

UZBEKISTAN

Authoritarian Uzbekistan constrains unrest, but water scarcity could create opportunities for international neighbors, wealthy industrialists, and Uzbek citizens to threaten the current political order.

Uzbekistan depends on water from the Syr Darya and Amu Darya Rivers that originate in Kyrgyzstan and Tajikistan.

Historically, Uzbekistan and its neighbors so overused these rivers to grow cotton in the desert that they drained the Aral Sea. Though upstream average annual rainfall is projected to increase slightly, nothing suggests the Aral Sea will recover.



Drought-Prone Upstream Countries Control 90% of Uzbekistan's Water Supply

Dry years could strain relations as Uzbekistan competes for water with Central Asian neighbors and Afghanistan. Annual rainfall in 2025 was the lowest in decades.



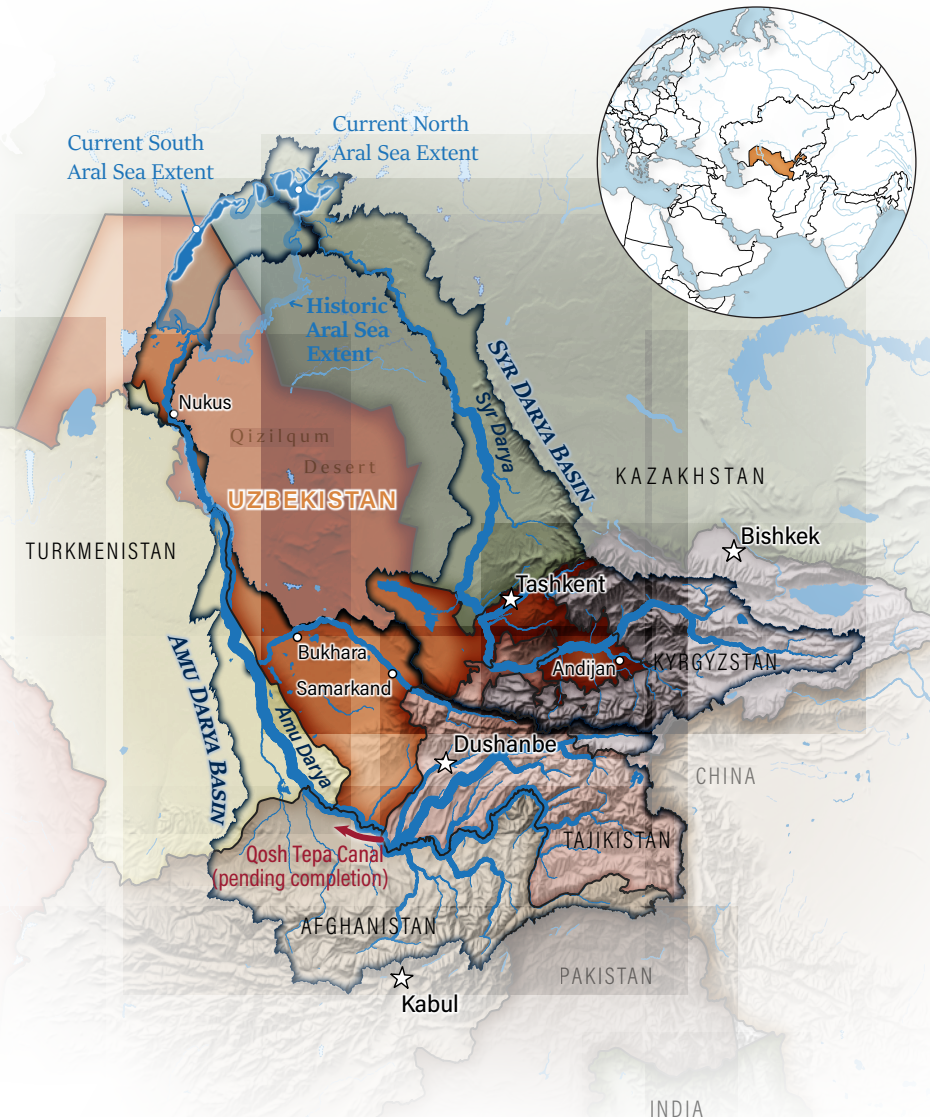
Tycoons from Traditional and Emerging Industries Compete Over Dwindling Rivers

Water scarcity could limit industrial expansion and drive discontent among powerful oligarchs. Industry must share only 10% of Uzbekistan's water with domestic users as the remaining 90% is allocated to irrigation.



