Exploring leakage reduction potential to adapt to drought risk under climate change in the Danube region

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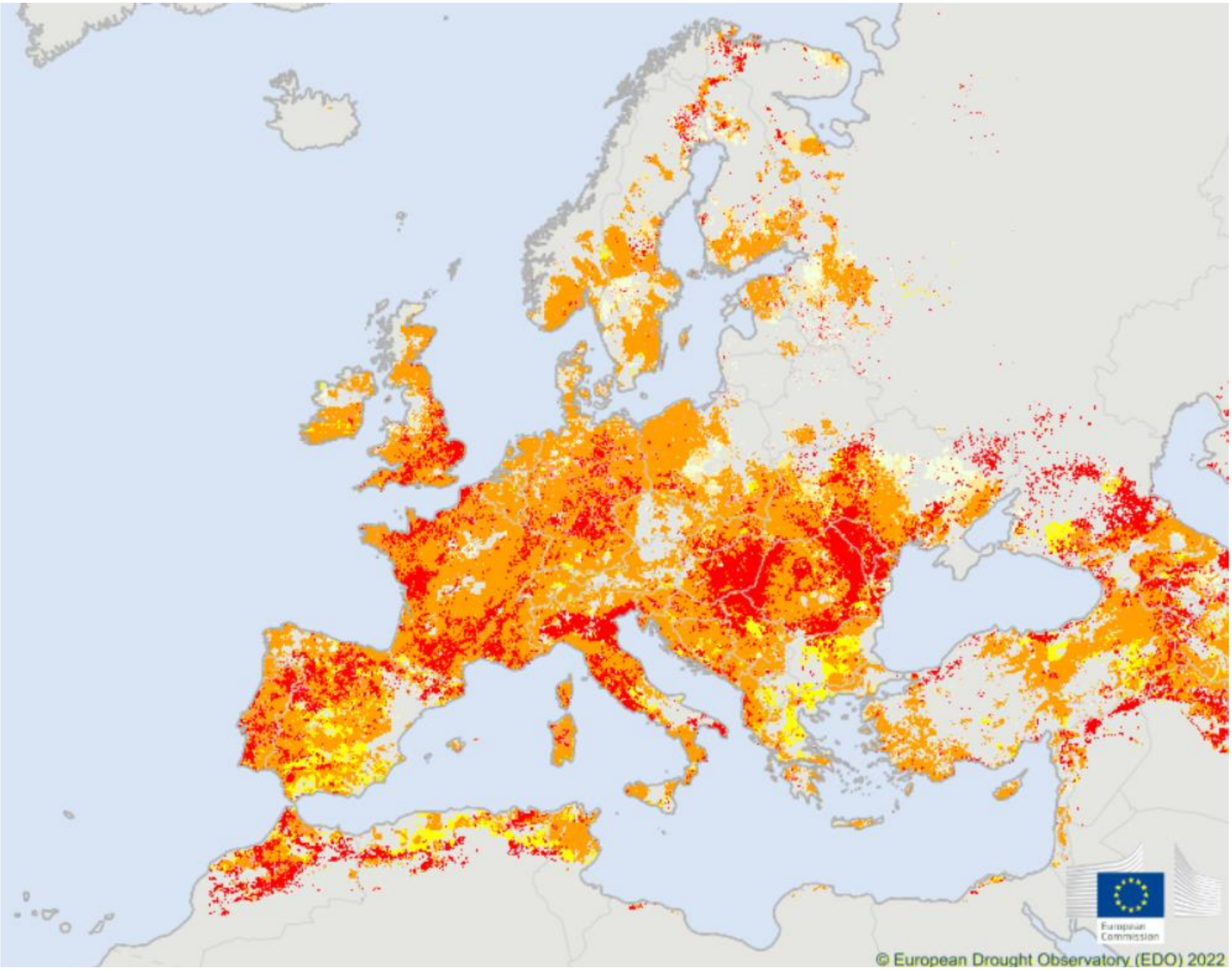
IAWD DANUBE WATER PROGRAM

