Science Societies

Elevated phosphate concentrations in Iowa groundwater

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Soil scientist Matthew Streeter from the Iowa Geological Survey collects a groundwater sample

Soil scientist Matthew Streeter from the Iowa Geological Survey collects a groundwater sample from a shallow well installed at a reconstructed prairie in Iowa. Photo courtesy of the Iowa Geological Survey.

Excessive phosphorus (P) export from agricultural non-point sources can impair local and regional water bodies. For farmers and researchers to mitigate environmental risks, a better understanding of shallow groundwater concentrations is needed. Groundwater discharge as baseflow or tile drainage may contribute substantial dissolved P loads to rivers.

In an article recently published in the *Journal of Environmental Quality*, researchers from the University of Iowa and two private Iowa colleges summarized results from 17 different Iowa-based studies conducted over a 14-year period. The studies included 210 discrete locations of water table dissolved phosphate (DPO_4^{3-}) measurements

collected across the state.

The team found that DPO_4^{3-} concentrations ranged from 0.02 to 1.56 mg L^{-1} and were characterized by a median value of 0.10 mg L^{-1} within a narrow 95% confidence interval of 0.08 to 0.11 mg L^{-1}. Although minor variations were observed among land cover class and landscape position, concentrations were found to exhibit widespread uniformity due to source contributions from current and historical agricultural management and other natural sources. Overall, median concentrations were higher than typical water quality criteria used to assess risk to surface water, thereby implying that simply discharging groundwater DPO_4^{3-} to streams, rivers, and lakes may be sufficient to cause environmental degradation.

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Schilling, K.E., Jacobson, P.J., St. Clair, M., & Jones, C.S. (2020). Dissolved phosphate concentrations in Iowa shallow groundwater. *Journal of Environmental Quality*, *49*. **https://doi.org/10.1002/jeq2.20073**

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