ERASMUS-EDU-2023-CBHE
Project number: 101129032

Duration: 36 months
(01/01/2024 – 31/12/2026)

LESLIE
LAND MANAGEMENT
ENVIRONMENT &
SOLID-WASTE

Co-funded by
the European Union

Πανεπιστήμιο Κύπρου
University of Cyprus

MICRO-CREDENTIAL

Climate Change of Sustainable Land Management in Central Asia

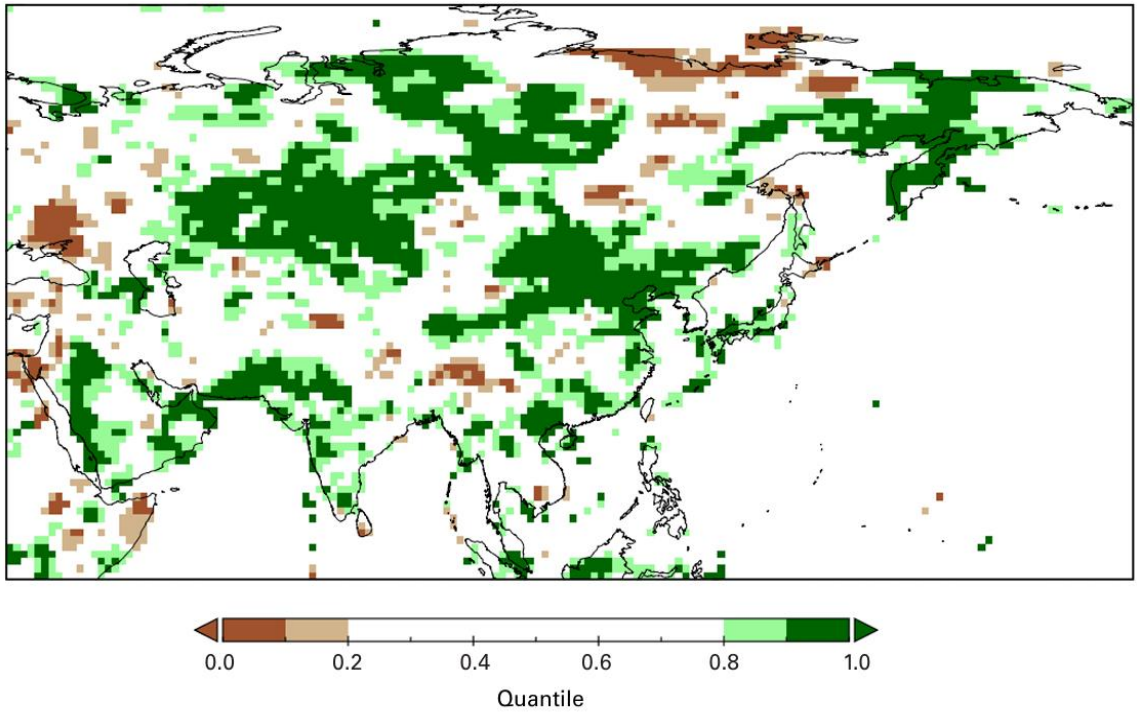
2- Observed Climate Change and attribution

