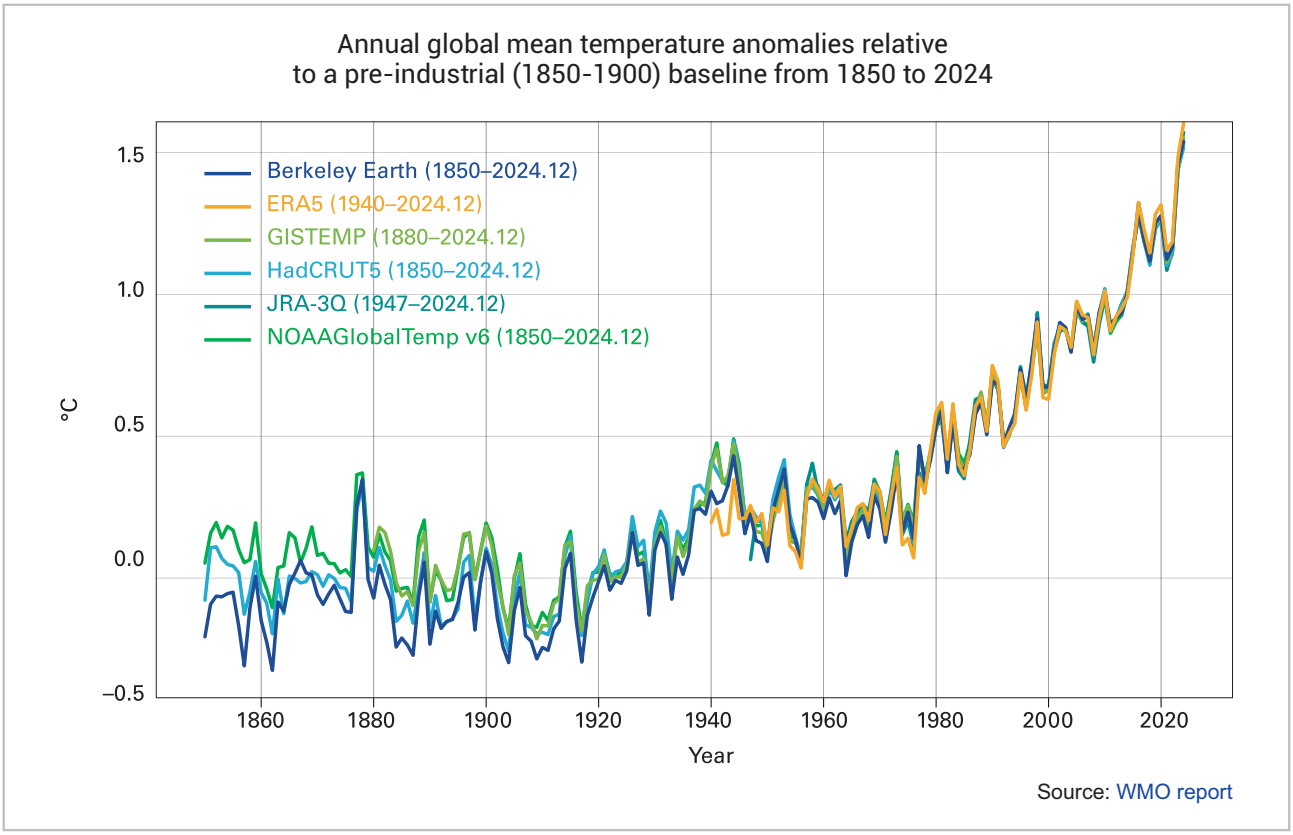
SECTION 12

Thematic Reviews

12.1. Climate Change

12.1.1. Global Trends and Implications

According to the WMO's State of the Global Climate 2024 report, **2024 was the warmest year**[352] **in the 175-year observational record** (since 1850). It saw new records for greenhouse gas (GHG) concentrations, surface air and ocean temperatures, ocean heat content, sea level rise, and glacier retreat. Climate change is accelerating, impacting all components of the climate system – the atmosphere, oceans, cryosphere, and biosphere – with increasingly severe consequences for human health, food and water security, infrastructure, and economies worldwide. Although the long-term temperature goal of the Paris Agreement remains theoretically within reach, achieving it is now under serious threat.



Key climate indicators[353]

Temperature. The global annual average temperature was approximately 1.55°C (±0.13°C) above the 1850-1900 pre-industrial baseline, a finding consistent across all major international datasets. The decade 2015-2024 was the warmest on record. This warming was driven primarily by rising GHG concentrations and amplified by the El Niño event, which intensified atmospheric and oceanic heating.

Greenhouse gases. Atmospheric levels of the three main GHGs – carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) - reached new peaks. Data from WMO Bulletin No.20 show concentrations of 420 ppm for CO_2, 1934 ppb for CH_4, and 336 ppb for N_2O. These values represent 151%, 265%, and 125% of pre-industrial levels, respectively. The increase in CO_2 concentration by 11.4% over just the past two decades is particularly concerning.

Oceans. The oceans absorb roughly 90% of the excess heat trapped by GHGs. In 2024, global ocean heat content reached its highest level in the 65-year observational record. The rate of ocean warming since 2005 has more than doubled compared to the 1960-2005 period. Projections indicate ocean warming will continue throughout this century, even

[352] Based on the analysis of six datasets
[353] State of the Global Climate 2024, WMO-No.1368

under low-emission scenarios. Concurrently, ocean acidification persists, evidenced by a steady decline in the global average pH of surface waters.

Sea level. Global mean sea level reached a record high in 2024 since satellite measurements began in 1993. The rate of rise over the past decade (2015-2024), at 4.7 mm per year, was more than double the rate observed in the first decade of satellite records (1993-2002, 2.1 mm per year).

Cryosphere. Glaciers experienced their most negative mass balance on record during the 2022-2024 period. Particularly severe ice loss was recorded in Norway, Sweden, Svalbard, and the tropical Andes. Seven of the ten years with the highest glacier mass loss since 1950 have occurred since 2016.

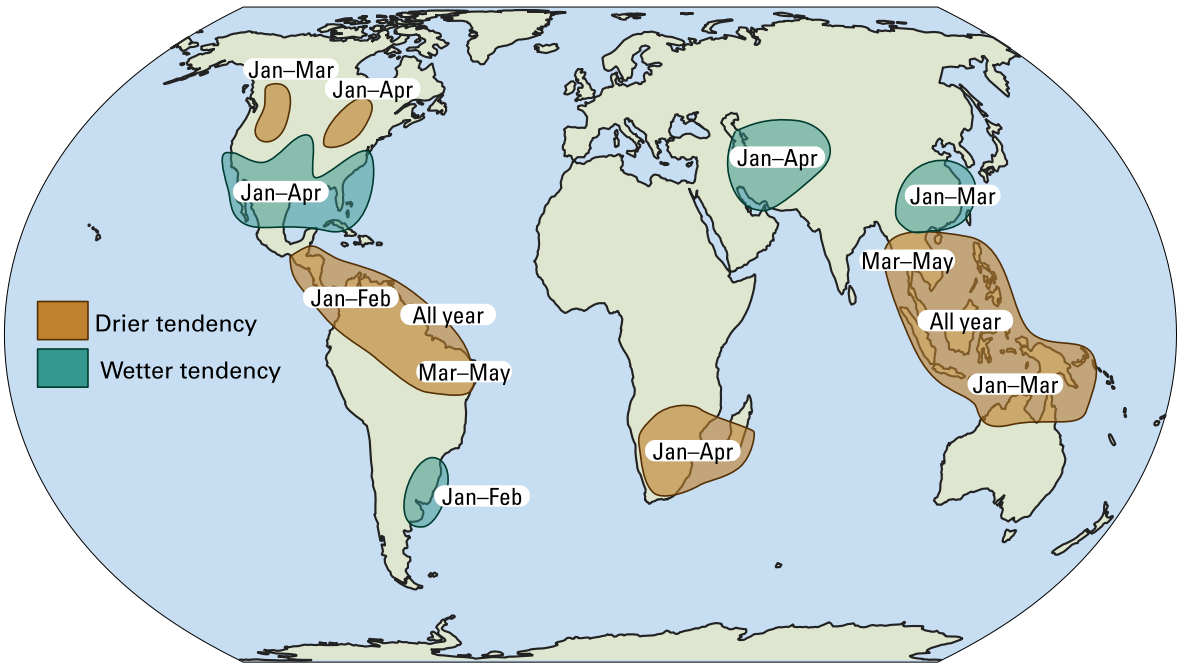
Extreme events and impacts

2024 set a new record for the number of weather- and climate-related disasters leading to mass displacement – the highest since 2008. Extreme events destroyed homes, infrastructure, and agricultural land, damaged ecosystems, worsened food insecurity, and heightened the vulnerability of populations, especially in conflict-affected regions.

Tropical cyclones were responsible for the most significant disasters: (1) typhoon Yagi affected Vietnam, the Philippines, southern China, Laos, Thailand, and Myanmar; (2) hurricanes Helene and Milton in the United States caused tens of billions of dollars in damage and claimed over 200 lives, marking the deadliest hurricane season in the U.S. since Katrina (2005); cyclone Chido struck Mayotte, Mozambique, and Malawi, causing widespread destruction, loss of life, and displacing approximately 100,000 people.

Food security deteriorated sharply, with crises intensifying in 18 countries. In eight countries, the population facing acute food insecurity grew by over one million people. Key drivers included drought, high food prices, and the impact of El Niño on cereal yields.

Typical El Niño seasonal precipitation effects for January to June
(data based on historical correlations)



Source: WMO report

Flooding in Brazil (May) killed over 200 and devastated agriculture and fisheries. In Spain's Valencia region, a record 772 mm of rain fell within 24 hours on October 29, triggering deadly floods. Floods and cold snaps in Afghanistan and neighboring countries resulted in hundreds of fatalities and inundated 35,000 hectares of farmland. During the summer, intense monsoon rains caused widespread flooding across the Sahel and East Africa (Kenya, Tanzania, South Sudan).

Severe **drought** gripped Northwest and Southern Africa (notably Zimbabwe, Zambia, Botswana, and Namibia), crippling agriculture and hydropower. In Chile, the February **wildfires** were the country's most destructive this century, killing over 300 people.

Canada and the United States also experienced one of their most severe wildfire seasons on record, displacing more than 300,000 people.

Heatwaves affected vast regions, including East Asia, Southern Europe, the Middle East, North America, and Africa. In Saudi Arabia, temperatures reaching 50°C during the Hajj pilgrimage in Mecca led to numerous heat-related fatalities.

Impact on water resources

The WMO's State of Global Water Resources report highlights *increasing instability* in the global hydrological cycle. In 2024, only about one-third of the world's river basins experienced near-normal flow conditions, with the rest facing significant water deficits or surpluses.

2024 marked the third consecutive year of widespread glacier melt across all regions. Many areas dependent on meltwater from smaller glaciers are at or approaching "peak water" – the point of maximum annual runoff – after which supplies will diminish as glaciers shrink. Severe drought affected the Amazon basin, parts of South America, and Southern Africa, while anomalously wet conditions prevailed in Central, Western, and Eastern Africa, parts of Asia, and Central Europe.

Global climate policy and economic risks

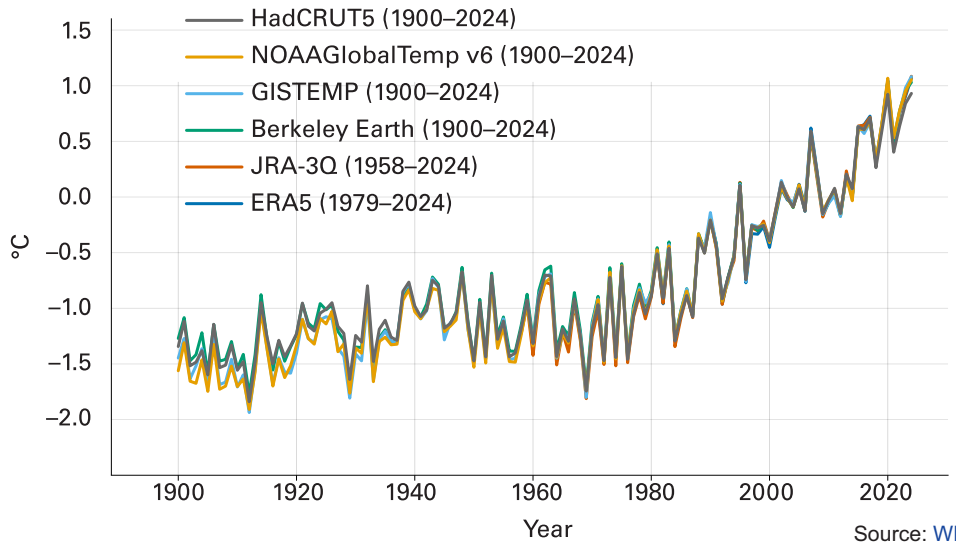
The UN Environment Programme's (UNEP) Emissions Gap Report 2024 warns that current national policies and pledges put the world on track for a global temperature rise of 2.6-3.1°C by 2100. To stay on a pathway limiting warming to 1.5°C, global emissions must fall by approximately 42% by 2030 and 57% by 2035 relative to 2019 levels. Achieving this, while technically feasible, requires a transformative scale-up of solar and wind energy, forest restoration, reform of the global financial system, and massive investment in climate mitigation. G20 nations, particularly major emitters, bear primary responsibility for delivering a step-change in ambition and accelerating action within this decade.

Research on "The Macroeconomic Impact of Climate Change: Global vs. Local Temperature" suggests that 1°C of global warming could reduce world GDP by over 20%. If current trends persist, the cumulative loss to global welfare could exceed **30%**, and the social cost of carbon could rise above $1,500 per ton. These figures underscore that the economic costs of inaction far outweigh the investments required for timely climate adaptation and mitigation.

12.1.2. Regional Focus: Asia and Central Asia

Climate Trends in Asia

The WMO's State of the Climate in Asia 2024 report indicates the continent is warming at nearly twice the global average rate. 2024 was either the first or second warmest year on record[354] for Asia (after 2020), with a mean temperature about 1.04°C above the 1991-2020 mean.



[354] depending on data set

Record-high sea surface temperatures and extensive marine heatwaves were observed. Sea level rise in the Pacific and Indian Oceans exceeded the global mean, heightening risks for low-lying coastal areas. Glaciers in the High Mountain Asia region (including the Himalayas and Tien Shan) continued to retreat rapidly, increasing hazards from glacial lake outburst floods and landslides and threatening long-term water security for millions.

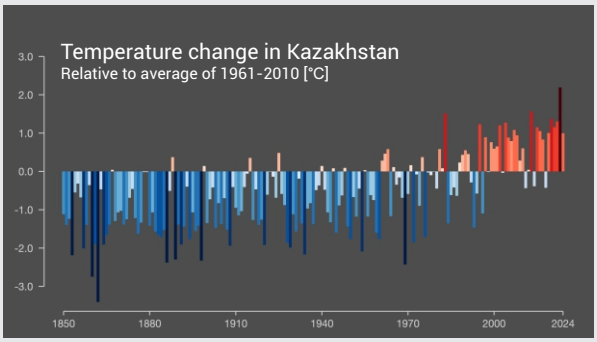
Extreme rainfall, droughts, and tropical cyclones caused widespread damage and loss of life. The report stresses the urgent need for investment in climate adaptation, early warning systems, and resilient development.

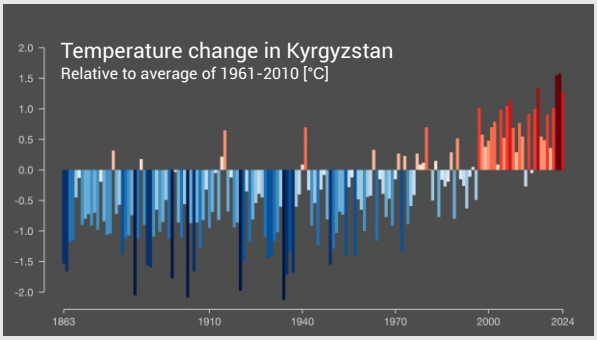
Central Asia: Accelerating Changes

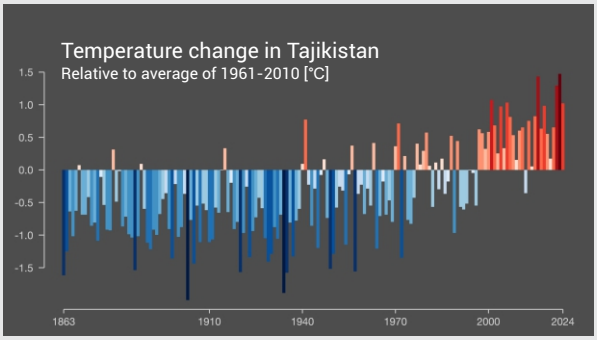
Central Asian countries have experienced a clear and accelerating warming trend since the late 20th century. While earlier temperature variations remained within the climatic norm (1961-2010), warming intensified from the late 1980s and accelerated sharply after the 2000s. **2024 was the warmest year** in the region's instrumental history, with temperatures in all Central Asian countries exceeding the norm by more than +1.5°C. This confirms a regional pattern of intensifying climate change, manifested through more frequent droughts, land degradation, growing water scarcity, and the rapid retreat of glaciers.

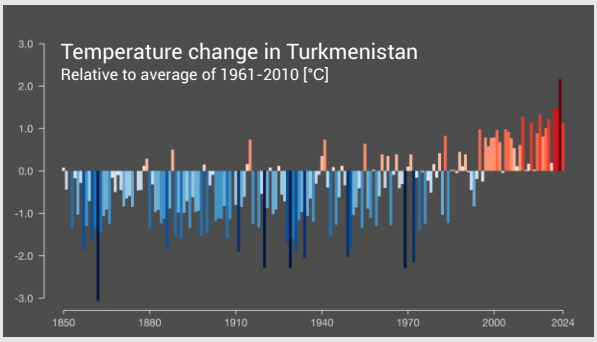
Temperature changes for Central Asia countries relative to climate norm (1961-2010)

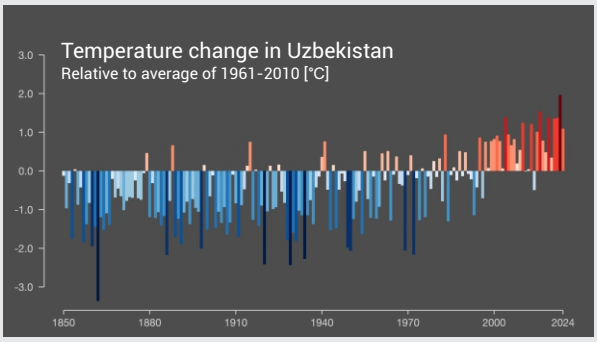
Source: https://showyourstripes.info/
(University of Reading, Great Britain)











Kazakhstan. In April 2024, the country experienced its most severe flooding in 80 years. A state of emergency was declared in 10 provinces, affecting approximately 100,000 people. The summer brought extreme heat and drought, particularly in the Syr Darya River basin. According to research published in Atmospheric Chemistry and Physics, the Aralkum Desert remains a primary source of dust storms, impacting the atmospheric radiation balance and air quality in western and southern regions (Mangystau, Kyzylorda, and Turkistan provinces).