Water Scarcity Could Drive Northern Unrest and Radical Islamist Recruitment

Rice farmers with insufficient irrigation may join activists in Karakalpakstan or Islamic extremists in the Fergana Valley. While irrigation gets 90% of Uzbekistan's water, rice farmers must compete with lucrative cotton growers.



BLUF

Dry years could strain relations as Uzbekistan competes for water with Central Asian neighbors and Afghanistan.



Uzbekistan has almost no control over the amount of water that flows into its borders.

- Ninety percent of Uzbekistan's water originates in Kyrgyzstan and Tajikistan,¹ flowing into Uzbekistan through the Syr Darya and Amu Darya rivers (Map 1).
- Low rainfall years (Fig. 1) are projected to persist. Because of record-low rainfall in 2025, Kyrgyzstan's main reservoir may be too low to supply Uzbekistan with enough water in 2026.²

New upstream hydropower dams that meet electricity needs may change the timing of water to Uzbekistan.

- The Rogun hydropower dam in Tajikistan and the Karambata 1 hydropower dam in Kyrgyzstan (Map 1) could store water in wet years that can be released for irrigation. In dry years, upstream hydropower countries and downstream irrigation countries may argue over timing of releases to maximize their own interests.

Uzbekistan must supply water to downstream Turkmenistan and Kazakhstan and may lose water to Afghanistan.

- As part of the 1992 Almaty Agreement,³ Uzbekistan must ensure an annually negotiated amount of water flows from the Amu Darya into Turkmenistan and from the Syr Darya into Kazakhstan, even in dry years.⁴
- Afghanistan's new Qosh Tepa canal could divert up to 20% from the Amu Darya river before it reaches Uzbekistan.⁵ Studies suggest Uzbekistan's agriculture could lose half of its irrigation water in dry years.

Map 1: Much of Uzbekistan is a desert dependent on rain and glacier melt from Kyrgyzstan and Tajikistan.

Drought in upstream countries leaves Uzbekistan parched and causes geopolitical tension between neighbors who rely on shared river systems.

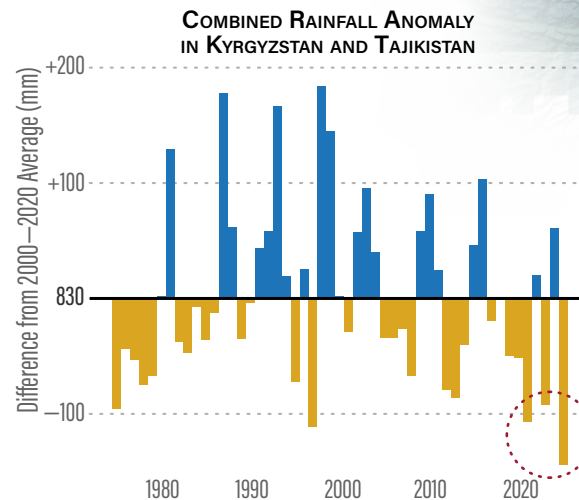
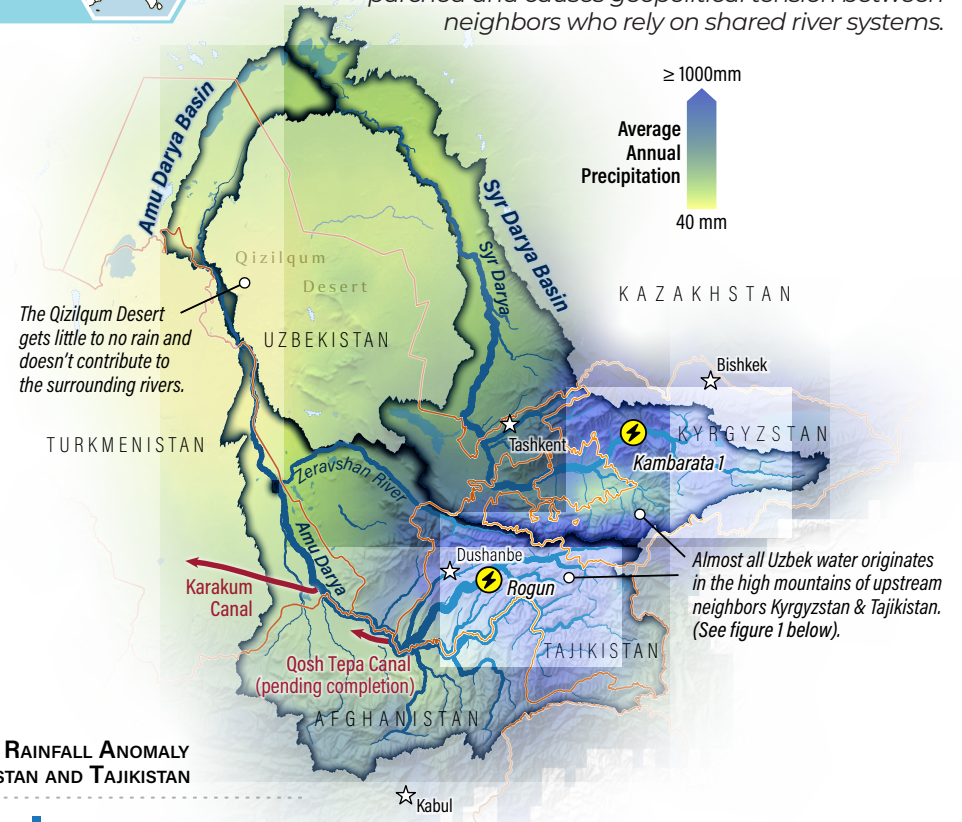


