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# Climate change threatens terrestrial water storage over the Tibetan Plateau

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## Abstract

Terrestrial water storage (TWS) over the Tibetan Plateau, a major global water tower, is crucial in determining water transport and availability to a large downstream Asian population. Climate change impacts on historical and future TWS changes, however, are not well quantified. Here we used bottom-up and top-down approaches to quantify a significant TWS decrease ( $10.2 \text{ Gt yr}^{-1}$ ) over the Tibetan Plateau in recent decades (2002–2017), reflecting competing effects of glacier retreat, lake expansion and subsurface water loss. Despite the weakened trends in projected TWS, it shows large declines under a mid-range carbon emissions scenario by the mid-twenty-first century. Excess water-loss projections for the Amu Darya and Indus basins present a critical water resource threat, indicating declines of 119% and 79% in water-supply capacity, respectively. Our study highlights these two hotspots as being at risk from climate change, informing adaptation strategies for these highly vulnerable regions.

## Main

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### Contributions

D.L. and Xueying Li developed the methodology of this study. Xueying Li and D.L. performed the analysis with additional support from B.R.S., M.E.M., Xingdong Li, F.T., Z.S. and G.W. All authors discussed the results and improved the writing of this manuscript.

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## Ethics declarations

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Competing interests

The authors declare no competing interests.

## Peer review

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Peer review information

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