Changes in Precipitation, Droughts and Extreme Events

CC-W02-V06



A WARMER ATMOSPHERE CAN HOLD MORE WATER VAPOUR



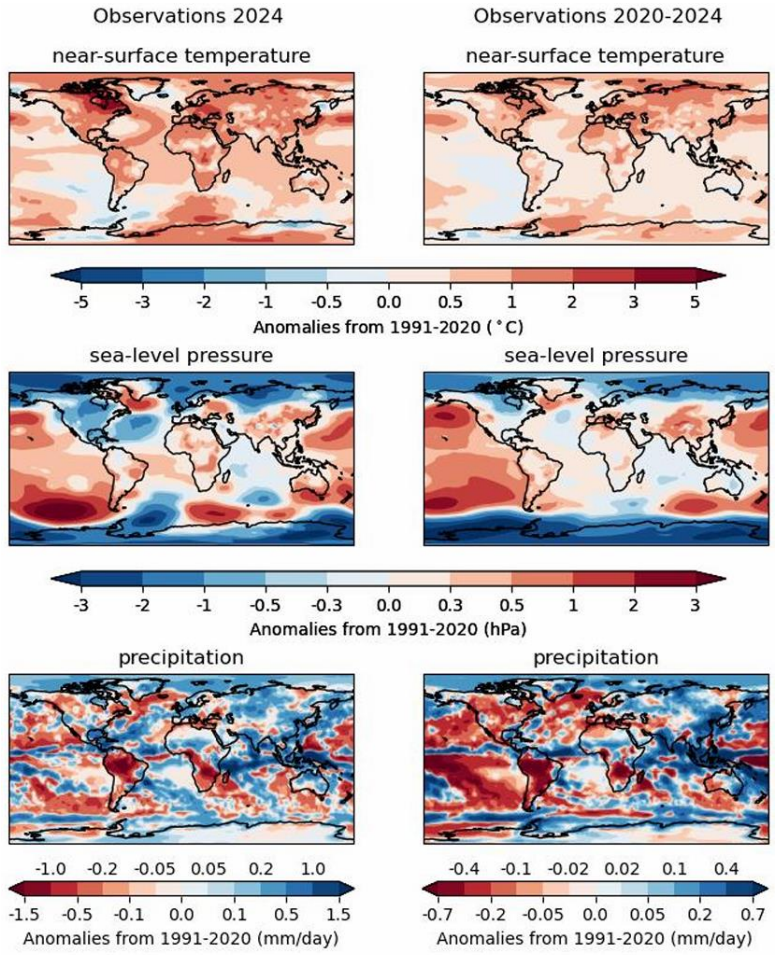
Precipitation anomalies in Asia (2024) relative to 1991–2020, showing spatial contrasts between wetter and drier conditions consistent with an intensifying hydrological cycle. Source: State of the climate in Asia (WMO, 2024)

- Rising air temperatures increase the atmosphere's capacity to hold water vapour.
- This creates conditions that can support more intense rainfall events.
