



**SHARED VISION
FOR A RESILIENT FUTURE**

Cryosphere and Economy: Water Resources, Agriculture, and Emergencies

Food security in Central Asia in the light of retreating glaciers

**Temur Yunusov
Cambridge Central Asia Forum**

24/04/2026

FOOD IS THE BASIS OF CIVILISATION

- 10,000 BC Agricultural revolution changed our nutrition source from hunter-gatherer to farming tribes
- 9,500 BC wheat and barley are domesticated in the Fertile Crescent and this allowed much larger concentrations of humans to persist
- First cities emerge in Mesopotamia about this time
- 3,500 BC irrigation in Mesopotamia increases the yield and efficiency of agriculture



A detailed mosaic artwork of a Roman kitchen scene with traditional dishes like lentils, dates, and cheese, made with intricate tile patterns. Image by DALL-E

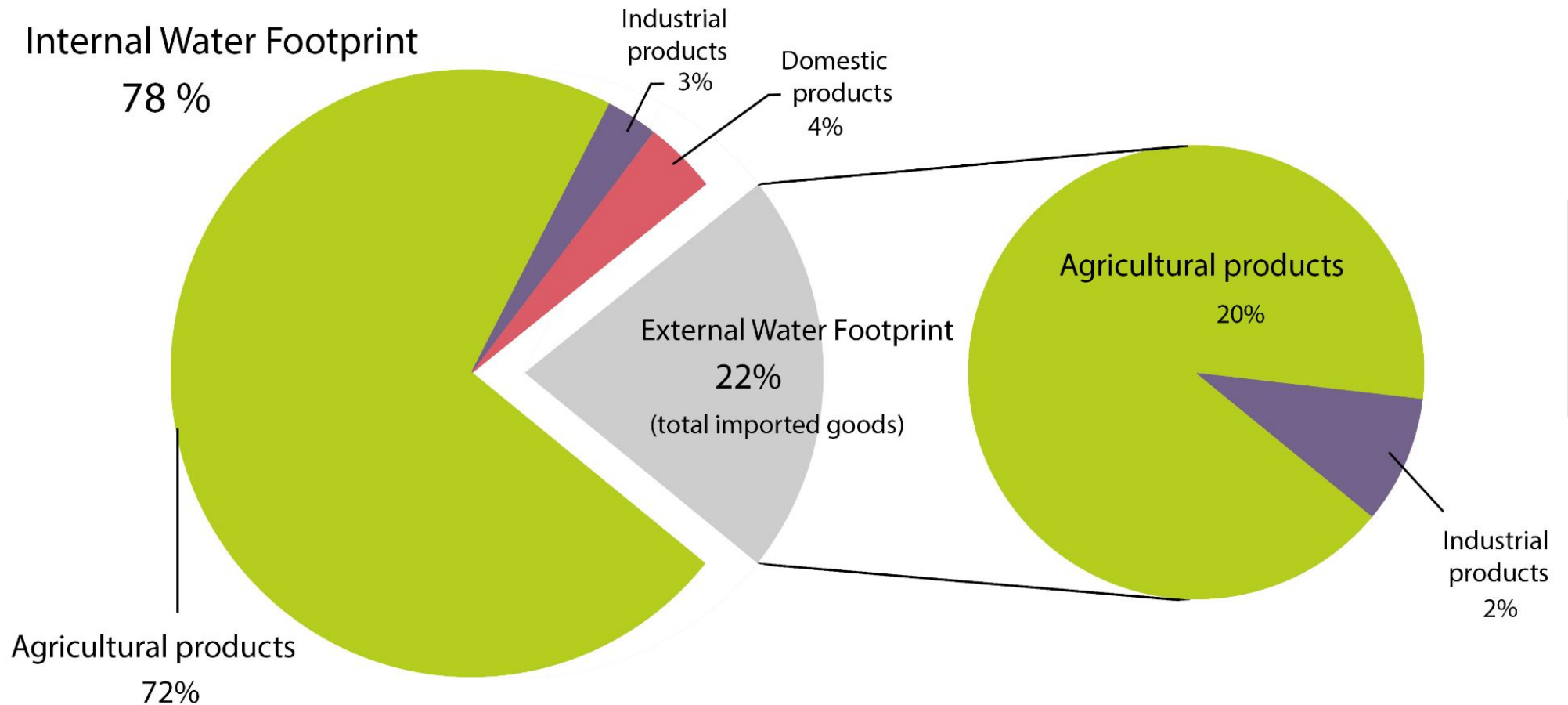


FRESH WATER IS THE BASIS OF MODERN AGRICULTURE

Global Water Footprint by sector

Water is the most essential, irreplaceable resource for agriculture.

Agriculture accounts for total 92% of fresh water consumption globally





WATER IS WORTH MORE THAN CITIES

