Geophysical Research Abstracts
Vol. 21, EGU2019-5200, 2019
EGU General Assembly 2019


# Phosphorus fluxes to the environment from mains water leakage: Seasonality and future scenarios

Daren Gooddy (1), Matthew Ascott (1), Daniel Lapworth (1), Paul Davidson (2), Mike Bowes (3), Helen Jarvie (3), and Benjamin Surridge (4)

(1) British Geological Survey, Groundwater, Wallingford, United Kingdom (dcg@bgs.ac.uk), (2) Environment Agency, Kings Meadow House, Kings Meadow Road, Reading, Berkshire, RG1 8DQ, United Kingdom, (3) Centre for Ecology & Hydrology, Maclean Building, Crowmarsh, Oxfordshire, OX10 8BB, United Kingdom, (4) Lancaster Environment Centre, Lancaster University, Lancaster, LA1 4YQ, United Kingdom

Accurate quantification of sources of phosphorus (P) entering the environment is essential for the management of aquatic ecosystems. P fluxes from mains water leakage (MWL-P) have recently been identified as a potentially significant source of P in urbanised catchments. However, both the temporal dynamics of this flux and the potential future significance relative to P fluxes from wastewater treatment works (WWT-P) remain poorly constrained. Using the River Thames catchment in England as an exemplar, we present the first quantification of both the seasonal dynamics of current MWL-P fluxes and future flux scenarios to 2040, relative to WWT-P loads and to P loads exported from the catchment. The magnitude of the MWL-P flux shows a strong seasonal signal, with pipe burst and leakage events resulting in peak P fluxes in winter (December, January, February) that are >150% of fluxes in either spring (March, April, May) or autumn (September, October, November). We estimate that MWL-P is equivalent to up to 20% of WWT-P during peak leakage events. Winter rainfall events control temporal variation in both WWT-P and riverine P fluxes which consequently masks any signal in riverine P fluxes associated with MWL-P. The annual average ratio of MWL-P flux to WWT-P flux is predicted to increase from 15 to 38% between 2015 and 2040, associated with large increases in P removal at wastewater treatment works by 2040 relative to modest reductions in mains water leakage. However, further research is required to understand the fate of MWL-P in the environment. Future P research and management programmes should more fully consider MWL-P and its seasonal dynamics, alongside the likely impacts of this source of P on water quality in catchments.