Legacy and contemporary phosphorus contributions influence river water quality trends in the conterminous United States

Sarah Stackpoole, U.S. Geological Survey Co-Authors: Ted Stets and Lori Sprague (USGS) European Sustainable Phosphorus Platform Webinar February 2, 2022





Agricultural P balance



Agricultural P surpluses are widespread



Proxy Estimate of Legacy P

River Phosphorus Export

Agricultural P Balance

If the ratio was greater than 1, or less than 0, we assumed that legacy P was a source to river P export.

1000

2000



-1000

0

Agricultural P balance change (kg km⁻²)

Trends in river P loads compared to changes in agricultural P balance







science for a changing world

For the 43 watersheds in Q1, river P export increased despite reductions in agricultural P balances.

2000

Summary and Conclusions

• Agricultural Phosphorus Balance

P balance (kg km⁻²) = (P_{fertilizer} + P_{manure}) – (P_{cropuptake})

- Theoretically, a phosphorus (P) balance trend should match an P river load trend
- But sometimes there is a disconnect, and river nutrient loads do not have the same trend trajectory as nutrient balances.
- We hypothesize that this may be due to watershed buffering capacity and best management practices(BMPs) protect water quality despite increasing P surpluses on the landscape
- Legacy nutrients may degrade water quality despite reductions in P surpluses on the

For more information:

- Contact Information: Sarah Stackpoole, Research Ecologist, US Geological Survey, Denver, Colorado, USA, <u>sstackpoole@usgs.gov</u>
- Study Reference: Sarah M. Stackpoole, Edward G. Stets, and Lori A. Sprague. 2019. Variable impacts of contemporary versus legacy agricultural phosphorus on US river water quality. PNAS 116 (41) 20562-20567 https://doi.org/10.1073/pnas.1903226116