“As the earthquake faults grind rocks together they make an impermeable clay, which often forces water to the surface along spring lines, determining where people live. To the casual observer, it seems as if the major earthquakes in this part of the world (along the Silk Road) often seem to ‘target’ towns and cities but, in reality, people are often simply living where the water is, which is also where earthquakes happen.”

**Prof. James Jackson
Department of Earth Sciences,
University of Cambridge**



Earthquakes without frontiers

GLACIERS ARE THE SOURCE OF FRESH WATER IN CENTRAL ASIA

Out of five main river basins in Central Asia, the Amudarya and the Syrdarya rivers carry 90% of the region's fresh water supply.

The Amudarya river originates in the glaciers of the Pamir Mountains (Tajikistan).

The Syrdarya river originates in the glaciers of the Tien Shan Mountains (Kyrgyzstan).



Source: [Climate Volatility and Change in Central Asia: Economic Impacts and Adaptation](#), Mirzabaev A., 2012.



GLACIERS ARE DESAPPEARING ACROSS THE WORLD

Iceland launched the world's first Global Glacier Casualty List and Glacier Graveyard in August 2024.

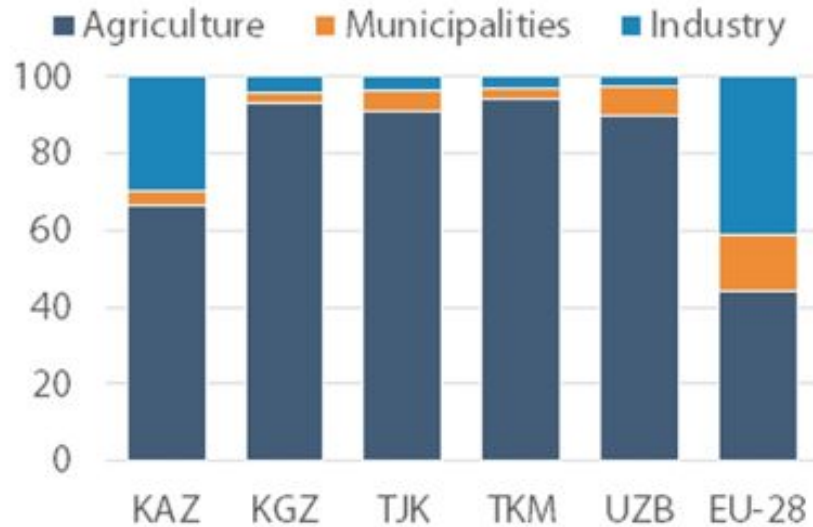
The webresource below lists 40 glaciers worldwide, which have already disappeared:

