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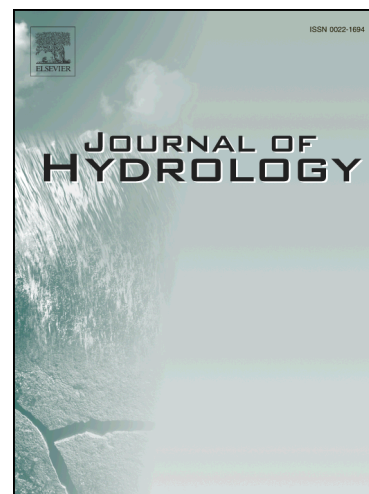
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# Assessment of Surface Water Storage trends for increasing groundwater areas in India

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## **Abstract**

Recent studies based on Gravity Recovery and Climate Experiment (GRACE) satellite mission suggested that groundwater has increased in central and southern parts of India. However, surface water, which is an equally important source of water in these semi-arid areas has not been studied yet. In the present study, we outline the study areas based on trends in GRACE data followed by trend identification in surface water storages and checking the hypothesis of causality. Surface Water Extent (SWE) and Surface Soil Moisture (SSM) derived from Moderate-resolution Imaging Spectroradiometer (MODIS) and Advanced Microwave Scanning Radiometer - Earth Observing System (AMSR-E) respectively, are selected as proxies of surface water storage. Besides SWE and SSM, trend test was performed for GRACE derived terrestrial water storage (TWS) for the study areas named as R1, R2, GOR1 and KOR1. Granger-causality test is used to test the hypothesis that rainfall is a causal factor of the inter-annual variability of SWE, SSM and TWS. Positive trends were observed in TWS for R1, R2 and GOR1 whereas SWE and SSM show increasing trends for all the study regions. Results suggest that rainfall is the granger-causal of all the storage variables for R1 and R2, the regions exhibiting the most significant positive trends in TWS.

**Key Points:** GRACE; Terrestrial Water Storage; Positive Trend; Rainfall deficit

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