Kyrgyzstan. Spring 2024 saw 115 recorded cases of mudflows and flash floods triggered by heavy rainfall. In Jalal-Abad, there were 82 days with temperatures classified as hot, of which 28 exceeded +35°C.

Increasing heat and moisture deficits are heightening the risks of glacial lake outburst floods, with around 350 glacial lakes now considered potentially hazardous. In July, the emergency warning system of the Ministry of Emergency Situations prevented a possible outburst of Lake Zyndan Zapadnoye in Issyk-Kul province, enabling the timely evacuation of local residents.

Tajikistan. From April to May 2024, intense rainfall in Gorno-Badakhshan Autonomous Province (GBAO) caused significant flooding and mudflows. Summer temperatures reached 46°C in Khatlon province, accompanied by severe dust storms. Natural disasters cost the country an estimated 0.4-1.3% of its GDP annually. According to UNICEF, 23 out of 62 districts are classified as high-vulnerability zones. The high proportion of annual economic losses from natural disasters makes Tajikistan one of the most climate-vulnerable countries in Central Asia. In 2024, a roadmap was adopted under "Early Warnings for All" Initiative, aimed at enhancing preparedness and reducing climate risks.

Turkmenistan. The frequency of salt-dust storms increased in spring and summer 2024, causing disruptions to power supply and damage to infrastructure, particularly in the northern and eastern parts of the country. A major episode occurred on June 22, reducing visibility to 50 meters, damaging power lines, and tearing roofs off buildings.

Uzbekistan. According to the national hydrometeorological service (Uzhydromet), summer 2024 was one of the three warmest on record. Temperatures exceeded the norm by **1-2°C**, and by **2-2.5°C** in June. The number of days with temperatures above +40°C surpassed the average of the last decade. Sand and dust storms remain a major climate threat, with their frequency and intensity increasing, especially in the Republic of Karakalpakstan, and Bukhara and Surkhandarya provinces.

12.1.3. Response Measures and Climate Policy

In 2024, global and regional efforts to combat climate change continued to gain momentum, reflecting growing political will, technological progress, and an increased awareness of the need to adapt to climate risks.

Global Context

The **European Union** (EU) advanced the implementation of the European Green Deal, including the launch of the Carbon Border Adjustment Mechanism (CBAM). This instrument is designed to equalize the cost of carbon-intensive goods produced within the EU and those imported from third countries by requiring the purchase of CBAM certificates. A transitional phase began in 2024, mandating importers to report embedded emissions without financial obligations; the full implementation with financial charges is scheduled for 2026. Additionally, new regulations on the Energy Performance of Buildings Directive (EPBD)[355] and the EU Methane Regulation came into force. Funding for sustainable energy projects under the REPowerEU Plan was substantially increased, and new legislative acts on nature restoration and industrial decarbonization were adopted. The European Commission also launched the European Energy Efficiency Financing Coalition, bringing together EU member states, financial institutions, and international partners to mobilize private investment and create sustainable financing mechanisms for energy efficiency projects.

The **United Kingdom**, while no longer an EU member, continued its active climate policy. On September 30, 2024, the country's last coal-fired power station, Ratcliffe-on-Soar Power Station (2,000 MW capacity), was shut down. This event marked the end of coal-fired power generation in the UK and reaffirmed the country's commitment to achieving net-zero emissions.

The **United States** continued implementing the provisions of the Inflation Reduction Act (IRA), which provides the largest climate investment package in the nation's history. In 2024, major subsidy programs were launched to support electric vehicle manufacturing, clean energy, and sustainable agriculture. Significant investments were announced for modernizing the power grid, alongside substantial funding for monitoring and reducing methane emissions in the oil and gas sector.

China adopted the 2024-2025 Energy Conservation and Carbon Reduction Action Plan, targeting a reduction in the energy intensity of GDP and CO_2 emissions. The country maintained its global leadership in deploying new solar and wind capacity and in developing carbon capture, utilization, and storage (CCUS) technologies, hydrogen energy, and a green power certificate mechanism.

India continued implementing its National Solar Mission, launching a program to support household solar installations. This initiative contributed to a record increase in solar capacity of 24.5 GW, nearly double the figure from the previous year.

Africa. The first **Climate and Health Africa Conference** (CHAC-2024) was held in Harar, Ethiopia, resulting in the adoption of the Harar Declaration. This document aims to strengthen the climate resilience of healthcare systems and address serious challenges

[355] The Energy Performance of Buildings Directive (EU/2024/1275, EPBD) came into force on 28 May 2024 and shall be integrated into national legislations by 29 May 2026

related to the impact of climate change on the continent's population health.

Central Asia

Central Asian countries intensified their efforts in climate change mitigation and adaptation in 2024, strengthening institutional frameworks and advancing green initiatives:

- **Kazakhstan** commenced work on updating its NDC, focusing on **phasing out coal**, developing renewable energy, and improving energy efficiency. In 2024, Kazakhstan accelerated **reforms in low-carbon infrastructure**. A mechanism for green financing and credit guarantees for renewable energy projects was introduced at development banks. Furthermore, the Development Bank of Kazakhstan approved a Green and Reimbursement Financing Policy aimed at stimulating investment in sustainable projects.

- **Tajikistan and Kyrgyzstan** prioritized the development of hydropower and sustainable water resource management, with a particular focus on participating in international initiatives for glacier monitoring and climate risk assessment.

In **Kyrgyzstan**, a "green" transformation is being implemented in accordance with the **"Kyrgyzstan – a Green Economy Country" concept**. This document outlines strategic directions for sustainable development. In 2024, work continued on developing a National Adaptation Plan (NAP),[356] aimed at enhancing climate resilience in key sectors – agriculture, water resources, and energy. The plan envisages integrating climate risks into national planning and strengthening institutional capacity. Thus, the country's climate policy combines green economy development with adaptation measures, ensuring an integrated approach to climate mitigation and enhanced nature and economy resilience.

Tajikistan. In November 2024, the **Country Climate and Development Report** (CCDR) for Tajikistan was published. Central to plans for a green, sustainable transformation is the Rogun Hydropower Plant (HPP) project (3,780 MW). The commissioning of this plant will be a significant step towards decarbonizing and transforming the country's economy. Expert estimates suggest that effective adaptation investments could **cut Tajikistan's climate-related GDP losses from 5-6% down to 2-3.8%**. These gains would stem from reducing the impact of climate factors: specifically, lowering flood damage to transport infrastructure by 60%, livestock losses by 40-50%, and labor productivity losses by 20-30%.

- **Turkmenistan** intensified efforts in afforestation, energy conservation, and adapting agriculture to changing climatic conditions and extended participation in regional climate programs. The country continued implementing its **National Strategy on Climate Change**, aimed at adapting key sectors and reducing GHG emissions. In collaboration with UNEP and UNDP, work is underway to develop a **National Adaptation Plan (NAP)** and establish a **GHG inventory system and measurement, reporting, and verification (MRV) mechanisms**. Turkmenistan confirmed its intention to reduce GHG emissions by 20% by 2030 compared to 2010 levels and joined the **Global Methane Pledge** in December 2023. At the regional level, Turkmenistan proposed the initiative to establish a UN-backed Regional Climate Technology Center in Ashgabat.

- **Uzbekistan** continued its course towards an **accelerated energy and climate transition** in 2024. The country set a target to reach a total installed renewable energy capacity of 19 GW by 2030 and reach a 54% share of RES in energy mix. To stimulate sustainable development, a significant increase in "green" projects is planned in the next five years. A dual education system tailored to the industry and energy sectors is being implemented, alongside the establishment of next-generation engineering schools. These institutions focus on training specialists in renewable energy, energy efficiency, green technologies, and digital solutions for agriculture.

In 2024, the CA countries worked on implementing the **Regional Climate Change Adaptation Strategy** adopted in 2023. Regional Working Group's meetings were held on implementation of the Strategy, the Secretariat of the RWG was established and recommendations for effective implementation of the Strategy were discussed.

12.1.4. International Processes and Climate Justice

The Paris Agreement and COP29

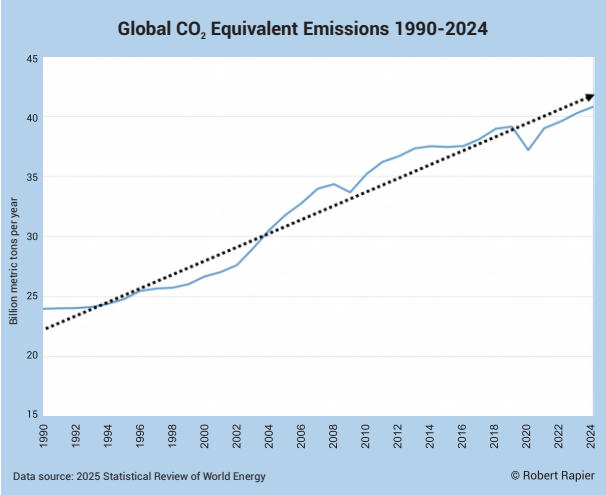
The Paris Agreement[357] under the United Nations Framework Convention on Climate Change (UNFCCC) remains the key international instrument uniting 195 countries[358] responsible for over 98% of global GHG emissions. In 2024, GHG emissions hit a new record high of 40.8 billion metric tons of CO_2 equivalent, up from 40.3 billion tons in 2023, despite the significant expansion of renewables and interna-

[356] Under the UNDP-GCF project "Advancing the National Adaptation Plan (NAP) Process for Medium- and Long-Term Planning and Implementation of Climate Change Adaptation Measures in the Kyrgyz Republic"

[357] Adopted on 12 December 2015 at COP21 in Paris

[358] The United States is the only country in the world to have withdrawn from the Paris Agreement on November 4, 2020, rejoined in February 2021, and withdrawn once again on January 20, 2025

tional climate pledges. The world's top three emitters – **China, the United States, and India** – continue to maintain their dominant share of global emissions.



Starting in 2020, countries have been submitting their national climate action plans, known as Nationally Determined Contributions (NDCs). According to the NDC Insights Series, by the end of 2024, **19 countries** had submitted their NDCs. This group includes five G20 members, five Small Island Developing States (SIDS), two BRICS nations, and one Least Developed Country (LDC). Collectively, these nations account for 20.5% of global GHG emissions. If all remaining expected NDCs are submitted by COP30, the coverage of global emissions is projected to reach 96.2%.

Under the Enhanced Transparency Framework (ETF),[359] nations have begun providing comprehensive reports on climate mitigation, adaptation, and support – aligned with Paris Agreement regulations. By year-end 2024, 90 countries had successfully submitted their first biennial reports.

A key event of 2024 was the **29th Conference of the Parties (COP29) to the UNFCCC**. Held under the theme "In solidarity for a green world" from November 11 to 22 in Baku, Azerbaijan, the conference brought together over 70,000 delegates. The central topic was climate finance, including the agreement on a New Collective Quantified Goal (NCQG). Developed countries made commitments to increase climate finance for developing countries. Developed nations have committed to tripling their annual climate finance for developing countries, increasing it from $100 billion to $300 billion by 2035. Furthermore, they aim to mobilize up to $1.3 trillion per year from a variety of sources, including public and private sectors, multilateral funds, and innovative financial instruments.

Nevertheless, COP29 highlighted persistent disagreements on core climate agenda items: adaptation, finance, and mitigation. Negotiations on GHG emissions reduction and the formulation of new Nationally Determined Contributions (NDCs) failed to produce a unified decision text, reflecting ongoing uncertainty in meeting the goals of the Paris Agreement. The final outcomes were limited to framework provisions, with key issues deferred to the sessions of the UNFCCC Subsidiary Bodies scheduled to take place in Bonn in 2025

Key COP29 Agreements

- Global Energy Storage and Grids Pledge: a commitment to increase global energy storage capacity to 1,500 GW by 2030 and develop green energy corridors (the initiative aims to accelerate the transition to RES).

- Hydrogen Declaration: countries reaffirmed their commitment to accelerating the development of clean, renewable, and low-carbon hydrogen as a key decarbonization tool. The declaration outlines plans to scale up hydrogen demand, integrate it into national energy and climate strategies, establish international standards, build necessary infrastructure, and provide support to developing nations.

- Declaration on Green Digital Action: a pledge by nations and the private sector to harness digital solutions for climate change mitigation and adaptation.

Participation of Central Asian Countries at COP29

Countries across Central Asia spoke with a coordinated voice, highlighting that a regional framework is vital for climate adaptation and resource stewardship. The Conference served as a platform for these nations to present their progress and objectives aligned with their revised national climate action plans

Kazakhstan demonstrated initiatives for achieving carbon neutrality by 2060 and developing a carbon trading platform. Emphasis was placed on land degradation neutrality and restoration projects.

Kyrgyzstan presented its NDC 3.0 roadmap, GLOF (Glacial Lake Outburst Flood) monitoring solutions, and a new **Nature Conservation Trust Fund**. Sessions led by the delegation focused on mountain sustainability, gender issues, and youth empowerment, with a strong emphasis on fostering employment within mountain communities.

Tajikistan advocated for initiatives on glacier preservation. President Emomali Rahmon proposed establishing a **Regional Coordination Center for Glaciology in Dushanbe under the auspices of the WMO** and supported the UN Action Decade of Cryospheric Sciences (2024-2033).

[359] Established in 2015, the ETF aims to enhance transparency, foster accountability, and track global climate progress. It succeeds the former MRV framework, providing a more robust and unified reporting system

Turkmenistan engaged in key discussions regarding climate adaptation, green financing, and technological innovation. The country highlighted water stewardship and renewables as strategic priorities, reaffirming its commitment to regional collaboration to meet the objectives of the Paris Agreement.

Uzbekistan presented its strategy for drought-resilient agriculture and solar energy expansion at COP29. The country, alongside Azerbaijan and the IOM, introduced the "Silk Road Declaration" regarding climate-induced migration. President Mirziyoyev's proposals included an **International Climate Loss and Damage Assessment Center**, a regional seed and genetic bank for resilient crops, and a **UN Innovative Agri-Hub** specifically for landlocked nations. He also spearheaded a call for a UN Declaration focused on the ecological security of river ecosystems.

On the sidelines of COP29, a ministerial meeting of Central Asian countries was held, reaffirming commitment to the **Regional Climate Change Adaptation Strategy**. The discussions focused on concrete steps for climate data exchange and transboundary water management (including joint monitoring and planning). Key priorities included the establishment of the **Central Asian Climate Data Center** as a platform for scientific exchange and decision support, as well as the development of climate finance mechanisms and enhanced access to international funds. Special attention was paid to the Regional Climate Action Transparency Hub (ReCATH), which presented findings on GHG inventory, adaptation planning, and the readiness of regional countries for the upcoming reporting cycle under the Paris Agreement.

COP29 Leaders Summit, November 12, Baku, Azerbaijan

Climate Litigation: Trends in 2024

In 2024, climate change-related litigation gained even greater prominence. In many countries, the judiciary is increasingly being utilized as a strategic tool to enhance climate accountability for both corporations and the state, as well as a primary means of safeguarding human rights amid the escalating climate crisis.

The **US** remained the epicenter of climate litigation: in 2024, 41 active cases were recorded against major oil and gas corporations, including ExxonMobil, Chevron, Shell, and BP. These proceedings are becoming a primary instrument for applying public and legal pressure on businesses to accelerate reforms. Meanwhile, although U.S. climate policy remains vulnerable to domestic political polarization, several states, most notably **California** and **New York**, have continued to independently implement ambitious climate strategies aimed at emissions reduction and the development of a green economy.

Europe. One of the most significant developments was the ruling by the European Court of Human Rights (ECHR) in the case of Verein KlimaSeniorinnen Schweiz and Others v. Switzerland (April 2024). For the first time, the Court ruled that a **state had failed to take sufficient measures to combat climate change, thereby violating human rights** protected under the European Convention on Human Rights. This landmark decision is unprecedented and establishes a legal precedent for similar litigation across other European nations.

In **Italy**, the first climate-related lawsuit against a private corporation, ENI, entered its active phase. Filed in 2023 by Greenpeace, ReCommon, and 12 individual citizens, the plaintiffs are seeking to hold the company accountable for its contribution to climate change. They are also requesting a court order to align ENI's corporate operations with the objectives of the Paris Agreement. This proceeding has set a significant precedent in Italian jurisprudence and has bolstered the growing trend of holding businesses legally liable for climate-related impacts.

In **Norway**, the Oslo District Court invalidated the development licenses for three new oil fields in the North Sea, ruling that a proper climate impact assessment had not been conducted during the project approval process. The decision, ruled in favor of Greenpeace Nordic and the youth movement Natur og Ungdom, represents a historic victory for civil society and underscores Norway's obligations under the Paris Agreement.

At the request of the Commission of Small Island States (COSIS), the **International Tribunal for the Law of the Sea** (ITLOS) issued an Advisory Opinion clarifying state obligations under the UN Convention on the Law of the Sea (UNCLOS) regarding the protection of the marine environment from anthropogenic GHG emissions. The Tribunal unanimously reached the following key conclusions: (1) anthropogenic GHG emissions into the atmosphere qualify as **"pollution of the marine environment"**, as they lead to ocean warming and acidification; (2) state obligations to protect the marine environment are characterized as **"due diligence"**; they are stringent and require the adoption of national measures based on the best available science and international standards; (3) under Article 194(1) of UNCLOS, states are mandated to take **"all measures necessary"** to prevent, reduce, and control pollution caused by GHG emissions; (4) states must ensure that activities within their jurisdiction do not cause damage to other states or areas beyond national jurisdiction through such

pollution; (5) developed states have an obligation to provide assistance to vulnerable developing states, including SIDS, in combating GHG-induced pollution and implementing adaptation measures. Despite its non-binding nature, the ITLOS Advisory Opinion establishes a significant legal foundation for holding states accountable for the climate crisis and strengthening the protection of the marine environment. Thus, 2024 marked an important stage in the institutionalization of international climate justice. The decisions rendered strengthen the legal frameworks for climate accountability and demonstrate the increasing role of the judiciary in ensuring a just and sustainable transition toward low-carbon development.

