Regional Cooperation in skills development for water resources management

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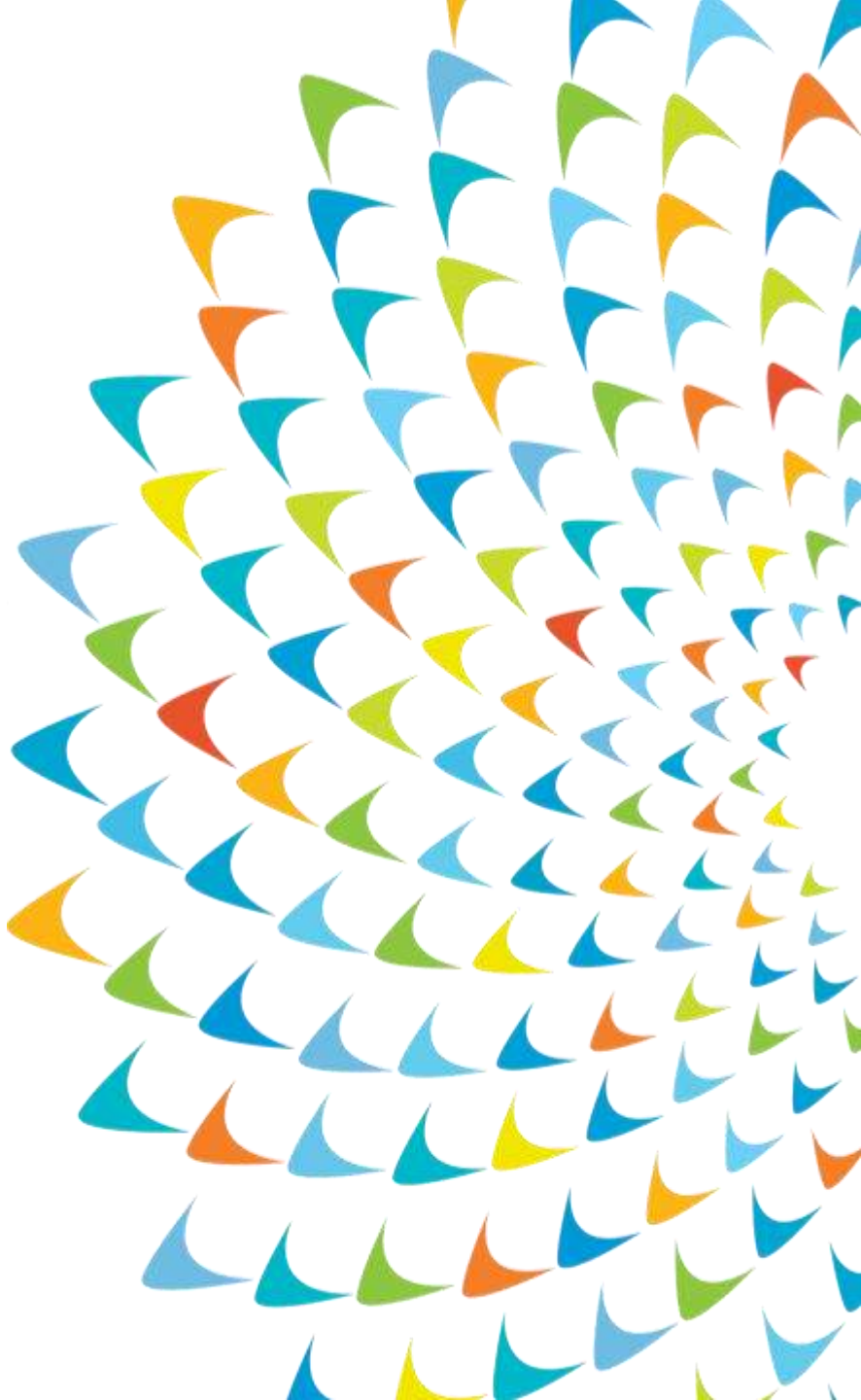
ADB



Contents

- Overview of water resources in the CA region
- Climate change impacts on water resources
- Adaptation to climate change
- Skills needed to respond to the emerging challenges