<https://glaciercasualtylist.rice.edu/>

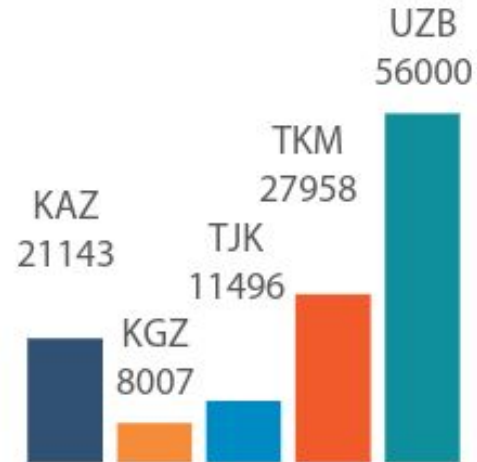


WATER CONSUMPTION IN CENTRAL ASIA

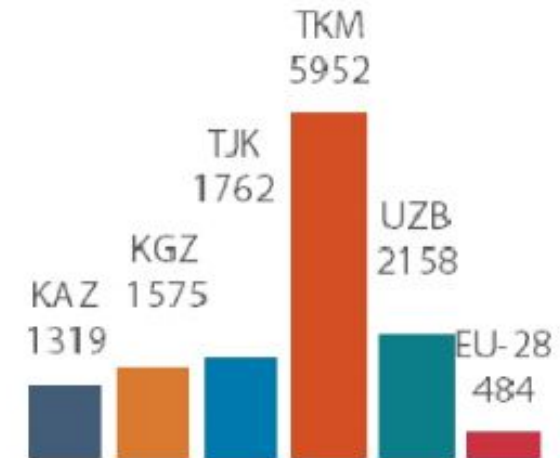
Water use by sector, % of total use



Total water use, million m³/year



Total per capita water use, m³/year



Central Asian countries use most of their water for irrigation, and therefore have very high total water consumption. Uzbekistan and Turkmenistan are the biggest users.

Source: [FAO](#), [European Environment Agency](#).