12.2. Progress in Integrated Water Resources Management and Transboundary Water Cooperation in Central Asia (SDG 6.5) in 2017-2023

Review prepared by F. Abdullaeva

This review was prepared as part of the "Thematic Reviews" series of the Water Yearbook to analyze the progress of Central Asian countries in achieving the targets outlined in the 2030 Agenda for Sustainable Development.

This section analyzes the dynamics of two indicators: 6.5.1 – the degree of implementation of Integrated Water Resources Management (IWRM), and 6.5.2 – the proportion of transboundary basin area covered by operational arrangements for water cooperation in Central Asian countries (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan) for 2017, 2020, and 2023.

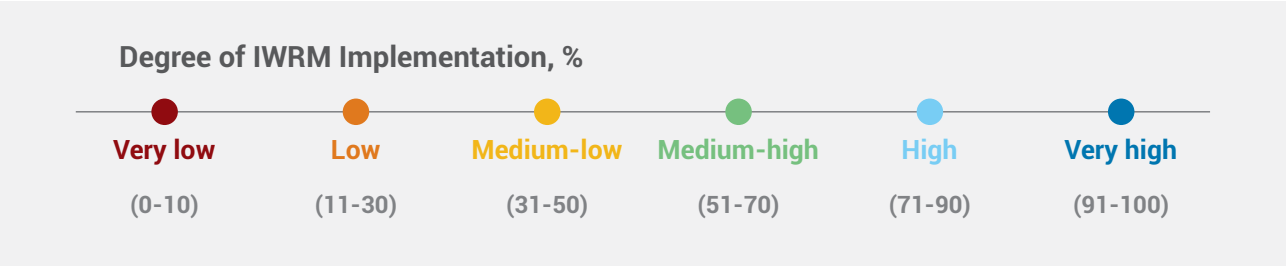
SDG 6.5 is formulated as follows: "By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate". To monitor progress toward this goal, SDG 6.5.1 tracks the degree of IWRM implementation, while SDG 6.5.2 examines the country's territory within transboundary water basins and assesses the extent to which this territory is covered by operational cooperation arrangements.

Progress in IWRM implementation at all levels (SDG 6.5.1)

SDG 6.5.1 assesses the degree of IWRM implementation on a scale of 0 to 100 across four components (Fig. 1): (1) enabling environment; (2) institutions and participation; (3) management instruments; (4) financing. The indicator is determined based on a self-assessment questionnaire filled out by countries every three years.[360]

As of 2023, 191 states submitted reports on SDG Indicator 6.5.1, of which 137 provided data for three monitoring cycles: 2017, 2020, and 2023. In 2017, among Central Asian countries, only Kazakhstan and Uzbekistan prepared reports. In 2020 and 2023, all five states of the region participated in the monitoring.

Figure 1. Classification of IWRM index values
(SDG 6.5.1 scores)



Overall Dynamics. Between 2017 and 2023, Kazakhstan improved its SDG 6.5.1 score from 30 to 51, moving from the "Low" to the "Medium-high" implementation category.[361] Uzbekistan also demonstrated growth, from 45 to 52 points (Medium-high level).[362] Countries that joined the monitoring in 2020 showed the following progress by 2023: Kyrgyzstan – from 31 to 38 points (remaining at the Medium-low level);

[360] https://w3.unece.org/SDG/ru/Indicator?id=232
[361] https://iwrmdataportal.unepdhi.org/country-reports/kazakhstan
[362] https://iwrmdataportal.unepdhi.org/country-reports/uzbekistan

Tajikistan – from 46 to 54 points (Medium-high level); Turkmenistan, which maintained the highest values in the region throughout the period, increased its score from 64 to 68 points, confirming its stable position in the Medium-high level of IWRM implementation (Table 1).[363]

By 2023, most countries reached a Medium-high level in **enabling environment** (Component 1), **institutional arrangements** (Component 2), and **practical IWRM tools** (Component 3); however, **financing** of the water sector (Component 4) remains a lagging area in most countries of the region.

Table 1. Degree of IWRM implementation in Central Asian countries, 2017–2023
(SDG 6.5.1)

IWRM Component	Country	2017	2020	2023
1. Enabling environment *(policies, laws, plans)*	**KZ**	29	37	44
	KG		27	39
	TJ		49	61
	TM		63	69
	UZ	38	41	49
	Global	**51**	**57**	**61**
2. Institutions and participation *(institutions, coordination, stakeholders)*	**KZ**	24	51	57
	KG		30	37
	TJ		43	48
	TM		48	55
	UZ	53	53	57
	Global	**53**	**58**	**61**
3. Management instruments *(planning, monitoring, data, etc.)*	**KZ**	40	51	61
	KG		43	47
	TJ		48	54
	TM		63	66
	UZ	56	60	62
	Global	**51**	**55**	**58**
4. Financing *(budget and investment in water resources management)*	**KZ**	28	43	43
	KG		23	28
	TJ		42	52
	TM		80	80
	UZ	34	37	38
	Global	**41**	**46**	**49**
Overall score	**KZ**	30	46	51
	KG		31	38
	TJ		46	54
	TM		64	68
	UZ	45	48	52
	Global	**49**	**54**	**57**

Note: **Degree of implementation by score:** Very high (91-100); High (71-90); Medium-high (51-70); Medium-low (31-50); Low (11-30); Very low (0-10); No data

Source: Country reports for 2017-2023, http://iwrmdataportal.unepdhi.org/country-reports

[363] https://iwrmdataportal.unepdhi.org/country-reports/turkmenistan

Component 1: Enabling environment *(policy, legislation, plans)*. This component reflects the existence of **policy, legal, and strategic frameworks** that lay the foundation for IWRM implementation at national and subnational levels, including the existence of transboundary water management arrangements. Based on the 2020 self-assessment (Table 1), Kazakhstan (37), Tajikistan (49), and Uzbekistan (41) rated their **enabling environment** for IWRM as Medium-low. Kyrgyzstan recorded a Low level (27), while only Turkmenistan showed a Medium-high indicator (63).

By 2023, positive dynamics are observed in almost all Central Asian countries. Kazakhstan increased its score to 44, maintaining a Medium-low level. The national report (Table 2, indicators 1.1 a, b, c) highlights persisting challenges, including insufficient development of water legislation and strategic planning. Kyrgyzstan, despite growing to 39 points – allowing it to move from "Low" to "Medium-low" – continues to face difficulties in implementing policy documents at national and other levels (Table 2, indicators 1.1 and 1.2). Tajikistan improved its result to 61 points (Medium-high); Turkmenistan increased to 69 points (Medium-high); Uzbekistan raised its score to 49 (Medium-low).

Notably, **arrangements for transboundary water management** (Table 2, indicator 1.2c) received high or medium-high scores in all countries. Kazakhstan, Kyrgyzstan, and Turkmenistan rated these arrangements at the maximum of 80 points, while Uzbekistan and Tajikistan rated them at 70.

Table 2. Assessment by CA countries of the enabling environment for IWRM implementation, 2020, 2023 *(SDG Indicator 6.5.1)*

	KZ		KG		TJ		TM		UZ	
	2020	2023	2020	2023	2020	2023	2020	2023	2020	2023
1.1. What is the status of policies, laws, and plans to support IWRM at the national level?										
a. National water resources policy	40	40	40	60	60	70	60	70	60	70
b. National water resources laws	20	30	50	60	50	70	60	70	30	40
c. National IWRM plans	20	30	20	30	50	60	60	70	30	40
1.2. What is the status of policies, laws, and plans to support IWRM at other levels?										
a. Sub-national water resources policies	40	50	10	10	40	60	60	70	40	40
b. Basin/aquifer management plans based on IWRM	20	40	20	20	50	60	60	60	30	40
c. Arrangements for transboundary water management	80	80	30	80	60	70	80	80	70	70
d. Sub-national water resources regulations (laws, decrees, etc.)	40	40	20	10	30	40	60	60	30	40
Overall score: Enabling Environment	**37**	**44**	**27**	**39**	**49**	**61**	**63**	**69**	**41**	**49**

Note: **Degree of implementation by score:** Very high (91-100); High (71-90); Medium-high (51-70); Medium-low (31-50); Low (11-30); Very low (0-10)

Source: Country reports for 2017-2023, http://iwrmdataportal.unepdhi.org/country-reports

Component 2: Institutions and participation *(institutions, stakeholders, coordination)*. This component reflects the development of **institutional mechanisms** for IWRM implementation, including cross-sectoral coordination, stakeholder participation, and **gender aspects**.

As of 2020 (Table 1), Kazakhstan and Uzbekistan assessed the level of development of relevant institutions and participation processes as Medium-high (51 and 53, respectively); Tajikistan and Turkmenistan demonstrated a Medium-low level (43 and 48), while Kyrgyzstan reported a Low level (30 points).

By 2023, some improvement was recorded in all countries. Kyrgyzstan moved to Medium-low (37), Turkmenistan to Medium-high (55), while others maintained their previous levels.

In 2023, Tajikistan, Turkmenistan, and Uzbekistan continued to note the effectiveness of **national authorities for leading IWRM implementation** (Table 3, indicator 2.1a), indicating the presence of stable institutional mechanisms. For Kazakhstan, this indicator improved from 20 to 40 (Medium-low level). In all countries of the region, with the exception of Kyrgyzstan, positive dynamics are observed in the area of intersectoral coordination (indicator 2.1b).

The engagement of the **public in water resources policy, planning, and management at national level** also requires strengthening. Despite high values in Kazakhstan (80) and medium-high levels in Kyrgyzstan and Uzbekistan (60 each), the assessment for other countries remains in the 40-point range, reflecting an insufficient level of transparency, participation, and dialogue at the local level (indicator 2.1 d).

For all countries, **participation of vulnerable groups in water planning and management** remains unchanged: Kazakhstan – medium-high, Kyrgyzstan – low, Tajikistan and Turkmenistan – very low, and Uzbekistan – medium-low (Table 3, indicator 2.2 c). Furthermore, in all Central Asian countries, the **integration of gender aspects** into IWRM policy and practice remains weak: Kazakhstan – 10,[364] Kyrgyzstan – 30, Tajikistan and Turkmenistan – 40, and Uzbekistan – 50. This indicates the need for a systemic approach to ensuring gender balance, including the participation of women in water committees and gender mainstreaming in planning.

Table 3. Assessment by CA countries of institutions and participation for IWRM implementation, 2020, 2023 *(SDG Indicator 6.5.1)*

	KZ		KG		TJ		TM		UZ	
	2020	2023	2020	2023	2020	2023	2020	2023	2020	2023
2.1. What is the status of institutions for IWRM implementation at the national level?										
a. National government authorities for leading IWRM implementation	20	40	40	40	60	70	60	60	60	70
b. Coordination between national government authorities representing different sectors on water resources policy, planning and management	40	70	40	40	50	60	40	60	60	70
c. Public participation in water resources policy, planning and management at national level	80	80	40	60	40	40	20	40	50	60
d. Private sector participation in water resources development, management and use	100	100	10	10	40	40	80	80	40	50
e. Developing IWRM capacity	40	50	30	40	50	60	50	50	60	60
2.2. What is the status of institutions for IWRM implementation at other levels?										
a. Basin/aquifer level organizations for leading implementation of IWRM	20	20	20	30	50	50	80	80	60	60
b. Public participation in water resources policy, planning and management at the local level	80	80	50	30	30	40	10	20	60	60
c. Participation of vulnerable groups in water resources planning and management	60	60	20	20	10	10	10	10	40	40
d. Gender mainstreaming in water resources management	0	10	30	30	30	40	20	40	40	50
e. Organizational framework for transboundary water management	100	100	40	70	60	70	80	80	70	70
f. CSub-national authorities for leading IWRM implementation	20	20	10	40	50	50	80	80	40	40
Overall score: Institutions and participation	**51**	**57**	**30**	**37**	**43**	**48**	**48**	**55**	**53**	**57**

Note: **Degree of implementation by score:** Very high (91-100); High (71-90); Medium-high (51-70); Medium-low (31-50); Low (11-30); Very low (0-10)

Source: Country reports for 2017-2023, http://iwrmdataportal.unepdhi.org/country-reports

Component 3: Management Instruments *(planning, monitoring, data, etc.)* assesses the existence and degree of application of **practical IWRM tools**, including basin management plans, functioning of information systems, monitoring, research and assessment of water resources. A comparative analysis of 2020 and 2023 data showed gradual improvement in all countries of the region: Kazakhstan (51 to 61); Kyrgyzstan (43 to 47); Tajikistan (48 to 54), moving into the **medium-high** category; Turkmenistan (60 to 66) and Uzbekistan (60 to 62) (Table 1).

At the national level, growth was noted in: (1) **monitoring of water availability** (3.1a) in Tajikistan (50 to 60); (2) s**ustainable and efficient water use management** (3.1b) in Turkmenistan (50 to 60); (3) **pollution control** (3.1c) in all countries (Kyrgyzstan maintained 60); (4) **management of water-related ecosystems** (3.1d) in Kazakhstan (40 to 60) and Tajikistan (40 to 50), while other countries maintaining the same level (60); (5) **disaster risk reduction management instruments** (3.1e) in Kazakhstan (60 to 70) and Tajikistan (50 to 60), other republics keeping the same indicator values.

Notable improvements also concern the development of d**omestic data and information sharing** at all levels (Table 4, indicator 3.2 c). Specifically, Kazakhstan's score rose from 40 to 80, indicating a transition to a high degree of implementation. Despite a 10-point improvement in their scores, Kyrgyzstan, Tajikistan, and Uzbekistan saw no change in their standing.

[364] https://iwrmdataportal.unepdhi.org/country-reports/kazakhstan

Integration of **water-related ecosystem management** at the national level (indicator 3.1 d) also reflects strengthening institutional capacity.

To further advance IWRM, measures are required to bolster cross-sectoral coordination, develop integrated information systems, and ensure more comprehensive consideration of environmental and climate factors in management processes. These priority areas are vital in the face of mounting water stress and transboundary challenges within the region.

Table 4. CA countries' responses on IWRM management instruments
(SDG 6.5.1)

	KZ		KG		TJ		TM		UZ	
	2020	2023	2020	2023	2020	2023	2020	2023	2020	2023
3.1. What is the status of management instruments to support IWRM implementation at the national level?										
a. National monitoring of water availability (includes surface and/or groundwater, as relevant to the country)	40	40	30	30	50	60	70	70	70	70
b. Sustainable and efficient water use management from the national level, (includes surface and/or groundwater, as relevant to the country)	60	60	60	60	60	60	50	60	60	60
c. Pollution control from the national level	40	60	60	60	40	50	50	50	50	60
d. Management of water-related ecosystems from the national level	40	60	60	60	40	50	60	60	60	60
e. Management instruments to reduce impacts of water-related disasters from the national level	60	70	40	40	50	60	60	70	70	70
3.2. What is the status of management instruments to support IWRM implementation at other levels?										
a. Basin management instruments	60	60	20	40	50	60	60	60	60	60
b. Aquifer management instruments	40	40	40	40	50	50	60	60	60	60
c. Data and information sharing within countries at all levels	40	80	40	50	40	50	80	80	60	70
d. Transboundary data and information sharing between countries	80	80	40	40	50	50	80	80	50	50
Overall score: IWRM instruments	**51**	**61**	**43**	**47**	**48**	**54**	**63**	**66**	**60**	**62**

Note: **Degree of implementation by score:** Very high (91-100); High (71-90); Medium-high (51-70); Medium-low (31-50); Low (11-30); Very low (0-10)

Source: Country reports for 2017-2023, http://iwrmdataportal.unepdhi.org/country-reports

Component 4: Financing *(budgets and investments for IWRM)* remains one of the least developed components in most of Central Asian countries. In 2020 (Table 1), financial provision was low in Kyrgyzstan (23) and at the lower end of medium-low in Kazakhstan (43), Tajikistan (42), and Uzbekistan (37), reflecting a limited yet more stable level of funding. Only Turkmenistan demonstrated a high level (80).[365]

In 2023, the situation changed slightly. Tajikistan reached 52 points (medium-high), Uzbekistan rose to 38, and Kyrgyzstan to 28. Kazakhstan remained at 43. The dynamics indicate a continuing deficit of sustainable and effective financial mechanisms. Turkmenistan remains the only country in the region with a high level of IWRM financing, maintaining a stable score of 80.

These trends highlight a persistent deficit of sustainable and effective financing mechanisms within the IWRM sector. Most countries in the region are characterized by limited domestic funding, a heavy reliance on international donors, and a lack of sufficient economic incentives for rational water use. In the Kyrgyz Republic, for instance, **national resources cover only the basic needs of the water sector** (Table 5, indicator 4.1a), which is reflected in the indicator's rise from 20 to 60 over the reporting period. Conversely, investment in **IWRM activities** (Table 5, indicator 4.1b) remains extremely limited (20), underscoring the ongoing need for international support. A similar pattern is observed in Uzbekistan (Table 5, indicators 4.1a and 4.1b), where the situation has remained unchanged since 2020.

Despite ongoing challenges, all Central Asian countries acknowledge the need to increase financing for IWRM. National strategies and development plans articulate **intentions to scale up investment in water infrastructure and management systems**. Tajikistan,

[365] https://iwrmdataportal.unepdhi.org/country-reports

for instance, has set a target to reach a "medium-high" financing level by 2030, contingent upon the active mobilization of external investment.[366] In Uzbekistan, ongoing reforms are shaping new water financing mechanisms, including the establishment of specialized funds and the development of public-private partnership (PPP) models. At the regional level, approaches to the coordination and joint financing of transboundary initiatives are under discussion. Notably, Kyrgyzstan has introduced an initiative for neighboring states to co-finance reservoirs located in border zones.

Consequently, **as of 2023, the "Financing" component remains the most vulnerable element of the SDG 6.5.1 framework for nearly all countries in the region**. This significantly constrains the achievement of stated IWRM goals and underscores the urgent need for accelerated reforms in the financial and economic governance of the water sector.