Drought pose an increasingly intense threat to water utilities in the Danube region

- In recent years such as 2003, 2007, 2012, 2015 and 2017 significant parts of the Danube Region were affected by drought, undermining utility services across the region.
- The drought in 2022 is widely considered to be the most severe on record.
- These recent trends highlight the significance of the issue in Europe, including the Danube, particularly in the context of climate change.
- It is crucial that water utilities prioritise and scale-up their responses to water stress and droughts in the coming decade.
- Leakage reduction is a low hanging fruit for water utilities to realise greater drought resilience.



Drought alerts raised during July 2022 (European Drought Observatory)

Objectives

- The objective of the assessment is to better understand the changes in water supply availability existing utility sources to inform adaptation strategies.

- The approach involved 3 steps:

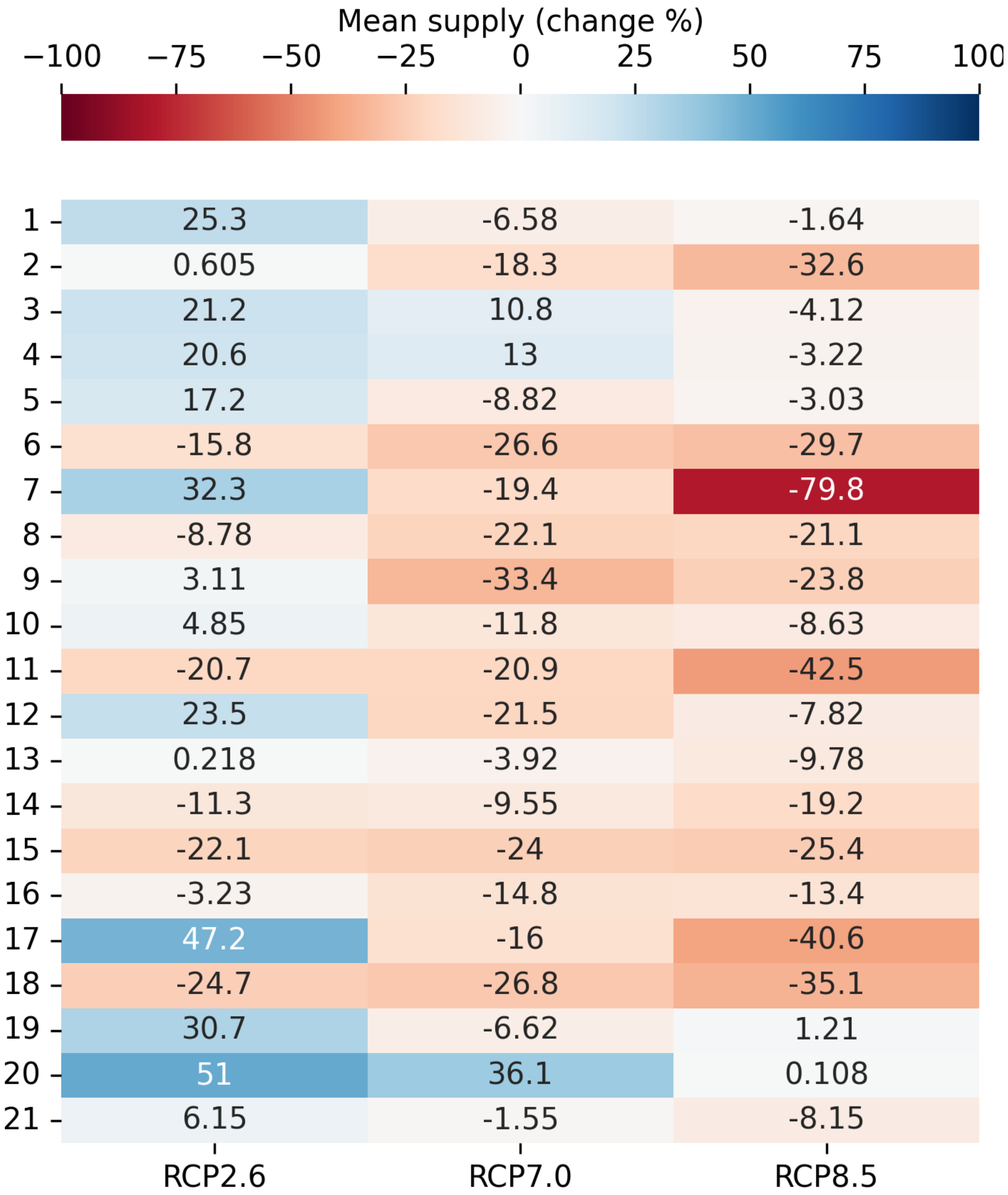
1. Collect data through engagement with utilities and global data sets[1]
2. Undertake water supply availability assessment under present day and under future climate change[2]
3. Evaluate the potential for leakage reduction to adapt to reduced water supply availability, and associated investment needs[3]