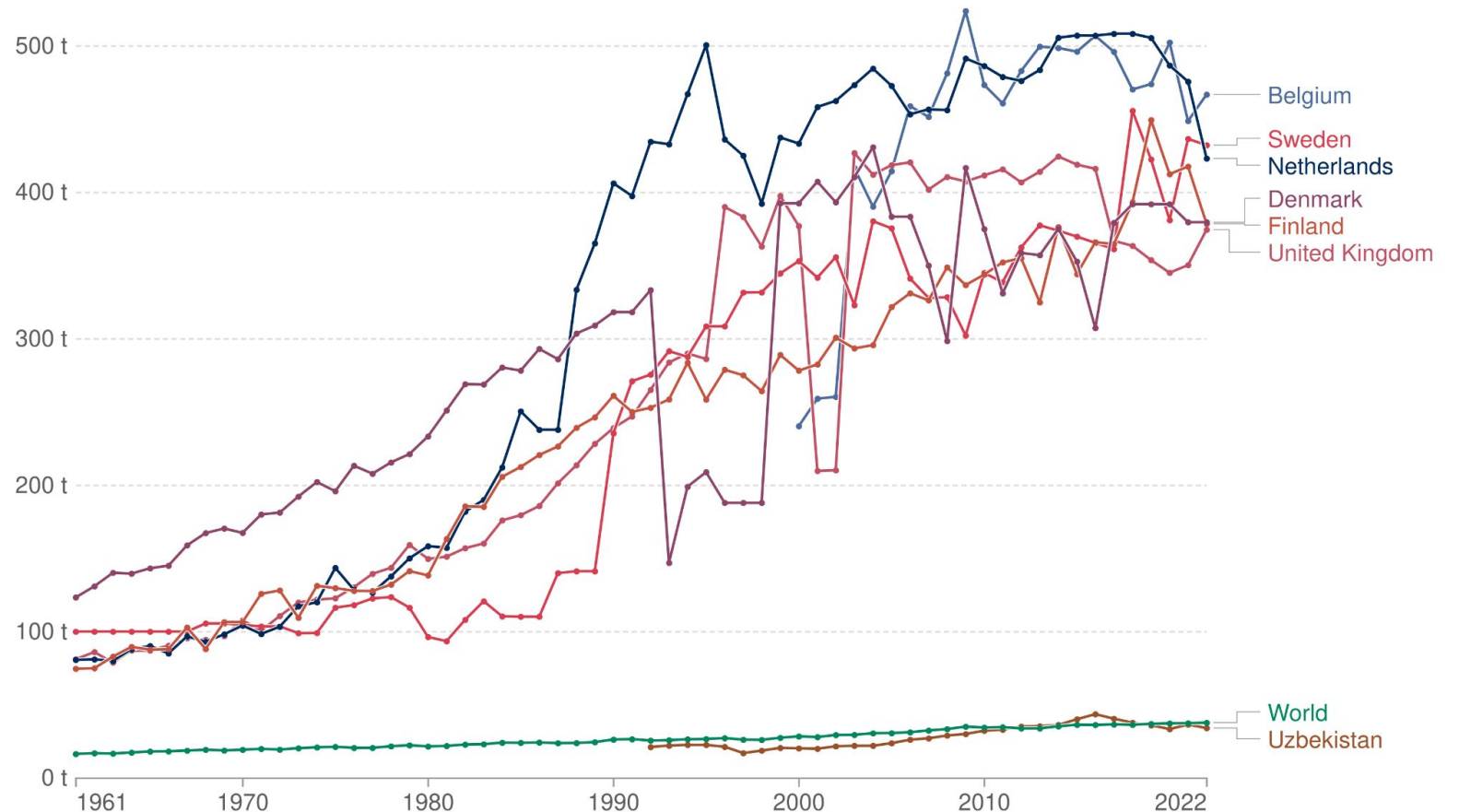
POTENTIAL WATER-SAVING STRATEGIES FOR AGRICULTURE

Taking tomato production as an example, Uzbekistan produces about the global average of 35 tons/ha.

Top 5 producers of tomatoes (plus the UK) are all northern European countries, not traditionally known to be large tomato suppliers.

Tomato: Yield

Yields are measured in tonnes per hectare.



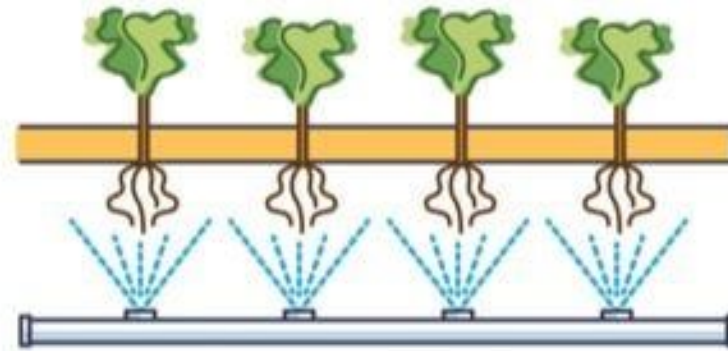
Our World
in Data

Data source: Food and Agriculture Organization of the United Nations

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POTENTIAL WATER-SAVING STRATEGIES FOR AGRICULTURE

Modern agricultural systems are both highly productive and offer up to 99% water-saving efficiency compared to traditional field irrigation



AEROPONICS



DEEP WATER CULTURE



DRIP SYSTEM



NUTRIENT FILM TECHNIQUE

POTENTIAL WATER-SAVING STRATEGIES FOR AGRICULTURE

Aero/hydroponic systems can support a wide range of crops, which can both reduce the land use and water consumption without compromising yields.

