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A multidisciplinary analysis of groundwater declines and agricultural production in the High Plains Aquifer of Kansas

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The High Plains Aquifer provides groundwater for 30% of the irrigated agriculture in the USA. Within Kansas, groundwater supports the congressional district with highest market value of agriculture. And yet, over-pumping and associated groundwater declines threaten the long-term prospects. The groundwater portion of this study quantifies the availability of groundwater stores over the next 100 years. A water-use function is developed to quantify the historical and future impacts of irrigation on corn production. A relationship between corn consumption per head of cattle quantifies the herd size that can be supported by irrigated corn. Together, we project the impacts of changes in groundwater stores on corn and cattle production for the next century. Scenarios analyze the impacts of water savings today on current and future agriculture production.

Reference: Steward, D. R., Bruss, P. J., Yang, X., Staggenborg, S. A., Welch, S. M. and M. D. Apley, Tapping unsustainable groundwater stores for agricultural production in the High Plains Aquifer of Kansas, projections to 2110, Proceedings of the National Academy of Sciences of the United States of America, 110(37) E3477-E3486, September 10, 2013.

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