- Results presented for utilities that provided data are anonymised.

1. Global Water Intelligence Utility Data.
2. Surface water and groundwater source data was collected from from the Community Water Model (CWatM) for a historical scenario (1980-2010) and three combined climate change scenarios and socioeconomic growth projections (2060-2090) across SSP1-2.6, SSP3-7.0 and SSP5-8.5.
3. The unit investment cost for leakage reduction was extracted from a recent World Bank project on a National Loss Reduction Plan in Croatia (World Bank, 2023). A minimum achievable leakage rate of 25% is adopted based on the average rate across EU Member States. Uncertainty in the unit cost is captured by factoring costs by +/-25%.

Changes in mean water supply per utility per climate scenario

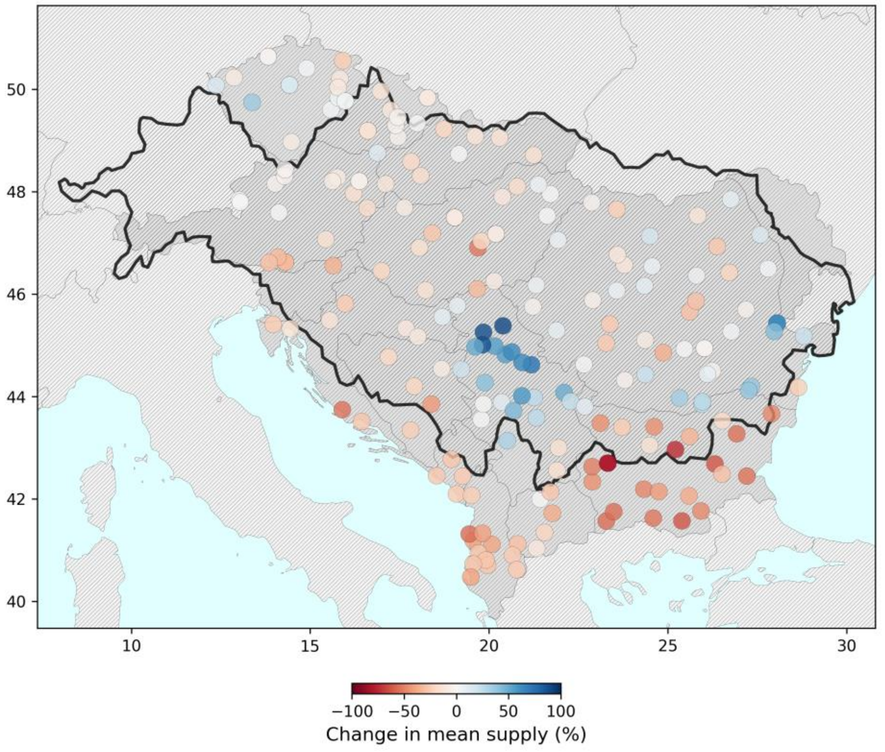
- Figure illustrates mean change in water supply available to each utility between 2060-2090 under the three considered scenarios of climate warming relative to the baseline climate scenario (2080-2010).
- Overall, water supply availability is expected to decrease across the water supply utilities considered.
- Under the worst-case climate scenario, utilities 2, 7, 11, 17 and 18 are projected to suffer from the greatest decline in water supply availability.
- Uncertainty in changes in water supply availability across climate change scenarios is large.

