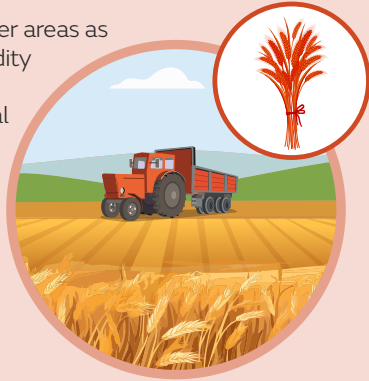


Climate risks identified for the Central Asia region by the 2050s

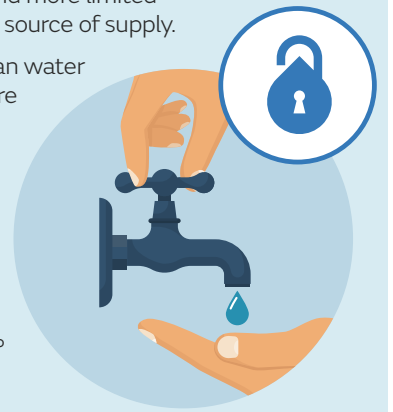
Agriculture and food security

- Crop yields across Central Asia could increase in cooler, wetter areas as temperatures rise, and decline in hotter, lowland areas as aridity increases, with mixed impacts on crop production overall. In Kazakhstan, a major wheat producer, areas suitable for cereal crops may shift northward. In hotter, lowland areas of Tajikistan and Uzbekistan, the yields of most crops will likely decline.
- Central Asian livestock and pasture productivity will likely decline in hotter lowland areas but potentially increase in cooler, wetter areas. Livestock production accounts for 26–54% of agricultural GDP, and governments are looking to boost production for growing domestic and export markets.
- Land degradation in Central Asia incurs annual costs equivalent to roughly 3% of regional GDP, but higher temperatures and increasing aridity could exacerbate problems of soil-water salinisation, rangeland degradation, and soil erosion caused by poor irrigation and rangeland management.
- Food insecurity could increase across Central Asia as the effects of greater climate variability and extremes translate into more unstable food production and consumer prices, greater market volatility, and potentially longer-term price rises.



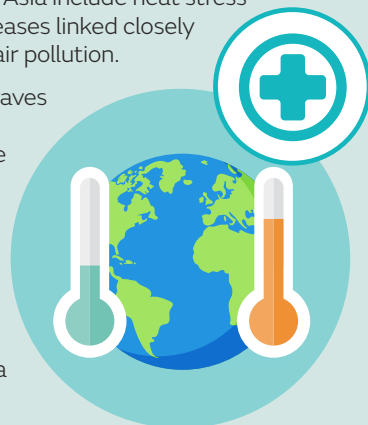
Water resources and water-dependent services

- River flows in Central Asia's two main river basins, the Amu Darya and Syr Darya, will increase to 2050 as meltwater flows peak but then decline as glaciers and snowpack recede. After 2050, rainfall is unlikely to make up the meltwater deficit, and more limited groundwater resources are unlikely to provide an equivalent source of supply.
- Risks to irrigation economies, electricity generation and urban water supply will increase as Central Asian river flows become more variable and ultimately decline from the 2050s. Water insecurity for different economic sectors could therefore increase, amplifying pressure on irrigation to release water for other uses.
- Water contamination linked to higher temperatures, floods and droughts is likely to increase, posing risks to drinking water quality and irrigation-dependent cropping in lowland areas of Central Asia. Salinisation already affects roughly 50% of irrigated land, and higher rates of evaporation may exacerbate the problem.
- Transboundary risk management will grow in importance in Central Asia as countries have to share more variable and increasingly limited water across boundaries. Greater cooperation between upstream and downstream countries will be needed to address tensions over allocation priorities, volumes, and the timing of upstream dam releases from hydropower plants.



Health

- The health outcomes sensitive to climate change in Central Asia include heat stress and heat-related mortality, diarrhoeal and water-borne-diseases linked closely with undernutrition, and health conditions associated with air pollution.
- Heat-related morbidity and mortality will increase as heatwaves become more frequent and intense, especially in hotter south-central areas of Central Asia. The most vulnerable are the elderly, infants, pregnant women, people living in informal settlements, and outdoor labourers.
- Higher levels of air pollution linked to rising temperatures and heatwaves are likely across Central Asia. Air pollution is now one of the leading causes of morbidity and mortality in the region, and transboundary sand and dust storms associated with summer heatwaves have been linked with a range of respiratory and cardiovascular problems.
- The prevalence of diarrhoeal and water-borne diseases, key contributors to undernutrition, will likely increase in Central Asia because higher temperatures, more intense rainfall events and floods can accelerate the growth and spread of dangerous pathogens. Risks increase for those populations with more limited access to safe water and sanitation (Kyrgyzstan, Tajikistan).



