



Future risk of water shortage in Southern and Eastern Asia: The implications of mitigation

Xiang Gao (1), Adam Schlosser (1), Charles Fant (2), and Kenneth Strzepek (1)

(1) Massachusetts Institute of Technology, Cambridge, United States, (2) Industrial Economics, Incorporated, Cambridge, United States

The adequacy of freshwater resources remains a critical challenge for a sustainable and growing society. Here we provide a comprehensive risk-based assessment of water use and availability under future climate and socioeconomic changes across Southern and Eastern Asia (SEA) by employing large ensemble scenarios that consistently capture the spectrum of regional climate, population, and economic projections within an integrated modeling framework. We show socio-economic growth consistently contributes to an increase in water stress by midcentury. For the effects of climate and combined climate-socioeconomic changes, the ensemble medians project increases in water stress in China but reductions in India, with a considerable spread across the ensemble. Nevertheless, the most deleterious climate-change impact is the low probability but salient risk of extreme increases in water stress arising from a small subset of extreme climate outcomes, underlining the importance of capturing as comprehensive a range of climate-change outcomes in support of risk-based assessments. In these outcomes, annual withdrawals will routinely exceed water-storage capacity over China and India. The likelihood of these outcomes is eliminated with a modest mitigation scenario, and would benefit up to 430 and 700 million people in China and India, respectively, expected to be living in these basins by midcentury.