- At the same time, warming increases evaporative demand and accelerates soil drying.
- Therefore, climate warming can strengthen both heavy precipitation and drought-related stress.



Co-funded by the European Union

GLOBAL TEMPERATURE ANOMALIES: WHY THEY MATTER



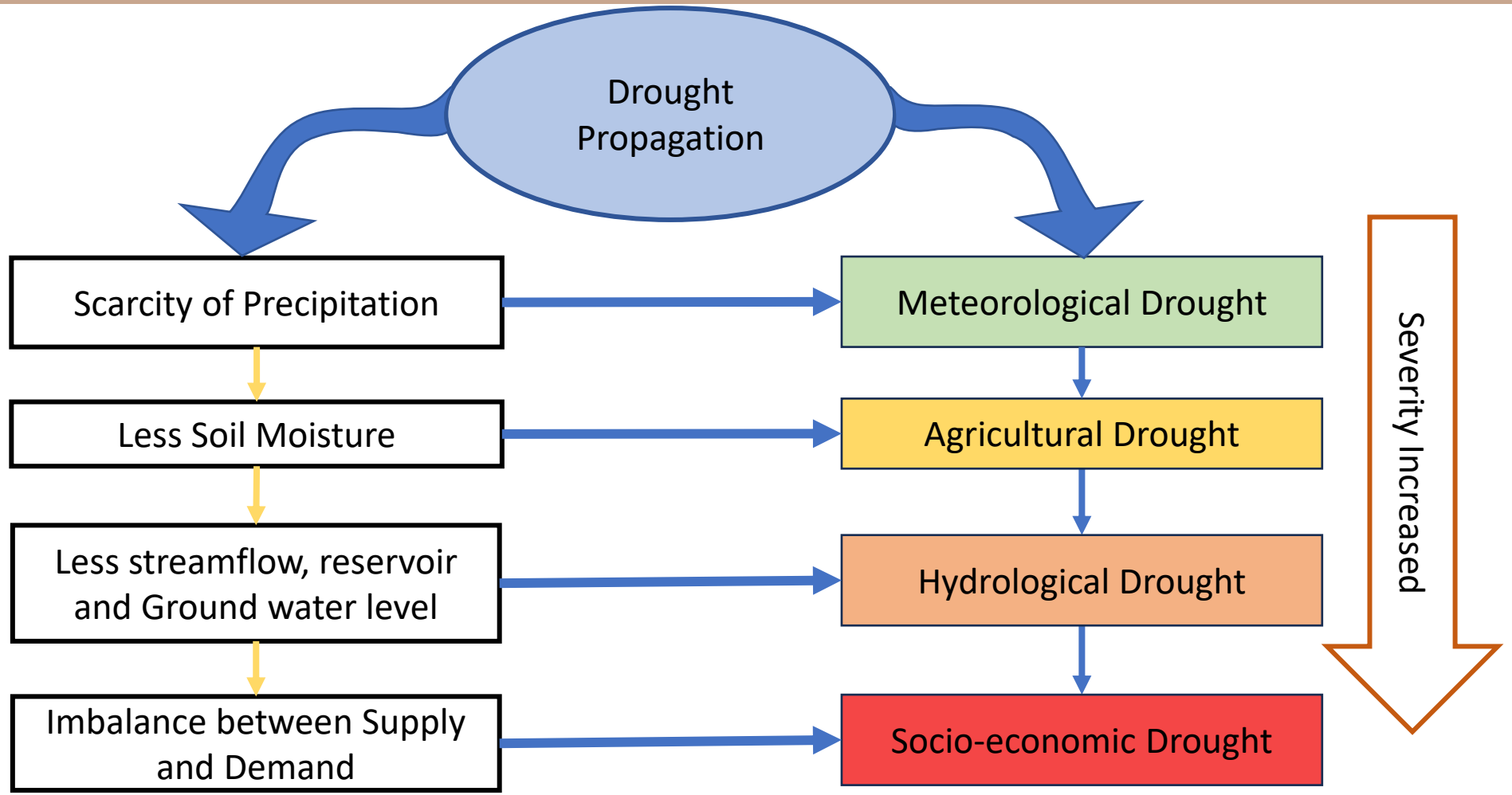
Global temperature anomalies relative to a baseline period show consistent warming in recent years across the observational record. Source: WMO Global Annual to Decadal Climate Update 2025-2029 (WMO, 2025)

