

How do riparian buffer strips influence the nutrient uptake efficiency of small agricultural headwater streams?

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The north-eastern part of Austria as well as the south-eastern part of the Czech Republic is characterized by intensive agriculture as the dominant land use in the catchment, thereby imposing multiple pressures on the headwaters in these areas. Besides receiving high loads of nutrients from the surrounding fields, the streams have been heavily regulated, showing straightened and incised channels with scarce bank vegetation. Riparian buffer strips are usually small, exhibiting V-shaped reed-vegetated profiles whose management is subordinated to flood protection. As a result, many agricultural streams have a bad ecological status according to the EU WFD.

The aim of the three-year research project ProFor Weinviertel – Jižni Morava (2009-2011) is to identify efficient management options for those small, heavily degraded agricultural streams which have the potential to improve the on-site retention of nutrients and restore the good water quality of the streams. The focus of the research lies on the complex, often non-linear effects of bank and stream morphology, including riparian buffer strips management, on the stream metabolism and the in-stream uptake, storage, and release of nutrients.

Bank morphology and bank vegetation not only have impacts on the nutrient retention before entering the stream, but also on the nutrient uptake and/or release within the stream. Bank structures influence the channel morphology and heterogeneity and, thus, lead to changes in the surface area-to-volume ratio of the stream and in the available contact zone and time for nutrient processing (Gücker et al. 2008). The shading of a stream may alter the stream metabolism by shifting processes from primary production to respiration and organic matter degradation. In the presence of woody material, in-stream denitrification may be enhanced and function as an important sink for nitrogen (Craig et al. 2008). On the other hand, an inefficient restoration of bank and channel structures may lead to an unfavourable secondary release of sediment-bound nutrients and, thus, may override the positive effects of riparian buffer strips.

References

Craig et al. (2008). *Front. Ecol. Environ.* 6; doi:10.1890/070080

Gücker et al. (2008). *Freshwat Biol* x, 1-17; doi:10.1111/j.1365-2427.2008.02069