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Woody Plant Expansion is Modifying the Regional Hydrology of the Southern Great Plains, USA

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Grasslands and savannas worldwide have undergone substantial changes in recent decades, and currently face a host of threats (e.g., overgrazing, alteration of fire regimes, invasion of nonnative species). Many of these threats are exacerbated by climatic changes and are directly or indirectly related to the widespread proliferation of shrubs and trees. Woody plant encroachment has significantly modified large portions of the Southern Great Plains. The conversion of landscapes from grassy dominated to that dominated by woody plants has resulted in measurable changes in the water budget at multiple scales. We have documented changes in streamflow across the region at large time and spatial scales and have found that depending on climatic and soil conditions the results can differ. Where precipitation is the highest in the most eastern portion of the region, the increase in tree cover has resulted in lower streamflows because of increased evapotranspiration. As annual rainfall declines, the influence of tree cover on streamflow is manifest in changes in soil infiltration. In general soil infiltration capacity has increased and as a result the size of regional flood events have declined.