Table 5. CA countries' assessment of financing for water resources development and management *(SDG 6.5.1)*

	KZ		KG		TJ		TM		UZ	
	2020	2023	2020	2023	2020	2023	2020	2023	2020	2023
4.1. What is the status of financing for water resources development and management at the national level?										
a. National budget for water resources infrastructure (investment and recurrent costs)	40	40	20	60	50	60	80	80	50	50
b. National budget for IWRM elements (investments and recurrent costs)	40	40	20	20	50	60	70	70	30	30
4.2. What is the status of financing for water resources development and management at other levels?										
a. Sub-national or basin budgets for water resources infrastructure (investment and recurrent costs)	20	20	20	10	30	40	80	80	40	40
b. Revenues raised for IWRM elements	40	40	30	30	40	50	70	70	30	30
c. Financing for transboundary cooperation	100	100	30	30	40	50	100	100	50	50
d. Sub-national or basin budgets for IWRM elements (investment and recurrent costs)	20	20	20	20	40	50	80	80	20	30
Overall score: Financing	**43**	**43**	**23**	**28**	**42**	**52**	**80**	**80**	**37**	**38**

Note: **Degree of implementation by score:** Very high (91-100) | High (71-90) | Medium-high (51-70) | Medium-low (31-50) | Low (11-30) | Very low (0-10)

Source: Country reports for 2017-2023, http://iwrmdataportal.unepdhi.org/country-reports

Progress in Transboundary Water Cooperation (SDG 6.5.2)

SDG 6.5.2 monitors the proportion of transboundary basin area (within a country's territory) covered by operational arrangements for water cooperation. An "arrangement" implies a bilateral or multilateral treaty, convention, agreement, or other formal arrangement between countries that establishes a framework for interaction regarding transboundary basins.[367]

An arrangement is "operational" if it meets **four criteria**: (1) a joint institutional body for basin management is in place; (2) regular interstate meetings are held (at least once a year); (3) there are joint management objectives, a joint action plan, or coordinated measures; and (4) a regular exchange of data and information between the parties is maintained.[368]

Globally, there are 286 transboundary river basins and 592 transboundary aquifer systems. According to 2023 data, the global proportion of transboundary basin area covered by operational cooperation arrangements stood at approximately 59%. This indicates that functional transboundary water cooperation mechanisms exist for just over half of the relevant basin areas. Only 27 out of 153 participating countries have achieved full (100%) coverage of their transboundary water bodies through operational agreements.

Notably, the coverage level for transboundary surface waters (rivers and lakes) was significantly higher (65%) than for transboundary aquifers, which stood at 45% (below the overall global indicator value of 59%). Furthermore, fewer countries reported data on aquifers. This suggests a lack of knowledge and understanding regarding the physical characteristics of transboundary aquifers among riparian states, as well as a limited number of cooperation agreements specifically designed for groundwater systems.

[366] https://iwrmdataportal.unepdhi.org/country-reports/tajikistan

[367] UNECE and UNESCO, Step-by-step monitoring methodology for SDG Indicator 6.5.2 (2020 version), https://unece.org/guidance-materials-and-information-countries; UNECE, Guide to reporting under the Water Convention and as a contribution to SDG Indicator 6.5.2 monitoring, UN document ECE/MP.WAT/60, https://unece.org/info/publications/pub/2499. The definition of "arrangement for water cooperation" is provided in the two aforementioned publications

[368] https://unece.org/sites/default/files/2023-03/2210919_R_ECE_CEP_192_WEB.russian%20version%20pdf.pdf

In Central Asia, the situation is highly heterogeneous: **Kazakhstan and Uzbekistan achieved 100% coverage for transboundary rivers and lakes, Turkmenistan 66.02%, and Kyrgyzstan 43.68%** (Table 6).

A joint body, mechanism, or commission has been established and is functioning among the riparian states to facilitate transboundary cooperation. Regular official interaction (at least once a year) occurs through meetings at political or technical levels. Furthermore, common goals and strategic priorities have been aligned, alongside a joint or coordinated management/action plan, and a regular (at least annual) exchange of data and information has been operationalized.

Table 6. Proportion of transboundary basin area with an operational arrangement in CA countries (%), 2017, 2020, 2023 *(SDG 6.5.2)*

Country	6.5.2 Proportion of transboundary basin area with an operational arrangement for water cooperation (%)								
	Total			Transboundary rivers and lakes			Transboundary aquifers		
	2017	2020	2023	2017	2020	2023	2017	2020	2023
Kazakhstan	72	63.22	63.41	100	100	100	0	0	0
Kyrgyzstan	RnS[369]	27.2	39.39	RnS	29.91	43.68	RnS	0	0
Tajikistan	RnS	RnS	RnS	RnS	RnS	RnS	RnS	RnS	RnS
Turkmenistan	NaN[370]	NaN	NaN	NaN	66.02	66.02	NaN	NaN	NaN
Uzbekistan	NaN	69.59	69.59	59.3	100	100	NaN	0	0
Global	59.16	58	59[371]	63.28	64	65	48.52	42	45[372]

Source: UNECE and UNESCO (2017, 2020 and 2023), https://www.sdg6data.org/indicator/6.5.2

Table 7. Assessment by countries of transboundary cooperation for implementation of IWRM, 2020, 2023 *(SDG 6.5.1)*

	KZ		KG		TJ		TM		UZ	
	2020	2023	2020	2023	2020	2023	2020	2023	2020	2023
Enabling environment: 1.2. What is the status of policies, laws and plans to support IWRM at other levels?										
c. Arrangements for transboundary water management	80	80	30	80	60	70	80	80	70	70
Institutions and participation: 2.2. What is the status of institutions for IWRM implementation at other levels?										
e. Organizational framework for transboundary water management	100	100	40	70	60	70	80	80	70	70
Instruments: 3.2. What is the status of management instruments to support IWRM implementation at other levels?										
d. Transboundary data and information sharing between countries	80	80	40	40	50	50	80	80	50	50
Financing: 4.2. What is the status of financing for water resources development and management at other levels?										
c. Financing for transboundary cooperation	100	100	30	30	40	50	100	100	50	50

Note: **Degree of implementation by score:** Very high (91-100); High (71-90); Medium-high (51-70); Medium-low (31-50); Low (11-30); Very low (0-10)

Source: Country reports for 2017-2023, http://iwrmdataportal.unepdhi.org/test/countrydatabase

[369] Report not submitted

[370] Report submitted but the indicator value is not available

[371] By consolidating data from 2017, 2020, and 2023, SDG 6.5.2 is now available for 117 countries that share transboundary rivers, lakes, and aquifers, up from 101 countries in 2020 and 67 in 2017. The observed fluctuations in the indicator values do not signify a decline in the level of transboundary cooperation; rather, they reflect an expanded geographical scope and the inclusion of additional countries in the monitoring process

[372] In 2023, data on the transboundary aquifer component was available for 111 countries, compared to 94 in 2020 and 65 in 2017. The decrease in the indicator's value reflects the fact that the 17 newly reporting countries generally reported lower scores than the 94 countries that participated in the 2020 cycle

These results are consistent with the findings for SDG 6.5.1 (Table 7). As previously noted, in 2023, **arrangements for transboundary water management** (indicator 1.2.c) and the **organizational framework for transboundary water management** (indicator 2.2.e) received "high" and "very high" ratings from all countries in the region. Notably, Kyrgyzstan and Tajikistan showed improved scores by 2023. Scores for **transboundary data and information sharing** (indicator 3.2.d) remained unchanged: Kazakhstan and Turkmenistan maintain "high" ratings, reflecting advanced infrastructure and effective interaction mechanisms. In the remaining countries, this indicator persists at a "medium-low" level, highlighting the need for further enhancement of coordination and the integration of information systems.

The current status of **financing for transboundary cooperation** remains consistent with 2020 levels: Kazakhstan and Turkmenistan rate it as "very high," Tajikistan and Uzbekistan as "medium-low," and Kyrgyzstan as "low." Overall, the two downstream countries, Kazakhstan and Turkmenistan, remain the most satisfied with the current status of transboundary cooperation. It should be noted that this assessment encompasses cooperation not only within the Aral Sea basin but also across other basins where these countries are riparian stakeholders.

Conclusions and Next Steps

Overall, between 2017 and 2023, Central Asian countries demonstrated visible progress toward achieving SDG 6.5. The IWRM implementation index (SDG Indicator 6.5.1) shows a positive trend across all states in the region. At the regional level, efforts to develop water strategies and regulatory frameworks have intensified, interagency coordination mechanisms are in process of establishment, and basin-level monitoring and planning systems are improving.

Nevertheless, several challenges persist. Key among them are insufficient funding for the water sector (with the exception of Turkmenistan), limited institutional capacity at the local level, inadequate attention to gender mainstreaming, and weak public engagement in management processes. In 2023, regarding the financing component, only Tajikistan managed to reach a "medium-high" level (52), while Kazakhstan, Kyrgyzstan, and Uzbekistan remain at "low" or "medium-low" levels.

Regarding SDG Indicator 6.5.2, which characterizes transboundary water cooperation, the situation remains largely unchanged, except for Kyrgyzstan, which improved its performance in 2023 (43.68%) compared to 2020 (29.91%). Kazakhstan and Uzbekistan have maintained 100% coverage of transboundary basins with operational arrangements, while Turkmenistan holds at approximately 66%. An analysis for Tajikistan was not possible due to a lack of official data. This underscores the need to update and expand the legal and treaty framework to cover all water bodies, including groundwater, and to ensure the effective practical implementation of existing agreements. To accelerate progress on SDG 6.5 in Central Asia, the following measures are recommended:

Strengthening financial support for IWRM. Governments should increase budget allocations for water management and mobilize extra-budgetary sources. It is crucial to develop economic mechanisms *(such as PPPs, etc.)* that incentivize rational water use and investment in water infrastructure. International partners – donors and financial institutions – are encouraged to expand assistance for IWRM projects, prioritizing countries with low funding levels (Kyrgyzstan, Uzbekistan).

Developing institutional capacity and coordination. Water authorities must be strengthened at both national and basin levels, provided with clear mandates and sufficient resources. Countries should expedite the establishment of basin councils/commissions in all major river basins and ensure the meaningful participation of all stakeholders *(agriculture, energy, environment, and local communities)*. It is recommended to implement professional development programs for water sector personnel that promote gender balance and youth engagement. International organizations *(UNEP, UNDP, GWP, etc.)* can facilitate knowledge exchange and institutional development through platforms like the IWRM Action Hub.

Enhancing IWRM information tools. The region requires modern water monitoring systems, data exchange protocols, and scenario modeling. Support should be given to the Central Asian Regional Water Information System, integrated with national databases, to ensure transparent information sharing. Joint scientific research on water resource assessment, climate impact, and aquatic ecosystems must be intensified to ensure that decisions are evidence-based. International scientific and technical cooperation *(via UNESCO, WMO, etc.)* can help bridge gaps in data and monitoring technologies.

Expanding transboundary cooperation. Central Asian states should finalize and implement pending agreements, such as bilateral treaties between Uzbekistan and Kazakhstan, and Uzbekistan and Kyrgyzstan, while more actively involving Afghanistan in the Amu Darya dialogue. Particular focus should be placed on concluding agreements for transboundary aquifers, which currently remain overlooked. It is advisable to ensure that operational management mechanisms for all regional transboundary water bodies are in place by 2030. To this end, countries should leverage international instruments like the UN Water Convention and other multilateral water diplomacy initiatives.

International partners can play a pivotal role in this process by providing expert and technical support. In particular, UNECE and UNESCO, which serve as the co-custodian agencies for monitoring SDG Indicator 6.5.2, possess the necessary methodological exper-

tise to assist countries in the drafting, implementation, and evaluation of transboundary agreements.

Monitoring and knowledge sharing. The region should continue participating in global SDG 6.5 monitoring cycles. A regular exchange of progress data among Central Asian states should be established, including regional meetings of national coordinators for indicators 6.5.1 and 6.5.2. This will facilitate peer-to-peer learning – for example, adopting Turkmenistan's successful financing models or Kazakhstan's public participation practices. Regional organizations and development partners should play a coordinating role in this process.

Implementing these recommendations will allow Central Asian states to solidify the foundations of integrated water resources management, address existing gaps, and ensure the achievement of SDG 6.5 at all levels by 2030.

12.3. Earth Overshoot Day 2024

Every year marks the date when humanity depletes its annual supply of renewable natural resources – the point when we've used up what the planet can regenerate in a full year. This critical milestone is called Earth Overshoot Day. In 2024, it landed on August 1st. Experts calculate that we are currently consuming natural resources at a rate 1.7 times faster than Earth's ecosystems can recover.

This indicator is calculated based on the Ecological Footprint – a metric that measures how much biologically productive land area (in global hectares) humanity requires to support its needs over the course of a year. The first Earth Overshoot Day was recorded in 1970, falling on December 29th. Since then, the date has been creeping earlier in the year. If the current trend continues, by 2030 Earth Overshoot Day could arrive as early as the end of June.

This overshoot day can also be calculated for individual countries. In this case, the date shows when Earth Overshoot Day would fall if the entire global population lived like the citizens of that particular country.

While Earth Overshoot Day has held relatively steady in recent years, it still occurs well before the end of the

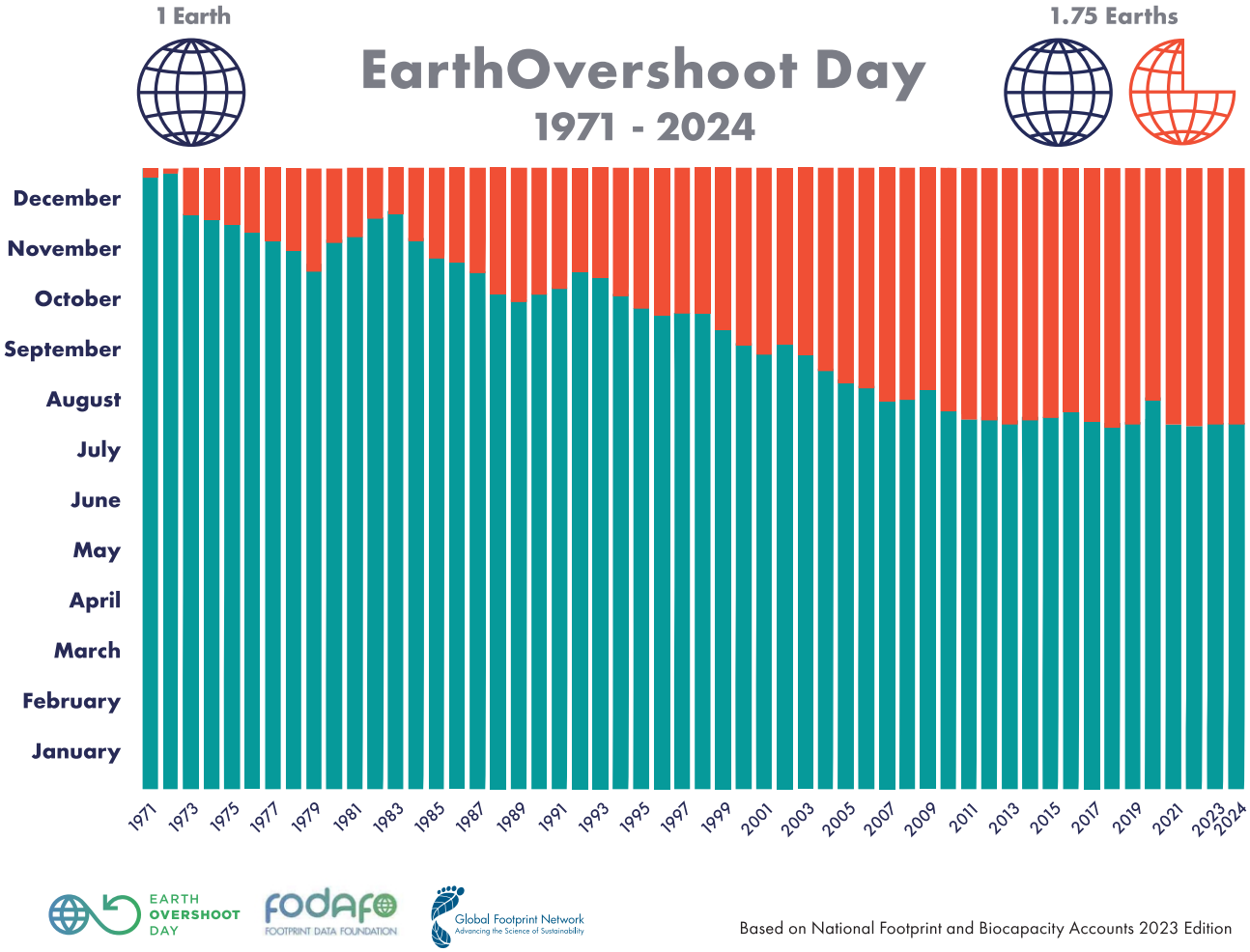
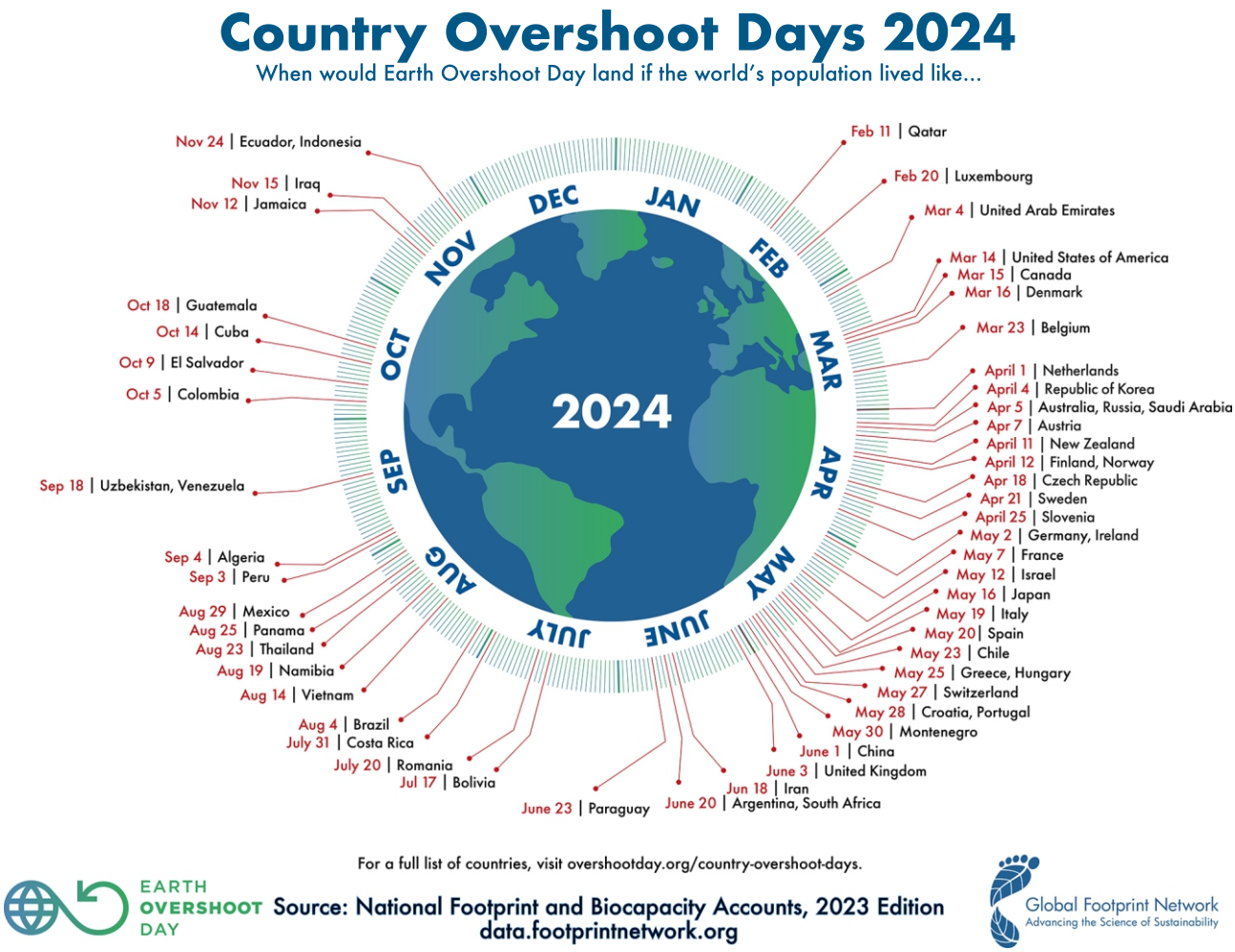


Image source: https://www.overshootday.org/newsroom/past-earth-overshoot-days/



year. This means we are consistently depleting the biosphere's resources. The remaining months are spent living in "ecological debt" to our planet. Therefore, this leveling off of the date should not be mistaken for progress. In reality, the overuse of natural resources is still building up, amplifying long-term environmental threats.