Note: focus is on the Central Asia region

ADB

Water resources

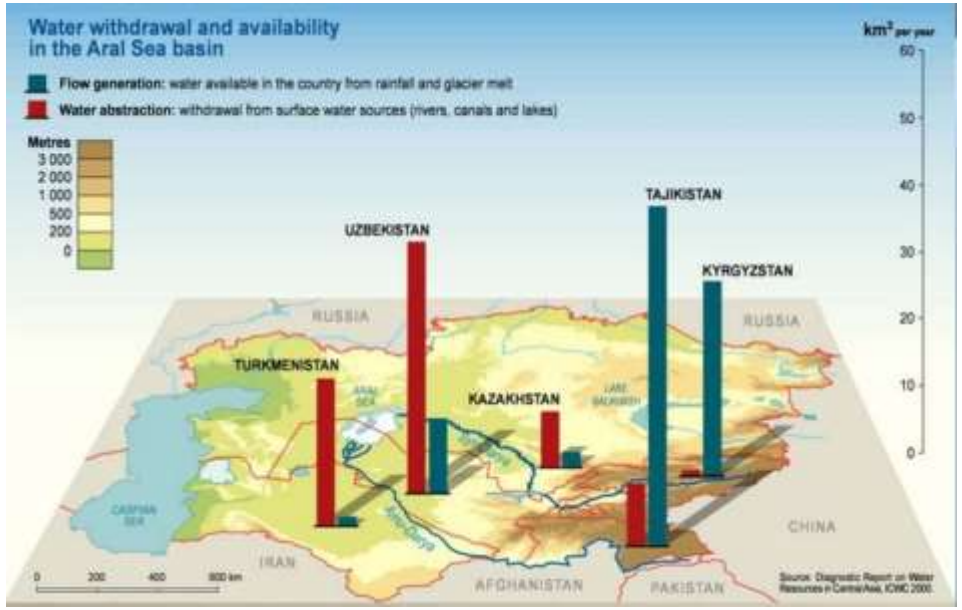
Surface waters

Groundwater

Glaciers

Surface water resources

Data is key => water accounting



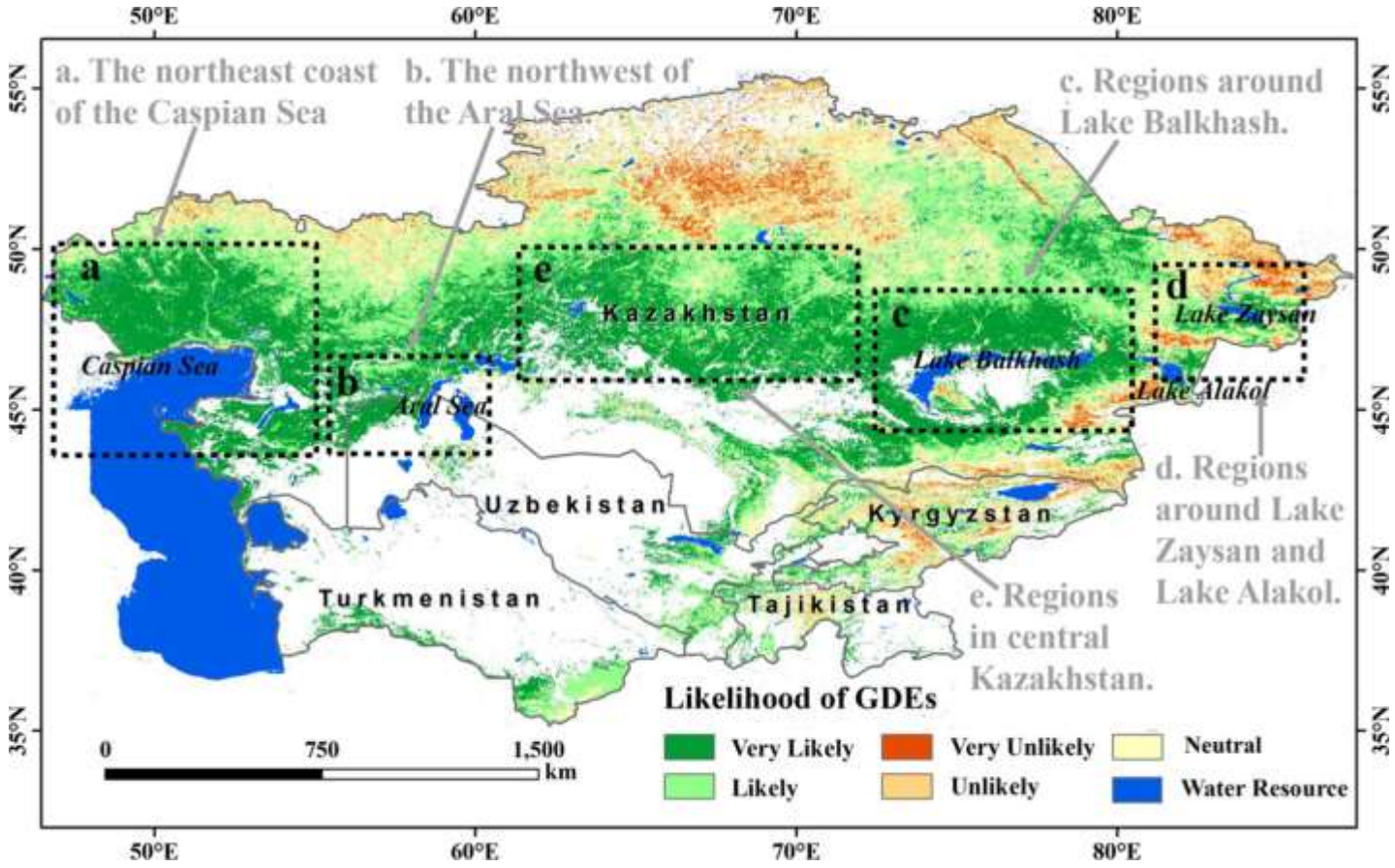