Figure 1: Low rainfall years upstream in Kyrgyzstan and Tajikistan may leave Uzbekistan struggling to meet competing water needs.

Rainfall in three of the last five years has been substantially lower than the 2000-2020 average (830 mm).

Rainfall in 2025 in Kyrgyzstan and Tajikistan was the lowest in decades.

BLUF Water scarcity could limit industrial expansion and drive discontent among powerful oligarchs.

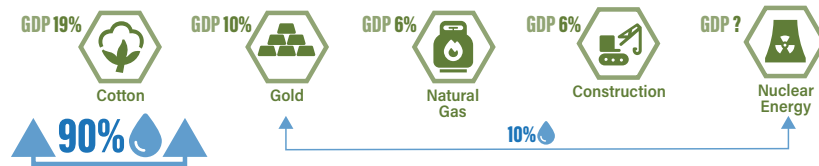


Map 2: Arid Uzbekistan's industry and irrigation overlap in areas served by rivers and canals.

Natural gas oligarchs and powerful cotton families compete for water with emerging gold magnates, a growing construction sector, and expanding nuclear energy.

Cotton, Uzbekistan's "white gold," dwarfs the water use of other water-intensive industries like gold mining and natural gas extraction.

- Ninety percent of water goes to irrigation, primarily for cotton.⁶ In wet years (Fig. 2), the country has enough to irrigate and serve mines and gas fields. While average annual rainfall may increase slightly, dry years are still projected to occur.
- Major industries and irrigated areas overlap (Map 2), forcing all of Uzbekistan's major players to compete over the same water sources.



Established oligarchs and emerging business tycoons may jockey for political power if the government fails to meet their water needs.

- As Uzbekistan privatizes gold mining, new magnates may demand the same water access given to oil barons and dominant cotton families, industries that were privatized when water was more abundant.
- Plans for nuclear reactors⁷ and specialized industrial zones⁸ will bolster the wealth of emerging construction and manufacturing magnates but demand more water for concrete mixing, plant cooling, and fabrication processes.
- Uzbekistan's rulers typically appease politically ambitious tycoons with resources,⁹ but there is no way to make more water.

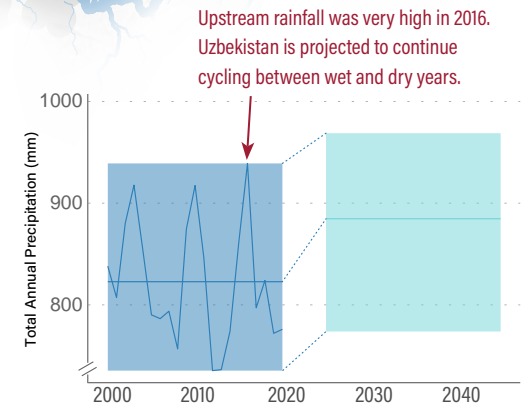
Uzbekistan's new water code could streamline governance but make the corruption that pacifies oligarchs more difficult.