- Temperature anomalies show change relative to a baseline.
- This makes global comparison more meaningful.
- Different regions have different normal temperatures.
- The global record is built from standardized changes.



Co-funded by the European Union

DROUGHT IS NOT ONE VARIABLE

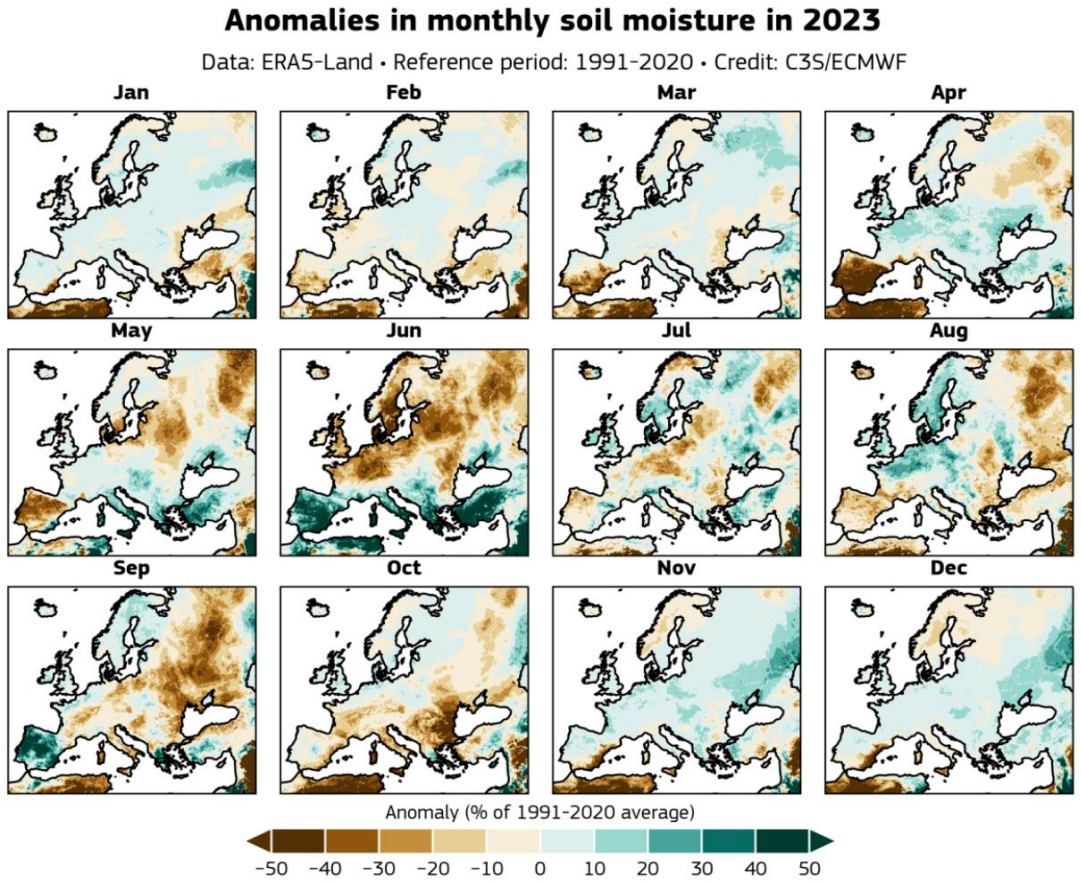


Conceptual diagram of drought propagation, illustrating how precipitation deficits can evolve into agricultural, hydrological , and socio-economic drought, with increasing impacts over time. Source: Hydrological Drought Analysis using Streamflow Drought Index (SDI) in Ethiopia (2022)

Co-funded by the European Union



HEAT MAKES DRY PERIODS MORE DAMAGING



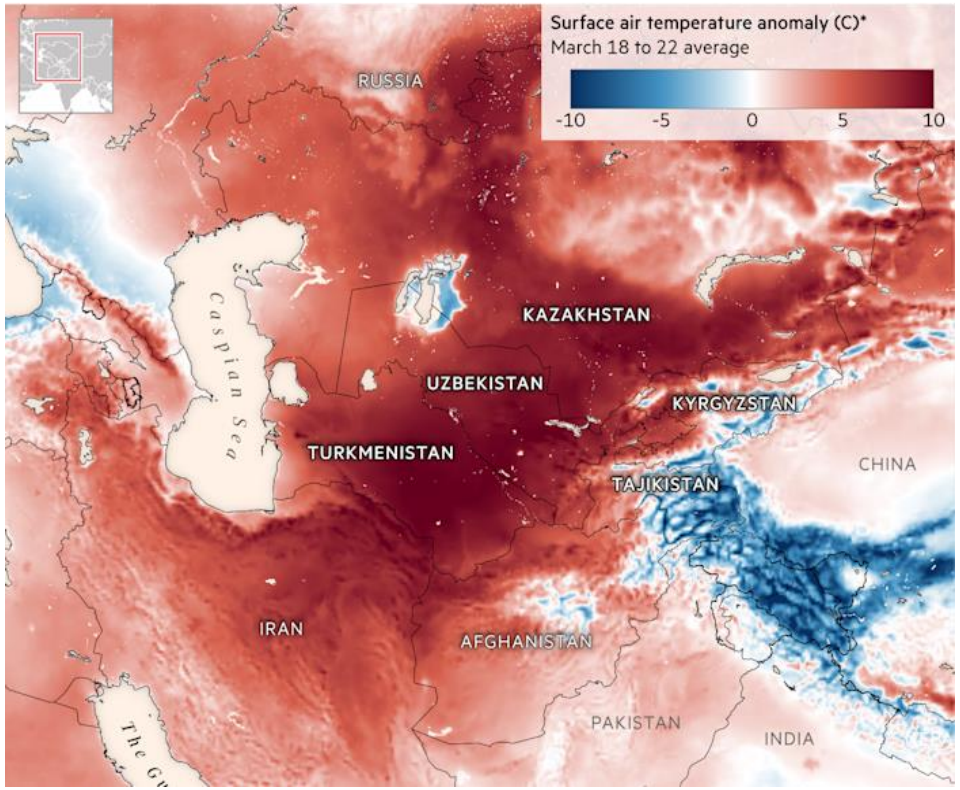
Monthly soil moisture anomalies in 2023 relative to 1991–2020, showing periods of sustained drying linked to temperature and atmospheric demand. Source: Copernicus Climate Change Service (C3S/ECMWF). Data source: ERA5-Land

- Even where rainfall trends are small or uncertain, higher temperatures can intensify drying.
- Hotter conditions increase evaporation from soils and plants.
- That can shorten recovery time between dry spells.
- In dry landscapes, modest moisture losses can produce large impacts on crops, ecosystems, and fire risk.