Source: cwater-info.net

Groundwater resources

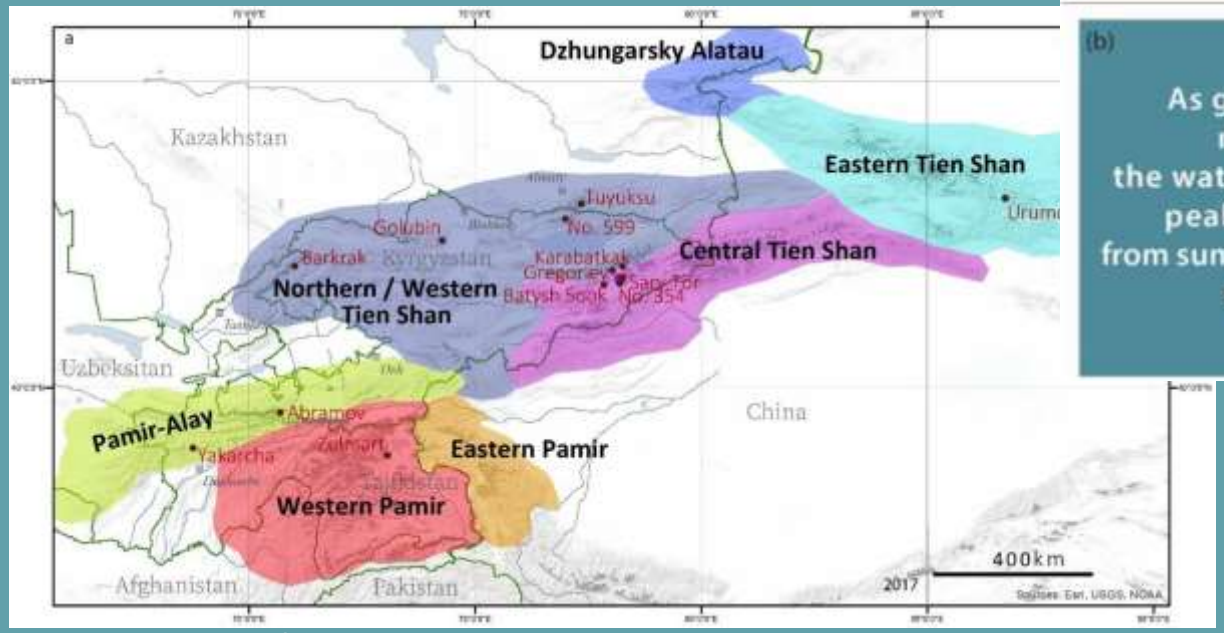
Central Asia depends on groundwater as a source of drinking water and irrigation.

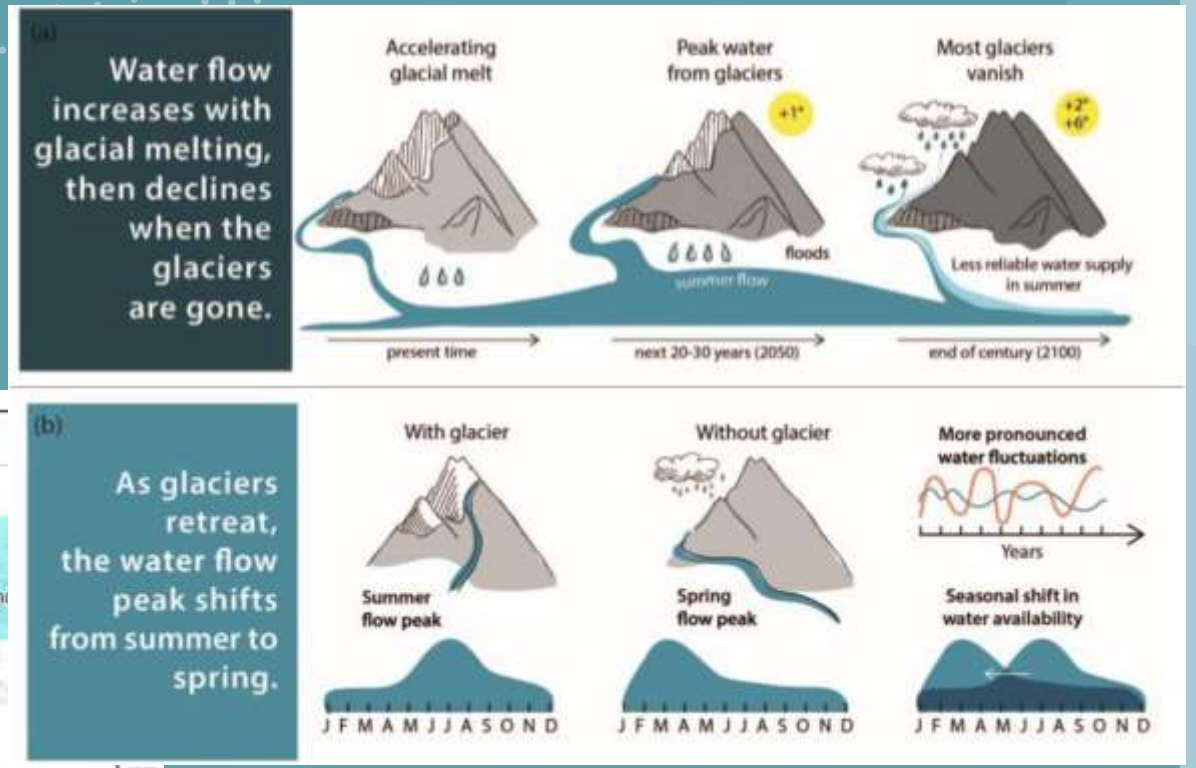
Skills needed:
water accounting + modeling