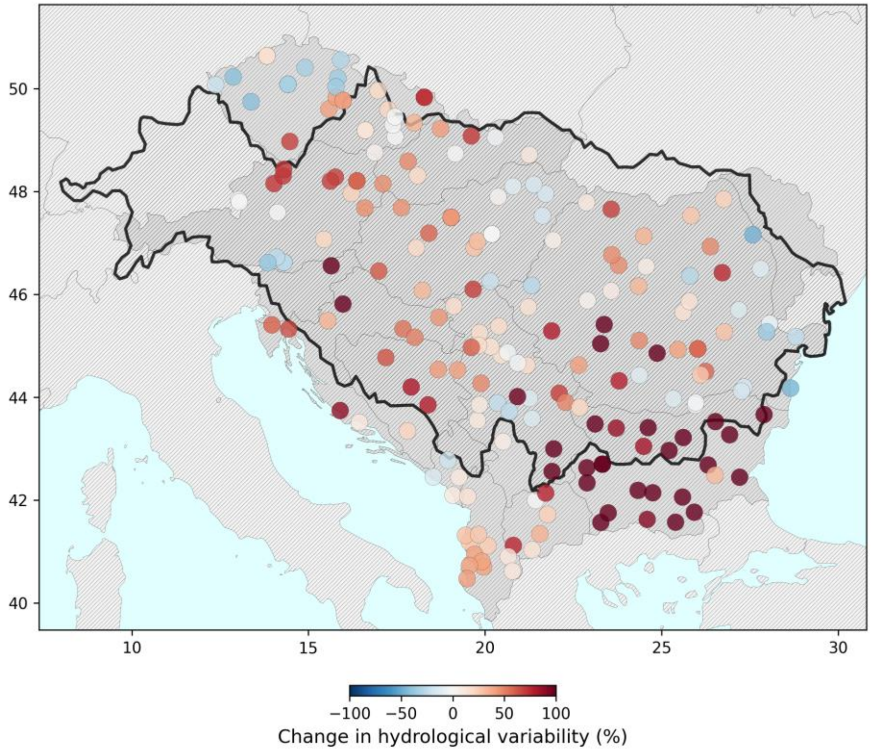


Changes in mean water supply per utility per climate scenario

- Left plot illustrates spatial variation mean supply, with utilities in the south of the basin, as well as utilities along the western coast, are project to experience a decline in water availability.