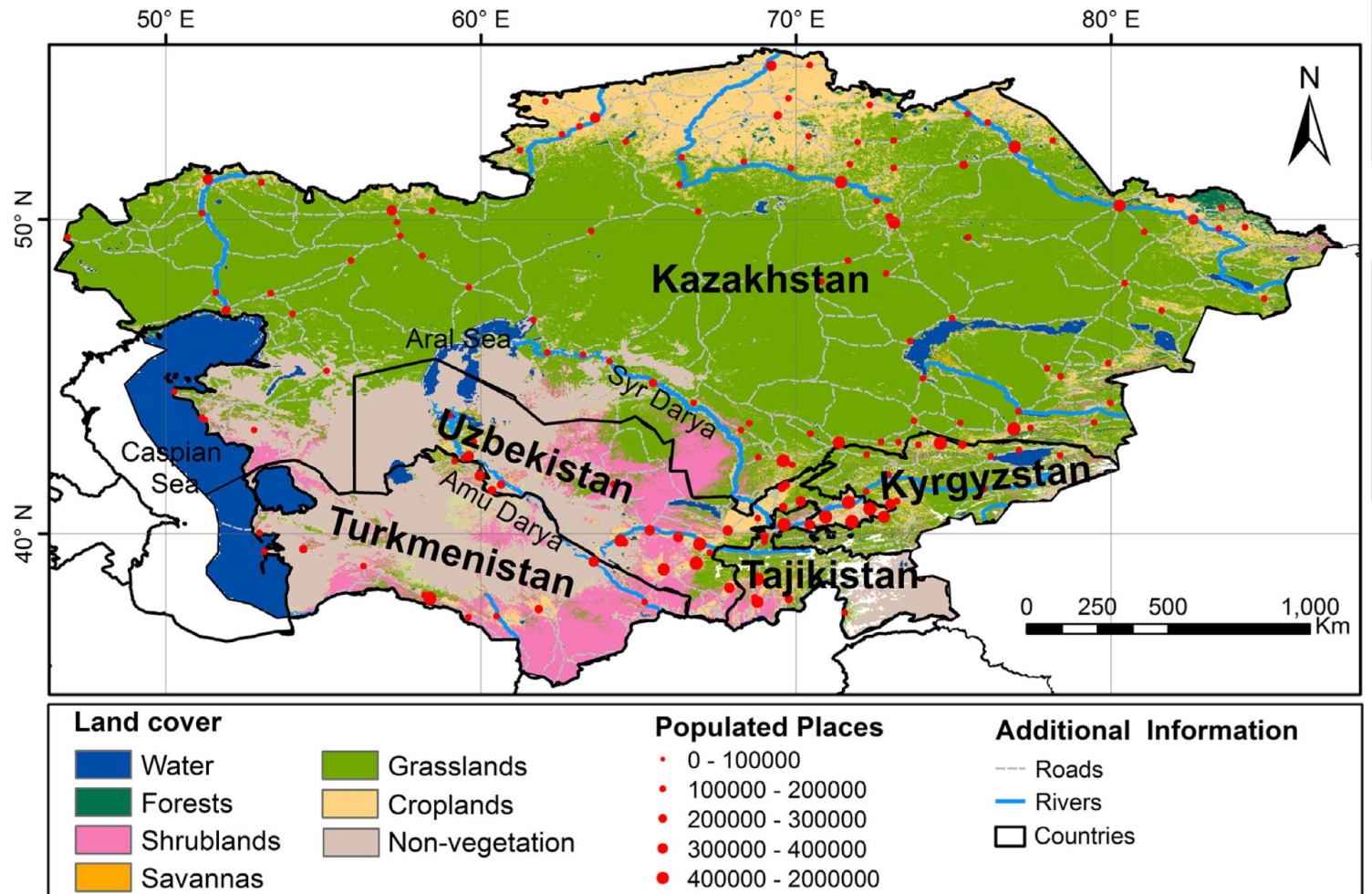
The freed up land and water can be used to increase tree cover across the region to stabilise and ameliorate the soil and reduce desertification and salinidation trends.



POTENTIAL WATER-SAVING STRATEGIES FOR AGRICULTURE

However, not all crops are currently feasible to grow using aero/hydroponic systems. Such important crops like wheat, corn and rice will need different approaches and, potentially, may have limited zoning spread.

This means that northern Kazakhstan, for example, may be the only ones able to grow such crops and the rest of the Central Asian region will have to view their food security as a regional priority, rather than national.





Thank you for your attention