Groundwater dependent ecosystems



Glaciers





Skills:
hydrological modelling that includes processes related to i.e. ground water, precipitation, evaporation and permafrost

Main water user sectors

Agriculture

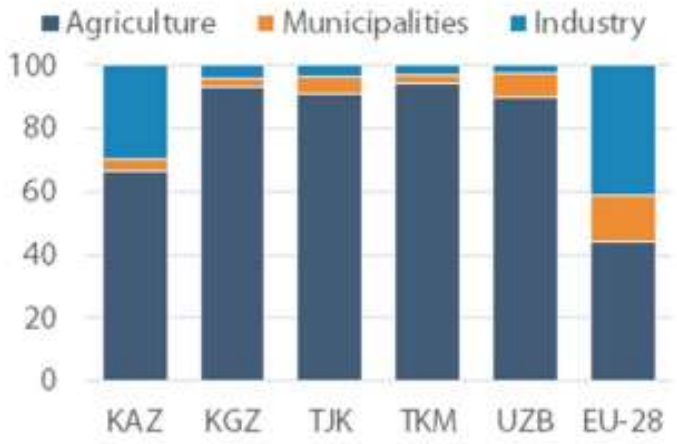
Domestic: drinking, urban (landscaping, fire department, city cleaning, building materials, etc.)

Industrial

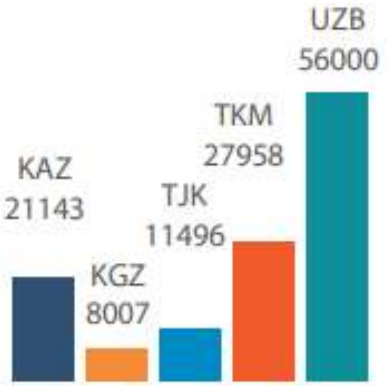
Energy (significant in the case of CA)