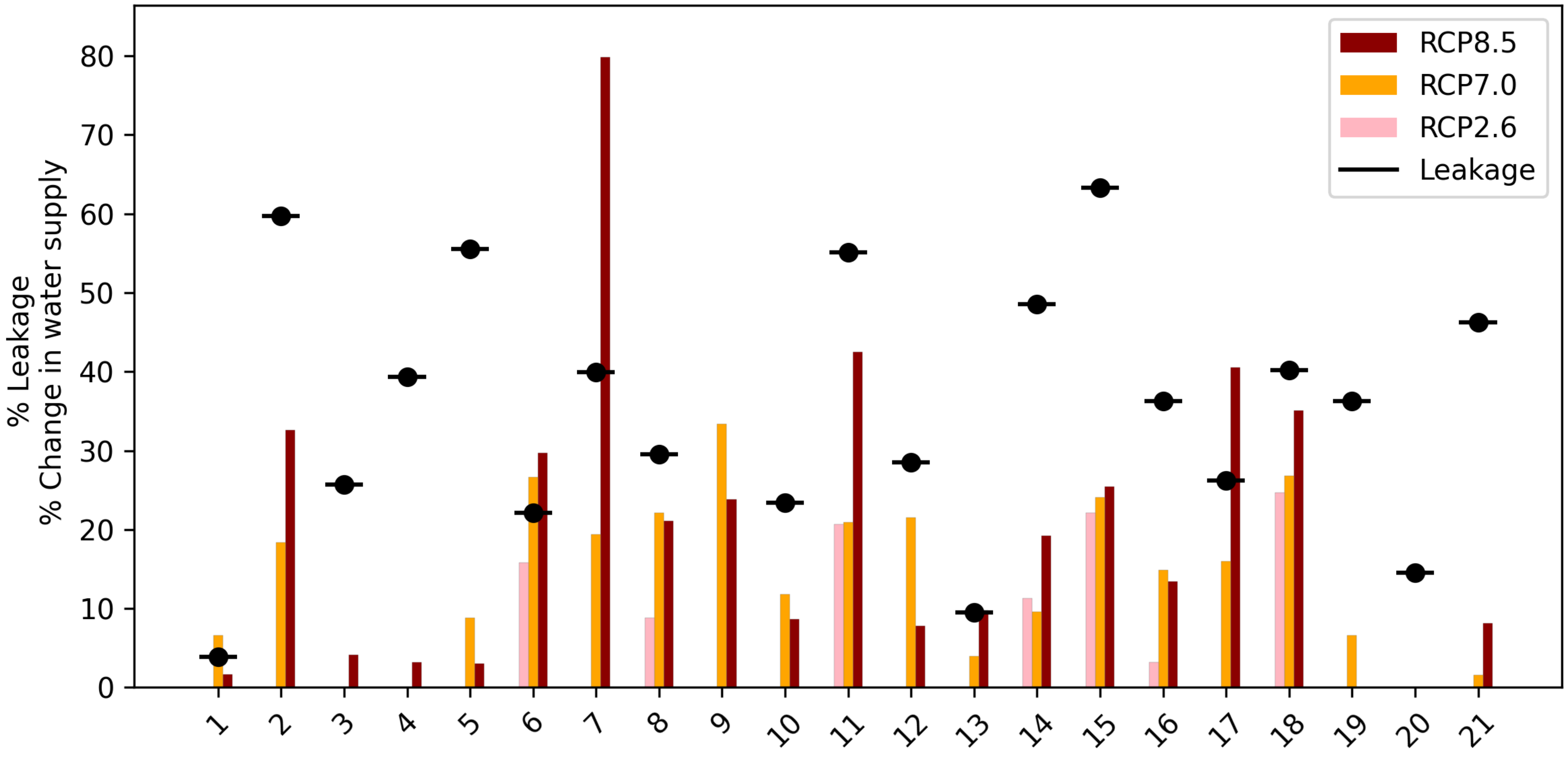
- Right plot illustrates projected change in hydrological variability[1], with greater variation observed for southern utilities. This may indicate a need for greater storage to manage extreme high and low flows.





1. Variation is measured in terms of the difference between the 90th and 10th quantile of monthly supply, divided by the mean.