12.4. Desertification: Global and Regional Trends and Actions

Desertification is one of today's most critical and multifaceted challenges, affecting the environmental, socio-economic, and political dimensions of sustainable development. The term describes the process of **land degradation** that leads to desert-like conditions, resulting in the decline or loss of biological and economic productivity. This threat is most acute for rainfed and irrigated croplands, pastures, meadows, forests, and woodlands. Degradation results from many factors, including land use and management practices (UNCCD, 2024).

Central Asia is one of the world's most vulnerable regions to desertification. Here, an arid climate intersects with large-scale landscape transformations – most notably the drying of the Aral Sea – alongside a heavy economic reliance on irrigated agriculture and pastoralism. These challenges are compounded by limited water resources and accelerating soil salinization. Together, these factors are driving the degradation of natural ecosystems and posing significant risks to sustainable development.

In 2024, global attention on desertification reached a new peak with the **16th session of the Conference of the Parties to the UN Convention to Combat Desertification** and the 30th anniversary of the Convention. Simultaneously, Central Asian nations ramped up collective efforts to preserve and restore their lands.

This review summarizes the milestone events of 2024, global trends, and regional initiatives. It examines the primary drivers of land degradation, explores key policy shifts and major projects, and offers practical recommendations for preventing and mitigating the impacts of desertification in Central Asia.

12.4.1. Drivers of Desertification, Global Trends and Challenges

Desertification results from the cumulative impact of natural and anthropogenic factors, which together undermine the stability of ecosystems and economic activities.

Among the climatic and natural drivers, a primary role is played by shifting precipitation patterns and more frequent, prolonged droughts, which reduce moisture availability for vegetation and soil. This is compounded by rising average annual temperatures and intensified evaporation. Erosion is another critical element: wind erosion – prevalent in steppe and desert zones – and water erosion, which occurs during extreme rainfall events. Furthermore, shifts in the hydrological balance, such as fluctuating groundwater levels and the recession of glaciers and snowfields, are diminishing the primary water sources for rivers and aquifers in arid regions.

Anthropogenic factors amplify natural processes, often acting as their primary catalysts. Chief among these is unsustainable land management – characterized by excessive tillage, the expansion of monocrops, and the abandonment of crop rotation. Inefficient irrigation practices lead to secondary salinization and waterlogging, while overgrazing severely impacts landscapes as pastures lose their vegetative cover and become highly susceptible to deflation. This is further exacerbated by deforestation and the destruction of shrub ecosystems, which trigger biodiversity loss and accelerate erosive processes.

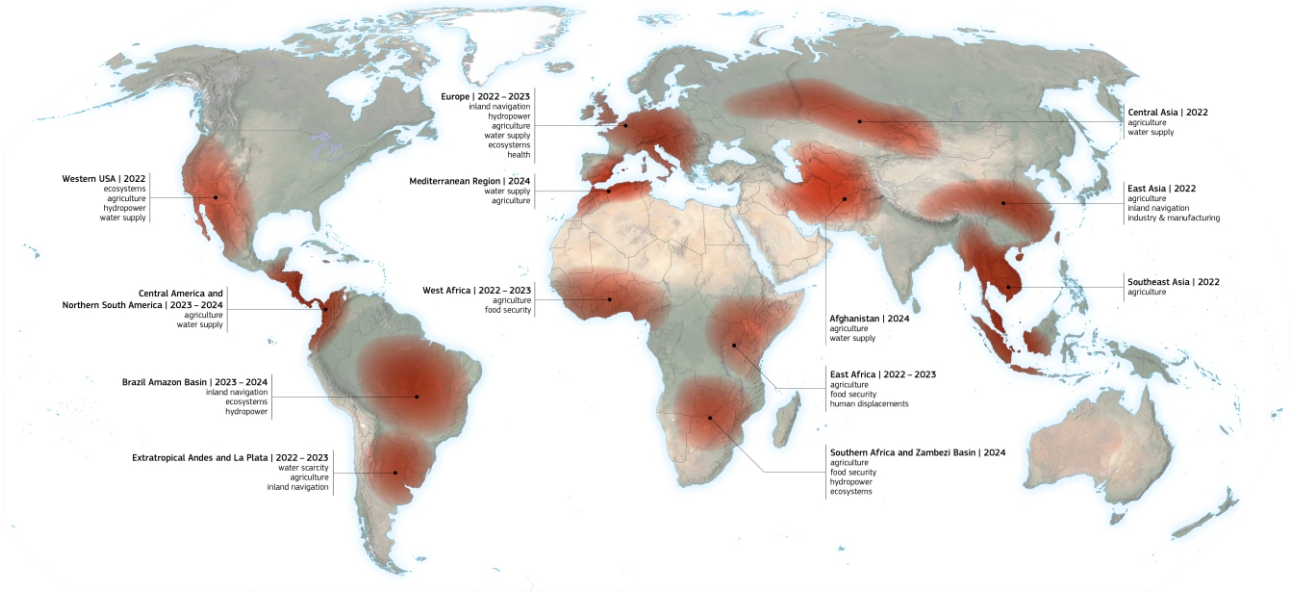
Socio-economic drivers also create a 'fertile ground' for deeper land degradation. Population growth and demographic pressures intensify the strain on natural resources. Furthermore, inadequate infrastructure, the inefficient management of land and water, and a lack of long-term sustainable development strategies increase the vulnerability of these regions.

Given these factors, **global trends** are beginning to **take shape**. According to Global Land Outlook, approximately 1 million km^2 of lands are **becoming degraded** every year, 40% of land is already degraded, and, if current trends persist, up to 1.6 billion ha could lose productivity by 2050. The resulting economic fallout from land degradation could approach $44 trillion, or roughly half of global GDP (UNCCD, 2022, 2nd edition).

Degradation manifests in several key ways, with **soil salinization** posing a particularly acute threat. Affecting approximately 1.4 billion ha (10% of the Earth's land surface), salinization puts an additional 1 billion ha at risk (FAO, 2024). This process can slash crop yields by up to 70% across both irrigated and rainfed lands. Major agricultural hubs are especially vulnerable, including **China, the USA, Russia, Australia,** and **Argentina,** alongside **Iran, Sudan,** and Central Asian nations such as **Afghanistan, Uzbekistan, and Kazakhstan**. If current trends persist, saline-affected areas could encompass one-third of all land by the end of the century.

Aridification represents an equally critical challenge. Unlike temporary droughts, aridification is often irreversible; approximately **7.6%** of global territories have already crossed the aridity threshold, permanently losing their historical climatic characteristics. Over the last three decades, **77.6%** of land has become increa-

Figure 2. Examples of major drought events with examples of impacted systems; red areas represent the approximate spatial extent of drought impacts *(conditional boundaries)*



Source: World Drought Atlas, worlddroughtatlas.org

singly dry, with drylands expanding by **4.3 million km²** to cover **40.6%** of the Earth's ice-free surface (UNCCD, 2024). In 2020, 30% of the global population (**2.3 billion people**) lived in arid regions, up from **22.5%** in 1990 (UNCCD, 2022). By 2100, the convergence of aridification, water scarcity, and soil degradation could threaten the quality of life, food security, and stability of up to 5 billion people, potentially driving large-scale forced migration (UNCCD, 2024).

A primary manifestation of this desertification is the surging **frequency of extreme droughts** (Figure 2).

At the same time, **2 million tons of sand and dust** enters the atmosphere every year. This impacts nearly **3.8 billion people** and alters regional climate and ecological balances (WMO, 2025). **Unsustainable agricultural practices** continue to drive this degradation: over-tillage and monocropping, which contribute to **80%** of **forest and soil loss**. Furthermore, the Earth's ecosystems are losing their ability to absorb carbon (IPCC, 2023).

The aforementioned processes give rise to the **key challenges of our time**. First and foremost, food security is under threat: degraded and salinized soils lose productivity, which constrains agricultural capacity. The crisis of water security is also intensifying; deteriorating quality and dwindling availability have become critical bottlenecks for millions of people and entire economic sectors. As **ecological sustainability** erodes, ecosystems are losing both their biodiversity and their inherent capacity to maintain a natural balance. Consequently, **social risks** are escalating as competition for dwindling resources intensifies. This is driving a rise in forced migration while deepening poverty and instability in the world's most vulnerable regions. Finally, the synergy between aridification and dust storms poses a grave climatic threat, further exacerbating global warming and increasing the frequency of extreme weather events.

Ultimately, desertification is far more than a localized environmental issue; it is a multi-dimensional challenge that fundamentally threatens global food, water, social, and climate security.

12.4.2. International Agenda: the United Nations Convention to Combat Desertification and Outcomes of COP16

The UN Convention to Combat Desertification

The key international legal instrument in the field of preventing land degradation is the United Nations Convention to Combat Desertification (UNCCD) adopted in 1994.[373] The Convention's primary mandate is to combat desertification and mitigate the effects of drought through effective action at all levels, supported by international cooperation and partnership arrangements, in a framework of an integrated approach combining the environmental, social, and economic aspects of sustainable development *(Article 2)*.

Parties to the Convention have committed to developing and implementing national, subregional, and regional action programs aimed at preventing and reducing land degradation, rehabilitating affected areas, and adapting to drought *(Article 9)*. Affected countries are obligated to prioritize combating desertification within national planning, ensure the participation of local populations (especially women and youth), and take into consideration traditional knowledge *(Article 5)*. Developed countries, in turn, commit to providing financial and technical support, including the transfer of relevant technologies and knowledge *(Article 6)*. As of January 1, 2025, the Convention has 197 Parties, including all Central Asian countries.

Parties to the Convention submit national reports to the UNCCD Secretariat. These reports serve both as a tool for monitoring the implementation of international commitments and as a basis for planning environmental measures at the national level, providing the necessary analysis and data for timely decision-making. As of January 1, 2025, Central Asian countries have each prepared 8 national reports (the Republic of Tajikistan – 6).[374] These documents cover the period 2018-2022 and provide an overview of the results of implementing land degradation countermeasures, including progress towards achieving voluntary national targets for Land Degradation Neutrality (LDN) by 2030, as well as the implementation of national action programs to combat desertification.

16th Session of the Conference of the Parties

In 2024, the flagship event in the field of combating land degradation was the 16th session of the Conference of the Parties to the UNCCD (COP16), held on December 2-13 in Riyadh, Saudi Arabia, under the motto *"Our Land. Our Future"*. The Conference was attended by representatives from all 197 Parties to

[373] Adopted in Paris on 17 June 1994

[374] National country reports are available on: Kazakhstan, https://www.unccd.int/our-work-impact/country-profiles/kazakhstan;
Kyrgyzstan, https://www.unccd.int/our-work-impact/country-profiles/kyrgyzstan;
Tajikistan, https://www.unccd.int/our-work-impact/country-profiles/tajikistan;
Turkmenistan, https://www.unccd.int/our-work-impact/country-profiles/turkmenistan;
Uzbekistan, https://www.unccd.int/our-work-impact/country-profiles/uzbekistan

16th Session of the Conference of the Parties to the United Nations Convention to Combat Desertification (UNCCD COP16), December 2-13, Riyadh, Saudi Arabia / Credit: UNCCD

the Convention, with the total number of participants exceeding 20,000. Key agenda items included enhancing resilience to droughts and dust storms, restoring degraded lands, mobilizing financial resources, and strengthening the political status of sustainable land management measures.

COP16 outcomes

- **Political commitments.** Countries agreed to give higher priority to land restoration and drought adaptation measures by integrating them into national strategies and development programs.

- **Mobilization of financial resources.** Participants announced the allocation of over $12 billion for projects to combat desertification, land degradation, and drought worldwide, primarily in Africa and Asia. However, the global financing gap through 2030 is estimated at no less than $2.6 trillion (approximately $1 billion per day).

- **Role of the private sector.** The *Business for Land (B4L)* initiative was reaffirmed – a partnership with major corporations in the agricultural, energy, and financial sectors aimed at restoring 1.5 billion ha of degraded land by 2030 and achieving global Land Degradation Neutrality (LDN), thereby fulfilling the central goal of the UN Decade on Ecosystem Restoration.

- **Regional initiatives.** Central Asia was represented as a unified bloc at COP16, with a consolidated regional position presented by the delegation of Kazakhstan. Notably, for the first time in 29 years of participation, Uzbekistan successfully secured the inclusion of its initiative within the official COP decisions: the *Samarkand Declaration on Sand and Dust Storms* was endorsed and opened for accession by all Parties. The document formalizes the necessity of international coordination in monitoring and forecasting storms, exchanging scientific data, and integrating SDS management into national sustainable development and climate adaptation strategies.

2024 – the 30th Anniversary of the Convention

Annually on June 17, the global community observes the *World Day to Combat Desertification and Drought* established to commemorate the signing of the Convention in 1994. The 2024 anniversary events, held in **Bonn, Germany** – home to the UNCCD Secretariat – were the largest in recent years. The German Government hosted a high-level international conference featuring world leaders, heads of UN agencies, scientists, and representatives from civil society and youth organizations.

Under the theme *"United for Land: Our Heritage. Our Future"*, the 2024 observance focused on mobilizing all sectors of society to preserve and restore land resources. Participants emphasized the urgency of accelerating sustainable land-use practices and raising public awareness regarding the scale of desertification. A particular focus was placed on youth engagement: according to UNCCD estimates, involving young people in land restoration could create **up to 600 million jobs over the next 15 years**, simultaneously addressing global employment challenges and environmental rehabilitation.

12.4.3. International Experience in Restoring Degraded Lands

In 2024, the international community accelerated the implementation of large-scale projects designed to halt desertification and restore degraded ecosystems.

One of the most prominent examples is China's **Three-North Shelter Forest Program**. Launched in 1978, it is the world's largest afforestation initiative, aimed at shielding territories from sand and dust storms. Over 45 years, an extensive forest belt – comparable in length to the Great Wall of China – has been established, significantly curbing desertification across several provinces. However, the project faces ecological hurdles: certain plantations are water-intensive or struggle with poor soil quality, while deforestation for agricultural expansion persists. Despite these challenges, China aims to triple its protective forest cover to 4 million km^2 by 2050.


Field Geometry / Credit: Konstantin Tolokonnikov

The **Great Green Wall** initiative unites 22 African nations in a joint effort to halt the expansion of the Sahara Desert, which consumes vast tracts of fertile land annually (UNCCD, 2024). Degradation here is driven by a combination of climatic factors, such as drought, and anthropogenic pressures, including deforestation, slash-and-burn agriculture, and overgrazing. Since 2012, approximately 30 million ha have been restored toward a target of 100 million ha by 2030. While financial and logistical obstacles remain, the project is a cornerstone of the region's sustainable development strategy.

The Sahara Desert and the African Sahel Region: The Great Green Wall Initiative

A significant example in the post-Soviet space is the **Phytomelioration Program in Kalmykia**. In the late 20th century, massive land plowing and a shift to intensive sheep farming led to the creation of a man-made desert. Though degraded land was successfully reduced from 600,000 to 240,000 ha through targeted conservation, degradation has accelerated again since the 2000s. This resurgence highlights the critical need for long-term institutional mechanisms to sustain restoration gains.

Beyond afforestation, **technological and agrotechnical solutions** are becoming increasingly widespread. Drip irrigation, pioneered in Israel, delivers water directly to plant roots to minimize evaporation. This technology enabled Israel – more than half of which is covered by the Negev Desert – to build a competitive agricultural sector that exports globally. Today, Israeli firms supply these systems to over 100 nations, proving that innovation can revolutionize farming in water-scarce regions.

A particularly promising frontier is **carbon farming**, which focuses on sequestering organic matter to restore soil fertility. This approach boosts crop yields and improves moisture retention while reducing the need for chemical fertilizers and lowering greenhouse gas emissions. Experts suggest that adopting sustainable carbon farming practices is essential not only for land restoration but also for climate change mitigation.

12.4.4. Regional dynamics: combatting land degradation in Central Asia

In Central Asia, the convergence of harsh environmental conditions and intense human activity has made land degradation a critical concern. The region's landscapes are inherently fragile: bulk of the region's territory is occupied by desert and semi-desert areas, namely the Karakum Desert, the Kyzylkum Desert, the Ustyurt Plateau and the new Aralkum Desert formed in place of the dried Aral Sea. The key drivers of degradation are overgrazing of pastures, inefficient land and water use, deforestation, and climate change (UNCCD, 2023). According to the UN data, as of 2019, over 20% of the total region's area is degraded, equivalent to roughly 80 million ha, an area almost four times the size of the Kyrgyz Republic (Table 8, Figure 3).

Between 2015 and 2019, degraded land areas remained relatively stable overall; while Kazakhstan and Turkmenistan saw marginal increases, Kyrgyzstan reported a 1.03% decrease. While Uzbekistan reported the highest proportion of degraded land in the region,[375] it also saw the largest decrease from 30% to 26% compared to 2015.

