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Global water scarcity reduction requires water quality solutions

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Water scarcity threatens people in various regions, and has predominantly been studied from a water quantity perspective. However**,** the provision of water for human uses and environmental health is dependent on both sufficient water availability but also appropriate water quality for the intended use.

Our study presents the first estimates of global water scarcity driven by both water quantity and water quality issues and including impacts of desalination and treated waste-water reuse. We have developed a new water scarcity framework combining model simulations of multiple global hydrological models and global surface water quality models (water temperature, salinity, organic pollution, nutrients) and spatially-explicit datasets of desalination and treated wastewater reuse capacities globally.

Our results show that 40% of the world's population currently lives in regions with severe water scarcity, which is driven by a combination of water quantity and quality issues. Impacts of water quality are in particular high in river basins in eastern China. Here, excessive water withdrawals and polluted return flows degrade water quality, exacerbating water scarcity. Our results show that expanding desalination and treated wastewater reuse capacities can strongly reduce water scarcity in most river basins, although the side-effects (e.g. brine production, high energy demands and costs) must be considered. We conclude that effective water scarcity reduction requires that we expand our focus from conventional measures, which mainly focus on improving water supply for sectoral uses, to solutions that also promote water quality improvements.