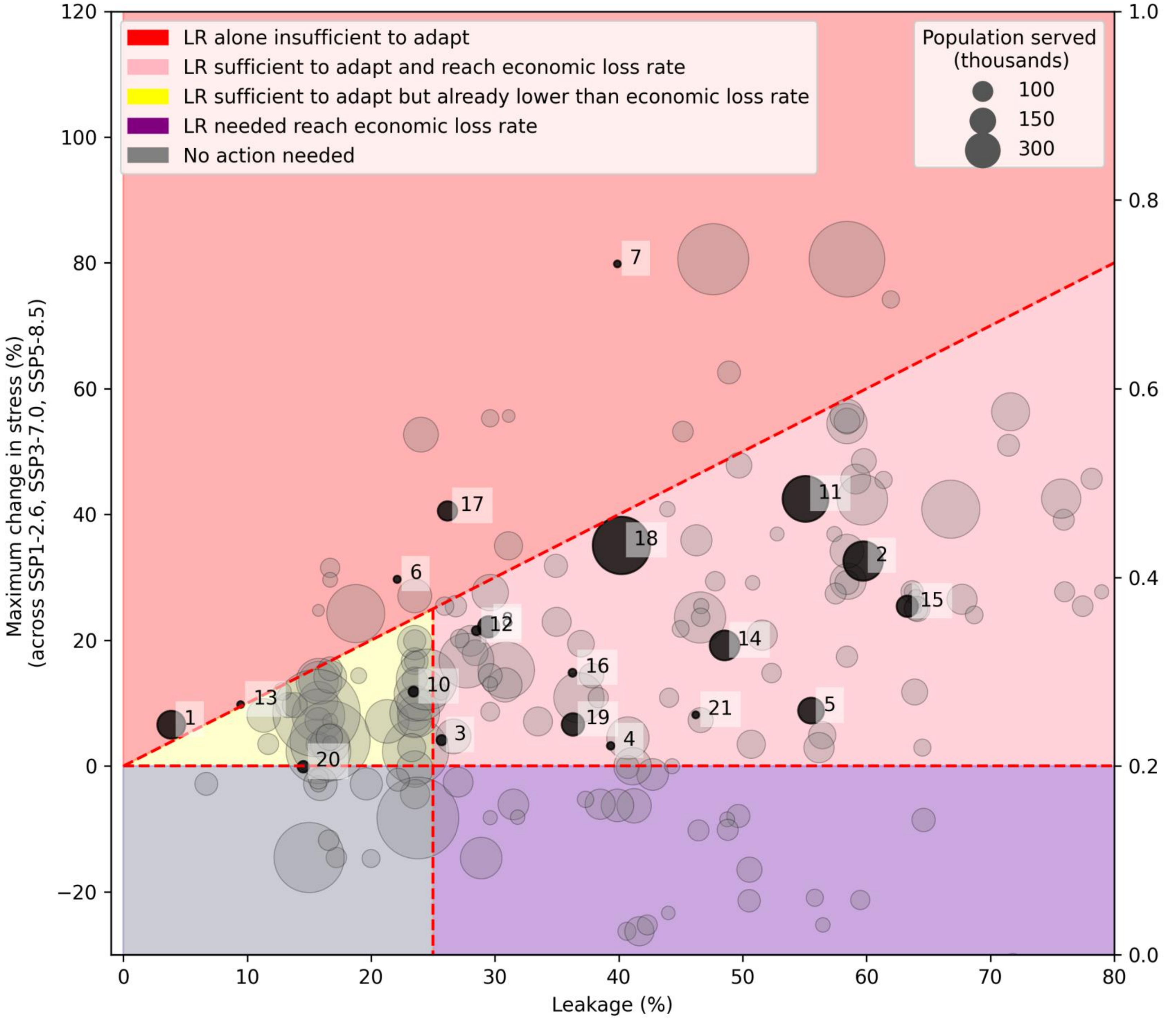
Changes in mean water supply per utility per climate scenario relative to leakage loss (1/2)