Water use per sector in the CA region

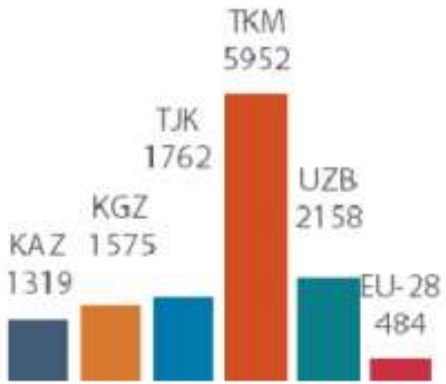
Water use by sector, % of total use



Total water use, million m^3/year



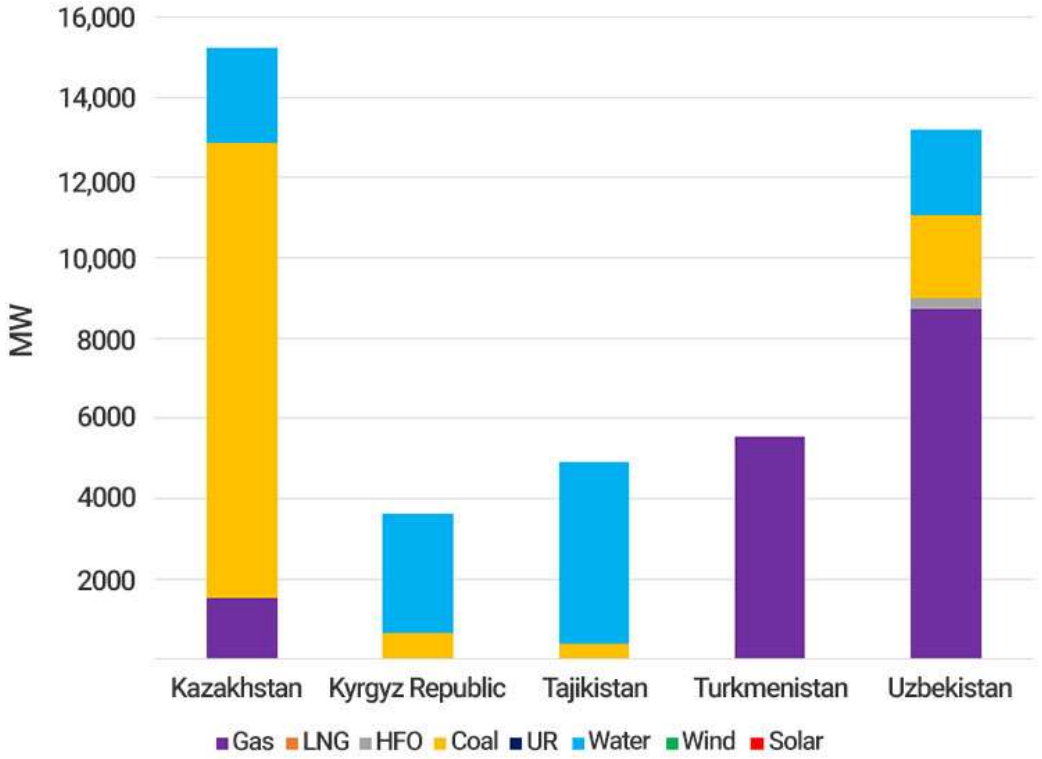
Total per capita water use, m^3/year



Central Asian countries use most of their water for irrigation, and therefore have very high total water consumption.

Source: FAO, European Environment Agency.

Water-energy nexus



Source: world bank

- Water and energy are heavily inter-dependent in the region.
- The operation of hydropower projects requires construction of large dams and reservoirs, which alter natural water courses and seasonal variation of river discharge.
