

Ditch-to-stream analysis of phosphorus concentrations in agricultural surface waters: nutrient scaling across multiple spatio-temporal scales

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Eutrophication of streams and lakes continues to be a problem in lowland surface-waters across the globe. Diffuse nutrient export from agricultural fields remains to be its main driver even though a lot of efforts have been put in the instalment of prevention measures to decrease nutrient export, such as the mandatory buffer strips across ditches and small streams.

For a full analysis of the dynamics of eutrophication, not only large-scale nutrient data of the main contributors are required, but equally importantly, spatio-temporally distributed information on nutrient fluxes through smaller and larger ditches, groundwater contributions and smaller and larger interposed lakes. This paper analyses the quantitative differences of nutrient and other physical and chemical water quality data between surface waters of different spatial scales (from micro- to macro-scale) for a high temporal resolution (weekly to bi-weekly). Key findings are the very different timing of peaks and large differences of nutrient concentrations of ditches with or without groundwater recharge in relation to the stream data and their large interannual variability.

In view of the scaling behaviour of the water quality data, the paper critically discusses the usefulness of nutrient measurements, which are acquired typically at the upper meso-scale in comparison to the data of this study which were collected across spatio-temporal scales to combat future eutrophication.