18.01 million people (30.51% of the region's total population) in Central Asia are reported to be exposed to land degradation, while 26.7 million people (51.3%) are exposed to drought. The percentage of population exposed to land degradation varies from 29.2% in Uzbekistan (9.3 million people) to 35.5% in Kyrgyzstan (1.9 million people). In turn, the percentage of population exposed to drought varies from 20.75% in Turkmenistan (1.67 million people) to 88.71% in Kyrgyzstan (4.74 million people) (Table 9).

About 60% of CA's population is directly dependent on agriculture as the primary source of income, therefore droughts pose a serious threat to the economic security of the majority of the region's population. Around 12 million people live in areas with high drought risk (about 40 million ha). Most of these hotspots are located in the foothill areas of the source of the Amu Darya and Syr Darya deltas, extending to the transboundary areas of the Aral Sea region.

More than 80% of 400 million ha of CA is covered by deserts and steppes. Combined with climate change and repeated droughts, this makes the region a natural source of sand and dust storms (SDS). Nearly 6.5 million people (about 9% of the region's population) live in SDS medium- and high-risk areas. SDS are often transnational. Research shows that salts from the Aral Sea region are being detected along the coast of the Antarctic, on glaciers in Greenland, in

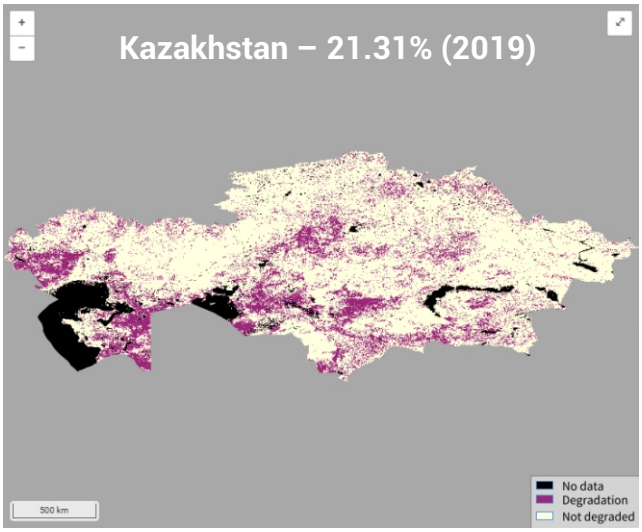
[375] 3 million ha of land in Uzbekistan have been degraded due to the drying of the Aral Sea

Table 8. Land degradation and drought-prone areas in Central Asia

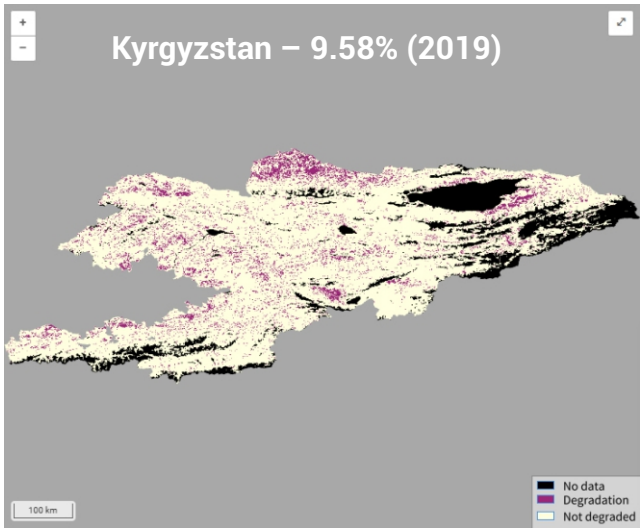
Country	Degraded lands, Mha / %		Drought-prone areas	
			Total area, Mha	Proportion of the total country area, %
	2015	2019	2019	2019
Kazakhstan	56.27 / 20.65	58.09 / 21.31	117.1	41.25
Kyrgyzstan	2.12 / 10.61	1.92 / 9.58	10.49	52.9
Turkmenistan	8.38 / 17.06	8.70 / 17.72	7.17	15.24
Uzbekistan	13.57 / 30.22	11.74 / 26.14	17.29	38.52

Note: the data on Tajikistan is not available
Source: https://data.unccd.int/

Figure 3. Proportion of degraded land of the total country area



Source:
https://data.unccd.int/country-overview?country=KAZ



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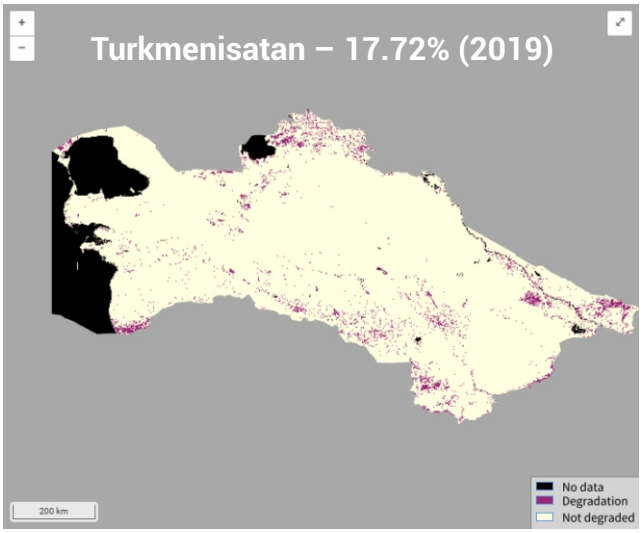
https://data.unccd.int/country-overview?country=KGZ



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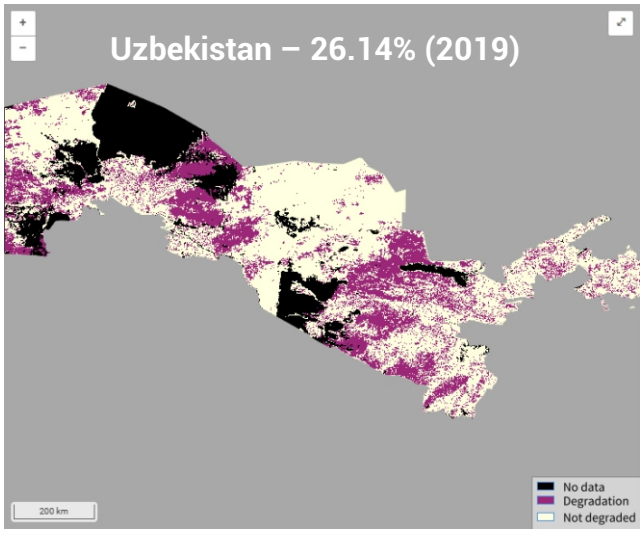


Source:
https://data.unccd.int/country-overview?country=UZB

Table 9. Drought and land degradation exposure on population in the CA countries, 2019

Country	Population exposed to land degradation		Population exposed to drought	
	million people	percentage, %	million people	percentage, %
Kazakhstan	4.37	31.67	4.02	58.36
Kyrgyzstan	1.90	35.50	4.74	88.71
Turkmenistan	2.45	30.39	1.67	20.75
Uzbekistan	9.30	29.20	16.27	51.20

Note: the data on Tajikistan is not available
Source: https://data.unccd.int/

Norwegian woods and other regions around the globe.

Recognizing the scale of the challenge, all **five Central Asian nations have prioritized combating desertification** and have joined the land degradation neutrality (LDN) target-setting program, pledging to restore degraded lands by 2030. Per UNCCD, 2023, half of the LDN targets set by countries have already been achieved or currently underway. Key measures include reforestation projects, the modernization of irrigation systems, and soil conservation efforts.

As the region's largest country, **Kazakhstan** prioritizes the sustainable management of its vast steppe and desert landscapes. Under its Concept for Transition to a Green Economy, the country emphasizes resource stewardship and 'green' agricultural principles. Key objectives include restoring disturbed lands, halting pasture withdrawal, and optimizing water and other natural resource use. Kazakhstan's Ecological Code classifies the "reduction of land degradation and desertification" as a mandatory environmental quality indicator. This is supported by five-year regional action plans subject to state-level oversight. Furthermore, the 2021-2030 Agro-Industrial Development Concept addresses critical pasture degradation through science-based analysis and targeted anti-erosion measures.

Kyrgyzstan faces significant degradation of its mountain pastures and forest ecosystems. With international support, the country is implementing sustainable pasture management systems. According to UN, approximately 120,000 ha of pastures and forests are under resilient use. These efforts include seasonal grazing rotations, reforestation of fire-damaged areas, and slope stabilization through tree planting. The Law on the Protection of Soil Fertility of Agricultural Land, mandate soil conservation and establish robust monitoring systems. These initiatives align with the Concept of Environmental Security until 2040, which sets long-term ecological goals, supported by a Phase I Action Plan (2025-2029).

As the region's most mountainous nation, **Tajikistan** faces acute desertification challenges in its arid southern and western foothills. According to UNECE, the country restored 7,315 ha of forest between 2009 and 2018, with an ambitious target to add 66,000 ha by 2030 through a mix of active planting and natural regeneration. Given that 47% of the territory remains drought-prone, recent efforts have focused on the "Afforestation and Agroforestry" project to bolster local incomes while halting land degradation. These ecological goals are integrated with the 2022-2027 State Program for Development of New Irrigated Land and Reclamation of Withdrawn Land, which seeks to prevent abandonment of agricultural areas and expand irrigation to boost crop yields and food security.

With the Karakum Desert covering much of its territory, **Turkmenistan** has institutionalized desertification control at the state level. A national mechanism mandates that a portion of enterprise profits be reinvested directly into reforestation. Following COP16 in late 2024, the National Institute of Deserts, Flora, and Fauna convened a high-level roundtable to showcase progress toward Land Degradation Neutrality (LDN). Central to these efforts is the 2021-2025 National Forestry Program, which targets the annual planting of 3 million seedlings and the creation of extensive protective shelterbelts. This works in tandem with the 2021–2025 National Program of Turkmenistan on the Aral Sea, an initiative to improve the environmental and social situation in the Turkmen part of the Aral Sea region and mitigate the desiccation of the Aral Sea through legislative reform, biodiversity conservation, establishment of "green zones", and development of medical infrastructure for affected population.

Uzbekistan, being one of the countries in the region most affected by desertification, demonstrates significant success in combating this problem. According to the latest data, the share of degraded land has decreased from 30% to 26%. Since 2018, the country has been implementing a large-scale campaign to plant saxaul and other desert plants on the exposed bed of the Aral Sea. Between 2018 and 2022, Uzbekistan carried out saxaul planting on an area of 1.6 million ha of the Aralkum desert, and by the end of 2024, the area of established saxaul forests reached

Salt-tolerant tree seedlings planted by forestry personnel on the dried bed of the Aral Sea / Photo: Forestry Agency under the Ministry of Ecology of Uzbekistan

1.7 million ha. A legal framework aimed at ecosystem restoration and natural resource conservation has been established. In particular, the Environmental Protection Concept until 2030 sets 24 target indicators, among which the key ones are the reclamation of disturbed lands, expansion of forest plantations, rational use of water, and reduction of air pollution. It is complemented by the Forestry Development Concept until 2030, which provides for increasing the area of forest fund lands to 14 million ha, of which 6 million ha will be covered by forest. Particular attention is paid to desert and semi-desert territories, including the Aral Sea region, where protective plantings saxaul, calligonum, and tamarisk are established. Government resolutions have strengthened the institutional framework for implementing these tasks. Resolution No.31 of the Cabinet of Ministers of the Republic of Uzbekistan (dated January 18, 2022) established target areas for afforestation on the dried bed of the Aral Sea for 2022-2026. Furthermore, Resolution No.PP-197 of the President of the Republic of Uzbekistan (dated May 30, 2025) established the Agency for Afforestation and Combating Desertification, which is tasked with creating forests on 1.5 million ha of degraded land by 2030, growing about 919 million seedlings, and arranging 18.7 thousand ha of protective forest belts using digital technologies for forest fund management.

Furthermore, all five Central Asian nations have enacted dedicated pasture legislation to halt degradation and desertification.[376] These regulatory frameworks establish the principles of sustainable land use, define permissible carrying capacities to prevent overgrazing, and mandate both strategic use planning and systematic monitoring of pasture status.

The **overarching priorities for Central Asia** in combating desertification focus on protecting and expanding forests, shrublands, and protective green belts in arid zones; reclaiming degraded pastures and irrigated lands; preventing and mitigating the impact of sand and dust storms; and, improving water management, while accounting for climate risks. Despite varying national strategies, there is a unified recognition of desertification as a transboundary threat requiring synchronized action. Significant progress has been made through recent regional initiatives. During the 21st session of the CRIC21, a concept "one region, one ecosystem" was introduced in Samarkand in 2023. Nations aligned on a unified regional position, proposing joint monitoring systems for dust storms and the exchange of sustainable agricultural technologies in Astana in 2024. A transboundary project on adaptation to climate change and prevention of desertification has been started to be developed with the support of UNDP and CAREC in Bishkek.

12.4.5. Recommendations for combating desertification

Based on global and regional trends, international best practices, and the current state of land resources in Central Asia, the following priority areas for action are recommended:

(1) Enhancing agricultural water efficiency:

- adopt modern irrigation technologies (drip, sprinkler systems) and upgrade drainage infrastructure to prevent soil salinization and waterlogging;
- develop rainwater harvesting practices;
- apply digital water-management solutions

(2) Sustainable pasture and livestock management:

- regulate load through rotational grazing and regenerative livestock principles[377] to restore vegetation and soil health;
- balance economic productivity with ecosystem preservation;
- reclaim degraded land using indigenous plant species and considering local environmental conditions;
- empower local communities to lead pasture planning and monitoring efforts

[376] Law of the Republic of Kazakhstan of February 20, 2017, No.47-VI "On Pastures"; Law of the Kyrgyz Republic dated January 26, 2009, No.30 "On Pastures"; Law of the Republic of Tajikistan dated June 20, 2019, No.1618 "On Pastures"; Law of Turkmenistan dated August 18, 2015, No.267-V "On Pastures"; Law of the Republic of Uzbekistan dated May 20, 2019, No.ZRU-538 "On Pastures"

[377] ICARDA jointly with IUCN pioneered the Sustainable Rangeland Management (SRM) toolkit, which transforms rangeland restoration processes through sustainable practices such as regenerative grazing

(3) Drought monitoring and early warning:

- establish robust national and regional systems to track soil moisture, precipitation, and river levels. These systems must be linked to rapid-alert mechanisms;
- develop drought-management plans that offer direct support to farmers during extreme dry periods

(4) Community engagement and human capital:

- implement educational programs on sustainable agrotechnology and soil and water conservation;
- financial support, such as grants and microcredits directed toward eco-friendly rural initiatives;
- specific focus on involving women and youth in restoration projects

(5) Regional and international cooperation:

- develop coordinated strategies and ensure the exchange of advanced technologies;
- promote collaborative projects on monitoring and mitigation of transboundary sand and dust storms;
- establish a dedicated regional platform for Land Degradation Neutrality (LDN) to exchange best practices and coordinate actions

(6) Innovations and digital technologies:

- scale up the use of remote sensing and smart management systems for water and pastures and of nature-based solutions;
- support the adoption of carbon farming as a dual-purpose tool for soil restoration and climate change mitigation

(7) Financing and institutional support:

- engage the private sector, develop green bonds and environmental funds;
- intensify collaboration through initiatives, such as RESILAND CA+, UNDP projects, World Bank projects, and the UNCCD.

Implementation of these measures will curb land degradation, reduce regional vulnerability, and establish a resilient basis for Central Asia's food, water, and environmental security.

Conclusion

Desertification is a global threat: approximately 40% of the Earth's land is already degraded, and without intervention, an additional 1.6 billion ha could lose productivity by 2050. Agricultural lands, pastures, and forests remain the most susceptible to this decline. Driven by a volatile combination of unsustainable farming, inefficient water management, and escalating aridity under a changing climate, these processes pose a direct challenge to food security, ecosystem resilience, economic stability, and public health.

The milestones of 2024 have demonstrated that political will, coordinated international efforts, and technological innovation can contain and gradually reverse this trend. Combating desertification is now recognized as a global imperative on par with climate change and biodiversity loss, forming a core pillar of the international sustainable development agenda.

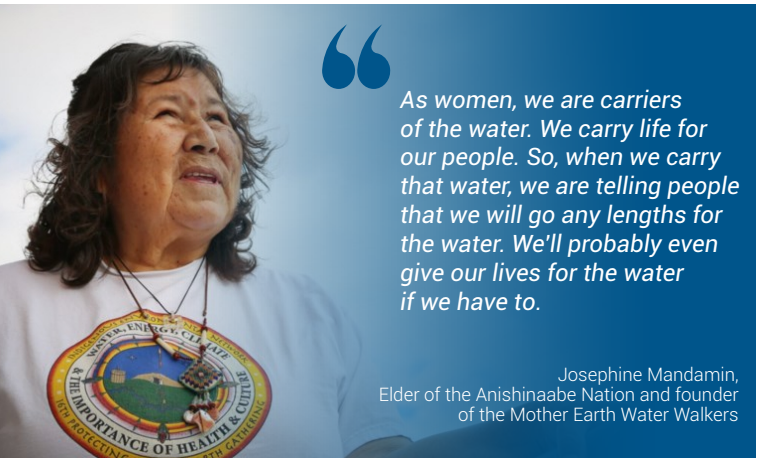
Central Asia stands at the frontline of this crisis. Over 20% of its land is degraded, and up to half of its population grapples with the fallout of drought and desertification. The transboundary nature of sand and dust storms has transformed this from a national issue into a shared regional emergency. However, the region has made significant strides in institutionalizing its response through the enactment of national strategies, specialized pasture laws, and large-scale reforestation programs. The region's ability to champion joint initiatives is best exemplified by the Samarkand Declaration on Sand and Dust Storms, which garnered global recognition. While achievements in afforestation and legislative reform are substantial, the pace of progress remains uneven and requires deepening regional cooperation.