- Signed in October 2025, the new water code presents a unified legal framework for Uzbekistan's fragmented water governance.¹⁰
- New permits, quotas, and environmental regulations may complicate customary patronage relationships.



Figure 2: Projected increases in upstream rainfall could benefit Uzbekistan, but water demand from expanding industry may grow faster than supply.

Around 2035, average annual rainfall upstream of Uzbekistan is projected to increase by ~5% over 2010 levels. However, low rainfall years are also projected to persist.



BLUF

Rice farmers with insufficient irrigation may join activists in Karakalpakstan or Islamic extremists in the Fergana Valley.



Rice makes up 10-20% of daily diet and is a cornerstone of Uzbek cultural identity.

- Seventy percent of rice is grown by small farmers who depend on degraded irrigation canals (**Map 3**).¹¹ Uzbekistan aims for self-sufficiency, but the gap between supply and demand is growing, increasing reliance on expensive imports.
- Rainfall in Kyrgyzstan and Tajikistan heavily influences rice production in Uzbekistan. Dry years upstream lead to lean years in Uzbekistan (**Fig. 3**).
- Cotton needs 5-6 times more water than rice, and its irrigation often takes priority. Cotton privatization in 2017 enabled land grabs by big companies that remove rice farmers from their fields to grow cotton.¹²

Independence activists in Karakalpakstan and Islamic extremists in the Fergana Valley could mobilize frustrated rice farmers to their causes.

- Karakalpakstan’s 2022 revolt over proposed changes to their status in the constitution forced the government to back down from those changes. Part of Karakalpakstan’s grievance is over a lack of irrigation and the draining of the Aral Sea.¹³
- The government suppresses Islamic mobilization in the Fergana Valley, but extremists may find new support from farmers who lose their crops because of drought and crumbling irrigation infrastructure.¹⁴

New areas of unrest may form as rice farmers migrate from dry areas to irrigated ones.

- Rice farmers are moving away from the Amu Darya to the Syr Darya to find water.¹⁵ Conflict may arise if Syr Darya farmers see newcomers as outsiders.
- Population is increasing far faster in areas with functional irrigation infrastructure where water still reaches (**Map 3**). Dry years may feel worse as more people demand water for irrigation and domestic needs.

Map 3: Karakalpakstan’s autonomy movement in the west and Islamic extremists in the east create instability.

Growing populations around irrigated areas in the middle of the country may give rise to new areas of unrest.

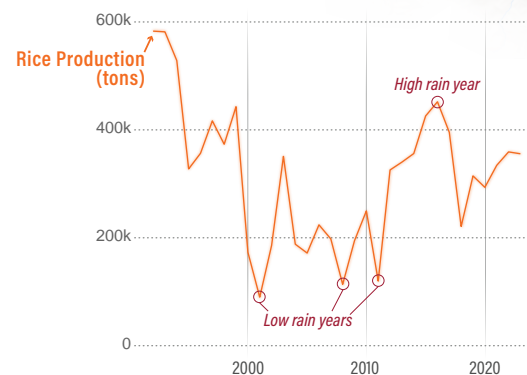
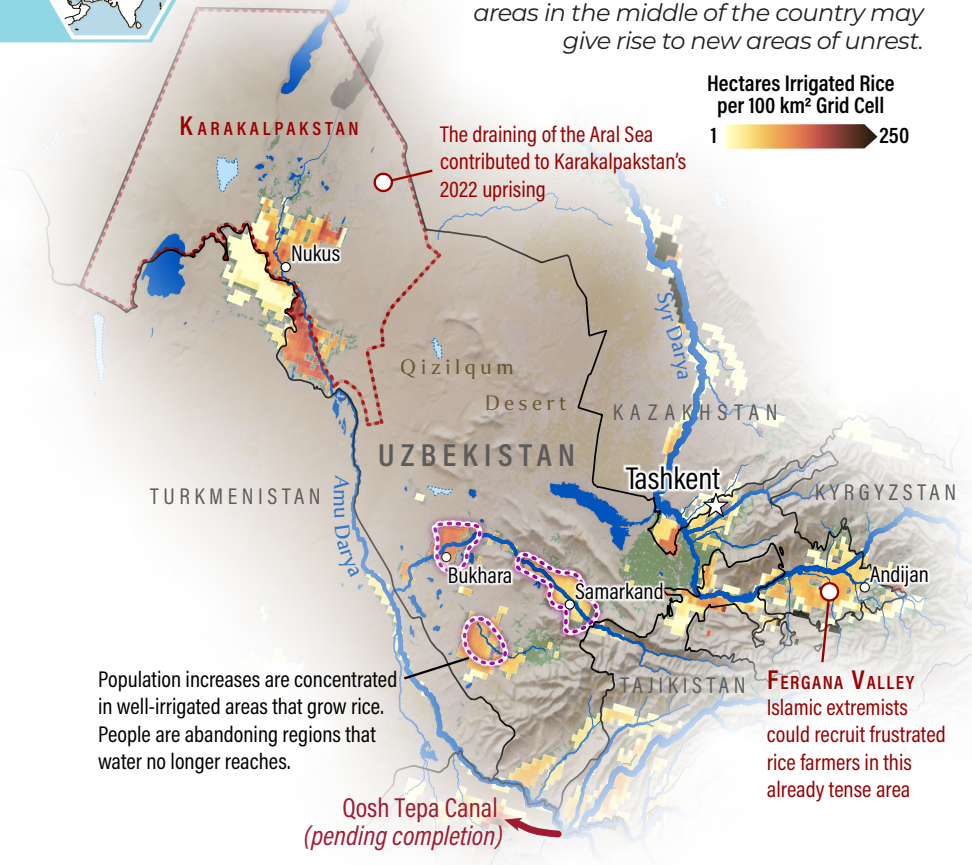