Co-funded by the European Union

CLIMATE RISK IS ABOUT EXTREMES



Surface air temperature anomalies during a Central Asian heatwave, illustrating the spatial extent of extreme heat events. Source: NASA GISTEMP / ERA5 (via Financial Times).

- Human influence has increased hot extremes across most inhabited regions.
- Heavy precipitation has increased in many well-observed regions.
- Compound events (e.g., heat and drought) amplify impacts.
- Climate impacts are driven more by extremes than by changes in the mean.

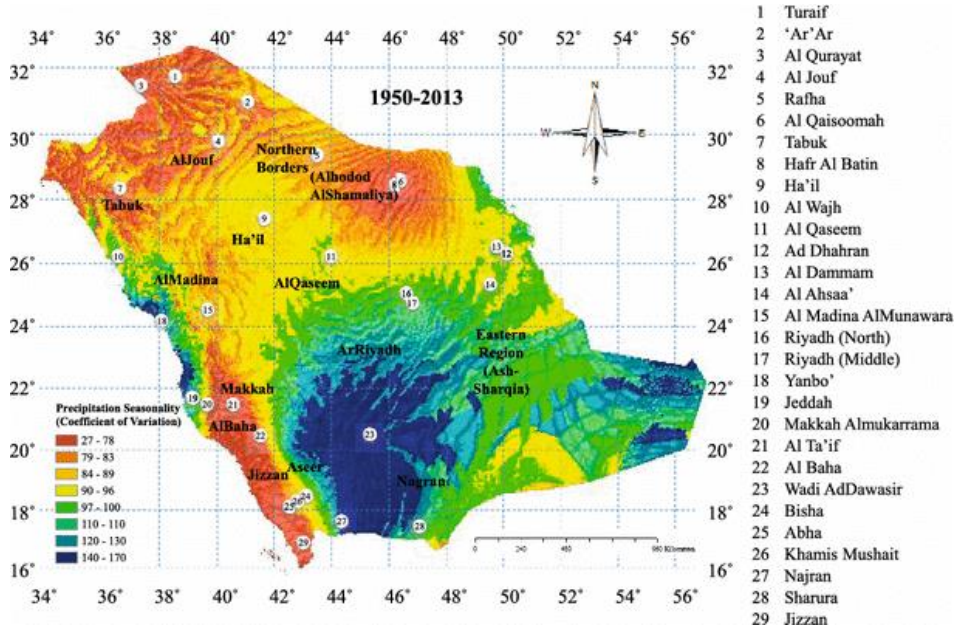


Co-funded by the European Union

THE CORRECT INTERPRETION IS REGIONAL, SEASONAL AND CONNECTED

- Some regions become wetter, while others become drier.
- Topography, circulation, land use, and season shape local outcomes.
- Complexity in the water cycle does not contradict climate change.
- Warming is altering moisture, extremes, and water stress.
- Global averages can hide important regional differences.





Precipitation seasonality in Saudi Arabia (1950–2013), expressed as the coefficient of variation, illustrating marked regional hydroclimatic contrasts across the Kingdom. Source: *Observations, projections and impacts of climate change on water resources in Arabian Peninsula: current and future scenarios. Environmental Earth Sciences (Amin M.T. et al. 2016, 75*, 864).

Co-funded by the European Union

ERASMUS-EDU-2023-CBHE
Project number: 101129032

Duration: 36 months
(01/01/2024 – 31/12/2026)

LESLIE
LAND MANAGEMENT
ENVIRONMENT &
SOLID-WASTE

Co-funded by
the European Union

Πανεπιστήμιο Κύπρου
University of Cyprus

MICRO-CREDENTIAL

Climate Change of Sustainable Land Management in Central Asia

2- Observed Climate Change and attribution

Changes in Precipitation, Droughts and Extreme Events

CC-W02-V06