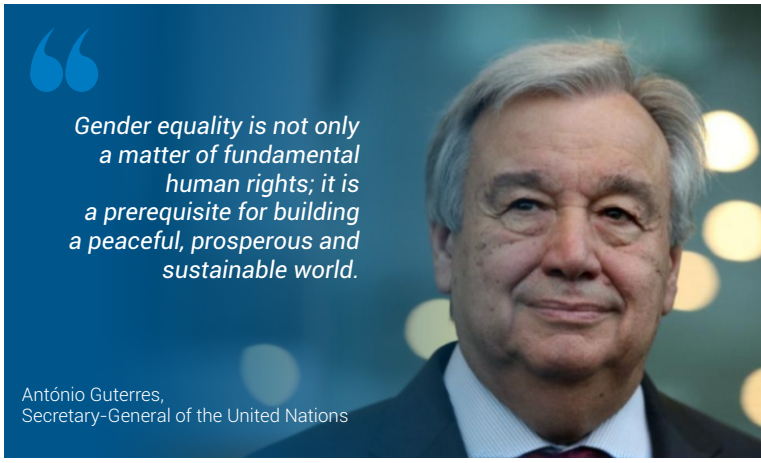
12.5. Gender Mainstreaming in the Water Sector of Central Asian Countries

The review was prepared by A. Karibay and Zh. Naurozbaeva (Republic of Kazakhstan), M. Seidakmatova (Kyrgyz Republic), Sh. Tulieva (Republic of Tajikistan), R. Berkelieva (Turkmenistan), and F. Kadyrkhodzhaeva (Republic of Uzbekistan), under the general editorship of G. Makhmudova and O. Usmanova

In this edition of the Yearbook, members of the **Network "Women in Water Management of Central Asia and Afghanistan"**[378] provide an analytical review of gender mainstreaming within the region's water sector. This contribution, a first in the publication's history, marks a significant milestone toward a more inclusive and integrated regional water agenda.

This initiative is a natural continuation of the SIC ICWC's work to advance gender issues in the region's water sector, which began in 2007.





Objective of the review is to analyze how gender issues are integrated into the water sector of Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan, and to assess the extent to which these approaches contribute to sustainable and equitable water resources management.

INTRODUCTION

Water resources are foundational to the economies, ecosystems, and basic livelihoods of Central Asia. However, the region faces mounting pressure from climate change, surging water demand, and aging infrastructure. Consequently, social equity and gender equality in water governance have emerged as critical pillars of sustainable development.

Women in rural and peri-urban areas of the region bear the primary burden of household water supply and are actively engaged in agricultural water use. However, their representation in water governance bodies remains limited.

Gender equality in water management requires creating environments where both women and men participate equally in planning, decision-making, and monitoring. This integration is essential not only for upholding human rights but also for strengthening the resilience of water supply systems and adapting to climate risks.

Evidence from the World Bank and UNDP highlights that integrating women into water committees and Water User Associations (WUAs) is a key driver of operational success. Such inclusion fosters more equitable water distribution, mitigates local conflicts, and measurably improves service delivery levels in rural areas.

International instruments adopted by the Central Asian countries also underscore the importance of gender mainstreaming:

- **The Beijing Declaration and Platform for Action (1995)**, which placed women's access to natural resources and participation in their management among its key priorities;
- **The Convention on the Elimination of All Forms of Discrimination against Women (CEDAW, 1979)**, signed and ratified by all countries in the region;

[378] The Network "Women in Water Management of Central Asia and Afghanistan" was established in 2021 under the OSCE project "Women, Water Management and Conflict Prevention" – Phase II, and is part of the Global Network "Women in Water Diplomacy"

- **The 2030 Agenda for Sustainable Development and the Sustainable Development Goals**, in particular SDG 5 ("Achieve gender equality and empower all women and girls") and SDG 6 ("Ensure availability and sustainable management of water and sanitation for all").

The review is structured by country and examines four key dimensions: (1) **the existence and implementation of national gender policies;** (2) **the extent of gender mainstreaming in water legislation and national strategies;** (3) **the substantive role and representation of women in water governance institutions;** and (4) **the barriers and achievements in advancing gender equality**.

While there is a region-wide commitment to gender equality, the findings reveal significant disparities in the depth of mainstreaming and the effectiveness of overcoming institutional and socio-cultural barriers. In some countries, progress is anchored by formal quotas in strategic documents and the creation of dedicated women's platforms; in others, it remains confined to framework declarations.

Detailed country assessments are presented below.

REPUBLIC OF KAZAKHSTAN

Existence and Implementation Mechanisms of National Gender Policy

In Kazakhstan, the equality of rights and freedoms for women and men is firmly enshrined in the **Constitution**. Gender equality policy is governed by the **Law of the Republic of Kazakhstan "On State Guarantees of Equal Rights and Equal Opportunities for Men and Women"** (2009, as amended in 2025). This foundational document is designed to ensure gender parity across all spheres of public and civic life, fostering a culture of equal rights while systematically preventing discrimination on the basis of sex.

Having **ratified the Convention on the Elimination of All Forms of Discrimination against Women** (CEDAW) in 1998, Kazakhstan consistently reports on its progress to the CEDAW Committee. In 2016, the country reaffirmed its alignment with the **Beijing Platform for Action** at the UN World Leaders Summit. To operationalize these principles, the **Concept for Family and Gender Policy through 2030 was adopted** in December 2016, serving as the primary strategic roadmap. Oversight and coordination of gender mainstreaming – spanning public finance to education – are led by the **National Commission on Women's Affairs and Family-Demographic Policy** under the President. Current strategic initiatives include a draft **Roadmap for Gender-Responsive Budgeting**, which focuses on developing specialized planning and auditing instruments. Furthermore, in alignment with its international obligations, the government successfully implemented the **National Action Plan for Gender Equality** (2020-2022), specifically targeting increased female representation in political and economic decision-making.

Gender Mainstreaming in Water Legislation and Strategies

The new Water Code of the Republic of Kazakhstan, which entered into force on 10 June 2025, reinforces the basin management principle, mandating the participation of all stakeholders, including women. However, **explicit mechanisms for gender mainstreaming are not yet detailed** within the Code itself. In the absence of sector-specific provisions, the non-discrimination principles enshrined in Article 14 of the Constitution and the 2009 Law on State Guarantees serve as the legal bedrock for gender integration in the water sector.

Furthermore, the **Water Sector Development Concept**, developed with UNDP support, emphasizes coordination with civil society. This creates significant entry points for gender-sensitive initiatives and underscores the vital role of women in decision-making to optimize water resource management.

Internationally, Kazakhstan's commitment to the Sustainable Development Goals (SDGs) – particularly SDG 5 (Gender equality) and SDG 6 (Clean water and sanitation) – acts as a catalyst for national strategy. Under SDG Indicator 6.5.1 (Degree of IWRM implementation), the country is actively working to enhance the participation of women and youth. This includes conducting knowledge needs assessments and developing targeted measures to bridge the gap between high-level gender goals and water-related laws and plans.

Role and Participation of Women in Water Governance Institutions

A study by **UNDP and UN Women showed that fewer than 40% of citizens** correctly understand the concept of gender equality, while entrenched stereotypes reduce women's willingness to choose technical and managerial professions, including in the water sector. For Kazakhstan, where irrigated agriculture and transboundary rivers play a key role, this area is of particular importance.

While women's inclusion in water management is of critical socio-economic significance, their actual participation in Kazakhstan remains disproportionately low. In its latest SDG 6.5.1 reporting, the country explicitly categorizes the degree of gender mainstreaming in this sector as 'very low.'

Data from the Ministry of Culture and Information (as of 1 January 2025) reveals a stark contrast between general public sector trends and the water industry. Nationally, women hold 55.8% of public sector positions, with 39.1% in managerial roles. However, the water sector exhibits a persistent gender imbalance: within the structures of the Ministry of Water Resources and Irrigation (est. 2023), Kazvodkhoz, and the Nura Group Waterworks, women **represent only 17%** of the 10,000-workforce.

The representation of women is most critical within Basin Councils and Water User Cooperatives, which oversee water allocation, irrigation scheduling, and tariff structures. International evidence confirms that without women's active involvement, management decisions often fail to reflect the practical needs of households and small-scale farmers.

At the same time, despite the lack of systematic collection and analysis of gender-disaggregated data in

the water sector, available statistics demonstrate the presence of management potential: according to Forbes.kz, more than a quarter of peasant and farming enterprises are headed by women, whose contribution remains underutilized in water management.

Barriers and Achievements in Advancing Gender Equality in the Water Sector

Advancing gender equality in the sector is hindered by several challenges. The **primary barriers** include: (1) the absence of direct mandates or quotas within water legislation, leaving women without guaranteed representation in Basin Councils and Water User Cooperatives; (2) underdeveloped gender-responsive budgeting (GRB) practices and a lack of dedicated resource allocation; (3) persistent social stereotypes coupled with a limited pipeline of women possessing specialized technical training; (4) fragmented statistics that impede effective progress monitoring.

Despite these challenges, **positive trajectories** are emerging:

(1) The 2023-2025 reforms, including the establishment of the Ministry of Water Resources and Irrigation and the new Water Code, provide a modern framework for introducing gender-sensitive approaches; (2) national quotas and targets for gender equality, embedded in strategic documents through 2030, do not yet directly extend to the water sector but lay the groundwork for their future implementation.

Conclusion

Kazakhstan possesses a robust regulatory and institutional framework for gender equality; however, this potential remains under-realized within the water sector. While the new Water Code offers a window of opportunity for gender-sensitive governance, it currently lacks the codified mechanisms necessary to guarantee women's participation. Furthermore, sociological data confirm that deep-seated stereotypes and a lack of awareness continue to hinder women's entry into technical and managerial roles. **To ensure sustainable progress, it is necessary to:**

1. Enshrine minimum participation quotas for women within basin councils and related governance structures through targeted subordinate legislation.

2. Integrate GRB frameworks to ensure that resource allocation is directly linked to gender-equitable outcomes.

3. Establish a systematic process for the collection, analysis, and public reporting of gender-disaggregated data in water management.

4. Enhance women's professional capacity through specialized technical training and mentoring programs.

This synergy of legal, institutional, and educational interventions will effectively embed gender perspectives into water management, ultimately driving the success and resilience of sectoral reforms.

KYRGYZ REPUBLIC

Introduction

The Kyrgyz Republic has established a robust legislative and strategic framework for advancing gender equality, anchored by the Law on State Guarantees of Equal Rights and Equal Opportunities (2006) and various international commitments.

However, the substantive participation of women in water management remains constrained. Analysis reveals that existing legislation lacks explicit mechanisms for engagement, while traditional practices and entrenched social norms continue to impede the institutionalization of women's roles within the water sector.[379] The Kyrgyz Republic has established a robust legislative and strategic framework for advancing gender equality, grounded in the Equal Rights Law (2006) and international commitments.

However, the actual participation of women in water resources management remains limited. Analysis shows that the legislation lacks clear mechanisms for engagement, and that traditional practices and social norms continue to hinder the strengthening of women's roles in water sector institutions.

Existence and Implementation Mechanisms of National Gender Policy

Kyrgyzstan has consistently strengthened its national gender policy framework for nearly three decades. Since 2006, the Law "On State Guarantees of Equal Rights and Equal Opportunities for Men and Women" has provided the legal foundation for integrating gender equality across economic and social sectors, including agriculture and natural resource management.

As of 2025, two overarching strategic documents guide this agenda: the **National Strategy for Achieving Gender Equality through 2030** and the **National Development Strategy (2018-2040)**. Both frameworks include specific provisions for ensuring gender sensitivity in the natural resources sector, expanding women's economic empowerment, and bolstering their representation in local governance.

Internationally, the Kyrgyz Republic solidified its commitments by ratifying the **UN Convention on the Elimination of All Forms of Discrimination against Women** (CEDAW) in 1997 and adopting the **2030 Agenda for Sustainable Development** in 2015. The country also remains a committed party to the **Beijing Declaration and Platform for Action**. Implementation is spearheaded by the National Council on Family and Gender Policy under the Cabinet of Ministers, supported by specialized gender units within ministries and local self-

[379] This review is based on publicly available data from official sources, international research, and other grey literature, and may not fully reflect the current situation due to outdated statistical data, reports, and limited gender research in the water sector of the Kyrgyz Republic

governance bodies. These activities are sustained through a combination of state budgetary allocations and strategic partnerships with international organizations, including the UNDP and the World Bank.

Gender Mainstreaming in Water Legislation and Strategies

The Water Code of the Kyrgyz Republic (2005) and the **Law on Water** (1994) contain no direct mechanisms for gender mainstreaming or specific guarantees of equal participation of women in water management. Article 6 of the Water Code only mentions the participation principle: *"all stakeholders shall participate in the planning and decision-making process"*, without clarifying who constitutes a stakeholder within the context of this document.

Significantly, the **National Water Strategy through 2040** already integrates approaches that account for social and gender dynamics in water management. The Strategy explicitly mandates that *"special attention must be paid to ensuring the participation of all stakeholders, including women and youth, at all levels"* and emphasizes the need to align water policy with the interests of women and vulnerable groups. To operationalize this, the document envisages specific budgetary allocations for gender-sensitive climate adaptation, such as training for women farmers in drought-prone regions. A key milestone in the Strategy is the provision to ensure that women's representation in irrigation and pasture management structures reaches at least 30%. However, despite these progressive formulations, the concrete implementation mechanisms, including formal quotas and targeted recruitment programs, remain under development. Consequently, the substantive integration of these gender perspectives into national water legislation and day-to-day regulations remains limited.

Role and Participation of Women in Water Governance Institutions (WUAs, Water Councils, etc.)

Women are pivotal to water management at both household and agricultural levels. Research by Jenniskens (2022) underscores that projects designed and implemented with full female participation are measurably more sustainable and effective. Studies by the IUCN and the Women's Federation for World Peace further confirm that women are key stewards of water and land, making critical daily decisions on resource allocation and conservation. Their involvement fosters innovation and cooperative solutions across both formal and informal governance structures, including at the transboundary level.

The advancement of gender equality in the water sector of the Kyrgyz Republic is reflected in the country's international commitments. According to national reporting on indicator 6.5.1 "Level of IWRM implementation," Kyrgyzstan rates the indicator of gender mainstreaming in water resources management at only 30 out of 100, indicating the need for significant improvement.

Statistical evidence highlights an underrepresentation of women in managerial roles. In 2023, women constituted only 8% of Water User Association (WUA) members (23,400 out of 296,000). Out of nearly 500 WUAs nationwide, only three are headed by women, and only one regional WUA Support Office (Naryn) is under female leadership. A similar disparity persists in Basin Councils, where female participation remains minimal despite recommendations calling for a 20% minimum threshold.[380]

Ultimately, the meaningful inclusion of women at the decision-making level is not a formality; it is essential for ensuring that development policies accurately reflect and address the needs of women and girls.

Barriers and Achievements in Advancing Gender Equality in the Water Sector

The **barriers** to advancing gender equality in Kyrgyzstan's water sector are multifaceted and systemic. Based on situational analysis and available research, the following **primary obstacles** have been identified: (1) insufficient application of gender-responsive budgeting; (2) traditional water management structures that remain male-dominated and lack mechanisms for inclusive leadership; (3) at the local level, women face overlapping barriers based not only on gender but also on social status and age; (4) socio-cultural and institutional barriers.

While the state recognizes these challenges and has launched various initiatives to support women in water management and entrepreneurship, progress remains uneven. Currently, the most substantive results are largely driven by international development programs implemented in partnership with government agencies.

Conclusion

In summary, while the Kyrgyz Republic has established a sophisticated regulatory framework and aligned itself with global gender mandates, the water sector requires more decisive action to achieve genuine gender equality. The country's strategies contain undeniably progressive provisions; however, their impact remains stifled by a lack of operational mechanisms, robust monitoring systems, and dedicated financial pathways.

Therefore, only comprehensive and consistent efforts by the state, donors, and communities themselves can ensure a narrowing of the gender gap and create conditions for broader women's participation in water management.

REPUBLIC OF TAJIKISTAN

Introduction

In Tajikistan, the principle of gender equality – enshrined in Article 17 of the Constitution – is increasingly recognized as a cornerstone of sustainable water ma-

[380] K. Musabaeva. *Status of Women's Participation in Basin Water Councils in Kyrgyzstan*. Presentation at the webinar "Women's Participation in Water Management: The Case of Water Basin Councils in Kyrgyzstan and Tajikistan," 25 April 2025, Bishkek

nagement. This is particularly vital given that agriculture accounts for over 90% of the nation's water consumption, a sector where women's roles have become progressively central.

The strategic necessity of expanding women's participation in water management is codified in key national frameworks, including the **Water Sector Reform Program (2016-2025)** and the **Syr Darya Basin Water Management Plan (2021-2025)**. Within these documents, women's involvement is framed not merely as a matter of equity, but as a functional prerequisite for operational sustainability and management effectiveness.

While the state actively promotes women's forums, capacity-building seminars, and professional exchanges, profound structural and cultural barriers remain. High rates of male out-migration have placed a double burden on rural women, yet their influence is often curtailed by limited access to information, financial resources, and formal decision-making platforms. Overcoming these entrenched gender stereotypes is essential to crafting an equitable water policy that ensures resilient resource access and participation for all stakeholders.

Existence and Implementation Mechanisms of National Gender Policy

Tajikistan maintains a sustained commitment to gender equality and inclusive development, with the principle of equal rights firmly anchored in **Article 17 of the Constitution**. The adoption of the **Sustainable Development Goals** (SDGs) has catalyzed a comprehensive policy shift, integrating social, economic, and environmental dimensions into a unified approach. The Republic is actively reinforcing its legislative framework by operationalizing the **Beijing Platform for Action** and embedding gender priorities into core national instruments. Central to this effort are the **National Development Strategy** (NDS) through 2030 and the **National Strategy for Enhancing the Role of Women** (2021-2030). Notably, the NDS-2030 treats gender equality as a critical cross-sectoral priority, establishing a systemic foundation to dismantle gender barriers within the broader context of sustainable development.

Gender equality is also designated as a distinct priority within the **Regional Socio-Economic Development Programs** (2021-2025), extending down to the municipal and district levels. These localized programs mandate specific interventions designed to broaden women's participation in socio-economic life, ensure equitable access to resources and education, and foster women's entrepreneurship. By embedding these targets into regional planning, the state aims to systematically reduce gender disparities across all sectors of the local economy.

Gender Mainstreaming in Water Legislation and Strategies

In Tajikistan, the gender dimension of sustainable water management is systematically integrated into several pivotal strategic frameworks. The **Water Sector Reform Program (2016-2025)** and the **Basin Water Management Plan for the Tajik Portion of the Syr Darya River Basin (2021-2025)** explicitly prioritize the enhancement of women's capacity and their inclusion in decision-making. These documents frame gender-balanced participation as a fundamental prerequisite for operational effectiveness and long-term sector sustainability.

> ***para.150*** *– "in contemporary Tajikistan, gender mainstreaming has gained significant momentum across various economic sectors, most notably in irrigated agriculture. Consequently, the ongoing reform process must* ***bolster women's representation in water management****. This involves actively promoting their participation not only at the operational level of production but also within senior organizational leadership."*
>
> *(Water Sector Reform Program (2016-2025))*

> ***Target 2*** *Task 2-6: Guarantee women's representation within IWRM decision making.*
>
> ***Action 2-5-1:*** *develop and implement an IWRM capacity-building program for women and hold women's forum on annual basis*
>
> *(Basin Water Management Plan for the Tajik Portion of the Syr Darya River Basin (2021-2025))*

At the constitutional level, Article 17 of the Constitution of the Republic of Tajikistan enshrines the principle of gender equality, providing a legal foundation for advancing the gender agenda across all sectors, including water management. While the **National Water Strategy of the Republic of Tajikistan through 2040** (adopted in February 2025) does not categorize gender as a standalone priority, it explicitly guarantees the *"right of every person to clean drinking water and mandates an inclusive approach to resource provision"* (Chapter 3). This reflects a commitment to non-discrimination and equitable access for all social groups, including women. Consequently, gender considerations are treated as an integrated, structural component of integrated water resources management rather than a peripheral policy area.

