



Global assessment of water challenges under uncertainty in water scarcity projections

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Anticipated increases in water scarcity will pose substantial challenges to households, farmers, and industries in order to secure a sufficient supply of water in the coming decades. To facilitate an adequate policy-making that addresses the mounting water scarcity problems, a thorough assessment of uncertainties and characteristics of projected changes in water scarcity are of great interest to decision-makers and stakeholders in the water sector.

Here we assess global water scarcity projections following feasible combinations of Shared Socioeconomic Pathways (SSPs) and Representative Concentration Pathways (RCPs) for the first half of the 21st century. We identify - alongside trends in average water scarcity - changes in the uncertainty range and drivers of anticipated water scarcity conditions. Our results show that average water scarcity and the associated range of uncertainty are generally on the increase worldwide. Based on this results we, develop a general decision-making framework by identifying four representative clusters of specific water-policy challenges and needs that could help to enhance policymaking in impacted regions by explicitly taking into account the associated uncertainties.

We further show that in ca. 4/5 of the global land area that is prone to water scarce conditions, these increases are dominated by climate change and associated trends in the water supply. In other regions, and especially those regions projected to show large relative increases in water scarcity, water scarcity changes are more likely driven by anticipated changes in the water demand. These results and the assessment of the relative importance of sector-specific changes in water demand (domestic, industrial, agricultural sector), could in particular help to facilitate targeted adaptation strategies.