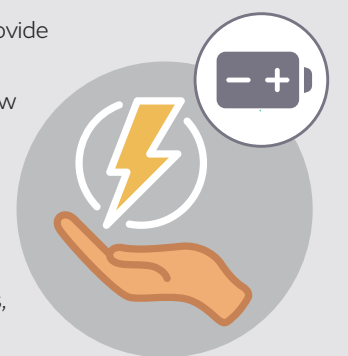
Infrastructure and settlements

- Climate risk and poverty will increasingly coincide in Central Asia's growing urban areas where robust infrastructure provision lags behind urban expansion. Households living in informal settlements, mainly in Afghanistan and Tajikistan, are most exposed to climate extremes, particularly more frequent and intense rainfall-flood events and extreme heat.
- The risk of land and mudslides may also increase, especially in mountain areas of Central Asia where warming-induced thawing is likely to destabilise landscapes. Landslides and mud flows are already estimated to cost the region 1–2% of GDP annually.
- Central Asian transport and communication systems will face greater damage and disruption from floods and land/mud slides. Current weather-related damages to road and rail networks as a share of GDP are highest in Tajikistan and Kyrgyzstan. In Kazakhstan, the additional cost to firms from flood-related transport disruption was estimated at USD 1.1 billion in 2019, roughly 0.5% of GDP.



Energy

- Electricity generation from Central Asia's thermal power plants may be reduced or disrupted by growing water constraints. Thermal power plants burning fossil fuels provide most of the region's electricity (in Turkmenistan, Uzbekistan, Kazakhstan) but need reliable water supplies for cooling.
- Electricity generation from Central Asian hydropower plants could be reduced or disrupted by greater river flow variability to the 2050s, and likely reductions in river flow thereafter. Hydropower plays an important role in electricity production in Kyrgyzstan, Tajikistan, and Afghanistan, with further hydropower dams planned or underway in the Pamir and Tian Shan mountains.
- Solar and wind power will be less affected by climate change in Central Asia, although solar outputs are sensitive to changes in the frequency of very warm, cloudy or hazy conditions, and wind turbines could be affected by overheating. Regional investment in renewables is accelerating rapidly.
- Higher cooling needs linked to rising summer temperatures and heatwaves will increase average and peak electricity demands across Central Asia, requiring greater grid flexibility, storage capacity, and peak generation capacity. Higher temperatures may also lower the capacity of power lines and damage other network components, limiting or disrupting supply.



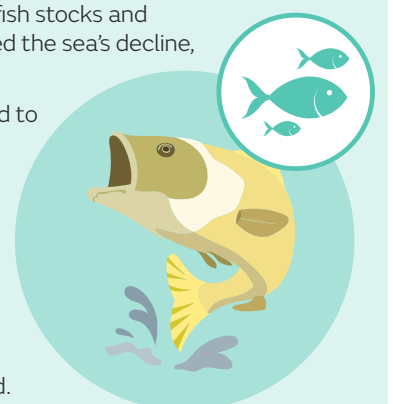
Environment

- Central Asia's sensitive ecosystems are under intense pressure from agricultural expansion, overgrazing, urban encroachment, and pollution, with climate change acting as an additional stressor on remaining habitats.
- Biome boundaries will shift northward as temperatures rise, contributing to an upward shift in mountain treelines and a squeeze on alpine habitats in Central Asia. Higher mountain treelines in Tajikistan, Kyrgyzstan and Kazakhstan could increase human-wildlife conflict as shrinking alpine grasslands support both livestock grazing for pastoralists and endangered species.
- Ongoing problems of land degradation and desertification in semi-arid Central Asian lowlands may be exacerbated by more intense droughts and higher temperatures. Roughly two-thirds of Central Asia's land area consists of dryland habitats already experiencing extreme biophysical conditions.
- Drought-induced forest dieback and increasing risks from forest fires could further reduce forest cover and biodiversity in Central Asia. Risks of species loss will be highest in fragmented habitats where fauna and flora are unable to disperse or migrate along elevational (temperature) gradients.



Blue economy and the marine environment

- Central Asia's inland seas are threatened by compounding problems of habitat destruction, reduced water inflows, and climate change, impacting marine-dependent livelihoods and economies.
- Reduced meltwater (river) inflows to the Aral Sea, in Central Asia, from 2050 onwards, combined with higher temperatures and more intense droughts, will likely contribute to longer-term shrinkage, with negative impacts on remaining fish stocks and ecosystems. Since 2005, higher meltwater flows have slowed the sea's decline, but the effect will likely be temporary.
- Water levels in the Caspian Sea, in Central Asia, are projected to fall 8–14m by 2100 because of higher rates of warming-induced evaporation from the sea surface and wider catchment. Falling water levels will expose shallower areas that currently provide key aquatic habitats for fish, migrating birds, and endemic seals.
- Falling water levels in the Caspian Sea, in Central Asia, pose economic risks for the sea's five littoral states (including Turkmenistan and Kazakhstan), with port and shipping operations potentially disrupted, and fishing rights contested.



*footnote: Unless otherwise stated, all statements refer to the Central Asia region and up to the 2050s time period.

View the full report here:

<https://www.metoffice.gov.uk/services/government/international-development/central-and-south-asia-climate-risk-report>

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