Figure 3: Dry years in Kyrgyzstan and Tajikistan lead to empty canals and reduced rice production.

Rice production may be further impacted by water withdrawals from Afghanistan’s Qosh Tepa canal (see page 1).

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Data Analysis Methods:

DATASETS: Historical Weather Data from ERA5 [1950-2024] - daily values for precipitation and average temperature, daily maximum temperature & daily minimum temperature . Future Weather Data from CMIP6 downscaled by NASA Earth Exchange Global Daily Downscaled Projection (NEX-GDDP-CMIP6). Scenario: SSP245 and/or SSP585 [2025-2045 & 2050-2070, historical 2000-2020]. 17 models: ACCESS-ESM1-5, BCC-CSM2-MR, CanESM5,CMCC-ESM2, FGOALS-g3, GISS-E2-1-G, MIROC-ES2L, MPI-ESM1-2-HR, MRI-ESM2-0, NESM3, NorESM2-MM, CNRM-ESM2-L, EC-Earth3-Veg-LR, GFDL-ESM4, INM-CM5-0, IPSL-CM6A-LR, KIOST-ESM, UN Food and Agriculture Organization Crops and Livestock Production Data [1960 –2023] - annual values for Crop yields, area harvested, and production for rice and Cotton. The North American Multi-Model Ensemble (NMME) Seasonal Forecast – Precipitation Rate Anomaly from the January 2026 run. 5 models were used: COLA-RSMAS-CCSM4, CanCM4i-IC3, GEM5.2-NEMO, NASA-GEOSS2S, NCEP-CFSv2. Accessed at: <http://weather.ou.edu/~kpegion/nmme/forecasts/data/>

CALCULATIONS: Baseline (sometimes called “normal”) and representative future values for each year of interest are calculated using 21-year time intervals around the date of interest. Our historic normal is based on the year 2010 (2000-2020) using ERA5 data. To bias correct future values, we calculate the difference or ratio between NEX-GDDP-CMIP6 modeled future [2035 (2025-2045) and/or 2060 (2050-2070)] and modeled historic [2010 (2000-2020)] values and add this difference to the historic baseline value or multiply the ratio by the historic baseline value for each metric of interest. All calculations are spatially distributed (quarter-degree grid cells) and aggregated as the final step.

We grouped our results based on country and for some analyses combined Kyrgyzstan and Tajikistan into one ROI.

Precipitation

Mean Annual Precipitation: The sum of the total daily precipitation for each year, averaged over the time period of interest.

Total Annual Precipitation: The sum of the total daily precipitation for each year.

Annual Deviation from Normal: The total annual difference between total annual precipitation and the 2010 normal precipitation, calculated on an annual time step.

(Interannual) Precipitation Variability: The coefficient of variation (ratio of standard deviation to the mean) of total annual precipitation within a time period of interest

Cumulative 6-Month precipitation Anomaly: The sum of monthly precipitation anomalies over a 6-month period beginning in the present month, in this case, January 2026.

