Geophysical Research Abstracts
Vol. 21, EGU2019-5978, 2019
EGU General Assembly 2019

Effects of a forested channel section on the phosphorus buffering capacity of fine sediments in an agricultural stream (Thayatal National Park region, Austria)

Elmira Akbari (1), Ronald Pöppl (1), and Gabriele Weigelhofer (2)

(1) University of Vienna, Geography and Regional Research, Vienna, Austria (elmira.akbari@univie.ac.at), (2) University of Natural Resources and Life Sciences (BOKU), Vienna, Austria

Agricultural streams are exposed to inputs of phosphorus-loaded soil particles from the catchment, which impair the water and sediment quality and lead to habitat degradation. Forested sub-catchments and channel sections protect streams from lateral inputs and thus may have positive effects on the phosphorus (P) buffer mechanism, depending on the hydrology. The transport of P-rich sediments is highly influenced by precipitation and flood events. Our study aimed to explore effects of a forested channel section and the role of flood events on the P buffering capacity of fine sediments in the lower reach of a medium-sized agricultural stream (Fugnitz), located in the Thayatal National Park (NP) region, Austria.

Sediment samples were collected at five locations within the NP as well as at an upstream (reference) site outside the NP during base-flow conditions as well as before and after a flood event. We used P adsorption and re-suspension experiments to determine the equilibrium P concentrations (EPC0) of bed sediments and P exchange rates between water and sediments.

EPC0 decreased from 180 to 41 μg L^{-1} between the upstream and downstream sites in the NP in the pre-flood period. Upstream sediments showed a high potential for P release, with EPC0 greater than soluble reactive P (SRP) concentrations in the stream water, reflecting the influence of upland agricultural area. In contrast, downstream sediments had lower EPC0 than SRP concentrations, indicating a potential of sediments to act as P sinks. The results from the re-suspension experiments confirmed our findings. Both, stream water SRP concentrations and EPC0, increased at most sites within the NP from the pre- to the post-flood period. In contrast, EPC0 did not differ significantly at the agricultural site outside the NP. These results indicate the input or re-mobilization of P-rich sediments from upstream agricultural sites or from the catchment.

Our study shows that flood dynamics may influence P loads in national parks through the transport of P-rich sediments from upstream agricultural areas.

Keywords
Equilibrium phosphorus concentration, Thayatal National Park, flood dynamics, agriculturally derived sediments