- This influences the timing of flows in transboundary rivers.
- With increased floods that can lead to landslides, hydropower plants can pose significant risk.
- Pumped irrigation requires a significant supply of electricity.
- These and other interlinkages demonstrate a need for greater coordination among countries in the planning and operations of water and energy sectors.

Climate change and water resources

Higher heat => more evaporation from reservoirs and rivers

Higher heat => increase in water demand for drinking and cooling

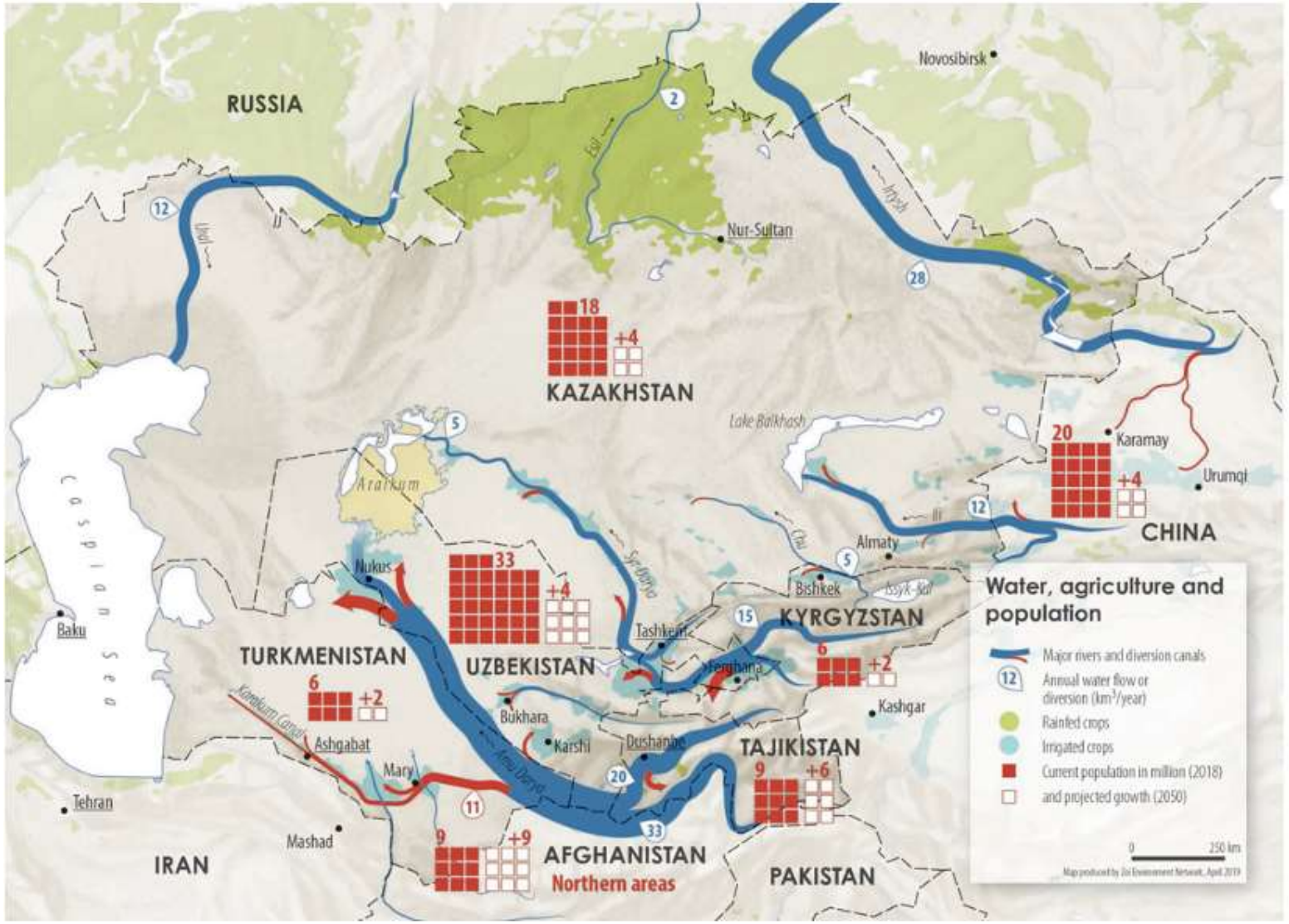
Higher heat => increase in crop water demand