Temperature

Mean Annual Temperature: The mean of the daily average temperature for each year, averaged over the time period of interest. Also referred to as the “normal temperature” for the time period of interest.

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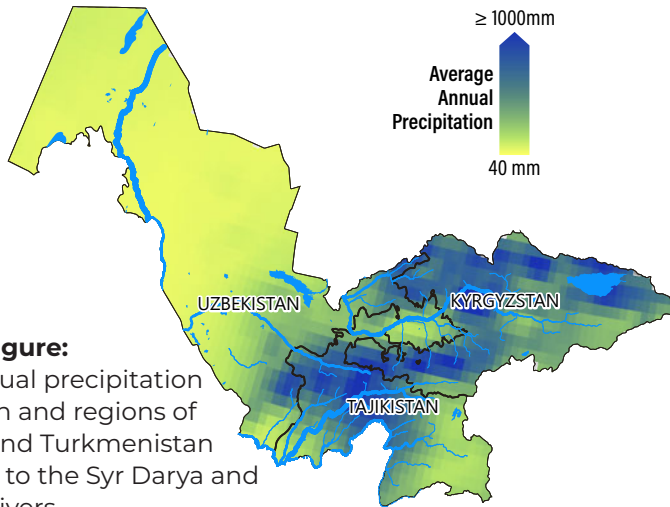
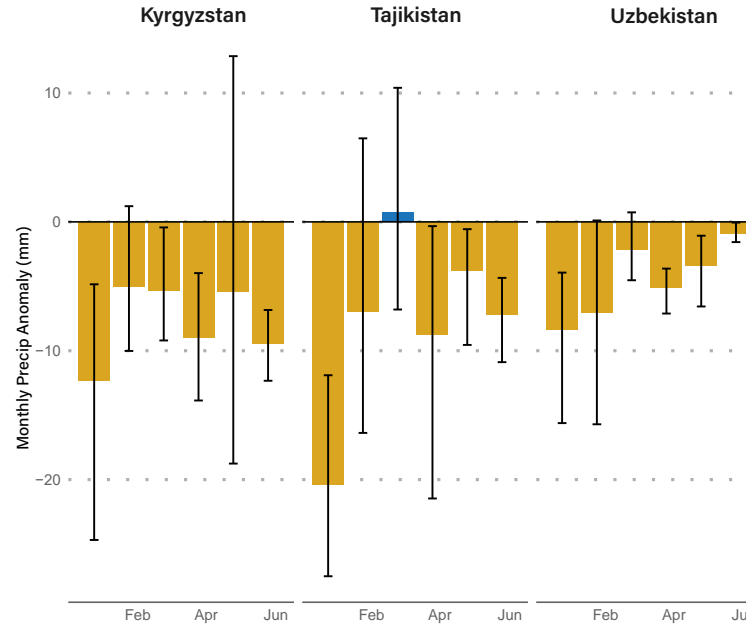
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Supplemental Materials: Uzbekistan

North American Multi-Model Ensemble (NMME) 6-month Outlook

Figure S1: NMME Monthly Precipitation Anomaly

The first half of 2026 shows very little relief from 2025's record low rainfall. Above-average rainfall would be required to fill reservoirs and irrigation canals.



Reference figure:

Average annual precipitation in Uzbekistan and regions of Kyrgyzstan and Turkmenistan contributing to the Syr Darya and Amu Darya rivers.



Figure S2: NMME 6-month Precipitation Anomaly

The forecasted cumulative rainfall deficit for Jan-Jun 2026 is almost 100 mm, or the difference between an average and a very dry year. If this forecast is correct, rainfall would have to be substantially above average from Jul-Dec to mitigate this year's drought impacts.

Supplemental Materials: Uzbekistan

Temperature Maps

Change in temperature (averaged across 16 CMIP6 models) in 2035 and 2060 for SSP245 and SSP585.



2010



2035
SSP245



2035
SSP585



2060
SSP245



2060
SSP585



Supplemental Materials: Uzbekistan

Precipitation Maps

Uzbekistan gets very little rainfall. Even with a 15% increase by 2060, the country would still be almost totally reliant on rain from upstream countries.

Percent change in precipitation (averaged across 16 CMIP6 models) in 2035 and 2060 for SSP245 and SSP585.



2010



2035
SSP245



2035
SSP585



2060
SSP245



2060
SSP585