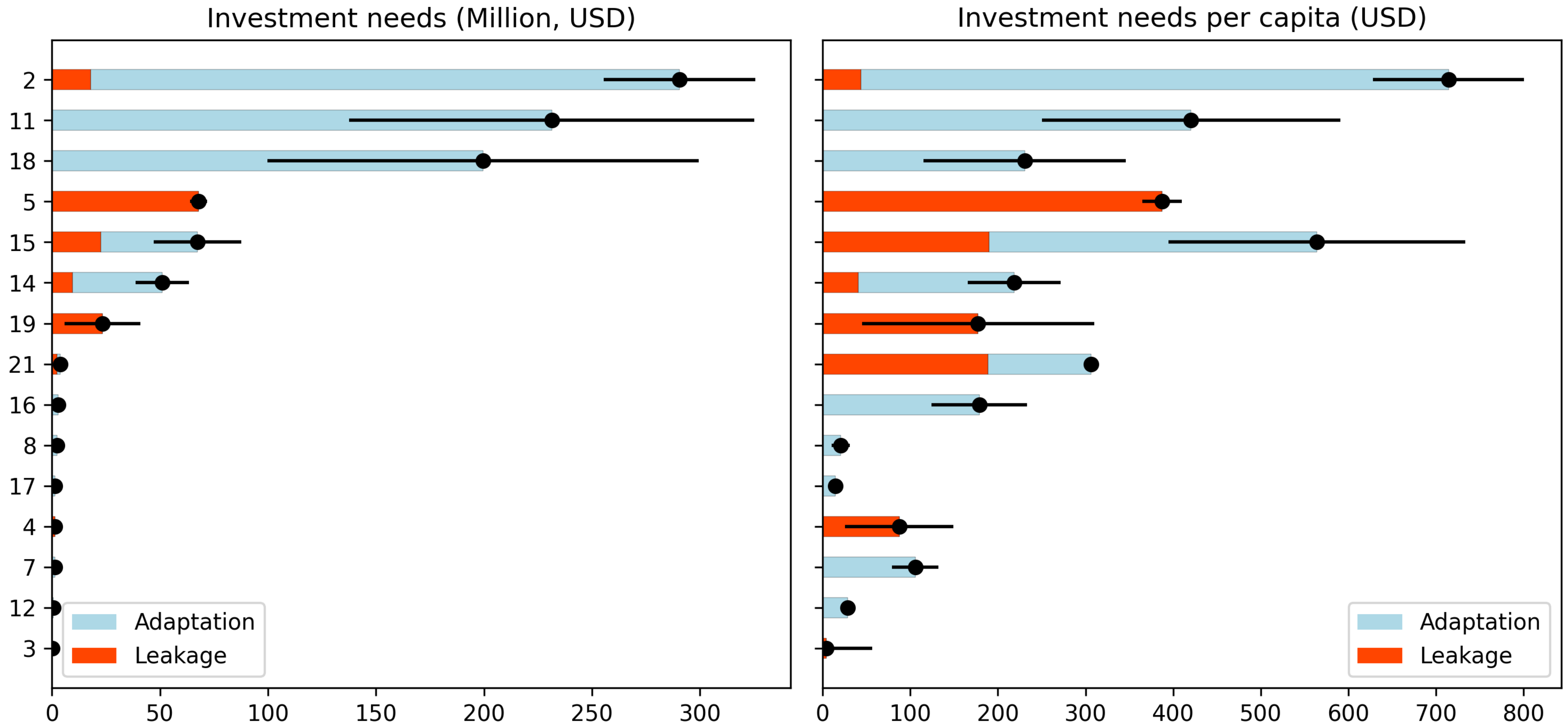
- For many utilities, changes in water stress exceed current leakage rates.
- Particularly where leakage < 25%, leakage reduction alone is not sufficient to adapt.
- In other cases, leakage rates are high compared to water stress increase, indicating high adaptation potential.

Changes in mean water supply per utility per climate scenario relative to leakage loss (2/2)

- Red zone: leakage reduction expected not to be sufficient to fully adapt.
- Pink zone: leakage reduction could be sufficient to fully adapt.
- Yellow zone: leakage reduction action could be sufficient to adapt, however, is less achievable.



Investment needs in leakage reduction



Policy conclusions

- Water supply availability at **existing utility sources** is projected to **decline** under climate change conditions for many utilities in the Danube Region.

- Leakage reduction is an **important strategy to adapt** to reducing water supply availability, and enhance overall operational efficiency, but may not be sufficient to fully adapt.

- Other adaptation options to consider may include **water storage** and **desalination**.