Role and Participation of Women in Water Governance Institutions

Tajikistan has established several national mechanisms to operationalize the third principle of IWRM: the inclusive participation of all stakeholders, including women. A key instrument in this effort is the series of Women's Forums convened by the Government on the sidelines of major international summits. Notable examples include the **Women's Water Forum**, held in conjunction with the International Decade for Action "Water for Sustainable Development" 2018-2028 (2018, 2022, 2024), and the **Women's Forum on Glacier Preservation** (May 2025). Furthermore, women's dialogues within the **National Commission on Irrigation and Drainage** (2022, 2024) provide a sustained platform for amplifying women's leadership. These venues are essential for sharing best practices, advancing the gender agenda, and ensuring that women's recommendations are formally integrated into international conference outcomes.

At the **basin level**, robust mechanisms have been operationalized to institutionalize women's participation in water governance. A primary example is the Basin Water Management Plan for the Tajik Portion of the Syr Darya River (2021-2025), which defines specific targets and metrics for gender mainstreaming (Task 2-6, Action 2-6-1). Supported by the Ministry of Energy and Water Resources, the establishment of the **Syr Darya**[381] and **Kofarnigan Basin Women's Forums**[382] represents a significant milestone. These platforms serve as multi-stakeholder hubs, convening female water users, WUA members, local authorities, and academic representatives. By meeting ahead of Basin Council sessions, these forums ensure that women's technical recommendations and social priorities are formally integrated into Council decisions. Ultimately, these basin-level initiatives foster participatory governance, facilitate knowledge exchange, and empower both women and youth to lead in sustainable, inclusive water management.

Local-level efforts focus on empowering women water users (targeting not less than 30% representation) through training sessions, field visits, and exchanges. These programs bridge the gap in technical expertise – such as water accounting and conservation technologies – while simultaneously fostering leadership skills and legal awareness. These initiatives strengthen women's role in decision-making and expand their capacities within local water management institutions.

Barriers and Achievements in Advancing Gender Equality in the Water Sector

Advancing gender equality in Tajikistan – particularly in rural areas – is hindered by a complex intersection of **structural, cultural, and socio-economic barriers**. Key challenges include: (1) high rural-to-urban migration; (2) limited access of women to natural resources, including water and financial resources, as well as to decision-making processes in traditionally male-dominated spheres (water and agriculture, local governance); (3) gender stereotypes and social norms limiting women's participation in public life; (4) insufficient implementation of laws and mechanisms for equal resource rights; (5) low levels of women's knowledge on water and land use (agronomic practices, seed selection, rational water use), which limits their competitiveness. Although women formally own land, in practice they often lack timely access to irrigation water, which forces them to transfer land use rights to men or lease out their land.

Furthermore, educational attrition, particularly after grade 9, severely restricts women's entry into technical and managerial career paths.

Notwithstanding these hurdles, Tajikistan is witnessing a **positive shift** toward gender mainstreaming within the water sector. Facilitated by state support and international cooperation, new capacity-building initiatives strengthen the roles and voices of women and youth in water management. The institutionalization of basin-level platforms and national dialogue mechanisms has created a vital space for female leadership positioning women as agents of change. Ultimately, this "bottom-up" empowerment not only expands individual opportunities but also bolsters the overall climate resilience and operational efficiency of rural water management systems.

Conclusion

The gender transformation of Tajikistan's water sector is transitioning from normative declarations to tangible, practical outcomes. A robust regulatory framework, coupled with the emergence of participatory platforms, has created a fertile environment for women's leadership at all levels. Through state-led initiatives and international partnerships, women's forums and specialized training programs are shaping a new generation of women leaders and strengthen their role in decision-making.

However, systemic barriers remain deeply entrenched. Addressing these requires a multi-dimensional strategy to dismantle socio-cultural biases, rectify resource disparities, and mitigate the institutional impacts of male out-migration. Overcoming these barriers requires comprehensive measures: strengthening gender policy mechanisms, improving gender statistics, changing social stereotypes, ensuring equal access to education and professional advancement for women and youth, and improving management practices.

Ultimately, mainstreaming gender into every phase of water planning and management will not only reduce inequality but also improve the efficiency of water use. By elevating the roles of women and youth, Tajikistan secures a strategic advantage in achieving sustainable development, community resilience, and long-term climate security.

[381] Established in 2019 with the support of SDC

[382] Established in 2022 with the support of USAID

TURKMENISTAN

Existence and Implementation Mechanisms of National Gender Policy

Turkmenistan's gender policy is anchored in its Constitutional framework, national legislation, and a series of strategic state mandates. Articles 19 and 20 of the **Constitution** establish the bedrock of this policy by enshrining gender equality and prohibiting discrimination on the basis of sex. A pivotal legislative milestone is the **Law "On State Guarantees of Equal Rights and Equal Opportunities for Women and Men"** (2015), which provides the legal architecture for advancing gender equity.

To translate these legal guarantees into measurable progress, the government utilizes **National Action Plans** (NAP) for Gender Equality. The current NAP for 2021-2025 outlines a comprehensive multisectoral strategy, prioritizing: strengthening the legislative framework, gender-responsive health care, equal access to education, combating violence, expanding women's economic rights, and increasing their participation at all levels.

Institutional mechanisms for policy implementation include:

- The Cabinet of Ministers of Turkmenistan, which defines the strategic direction of state policy;
- The Interdepartmental Commission on the Fulfillment of International Obligations, which oversees the development and monitoring of the National Action Plan;
- The Women's Union of Turkmenistan, a public organization dedicated to elevating the status of women;
- The Mejlis (Parliament), which enacts legislation and reflects growing female representation.

Implementation and monitoring involve conducting targeted activities and preparing periodic reviews and assessments of the National Action Plan. These processes are often carried out in collaboration with international organizations and involve the submission of national reports to the UN Committee on the Elimination of Discrimination against Women (CEDAW).

Consequently, Turkmenistan maintains a comprehensive legislative framework and institutional architecture to implement its national gender policy, supported by active monitoring and reporting on progress in this field.

Gender Mainstreaming in Water Legislation and Strategies

While direct references to gender in sectoral water legislation are limited, the existing legal and institutional framework provides a foundation for integrating gender aspects into water management.

The Law of Turkmenistan "On State Guarantees of Equal Rights and Equal Opportunities for Women and Men" (2015) aims to ensure gender equality across various spheres, including economic, political, social, and cultural life. Although specific references to the water sector are absent from publicly available excerpts, the law creates a legal basis for addressing gender aspects in sectoral legislation and strategies.

Gender aspects are addressed through the **National Action Plan for Gender Equality for 2021-2025**. Conducted studies, such as the MICS-6 ("Health and the Status of Women in the Family in Turkmenistan"), have identified disparities in access to resources, including water, between men and women.

International organizations (UN, OSCE, UNDP, etc.) actively promote gender equality in natural resource management. Their activities include: (1) conducting consultations and seminars on the gender dimensions of water management and climate change adaptation; (2) developing recommendations for the collection and analysis of gender-disaggregated data in the water and agricultural sectors to account for the needs and vulnerabilities of different groups; and (3) raising awareness of women's roles in water management while developing their professional skills.

Turkmenistan is implementing IWRM principles with the support of international partners. A key reference point is the **Dublin Principles** (1992), which recognize that women play a central role in the provision, management, and safeguarding of water.

Role and Participation of Women in Water Governance Institutions

Comprehensive and systematized information regarding the role and participation of women in Turkmenistan's water governance institutions remains limited. Nevertheless, based on available data and broader trends in Central Asia, several key conclusions can be drawn.

At the international and regional levels, the vital role of women in the provision, management, and conservation of water resources is increasingly recognized. A gender-sensitive approach is known to improve the effectiveness and sustainability of water management. However, consistent with regional trends, women in Turkmenistan remain underrepresented in formal water governance structures at all levels. Social stereotypes that characterize the water sector as a predominantly "male" domain continue to restrict women's active participation in decision-making.

A significant challenge is the lack of gender-disaggregated statistics, which complicates an objective assessment of women's participation in water management. Even when women hold formal membership – particularly in rural areas – they often face barriers to accessing information, training, and meaningful influence over decision-making processes.

The existing regulatory framework, strategic initiatives, and ongoing projects provide a foundation for ensuring equal participation across various sectors, including water. However, while women's economic activity rate in Turkmenistan is approximately 48%, their representation in leadership positions remains limited. Formally equal access to education does not always result in equal participation in technical and agricul-

tural professions, where men continue to predominate.

Despite the lack of specific data on women's involvement in water governance institutions, it is evident that their active engagement offers considerable benefits. This is due to their unique knowledge, experience, and direct stake in the sustainable management of resources at the household and community levels.

Barriers and Achievements in Advancing Gender Equality in the Water Sector

Analyzing barriers and achievements in advancing gender equality in Turkmenistan's water sector requires a consideration of both national trends and the specific characteristics of water management. Turkmenistan's Constitution and the Law "On State Guarantees of Equal Rights and Equal Opportunities for Women and Men" provide a legal basis for gender equality that theoretically extends to the water sector.

Despite these regulatory foundations and initiatives, the water sector – and specifically agriculture, the country's largest water consumer – continues to face several challenges: (1) entrenched gender stereotypes that limit women's participation in management at the level of farms and water management organizations; (2) low representation of women in leadership and technical positions; and (3) a lack of gender-disaggregated data, which complicates an objective assessment of water policy effectiveness from a gender perspective.

Despite the regulatory foundations and initiatives, the water sector – and agriculture in particular, the country's largest water consumer – continues to face challenges: (1) entrenched gender stereotypes limiting women's participation in management at the level of farms and water management organizations; (2) low representation of women in leadership and technical positions in the water sector; (3) a lack of gender-disaggregated data, which makes it difficult to objectively assess the effectiveness of water policy from a gender equality perspective.

There is growing recognition that women's involvement can enhance the efficiency and sustainability of water management. Official discourse frequently notes that gender policy advancement is pursued with regard to national cultural characteristics and the traditional role of Turkmen women, emphasizing their importance as both keepers of the home and active participants in the country's development.

However, to achieve meaningful progress in securing substantive gender equality in the water sector, further efforts are required to refine relevant legislation, strengthen implementation mechanisms, and overcome persistent social norms and stereotypes.

Conclusion

Turkmenistan possesses a regulatory framework and institutional mechanisms that provide a foundation for integrating gender aspects into water management. International projects and national initiatives are already contributing to raising awareness, developing women's competencies, and gradually strengthening their role within the natural resources sphere.

However, women's participation in the water sector remains constrained by social stereotypes, insufficient representation in governance structures, and an absence of gender-disaggregated data. To achieve further progress, it is necessary to strengthen practical policy implementation mechanisms, expand women's representation in decision-making, and ensure more systematic consideration of gender factors in sectoral planning.

REPUBLIC OF UZBEKISTAN

Existence and Implementation Mechanisms of ational Gender Policy

In recent years, Uzbekistan has demonstrated sustained political will to strengthen the institutional and regulatory framework for gender equality. The 2019 adoption of the Laws **"On Guarantees of Equal Rights and Opportunities for Women and Men"** and **"On the Protection of Women from Harassment and Violence"** marked a turning point in the development of state gender policy.

In 2021, the **Strategy for Achieving Gender Equality in Uzbekistan through 2030** was approved, implemented in partnership with UNDP, the Senate of the Oliy Majlis, and the Gender Commission. The Strategy envisages ensuring equal rights and opportunities for women and men in political and electoral processes; expanding women's participation in public administration; and integrating gender approaches into the education system. It also focuses on strengthening women's socio-economic rights – including access to financing, land, and property – while introducing gender-sensitive planning and budgeting. Particular attention is devoted to mainstreaming gender aspects into climate change adaptation policy.

Uzbekistan's significant reforms in women's rights were recognized by the World Bank, as reflected in the country's improved position in the **"Women, Business and the Law"** index (rising from 139th in 2019 to 134th in 2020). The establishment of the **National Dialogue of Women Leaders of Uzbekistan** and the **Republican Women's Council** has expanded the number of women in leadership, fostered leadership qualities in women and girls, and created mechanisms for overcoming gender stereotypes. Additionally, UNDP initiated the **"Gender Equality Seal"** to incentivize institutional changes and the adoption of gender-sensitive practices in public administration.

As a result, according to the National Voluntary Review on the SDGs, the share of women in leadership positions in Uzbekistan has reached 29.2%.

Gender Mainstreaming in Water Legislation and Strategies

In the context of global climate challenges and ongoing reforms in the agricultural and water sectors, Uzbekistan is taking significant steps to integrate gender perspectives into water management policy. A primary milestone in this process was the approval of the **Gender Strategy for the Water Sector of Uzbekistan for 2025-2030**.

This Strategy is grounded in a number of key documents, including the **Constitution of the Republic of Uzbekistan**, the Law **"On Guarantees of Equal Rights and Opportunities for Women and Men"**, and the national strategies "New Uzbekistan-2026" and "Uzbekistan-2030," as well as the country's international obligations under the SDGs. It is aimed at removing existing barriers, ensuring equal access to resources, training, and decision-making. The core **objectives of the Strategy** include: (1) increasing women's participation in water management at all levels; (2) ensuring the gender sensitivity of water policy; (3) expanding women's economic opportunities within the sector; (4) creating an inclusive and safe working environment; (4) developing gender-disaggregated statistics and conducting gender audits; (5) introducing gender-responsive budgeting.

The Strategy identifies **six priority areas**: (1) institutional strengthening of sectoral gender policy; (2) women's representation in decision-making; (3) gender-sensitive design; (4) expansion of women's economic opportunities; (5) social protection and safe working conditions; and (6) information and awareness-raising.

The implementation of the Strategy is **expected to achieve the following outcomes** by 2030:

- An increase in the share of women among water sector management staff to at least 30%;
- Improved gender sensitivity across all water programs and projects;
- Expanded access for women to training, employment, and financing;
- Increased public awareness of the importance of gender equality within the framework of sustainable development.

Role and Participation of Women in Water Governance Institutions

Women's representation in Uzbekistan's water sector remains comparatively low, despite their significant roles in agriculture, domestic water use, and local-level resource management. According to 2021 estimates, women constitute only approximately 7% of the water sector workforce, and their representation in management positions is less than 3% (76 individuals). This trend persists among young specialists, where women occupy approximately 8% of positions.

Notably, while nearly 9 million women reside in rural areas and are actively engaged in agricultural production, they head only 6.5% of the country's more than 85,000 farming enterprises.[383] This disparity between potential and actual participation highlights the insufficient engagement of women in agricultural development and water governance, underscoring the need for targeted support measures.

To ensure equal opportunity within the state water management system, the Strategy outlines practical measures to expand women's representation in Water User Associations (WUAs), water councils, and scientific institutions. These efforts are expected to enhance decision-making quality and the overall sustainability of water management.

Barriers and Achievements in Advancing Gender Equality in the Water Sector

In recent years, progress in advancing gender equality has been notably strengthened; however, **several obstacles** remain that affect the sustainability and depth of these gains. The most significant barriers include: (1) socio-cultural norms that limit women's professional activity; (2) the underrepresentation of women in governance, despite their high engagement in domestic and agricultural water use; (3) a lack of gender-disaggregated data, which complicates needs assessments and the evaluation of policy effectiveness; and (4) limited access to land, finance, modern irrigation technologies, and professional networks, all of which reduce women's capacity to innovate and participate in sustainable water management. Collectively, these factors impede the full realization of the gender agenda and necessitate a systemic approach.

Among the **key achievements**, the following are noteworthy: (1) the development and adoption of the Gender Strategy for the Water Sector; (2) progress in developing gender action plans and expanding training opportunities for women in water conservation, irrigation, and resource management; (3) strengthening of women's participation in local-level governance, such as basin councils, and a gradual increase in the number of women in leadership; and (4) increased public awareness and political support for gender initiatives.

Conclusion

Uzbekistan demonstrates sustained political will to advance gender equality, transitioning from formal norms toward practical implementation mechanisms. The adoption of foundational laws and the development of the Gender Strategy for the Water Sector for 2025-2030 confirm a commitment to integrating gender principles into water management and ensuring substantive opportunities for women to participate in decision-making, professional development, and resource access.

Despite persistent barriers, the institutional framework is gradually strengthening, with mentoring programs and gender budgeting gaining traction and the number of women in leadership positions on the rise.

By 2030, Uzbekistan aims to increase the share of women in water sector leadership to at least 30%, ensure equitable access to training and resources, and institutionalize gender-sensitive approaches across all water management programs. This transition is viewed not merely as a move toward equality, but as a strategic precondition for sustainable water management, improved sector performance, and the country's enhanced climate and social resilience.

[383] As of 2023

KEY FINDINGS AND RECOMMENDATIONS

The analysis indicates that while Central Asian nations have established the foundational frameworks for gender-sensitive water policy, a significant gap remains between policy and practice. Although national strategies and regulatory acts formally recognize the importance of women's participation in water and natural resource management, their practical integration remains inconsistent, particularly at the basin and local levels. Currently, gender mainstreaming relies heavily on fragmented initiatives – such as forums, trainings, mentorship programs and dialogue platforms – rather than a systemic institutionalization within broader water sector reforms. To cultivate a more inclusive and resilient water sector in Central Asia, the following actions are recommended:

(1) Shift public and professional perceptions to overcome entrenched biases that view the water sector and technical disciplines as exclusively "male" domains.

(2) Enhance the attractiveness of careers in water management by ensuring competitive compensation, robust social protections, and clear professional development pathways.

(3) Support women and youth in pursuing specialized education and leadership roles. This should include formalized mentoring, vocational training, and targeted incentives to attract the next generation of water professionals.

(4) Improve the precision of sectoral analysis by ensuring the systematic collection and reporting of gender-disaggregated data, reflecting the actual roles of men and women in water governance.

Ultimately, achieving substantive gender equality in **Central Asia's water sector requires a holistic approach** that aligns political will with institutional reform, sustainable financing, and community engagement. Executing these measures will ensure the meaningful participation of women and youth, thereby securing the long-term effectiveness and sustainability of water management across the region.

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