Higher heat => melting of glaciers

Higher heat => ocean current regimes => More frequent and higher intensity weather extremes

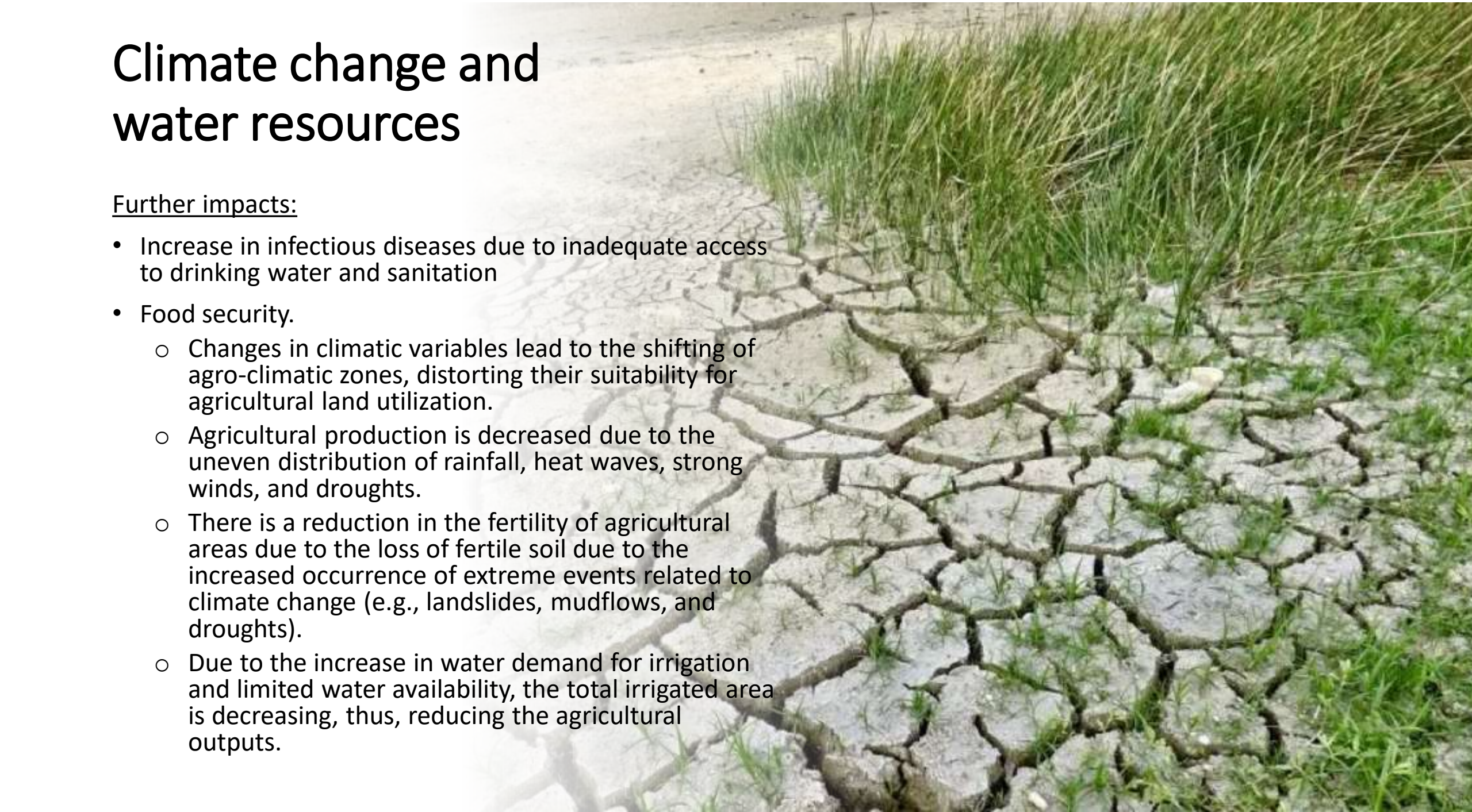
More floods => more landslides

Projections for water need up to 2025



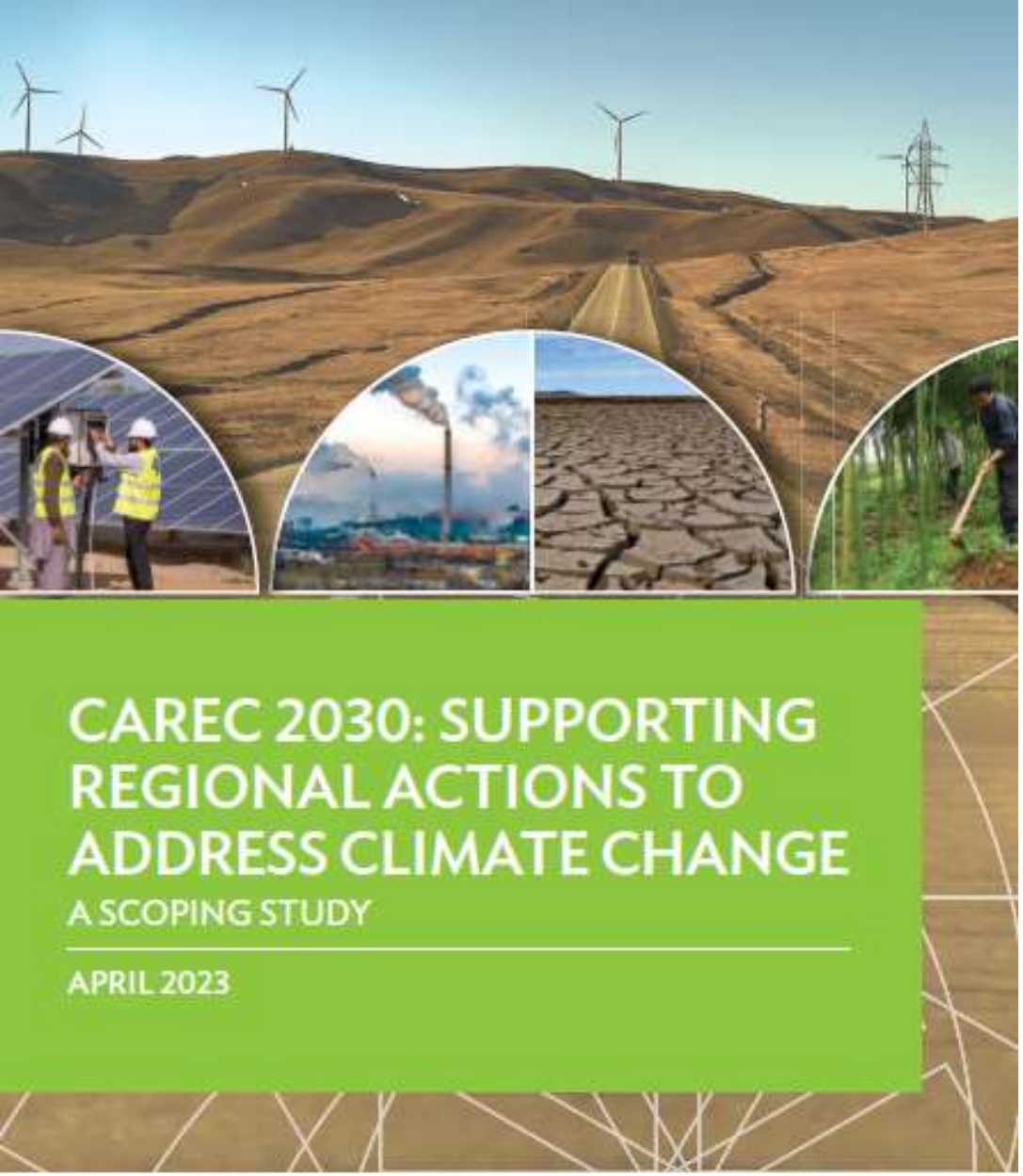
Water resources could be the primary limiting factor for the socio-economic development in the CA.

Climate change and water resources



Further impacts:

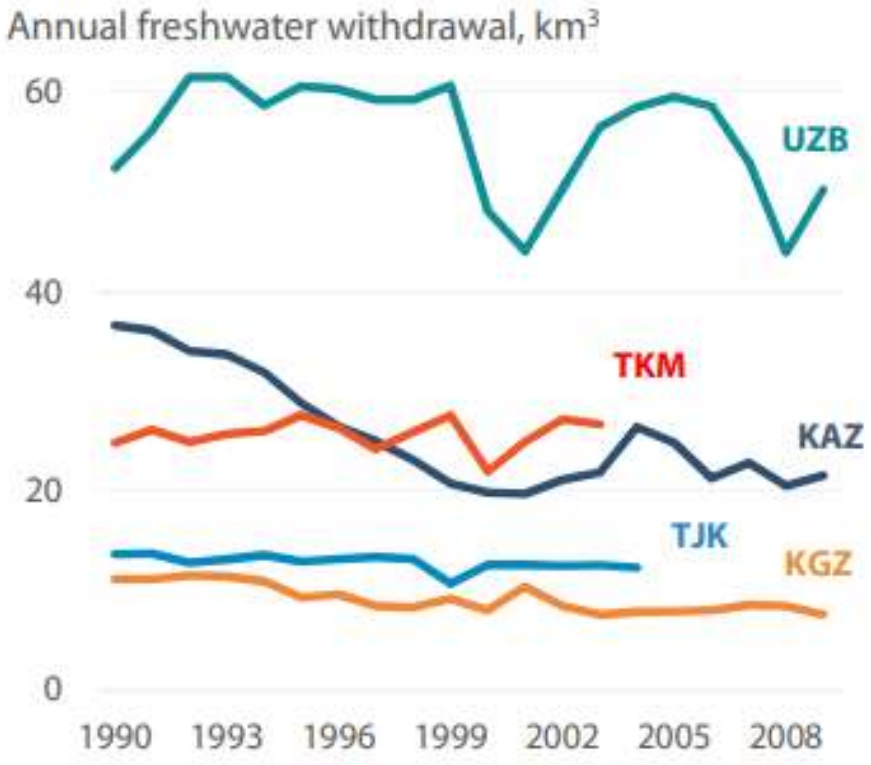
- Increase in infectious diseases due to inadequate access to drinking water and sanitation
- Food security.
  - Changes in climatic variables lead to the shifting of agro-climatic zones, distorting their suitability for agricultural land utilization.
  - Agricultural production is decreased due to the uneven distribution of rainfall, heat waves, strong winds, and droughts.
  - There is a reduction in the fertility of agricultural areas due to the loss of fertile soil due to the increased occurrence of extreme events related to climate change (e.g., landslides, mudflows, and droughts).
  - Due to the increase in water demand for irrigation and limited water availability, the total irrigated area is decreasing, thus, reducing the agricultural outputs.



Climate change in the CAREC region

- According to ADB, higher-than-average temperature rises are likely to lead to greater water scarcity, expanded desertification, and more extreme weather events like floods, droughts, and heat stress.
- A water supply gap of 37% will occur by 2050 unless irrigation systems and other critical water infrastructure are upgraded and modernized.
- This gap could lead to lower agricultural productivity, more food insecurity, worse health outcomes—and potential conflicts over scarce resources.
- At the same time, over the past 50-60 years, there has been a 30% decrease in glacier surface area as a result of changing climate conditions.
- The melting of snowcaps combined with intensifying weather events have triggered natural calamities such as floods and landslides that are happening more frequently and severely.
- By 2070 and onwards, availability of water resources and river discharge is likely to decline due to further melting of glaciers.

Good progress has been made in water saving.



Since 1990, water use has fallen considerably in Kazakhstan and Kyrgyzstan; however, there has been less progress in Uzbekistan and Turkmenistan,

Source: CA Water Info.

Climate adaptation in water resources management

Main goal is to reduce water losses and increase water productivity:

- timely identification of extreme weather occurrences
- modernization of irrigation systems, and digital technologies and automated systems to improve the efficiency of water management systems
- Building resilience to respond to more frequent and intense floods
- Subsidizing water-saving technologies.
- Reducing the share of water-intensive crops in crop production
- Capacity building on digitalization of the water sector
- monitoring of groundwater and groundwater recharge
- Treatment and reuse of wastewater (circular economy)
- Promotion of nature-based solutions
- Pollution control by building industrial wastewater treatment plants and minimizing dumping the wastewater in storage ponds.

Recommendations for Skills development

Soft skills

- Climate change impact assessment
- Climate modeling – downscaling global models
- Enhanced discharge monitoring of snow-fed catchments and early warning
- A climate database for forecasts and vulnerability assessments
- Water-resource modeling, esp. groundwater modeling
- Water accounting (monitoring, digitalization, GIS data bank, methodologies)
- Water-energy modeling

Recommendations for Skills development

Technological and infrastructural:

- Technologies to save energy in the water sector e.g., solar pumps to replace electric pumps
- Soil reclamation
- On-farm water storage infrastructure
- Groundwater recharge techniques
- Treatment and reuse of wastewater
- Nature-based solutions

Thank You!